VAX DATATRIEVE

Reference Manual

Order No. AA-K079E-TE

digital™

software

VAX DATATRIEVE Reference Manual

Order No. AA-K079E-TE

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This manual contains general information on using VAX DATATRIEVE.

OPERATING SYSTEM:	**VMS**
	MicroVMS
SOFTWARE VERSION:	**VAX DATATRIEVE V4.1**

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Contents

How to Use This Manual

This manual describes VAX DATATRIEVE software and provides reference information for terms, concepts, syntax elements, commands, statements, and definition clauses.

Intended Audience

This manual assumes you have a working knowledge of DATATRIEVE, or you know the basic concepts of data processing and are familiar with the VMS operating system.

If you have no prior experience with DATATRIEVE, the *VAX DATATRIEVE Handbook* describes the tasks of managing information with DATATRIEVE.

Operating System Information

Information about the versions of the operating system and related software that are compatible with this version of VAX DATATRIEVE is included in the VAX DATATRIEVE media kit, in either the Installation Guide or the Before You Install letter.

Contact your DIGITAL representative if you have questions about the compatibility of other software products with this version of VAX DATATRIEVE. You can request the most recent copy of the *VAX System Software Order Table/Optional Software Cross Reference Table*, SPD 28.98.xx, which will verify which versions of your operating system are compatible with this version of VAX DATATRIEVE.

Structure

This manual is divided into seven chapters and three appendixes:

Chapter 1	Presents the basic concepts and terms of DATATRIEVE.
Chapter 2	Explains how to create, use, and maintain the access control lists of data descriptions in the Common Data Dictionary.
Chapter 3	Explains the use of value expressions and Boolean expressions.
Chapter 4	Describes the use of DATATRIEVE functions.
Chapter 5	Presents the rules for using record selection expressions.
Chapter 6	Describes record and field definition clauses.
Chapter 7	Presents, in alphabetical order, full descriptions of the commands, statements, and definition clauses that comprise the DATATRIEVE data management language. The chapter describes the function, syntax, arguments, restrictions, results, and use of each command, statement, or clause, and provides examples of typical operations.
Appendix A	Lists VAX DATATRIEVE keywords in alphabetical order.
Appendix B	Presents the VAX DATATRIEVE sort order according to the ASCII value of printing characters.
Appendix C	Describes the different categories of VAX DATATRIEVE error messages and provides information on reporting severe errors.

Related Documents

For further information on the topics covered in this manual, you can refer to:

- *VAX DATATRIEVE Release Notes*

  Includes specific information about the current DATATRIEVE release and contains material added too late for publication in the other DATATRIEVE documentation.

- *VAX DATATRIEVE Installation Guide*

  Describes the installation procedure for VAX DATATRIEVE. The manual also explains how to run User Environment Test Packages (UETPs), which test DATATRIEVE product interfaces, such as the interface between DATATRIEVE and Rdb/VMS.

- *VAX DATATRIEVE Guide to Using Graphics*

  Introduces the use of DATATRIEVE graphics and contains the reference material for creating DATATRIEVE plots.

- *VAX DATATRIEVE Guide to Writing Reports*

  Explains how to use the DATATRIEVE Report Writer.

- *VAX DATATRIEVE Handbook*

  Describes how to create DATATRIEVE applications. The manual includes some tutorial information on describing data and creating procedures.

- *VAX DATATRIEVE User's Guide*

  Describes how to use DATATRIEVE interactively. The manual includes information on using DATATRIEVE to manipulate data and on using DATATRIEVE with forms, relational databases, and database management systems. It also describes how to improve performance and how to work with remote data.

- *VAX DATATRIEVE Pocket Guide*

  Contains quick-reference information about using DATATRIEVE.

- *VAX DATATRIEVE Guide to Programming and Customizing*

  Explains how to use the DATATRIEVE Call Interface. The manual also describes how to create user-defined keywords and user-defined functions to customize DATATRIEVE and how to customize DATATRIEVE help and message texts.

Conventions

This section explains the conventions for the syntax and symbols used in this manual:

WORD	An uppercase word in a syntax format is a keyword. You must include it in the statement if the clause is used.
word	A lowercase word in a syntax format indicates a syntax element that you supply.

[ ]	Square brackets enclose optional clauses from which you can choose one or none.
{ }	Braces enclose clauses from which you must choose one alternative.
RET	This symbol indicates the RETURN key. Unless otherwise indicated, end all user input lines in examples by pressing the RETURN key.
TAB	This symbol indicates the TAB key.
CTRL/x	This symbol tells you to press the CTRL (control) key and hold it down while pressing a letter key. If you press CTRL/Z, the word Exit appears in reverse video; if you press CTRL/Y, the word Interrupt appears in reverse video. Examples of video output in this book do not include either word; instead the conventions ˆZ and ˆY are used.
GOLD-x	This symbol indicates that you press the GOLD key and then a specified letter key consecutively.
" "	These are double quotation marks.
' '	These are single quotation marks.
...	A horizontal ellipsis in syntax formats means you can repeat the previous item. A horizontal ellipsis in examples means that information not directly related to the example has been omitted.
⋮	A vertical ellipsis in syntax formats means you can repeat the syntax element from the preceding line. A vertical ellipsis in examples means that information not directly related to the example has been omitted.
Color	Color in examples shows user input.

Since CDD Version 3.1, CDD path names include a leading underscore. For example:

```
DTR> SHOW DICTIONARY
The default dictionary is _CDD$TOP.DTR32.WEAGER
```

Examples of the output in DATATRIEVE manuals do not reflect this change. You do not need to enter CDD path names with the leading underscore.

References to Products

VAX DATATRIEVE is a member of the VAX Information Architecture, a group of products that work with each other and with VAX languages conforming to the VAX calling standard to provide flexible solutions for information management problems.

VAX Information Architecture documentation explaining how these products interrelate is included with the VAX CDD documentation. VAX Information Architecture documentation is also available separately. Contact your DIGITAL representative.

The VAX DATATRIEVE documentation to which this manual belongs often refers to products that are part of the VAX Information Architecture by their abbreviated names:

- VAX CDD software is referred to as CDD.
- VAX DATATRIEVE software is referred to as DATATRIEVE.
- VAX DBMS software is referred to as DBMS.
- VAX Rdb/ELN software is referred to as Rdb/ELN.
- VAX Rdb/VMS software is referred to as Rdb/VMS.
- VAX TDMS software is referred to as TDMS.
- VIDA software is referred to as VIDA.

This manual uses the terms relational database or relational source to refer to all three of these products:

- VAX Rdb/ELN
- VAX Rdb/VMS
- VIDA

Technical Changes and New Features

This section describes the new features for VAX DATATRIEVE documented in this manual.

Version 4.1

The new features for Version 4.1 include:

- Ability to specify keypad definitions using the following new functions:
  - FN$COMMAND_KEYBOARD
  - FN$DEFINE_KEY
  - FN$DELETE_KEY
  - FN$KEYPAD_MODE
  - FN$KEYTABLE_ID
  - FN$LOAD_KEYDEFS
  - FN$PROMPT_KEYBOARD
  - FN$SHOW_KEY
  - FN$SHOW_KEYDEFS

- SHOW KEYDEFS command showing all current key definitions
- SHOW SETUP enhancement showing keypad mode
- DEFINE FILE enhancement allowing FDL file for an RMS domain

New features since Version 3.0 are also described in online help. To read a description of new features from within DATATRIEVE, type:

```
DTR> HELP New_Features
```

Introduction to the VAX DATATRIEVE Language 1

The VAX DATATRIEVE language is designed to simplify the tasks of data definition, management, and retrieval. This manual is the primary source for information on the structure of this language.

1.1 Commands and Statements

During an interactive VAX DATATRIEVE session, you control DATATRIEVE operations by entering a series of commands and statements:

- Commands let you define the DATATRIEVE basic data structures, such as domains, records, files, tables, and procedures. DATATRIEVE stores this information in the VAX Common Data Dictionary (CDD), and you can assign appropriate access privileges to different types of users.
- Statements, on the other hand, let you manage data by storing, modifying, and erasing records. You also use statements to retrieve and display selected data through precise queries.

Besides this difference in function, commands and statements also differ in structure:

- A command consists of a keyword, which is the command name (such as READY or SHOW), and may include other elements, such as additional keywords, dictionary path names, and definition clauses. You can enter commands only at DATATRIEVE command level, when you see the DTR> prompt. You cannot combine a command with another command or with a statement to form a compound command.

- A statement also consists of a keyword, which is the statement name, and may include other elements such as additional keywords, record selection expressions, value expressions, and Boolean expressions. Unlike commands, statements can be combined to form compound statements.
- Statements cannot use path names in place of given names. You can use path names with commands, but not with statements. The FINISH command is the only exception to this rule.

A compound statement is two or more statements you combine in a BEGIN-END statement or a THEN statement. You can use a compound statement anywhere you can use a simple statement. DATATRIEVE executes each statement of a compound statement in consecutive order.

The format for a compound statement in a BEGIN-END block is:

```
BEGIN

     statement-1

    [statement-2]
     .
     .
     .

END
```

The format of a compound statement using THEN is:

```
statement-1  {THEN statement-2}  [...]
```

You can perform complex or repetitive tasks by nesting statements within other statements. With the REPEAT, FOR, and WHILE statements, you can form repeating loops. With the IF-THEN-ELSE and CHOICE statements, you can do conditional transfers or branching. Each of these compound statements contains other statements.

You can find alphabetical and functional summaries of DATATRIEVE commands and statements in Tables 7-1 and 7-2. The reference chapter of this manual contains complete descriptions of the commands and statements of DATATRIEVE.

1.2 Command and Statement Elements

Every DATATRIEVE command and statement consists of one or more of the following elements:

- Command or statement name
- Other keywords
- Names, which identify items associated with values
- Expressions, which specify values or create record streams
- A terminator, which signals the end of a command or statement
- A continuation character, which allows a command or statement to be continued on the next input line
- A comment, which allows you to enter text with a command or statement

1.3 The DATATRIEVE Character Set

Every element of a DATATRIEVE command or statement must be constructed of characters from the DATATRIEVE character set. Table 1-1 lists the characters in the DATATRIEVE character set.

Note

DATATRIEVE accepts lowercase letters as input but converts them to uppercase letters before analyzing the syntax of your input. DATATRIEVE preserves lowercase letters only in character string literals enclosed in quotation marks.

Similarly, DATATRIEVE treats hyphens as lowercase underscores. It accepts hyphens as input characters but converts them to underscores before analyzing the syntax of your input. To use the hyphen (-) as a minus sign, you must separate the two expressions in the subtraction with spaces. Otherwise, DATATRIEVE treats "–" as a hyphen.

Table 1-1: The DATATRIEVE Character Set

Uppercase Letters:
A through Z

Lowercase Letters:
a through z

Digits:
0 through 9

Special Characters:

.	(period)	"	(double quotation mark)
,	(comma)	'	(single quotation mark)
;	(semicolon)	=	(equal sign)
:	(colon)	|	(vertical line)
(	(left parenthesis)	<	(less-than sign)
)	(right parenthesis)	>	(greater-than sign)
[	(left bracket)	$	(dollar sign)
]	(right bracket)	!	(exclamation point)
+	(plus sign)	_	(underscore)
-	(hyphen or minus sign)	%	(percent sign)
	(space)	?	(question mark)
*	(asterisk)	@	(at sign)
/	(slash)	<RET>	(RETURN)
		<TAB>	(TAB)

1.4 Keywords

Most keywords are elements of commands or statements. In this manual, DATATRIEVE keywords are printed in uppercase letters.

Keywords are restricted to the positions shown in syntax formats of commands and statements. Do *not* use keywords as names of domains, records, fields, dictionary tables, domain tables, views, databases, database instances, collections, procedures, or variables.

See Appendix A for a list of all DATATRIEVE keywords.

You can also create a unique set of custom-tailored DATATRIEVE keywords. You can define synonyms for the usual keywords and make DATATRIEVE recognize foreign language words, abbreviations, habitual typographical errors, and names of commands you are accustomed to from working with other software systems. You can even define several synonyms for the same keyword.

Three ways to define synonyms for keywords are:

- Include the assignment of synonyms in your DTR$STARTUP command file, using the DECLARE SYNONYM statement.
- Define synonyms for a particular DATATRIEVE session with a DECLARE SYNONYM command.
- Create a file of DATATRIEVE synonyms and assign it the logical name DTR$SYNONYM.

See the DECLARE SYNONYM section in the reference chapter of this book for more information about these methods of defining synonyms. Refer to the *VAX DATATRIEVE Guide to Programming and Customizing* for information about how to create your own keywords.

1.5 Names

A DATATRIEVE name is a character string used to identify one of the following items:

Collection	Dictionary table	Field	Procedure	Variable
Database	Domain	Plot	Record	View domain
Database instance	Domain table	Port	Table	

A DATATRIEVE name can be from 1 through 31 characters long and can contain letters, digits, hyphens (-), underscores (_) and dollar signs ($). DATATRIEVE names, however, must conform to the following set of restrictions:

- A name must begin with a letter.
- A name must end with a letter or digit.
- A name cannot be a keyword. (See Appendix A for a list of DATATRIEVE keywords.)
- You can continue a name from one input line to another by typing a hyphen (-) and pressing RETURN.

Some valid DATATRIEVE names are:

TOTAL_SALARY

YACHTS

PRICE_PER_POUND

YEAR-TO-DATE_EARNINGS_FOR_1980

Some invalid DATATRIEVE names are:

TOTAL
(Duplicates a keyword)

1980_EARNINGS
(Does not begin with a letter)

PRICE-PER-POUND($/LB)
(Contains illegal characters)

YEAR-TO-DATE_EARNINGS_FOR_FY_1980
(Contains too many characters)

1.6 DATATRIEVE Procedures

Most applications of DATATRIEVE involve sequences of commands and statements that recur regularly. You can avoid retyping such a sequence by storing it in the Common Data Dictionary (CDD) as a **procedure**. With the DEFINE PROCEDURE command, you give the recurring sequence a name and enter both the name and the sequence into the CDD. The next time you need to use that sequence of commands and statements, you invoke the procedure by entering a colon (:) and the procedure name. DATATRIEVE then executes the statements and commands in the procedure.

1.7 Command Files and DATATRIEVE

You can use VMS command files in DATATRIEVE in much the same way you use DATATRIEVE procedures. There are three major differences between the two. First, procedures are stored in the Common Data Dictionary, and command files are stored in a VMS directory. Second, you invoke a command file by entering "@" followed by the file name, instead of a colon and the procedure name. Third, command file invocations are parsed by DATATRIEVE as commands and therefore cannot be included in BEGIN-END, IF-THEN-ELSE, or other compound statements.

DATATRIEVE makes important use of command files. The EDIT and EXTRACT commands create command files you can invoke to change or add definitions of dictionary objects to the CDD.

If SET VERIFY is in effect, DATATRIEVE displays all the commands and statements as it executes them. See the section on the SET command in the reference chapter of this manual for more information.

DATATRIEVE also makes another time-saving use of command files. If you assign the logical name DTR$STARTUP to a command file, DATATRIEVE executes the contents of the command file when you invoke DATATRIEVE from DIGITAL Command Language (DCL) level. DTR$STARTUP can perform any DATATRIEVE operation, such as readying domains and forming collections. In addition, you can store the current time into a domain for monitoring the use of DATATRIEVE.

The reference chapter of this manual includes sections on the EDIT and EXTRACT commands. See the chapter on editing in the *VAX DATATRIEVE Handbook* for information on how to change the definitions of objects in the CDD.

1.8 Starting and Ending a DATATRIEVE Session

To start a DATATRIEVE session, begin at DCL command level and use the command RUN SYS$SYSTEM:DTR32xx. The suffix xx is sometimes necessary to identify the image of DATATRIEVE you want to run. See the person who installed DATATRIEVE on your system to determine if you need to specify a suffix and, if you do, what characters you type in place of xx. For example, if you want to run the version of DATATRIEVE that uses TDMS, you may need to include the suffix TD:

```
$ RUN SYS$SYSTEM:DTR32TD
VAX Datatrieve V4.1
DEC Query and Report System
Type HELP for help
DTR>
```

The startup banner shows that you have successfully invoked DATATRIEVE. Note that the message you receive in response to your request should specify the version of DATATRIEVE you want to run. If it does not, consult the person responsible for DATATRIEVE at your site.

To simplify this command, you can assign a symbol to it in your LOGIN.COM file. To use DTR32 to invoke the version of DATATRIEVE in the previous example, enter:

```
$ DTR32 :==  $SYS$SYSTEM:DTR32TD
$ DTR32
VAX Datatrieve V4.1
DEC Query and Report System
Type HELP for help
DTR>
```

To end your DATATRIEVE session if you are at a DTR> prompt, type EXIT and press the RETURN key or use CTRL/Z. Either returns you to the VMS system prompt. If you are at a CON>, DFN>, or RW> prompt, use CTRL/Z to get to the DTR> prompt. Then use CTRL/Z again or type EXIT and press the RETURN key.

1.9 DATATRIEVE Prompts

Several prompts help you keep track of your status during your interactive DATATRIEVE session. There are three types of prompts: those at the beginning of input lines that show DATATRIEVE is ready for your input, those that show what DATATRIEVE expects your next input to be, and those that request you to input values for storing or modifying records.

1.9.1 Input Line Prompts

The DATATRIEVE command level prompt is DTR>. It shows that DATATRIEVE is ready for you to enter any DATATRIEVE command or statement.

The continuation prompt is CON>. DATATRIEVE displays the CON> prompt when you press the RETURN key before completing the syntax of a command or statement. You must finish the command or statement you have begun or enter a CTRL/C to return to DATATRIEVE command level.

Sometimes you press the RETURN key intending to continue the command or statement, but DATATRIEVE executes what you have entered and returns you to command level. Because the syntax of many commands and statements is rich with options, the number of possible complete forms is large. You can always press the RETURN key after a comma, in the middle of a string of required keywords, and in the midst of value expressions and Boolean expressions. You can also use the hyphen (-) as a continuation character. See the section in this chapter on the hyphen for more details.

When DATATRIEVE displays the CON> prompt on your terminal, the number of correct options you can choose from varies depending on the syntax of the command or statement and the point at which you pressed the RETURN key. When DATATRIEVE displays the CON> prompt, it expects your input to fill the syntactic pattern of the command or statement you have started but not finished.

When you press the RETURN key before finishing a DEFINE command, DATATRIEVE displays the DFN> prompt on your terminal to show you have not finished the definition.

When you are entering a report specification, the Report Writer uses RW> to prompt you to complete unfinished Report Writer statements and to enter additional Report Writer statements. When you enter the END_REPORT statement, the Report Writer executes the report specification and returns you to DATATRIEVE command level and the DTR> prompt.

1.9.2 Syntax Prompts

When you press RETURN before completing a command or statement, DATATRIEVE prompts you with a phrase in square brackets telling you what sort of input it expects to satisfy the syntax of the command or statement. This example shows several of the DATATRIEVE syntax prompts:

```
DTR> SET
[Looking for SET option]
CON> DICTIONARY
[Looking for dictionary path name]
CON> CDD$TOP
DTR> READY
[Looking for dictionary path name]
CON> YACHTS
DTR> FIND
[Looking for name of domain, collection, or list]
CON> YACHTS WITH
[Looking for Boolean expression]
CON> LOA
[Looking for relational operator (EQ, GT, etc.)]
CON> GT
[Looking for value expression]
CON> 24
[105 records found]
DTR> SORT
[Looking for sort list]
CON> BY
[Looking for next element in list]
CON> LOA,
[Looking for next element in list]
CON> BEAM
DTR>
```

You can suppress these prompts by entering a SET NO PROMPT command at DATATRIEVE command level. If you have suppressed these prompts, you can enable them by entering a SET PROMPT command at DATATRIEVE command level.

1.9.3 Prompts for Storing and Modifying Values

When you enter STORE or MODIFY statements that do not contain the USING clause, DATATRIEVE prompts you to enter values for the fields to be stored or modified. The prompts take the general form:

```
Enter field-name:
```

These prompts are not affected by the SET NO PROMPT command. DATATRIEVE displays these prompts on your terminal whether SET NO PROMPT is in effect or not.

1.10 Termination and Continuation Characters

DATATRIEVE has two termination characters, the semicolon (;) and the carriage return (RETURN), and a continuation character, the hyphen (-). A terminator signals the end of a command or statement, while a continuation character tells DATATRIEVE to expect additional input to complete the command or statement.

1.10.1 The Semicolon

A terminator signals the end of a command or statement. The formal terminator in DATATRIEVE is the semicolon (;). You can enter several commands on the same input line if you separate each from the next with a semicolon. If you enter more than one command on an input line, DATATRIEVE does not begin processing those commands until you press the RETURN key.

Note

The semicolon is also used as part of the dictionary path name to denote versions of dictionary objects. The semicolon in the dictionary path name is always followed by the version number. An example of this format is CDD$TOP.HOLMES.YACHTS;1.

1.10.2 The RETURN Key

You can end commands and statements, except the DEFINE and DELETE commands and the DECLARE statement, by pressing the RETURN key when the syntax of the command or statement is complete.

If SET PROMPT is in effect and you press the RETURN key before the syntax of a statement or command is complete, DATATRIEVE prompts you for the next element in the syntax.

1.10.3 The Hyphen

You can use the hyphen (-) at the end of an input line to continue your command or statement on the next input line. When you use a hyphen as a continuation character, DATATRIEVE does not check the syntax of your input until you press the RETURN key at the end of a line that does not end with a hyphen.

If an input line ends with a complete word, enter a space before typing the hyphen and pressing the RETURN key. If you do not enter a space after the complete word or at the beginning of the next line, DATATRIEVE considers the characters at the end of the first line and those at the beginning of the next to be one string of characters.

If you have to change input lines in the middle of a character string literal, name, or keyword, you must use a hyphen to shift your input to the next line.

The maximum number of characters in an input line extended by hyphens is 255 characters.

1.11 Comments

You can include a comment in an input line by preceding the comment with an exclamation point (!) and ending it by pressing the RETURN key. The comment can include any characters on your terminal keyboard except escape and control characters.

You can also use the exclamation point in procedures and command files to document their functions. When you invoke a procedure that contains comments, DATATRIEVE suppresses the comments. The comments in procedures, however, are stored in the Common Data Dictionary as part of the procedure definition.

When you invoke a command file, DATATRIEVE displays the comment lines in the command file on your terminal if SET VERIFY is in effect. To suppress the display, enter a SET NO VERIFY or SET NOVERIFY command. See the section on the SET command in the reference chapter of this manual for more information.

Access Control Lists and DATATRIEVE Protection 2

The definitions of domains, records, procedures, and tables are valuable to people and organizations that use VAX DATATRIEVE to manage their data. The people responsible for the integrity and stability of their information resources must protect those data definitions by controlling access to them.

The VAX Common Data Dictionary (CDD) provides a mechanism for controlling access to the definitions you store in it. However, the CDD is designed to protect data definitions and procedures against browsing and unauthorized use, not to intercept and prevent intentional, determined assaults on the dictionary.

The access control lists of the CDD should be used with the VMS access and file security mechanisms to augment the overall security strategy for your data processing system.

2.1 Access Control Lists

The key to the CDD system of protection is the access control list (ACL). As the name implies, an ACL controls access to directories and objects in the Common Data Dictionary. The CDD provides users of VAX DATATRIEVE with 13 access privileges. These privileges control, for example, whether you can create, modify, or delete a dictionary object; use a dictionary object; see the definition of an object; create a new dictionary directory; or use the given name of a dictionary directory in the path name of an object or other directories.

An ACL determines who has which access privileges to a dictionary directory or object. The ACL of a dictionary directory can also control what access users can have to the descendants of that directory.

2.1.1 An Overview of ACL Entries

Every directory and object in the CDD can have an access control list. An ACL generally consists of one or more ACL entries, although an ACL can be empty. Each entry in an access control list performs two functions:

- It identifies individual users or classes of users to whom the ACL entry applies.
- It grants, denies, and banishes the access privileges of the user or class of users to whom the entry applies.

An ACL entry affects your access privileges to a directory or object only if *all* the entry's user identification criteria match the characteristics of your process. An ACL can identify you by your VMS username, your user identification code (UIC), a password, your terminal number or job class. See the section in this chapter about user identification criteria for further details.

If some of the user identification criteria apply to a process but some do not, then the ACL entry does not apply to the process. You can make the user identification criteria very specific or very general. In one ACL entry, you can control access privileges of a single user or all users, depending on the user identification criteria you include in the entry.

The access to every directory or object in the CDD (except the root directory, CDD$TOP) can be controlled by more than one access control list—its own and the access control lists of its ancestors.

In the CDD, every directory and object has a full dictionary path name that begins with CDD$TOP, contains all the directories (in hierarchical order) that are ancestors of the directory or object in question, and ends with the given name of that directory or object.

Each segment of a dictionary path name has an ACL associated with it. Each of those ACLs can change your access privileges because your access privileges *accumulate* as you move along a hierarchical path in the CDD. In effect, you *inherit* the access privileges from the ancestors of an object or directory, modified by the ACL of the dictionary or object you are trying to access.

2.1.2 Displaying an Access Control List

Use the SHOWP command to display the contents of an ACL. To display the ACL on your terminal, you need specify only the given name, full dictionary path name, or relative path name after typing the keyword SHOWP.

You can use the SHOWP command to display the ACL for any object or directory to which you have C (CONTROL) and P (PASS_THRU) access.

For example, when the user Jones enters this SHOWP command, DATATRIEVE displays the ACL of CDD$TOP on her terminal:

```
DTR> SHOWP CDD$TOP
  1:    [*,*], Username: " JONES"
        Grant - CPSX, Deny - DEHMRUW, Banish - FG

DTR>
```

As the ACL indicates, Jones has four privileges at CDD$TOP: C (CONTROL), P (PASS_THRU), S (SEE), and X (EXTEND).

Alternatively, Jones can show her privileges by using the SHOW PRIVILEGES command:

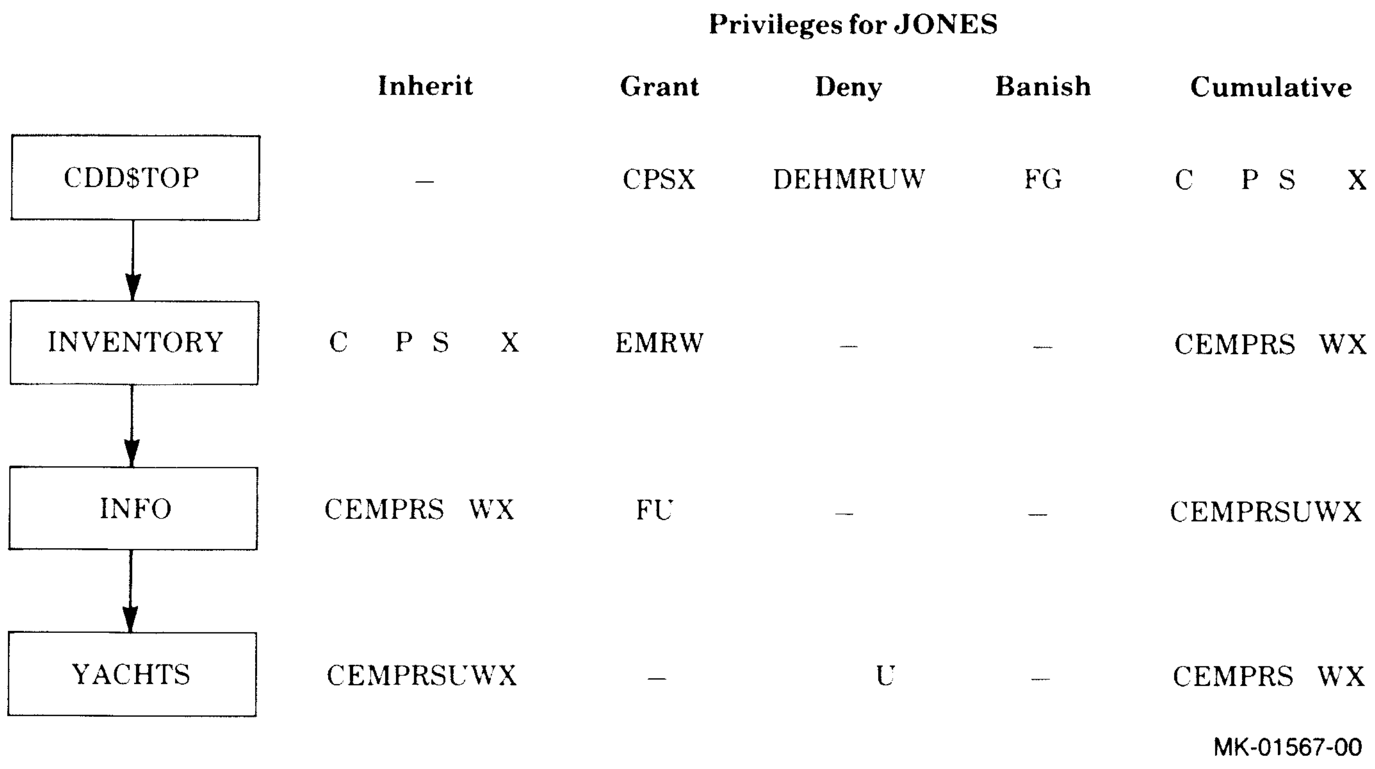
```
DTR> SHOW PRIVILEGES FOR CDD$TOP
Privileges for CDD$TOP
 C (CONTROL)      - may issue DEFINEP, SHOWP, DELETEP commands
 P (PASS_THRU)    - may use given name of directory or object in pathname
 S (SEE)          - may see (read) dictionary
 X (EXTEND)       - may create directory or object within directory

DTR>
```

You can use SHOW PRIVILEGES only to display your actual privileges for a given dictionary path name. If there are ACL entries for other users, use the SHOWP command to display the information.

2.1.3 Accumulation of Privileges

Privileges are passed on from higher directories to lower directories. Figure 2-1 illustrates a sample CDD path that shows how access privileges can accumulate. It is the path for the YACHTS domain in the INFO directory. The column on the right entitled "Cumulative" indicates the privileges in effect at different levels of the CDD.



Privileges for JONES

	Inherit	Grant	Deny	Banish	Cumulative
CDD$TOP	–	CPSX	DEHMRUW	FG	C P S X
INVENTORY	C P S X	EMRW	–	–	CEMPRS WX
INFO	CEMPRS WX	FU	–	–	CEMPRSUWX
YACHTS	CEMPRSUWX	–	U	–	CEMPRS WX

Figure 2-1: Sample CDD Path – CDD$TOP.INVENTORY.INFO.YACHTS

Each of the four segments of this path name has an ACL. Jones uses the SHOWP command to display the ACL for a given path name. The example specifies only one user identification criterion: the VMS username, Jones. Each ACL has only one entry. Following each ACL is the list of privileges that the user Jones has for each segment of the path name. The list of privileges expands or shrinks according to the distribution of privileges in each ACL. The section in this chapter about CDD privilege specification explains the meaning of the various privileges.

```
DTR> SHOWP CDD$TOP
  1:    [*,*], Username: "JONES"
        Grant - CPSX, Deny - DEHMRUW, Banish - FG
```

The ACL indicates that Jones has four privileges at CDD$TOP: C (CONTROL), P (PASS_THRU), S (SEE), and X (EXTEND).

```
DTR> SHOWP CDD$TOP.INVENTORY
  1:    [*,*], Username: "JONES"
        Grant - EMRW, Deny - none, Banish - none
```

For INVENTORY, Jones has eight privileges: C (CONTROL, P (PASS_THRU), S (SEE), and X (EXTEND) from CDD$TOP, and E (DTR_EXTEND/EXECUTE), M (DTR_MODIFY), R (DTR_READ), and W (DTR_WRITE) from INVENTORY.

```
DTR> SHOWP CDD$TOP.INVENTORY.INFO
  1:    [*,*], Username: "JONES"
        Grant - FU, Deny - none, Banish - none
```

For INFO, the user Jones has nine privileges: four privileges from CDD$TOP, four privileges from INVENTORY, and U (UPDATE) from INFO. However, Jones does not have F (FORWARD) privilege. Even though the ACL for INFO tries to grant Jones the F (FORWARD) privilege, the grant has no effect because F (FORWARD) was one of the privileges banished by the ACL for CDD$TOP. Once a privilege is banished, it can never be granted by any descendant of the directory whose ACL banished it.

```
DTR> SHOWP CDD$TOP.INVENTORY.INFO.YACHTS
  1:    [*,*], Username: "JONES"
        Grant - none, Deny - U, Banish - none
```

For YACHTS, the user Jones has only eight privileges: four privileges from CDD$TOP and four privileges from INVENTORY. Jones does not have U (UPDATE) access to YACHTS. Even though the ACL for INFO granted it, the ACL for YACHTS denied it.

Jones can also display her privileges for this directory by means of the SHOW PRIVILEGES command:

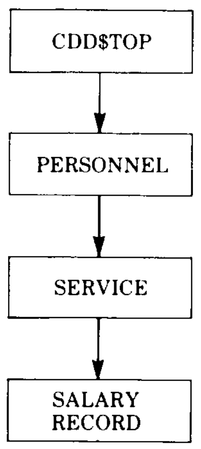
```
DTR> SHOW PRIVILEGES
Privileges for CDD$TOP.INVENTORY.INFO.YACHTS;1
 R (DTR_READ)      - may ready for READ, use SHOW and EXTRACT
 W (DTR_WRITE)     - may ready for READ, WRITE, MODIFY, or EXTEND
 M (DTR_MODIFY)    - may ready for READ, MODIFY
 E (DTR_EXTEND_EXECUTE) - may ready to EXTEND, or access table or procedure
 C (CONTROL)       - may issue DEFINEP, SHOWP, DELETEP commands
 P (PASS_THRU)     - may use given name of directory or object in pathname
 S (SEE)           - may see (read) dictionary
 X (EXTEND)        - may create directory or object within directory

DTR>
```

When you use the SHOW PRIVILEGES command, DATATRIEVE displays your privileges according to the path name specified. DATATRIEVE takes into account the applicable ACL entries of the parent directories.

2.1.4 Combinations of ACL Entries

The ACL for the four segments of CDD$TOP.PERSONNEL.SERVICE.SALARY_RECORD demonstrate how combinations of user identification criteria at different levels of the CDD hierarchy control access to data descriptions. The user identification criteria in these ACL entries match the characteristics of four individual users: Casaday, Kellerman, Foster, and Jones. Figure 2-2 illustrates the privileges at each level of the CDD for each of the four users. The explanation following each set of ACL entries describes which ACL at a given level applies to each of the four users.



	USER	Inherit	Grant	Deny	Banish	Cumulative
CDD$TOP	CASADAY	–	CDHPSX	–	–	CDHPSX
	KELLERMAN	–	P	CDEHMRSUWX	FG	P
	FOSTER	–	P	CDEHMRSUWX	FG	P
	JONES	–	P	CDEHMRSUWX	FG	P
PERSONNEL	CASADAY	CDHPSX	CDHPSX	–	–	CDHPSX
	*KELLERMAN	P	H SX	CDEFGMRUWX		HPS
	*FOSTER	P	H S	CDEFGMRUWX	–	HPS
	JONES	P	–	–	CDEFGHMPRSUWX	–
SERVICE	CASADAY	CDHPSX	CDHPSX	–	–	CDHPSX
	**KELLERMAN	HPS	H S	DEMRUWE	C	HPS
	**FOSTER	HPS	H S	DEMRUWE	C	HPS
	JONES	–	–	–	CDEFGHMPRSUWX	–
SALARY RECORD	CASADAY	CDHPSX	CDEHMRSUW	–	–	CDEHMPRSUWX
	KELLERMAN	HPS	DE MR UW	–	–	DEHMPRSUW
	FOSTER	HPS	E R	–	–	EH PRS
	***JONES	–	–	–	–	–

* These privileges apply only if the user specifies the password. For access to PERSONNEL, all users except Casady must use the password "SEMISECRET".

** These privileges apply only if the user specifies the password. For access to SERVICE, all users except Casady must use the password "SECRET". They must also use the password for PERSONNEL.

*** Jones is not covered by an ACL entry for SALARY_RECORD. She has no access privileges, because she does not know the passwords to either of the higher directories, PERSONNEL and SERVICE.

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Figure 2-2: Sample CDD Path - CDD$TOP.PERSONNEL. SERVICE.SALARY_RECORD

The SHOWP command illustrates the privileges at CDD$TOP:

```
DTR> SHOWP CDD$TOP
  1:     [*,*], Username: "CASADAY"
         Grant - CDHPSX, Deny - none, Banish - none
  2:     [*,*]
         Grant - P, Deny - CDEHMRSUWX, Banish - FG

DTR>
```

Casady, the system manager, is responsible for organizing and maintaining the CDD, and so she retains all the access privileges granted by default. Casaday inherits these privileges at each hierarchy level.

To protect the CDD against modification or redundancy, Casaday grants only PASS_THRU to all other users, including Kellerman, Foster, and Jones. In addition, she banishes FORWARD and GLOBAL_DELETE to ensure that no other user can create subdictionary files or delete large portions of the dictionary.

```
DTR> SHOWP CDD$TOP.PERSONNEL
  1:     [*,*], Username: "CASADAY"
         Grant - CDHPSX, Deny - none, Banish - none
  2:     [*,*], Password: "SEMISECRET"
         Grant - HS, Deny - CDEFGMRUWX, Banish - none
  3:     [*,*]
         Grant - none, Deny - none, Banish - CDEFGHMPRSUWX

DTR>
```

All the record definitions in the PERSONNEL subdictionary are sensitive, and so Casaday has included the password "SEMISECRET" as a user identification criterion to restrict access. Kellerman, who is responsible for all the records in the personnel department, and Foster, an applications programmer who uses personnel record definitions, know the password and so have PASS_THRU (inherited from CDD$TOP), HISTORY, and SEE privileges to the subdictionary. Jones, who works in sales, does not know the password and so has no access to PERSONNEL or any of its children. Only the third ACL entry applies to Jones, and this entry banishes all the access privileges.

The relative position of access control list entries is significant. The CDD stops searching the user identification criteria in the ACL entries as soon as it finds a match. In this example, if entries 2 and 3 were reversed, then only Casaday would have any access privileges at PERSONNEL. All other processes would match the second entry, which banishes all privileges. Therefore, the CDD would discontinue the user identification search before reaching entry 3, the one granting access to those using the password.

```
DTR> SHOWP CDD$TOP.PERSONNEL.SERVICE
  1:    [*,*], Username: "CASADAY"
        Grant - CDHPSX, Deny - none, Banish - none
  2:    [*,*], Password: "SECRET"
        Grant - HS, Deny - DEMRUWX, Banish - C
  3:    [*,*]
        Grant - none, Deny - none, Banish - CDEFGHMPRSUWX

DTR>
```

Confidential employee record definitions are stored in the SERVICE directory. Casaday has added a new password, "SECRET", to limit the number of personnel department users with access to this directory. Authorized users like Kellerman and Foster now have access to this directory only when they include the appropriate passwords in the dictionary path name:

```
CDD$TOP.PERSONNEL(SEMISECRET).SERVICE(SECRET)
```

Failure to include either password results in the banishment of all privileges, because the access control list entry 3 for CDD$TOP.PERSONNEL or CDD$TOP.PERSONNEL.SERVICE applies. Users are unable to proceed further, even if the next CDD level grants all privileges to all users. Unauthorized users like Jones have no access to this directory because ACL entry 3 banishing all privileges applies.

```
DTR> SHOWP CDD$TOP.PERSONNEL.SERVICE.SALARY_RECORD
  1:    [*,*], Username: "CASADAY"
        Grant - CDEHMRSUW, Deny - none, Banish - none
  2:    [*,*], Username: "KELLERMAN"
        Grant - DEMRUW, Deny - none, Banish - none
  3:    [*,*], Username: "FOSTER"
        Grant - ER, Deny - none, Banish - none

DTR>
```

Unlike CDD$TOP, PERSONNEL, or SERVICE, SALARY_RECORD is a dictionary object that holds a record definition. This difference is reflected in the new default privileges that the SHOWP command indicates for Casaday.

ACL entry 2 grants Kellerman the privileges he needs to maintain the SALARY_RECORD definition. Foster, whose process matches the third access control list entry, inherits PASS_THRU, HISTORY, and SEE from SERVICE, and he receives DTR_EXTEND and DTR_READ, which allow him to ready the domain associated with SALARY_RECORD. Unauthorized users such as Jones are not covered by any of the ACL entries. However, Jones still does not have any privileges, because she did not inherit any privileges from the parent directory SERVICE.

2.1.5 Summary of ACL Results

Here is a summary of the effects access control lists can have on the access privileges of DATATRIEVE users:

- You have all CDD and DATATRIEVE privileges unless they are specifically denied or banished by an entry in the ACL of a segment of a dictionary path name you use in a DATATRIEVE command, in a procedure invocation, or in a DATATRIEVE table invocation.
- Your access privileges to an object or directory are those inherited from its ancestors as modified by its own ACL.
- An ACL entry applies to a user only if *all* the user identification criteria match the characteristics of the user's process.
- The CDD begins its search of an access control list with entry 1 and ends its search as soon as it finds the *first* entry for which the characteristics of the user's process match *all* the user identification criteria.
- If an access privilege is banished by an entry in the ACL of a dictionary directory, that privilege cannot be restored to a user by any entry in the access control list of any descendant of that directory.

2.2 The Parts of an ACL Entry

An entry in the ACL of a dictionary object or directory has two parts:

- The user identification criteria
- The privilege specification

The user identification criteria determine the user or class of users to whom the entry applies. The CDD compares the user identification criteria with the characteristics of the user's process and with any passwords appended to the given name of the object or directory.

The privilege specification can grant, deny, or banish the access privileges of the user or class of users to whom the entry applies.

The next sections of this chapter discuss the four user identification criteria and the 13 access privileges.

2.2.1 User Identification Criteria

An ACL entry applies to a user only if *all* the user identification criteria are satisfied. The CDD searches the ACL from the beginning and uses the first entry whose user identification criteria are satisfied.

If the user identification criteria in all entries of an ACL are specific, none of the entries might apply to a user. If no entry matches, then the user has the same privileges to the object or directory as to the parent of the object or directory.

The last entry in an ACL should apply to all users and assign as few privileges as are consistent with user needs and the integrity of the data definitions those privileges affect.

You can use four criteria for identifying users:

- VMS username
- VMS User Identification Code (UIC)
- Password
- Terminal number or job class

In an ACL entry, you can specify one option from each of these four categories. You can include one username, one UIC, one password, and one terminal number or job class. You must include at least one user identification criterion per ACL entry.

2.2.1.1 Identifying Users by Username — The username is a basic concept in using the VMS operating system. When you log in to your system, the first prompt from VMS requires you to enter a valid username assigned by your system manager.

Each ACL entry can contain one identification criterion based on the username. Specifying a username in an ACL entry limits the entry to one user or to a group of users who log in with the same username. For example:

```
USER = KELLERMAN
```

2.2.1.2 Identifying Users by the UIC — The User Identification Code (UIC) is one of the identifiers the VMS operating system uses. The UIC is a 2-part numeric or alphanumeric code that identifies a user and determines his or her relationship to other users on the system. The UIC determines the ownership of VMS files and is assigned by your system manager.

The UIC is enclosed in square brackets or angle brackets. A comma separates the two parts of the UIC, and each part can be from one to three digits long.

The two parts of a numeric UIC are an octal group number and an octal member number. The octal group number identifies the group of users a person belongs to. Group members share the same group number in numeric UICs. VMS lets you control access to files according to UIC group number. The octal member number identifies the individual user in a group.

The two parts of an alphanumeric UIC are a text string consisting of a member name and, optionally, a group name. As with numeric UIC member numbers, the alphanumeric member name identifies the individual user in a group. Group members also share the same group name in alphanumeric UICs. VMS lets you control access to files according to UIC group name.

In an ACL entry, you can specify the UIC in several ways:

- By specifying all the digits or characters of both parts of the UIC, you can identify one or more users who log in with the same UIC associated with their process. For example:

  ```
  UIC = [240,240]
  ```

- For numeric UICs, you can use the asterisk (*) wildcard in place of the group number to identify all group numbers and in place of the member number group to identify all member numbers.

  The following example identifies users with the numeric UICs [240,101], [240,300], [240,544], [240,777]:

  ```
  UIC = [240,*]
  ```

- By using asterisks in place of both groups of digits in the numeric UIC, you identify all users, regardless of their UICs:

  ```
  UIC = [*,*]
  ```

- For alphanumeric UICs, you can use the asterisk (*) wildcard in place of the member name in an alphanumeric UIC but not in place of the group name.

  The following example uses the alphanumeric UICs [MYGROUP,MYSELF]. MYGROUP is equivalent to [212,*] and MYSELF is equivalent to [212,370]. The valid UIC specifications are:

  ```
  UIC = [MYGROUP,MYSELF]
  UIC = [MYGROUP]
  UIC = [MYSELF]
  UIC = [MYGROUP,*]
  UIC = [212,370]
  UIC = [212,*]
  UIC = [*,*]
  ```

You *must* include the comma and enclose the UIC specification in square brackets or angle brackets. If you specify no UIC for an ACL entry, the CDD supplies [*,*] as a default.

2.2.1.3 Identifying Users by Rights Identifiers

Rights identifiers are another basic concept in using the VMS operating system. A rights identifier is a single text string enclosed in brackets. The system manager defines a rights identifier in the system rights database. The identifier can indicate individuals or members of a particular group. For example, your system manager might define the following rights identifier to indicate the members of an accounting division of your company:

```
[ACCTGID]
```

When you specify a rights identifier with the DEFINEP command, you can use only identifiers that are currently in the system rights database. Your system manager can check a valid identifier using the Authorize Utility:

```
$ RUN AUTHORIZE

UAF> SHOW/ID ACCTGID
```

2.2.1.4 Identifying Users by the Password

You can also specify a password as an identification criterion in an ACL entry. If an ACL entry for a directory or object in the CDD defines a password, the password can be specified as part of the given name of the directory or object. Using a password identifies the user or group of users who know the password.

When you need the access privileges to a directory or object granted by an ACL entry containing a password, you can specify the password in two ways:

- You can enter the password, enclosed in parentheses, after the given name of the directory or object:
  - With only the given name:

    ```
    YACHTS;1(SAILOR)
    ```

  - In a full dictionary path name:

    ```
    CDD$TOP.INVENTORY(SECRET).YACHTS;1(SAILOR)
    ```

- You can also enter an asterisk in parentheses after the given name of the directory or object. This asterisk in place of the password causes DATATRIEVE to prompt you for the password. When you respond, DATATRIEVE does not echo the characters on your terminal. This prompting protects your password and, as a result, your data and data definitions:
  - In place of the password in parentheses, enter (*):

    ```
    DTR> SHOWP YACHTS (*)
    ```

  - DATATRIEVE responds with a prompt for the password:

    ```
    Enter password for YACHTS:
    ```

When you are editing objects that require CDD passwords, remember that if you are required to specify a password when editing an object, you must also edit the REDEFINE command and explicitly enter the password. For example, you enter the following EDIT command with the password SECRET:

```
DTR> EDIT SECRET_REC (SECRET)
```

DATATRIEVE places the record definition (SECRET_REC) in the editing buffer. It then inserts a REDEFINE command at the top of the record definition:

```
REDEFINE RECORD SECRET_REC USING
01 TOP.
      .
      .
      .
;
```

This REDEFINE command fails, however, unless you explicitly enter the password when you edit it:

```
REDEFINE RECORD SECRET_REC (SECRET) USING
01 TOP.
      .
      .
      .
;
```

Note also that once the password is part of the source definition, you do not have to explicitly enter it in subsequent edits. DATATRIEVE places it in the editing buffer automatically. However, the password will also be visible when you use the SHOW command to show the object (unless you use the asterisk in parentheses as described in this section on page 2-12).

2.2.1.5 Identifying Users by the Terminal Number or Job Class — You can also identify users by their terminal line numbers and their job class:

- You can identify users who work from a particular terminal line. You specify the terminal number in the format TTnn[:]. For example:

  ```
  TERMINAL = TTH6
  ```

- You can identify all users whose terminal lines are hard-wired to your local system. Use the keyword LOCAL:

  ```
  TERMINAL = LOCAL
  ```

- You can identify all users whose processes are running on anything other than a hard-wired line. By using the keyword NONLOCAL you can identify all processes using dial-up lines, running in batch mode, using DECnet and running as remote terminals, and using the Distributed Data Manipulation Facility to run DATATRIEVE from a remote node in a network of VAX computers. For example:

  ```
  TERMINAL = NONLOCAL
  ```

- You can identify all batch processes by using the keyword BATCH:

  ```
  TERMINAL = BATCH
  ```

- You can identify all processes using the Distributed Data Manipulation Facility to run DATATRIEVE from a remote node in a network of VAX computers. Use the keyword NETWORK:

  ```
  TERMINAL = NETWORK
  ```

2.2.2 DATATRIEVE and CDD Privilege Specification

The second part of an ACL entry determines what changes CDD makes to the access privileges of a user who matches the user identification criteria. The privilege specification controls the access changes the user inherits from the parent of the object or directory to which the ACL belongs.

The CDD can make three types of changes to the user's list of inherited privileges:

- The GRANT clause can add any privileges not already acquired by the user and not banished previously.
- The DENY clause can remove any privileges the user had to the parent directory.

- The BANISH clause can deny a privilege to a directory or object. A privilege banished by the ACL of a directory can never be granted by any entry in the ACL of any descendant of that directory.

If no entry in the access control list of an object or directory matches the user, the CDD makes no changes to the privileges the user has to the parent directory.

Thirteen access privileges are available to users of DATATRIEVE: four are DATATRIEVE privileges and nine are CDD privileges. Table 2-1 gives a brief description of each of these privileges.

Table 2-1: Access Privileges

Privilege	Allows you to:
C (CONTROL)	Read, create, modify, and delete ACL entries. You cannot deny yourself CONTROL privilege.
D (LOCAL_DELETE)	Delete dictionary objects and directories and subdictionaries with no children. Also lets you edit, replace, or recompile definitions stored in the CDD.
E (DTR_EXTEND/EXECUTE)	Ready a domain for EXTEND access, access a table, or invoke a procedure.
F (FORWARD)	Create subdictionaries.
G (GLOBAL_DELETE)	Delete dictionary directories and subdictionaries, including any children they may have, with a single command.
H (HISTORY)	Add entries to CDD history lists with the Dictionary Management Utility (DMU).
M (DTR_MODIFY)	Ready a domain for READ and MODIFY access.
P (PASS_THRU)	Use a dictionary directory, subdictionary, or object in a path name. You cannot deny yourself PASS_THRU privilege.
R (DTR_READ)	Ready a domain for READ access, display CDD definitions with a SHOW command, use the EDIT command, and copy them into a command file with an EXTRACT command.

(continued on next page)

Table 2-1: Access Privileges (Cont.)

Privilege	Allows you to:
S (SEE)	See the definition of a dictionary object. SEE access to a domain definition and its associated record definition is necessary to define a data file and then to ready the domain.
U (UPDATE)	Update the definition of a dictionary object.
W (DTR_WRITE)	Ready a domain for WRITE access.
X (EXTEND)	Create children of dictionary directories and subdictionaries.

2.2.2.1 Access Privilege Requirements – Privileges have effects on the range of DATATRIEVE statements and commands you can use.

Table 2-2 lists statements and commands and the privileges you need to use them. Any statements not listed in the table require no privileges except P (PASS_THRU) access to a default dictionary directory. If you do not have P access to a default dictionary directory, you cannot use VAX DATATRIEVE.

Table 2-2: Access Privilege Requirements

Data Description Commands	
DEFINE DICTIONARY DEFINE DOMAIN DEFINE PORT DEFINE PROCEDURE DEFINE RECORD DEFINE TABLE	To Parent Directory P (PASS_THRU) X (EXTEND)
REDEFINE DOMAIN REDEFINE PORT REDEFINE PROCEDURE REDEFINE RECORD REDEFINE TABLE	To Parent Directory P (PASS_THRU) X (EXTEND) To Highest Existing Version S (SEE) P (PASS_THRU) U (UPDATE)

(continued on next page)

Table 2-2: Access Privilege Requirements (Cont.)

DEFINE FILE	To Domain Definition P (PASS_THRU) S (SEE) W (DTR_WRITE) To Record Definition P (PASS_THRU) S (SEE) E (DTR_EXTEND/EXECUTE)
Data Protection Commands	
DEFINEP DELETEP SHOWP	To Dictionary Object or Directory P (PASS_THRU) C (CONTROL)
Dictionary Manipulation Commands	
SET DICTIONARY	To Dictionary Directory P (PASS_THRU)
SHOW path-name	To Dictionary Object P (PASS_THRU) S (SEE) R (DTR_READ)
EDIT path-name (if SET NO EDIT_BACKUP)	To Parent Directory P (PASS_THRU) X (EXTEND) To Dictionary Object P (PASS_THRU) S (SEE) R (DTR_READ) and either D (LOCAL_DELETE) or G (GLOBAL_DELETE)
EDIT path-name (if SET EDIT_BACKUP)	To Parent Directory P (PASS_THRU) X (EXTEND) To Dictionary Object P (PASS_THRU) S (SEE) R (DTR_READ) U (UPDATE)

(continued on next page)

Table 2-2: Access Privilege Requirements (Cont.)

EXTRACT	To Dictionary Object P (PASS_THRU) S (SEE) R (DTR_READ)
DELETE	To Parent Directory P (PASS_THRU) X (EXTEND) To Dictionary Object P (PASS_THRU) and either D (LOCAL_DELETE) or G (GLOBAL_DELETE)
Data Manipulation Commands and Statements	
READY for All Modes	To Domain, Database, Relation, and DBMS Record Definition P (PASS_THRU) S (SEE) To Record Definitions of RMS Domains E (DTR_EXTEND/EXECUTE)
for SNAPSHOT Access	To Domain Definition R (DTR_READ)
for READ Access	To Domain Definition R (DTR_READ) or W (DTR_WRITE) or M (DTR_MODIFY)
for WRITE Access	To Domain Definition W (DTR_WRITE)
for MODIFY Access	To Domain Definition M (DTR_MODIFY) or W (DTR_WRITE)
for EXTEND Access	To Domain Definition E (DTR_EXTEND/EXECUTE) or W (DTR_WRITE)

(continued on next page)

Table 2-2: Access Privilege Requirements (Cont.)

Invoke Procedure	To Procedure Definition P (PASS_THRU) S (SEE) E (DTR_EXTEND/EXECUTE)
Invoke Dictionary Table	To Table Definition P (PASS_THRU) S (SEE) E (DTR_EXTEND/EXECUTE)
Invoke Domain Table	To Table Definition P (PASS_THRU) S (SEE) E (DTR_EXTEND/EXECUTE) To Domain Definition P (PASS_THRU) S (SEE) and either R (DTR_READ) or W (DTR_WRITE) or M (DTR_MODIFY) To Record Definition P (PASS_THRU) S (SEE) E (DTR_EXTEND/EXECUTE)

2.2.2.2 Default Access Control Lists – When you create a dictionary directory, subdictionary, or object, the default ACL entry grants privileges to your username. Table 2-3 summarizes these privileges.

Table 2-3: Default Access Control Lists

For Dictionary or Subdictionary Directories	For Dictionary Objects
C (CONTROL)	C (CONTROL)
D (LOCAL_DELETE)	D (LOCAL_DELETE)
H (HISTORY)	E (DTR_EXTEND/EXECUTE)
P (PASS_THRU)	H (HISTORY)

(continued on next page)

Table 2-3: **Default Access Control Lists (Cont.)**

For Dictionary or Subdictionary Directories	For Dictionary Objects
S (SEE)	M (DTR_MODIFY)
X (EXTEND)	R (DTR_READ)
	S (SEE)
	U (UPDATE)
	W (DTR_WRITE)

2.3 Creating ACL Entries

You can create ACL entries for dictionary objects and directories in three ways:

- DATATRIEVE DEFINEP command. See the section in this chapter about the DEFINEP command for detailed information.
- SET PROTECTION/EDIT command of the CDD Dictionary Management Utility (DMU). This feature allows you to edit ACLs from VT100 or VT200 family terminals with single-stroke keypad commands. See the *VAX Common Data Dictionary Utilities Reference Manual* for detailed information about the DMU SET PROTECTION/EDIT command.
- SET PROTECTION command of the CDD Dictionary Management Utility (DMU). See the *VAX Common Data Dictionary Utilities Reference Manual* for detailed information about the DMU SET PROTECTION command.

2.3.1 Suggestions for Assigning Privileges

There are many combinations of privileges that you can assign to users. This section offers some suggestions concerning the privileges you might grant, deny, and banish for different types of users.

For many applications, users need only DTR_READ, PASS_THRU, and SEE to access the data definitions in the CDD. Consider restricting most users to these privileges to safeguard the dictionary. Other suggestions include:

- Restricting full access at CDD$TOP to the system manager or data administrator responsible for organizing and maintaining the directory hierarchy. Limit all other users to PASS_THRU.
- Distributing control over the next level in the hierarchy. If, for example, your dictionary is organized by department, give each department manager the privileges needed to manage his or her portion of the hierarchy.

- Making full access more widespread at the second level below CDD$TOP, where some data definitions are stored and where some users have personal directories assigned to them. Grant DTR_READ, PASS_THRU, SEE, and HISTORY to those users who need only to access record definitions and record audit trail information in history list entries. For those users with personal directories, you can include CONTROL, LOCAL_DELETE, and EXTEND as well.
- Denying access privileges to all other users. Create a last ACL entry for users with a UIC = [*,*] to deny all privileges (DENY = ALL). By taking this action, you prevent other users from inheriting privileges from higher directories. This catch-all entry ensures that only the users specified in the other ACL entries have access to that part of the dictionary.

You should be especially careful about granting CONTROL, FORWARD, and GLOBAL_DELETE.

- CONTROL allows the user who possesses it to use the DEFINEP command. Therefore, CONTROL is equivalent in effect to having all access privileges. At the top levels of the hierarchy, limit CONTROL to the system manager or data administrator.
- FORWARD allows the user to create subdictionary files. Subdictionaries can be more secure than dictionary directories, but they require more time for I/O operations, and they are charged against FILLM, your VMS open file limit. Whether or not you choose to use subdictionaries, you should limit the ability to create them to the system manager or data administrator.
- GLOBAL_DELETE allows the user to delete a directory or subdictionary *and all of its descendants.* You should deny GLOBAL_DELETE to all users except the system manager or data administrator.

Any user with VMS BYPASS privilege has full access to the entire CDD. As a general rule, you should grant users only those privileges they need to work in their portions of the CDD. For more information on CDD access privileges and the DMU commands to establish the privileges, see the *VAX Common Data Dictionary Utilities Reference Manual.*

2.3.2 The Syntax of the DEFINEP Command

To assign privileges without leaving DATATRIEVE, you can use the DEFINEP command. To create an ACL entry with the DEFINEP command, you must have at least P (PASS_THRU) and C (CONTROL) access to the object or directory whose ACL you want to change.

The format of the DEFINEP command is:

```
DEFINEP [FOR] path-name sequence-number [,]
 / PW = password                         \
 | UIC = [uic-spec]                       |
 | USER = username                        |
 |                                        |       /  / GRANT  \     / privilege-list \ \
<                  / TTnn:     \           > [,...] {,} <  < DENY    >  =  <                > >  [,...]
 |                 | LOCAL     |          |       \  \ BANISH /     \ ALL            / /
 | TERMINAL =     <  NONLOCAL   >         |
 |                 | BATCH     |          |
 \                 \ NETWORK   /          /
```

2.3.2.1 Path Name in the DEFINEP Command – The path name is the dictionary path name of the object or directory to whose ACL you want to add an entry. It can be the given name, full dictionary path name, or relative dictionary path name of the dictionary object or directory whose ACL you want to change.

For example, assume that your default directory is CDD$TOP.INVENTORY.

- To change the ACL for CDD$TOP.INVENTORY.INFO, use the given name:

```
DTR> DEFINEP FOR INFO ...
```

- To change the ACL for CDD$TOP.INVENTORY.INFO.YACHTS, use a relative path name:

```
DTR> DEFINEP FOR INFO.YACHTS ...
```

- To change the ACL for CDD$TOP.FAMILIES, use a relative path name:

```
DTR> DEFINEP FOR -.FAMILIES ...
```

- To change the ACL for CDD$TOP.INVENTORY, the default directory, use a relative path name or the full dictionary path name:

```
DTR> DEFINEP FOR -.INVENTORY ...
```

or

```
DTR> DEFINEP FOR CDD$TOP.INVENTORY ...
```

2.3.2.2 Sequence Number in the DEFINEP Command — The sequence number of an ACL entry indicates its position in the ACL. Entry 1 is at the top of the ACL, and the entry with the largest number is at the bottom. The position of entries in the ACL can be important. Illogical orders of entries can create serious problems for all users of a dictionary object or directory. For example, if the first entry in the ACL denies P (PASS_THRU) access to all users, no one can use the directory or object, and no one without a privileged VMS account can change the ACL to correct the faulty entry.

In the DEFINEP command, the sequence number indicates the position in the ACL you want the entry to have. The sequence number of an ACL entry is not absolute, but only relative to the position of the entry in the ACL. When ACL entries are added or deleted, the sequence numbers of the remaining entries can change. Specifying a sequence number in the DEFINEP command has these effects:

- If the sequence number in the DEFINEP command is smaller than the number of entries already in the ACL, the CDD changes the sequence numbers of entries whose number is equal to or greater than the number specified in the DEFINEP command. For example, if the ACL has four entries in it and you enter a sequence number of 3 in the DEFINEP command, the sequence numbers of the original entries numbered 3 and 4 change to 4 and 5.
- If the sequence number in the DEFINEP command is larger than the number of entries in the ACL, the CDD changes the sequence number of the new entry to one greater than the previous number of entries in the ACL. For example, if the ACL has four entries in it and you enter a sequence number of 7 in the DEFINEP command, the CDD changes the sequence number of the entry to 5 because it is now the fifth entry in the ACL.

Previous sections of this chapter have discussed the user identification criteria and the privilege specifications.

Here is a sample ACL and DEFINEP command to show the effect of adding an ACL entry to the middle of the list:

```
DTR> SHOWP FOR PERSONNEL
  1:    [*,*], Username: "JONES"
        Grant - RSW, Deny - none, Banish - none
  2:    [*,*], Password: "SECRET", Username:  "DENN"
        Grant - C, Deny - none, Banish - none
  3:    [*,*]
        Grant - none, Deny - P, Banish - none
```

(continued on next page)

```
DTR> DEFINEP FOR CDD$TOP.PERSONNEL 2
[Looking for define privilege option]
CON> PW = CHAUCER, USER = METES, TERMINAL = NONLOCAL,
[Looking for define privilege option]
CON> GRANT = EMPRSWUX, BANISH = G

DTR> SHOWP FOR CDD$TOP.PERSONNEL
  1:    [*,*], Username: "JONES"
        Grant - RSW, Deny - none, Banish - none
  2:    [*,*], Password: "CHAUCER", Terminal: "NONLOCAL", Username: "METES"
        Grant - EMPRSUWX, Deny - none, Banish - G
  3:    [*,*], Password: "SECRET", Username:  "DENN"
        Grant - C, Deny - none, Banish - none
  4:    [*,*]
        Grant - none, Deny - P, Banish - none

DTR>
```

For more information about the DEFINEP command, see the DEFINEP section in the reference chapter of this manual.

2.4 Removing Entries from an ACL

You can remove entries from an ACL in three ways:

- DATATRIEVE DELETEP command. See the section in this chapter about the DELETEP command for information.
- SET PROTECTION/EDIT command of the CDD Dictionary Management Utility (DMU). This feature, available only from the DMU prompt, allows you to edit ACLs from VT100 or VT200 family terminals with single-stroke keypad commands. See the *VAX Common Data Dictionary Utilities Reference Manual* for detailed information about the DMU SET PROTECTION/EDIT command.
- DELETE/PROTECTION command of the CDD Dictionary Management Utility (DMU). See the *VAX Common Data Dictionary Utilities Reference Manual* for detailed information about the DMU DELETE/PROTECTION command.

To remove an ACL entry with the DELETEP command, you must have at least P (PASS_THRU) and C (CONTROL) access to the object or directory whose ACL you want to change.

The format of the DELETEP command is:

```
DELETEP  path-name  sequence-number
```

The path-name is the given name, full dictionary path name, or relative path-name of the object or dictionary whose ACL you want to change. The sequence-number is the sequence number of the entry in the ACL. To be sure you remove the correct entry from the ACL, enter a SHOWP command before entering a DELETEP command.

When you remove an ACL entry from any position but the last in the list, the sequence numbers of all the entries between the one removed and the end of the list are reduced by one. For example, this DELETEP command removes the second entry from the ACL for CDD$TOP.PERSONNEL:

```
DTR> SHOWP CDD$TOP.PERSONNEL(SECRET)
  1:    [*,*], Username: "JONES"
        Grant - RSW, Deny - none, Banish - none
  2:    [*,*], Password: "CHAUCER", Terminal: "NONLOCAL", Username: "METES"
        Grant - EMPRSUWX, Deny - none, Banish - G
  3:    [*,*], Password: "SECRET", Username:  "DENN"
        Grant - C, Deny - none, Banish - none
  4:    [*,*]
        Grant - none, Deny - P, Banish - none

DTR> DELETEP CDD$TOP.PERSONNEL(SECRET) 2
DTR> SHOWP CDD$TOP.PERSONNEL(SECRET)
  1:    [*,*], Username: "JONES"
        Grant - RSW, Deny - none, Banish - none
  2:    [*,*], Password: "SECRET", Username:  "DENN"
        Grant - C, Deny - none, Banish - none
  3:    [*,*]
        Grant - none, Deny - P, Banish - none

DTR>
```

When entry number 2 is removed, entry 3 becomes 2 and entry 4 becomes 3. Because the sequence numbers are relative to the position of the entries in the ACL, the numbers adjust to close any gaps and preserve the sequential numbering of the entries.

For more information, see the DELETEP section in the reference chapter of this manual.

Value Expressions and Boolean Expressions 3

3.1 Introduction

This chapter describes the value expressions and Boolean expressions used in VAX DATATRIEVE statements.

A **value expression** is a string of symbols that specifies a value DATATRIEVE can use when executing statements.

DATATRIEVE provides you with value expressions of the following types:

- Character string literals
- Numeric literals
- Qualified field names
- Local and global variables
- Date value expressions
- Prompting value expressions
- Values from dictionary and domain tables
- FROM value expression
- CHOICE value expression
- IF-THEN-ELSE value expression
- FORMAT value expression

- Statistical expressions
- Arithmetic expressions
- Concatenated expressions

In addition, certain DATATRIEVE functions are value expressions. They are described in the chapter on functions.

A **Boolean expression** is the logical representation of a relationship between value expressions. The value of a Boolean expression is either true or false.

The Boolean expressions used in DATATRIEVE consist of value expressions, relational operators, and Boolean operators. The **relational operators** control the comparison of value expressions. The **Boolean operators** enable you to join two or more Boolean expressions and to reverse the value of a Boolean expression.

3.2 Value Expressions

Value expressions specify values that DATATRIEVE uses when executing statements.

3.2.1 Literals

The simplest way to specify a value is with a literal. A **literal** is either a character string enclosed in quotation marks or a number.

3.2.1.1 Character String Literals — A **character string literal** is a string of printing characters up to 253 characters long. The maximum size for an input line in DATATRIEVE is 255 characters, but in character string literals, two of those characters are used for the quotation marks. The printing characters consist of the uppercase and lowercase letters, numbers, and the following special characters:

! @ # # $ % ^ & * ( ) - _ = + ' [

{] } ~ ; : ' " \ | , < . > / ?

To type a literal on more than one line, enter a hyphen immediately before pressing the RETURN key. DATATRIEVE strips the hyphen from that part of the character string literal and waits for you to complete the literal by typing the closing quotation mark. As long as the total number of characters in the literal does not exceed 253, you can use any number of continuation characters between the quotation marks.

The maximum length of character strings used as the values of variables or fields is independent of the maximum length of character string literals. However, to assign as a value a character string exceeding 253 characters in length, you must use one of two methods:

- You can use concatenated expressions (described in the section in this chapter on concatenated expressions).
- For field values, you can define a very long field as a group field composed of elementary fields up to 253 characters long, and then store character string values in each elementary field.

Use pairs of either single or double quotation marks to enclose character string literals. You must use the same type of quotation mark to end a character string literal as you used to begin it.

To include one type of quotation mark in a character string literal, enclose the literal in quotation marks of the other type. For example, to include double quotation marks in a character string literal, enclose the character string in single quotation marks. In such cases, you can include unpaired quotation marks in the literals.

To include a quotation mark in a character string literal enclosed by the quotation marks of the same type, you must type two consecutive quotation marks for every one you want to include in the literal.

The following are examples of character string literals and their values:

```
Literal: "Invalid value for this field"
 Value: Invalid value for this field

Literal: "MAXIMUM PRICE IS $1400.  PLEASE RE-ENTER PRICE.
 Value: MAXIMUM PRICE IS $1400.  PLEASE RE-ENTER PRICE.

Literal: "Capt. Jack says, ""Time to reorder."""
 Value: Capt. Jack says, "Time to reorder."

Literal: "They said, ""We're going."""
 Value: They said, "We're going."

Literal: 'They said, "We''re going."'
 Value: They said, "We're going."
```

Although DATATRIEVE usually converts all lowercase letters of your input to uppercase, it preserves lowercase letters in character string literals. Because the case of the character string literals is preserved, comparisons using these literals are case-sensitive.

3.2.1.2 Numeric Literals – A **numeric literal** is a string of digits that DATATRIEVE interprets as a decimal number. A numeric literal may contain a decimal point and up to 31 digits. The decimal point is optional and is not counted in the maximum number of digits.

A numeric literal *can* begin with a decimal point. Thus, for example, .5 is a valid numeric literal.

A numeric literal *cannot* end with a decimal point. For example, 123. is *not* a valid numeric, but 123.0 is.

If you use a numeric literal to assign a value to a field or a variable, the data type of the field or variable controls the maximum value you can assign.

Restrictions

- When the field or variable belongs to the data type COMP, the limit on the number of digits you can specify in the PICTURE (PIC) clause is 18. If you specify a number of digits greater than 18 in the PIC clause, DATATRIEVE displays an error message on your terminal.
- When the field or variable belongs to the data type LONG, the largest number you can assign to that field or variable is 2,147,483,647. Any larger number with 31 digits or less results in a truncation error. The smallest number you can assign is −2,147,483,648. Any smaller number with less than 31 digits results in a truncation error.
- For all other numerical data types, the limit on digits you can assign and display is 31.
- The format specified in the PICTURE (PIC) clause of a field or variable also limits the values you can assign with numeric literals. See the section on the PICTURE clause in the reference chapter of the manual for more information.

3.2.2 Qualified Field Names

You can use elementary field names, virtual field names, and group field names as value expressions.

3.2.2.1 Elementary and REDEFINES Field Names – The value specified by an elementary field name is the value stored in a field of a record. If the field name you use refers to a REDEFINES field, the value associated with the name is determined by the clauses that define the REDEFINES field in the record definition.

3.2.2.2 COMPUTED BY Fields — COMPUTED BY fields are **virtual fields**. DATATRIEVE does not store the value of a COMPUTED BY field in a record. That value is calculated every time you refer explicitly or implicitly to a COMPUTED BY field.

The COMPUTED BY clause includes a value expression. The value specified by the virtual field is associated with the value expression in the COMPUTED BY clause. See the section on COMPUTED BY in the reference section of this manual for more information.

3.2.2.3 Group Field Names — When you use group field names in assignment statements, the value of the group field depends on the type of assignment you specify:

- group-field-name-1 = group-field-name-2

  In this type of assignment, the value of group-field-name-2 includes the values of all elementary fields, all REDEFINES fields, and all COMPUTED BY fields. The assignment of values is made on the basis of similar field names. For field names in group-field-1 that match names in group-field-2, DATATRIEVE assigns the values in group-field-2 to the appropriate fields in group-field-1.

  DATATRIEVE ignores any fields in group-field-2 whose names do not match any field names in group-field-1. For any elementary field in group-field-1 whose name matches none of the field names in group-field-2, DATATRIEVE assigns the MISSING or DEFAULT value if one is defined for the field, or a value of 0 if the field is numeric, or a blank if the field is alphabetic or alphanumeric.

  DATATRIEVE stores no values in any COMPUTED BY or REDEFINES fields in group-field-1, regardless of any matches between the names of those fields and fields of any type in group-field-2.

  The values of the elementary, REDEFINES, and COMPUTED BY fields associated with group-field-name-2 are the values stored in or associated with the fields that constitute group-field-2 of a record.

- elementary-field-name = group-field-name

  Because of problems that can arise from conflicting data types, assignments of this type are not recommended.

  If you make an assignment of this type, the value of the group field is the same value displayed on your terminal when you enter a DISPLAY group-field-name statement. The value is the concatenation of the values in the elementary fields that constitute the group field. REDEFINES and COMPUTED BY fields are ignored. You can reduce conflicts of data types by using an alphanumeric PICTURE string in the definition of the elementary field.

3.2.2.4 Query Names — If the record definition contains a query name for a field, you can use the query name exactly as you use the associated field name.

3.2.2.5 Qualifying Field Names — To clarify the context for recognizing names and associating values with those names, you can qualify field names with several optional elements:

- Context variables

  Distinguish between fields in different record streams.

- Collection names

  Distinguish between fields in selected records in different collections. You can use a collection name to modify a field from a selected record only.

- Domain names

  Distinguish between fields that have the same field name but are associated with different domains.

- Record names

  Distinguish between fields that have the same field name but are contained in different records.

- Group field names

  Distinguish between fields that have the same field name but are contained in different group fields.

Use the following format to specify field names:

```
[ collection-name. ]
[ context-variable.] [domain-name.] [record-name.] [group-field-name.] [...] field-name
```

For duplicate field names, you must specify whatever option or combination of options is needed to make the name unique.

3.2.3 Variables

The DECLARE statement defines global and local variables for use as value expressions. When DATATRIEVE initializes a variable, it assigns the variable the MISSING VALUE or DEFAULT VALUE if one is specified in the DECLARE statement. DATATRIEVE assigns a value of zero to numeric variables and a space to alphabetic and alphanumeric variables if no MISSING VALUE or DEFAULT VALUE is specified.

3.2.3.1 Global Variables – You can define global variables only with DECLARE statements entered in response to the DTR> prompt of DATATRIEVE command level.

You can use a global variable as a value expression in any DATATRIEVE statement. Unless you define a global variable with a COMPUTED BY clause, the global variable retains the value you assign to it until you either assign it a new value or release it with the RELEASE command.

The value of a global variable defined with a COMPUTED BY clause depends on the value expression that controls the computation. For example, you can declare the value of the variable to be 1.2 times the price of a boat in the YACHTS domain. The value of the variable changes according to the value of the PRICE field for different records:

```
DTR> READY YACHTS
DTR> DECLARE VAR COMPUTED BY PRICE * 1.2.
DTR> FOR FIRST 5 YACHTS PRINT VAR USING $$$,$$$.99

   VAR

$44,341.20
$21,480.00
$33,000.00
$22,320.00
$11,874.00

DTR>
```

3.2.3.2 Local Variables — You can define local variables with DECLARE statements entered in BEGIN-END and THEN statements.

A local variable is released as soon as DATATRIEVE completes the execution of the clause or statement in which it was declared. Although a local variable stays in effect for subsequent statements of the compound statement in which it is declared, it has no meaning in any outer statements containing that compound statement.

The following example illustrates how a local variable declared in an inner statement can supersede one with the same name declared in an outer statement. Notice, however, that the value of the variable in the outer statement is not affected by the different data type or different value assigned to the inner one. Note also that neither local variable exists when DATATRIEVE completes the execution of the compound statements containing them both:

```
DTR> SET NO PROMPT
DTR> BEGIN
CON>    DECLARE X PIC XXX.
CON>    X = "TOP"

CON>    PRINT X
CON>            BEGIN
CON>               DECLARE X PIC 9V99 EDIT_STRING 9.99.
CON>               X = 1.23
CON>               PRINT X
CON>            END
CON>    PRINT X
CON> END

 X

TOP

 X

1.23

 X

TOP

DTR> PRINT X
Field "X" is undefined or used out of context
DTR>
```

To avoid problems resolving names for variables and fields, do not use variable names that duplicate field names of domains you have readied.

3.2.4 Date Value Expressions

If you define a field or a variable with a USAGE DATE clause, then you can assign a value with one of the four DATATRIEVE date value expressions:

- "TODAY" returns the value of the current system date.
- "NOW" returns the value of the current system date and time.
- "YESTERDAY" returns the value of one day before the current date.
- "TOMORROW" returns the value of one day after the current date.

Note that "NOW" is the only value expression that returns the time as well as the date. You can use the function FN$DATE to assign a date field a time that is not current.

The following DATATRIEVE session illustrates these expressions:

```
DTR> DECLARE X USAGE DATE.
DTR> X = "TODAY"
DTR> PRINT X

     X

28-Dec-1982

DTR> X = "TOMORROW"
DTR> PRINT X

     X

29-Dec-1982

DTR> X = "YESTERDAY"
DTR> PRINT X

     X

27-Dec-1982

DTR> DECLARE Y PIC X(23).
DTR> X = "NOW"
DTR> Y = X
DTR> PRINT Y

        Y

28-Dec-1982 13:35:11.54

DTR>
```

You can add or subtract dates. For example, you might want to know how many days you have to complete a project. Define variables for today's date and the project date. Then subtract today's date from the project due date:

```
DTR> DECLARE T USAGE DATE.
DTR> T = "TODAY"
DTR> DECLARE PROJECT_DUE DATE.
DTR> PROJECT_DUE = "21-AUG-83"
DTR> PRINT (PROJECT_DUE - T)
                         112

DTR>
```

DATATRIEVE indicates that the project is due in 112 days.

To use these value expressions, the field or variable must be assigned the DATE data type. Otherwise, DATATRIEVE treats the expression as a character string literal. For example:

```
DTR> PRINT "TODAY"
TODAY

DTR>
```

DATATRIEVE returns the value "TODAY" because the quoted expression is not associated with a variable or field of the DATE data type. However, if you supply an edit string containing date edit string characters, DATATRIEVE returns the current system date in the form specified by the edit string:

```
DTR> PRINT "TODAY" USING DD-MMM-YY
18-Jan-83

DTR>
```

3.2.5 Prompting Value Expressions

If you want DATATRIEVE to prompt you for a value, use a prompting value expression. This feature is especially useful in a procedure because it allows you to use a different value each time you invoke the procedure. DATATRIEVE recognizes two types of prompting expressions: the *.prompt and the **.prompt.

The format of a *.prompt value expression is:

*."prompt-name"

The prompt name is a character string literal. If the prompt name contains no blanks and conforms to the rules for DATATRIEVE names, you do not have to enclose the literal in quotation marks. If the prompt name contains blanks or does not conform to those rules, you must enclose it in quotation marks.

If you put a *.prompt value expression in a REPEAT loop or a FOR loop, DATATRIEVE prompts you for a value each time it executes the loop.

The format of the **.prompt value expression is:

**."prompt-name"

The same rules govern the use of quotation marks for the literal in the prompt name.

If you put a **.prompt value expression in a REPEAT loop or a FOR loop, DATATRIEVE prompts you for a value only the first time it executes the loop. If your **.prompt value expression assigns a value to a variable or a field, DATATRIEVE uses the same value each time through the loop. This feature is especially useful when storing or modifying a group of records that have a common value in one or more fields.

The following example shows the difference between the *.prompt and **.prompt value expressions:

```
DTR> READY PHONES WRITE
DTR> REPEAT 2
CON>    STORE PHONES USING
CON>    BEGIN
CON>            DEPARTMENT = **.DEPARTMENT
CON>            LOCATION = **.LOCATION
CON>            NAME = *.NAME
CON>            NUMBER = *.NUMBER
CON>    END
Enter DEPARTMENT: CED
Enter LOCATION: MK3
Enter NAME: Gardens, Marvin
Enter NUMBER: 555-1776
Enter NAME: D'Ecor, Espree
Enter NUMBER: 555-1812
DTR>
```

3.2.6 Values from a Table

You can use a value stored in a dictionary table or a domain table anywhere the syntax of a DATATRIEVE statement allows a value expression.

The format for retrieving a value from a dictionary table or a domain table is:

value-expression VIA table-name

If the value expression you specify is stored as a code string in the table you specify, the value of the entire expression is the corresponding translation string in the table.

If the table contains an ELSE clause and the value expression you specify does not match any code string in the table, the value of the entire expression is the translation string stored in the ELSE clause of the table.

If the table contains no ELSE clause and the value expression you specify does not match any code string in the table, DATATRIEVE displays this message on your terminal:

```
Value not found from record or table.
```

See the *VAX DATATRIEVE Handbook* for more information about the creation and use of dictionary tables and domain tables.

3.2.7 Statistical Expressions

Statistical expressions compute values based on a value expression evaluated for each record in a record stream.

Format

To specify the average, maximum, minimum, standard deviation, or total:

$$\left\{\begin{array}{l}\text{AVERAGE}\\ \text{MAX}\\ \text{MIN}\\ \text{STD\_DEV}\\ \text{TOTAL}\end{array}\right\}\ \text{value-expression [OF rse]}$$

To specify the count:

COUNT [OF rse]

To specify the running count:

RUNNING COUNT

To specify the running total:

RUNNING TOTAL value-expression

Arguments

value-expression

Is a DATATRIEVE value expression that the statistical function operates on.

OF rse

Is a record selection expression you can use to form a record stream of the records to which the statistical function applies.

Table 3-1 shows the operations performed by the DATATRIEVE statistical functions.

Table 3-1: Values Derived with Statistical Functions

Function	Value of Function
AVERAGE	The average value of the value expression
MAX	The largest value of the value expression
MIN	The smallest value of the value expression
STD_DEV	The standard deviation of the value expression
TOTAL	The total value of the value expression
RUNNING TOTAL	The running total of the value expression for each evaluation of the PRINT statement
COUNT	The number of records in the CURRENT collection or in a specified collection or record stream
RUNNING COUNT	The running count of the evaluations of the PRINT statement

Restrictions

- If you leave out the OF rse clause, you must have a current collection of records to which the value expression applies.
- Except for COUNT and RUNNING COUNT, you must supply a value expression when using the statistical functions. The value expression you usually supply is a field name or a variable name.
- Do not supply a value expression when using COUNT or RUNNING COUNT.

- Note that DATATRIEVE does not reset RUNNING COUNT and RUNNING TOTAL inside a compound statement:

```
DTR> FOR FIRST 3 YACHTS
CON>    BEGIN
CON>      PRINT "outside running count", RUNNING COUNT, BUILDER
CON>      FOR FIRST 3 YACHTS
CON>         PRINT "inside running count", RUNNING COUNT, BUILDER
CON>    END
```

  In this example, DATATRIEVE does not reset the running count for "inside running count."

Results

- If you supply a record selection expression, DATATRIEVE uses all the records in the resulting record stream to compute the value of the function.
- If you do not supply a record selection expression in the OF clause, DATATRIEVE uses all records in the current collection to compute the value of the function.

Usage Notes

- If you specify two or more statistical expressions in the same PRINT statement, include an OF rse clause with *each* expression to identify the record stream relating to each statistical function. In the following example, the average is computed for the current collection because no RSE is specified, but the total is computed for the first five yachts only:

```
DTR> READY YACHTS
DTR> FIND YACHTS
[113 records found]
DTR> PRINT AVERAGE LOA, TOTAL LOA OF FIRST 5 YACHTS

AVERAGE  TOTAL
LENGTH   LENGTH
 OVER     OVER
  ALL     ALL

  30.        146
```

  In the following case, the RSE is specified for both average and total. As a result, the statistical functions compute the average LOA and total LOA for the first five YACHTS records.

```
DTR> PRINT AVERAGE LOA OF FIRST 5 YACHTS,
CON>      TOTAL LOA OF FIRST 5 YACHTS

AVERAGE  TOTAL
LENGTH   LENGTH
 OVER     OVER
  ALL     ALL

  29.        146

DTR>
```

- When a value expression is more complex than a field name or variable name, enclose the expression with parentheses. For example:

```
DTR> PRINT TOTAL (BEAM + LOA) OF FIRST 5 YACHTS

  TOTAL

      194

DTR> PRINT AVERAGE (BEAM/2) OF FIRST 5 YACHTS

AVERAGE

   4.800

DTR>
```

- When you include a statistical expression in a PRINT statement or in Report Writer PRINT or AT statements, DATATRIEVE forms a column header by combining the name of the statistical function and the field name.

- When DATATRIEVE uses a statistical function to calculate a value based on the values of fields or variables, it does not include those values specified as MISSING values in the record definition or in the DECLARE statement. When DATATRIEVE omits records from a calculation because they have MISSING values in the specified field, it displays a message on your terminal between the column header and the value:

```
DTR> FINISH
DTR> READY YACHTS
DTR> FIND YACHTS
[113 records found]
DTR> PRINT AVERAGE PRICE

AVERAGE
 PRICE

[Function computed using 50 of 113 values.]
$25,388

DTR>
```

- Statistical expressions can be used anywhere the syntax of a DATATRIEVE statement allows a value expression. A statistical expression can be the value expression that is part of another statistical expression.
- Note that DATATRIEVE increments RUNNING TOTAL and RUNNING COUNT for each occurrence of a list field and for each iteration of a loop:

```
DTR> FOR FIRST 2 FAMILIES
CON> BEGIN
CON>   PRINT SKIP 1, "Outer Running Count", RUNNING COUNT
CON>   PRINT PARENTS, SKIP 1
CON>   FOR KIDS
CON>     PRINT "Inner Loop", RUNNING COUNT,
CON>       EACH_KID, RUNNING TOTAL AGE
CON> END

                        RUNNING
                         COUNT

Outer Running Count        1

  FATHER      MOTHER

JIM         ANN

                                         RUNNING
              RUNNING    KID              TOTAL
               COUNT     NAME     AGE      AGE

Inner Loop       1   URSULA       7          7
Inner Loop       2   RALPH        3         10

Outer Running Count        2

JIM         LOUISE

Inner Loop       3   ANNE        31         41
Inner Loop       4   JIM         29         70
Inner Loop       5   ELLEN       26         96
Inner Loop       6   DAVID       24        120
Inner Loop       7   ROBERT      16        136
```

Examples

AVERAGE

```
DTR> PRINT AVERAGE PRICE OF YACHTS WITH BUILDER = "AMERICAN"

AVERAGE
 PRICE

$14,395

DTR>
```

COUNT

```
DTR> PRINT COUNT OF FAMILIES WITH NUMBER_KIDS EQ 2 USING 9

COUNT

  6

DTR>
```

MAX

```
DTR> PRINT FAMILIES WITH
DTR>   NUMBER_KIDS EQ MAX NUMBER_KIDS OF FAMILIES

                        NUMBER    KID
  FATHER      MOTHER     KIDS     NAME     AGE

BASIL       MERIDETH      6   BEAU       28
                              BROOKS     26
                              ROBIN      24
                              JAY        22
                              WREN       17
                              JILL       20

DTR>
```

MIN

```
DTR> PRINT YACHTS WITH PRICE EQ MIN PRICE

                              LENGTH
                               OVER
MANUFACTURER    MODEL   RIG     ALL   WEIGHT BEAM  PRICE

 VENTURE       21       SLOOP   21     1,500  07   $2,823

DTR>
```

RUNNING COUNT

```
DTR> PRINT RUNNING COUNT, TYPE, BEAM, LOA OF YACHTS WITH
CON>    BUILDER = "PEARSON"

                                           LENGTH
RUNNING                                     OVER
 COUNT  MANUFACTURER   MODEL       BEAM  ALL

     1    PEARSON      10M          11    33
     2    PEARSON      26           08    26
     3    PEARSON      26W          09    26
     4    PEARSON      28           09    28
     5    PEARSON      30           09    30
     6    PEARSON      35           10    35
     7    PEARSON      36           11    37
     8    PEARSON      365          11    36
     9    PEARSON      39           12    39
    10    PEARSON      419          13    42

DTR>
```

RUNNING TOTAL

```
DTR> FOR FIRST 5 YACHTS PRINT TYPE, PRICE,
CON>    RUNNING TOTAL PRICE USING $$$$,$$$

                                    RUNNING
                                     TOTAL
MANUFACTURER   MODEL       PRICE    PRICE

 ALBERG      37 MK II   $36,951  $36,951
 ALBIN       79         $17,900  $54,851
 ALBIN       BALLAD     $27,500  $82,351
 ALBIN       VEGA       $18,600 $100,951
 AMERICAN    26          $9,895 $110,846

DTR>
```

STD_DEV

```
DTR> PRINT STD_DEV PRICE OF YACHTS USING $$$,$$$

STANDARD
DEVIATION
  PRICE

[Function computed using 50 of 113 values.]
$15,480

DTR>
```

TOTAL

```
DTR> PRINT TOTAL PRICE OF YACHTS WITH
CON>     BUILDER = "CHALLENGER" USING $$$$,$$$

 TOTAL
 PRICE

$122,278

DTR>
```

3.2.8 Arithmetic Expressions

An arithmetic expression consists of value expressions and arithmetic operators. The value expressions must all be numeric. You can use an arithmetic expression anywhere the syntax of a DATATRIEVE statement allows a value expression.

DATATRIEVE provides four arithmetic operators. Table 3-2 shows the arithmetic operators and the operation each performs.

Table 3-2: Arithmetic Operators

Operator	Operation
+	Addition
–	Subtraction or negation
*	Multiplication
/	Division

You do not have to use spaces to separate arithmetic operators from value expressions, except in one case: if a DATATRIEVE name precedes a minus sign, you must put a space before the minus sign. Otherwise, DATATRIEVE interprets the minus sign as a hyphen and converts it to an underscore:

```
DTR> DECLARE X PIC 99.
DTR> X = 8
DTR> PRINT X-1
"X_1" is undefined or used out of context
DTR> PRINT 1-X
  -7

DTR>
```

You can use parentheses to control the order in which DATATRIEVE performs arithmetic operations. DATATRIEVE follows the normal rules of precedence when evaluating arithmetic expressions:

1. DATATRIEVE first evaluates any value expressions in parentheses.
2. DATATRIEVE then performs multiplications and divisions from left to right in the arithmetic expression.
3. Finally, DATATRIEVE performs additions and subtractions from left to right in the arithmetic expression.

The following examples show how DATATRIEVE evaluates arithmetic expressions:

```
DTR> PRINT (6 * 7) + 5
  47

DTR> PRINT 6 * (7 + 5)
  72

DTR> PRINT 6 + 7 * 5
  41

DTR> PRINT 12 - 6 * 2
   0

DTR> PRINT 5 + 10 / 2
   10

DTR>
```

3.2.9 Concatenated Expressions

DATATRIEVE allows you to join value expressions to form a concatenated expression. You can use a concatenated expression anywhere the syntax of a DATATRIEVE statement allows a character string literal. When DATATRIEVE concatenates value expressions, it converts their values to character string literals.

DATATRIEVE provides three types of concatenated expressions:

- value-expression | value-expression
- value-expression || value-expression
- value-expression ||| value expression

In each case, DATATRIEVE converts the values of each value expression to a character string literal and joins the literals to form a longer literal. The differences among the three forms of concatenated expression lie in the way they treat trailing spaces of the first literal, and whether they add any spaces between the literals.

Single bar leaves the literals as they are:

```
"ABC"|"DEF"    "ABC  "|"DEF"   "ABC"|"  DEF"   "ABC  "|"  DEF"
 ABCDEF         ABC  DEF        ABC  DEF        ABC    DEF
```

Double bar suppresses trailing spaces of the first literal and does nothing to the leading spaces of the second literal:

```
"ABC"||"DEF"   "ABC  "||"DEF"  "ABC"||"  DEF"  "ABC  "||"  DEF"
 ABCDEF         ABCDEF          ABC  DEF        ABC  DEF
```

Triple bar suppresses trailing space of the first literal, inserts one space, and does nothing to the leading spaces of the second literal:

```
"ABC"|||"DEF"  "ABC  "|||"DEF" "ABC"|||"  DEF" "ABC  "|||"  DEF"
 ABC DEF        ABC DEF         ABC   DEF       ABC   DEF
```

You can use concatenated expressions for assigning values to lengthy fields or variables. Concatenated expressions provide the only method for assigning values to fields or variables whose lengths exceed 255 characters. The following example combines the T edit string, *.prompt value expressions, and character string literals to assign a value to a long variable. You can use similar assignment statements in the USING clauses of the STORE and MODIFY statements:

```
DTR> DECLARE STR PIC X(300) EDIT_STRING IS T(50).
DTR> STR = *.L1|*.L2|*.L3|*.L4|*.L5
Enter L1: This string contains the first part of a long character
Enter L2: string. This string is so long that you can't use just
Enter L3: one character string literal to assign a value to it.
Enter L4: You need concatenated expressions to increase the length
Enter L5: of this string beyond the limit of 255 characters.
DTR> PRINT STR

                       STR

This string contains the first part of a long
character string. This string is so long that you
can't use just one character string literal to
assign a value to it.  You need concatenated
expressions to increase the length of this string
beyond the limit of 255 characters.

DTR>
```

3.2.10 Conditional Value Expressions

The CHOICE and IF-THEN-ELSE value expressions return a value based on the evaluation of one or more Boolean expressions. These value expressions are useful when you need to assign values that depend on certain conditions. They can be used in any statement that accepts value expresions, as well as in COMPUTED BY clauses for variables or field definitions.

3.2.10.1 CHOICE Value Expression — Returns one of a series of values depending on the evaluation of a series of conditional, or Boolean, expressions.

Format

```
CHOICE  [OF]

         boolean-expression-1  [THEN]  value-1
        [boolean-expression-2  [THEN]  value-2]

                  .               .       .
                  .               .       .
                  .               .       .

        ELSE value-n

END_CHOICE
```

Arguments

CHOICE

Marks the beginning of a CHOICE value expression.

OF

Is an optional word used to clarify syntax.

boolean-expression

Is a Boolean expression.

THEN

Is an optional language element you can use to clarify syntax.

value

Is the value returned by DATATRIEVE if the corresponding Boolean expression evaluates to "true."

ELSE value-n

Is the value returned by DATATRIEVE if all the Boolean expressions evaluate to "false."

Restriction

You must include the ELSE clause in the CHOICE value expression.

Results

- DATATRIEVE evaluates each Boolean expression in order. When a Boolean expression evaluates to true, DATATRIEVE returns the corresponding value in the THEN clause. DATATRIEVE then goes on to interpret the next language element after END_CHOICE.
- If all the Boolean expressions evaluate to false, DATATRIEVE returns the value specified in the ELSE clause.

Examples

Edit the record definition for YACHTS to add a new field DISCOUNT_PRICE. Calculate the price based on the discount that applies to a particular price range.

The following is the field definition for DISCOUNT_PRICE:

```
06 DISCOUNT_PRICE   COMPUTED BY
     CHOICE
        PRICE LT 20000 THEN (PRICE * .9)
        PRICE LT 30000 THEN (PRICE * .8)
        PRICE LT 40000 THEN (PRICE * .7)
        ELSE (PRICE * .6)
     ENDCHOICE
     EDITSTRING IS $$$,$$$.
```

Now display the expanded records:

```
DTR> READY YACHTS
DTR> FOR YACHTS WITH BUILDER = "ALBIN" OR
CON>     BUILDER = "AMERICAN" PRINT BOAT

                               LENGTH
                                OVER                        DISCOUNT
MANUFACTURER   MODEL      RIG    ALL   WEIGHT BEAM  PRICE    PRICE

 ALBIN        79         SLOOP   26     4,200  09  $17,900 $16,110
 ALBIN        BALLAD     SLOOP   30     7,276  09  $27,500 $22,000
 ALBIN        VEGA       SLOOP   27     5,070  09  $18,600 $16,740
 AMERICAN     26         SLOOP   26     4,000  08   $9,895  $8,906
 AMERICAN     26-MS      MS      26     5,500  08  $18,895 $17,006
```

Declare a variable called DISCOUNT_PRICE that takes values depending on the value for PRICE. Then display the field values for the records in YACHTS along with the value for DISCOUNT_PRICE:

```
DTR> DECLARE DISCOUNT_PRICE COMPUTED BY
CON>      CHOICE
CON>         PRICE LT 20000 THEN (PRICE * .9)
CON>         PRICE LT 30000 THEN (PRICE * .8)
CON>         PRICE LT 40000 THEN (PRICE * .7)
CON>         ELSE (PRICE * .6)
CON>      END_CHOICE
CON>      EDIT_STRING IS $$$,$$$.
DTR> FOR YACHTS WITH BUILDER = "ALBIN" OR BUILDER =
CON>      "AMERICAN" PRINT TYPE, PRICE, DISCOUNT_PRICE

                                     DISCOUNT
MANUFACTURER   MODEL      PRICE    PRICE

 ALBIN       79          $17,900 $16,110
 ALBIN       BALLAD      $27,500 $22,000
 ALBIN       VEGA        $18,600 $16,740
 AMERICAN    26           $9,895  $8,906
 AMERICAN    26-MS       $18,895 $17,006

DTR>
```

3.2.10.2 IF-THEN-ELSE Value Expression — Returns one of two values depending on the evaluation of a conditional, or Boolean, expression.

Format

```
IF boolean-expression  [THEN]  value-1  ELSE  value-2
```

Arguments

boolean-expression

Is a Boolean expression.

THEN

Is an optional language element you can use to clarify syntax.

value-1

Is the value returned by DATATRIEVE if the Boolean expression evaluates to true.

ELSE value-2

Is the value returned by DATATRIEVE if the Boolean expression evaluates to false.

Restriction

Unlike the IF-THEN-ELSE statement, the ELSE clause is required in the IF-THEN-ELSE value expression.

Results

- DATATRIEVE evaluates the Boolean expression. If the Boolean expression evaluates to true, DATATRIEVE returns value-1.
- If the expression evaluates to false, DATATRIEVE returns value-2.

Examples

You can use the IF-THEN-ELSE value expression to help avoid a dividing by zero error. The following example specifies an IF-THEN-ELSE value expression as a print list item, assigning a value of −1 where the denominator is zero.

Display data about Albin's and Ryder's yachts. Calculate the relationship of length (LOA) to width (BEAM). If the width is zero, set the value to −1:

```
DTR> FOR YACHTS WITH BUILDER = "ALBIN" OR BUILDER = "RYDER"
CON> PRINT TYPE, PRICE, LOA, BEAM,
CON>    IF BEAM = 0 THEN -1 ELSE LOA/BEAM ("LOA/"/"BEAM")

                                     LENGTH
                                      OVER         LOA/
MANUFACTURER   MODEL      PRICE       ALL    BEAM   BEAM

 ALBIN        79         $17,900     26      10      2.600
 ALBIN        BALLAD     $27,500     30      10      3.000
 ALBIN        VEGA       $18,600     27      08      3.375
 RYDER        S. CROSS   $32,500     31      00     -1.000

DTR>
```

Declare a variable LOA_BEAM. Use the IF-THEN-ELSE value expression within an assignment statement. For yachts built by Albin or Ryder, assign a value of −1 to LOA_BEAM when the BEAM equals zero. Otherwise, assign LOA_BEAM the value of LOA divided by BEAM.

```
DTR> DECLARE LOA_BEAM PIC S9V99 EDIT_STRING +9V99.
DTR> FOR YACHTS WITH BUILDER = "ALBIN" OR BUILDER = "RYDER"
CON> BEGIN
CON>    LOA_BEAM =
CON>    IF BEAM = 0 THEN -1 ELSE LOA/BEAM
CON>    PRINT TYPE, PRICE, LOA, BEAM, LOA_BEAM
CON> END
```

(continued on next page)

```
                                    LENGTH
                                     OVER       LOA
MANUFACTURER   MODEL       PRICE    ALL    BEAM BEAM

 ALBIN        79          $17,900  26      10  +2.60
 ALBIN        BALLAD      $27,500  30      10  +3.00
 ALBIN        VEGA        $18,600  27      08  +3.38
 RYDER        S. CROSS    $32,500  31      00  -1.00

DTR>
```

3.2.11 FORMAT Value Expression

Specifies a value that is formatted according to the edit string indicated or according to the default edit string.

Format

```
FORMAT   value-expression   [USING edit-string]
```

Arguments

value-expression

Is a field name or other DATATRIEVE value expression, specifying a value that DATATRIEVE uses when executing statements.

edit-string

Is one or more edit string characters that determines the value of the value expression. (See the section on EDIT_STRING clause in the reference chapter of this manual for information.)

Restriction

The edit string must conform to the conventions for specifying edit strings in DATATRIEVE. See the section on the edit string clause in the reference section of this manual for further information.

Results

- If there is a USING clause, DATATRIEVE returns a value according to the specified edit string.
- If there is no USING clause, DATATRIEVE returns a value according to the default edit string of the value expression. This edit string is based on the edit string or PICTURE clause for the field that is a part of the value expression.

Usage Notes

- You can use the FORMAT value expression as a sort key in a SORT statement or SORTED BY clause of an RSE. DATATRIEVE sorts the records according to the formatted value of the expression.
- You can use the FORMAT value expression as a reduce key in a REDUCE statement or REDUCED TO clause of an RSE. DATATRIEVE evaluates the expression for each record. Every time DATATRIEVE finds a new value, it retains the value of the field contained in the value expression.
- The maximum length of strings created using the FORMAT value expression is 65,535 characters.

Examples

You can use the FORMAT value expression to assist in data retrieval for fields with leading zeros. The following is the record definition for the PATIENT domain:

```
DTR> SHOW PATIENT_REC
RECORD PATIENT_REC USING
01 ACCOUNT.
     03 PATIENT_ID       PIC IS X(7).
     03 NAME.
            05 FIRST_NAME  PIC IS X(10).
            05 LAST_NAME   PIC IS X(10).
;
```

The records are stored in an indexed file with PATIENT_ID as the key field. Here is the patient data:

```
DTR> PRINT PATIENT

PATIENT   FIRST       LAST
  ID      NAME        NAME

0000010 HANK       MORRISON
0000011 BILL       SWAY
0000012 SY         KELLER
0000013 WAYNE      SMITH
0000014 JOE        FREDERICK
```

The following statement attempts to find the first record:

```
DTR> FIND PATIENT WITH PATIENT_ID = 10
[0 records found]
```

In this case DATATRIEVE does not find the record, because the leading zeros are significant when the field is alphanumeric. (The PICTURE clause for PATIENT_ID is X(7).)

Applying a FORMAT value expression to the field name overcomes the problem of the leading zeros:

```
DTR> FIND PATIENT WITH (FORMAT PATIENT_ID USING 99) = 10
[1 record found]
DTR> PRINT CURRENT

PATIENT   FIRST       LAST
  ID      NAME        NAME

0000010 HANK       MORRISON

DTR>
```

You can use the FORMAT value expression along with the REDUCED TO clause of the RSE to display the unique values in a record stream.

Display data on all of the yachts that have a price. Divide the yachts into price categories that are multiples of $10,000. Specify headings such as "YACHTS UNDER $10,000" and "YACHTS UNDER $20,000," and so on. You need to do the following:

1. Form a collection of all the yachts that have a price.
2. Determine the price categories that apply for the group of yachts. The expression FN$FLOOR (PRICE/10000) gives the value of the integer in the ten-thousands place of the price for a specific yacht. Place this expression within a REDUCED TO clause to identify the unique digits in the ten-thousands place of the PRICE of all the yachts.
3. Print headings for each price category of yachts, using the following expression for the price:

   ```
   FORMAT (FN$FLOOR(A.PRICE/10000) + 1) USING  $90,000
   ```

   This expression yields the value of the digit in the ten-thousands place plus one, formatted according to the edit string of $90,000. For example, if the digit is "1" ("1" in the ten-thousands place), the value of the FORMAT value expression is $20,000.
4. For each of the digits in the ten-thousands place, have DATATRIEVE search through the yacht records for matches on the corresponding number in the price field. That is, find those yachts for which:

   ```
   FN$FLOOR (PRICE/10000) = FN$FLOOR (A.PRICE/10000)
   ```

5. Print the values for PRICE, TYPE, and RIG for each yacht that matches on PRICE/10000.

Here is the entire procedure:

```
DTR> SHOW REDUCE_RPT
PROCEDURE REDUCE_RPT
READY YACHTS
FIND YACHTS WITH PRICE NE 0 ----------------------------------------------(1)
FOR A IN CURRENT REDUCED TO (FN$FLOOR(PRICE/10000)) ----------------------(2)
  BEGIN
    PRINT SKIP, COL 10,
       "YACHTS UNDER "(FORMAT (FN$FLOOR(A.PRICE/10000) + 1) USING --------(3)
       $90,000), SKIP
    FOR YACHTS WITH PRICE NE 0 AND FN$FLOOR (PRICE/10000) = --------------(4)
       FN$FLOOR (A.PRICE/10000) SORTED BY PRICE
           PRINT PRICE, TYPE, RIG ----------------------------------------(5)
  END
END_PROCEDURE

DTR> :REDUCE_RPT

         YACHTS UNDER $10,000


 PRICE  MANUFACTURER   MODEL     RIG

 $2,823  VENTURE     21         SLOOP
 $3,500  WINDPOWER   IMPULSE    SLOOP
   .        .          .          .
   .        .          .          .
   .        .          .          .

         YACHTS UNDER $90,000

$80,500  OLYMPIC     ADVENTURE  KETCH

DTR>
```

3.2.12 FROM Value Expression

Allows you to perform complex retrievals of records from one or more domains or collections. You can include a FROM value expression in the Boolean of the RSE that forms the collection or record stream.

Format

```
value-expression  FROM  rse
```

Arguments

value-expression

Is a DATATRIEVE value expression.

rse

Is a record selection expression.

Results

When you use a FROM value expression, DATATRIEVE determines its value in a two-step process:

1. It forms a record stream as specified by the RSE. If the number of records in the record stream is zero, DATATRIEVE aborts the statement containing the FROM value expression.
2. If at least one record matches the RSE, DATATRIEVE uses the values stored in the *first* record of that record stream to evaluate the value expression.

Examples

You can use the FROM value expression to print field values from more than one domain:

```
DTR> READY YACHTS, OWNERS
DTR> PRINT RIG FROM YACHTS, NAME FROM OWNERS
KETCH  SHERM
```

You can use the FROM value expression to form a collection from more than one domain:

```
DTR> FIND YACHTS WITH LOA > 35 AND
CON>     BUILDER NE BUILDER FROM OWNERS
[22 records found]

DTR> PRINT FIRST 5 CURRENT
                                      LENGTH
                                       OVER
MANUFACTURER   MODEL      RIG      ALL    WEIGHT BEAM  PRICE

 BLOCK I.     40         SLOOP    39     18,500  12
 CABOT        36         SLOOP    36     15,000  12
 CHALLENGER   41         KETCH    41     26,700  13  $51,228
 COLUMBIA     41         SLOOP    41     20,700  11  $48,490
 DOWN EAST    38         SLOOP    38     19,500  12

DTR>
```

3.3 Boolean Expressions

A Boolean expression is the logical representation of a relationship between value expressions. The value of a Boolean expression is either true or false.

You can use Boolean expressions in the following DATATRIEVE clauses and statements:

- WITH clause in a record selection expression
- WITH clause in a SELECT statement
- IF clause of an IF-THEN-ELSE statement
- IF clause of an IF-THEN-ELSE value expression
- CHOICE statement
- CHOICE value expression
- VALID IF clause in a record definition
- WHILE statement

Boolean expressions consist of value expressions, relational operators, and Boolean operators. **Relational operators** control the comparison of value expressions. **Boolean operators** enable you to join two or more Boolean expressions and to reverse the value of a Boolean expression. All Boolean expressions contain value expressions and relational operators, and some contain Boolean operators.

3.3.1 Relational Operators

Relational operators compare value expressions, check whether a code string is contained in a table, and check whether a record stream is empty or not. Most Boolean expressions contain a field name, a relational operator, and a value expression. Table 3-3 shows the format for using each relational operator.

Table 3-3: Relational Operators

Type of Comparison	Relationship of Values in Boolean	Relational Operator	Boolean Expression

PATTERN RECOGNITION	Exact match (case-sensitive).	=
		EQUAL
		EQ
			RIG = "YAWL"
			"YAWL" = RIG
			RIG = "MS", "YAWL"

	No match (case-sensitive).	NE NOT_EQUAL NOTEQUAL	RIG NE "YAWL" "YAWL" NE RIG RIG NE "MS", "YAWL"
	Substring matches (not case-sensitive).	CONT CONTAINING	RIG CONT "yawl" RIG CONT "ms", "yawl"
	Beginning substring matches (case-sensitive).	STARTING WITH*	RIG STARTING WITH "M" RIG STARTING WITH "M","Y"
	Substring does not match (not case sensitive).	NOT CONT NOT CONTAINING	RIG NOT CONT "ms" RIG NOT CONT "ms","ya"
VALUE WITHIN A RANGE	First value is greater.	> GT GREATER_THAN	PRICE > 50000 50000 > PRICE
	First date value is later than the second expression.	AFTER	START_DATE AFTER "1-Jan-1981" "1-Jan-1981" AFTER START_DATE
	First value is greater than or equal.	GE GREATER_EQUAL	PRICE GE 50000 50000 GE PRICE
	First value is less.	< LT LESS_THAN	PRICE < 20000 20000 < PRICE

(continued on next page)

Table 3-3: Relational Operators (Cont.)

Type of Comparison	Relationship of Values in Boolean	Relational Operator	Boolean Expression
	First date value is earlier than the second expression.	BEFORE	START_DATE BEFORE "1-Jan-1981" "1-Jan-1981" BEFORE START_DATE
	First value is less than or equal.	LE LESS_EQUAL	PRICE LE 20000 20000 LE PRICE
	First value is between the two values or equal to one.	BT BETWEEN	PRICE BETWEEN 30000 AND 54000
FIELD VALUE MISSING	Field value is the MISSING VALUE.	MISSING	PRICE MISSING
	Field value is not the MISSING VALUE.	NOT MISSING	PRICE NOT MISSING
LOOK UP IN TABLE	Field value is in the table.	IN table-name	RIG IN RIG_TABLE
	Field value is not in the table.	NOT IN table-name	RIG NOT IN RIG_TABLE
RECORD STREAM EMPTY	Record stream is not empty.	ANY rse	FAMILIES WITH ANY KIDS
	Record stream is empty.	NOT ANY rse	FAMILIES WITH NOT ANY KIDS

STARTING WITH is designed to work on text strings and can give **inconsistent** results when used with numeric fields.

* Using the STARTING WITH operator with numeric fields can produce inconsistent results; use only use ASCII printable characters (defined in Appendix B) for the specified substring.

Value expressions in Boolean expressions can be enclosed in parentheses only when they are placed to the right of the relational operator. DATATRIEVE returns a syntax error if you enclose a value expression in parentheses to the left of the relational operator. For example:

```
DTR> IF (3-2) EQ 1 THEN PRINT "OK"
IF ( 3 - 2 ) EQ 1 THEN PRINT "OK"
           ^

Expected relational operator (EQ, GT, etc.), encountered ")".
```

Use parentheses only to the right of the relational operator or enclose the entire Boolean expression in parentheses. For example:

```
DTR> IF (3-2 EQ 1) THEN PRINT "OK"
OK
```

When handling character string literals, DATATRIEVE considers lowercase letters to have a greater value than uppercase letters. Within each case, however, DATATRIEVE sorts the letters alphabetically, considers the letters near the beginning of the alphabet to be smaller than those near the end. Consequently, "ALBIN" is less than "AMERICAN". The order and "value" associated with alphanumeric characters is determined by the ASCII collating sequence. *Lowercase letters have a higher ASCII value than uppercase letters.* Appendix B lists the printing characters in ascending order of ASCII value.

In Boolean expressions using the relational operator CONTAINING, the comparison of the value expression and the field value is case-insensitive. The comparison is case-insensitive whether or not you enclose a character string literal within quotation marks.

The following examples show how to use relational operators that compare field values to value expressions:

```
DTR> FIND YACHTS WITH BEAM EQ 9,10,14
[50 records found]
DTR> PRINT CURRENT WITH RIG NE "SLOOP"

                                 LENGTH
                                  OVER
MANUFACTURER   MODEL      RIG     ALL   WEIGHT BEAM  PRICE

 EASTWARD     HO         MS       24     7,000  09  $15,900
 FISHER       30         KETCH    30    14,500  09
 GRAMPIAN     34         KETCH    33    12,000  10  $29,675
```

The last PRINT statement can be written with the value expression preceding the field name. DATATRIEVE displays the same records:

```
DTR> PRINT CURRENT WITH "SLOOP" NE RIG

                                 LENGTH
                                  OVER
MANUFACTURER   MODEL      RIG     ALL    WEIGHT BEAM  PRICE

 EASTWARD    HO         MS       24      7,000  09  $15,900
 FISHER      30         KETCH    30     14,500  09
 GRAMPIAN    34         KETCH    33     12,000  10  $29,675
```

You can also search for field values within a specified range:

```
DTR> PRINT YACHTS WITH LOA BT 30 AND 31

                                 LENGTH
                                  OVER
MANUFACTURER   MODEL      RIG     ALL    WEIGHT BEAM  PRICE

 ALBIN       BALLAD     SLOOP    30      7,276  10  $27,500
 BOMBAY      CLIPPER    SLOOP    31      9,400  11  $23,950
 C&C         CORVETTE   SLOOP    31      8,650  09
                 .                .                   .
                 .                .                   .
                 .                .                   .
 SOLNA CORP  SCAMPI     SLOOP    30      6,600  10
```

Here are some other queries using Boolean expressions:

```
DTR> PRINT COUNT OF YACHTS WITH BUILDER CONTAINING "a"

COUNT

    78


DTR> FIND YACHTS WITH LOA < 20
[2 records found]
DTR> FIND YACHTS WITH PRICE MISSING
[63 records found]
DTR> FIND YACHTS WITH PRICE NOT MISSING
[50 records found]
```

The relational operator IN compares the contents of a field with the code strings in a dictionary table or domain table. This comparison is useful for validating data you assign to fields or variables. The following example shows how to write a record definition that uses a table to validate the data before it is stored:

```
DTR> DEFINE RECORD PHONE_REC USING
DFN> 01 PHONE.
DFN>    02 NAME PIC X(20).
DFN>    02 NUMBER PIC 9(7) EDIT_STRING IS XXX-XXXX.
DFN>    02 LOCATION PIC X(9).
DFN>    02 DEPARTMENT PIC XX
DFN>            VALID IF DEPARTMENT IN DEPT_TABLE.
DFN> ;
```

The relational operator ANY checks whether a record stream is empty or not. This operator is useful for work with lists in hierarchical records. The record selection expression following ANY generally specifies the name of a list or sub-list. The following examples show how to use ANY. For more information on lists and hierarchies, see the *VAX DATATRIEVE User's Guide.*

```
DTR> READY FAMILIES
DTR> PRINT FAMILIES WITH ANY KIDS WITH AGE = 20

                        NUMBER    KID
  FATHER      MOTHER     KIDS     NAME    AGE

BASIL       MERIDETH       6   BEAU       28
                               BROOKS     26
                               ROBIN      24
                               JAY        22
                               WREN       17
                               JILL       20
JEROME      RUTH           4   ERIC       32
                               CISSY      24
                               NANCY      22
                               MICHAEL    20

DTR> PRINT FAMILIES WITH ANY KIDS WITH KID_NAME CONT "RAL"

                        NUMBER    KID
  FATHER      MOTHER     KIDS     NAME    AGE

JIM         ANN            2   URSULA      7
                               RALPH       3

DTR>
```

3.3.2 Boolean Operators

There are four Boolean operators: AND, OR, NOT, and BUT. With AND, OR, and BUT, you can join two or more Boolean expressions to form a single Boolean expression. NOT allows you to reverse the value of a Boolean expression. If you link Boolean expressions with AND or BUT, the resulting Boolean expression is true only if all the Booleans linked with AND or BUT are true.

If you link Boolean expressions with OR, the resulting Boolean expression is true if any one of the Booleans linked with OR are true.

If you precede a Boolean expression with NOT, the resulting Boolean expression is true if the Boolean expression following NOT is false.

The following examples show the use of Boolean operators:

```
DTR> READY YACHTS
DTR> PRINT YACHTS WITH BUILDER = "PEARSON" AND LOA = 30

                                  LENGTH
                                   OVER
MANUFACTURER   MODEL     RIG      ALL   WEIGHT BEAM  PRICE

 PEARSON     30         SLOOP    30     8,320  09

DTR> FIND YACHTS WITH BUILDER = "PEARSON" OR LOA = 30
[21 records found]


DTR> READY FAMILIES
DTR> PRINT FAMILIES WITH FATHER NOT EQ "JIM" AND
[Looking for Boolean expression]
CON> ANY KIDS WITH AGE GT 31

                       NUMBER    KID
  FATHER      MOTHER    KIDS     NAME     AGE

JEROME     RUTH         4   ERIC       32
                            CISSY      24
                            NANCY      22
                            MICHAEL    20
HAROLD     SARAH        3   CHARLIE    31
                            HAROLD     35
                            SARAH      27

DTR>
```

You can also use parentheses to group Boolean expressions. DATATRIEVE evaluates Boolean expressions in parentheses before evaluating other Booleans. If a Boolean expression contains Boolean operators as well as parentheses, DATATRIEVE evaluates the Boolean expression in the following order:

1. Expressions enclosed in parentheses
2. Expressions preceded by NOT
3. Expressions combined with AND
4. Expressions combined with OR

Table 3-4 shows the use of parentheses and the evaluation of compound Boolean expressions.

Table 3-4: Compound Boolean Expressions

Expression	Value
bool-1 AND bool-2 AND bool-3	True if all three Boolean expressions are true.
bool-1 AND (bool-2 OR bool-3)	True if bool-1 is true and either bool-2 or bool-3 is true.
(bool-1 AND bool-2) OR (bool-3 AND bool-4)	True if both bool-1 and bool-2 are true or if both bool-3 and bool-4 are true.
NOT (bool-1 OR bool-2) AND bool-3	True if both bool-1 and bool-2 are false and bool-3 is true.

The following example illustrates compound Boolean expressions:

```
DTR> PRINT YACHTS WITH
[Looking for Boolean expression]
CON>    (MODEL = "BALLAD" AND BUILDER = "ALBIN") OR
[Looking for Boolean expression]
CON>    (BUILDER = "TANZER" AND MODEL = 28)

                                  LENGTH
                                   OVER
MANUFACTURER   MODEL      RIG     ALL    WEIGHT BEAM  PRICE

 ALBIN       BALLAD     SLOOP   30      7,276  10  $27,500
 TANZER      28         SLOOP   28      6,800  10  $17,500

DTR>
```

DATATRIEVE Functions 4

A DATATRIEVE function is a word you define and add to the DATATRIEVE language. By adding functions, you extend the capability of DATATRIEVE to efficiently perform specific tasks. To learn how to define functions for DATATRIEVE, see the *VAX DATATRIEVE Guide to Programming and Customizing.*

Some functions are included in the installation kit for DATATRIEVE. You can use them to form value expressions or to set parameters for a process. These functions can be modified by users at your site. If they do not work as indicated in the examples, consult the person at your site responsible for DATATRIEVE for a list of the functions currently available.

The format for a DATATRIEVE function is:

```
function-name  [(value-expression  [,...])]
```

The remainder of this chapter is divided into three sections. The first section groups and lists the functions by type, with a brief description of the common features of each type. The second section presents all the functions (regardless of type) in alphabetic order, indicating the input and output of each function, as well as an example. The third section discusses optimizing function execution.

4.1 Functions Grouped by Type

The following sections group and list functions by type. The types include:

- Function value expressions
  - Functions using numeric data
  - Trigonometric functions
  - Functions using alphanumeric data
- Functions for keypad definitions
- Functions relating to processes
  - Functions for timing processes
  - Functions using logical names
  - Other functions relating to processes

Each section includes a description of the common features of each type.

4.1.1 Function Value Expressions

The following functions are value expressions and can be used in any DATATRIEVE statement where a value expression is permitted. The functions are classified according to their input values. They take either numeric data, alphanumeric data, or dates as arguments.

4.1.1.1 Functions Using Numeric Data — The following functions are value expressions that take numbers as arguments and return numbers as values:

- FN$ABS – Calculates absolute value of input
- FN$EXP – Calculates the value of **e** to specified power
- FN$FLOOR – Truncates the decimal part of positive input or rounds negative input
- FN$HEX – Calculates hexadecimal equivalent of input
- FN$LN – Calculates natural log of input
- FN$LOG10 – Calculates base 10 log of input
- FN$MOD – Calculates value of input according to specified modulus

- FN$NINT – Calculates integer nearest to input
- FN$SIGN – Indicates the sign of a number
- FN$SQRT – Calculates square root of input

4.1.1.2 Trigonometric Functions — The following are trigonometric functions available with DATATRIEVE:

- FN$ATAN – Calculates arctangent of input
- FN$COS – Calculates cosine of input
- FN$SIN – Calculates sine of input
- FN$TAN – Calculates tangent of input

4.1.1.3 Functions Using Alphanumeric Data — The following functions use alphanumeric data as input. The default format for functions using alphanumeric data is PIC X(30). If a function returns a value that is longer than 30 characters, DATATRIEVE truncates the value. You can override the default and process a value longer than 30 characters by using a FORMAT value expression. Include the function in the FORMAT value expression and specify an edit string long enough for the value you want to process.

For more information about using FORMAT value expressions, see the chapter about value expressions in this book.

- FN$STR_EXTRACT – Extracts substring from input
- FN$STR_LOC – Calculates starting position of substring in input
- FN$UPCASE – Changes characters in string to uppercase

4.1.1.4 Functions Using Dates — The following functions use dates as input:

- FN$JULIAN – Calculates Julian date of input
- FN$WEEK – Calculates number of weeks from start of year
- FN$YEAR – Extracts year part of input
- FN$MONTH – Extracts month part of input
- FN$DAY – Extracts day part of input
- FN$TIME – Extracts time part of input
- FN$HOUR – Extracts hour part of input

- FN$MINUTE – Extracts minute part of input
- FN$SECOND – Extracts seconds from time input
- FN$HUNDREDTH – Extracts hundredth-of-a-second part of input
- FN$DATE – Converts a date string to a 64-bit data value

4.1.2 Functions for Keypad Definitions

- FN$COMMAND_KEYBOARD – Returns the current value of the COMMAND_KEYBOARD field in the DATATRIEVE Access Block (DAB)
- FN$DEFINE_KEY – Takes a key definition in DIGITAL Command Language (DCL) DEFINE/KEY syntax, then creates the defined key in DATATRIEVE
- FN$DELETE_KEY – Lets you delete a key definition currently in effect
- FN$KEYPAD_MODE – Lets you specify the terminal mode from within DATATRIEVE
- FN$KEYTABLE_ID – Returns the value of the KEYTABLE_ID field currently in the DAB
- FN$LOAD_KEYDEFS – Lets you define multiple keypad keys from a file containing DCL DEFINE/KEY commands
- FN$PROMPT_KEYBOARD – Returns the value of the PROMPT_KEYBOARD field currently in the DAB
- FN$SHOW_KEY – Shows the definition of a keypad key
- FN$SHOW_KEYDEFS – Shows the key definitions in all of the states

4.1.3 Functions Relating to Processes

Most of the functions relating to processes are not value expressions. They initiate or affect various DATATRIEVE processes but have no output. The two exceptions are FN$TRANS_LOG and FN$_OPENS_LEFT, which generate output in providing information about a process.

4.1.3.1 Functions for Timing Processes — You can use the following functions to time processes:

- FN$INIT_TIMER – Initializes a timer and counter
- FN$SHOW_TIMER – Shows elapsed time since timer was last initialized

4.1.3.2 Functions Using Logical Names — The following functions define, delete, and translate logical-name synonyms for physical names like file specifications.

- FN$CREATE_LOG – Assigns a logical name as a synonym for a physical name
- FN$DELETE_LOG – Deletes the assignment of a logical name
- FN$TRANS_LOG – Translates a logical name

4.1.3.3 Other Functions Relating to Processes

- FN$DCL – Allows you to spawn directly from your main DATATRIEVE process to execute a specified DIGITAL Command Language (DCL) command
- FN$OPENS_LEFT – Calculates number of additional files you can open
- FN$SPAWN – Creates a subprocess
- FN$WIDTH – Changes the character width of the terminal

4.2 Functions Listed Alphabetically

The following sections describe each function in alphabetical order. Each section includes:

- A description of
  - Function
  - Input
  - Output
- An example

4.2.1 FN$ABS Function

Calculates the absolute value of input.

Input

A signed decimal number.

Output

An unsigned decimal number.

Example

```
DTR> PRINT FN$ABS (-128)

  FN$ABS

 1.2800E+02

DTR>
```

4.2.2 FN$ATAN Function

Calculates the arctangent of input.

Input

A signed decimal number (radians).

Output

A signed decimal number.

Example

```
DTR> PRINT 4 * (FN$ATAN (1))
 3.1416E+00

DTR>
```

4.2.3 FN$COMMAND_KEYBOARD Function

Returns the current value of the COMMAND_KEYBOARD field in the DAB. COMMAND_KEYBOARD is the keyboard used for command input.

This function allows you to add other functions that access the features of the Screen Management Guidelines of the Screen Management Facility (SMG).

Input

None.

Output

None.

Example

```
DTR> DECLARE COMMAND_KEYBOARD LONG.
DTR> COMMAND_KEYBOARD = FN$COMMAND_KEYBOARD
```

4.2.4 FN$COS Function

Calculates the cosine of input.

Input

A signed decimal number (radians).

Output

A signed decimal number.

Example

```
DTR> PRINT FN$COS (3.14159)

FN$COS

1.000

DTR>
```

4.2.5 FN$CREATE_LOG Function

Assigns a logical name as a synonym for a physical name.

Input

This function takes two paramters as input. The first is a logical name character string; the second is a physical name character string. Each string must be in quotation marks. The two strings must be separated by a comma. Both strings are enclosed in parentheses.

Output

None.

Example

```
DTR> FN$CREATE_LOG ("HANK", "DB0:[MORRISON.RW]LOG.RNO")
DTR>
```

4.2.6 FN$DATE Function

Converts a date string to a 64-bit data value.

Input

A complete date string formatted as "dd-Mmm-yyyy hh:mm:ss.cc". Unpredictable results may occur if you supply only a portion of a date string, such as "21-MAR-1981".

Output

A date data value formatted as "dd-Mmm-yyyy hh:mm:ss.cc".

Examples

```
DTR> DECLARE X USAGE DATE EDIT_STRING X(23).
DTR> X = FN$DATE("30-AUG-1983 15:20:31.45")
DTR> PRINT X

           X

30-Aug-1983 15:20:31.45

DTR>

DTR> DECLARE Y USAGE DATE EDIT_STRING X(23).
DTR> DECLARE Z PIC X(23).
DTR> Z = "20-FEB-1983 14:54:29.83"
DTR> Y = FN$DATE (Z)
DTR> PRINT Y

           Y

20-Feb-1983 14:54:29.83

DTR>
```

4.2.7 FN$DAY Function

Extracts the day part of input (dd in dd_Mmm_yyyy hh:mm:ss.cc).

Input

A date.

Output

An unsigned integer from 1 to 31.

Example

```
DTR> DECLARE CAL USAGE DATE EDIT_STRING X(23).
DTR> CAL = "NOW"; PRINT CAL

          CAL

 1-Feb-1983 08:51:11.55

DTR> PRINT FN$DAY (CAL)

  FN$DAY

          1

DTR>
```

4.2.8 FN$DCL Function

Allows you to spawn directly from your main DATATRIEVE process to execute a specified DCL command.

Input

Type FN$DCL at the DATATRIEVE prompt. On the same line, specify the DCL command argument you want to spawn to, such as the DCL print command. The DCL command argument can be any DCL command and must be placed inside quotation marks, which in turn are inside parentheses.

Output

Your DATATRIEVE process is suspended and the terminal is attached to the subprocess. The DCL command is executed.

Example

```
DTR> FN$DCL ("PRINT REPORT_ACCOUNTS.RPT")
Job REPORT_ACCOUNTS (queue SYSTEM_PRINT$QUEUE, entry 148)
started on PRINTER$LPA0
DTR>
```

The message appears indicating that the job has been added to the print queue. After the command has completed or you have exited from the program initiated by the command, you see the DTR> prompt. This shows that control has been returned to the original process in DATATRIEVE.

Note that the FN$DCL process inherits attributes from the caller (that is, the main DATATRIEVE process from which it spawned). Refer to the VMS documentation on run-time library routines for more information.

4.2.9 FN$DEFINE_KEY Function

Takes a key definition in DCL DEFINE/KEY syntax, then creates the defined key in DATATRIEVE.

Input

A quoted string containing the key definition in DCL DEFINE/KEY command syntax.

You must use single quotation marks for the outer pair of quotation marks. The inner pair of quotation marks must be double.

Output

None.

Example

```
DTR> FN$DEFINE_KEY ('DEFINE/KEY/ECHO/NOTERMINATE KP7 "FIND" ')
```

4.2.10 FN$DELETE_KEY Function

Deletes a key definition currently in effect.

Input

This function takes two parameters. The first parameter is the name of the key whose definition you want to delete. The second parameter is the state string. You must specify the state name DEFAULT when there is no alternate state.

Output

None.

Example

```
DTR> FN$DELETE_KEY ("KP0","DEFAULT")
DTR> FN$DELETE_KEY ("KP0","GOLD")
```

4.2.11 FN$DELETE_LOG Function

Deletes the assignment of a logical name.

Input

The logical name you want to delete.

Output

None.

Example

```
DTR> FN$DELETE_LOG ("HANK")
DTR> PRINT FN$TRANS_LOG ("HANK") USING X(30)

         FN$TRANS
           LOG

DTR>
```

4.2.12 FN$EXP Function

Calculates the value of **e** to specified power.

Input

A signed decimal number.

Output

A signed decimal number.

Example

```
DTR> PRINT FN$EXP (2)

         FN$EXP

 7.3891E+00

DTR>
```

4.2.13 FN$FLOOR Function

Truncates the decimal part of positive input or rounds negative input.

Input

A signed decimal number.

Output

A signed decimal number.

Example

```
DTR> PRINT FN$FLOOR (59.99)

  FN$FLOOR

 5.9000E+01

DTR> PRINT FN$FLOOR (-59.99)

  FN$FLOOR

 -6.0000E+01
```

4.2.14 FN$HEX Function

Calculates hexadecimal equivalent of input.

Input

A signed integer no larger than (2 ** 31) – 1 (the maximum value that can be stored in a signed longword).

Output

A hexadecimal character string.

Example

```
DTR> PRINT FN$HEX(183)

  FN$HEX

        B7

DTR>
```

4.2.15 FN$HOUR Function

Extracts the hour part of input (hh in dd_Mmm_yyyy hh:mm:ss.cc).

Input

A date.

Output

An unsigned integer from 1 to 24.

Example

```
DTR> DECLARE CAL USAGE DATE EDIT_STRING X(23).
DTR> CAL = "NOW"; PRINT CAL

          CAL

 1-Feb-1983 08:51:11.55

DTR> PRINT FN$HOUR (CAL)

  FN$HOUR

           8

DTR>
```

4.2.16 FN$HUNDREDTH Function

Extracts hundredth-of-a-second part of input (cc in dd_Mmm_yyyy hh:mm:ss.cc).

Input

A date.

Output

An unsigned integer from 0 to 99.

Example

```
DTR> DECLARE CAL USAGE DATE EDIT_STRING X(23).
DTR> CAL = "NOW"; PRINT CAL

          CAL

 1-Feb-1983 08:51:11.55

DTR> PRINT FN$HUNDREDTH (CAL)

  FN$HUNDREDTH

           55


DTR>
```

4.2.17 FN$INIT_TIMER Function

Initializes a timer and counter.

Input

None.

Output

None.

Example

```
DTR> SHOW TIME_READY
PROCEDURE TIME_READY
FN$INIT_TIMER
READY OWNERS
FN$SHOW_TIMER
END_PROCEDURE

DTR> :TIME_READY

ELAPSED: 0 00:00:04.24  CPU: 0:00:00.61  BUFIO: 1  DIRIO: 42  FAULTS: 64

DTR>
```

4.2.18 FN$JULIAN Function

Calculates the Julian date of input.

(A Julian date is based on days of the year being numbered beginning with January 1st. The Julian date of January 6th is 6. The Julian date of February 2nd is 33, and so on.)

Input

A date.

Output

An unsigned integer from 1 to 366. (There are 366 days in a leap year.)

Example

```
DTR> DECLARE CAL USAGE DATE EDIT_STRING X(23).
DTR> CAL = "NOW"; PRINT CAL

          CAL

 1-Feb-1983 08:51:11.55

DTR> PRINT FN$JULIAN (CAL)

  FN$JULIAN

          32

DTR>
```

4.2.19 FN$KEYPAD_MODE Function

Lets you specify the terminal mode from within DATATRIEVE.

This function duplicates the ability of the SET [NO] APPLICATION_KEYPAD command. The function form of FN$KEYPAD_MODE, however, allows you to change the keypad mode inside compound statements.

Input

You must specify one of two parameters:

- APPLICATION specifies application keypad mode
- NUMERIC specifies numeric keypad mode

This function is not case-sensitive; you can type APPLICATION or NUMERIC in either upper or lower case. The words must be in either single or double quotation marks, and the spelling must be exact.

Output

None.

Example

```
DTR> FN$KEYPAD_MODE ("APPLICATION")
DTR> FN$KEYPAD_MODE ("NUMERIC")
```

4.2.20 FN$KEYTABLE_ID Function

Returns the value of the KEYTABLE_ID field currently in the DAB.

FN$KEYTABLE_ID allows you to add other functions that access other capabilities of SMG.

Input

None.

Output

None.

Example

```
DTR> DECLARE KEYTABLE LONG.
DTR> KEYTABLE = FN$KEYTABLE_ID
```

4.2.21 FN$LN Function

Calculates the natural log of input.

Input

A signed number.

Output

A signed number.

Example

```
DTR> PRINT FN$LN (36)

  FN$LN

 3.5835E+00

DTR>
```

4.2.22 FN$LOAD_KEYDEFS Function

Lets you define multiple keypad keys from a file containing DCL DEFINE/KEY commands. This way you do not have to make multiple calls to the FN$DEFINE_KEY function.

Input

A quoted string with a DCL file specification indicating the file containing the DCL DEFINE/KEY commands.

Output

None.

Example

```
DTR> FN$LOAD_KEYDEFS ("APPL1.KEYS")
```

4.2.23 FN$LOG10 Function

Calculates the base 10 log of input.

Input

A signed number.

Output

A signed number.

Example

```
DTR> PRINT FN$LOG10 (36)

  FN$LOG10

 1.5563E+00

DTR>
```

4.2.24 FN$MINUTE Function

Extracts the minute part of input (mm in dd_Mmm_yyyy hh:mm:ss.cc).

Input

A date.

Output

An unsigned integer from 0 to 59.

Example

```
DTR> DECLARE CAL USAGE DATE EDIT_STRING X(23).
DTR> CAL = "NOW"; PRINT CAL

          CAL

 1-Feb-1983 08:51:11.55

DTR> PRINT FN$MINUTE (CAL)

  FN$MINUTE

          51

DTR>
```

4.2.25 FN$MOD Function

Calculates the value of input according to specified modulus.

Input

This function takes two parameters: a signed number and a modulus. The two must be separated by a comma, and both are enclosed in parentheses.

Output

A real number.

Example

```
DTR> PRINT FN$MOD (31,7)

  FN$MOD

 3.0000E+00

DTR>
```

4.2.26 FN$MONTH Function

Extracts the month part of input (Mmm in dd_Mmm_yyyy hh:mm:ss.cc).

Input

A date.

Output

An unsigned integer from 1 to 12.

Example

```
DTR> DECLARE CAL USAGE DATE EDIT_STRING X(23).
DTR> CAL = "NOW"; PRINT CAL

          CAL

 1-Feb-1983 08:51:11.55

DTR> PRINT FN$MONTH (CAL)

  FN$MONTH

            2

DTR>
```

4.2.27 FN$NINT Function

Calculates integer nearest to input.

Input

A signed number.

Output

A signed integer.

Example

```
DTR> PRINT FN$NINT (59.99)

  FN$NINT

         60

DTR>
```

4.2.28 FN$OPENS_LEFT Function

Calculates the number of additional files you can open.

Input

None.

Output

An unsigned integer.

Example

```
DTR> PRINT FN$OPENS_LEFT

  FN$OPENS
    LEFT

          3

DTR>
```

4.2.29 FN$PROMPT_KEYBOARD Function

Returns the value of the PROMPT_KEYBOARD field currently in the DAB. PROMPT_KEYBOARD is the keyboard ID used for prompting.

FN$PROMPT_KEYBOARD allows you to add other functions that access other capabilities of SMG.

Input

None.

Output

None.

Example

```
DTR> DECLARE PROMPT_KEYBOARD LONG.
DTR> PROMPT_KEYBOARD = FN$PROMPT_KEYBOARD
```

4.2.30 FN$SECOND Function

Extracts the second part of input (ss in dd_Mmm_yyyy hh:mm:ss.cc).

Input

A date.

Output

An unsigned integer from 0 to 59.

Example

```
DTR> DECLARE CAL USAGE DATE EDIT_STRING X(23).
DTR> CAL = "NOW"; PRINT CAL

         CAL

 1-Feb-1983 08:51:11.55

DTR> PRINT FN$SECOND (CAL)

  FN$SECOND

         11

DTR>
```

4.2.31 FN$SHOW_KEY Function

Displays the definition of a keypad key.

Input

This function takes two parameters:

- The first parameter specifies the keypad key name.
- The second parameter is the state string. You must specify the state name DEFAULT when there is no alternate state.

Each parameter must be in matching quotation marks. The two quoted parameters must be separated by a comma. Both parameters are enclosed in parentheses.

Output

The definition of the specified key.

Example

```
DTR> FN$SHOW_KEY ("KP7","DEFAULT")

   KP7 = "SHOW ALL"
       (echo,terminate,noerase,nolock)
```

4.2.32 FN$SHOW_KEYDEFS Function

Displays the key definitions in all of the states. This function duplicates the ability of the DATATRIEVE SHOW KEYDEFS command.

The function form of FN$SHOW_KEYDEFS lets you show all keypad definitions inside compound statements.

Input

None.

Output

The definitions of all the defined keys.

Example

```
DTR> FN$SHOW_KEYDEFS

BLUE state keypad definitions:
    KP1 = "SHOW KEYDEFS"
        (noecho,terminate,noerase,nolock)
DEFAULT state keypad definitions:
    PF1 = " "
        (echo,noterminate,noerase,nolock,set_state=GOLD)
    PF4 = " "
        (echo,noterminate,erase,nolock,set_state=BLUE)
    KP0 = "SHOW KEYDEFS"
        (echo,terminate,noerase,nolock)
    KP1 = "READY "
        (echo,noterminate,noerase,nolock)
    KP7 = "SHOW ALL"
        (echo,terminate,noerase,nolock)
    KP8 = "SHOW DOMAINS"
        (echo,terminate,noerase,nolock)
    KP9 = "SHOW RECORDS"
        (echo,terminate,noerase,nolock)
    ENTER = "SET APPLICATION_KEYPAD"
        (echo,terminate,noerase,nolock)
GOLD state keypad definitions:
    ENTER = "SET NO APPLICATION_KEYPAD"
        (echo,terminate,noerase,nolock)
    KP1 = "SHOW KEYDEFS"
        (noecho,terminate,noerase,nolock)
```

4.2.33 FN$SHOW_TIMER Function

Shows elapsed time since the timer was last initialized.

Note that DATATRIEVE does not include the information displayed by FN$SHOW_TIMER in a log file created with the OPEN command.

Input

None.

Output

Displays the elapsed time in this format:

D HH:MM:SS.SS

Example

```
DTR> SHOW TIME_READY
PROCEDURE TIME_READY
FN$INIT_TIMER
READY OWNERS
FN$SHOW_TIMER
END_PROCEDURE

DTR> :TIME_READY

ELAPSED: 0 00:00:04.24  CPU: 0:00:00.61  BUFIO: 1  DIRIO: 42  FAULTS: 64

DTR>
```

At the end of a 24-hour period, the timer begins displaying time in the number of days rather than the accumulated number of hours.

4.2.34 FN$SIGN Function

Indicates the sign of a number.

Input

A signed number.

Output

1, −1, or 0 (depending on the sign of the number).

Example

```
DTR> PRINT FN$SIGN (-4)

  FN$SIGN

          -1

DTR>
```

4.2.35 FN$SIN Function

Calculates the sine of input.

Input

A signed decimal number (radians).

Output

A signed decimal number.

Example

```
DTR> PRINT FN$SIN (3.14159_/2)

FN$SIN

1.000

DTR>
```

4.2.36 FN$SPAWN Function

Creates a subprocess by calling the Run-Time Library (RTL) routine LIB$SPAWN.

Input

Type FN$SPAWN at the DTR> prompt to create the subprocess.

Output

Your default DCL prompt appears on the screen. You can then invoke utilities or enter commands.

Type LOGOUT after the DCL prompt to return to your original process in DATATRIEVE. A message is printed on the screen indicating that you have logged out of the subprocess. DATATRIEVE generates the DTR> prompt, showing that control has been returned to the original process in DATATRIEVE.

Example

```
DTR> FN$SPAWN
$ MAIL
MAIL>
   .
   .
   .

MAIL> EXIT
$ LOGOUT
  Process PROCESSNAME_1 logged out at 25-FEB-1986 09:47:09:27
DTR>
```

Usage Notes

Use FN$SPAWN as a single and complete DATATRIEVE statement. This function should not be used within another simple or compound statement (unlike other functions).

FN$SPAWN inherits attributes from the caller (the main DATATRIEVE process it spawned from). Refer to the VMS documentation on run-time library routines for more information.

4.2.37 FN$SQRT Function

Calculates the square root of.

Input

Zero or a positive decimal number.

Output

Zero or a positive decimal number.

Example

```
DTR> PRINT FN$SQRT (196)

  FN$SQRT

 1.4000E+01

DTR>
```

4.2.38 FN$STR_EXTRACT Function

Extracts substring from input using a default edit string of 30 characters.

Input

This function takes three parameters:

- A character string
- An ordinal number of starting character (numerical position within string)
- The length of desired substring

Output

A substring.

Example

```
DTR> DECLARE WOMBAT PIC X(25).
DTR> WOMBAT = "Wombats have sharp claws."
DTR> PRINT FN$STR_EXTRACT (WOMBAT,9,4)

           FN$STR
           EXTRACT

have

DTR>
```

4.2.39 FN$STR_LOC Function

Calculates the starting position of substring in input.

Input

This functions takes two paramters: a character string and a substring.

Output

An unsigned integer.

Example

```
DTR> DECLARE WOMBAT PIC X(25).
DTR> WOMBAT = "Wombats have sharp claws."
DTR> PRINT FN$STR_LOC (WOMBAT,"claws")

 FN$STR
  LOC

         20

DTR>
```

4.2.40 FN$TAN Function

Calculates the tangent of input.

Input

A signed decimal number (radians).

Output

A signed decimal number.

Example

```
DTR> PRINT FN$TAN (3.14159_/4)

  FN$TAN

 1.0000E+00

DTR>
```

4.2.41 FN$TIME Function

Extracts the time part of input (hh:mm:ss.cc in dd_Mmm_yyyy hh:mm:ss.cc).

Input

A date.

Output

The time in VMS format.

Example

```
DTR> DECLARE CAL USAGE DATE EDIT_STRING X(23).
DTR> CAL = "NOW"; PRINT CAL

          CAL

 1-Feb-1983 08:51:11.55

DTR> PRINT FN$TIME (CAL)

  FN$TIME

 08:51:11.5

DTR>
```

4.2.42 FN$TRANS_LOG Function

Translates a logical name.

Input

A character string containing the logical name you want to translate.

Output

A character string.

Example

```
DTR> FN$CREATE_LOG ("HANK", "DB0:[MORRISON.RW]LOG.RNO")
DTR> PRINT FN$TRANS_LOG ("HANK") USING X(30)

            FN$TRANS
              LOG

DB0:[MORRISON.RW]LOG.RNO

DTR>
```

4.2.43 FN$UPCASE Function

Changes the characters in a string to uppercase.

Input

A character string.

Output

The input character string, all in uppercase.

Example

```
DTR> DECLARE WOMBAT PIC X(25).
DTR> WOMBAT = "Wombats have sharp claws."
DTR> PRINT FN$UPCASE (WOMBAT)

          FN$UPCASE

WOMBATS HAVE SHARP CLAWS.

DTR>
```

4.2.44 FN$WEEK Function

Calculates the week number for a date you enter.

(The week number is an integer from 1 to 52. A week number is assigned sequentially to each week, beginning with the first week of the year. The first week of January is week number 1, the second week of January is week number 2, and so on.)

Input

A date.

Output

An unsigned integer from 1 to 52.

Example

```
DTR> DECLARE CAL USAGE DATE EDIT_STRING X(23).
DTR> CAL = "NOW"; PRINT CAL

         CAL

 1-Feb-1983 08:51:11.55

DTR> PRINT FN$WEEK (CAL)

  FN$WEEK

        5

DTR>
```

Usage Notes

FN$WEEK does not use Sunday as the default beginning of each week (unlike most calendars). FN$WEEK begins its calculations with the first day of each year. It uses the day of the week on which January 1st occurs as the first day of each subsequent week that year. For example, January 1st occurred on a Wednesday in 1986. FN$WEEK calculates all week numbers in 1986 as though each week begins on Wednesday. Thus, the first Sunday, Monday, and Tuesday in 1986 are still part of week number 1.

Use the following procedure and table to print the week of the year with Sunday as the first day of the week:

```
DTR> DEFINE PROCEDURE OTHER_WEEK
DFN> !
DFN> !  declare variables for the various operations
DFN> !
DFN> DECLARE DATE USAGE DATE EDIT_STRING X(23).
DFN> DECLARE YEAR PIC 9(4).
DFN> DECLARE TEMP PIC 9(3).
DFN> DECLARE WEEK PIC 9(2).
DFN> !
DFN> DATE = *."date"
DFN> YEAR = FN$YEAR(DATE)
DFN> TEMP = YEAR VIA FIRST_DAY_TBL
DFN> WEEK = FN$WEEK(DATE + TEMP)
DFN> PRINT "The week of the year is ", WEEK (-) USING X9
DFN END_PROCEDURE
```

```
DTR> DEFINE TABLE FIRST_DAY_TBL
DFN> 1984:0
DFN> 1985:2
DFN> 1986:3
DFN> 1987:4
DFN> 1988:5
DFN> 1989:6
DFN> 1990:7
DFN> ELSE 0
DFN> END_TABLE
DTR>
```

The procedure calls a number from the table. This number represents the difference between the actual first day of the year and Sunday. The procedure adds this number to the date you have entered. The first week will then begin on Sunday; OTHER_WEEK will use Sunday as the default beginning of subsequent weeks.

Note that the numbers are stored in the table by year. The years shown in the table are only a sample; you can include as many years as you need.

4.2.45 FN$WIDTH Function

Changes the character width of the terminal.

Input

An integer.

Output

None.

Example

```
DTR> SET COLUMNS_PAGE = 132
DTR> FN$WIDTH (132)
```

FN$WIDTH (132) sets the terminal's width at 132 characters or columns. The SET COLUMNS_PAGE command ensures that any output produced by REPORT, PRINT, SUM, or LIST statements is spaced across the 132 columns.

4.2.46 FN$YEAR Function

Extracts the year part of input (yyyy in dd_Mmm_yyyy hh:mm:ss.cc).

Input

A date.

Output

An unsigned integer for years 1858 to 9999.

Example

```
DTR> DECLARE CAL USAGE DATE EDIT_STRING X(23).
DTR> CAL = "NOW"; PRINT CAL

          CAL

 1-Feb-1983 08:51:11.55

DTR> PRINT FN$YEAR (CAL)

  FN$YEAR

       1983

DTR>
```

4.3 Optimizing Function Execution

DATATRIEVE executes functions within loops two ways:

- For some functions, DATATRIEVE optimizes their execution within loops. Optimizing means that DATATRIEVE factors the function out of the loop and executes it once at the top of the loop.
- For the remainder of the functions, DATATRIEVE does not optimize their execution within loops. Instead, DATATRIEVE executes these functions for each iteration of the loop.

You can determine the default for each function by looking at the function definitions in DTR$LIBRARY:DTRFND.MAR:

- If the function definition does *not* include the DTR$FUN_NOOPTIMIZE statement, DATATRIEVE optimizes the function execution in loops.
- If a function definition *does* include the DTR$FUN_NOOPTIMIZE statement, DATATRIEVE does not optimize the execution of the function in loops. The following functions are not optimized because, in most instances, they should be executed for each iteration of a loop:

```
FN$CREATE_LOG
FN$DELETE_LOG
FN$INIT_TIMER
FN$SHOW_TIMER
FN$TRANS_LOG
FN$WIDTH
```

You can control the optimization of function execution by editing the function definitions in DTR$LIBRARY:DTRFND.MAR to include or to delete the DTR$FUN_NOOPTIMIZE statement. When you create your own function definitions, you also have the option of using DTR$FUN_NOOPTIMIZE.

See the *VAX DATATRIEVE Guide to Programming and Customizing* for more information about changing function definitions and adding your own functions to DATATRIEVE.

Record Selection Expressions (RSEs) 5

This chapter describes how to use the VAX DATATRIEVE record selection expression to form record streams and collections. The **RSE** specifies the conditions DATATRIEVE uses to form the subsets and combinations of records that you can output, report, and change.

A **record stream** is a group of records you form with a DATATRIEVE RSE. The record stream contains the records or the combinations of records that satisfy the conditions you specify in the RSE.

5.1 The RSE Format

The format of a record selection expression is:

```
┌ FIRST n ┐   [context-var IN] rse-source
│         │
└ ALL     ┘

[CROSS [context-var IN] rse-source [OVER field-name]] [...]

[WITH boolean-expression] [REDUCED TO reduce-key [,...]]

[SORTED BY sort-key [,...]]
```

The format for rse-source is:

```
{ domain-name        }
{ collection-name    }
{ list               }
{ rdb-relation-name  }  ┌                                             ┐
{ dbms-record-name   }  │ { MEMBER }                                  │
                        │ { OWNER  }   [OF] [context-name.set-name]   │
                        │ { WITHIN }                                  │
                        └                                             ┘
```

The domain-name in the preceding syntax includes DBMS domains, relational, VAX Record Management System (RMS), view, and network domains. Note that the MEMBER, OWNER, and WITHIN set-name syntax is used only with a DBMS domain name or DBMS record name.

The format diagram shows that the RSE contains one required element and seven optional elements. The following sections describe each element.

5.2 Specifying the Source of Records

The name of the record source is the only required element in an RSE. You must specify one of the five possible sources of the record stream:

- domain-name
- collection-name
- list-name
- rdb-relation-name
- dbms-record-name

This element tells DATATRIEVE which RMS, Rdb, or DBMS domain, collection, list, relation, or DBMS record contains the records to search when forming a record stream.

You can use record selection expressions to access remote data, but the RSEs cannot contain expressions that DATATRIEVE must evaluate on the remote node.

5.2.1 Domains as Sources of Record Streams

You can use the given name of a domain to specify the source of records DATATRIEVE searches when forming a record stream. Do *not* use a full or relative dictionary path name for the domain. Use the given name of any type of DATATRIEVE domain or alias you specify in the READY command.

Before you can use a domain name in an RSE, you must ready the domain with a READY command:

```
DTR> READY YACHTS
DTR> PRINT YACHTS

                                  LENGTH
                                   OVER
MANUFACTURER   MODEL     RIG       ALL    WEIGHT BEAM  PRICE

 ALBERG       37 MK II   KETCH    37     20,000  12  $35,000
 ALBIN        79         SLOOP    26      4,200  10  $17,900
         .                .                .
         .                .                .
         .                .                .

DTR>
```

5.2.2 Collections as Sources of Record Streams

You can use the name of a collection to specify the source of records DATATRIEVE searches when forming a record stream. Before you can use a collection in an RSE, you must establish the collection with a FIND statement.

Examples

You can specify the keyword CURRENT to refer to the collection you most recently formed:

```
DTR> READY YACHTS
DTR> FIND YACHTS
[113 records found]
DTR> PRINT CURRENT
                                 LENGTH
                                  OVER
MANUFACTURER   MODEL      RIG     ALL    WEIGHT BEAM  PRICE

 ALBERG      37 MK II   KETCH    37     20,000  12  $35,000
 ALBIN       79         SLOOP    26      4,200  10  $17,900
        .                 .                .
        .                 .                .
        .                 .                .
        .                 .                .

DTR
```

You can also use the name of a named collection to specify the source of records:

```
DTR> FIND BIG_ONES IN YACHTS WITH LOA > 40
[8 records found]
DTR> PRINT BIG_ONES WITH PRICE NE 0

                                 LENGTH
                                  OVER
MANUFACTURER   MODEL      RIG     ALL    WEIGHT BEAM  PRICE

 CHALLENGER  41         KETCH    41     26,700  13  $51,228
 COLUMBIA    41         SLOOP    41     20,700  11  $48,490
 GULFSTAR    41         KETCH    41     22,000  12  $41,350
 ISLANDER    FREEPORT   KETCH    41     22,000  13  $54,970
 OLYMPIC     ADVENTURE  KETCH    42     24,250  13  $80,500

DTR>
```

5.2.3 Lists as Sources of Record Streams

To retrieve, modify, and report data in the items of a list in a hierarchical domain, you can use the name of the list in an RSE. By using a list name to specify the source of records for an RSE, you can form a record stream from the list items in a single record.

Examples

A SELECT statement picks out the particular record containing the list. Then the RSE, "FIRST 1 KIDS", identifies the first item from the KIDS list of the selected record:

```
DTR> READY FAMILIES
DTR> FIND FAMILIES
[14 records found]
DTR> SELECT
DTR> PRINT AGE OF FIRST 1 KIDS

AGE

 7

DTR>
```

A FOR statement forms a stream of target records containing the list. Then the RSE, "KIDS WITH AGE GT 20", identifies the children who are older than 20:

```
DTR> FOR FAMILIES WITH NUMBER_KIDS = 2
CON>    PRINT KID_NAME, AGE OF KIDS WITH AGE GT 20

   KID
   NAME    AGE

ANN        29
JEAN       26
MARTHA     30
TOM        27

DTR>
```

For more information on using the PRINT statement to display items from lists, see the section on the PRINT statement in the reference chapter of this manual.

Refer also to the *VAX DATATRIEVE User's Guide* for additional examples illustrating the manipulation of data stored in hierarchical records.

Restrictions

- You *cannot* establish a valid record context by using only a list name in the OF rse clause of a MODIFY statement:

  ```
  DTR> READY FAMILIES WRITE
  DTR> MODIFY EACH_KID OF FIRST 1 KIDS
  "KIDS" is undefined or used out of context
  DTR>
  ```

If you include the MODIFY statement in a FOR statement, you establish context and DATATRIEVE modifies the record:

```
DTR> READY FAMILIES WRITE
DTR> FOR FAMILIES MODIFY EACH_KID OF FIRST 1 KIDS
Enter KID_NAME:
```

- You *cannot* erase from an OCCURS list. You must use the MODIFY statement to change or erase fields from a list:

```
DTR> ERASE ALL OF KIDS
"KIDS" is undefined or used out of context
DTR>
```

Usage Notes

- You can reduce the complexity of working with lists by entering the SET SEARCH command. This command invokes the DATATRIEVE Context Searcher, simplifying the job of providing the context for referring to items within lists. See the *VAX DATATRIEVE User's Guide* for more information about using hierarchical records.

- If you establish a valid record context with a SELECT statement or a FOR statement, you can use a list name in the OF rse clause of a MODIFY statement:

```
DTR> FOR FIRST 2 FAMILIES
[Looking for statement]
CON>      MODIFY EACH_KID OF KIDS
Enter KID_NAME:_<CTRL/Z>
Execution terminated by operator
DTR> FIND FIRST 2 FAMILIES
[2 records found]
DTR> SELECT
DTR> MODIFY EACH_KID OF KIDS
Enter KID_NAME:_<CTRL/Z>
Execution terminated by operator
DTR>
```

5.2.4 Using Relations and DBMS Records as Sources of Record Streams

You can use the given name of a relation or DBMS record to specify the source of records DATATRIEVE searches when forming a record stream. Do *not* use a full or relative dictionary path name for the relation or DBMS record. Use the given name.

Before you can use a relation or DBMS record name in an RSE, you must ready the database with a READY command:

```
DTR> READY PARTS_DB
```

5.3 Optional Elements of the RSE

Once you have indicated the source of records, you can change the record stream by specifying a number of characteristics. There are six optional elements of the record selection expression. You can use any or all of them in an RSE, but these elements must appear in the order specified in the syntax diagram.

5.3.1 Option 1: Restricting the Number of Records in a Record Stream

The FIRST n or ALL element specifies how many records are in the record stream formed by the RSE. If you include the element FIRST n, the record stream has no more than n records. The argument n should be a value expression that has the value of a positive integer:

```
DTR> PRINT FIRST 3 YACHTS

                               LENGTH
                                OVER
MANUFACTURER   MODEL      RIG    ALL   WEIGHT BEAM  PRICE

 ALBERG       37 MK II   KETCH   37     20,000  12  $35,000
 ALBIN        79         SLOOP   26      4,200  10  $17,900
 ALBIN        BALLAD     SLOOP   30      7,276  10  $27,500
```

Usage Notes

- If you also specify a sort order in the RSE, DATATRIEVE first sorts the records that satisfy the conditions of the RSE. Then the first n of those sorted records become the record stream. For example:

  ```
  DTR> PRINT FIRST 3 YACHTS SORTED BY LOA

                                 LENGTH
                                  OVER
  MANUFACTURER   MODEL      RIG    ALL   WEIGHT BEAM  PRICE

   WINDPOWER   IMPULSE    SLOOP   16       650  07   $3,500
   CAPE DORY   TYPHOON    SLOOP   19     1,900  06   $4,295
   ENCHILADA   20         SLOOP   20     2,300  07

  DTR>
  ```

- If n is not an integer, DATATRIEVE truncates any fractional part of the value and uses the remaining integer as the number of records in the record stream.

- If you use the element FIRST n and n is greater than the number of records satisfying those conditions, the record stream consists of all records meeting the conditions of the RSE.

- If you use the element ALL or omit this element, the record stream consists of all records that satisfy the conditions of the RSE.

5.3.2 Option 2: Naming a Record Stream

If you include a context variable in the RSE, you give the record stream a name. Using context variables to qualify field names also lets you refer to fields from different record streams in the same statement. See the appendix on name recognition and single record context in the *VAX DATATRIEVE User's Guide* for additional information on the use of context variables and qualified field names.

Usage Note

If you use a context variable in a FIND statement, the context variable becomes the name of the collection. Until you form another collection or release this one, it has two names: CURRENT (because it is the most recently formed collection) and the name of the context variable.

Example

When you use the CROSS clause to join domains sharing one or more field names, you can use context variables to specify which of the identically named fields you want DATATRIEVE to act on.

```
DTR> PRINT A.BOAT OF A IN YACHTS CROSS B IN YACHTS OVER
CON>      SPECS WITH A.TYPE NE B.TYPE

                                  LENGTH
                                   OVER
MANUFACTURER   MODEL      RIG     ALL    WEIGHT BEAM  PRICE

 CARIBBEAN   35          SLOOP    35     18,000  11  $37,850
 CHRISTCRAF  CARIBBEAN   SLOOP    35     18,000  11  $37,850
 SCAMPI      30          SLOOP    30     6,600   10
 SOLNA CORP  SCAMPI      SLOOP    30     6,600   10

DTR>
```

5.3.3 Option 3: Specifying Conditions for the Record Stream

In the WITH clause, you specify:

- The values DATATRIEVE compares with the values in records
- The type of comparison DATATRIEVE does as it searches through the source of records

When the values of a record satisfy the conditions specified in the Boolean expression (that is, when the Boolean expression is true), the record becomes part of the record stream formed by the RSE. See the chapter in this manual on Boolean expressions for more information.

Examples

Use the relational operator equals (=) to form a Boolean expression for a WITH clause:

```
DTR> PRINT YACHTS WITH BUILDER = "ALBIN"

                                LENGTH
                                 OVER
MANUFACTURER   MODEL     RIG     ALL    WEIGHT BEAM  PRICE

 ALBIN        79        SLOOP   26       4,200  10  $17,900
 ALBIN        BALLAD    SLOOP   30       7,276  10  $27,500
 ALBIN        VEGA      SLOOP   27       5,070  08  $18,600

DTR> FIND YACHTS WITH RIG = "MS", "KETCH"
[18 records found]
DTR> FIND YACHTS WITH RIG = "MS", "YAWL"
[5 records found]
DTR>
```

The Boolean ANY expression is true if the record stream formed by the RSE is not empty. An example is the clause WITH ANY KIDS WITH KID_NAME = "ELLEN". This clause eliminates records in the source that contain no items in the KIDS list with a KID_NAME of "ELLEN":

```
DTR> FIND FAMILIES WITH ANY KIDS WITH AGE > 30
[3 records found]

DTR> PRINT CURRENT WITH ANY KIDS WITH
[Looking for Boolean expression]
CON> KID_NAME = "ELLEN"

                         NUMBER    KID
  FATHER      MOTHER      KIDS     NAME     AGE

JIM         LOUISE          5   ANNE        31
                                JIM         29
                                ELLEN       26
                                DAVID       24
                                ROBERT      16

DTR>
```

5.3.4 Option 4: Retaining Only Unique Field Values

The REDUCED TO clause of the RSE isolates unique field values within the record stream. You can specify any field name or related value expression as a reduce key. This is the format of the REDUCED TO clause:

$$\text{REDUCED [TO]} \quad \left\{ \begin{array}{l} \text{field-name} \\ \text{value expression} \end{array} \right\} \quad [,\ldots]$$

If you include the RSE in a PRINT statement, DATATRIEVE displays the field values according to the order of the reduce keys.

Restrictions

- You must include at least one reduce key. Additional reduce keys must be separated by commas.
- You cannot include more than 255 reduce keys.

Example

Display the unique values of BEAM for all the records in YACHTS:

```
DTR> PRINT YACHTS REDUCED TO BEAM

BEAM

 00
 06
 07
 08
 09
 10
 11
 12
 13
```

For an example of the REDUCED TO clause with multiple reduce keys, see the section in this chapter on crossing a domain with itself.

5.3.5 Option 5: Sorting the Records

The SORTED BY element of the RSE sorts the records in the record stream. You can sort the records according to the values in one or more fields or according to a related value expression. This is the format of the SORTED BY clause:

```
                  ⎧ ⎡ ASC[ENDING]  ⎤                       ⎫
SORTED [BY]       ⎨ ⎢ DESC[ENDING] ⎥  { field-name       }  ⎬    [,...]
                  ⎨ ⎢ INCREASING   ⎥  { value-expression }  ⎬
                  ⎩ ⎣ DECREASING   ⎦                       ⎭
```

In the sort key, you can specify both the order of the sort and the field or value expression to be used as the basis of the sort.

Restrictions

- You must include at least one sort key. Additional sort keys must be separated by a comma.
- You cannot specify more than 255 sort keys.
- A SORTED BY clause cannot contain a REDUCED TO clause or another SORTED BY clause.

Usage Notes

- If you do not include a keyword to specify the order of the sort with the first sort key, the default order is ascending. If you do not specify the sort order for the second or any subsequent field or value expression, DATATRIEVE uses the sort order that applied to the preceding field.
- The value of characters for alphanumeric sorts is determined by the ASCII values of the characters. Appendix B presents the ASCII sorting sequence.
- The keywords ASC, ASCENDING, and INCREASING are equivalent: the sorted values begin with the smallest and end with the largest.
- The keywords DESC, DESCENDING, and DECREASING are also equivalent: the sorted values begin with the largest and end with the smallest.
- When you use multiple sort keys, DATATRIEVE treats the first field or value expression in the sort list as the major sort key and successive field or value expressions as minor keys. See the *VAX DATATRIEVE Guide to Writing Reports* for information on sorting with multiple sort keys to form control groups.

Example

You can sort records according to value expressions based on field values. For example, the following PRINT statement contains an RSE that sorts the YACHTS domain according to the values of BEAM divided by LOA:

```
DTR> PRINT TYPE, BEAM, LOA, BEAM/LOA ("BEAM/LOA") USING
CON>    9.999 OF FIRST 5 YACHTS WITH BEAM NE 0 SORTED BY
CON>    BEAM/LOA

                                 LENGTH
                                  OVER
MANUFACTURER   MODEL     BEAM  ALL    BEAM/LOA

 COLUMBIA     41          11    41     0.268
 NEWPORT      41 S        11    41     0.268
 CAPE DORY    25          07    25     0.280
 SALT         19          07    25     0.280
 DOUGLAS      32          09    32     0.281

DTR>
```

5.3.6 Option 6: The CROSS Clause and Relational Joins

When you include the CROSS clause in an RSE, DATATRIEVE uses two or more sources to form combinations of records you could otherwise form only with nested FOR loops or view domains. You can join these records in combinations based on the relationship between the values of fields in the sources. This combining of records is called a *relational join.*

Use the CROSS clause to:

- Compare records from one domain or collection
- Combine records from two or more domains or collections
- Flatten hierarchical domains to ease access to the list items

The format of the CROSS clause is:

```
[ CROSS [context-var IN]    rse-source    [OVER field-name] ]   [...]
```

You can improve DATATRIEVE performance in performing the join by taking advantage of key optimization. See the *VAX DATATRIEVE User's Guide* for guidelines to improve DATATRIEVE performance.

5.3.6.1 Crossing a Domain with Itself – When you want to compare records within the same domain, use the CROSS clause to cross the domain with itself. For example, suppose you want to display information about manufacturers who build boats with more than one type of rig. The following query uses one RSE that includes five out of the seven possible elements of an RSE. DATATRIEVE processes the query far faster than if nested FOR loops were used:

```
DTR> DEFINE PROCEDURE CROS
DFN> READY YACHTS
DFN> PRINT BUILDER, RIG, A.RIG OF
DFN>   A IN YACHTS CROSS YACHTS OVER BUILDER WITH
DFN>   RIG GT A.RIG REDUCED TO BUILDER, RIG, A.RIG
DFN> END_PROCEDURE

DTR> :CROS

MANUFACTURER  RIG    RIG

 AMERICAN    SLOOP  MS
 CHALLENGER  SLOOP  KETCH
 GRAMPIAN    SLOOP  KETCH
 IRWIN       SLOOP  KETCH
 ISLANDER    SLOOP  KETCH
 NORTHERN    SLOOP  KETCH
 PEARSON     SLOOP  KETCH

DTR>
```

Note the following features of this procedure:

- The print list contains the three values you want to display: the builder (BUILDER) and the two types of rig (RIG, A.RIG).
- The clause "A IN YACHTS CROSS YACHTS OVER BUILDER" joins the records in YACHTS with themselves, seeking matches on the BUILDER field. "OVER BUILDER" is used in place of the more complex "WITH AILDER = BUILDER".
- To retain only those records with two different values for RIG, use the WITH clause of the RSE. You have two options. If you use the Boolean expression "RIG NE A.RIG", then you get two combinations for every pair of records that meet the specifications of the RSE. (Only the order of the values for RIG and A.RIG are different.) Using "RIG GT A.RIG" eliminates this duplication.
- The three reduce keys correspond to the three value expressions of the print list: BUILDER, RIG, and A.RIG. This REDUCED TO clause retains only the unique combinations of these values.

5.3.6.2 Crossing Two Domains — When you want to join records from two domains, use the CROSS clause. If the records share a common field, you may want to add OVER followed by the field name.

For example, suppose you want to join the names of boat owners from the OWNERS domain with information on individual boats you have in the YACHTS domain. You want each OWNERS record paired only with the YACHTS record having the same MANUFACTURER and MODEL. The group field TYPE, which includes both MANUFACTURER and MODEL, is the primary key for the YACHT.DAT file. It is defined as NO DUP, and, as a result, no two boats can have the same value for TYPE. The RSE that forms this temporary combination of records is on the second input line of the PRINT statement:

```
DTR> PRINT NAME, YACHTS.TYPE, PRICE OF
CON>     YACHTS CROSS OWNERS OVER TYPE

   NAME     MANUFACTURER   MODEL     PRICE

STEVE        ALBIN        VEGA        $18,600
HUGH         ALBIN        VEGA        $18,600
JIM          C&C          CORVETTE
ANN          C&C          CORVETTE
JIM          ISLANDER     BAHAMA       $6,500
ANN          ISLANDER     BAHAMA       $6,500
STEVE        ISLANDER     BAHAMA       $6,500
HARVEY       ISLANDER     BAHAMA       $6,500
TOM          PEARSON      10M
DICK         PEARSON      26
JOHN         RHODES       SWIFTSURE

DTR>
```

In effect you have formed a virtual expanded record with fields from both YACHTS and OWNERS for the records that match on values for TYPE. The OVER TYPE phrase takes the place of WITH OWNERS.TYPE = YACHTS.TYPE. This RSE forms a record stream of 11 records. Because the two sources of records are different, there are no duplicates to contend with when they are crossed.

Figure 5-1 illustrates the way DATATRIEVE joins records from two domains. DATATRIEVE reads each record from the first source trying to find matches on the TYPE field. When DATATRIEVE finds a match, it joins the record from OWNERS with the record from YACHTS.

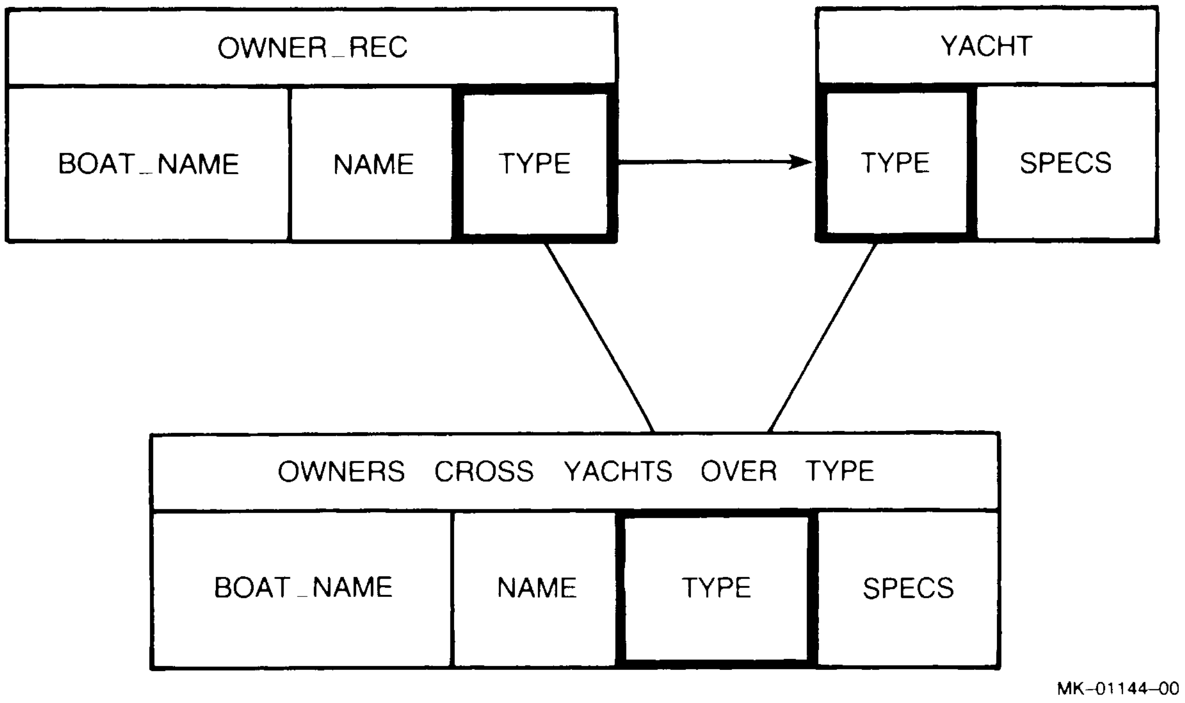

Figure 5-1: Joining OWNERS and YACHTS with CROSS

You can use CROSS to join two domains on the same remote node. However, you cannot join domains on different nodes.

5.3.6.3 Crossing More Than Two Domains – You can join records from more than two domains, collections, or lists. In fact, you can join two domains that share a common field and then join the expanded "records" with a third domain by means of a different field.

For example, suppose that you have three domains A, B, and C. A and B share a common field (FOO) that is a key field for B. You can join records from A and B by specifying the following RSE:

```
A CROSS B OVER FOO
```

But you may want to join this record stream with records from C. Assume that C has a key field (BAR) that is also found in either A or B. You specify the following RSE to join records from the three sources:

```
A CROSS B OVER FOO CROSS C OVER BAR
```

The CROSS clause also simplifies your work with hierarchical records.

One record in FAMILIES can have data on as many as 10 kids. Form a collection of the record with the largest number of kids:

```
DTR> FIND FAMILIES WITH NUMBER_KIDS = MAX NUMBER_KIDS OF FAMILIES
DTR> PRINT CURRENT

                          NUMBER    KID
  FATHER      MOTHER       KIDS     NAME     AGE

BASIL       MERIDETH        6    BEAU        28
                                 BROOKS      26
                                 ROBIN       24
                                 JAY         22
                                 WREN        17
                                 JILL        20
```

The record selection expression CURRENT CROSS KIDS flattens the hierarchy, simplifying the retrieval of list items. For example:

```
DTR> PRINT FATHER, MOTHER, NUMBER_KIDS,
DTR>     EACH_KID OF CURRENT CROSS KIDS

                          NUMBER    KID
  FATHER      MOTHER       KIDS     NAME     AGE

BASIL       MERIDETH        6    BEAU        28
BASIL       MERIDETH        6    BROOKS      26
BASIL       MERIDETH        6    ROBIN       24
BASIL       MERIDETH        6    JAY         22
BASIL       MERIDETH        6    WREN        17
BASIL       MERIDETH        6    JILL        20

DTR>
```

See the *VAX DATATRIEVE User's Guide* for a further discussion on how to use the CROSS clause.

5.3.6.4 CROSS Clause Restriction — You cannot reference a group field name in an OVER clause if the group field includes a COMPUTED BY field. (If you cross over a group field containing a COMPUTED BY field, DATATRIEVE includes too many records in the record stream.)

Instead, you should explicitly list each individual field of the group.

5.3.7 Option 7: Clauses for DBMS Records

Three clauses of the RSE specify access to records in DBMS sets on the basis of set relationships:

- MEMBER
- OWNER
- WITHIN

Use the MEMBER, OWNER, and WITHIN clauses to refer only to DBMS domains and DBMS views.

Restrictions

- When you use a context variable in a MEMBER, OWNER, or WITHIN clause, that context variable cannot refer to a record stream of items in a list or to a collection of such items. Lists are repeating fields in hierarchical records or hierarchical views.
- The DBMS record type associated with the DBMS domain or collection specified in the RSE must be a valid member type of the specified set type.
- You must use a valid context variable or the name of a collection with a selected record. The context variable must identify a record occurrence of a domain with a DBMS record type that participates in the specified set type.

  If the SYSTEM owns the set, you do not need to establish a context for the set. If the set is not owned by the SYSTEM and the context name is not present, DATATRIEVE determines the set occurrence for evaluating the rest of the RSE by using the most recent single record context of a domain with a record type that participates in the specified set type.

5.3.7.1 MEMBER Clause – The MEMBER clause lets you access the member records of a set. Conceptually, you are telling DATATRIEVE to "look down" from your current position and find the members of the set that are linked to that record.

Examples

This example selects a record from the domain DIVISIONS and prints all the records from the domain EMPLOYEES owned by that selected record through the set CONSISTS_OF:

```
DTR> FIND DIVISIONS
DTR> SELECT 3
DTR> PRINT EMPLOYEES MEMBER CONSISTS_OF

                                        Phone
Ident  Last Name----------- First Name  Number   Loc

 99998 PAYNE                RONALD      8902345 23456

DTR>
```

This example creates a collection from EMPLOYEES and PART_S. Each record in the collection contains all the fields from a record in EMPLOYEES and all the fields from a record in PART_S. DATATRIEVE joins each record from EMPLOYEES with each PART_S record that the record in EMPLOYEES owns through the set RESPONSIBLE_FOR:

```
DTR> FIND EMPLOYEES CROSS PART_S MEMBER RESPONSIBLE_FOR
DTR> PRINT EMP_LAST_NAME, PART_DESC OF CURRENT

[66 records found]
DTR>
```

This example defines a hierarchical DBMS view using one field from the DBMS domain DIVISIONS and two fields from the DBMS domain EMPLOYEES:

```
DTR> DEFINE DOMAIN WHOLE_DIVISION
DEF>  OF DIVISIONS, EMPLOYEES USING
DEF> 01 DIV OCCURS FOR DIVISIONS.
DEF>    02 DIV_NAME FROM DIVISIONS.
DEF>    02 WORKERS OCCURS FOR EMPLOYEES MEMBER CONSISTS_OF.
DEF>       04 EMP_ID FROM EMPLOYEES.
DEF>       04 EMP_NAME FROM EMPLOYEES.
DEF> ;
DTR>
```

5.3.7.2 OWNER Clause — The OWNER clause instructs DATATRIEVE to look up from a position in the database, thereby allowing you access to the owner record of a set.

Restriction

If you try to get access to the owner of a set owned by the SYSTEM, DATATRIEVE displays an error message on your terminal.

Examples

This example creates a collection. Each record in the collection has data from three records:

- A component record
- The part record that owns the component record in the set PART_USED_ON
- The part record that owns the component record in the set PART_USES

```
DTR> FIND A IN COMPONENTS CROSS
CON> PART_S OWNER PART_USED_ON CROSS
CON> PART_S OWNER OF A.PART_USES
[119 records found]
DTR>
```

This example prints the field DIV_NAME from DIVISIONS and the field EMP_NAME from EMPLOYEES. For each record in DIVISIONS, the example lists the EMPLOYEES record that owns the MANAGES set and the DIVISIONS record that is a member of that set. The print list item ALL EMP_NAME OF EMPLOYEES is an inner print list and has this general form:

ALL print-list OF rse

The inner print list contains an RSE, and you can use it to create a context for the items in a list of a hierarchical record or a hierarchical view:

```
DTR> FOR DIVISIONS
CON> PRINT DIV_NAME, ALL EMP_LAST_NAME OF
CON> EMPLOYEES OWNER OF MANAGES

Division Name------- Last Name----------

LA34 DEVELOPMENT     ZAHAN
SOFTWARE             SCHATZEL
RM05 DEVELOPMENT     ZOPF
ENG BUILD & TEST     THOMPSON
VT100 DEVELOPMENT    DALE
           .
           .
           .
DTR>
```

5.3.7.3 WITHIN Clause – The WITHIN clause gives you access to the member records or the owner record of a DBMS set.

You can use a WITHIN clause to replace a MEMBER clause or an OWNER clause. You can also replace a WITHIN clause with a MEMBER clause or an OWNER clause, depending on the relationship between the record and the set in which it participates. Use WITHIN when you do not need to specify whether you are looking for an OWNER or MEMBER.

Examples

This example uses the CROSS clause of the RSE and prints data from PART_S, SUPPLIES, and VENDORS. DATATRIEVE uses the sets PART_INFO and VENDOR_SUPPLY to associate PART_S records with SUPPLY and VENDOR records:

```
DTR> PRINT PART_S CROSS SUP IN SUPPLIES WITHIN
CON> PART_INFO CROSS
CON> VENDORS WITHIN SUP.VENDOR_SUPPLY

   Part                                                            Unit
  Number   ----------------Part Description---------------- St     Price


CE-3556-78 VT100 NON REFLECTIVE SCREEN                      G       $26
         $20  NO  G   MEMO 14        02321332
U.S. SEALS                              R.R. BINGHAM

132 MAIN ST.
MOLINE, ILL
                816,884,5398
AS-1110-85 1N970B DIODE                                     G       $20
         $17  NO  G   REPR 2         12345678
HIGH ENERGY CORP                        GIADONE ALEX
500 DOVER RD.
MAYNARD, MA
                617,555,6666
       .
       .
       .
DTR>
```

This example prints the name of each group next to the name of each employee in that group:

```
DTR> FOR DIVISIONS
CON> FOR EMPLOYEES WITHIN CONSISTS_OF
CON> PRINT DIV_NAME, EMP_LAST_NAME

Division Name------- Last Name-----------

LA34 DEVELOPMENT     FRATUS
SOFTWARE             HUTCHINGS
SOFTWARE             IACOBONE
SOFTWARE             PASCAL
RM05 DEVELOPMENT     PAYNE
ENG BUILD & TEST     FRASER
ENG BUILD & TEST     HORYMSKI
ENG BUILD & TEST     HUMPHRY
ENG BUILD & TEST     MASE
ENG BUILD & TEST     PARVIA
          .
          .
          .
DTR>
```

Record Definitions 6

In DATATRIEVE, you define a record and the logical relationships between fields with the DEFINE RECORD command. To define the logical record, you combine field definition clauses that specify the characteristics of each field. This combination of fields determines the structure of the record and represents the relationships between the items of data you store in the fields.

You can have DATATRIEVE write the record definition if you use the interactive Application Design Tool (ADT). However, because ADT does not provide all the available field definition clauses, you cannot define all types of records. See the *VAX DATATRIEVE Handbook* for a complete explanation of ADT.

This chapter briefly explains the various elements of a record definition and the record and field definition clauses you use to define records for DATATRIEVE domains. Detailed descriptions of these clauses can be found within the reference chapter of this manual. For more information on record and field definitions, see the *VAX DATATRIEVE Handbook.*

6.1 The Parts of a Record Definition

A record definition consists of one or more field definitions. Each field definition describes the field and its relationship to other fields in the record.

Every field definition contains at least three parts:

- A level number that specifies the relationship between the field and other fields in the record
- A field name that identifies the field
- A period (.) that signals the end of the field definition

Most field definitions also contain one or more field definition clauses.

6.2 Elementary and Group Fields

An **elementary field** is a basic unit of data. It contains no other field within it. A **group field**, on the other hand, contains one or more other fields. Every record definition must meet the following requirements for including elementary and group fields:

- A record definition must contain at least one elementary field.
- If a record contains more than one elementary field, it must contain a group field that includes all other fields in the record.
- A group field must contain at least one other field – either elementary or group.
- A group field can contain both elementary and group fields.

6.3 Field Levels and Level Numbers

The relationship between the fields in the record is made explicit by the level numbers assigned to the fields in the record definition. These numbers help to determine the field levels. The following sections refer to the YACHT record definition in Figure 6-1.

6.3.1 Field Levels

Every field in a record definition has a level number which specifies its relationship to the other fields in the record. A group field that contains all other fields in a record is at the first or top level. In the YACHT record, BOAT contains all other fields in the record and is at the top level.

A field contained in only a top-level field and in no other group field is subordinate to the top-level field. This subordinate field is at the second level in the record.

For example, TYPE and SPECIFICATIONS are both at the second level and are both subordinate to BOAT. Any field subordinate to only a second-level field is at the third level, and so on. Thus, MANUFACTURER and MODEL are at the third level.

6.3.2 Level Numbers

DATATRIEVE recognizes the levels of fields in a record definition according to the level numbers you assign to each field. The level number is the first element of a field definition. Level numbers are 1- or 2-digit numbers, ranging from 1 to 65. The number of the highest possible level is one (01), and the number of the lowest possible level is 65. Leading zeroes, as in 01 and 05, do not affect the value of the level number.

The level number of the top-level field must be the smallest one assigned to any field in the record definition, and no other field can have the same level number as the top-level field. The level number usually assigned to the top-level field is 01. Any field with a higher-level number is subordinate to the top-level field.

Figure 6-1 shows the use of level numbers for fields in the YACHT record definition.

```
01 BOAT
    03 TYPE
        06 MANUFACTURER
        06 MODEL
    03 SPECIFICATIONS
        06 RIG
        06 LENGTH_OVER_ALL
        06 DISPLACEMENT
        06 BEAM
        06 PRICE
```

Figure 6-1: Level Numbers in the YACHT Record Definition

In the record definition for YACHTS, BOAT is the top-level field and is the only field with the level number 01. TYPE and SPECIFICATIONS are group fields at the same level and have the same 03 level number. The seven elementary fields are all at the 06 level. MANUFACTURER and MODEL are contained in TYPE, and the other five are contained in SPECIFICATIONS.

The level numbers in YACHT illustrate several rules about assigning level numbers to fields:

- Only the level numbers determine the relationships among fields.
- Level numbers need not be consecutive. Only the relative value of level numbers determines the relationship between fields.
- Differences in level numbers mean differences in levels and differences in relationship.

6.4 Field Names

In addition to a level number, every field in a record must have a field name. You use the field name to identify the field in DATATRIEVE statements. If you include the QUERY_NAME clause in the field definition, you can use the query name in place of the field name. DATATRIEVE also uses the field name when printing the field's content: if there is no QUERY_HEADER clause in the field definition, DATATRIEVE uses the field name as a column header for the display of the data. If you include the QUERY_HEADER clause in the field definition, DATATRIEVE uses the query header, instead of the field name, to make the column header. You can override the printing of the field name or query header by specifying a column header modifier as part of a print list element in the PRINT, SUM, and REPORT statements.

A field name must conform to the DATATRIEVE rules for names, described in Chapter 1. In summary, these rules are:

- A name can consist of letters, digits, hyphens (-), and underscores (_).
- A name must begin with a letter.
- A name must end with a letter or digit.
- A name cannot duplicate a DATATRIEVE keyword. See Appendix C for a list of keywords.
- A name must be 31 characters or less.
- A name can be continued from one line to another only by using a hyphen.
- A name can duplicate another field name in the same record definition only if the duplicate field names are in different group fields. However, duplicating field names in a record is not a good data management practice. You can avoid name qualification by giving each field a unique name.

Note

You can create unnamed fields in the Common Data Dictionary Data Definition Language using the "*" construct. DATATRIEVE treats these unnamed fields as FILLER fields.

You can specify the keyword FILLER as the name of an elementary or group field. When you name a field FILLER, you cannot retrieve data from it or store data in it.

Like other fields, a field named FILLER must have a level number. It can also contain field definition clauses. You can, however, use the name FILLER for more than one field at the same level in a group field. When you use the PRINT, LIST, MODIFY, STORE, REPORT, and SUM statements to retrieve, update, or store the contents of a record, DATATRIEVE does not retrieve, update, or store values in FILLER fields.

The DISPLAY statement, however, displays all the contents of a group field, regardless of the field names in the record definition. As a result, you should not use the name FILLER as a means of protecting sensitive information stored in physical records. Using view domains that exclude the sensitive fields is somewhat better than using FILLER as a means of protecting information in data files.

If FILLER is the name of a group field, you cannot get access to the data in the physical record by:

- Using a name for that group field. DATATRIEVE does not recognize FILLER as a field name in a record selection expression, print list, or field list.
- Retrieving for output whole records or group fields containing the group field named FILLER. DATATRIEVE stops its access of fields in a group when it encounters the name FILLER, and it moves to the next field at the same level or at a higher level.

You can, however, retrieve values from the elementary and group fields included in a group field named FILLER. Each of those fields has its own valid name, and you can retrieve the value by specifying that name in a record selection expression, a print list, or a field list.

6.5 Field Classes

DATATRIEVE classifies every field by the type of data it contains or the way in which it stores data. Table 6-1 summarizes the field classes and their content.

Table 6-1: **Field Classes**

Field Type	Class	Content
Elementary field	Alphabetic	Uppercase and lowercase letters and spaces.
	Alphanumeric	Any combination of characters.
	Numeric	Any combination of digits and an optional sign (+ or −).
	DATE	A date.
	COMPUTED BY	None; the field definition specifies a value expression, but no value is stored in the record.
Group field	Alphanumeric	The values of the fields contained in the group field.

6.6 Field Definition Clauses

When you define a field, you specify its characteristics with one or more field definition clauses. A field definition clause consists of a keyword (such as PICTURE or QUERY_NAME) followed by a character string or value expression.

When you write DATATRIEVE record definitions, you can choose from the field definition clauses summarized in Table 6-2. Field definition clauses specify the following characteristics of fields:

- The class and length of the data and the format in which the data is stored (PICTURE, USAGE, COMPUTED BY, OCCURS)
- The format used when DATATRIEVE writes the data to a file or output device (EDIT_STRING, QUERY_HEADER, SIGN)
- The values accepted when you store data in the field (VALID IF, DEFAULT VALUE, MISSING VALUE)
- The way DATATRIEVE computes numeric values when you refer to the field (USAGE, SCALE, COMPUTED BY, MISSING)
- An alternate and equivalent name for the field (QUERY_NAME)
- An alternate way to define another field in the record (REDEFINES)

Table 6-2: Summary of Field Definition Clauses

Clause	Valid For	Purpose
COMPUTED BY	Elementary field	Describes a COMPUTED BY field.
DEFAULT VALUE	Elementary field	Specifies a value stored in the field if you do not enter a value when creating the record.
EDIT_STRING	Elementary field	Specifies the format of a value when DATATRIEVE writes a field value to a file or output device.
MISSING VALUE	Elementary field	Specifies a numeric or character-string literal denoting that no value is stored in the field. This causes DATATRIEVE to ignore a record with a MISSING value in a field when calculating statistical functions using values in that field.
OCCURS	Elementary or group field	Defines multiple occurrences of a field or group of fields.
PICTURE	Elementary field	Specifies the data type, length, and format of values stored in the field.
QUERY_HEADER	Elementary field	Specifies the column header for a field when DATATRIEVE writes one or more field values to a file or output device.
QUERY_NAME	Elementary or group field	Specifies an alternate name for a field.
REDEFINES	Elementary or group field	Creates an alternate definition for a field.
SCALE	Numeric elementary field	Specifies a scaling factor, a positive or negative integer indicating the power of 10 that determines the number of significant digits of an input value stored as a value in the field.

(continued on next page)

Table 6-2: Summary of Field Definition Clauses (Cont.)

Clause	Valid For	Purpose
SIGN	Numeric elementary field	Specifies the location and representation of the sign in a numeric field.
SYNCHRONIZED	Elementary field	Forces word boundary SYNC alignment according to data types when MAJOR_MINOR alignment is in effect.
USAGE	Numeric or date elementary field	Specifies the length and format of a numeric field or specifies a date field.
VALID IF	Elementary field	Tests a value against conditions specified in the Boolean expression before storing or modifying the value in the field.

6.6.1 Guide for Using Field Definition Clauses

When you write field definitions, you should observe these rules and guidelines for using field definition clauses:

- The definition of a group field must contain at least a level number and a field name. It can also contain one or more field definition clauses. DATATRIEVE ignores any PICTURE or USAGE clauses you include in a group field definition.
- You can use these clauses for both elementary and group fields: QUERY_NAME, REDEFINES, and OCCURS. Use the remaining clauses for elementary fields.
- A definition of an elementary field must contain a PICTURE, COMPUTED BY, or USAGE clause.
- If you use a PICTURE clause in a field definition, DATATRIEVE treats it as an edit string if no EDIT_STRING clause is present.
- If you use the USAGE clauses BYTE, WORD, LONG, QUAD, COMP (or INTEGER), or COMP-2 (or DOUBLE), then you do not need a PICTURE clause. The other USAGE clauses, COMP-3 (or PACKED), COMP-5 (or ZONED), and DISPLAY, require a PICTURE clause.

- If you use a COMPUTED BY clause to define a field, DATATRIEVE ignores any USAGE clause in your definition and treats a PICTURE clause as an edit string if no EDIT_STRING clause is present.
- You must end each field definition with a period. If the field is a group field with no field definition clause, place the period immediately after the field name.
- If the field definition contains one or more clauses, place the period after the last clause.
- You can put one or more field definition clauses on the same input line as the level number and field name.
- You can also put each field definition clause on one or more input lines.
- You can enter the clauses of a field definition in any order.
- Separate each field definition clause from the next by entering a space, a tab, or a carriage return.
- Indenting field definition clauses with spaces or tabs, or entering them on separate lines, does not change the characteristics of the field, but this practice makes your record definition easy to read.

You can find detailed descriptions of all the clauses in the alphabetical listings in the reference chapter of this manual.

6.7 Defining Data with DATATRIEVE and CDDL

Field definition clauses identify the data type of the values to be stored in the field. With few exceptions, data types are equivalent for DATATRIEVE and the Common Data Dictionary Data Definition Language Utility (CDDL). Table 6-3 lists both sets of data types.

Table 6-3: CDD and DATATRIEVE Data Types

CDD Data Type		DATATRIEVE Data Type	
BYTE	Can	BYTE	Can
WORD	be	WORD	only
LONGWORD	unsigned	LONGWORD	be
QUADWORD	(default)	QUAD	signed

(continued on next page)

Table 6-3: CDD and DATATRIEVE Data Types (Cont.)

CDD Data Type	DATATRIEVE Data Type
OCTAWORD or signed	–
F_FLOATING	REAL (COMP-1)
D_FLOATING	DOUBLE (COMP-2)
G_FLOATING	G_FLOATING
H_FLOATING	H_FLOATING
COMPLEX	–
UNSIGNED NUMERIC	PIC 9(n)
LEFT OVERPUNCHED NUMERIC	PIC S9(m)V9(n) SIGN LEADING
LEFT SEPARATE NUMERIC	PIC S9(m)V9(n) SIGN LEADING SEPARATE
RIGHT OVERPUNCHED NUMERIC	PIC S9(m)V9(n) SIGN TRAILING
RIGHT SEPARATE NUMERIC	PIC S9(m)V9(n) SIGN TRAILING SEPARATE
PACKED DECIMAL	PIC 9(m)V9(n) PACKED
ZONED NUMERIC	PIC S9(n) ZONED
BIT	–
DATE	DATE
TEXT	PIC A(n), PIC X(n)
UNSPECIFIED	PIC X(n) name FILLER
VARIANTS	REDEFINES
VARYING STRING	–
COMPUTED BY DATATRIEVE	COMPUTED BY
DEFAULT_VALUE FOR DATATRIEVE	DEFAULT VALUE
EDIT_STRING FOR DATATRIEVE	EDIT_STRING
MISSING_VALUE FOR DATATRIEVE	MISSING VALUE
–	PICTURE
QUERY_HEADER FOR DATATRIEVE	QUERY_HEADER

(continued on next page)

Table 6-3: CDD and DATATRIEVE Data Types (Cont.)

CDD Data Type	DATATRIEVE Data Type
QUERY_NAME FOR DATATRIEVE	QUERY_NAME
VALID FOR DATATRIEVE IF	VALID IF
ALIGNED	ALLOCATION
ARRAY	–
BASE	–
DIGITS ... FRACTIONS	SCALE n
INITIAL_VALUE	–
OCCURS	OCCURS n TIMES
OCCURS ... DEPENDING	* OCCURS n TO m TIMES DEPENDING ON
SCALE	SCALE n

* No other field definition can follow the last elementary field in the group field containing this clause.

Note that the CDDL keyword STRUCTURE is analogous in function to DATATRIEVE level numbers for fields.

Reference Section

Replace this page with the heavy page entitled Reference Section located at the end of this package.

DATATRIEVE Commands, Statements, and Definition Clauses 7

This chapter describes all DATATRIEVE commands, statements, and record and field definition clauses. (See the *VAX DATATRIEVE Guide to Using Graphics* for detailed reference information pertaining to graphics.) Table 7-1 lists the commands and statements in alphabetical order. Table 7-2 lists several frequently performed functions and indicates the commands and statements you can issue to perform them. See Chapter 6 on record definitions for a list of definition clauses.

The remainder of the chapter describes each command, statement, and definition clause and presents them in alphabetical order. Before you use a command, statement, or clause, read its description completely. Each section of the chapter divides its presentation of a command, statement, or clause into the following categories of information:

- **Format**

  The format of the command, statement, or clause includes the spelling and placement of keywords and the placement of required and optional syntax elements. As a rule, command and statement names and other keywords cannot be abbreviated. The sequence of command, statement, or clause elements is also critical. You must follow the sequence shown in the format. If you omit an optional element, leave its relative position in the command or statement empty and proceed to the remaining elements in a left-to-right order.

  Statements cannot use path names in place of given names. You can use path names with commands, but not with statements. The FINISH command is the only exception to this rule.

- **Restrictions**

  The restrictions tell you what requirements and limits there are on the use and action of a command, statement, or clause. They also list the access privileges you must have to enter a command or statement.

- **Results**

  Results tell you what action DATATRIEVE takes when you use the command or statement and its various options.

- **Usage Notes**

  Usage Notes present some common uses of the command, statement, or clause and its elements and indicate what other commands and statements you can use in conjunction with the command or statement.

- **Examples**

  The examples show the use of representative sequences of commands and statements. In the case of clauses, they show sample record or field definitions.

Symbols and conventions used in syntax formats are listed at the beginning of this manual.

Table 7-1 uses the following abbreviations:

CL	=	Clause
CO	=	Command
RW	=	Report Writer
ST	=	Statement

Table 7-1: Summary of Commands, Statements, and Clauses

Command, Statement, or Clause	Function
:(EXECUTE)	Invokes a DATATRIEVE procedure
@ (CO)	Invokes a command file stored in a VMS directory
ABORT (ST)	Ends statement, procedure, or command file execution
ADT (CO)	Invokes Application Design Tool (ADT)
ALLOCATION (CL)	Specifies word boundary alignment in the data file
Assignment (ST)	Assigns a value to an elementary field, group field, or variable
AT BOTTOM (ST) (RW)	Displays summary lines at the bottom of a report, page, or control group
AT TOP (ST) (RW)	Displays header lines at the top of a report, page, or control group

(continued on next page)

Table 7-1: Summary of Commands, Statements, and Clauses (Cont.)

Command, Statement, or Clause	Function
BEGIN-END (ST)	Groups statements into one compound statement
CHOICE (ST)	Executes one of a series of statements, depending on the evaluation of a series of Boolean expressions
CLOSE (CO)	Closes the file created by the OPEN command
COMMIT (ST)	Makes permanent the changes to DBMS and relational databases
COMPUTED BY (CL)	Describes a COMPUTED BY field
CONNECT (ST)	Makes explicit connections between a DBMS record and set
DECLARE (ST)	Defines a variable
DECLARE PORT (ST)	Creates a temporary port
DECLARE SYNONYM (ST)	Defines a synonym for the current session
DEFAULT VALUE (CL)	Specifies a value to be stored in the field if no value is entered
DEFINE DATABASE (CO)	Defines a DBMS database instance or a path name for a relational database
DEFINE DICTIONARY (CO)	Creates a data dictionary directory in the Common Data Dictionary
DEFINE DOMAIN (CO)	Creates a definition of a domain
DEFINE FILE (CO)	Creates a data file for a domain
DEFINE PORT (CO)	Creates a port definition
DEFINE PROCEDURE (CO)	Creates a procedure definition
DEFINE RECORD (CO)	Creates a record definition
DEFINE TABLE (CO)	Creates a domain table definition or a dictionary table definition
DEFINEP (CO)	Adds an entry to an access control list
DELETE; (CO)	Removes from the Common Data Dictionary a specific version of the definition of a dictionary object

(continued on next page)

Table 7-1: Summary of Commands, Statements, and Clauses (Cont.)

Command, Statement, or Clause	Function
DELETEP (CO)	Removes an entry from an access control list
DISCONNECT (ST)	Disconnects a record from a DBMS set
DISPLAY (ST)	Displays the value of a specified field
DISPLAY_FORM (ST)	Associates one or more forms with a domain
DROP (ST)	Removes a record from a collection but not from its data file
EDIT (CO)	Invokes an editor
EDIT_STRING (CL)	Specifies the format of a field value when it is printed
END_REPORT (ST) (RW)	Indicates the end of a report specification
ERASE (ST)	Removes records from an indexed or relative data file, or from a DBMS or relational database
EXIT (CTRL/Z) (CO)	Ends a DATATRIEVE session
EXTRACT (CO)	Copies the definition of a dictionary object into a command file
FIND (ST)	Retrieves records and establishes a current collection
FINISH (CO)	Ends control over and frees space occupied by domains and associated collections
FOR (ST)	Causes execution of one or a series of statements for specified records
HELP (CO)	Provides online assistance with DATATRIEVE
IF-THEN-ELSE (ST)	Executes either of two statements, depending on evaluation of a Boolean expression
LIST (ST)	Prints specified fields from a collection or record stream, one field per output line
MATCH (ST)	Relates list names with their subordinate elementary fields

(continued on next page)

Table 7-1: Summary of Commands, Statements, and Clauses (Cont.)

Command, Statement, or Clause	Function
MISSING VALUE (CL)	Specifies a literal denoting that no value is stored in the field
MODIFY (ST)	Changes the contents of a field or fields for the specified record or records
OCCURS (CL)	Defines multiple occurrences of a field or group of fields
ON (ST)	Sends output to the specified output file or device
OPEN (CO)	Creates a file that records user/DATATRIEVE dialogue
PICTURE (CL)	Specifies the format of a field value as it is stored in a record
PLOT (ST)	Specifies the plot name and arguments for a DATATRIEVE plot
PRINT (ST)	Displays value expressions according to a specified format
PRINT (ST) (RW)	Displays value expressions for each detail line of a report
PURGE (CO)	Deletes all but the highest versions of objects in a dictionary directory
QUERY_HEADER (CL)	Specifies the column header for the field value when it is printed
QUERY_NAME (CL)	Specifies an alternate name for a field
READY (CO)	Gives access to one or more domains, relational databases, or DBMS database instances
RECONNECT (ST)	Connects a DBMS record to the specified set occurrence
REDEFINE (CO)	Creates a new version of a dictionary object
REDEFINES (CL)	Creates an alternate definition for a field
REDUCE (ST)	Retains unique values of records in a collection
RELEASE (CO)	Ends control over and frees space occupied by specified collections, tables, or global variables

(continued on next page)

Table 7-1: Summary of Commands, Statements, and Clauses (Cont.)

Command, Statement, or Clause	Function
RELEASE SYNONYM (CO)	Releases a synonym definition
REPEAT (ST)	Executes a statement a specified number of times
REPORT (ST)	Invokes the Report Writer
Restructure (ST)	Transfers values of fields in a record stream to corresponding fields in a domain or list
ROLLBACK (ST)	Undoes changes made to DBMS or relational databases
SCALE (CL)	Specifies a scaling factor for a field value
SELECT (ST)	Selects a record in a collection
SET (CO)	• Establishes the current dictionary • Sets the maximum columns per page • Controls the use of forms • Controls the display of prompts • Determines the effect of ABORT • Controls the display of HELP text • Determines the effect of EDIT_BACKUP • Starts Guide Mode
SET (ST) (RW)	Sets the page format for a report
SHOW (CO)	• Shows what is in the dictionary • Shows the SET options in effect • Indicates readied domains, collections, and loaded tables
SHOWP (CO)	Displays an access control list for a specified dictionary element
SIGN (CL)	Specifies the location and representation of a sign for a numeric field
SORT (ST)	Sorts records in a collection
STORE (ST)	Creates and stores a record in an RMS data file, a relational or DBMS database, or a port

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Table 7-1: Summary of Commands, Statements, and Clauses (Cont.)

Command, Statement, or Clause	Function
SUM (ST)	Provides a summary of totals for specified numeric fields
SYNCHRONIZED (CL)	Forces word boundary alignment for storing field values in the data file
THEN (ST)	Joins two or more statements into a compound statement
USAGE (CL)	Specifies the internal storage format of a field or specifies a date field
VALID IF (CL)	Tests a value before storing it in a field
WHILE (ST)	Causes repetition of a statement while a specified Boolean expression is true

Table 7-2: Summary of Commands and Statements by Function

Topic/Function	Command, Statement or Clause
Online Assistance	
Printing command/statement information	HELP
Defining domains, records, and data files	ADT
Starting Guide Mode	SET GUIDE
Enabling/disabling statement prompting	SET PROMPT
Monitoring a Session	OPEN CLOSE
Ports	
Creating a temporary port	DECLARE PORT
Defining a port	DEFINE PORT
Redefining a port	REDEFINE PORT

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Table 7-2: Summary of Commands and Statements by Function (Cont.)

Topic/Function	Command, Statement or Clause
Ending a Session	
	EXIT (CTRL/Z)
Data Dictionaries	
Creating a data dictionary directory	DEFINE DICTIONARY
Establishing a current dictionary directory	SET DICTIONARY
Displaying contents of a default dictionary directory	SHOW ALL
Displaying CDD path name of a default dictionary directory	SHOW DICTIONARY
Deleting the definition of a dictionary object	DELETE
Purging the definition of a dictionary object	PURGE
Relational and DBMS Databases	
Readying all or part of a database for use	READY
Creating a database path name or database instance	DEFINE DATABASE
Creating a new version of a database path name or database instance	REDEFINE DATABASE
Deleting a database definition	DELETE
Modifying a database definition	EDIT
Copying a database definition to a command file	EXTRACT
Ending access to a database	FINISH
Displaying database, DBMS set, relation, and field names	SHOW
Making database changes permanent	COMMIT
Undoing database changes	ROLLBACK
Explicitly connecting a DBMS record to a set	CONNECT

(continued on next page)

Table 7-2: Summary of Commands and Statements by Function (Cont.)

Topic/Function	Command, Statement or Clause
Disconnecting a DBMS record from a set	DISCONNECT
Connecting a DBMS record to a specified set occurrence	RECONNECT
Domains	
Readying a domain for use	READY
Creating a domain definition	DEFINE DOMAIN ADT
Creating a new version of a domain definition	REDEFINE DOMAIN
Creating a data file for a domain	DEFINE FILE
Deleting a domain definition	DELETE
Modifying a domain definition	EDIT
Copying a domain definition to a command file	EXTRACT
Releasing control of a domain	FINISH
Displaying domain names or definitions	SHOW
Record Definitions	
Creating a record definition	DEFINE RECORD ADT
Creating a new version of a record definition	REDEFINE RECORD
Deleting a record definition	DELETE
Modifying a record definition	EDIT
Copying a record definition to a command file	EXTRACT
Displaying record names and definitions	SHOW
Specifying record word boundaries in storage	ALLOCATION
Describing a COMPUTED BY field	COMPUTED BY
Specifying a default value for a field	DEFAULT VALUE
Specifying a print edit string	EDIT_STRING
Specifying a literal denoting no value stored for a field	MISSING VALUE

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Table 7-2: Summary of Commands and Statements by Function (Cont.)

Topic/Function	Command, Statement or Clause
Defining multiple field occurrences	OCCURS
Specifying the format of field values	PICTURE
Specifying a column header in print statements	QUERY_HEADER
Specifying an alternate field name in print statements	QUERY_NAME
Creating an alternate definition for a field	REDEFINES
Specifying a sign in a numeric field	SIGN
Forcing word boundary SYNC alignment	SYNCHRONIZED
Specifying the internal storage format of numeric field or date field	USAGE
Specifying a VALID IF test during storage function	VALID IF
Handling Records	
Printing record/field values	DISPLAY
	LIST
	PRINT
	REPORT
	SUM
Adding records to a domain	STORE
Adding records to a database	STORE
Forming collections of records	FIND
Retaining unique values	REDUCE
Selecting records	SELECT
Sorting records	SORT
Removing a record from a collection	DROP
Deleting records from a file	ERASE
Changing field values	MODIFY
Transferring field contents	Restructure

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Table 7-2: Summary of Commands and Statements by Function (Cont.)

Topic/Function	Command, Statement or Clause
Procedures	
Creating a procedure	DEFINE PROCEDURE
Creating a new version of a procedure	REDEFINE PROCEDURE
Deleting a procedure	DELETE
Modifying a procedure	EDIT
Copying a procedure to a command file	EXTRACT
Displaying procedure names and definitions	SHOW
Dictionary Tables	
Creating a dictionary table	DEFINE TABLE
Creating a new version of a dictionary table	REDEFINE TABLE
Deleting a dictionary table	DELETE
Modifying a dictionary table	EDIT
Copying a dictionary table to a command file	EXTRACT
Releasing a dictionary table	RELEASE
Displaying dictionary table names and definitions	SHOW
Domain Tables	
Creating a domain table	DEFINE TABLE
Creating a new version of a domain table	REDEFINE TABLE
Deleting a domain table	DELETE
Modifying a domain table	EDIT
Copying a domain table to a command file	EXTRACT
Finishing a domain table	FINISH
Releasing a domain table	RELEASE
Displaying domain table names and definitions	SHOW

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Table 7-2: Summary of Commands and Statements by Function (Cont.)

Topic/Function	Command, Statement or Clause
Access Control Lists (ACLs)	
Creating an ACL:	
• for a domain	DEFINE DOMAIN
• for a procedure	DEFINE PROCEDURE
• for a record	DEFINE RECORD
• for a dictionary table	DEFINE TABLE
• for a domain table	DEFINE TABLE
• for a CDD directory	DEFINE DICTIONARY
Adding an entry to an ACL	DEFINEP
Deleting an entry from an ACL	DELETEP
Displaying an ACL	SHOWP
Synonyms	
Defining a synonym	DECLARE SYNONYM
Releasing a synonym	RELEASE SYNONYM
Variables	
Defining a variable	DECLARE
Assigning a value to a variable	Assignment
Releasing a variable	RELEASE
Combining/Repeating Statements	
Creating a compound statement	THEN
	BEGIN-END
Repeating a statement	REPEAT
Executing a statement conditionally	CHOICE
	IF-THEN-ELSE
	WHILE
Applying statements to records	FOR
Specifying output medium	ON

7.1 : (EXECUTE)

Invokes a DATATRIEVE procedure.

Format

```
{    :    }
{         }  procedure-name
{ EXECUTE }
```

Argument

procedure-name

Is the given name, full dictionary path name, or relative dictionary path name of the DATATRIEVE procedure you want to invoke.

Restrictions

- To invoke a procedure, you must have P (PASS_THRU), S (SEE), and E (DTR EXECUTE/EXTEND) access to it.
- You cannot invoke a procedure during an ADT, EDIT, or Guide Mode session.
- You cannot include the invocation of a procedure in the definition of a domain, record, or table.
- Do not allow a procedure to invoke itself, either directly or indirectly; you may create an infinite loop.
- If the procedure contains any commands, you cannot include an invocation of the procedure within a BEGIN-END block.

Results

- If the procedure consists of full commands or statements, DATATRIEVE executes each command or statement in the procedure in order.
- If the procedure contains only a clause or an argument from a command or statement, DATATRIEVE includes the procedure within the command or statement containing the procedure invocation.

Usage Notes

- You can use either a colon (:) or EXECUTE before the procedure name. The results are the same.
- You can nest procedures by invoking a procedure within another procedure but you must be careful not to allow the procedure to invoke itself.
- You can invoke a procedure in a REPEAT statement to execute it a number of times or in a FOR statement to apply it to a collection of records. You must, however, use care when invoking a procedure in these statements. For example, the following syntax can be used, but the results may be unexpected:

  ```
  REPEAT n :procedure-name
  ```

  This statement *does not* execute the procedure n times. When DATATRIEVE encounters the first complete statement in the procedure, it assumes that the REPEAT statement is also complete. Therefore, it executes the *first* command or statement in the procedure n times. DATATRIEVE then executes the remaining commands or statements in the procedure once.

  To repeat the entire procedure n times, enclose the procedure invocation in a BEGIN-END block:

  ```
  REPEAT n
      BEGIN
        :procedure-name
      END
  ```

  Use a similar technique for procedure invocations controlled by a FOR loop. For example:

  ```
  FOR rse
      BEGIN
        :procedure-name
      END
  ```

  Remember that if you use a procedure in this way, it cannot include a FIND, SELECT, or DROP statement because these statements cannot be used in BEGIN-END blocks.

Examples

Invoke a procedure to find the employee in PERSONNEL with the largest salary. Use EXECUTE to invoke the procedure from DIGITAL Command Language (DCL) level. In this example, DTR is the global symbol for invoking VAX DATATRIEVE:

```
DTR> SHOW MAX_SALARY
PROCEDURE MAX_SALARY
READY PERSONNEL
PRINT PERSONNEL WITH SALARY = MAX SALARY OF PERSONNEL
END_PROCEDURE

DTR> EXIT
$ DTR EXECUTE MAX_SALARY

                      FIRST      LAST            START           SUP
 ID     STATUS        NAME       NAME     DEPT   DATE     SALARY  ID

00012 EXPERIENCED CHARLOTTE  SPIVA      TOP  12-Sep-1972 $75,892 00012

$
```

Invoke a procedure three times that displays employees in a given department with salaries greater than $40,000:

```
DTR> SHOW BIG_SALARY
PROCEDURE BIG_SALARY
FOR PERSONNEL WITH DEPT  = *."the department"
BEGIN
  IF SALARY GT 40000
  THEN PRINT ID, NAME, DEPT,START_DATE, SALARY
END
END_PROCEDURE

DTR> REPEAT 3
CON> BEGIN
CON>     :BIG_SALARY
CON> END
Enter the department: F11

        FIRST      LAST              START
 ID     NAME       NAME      DEPT    DATE      SALARY

00891 FRED       HOWL       F11    9-Apr-1976 $59,594
78923 LYDIA      HARRISON   F11   19-Jun-1979 $40,747
Enter the department: T32
38462 BILL       SWAY       T32    5-May-1980 $54,000
83764 JIM        MEADER     T32    4-Apr-1980 $41,029
Enter the department: TOP
00012 CHARLOTTE  SPIVA      TOP   12-Sep-1972 $75,892

DTR>
```

Invoke a procedure to specify an edit string clause for a variable:

```
DTR> DEFINE PROCEDURE E_S
DFN> EDIT_STRING IS $$,$$$.99
DFN> END_PROCEDURE
DTR> DECLARE PRICE_PER_FT COMPUTED BY PRICE/LOA :E_S.
DTR> PRINT TYPE, PRICE_PER_FT OF FIRST 5 YACHTS

                            PRICE
                             PER
MANUFACTURER   MODEL         FT

 ALBERG       37 MK II      $998.68
 ALBIN        79            $688.46
 ALBIN        BALLAD        $916.67
 ALBIN        VEGA          $688.89
 AMERICAN     26            $380.58

DTR>
```

7.2 @ (Invoke Command File) Command

Invokes a command file.

Format

```
@ file-spec
```

Argument

file-spec

Is the file specification for the file you want to execute.

Restrictions

- When you invoke a command file, it must be on a line by itself.
- You cannot invoke command files while you are using the Application Design Tool (ADT) or Guide Mode.
- You cannot invoke a command file in a loop created by the FOR, REPEAT, or WHILE statements.
- You cannot include a command file invocation within a BEGIN-END block.
- Do not allow a command file to invoke itself, either directly or indirectly; you can create an infinite loop.

Results

- If you do not include a file type in the file specification, DATATRIEVE uses a .COM file type as a default. If there is no file in the specified VMS directory with a .COM file type, DATATRIEVE uses a .DTR file type as a default.
- If the command file consists of full commands or statements, DATATRIEVE executes each command or statement in the command file in order.
- If the command file ends with an incomplete DATATRIEVE command or statement, DATATRIEVE returns a CON> prompt, waiting for you to supply the missing elements.

Usage Notes

- You can include comments in a command file by placing an exclamation mark (!) before each comment line.
- To display the lines of a command file when you invoke it, enter the SET VERIFY command either from DCL or DATATRIEVE command level.

Example

Invoke a command file, BUILDER.COM, from DCL to produce a report on yachts by a specified builder. Your global symbol for invoking DATATRIEVE is DTR:

```
$ DTR @BUILDER
READY YACHTS
REPORT YACHTS WITH BUILDER = *.BUILDER
SET COLUMNS_PAGE = 70
PRINT BOAT
END_REPORT
Enter BUILDER: ALBIN

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                                          LENGTH
                                           OVER
MANUFACTURER     MODEL          RIG        ALL        WEIGHT    BEAM   PRICE

 ALBIN          79             SLOOP        26         4,200     10    $17,900
 ALBIN          BALLAD         SLOOP        30         7,276     10    $27,500
 ALBIN          VEGA           SLOOP        27         5,070     08    $18,600

$
```

7.3 ABORT Statement

Stops the execution of either a single statement or an entire procedure or command file.

Format

```
ABORT  [value-expression]
```

Argument

value-expression

Is a DATATRIEVE value expression, usually a character string literal.

Restriction

When DATATRIEVE processes the ABORT statement, ABORT affects the outermost statement that contains it.

When a statement contains nested FOR loops, you cannot use an ABORT statement to transfer control from an inner loop to an outer loop. Similarly, when a statement contains nested BEGIN-END blocks, you cannot use an ABORT statement to transfer control from an inner block to an outer one.

Results

- If the abort occurs during an interactive session, DATATRIEVE stops executing the statement containing the ABORT statement and returns control to the DATATRIEVE command level (indicated by the DTR> prompt). The ABORT statement does not end the interactive session.
- If the abort occurs in a procedure or command file, the result depends on whether SET ABORT is in effect:
  - If SET ABORT is in effect, DATATRIEVE returns to command level without executing the rest of the procedure or command file.
  - If SET NO ABORT is in effect, DATATRIEVE aborts the current statement and then processes any statements and commands remaining in the procedure or command file.
- If the abort occurs within a STORE or MODIFY statement, DATATRIEVE does not store a new record or modify the target record.

- If the abort occurs during an interactive session, DATATRIEVE displays on your terminal a message containing the value of the value expression you specify in the ABORT statement:

```
DTR> ABORT "Bad value for LOA."
ABORT: Bad value for LOA.
DTR> ABORT 3+2
ABORT: 5
DTR>
```

- If you invoke DATATRIEVE with an *invocation command line* (for example, $ DTR32 @BIGJOB), the effect of an ABORT statement depends on whether SET ABORT is in effect:
  - If SET ABORT is in effect, DATATRIEVE returns to DCL command level (indicated by the dollar sign prompt) without executing the rest of command file.
  - If SET NO ABORT is in effect, DATATRIEVE aborts the statement containing the ABORT statement and then processes any statements and commands remaining in command file.
- When you submit a batch stream containing a DATATRIEVE command file, any ABORT statements in the command file behave as they would if you had entered them during an interactive session:
  - Whether SET ABORT is in effect or not, DATATRIEVE prints the abort message containing the value of the specified value expression in the log file of the batch job.
  - If SET ABORT is in effect and DATATRIEVE processes an ABORT statement in a procedure or command file, DATATRIEVE returns to DATATRIEVE command level without executing the rest of the procedure or command file.
  - If SET NO ABORT is in effect and DATATRIEVE processes an ABORT statement in a procedure or command file, DATATRIEVE aborts the current statement and then processes any statements and commands remaining in the procedure or command file.
  - If you invoke DATATRIEVE with an invocation command line in the batch stream and DATATRIEVE processes an ABORT statement, SET ABORT ends the DATATRIEVE session and returns control of the process to the batch stream. SET NO ABORT aborts the current statement, and DATATRIEVE processes the remaining statements in the command file.

If the batch stream contains other command files queued after the DATATRIEVE command file, the processing of a DATATRIEVE ABORT statement does not end the batch job.

Usage Note

Use an IF-THEN-ELSE statement to establish the conditions for the abort (see the section on the IF-THEN-ELSE statement). The Boolean expression in the IF clause establishes the conditions that control the ABORT statement. An abort occurs when:

- The Boolean expression is true and the ABORT statement is in the THEN clause.
- The Boolean expression is false and the ABORT statement is in the ELSE clause.

Examples

Store a record in the YACHTS domain, but if the value of the BEAM field is 0, abort the operation and display a message:

```
DTR> STORE YACHTS VERIFY USING
[Looking for statement]
DTR> IF BEAM EQ 0 THEN ABORT "Bad value for BEAM"
Enter MANUFACTURER: AMERICAN
Enter MODEL: 1980
Enter RIG: SLOOP
Enter LENGTH_OVER_ALL: 25
Enter DISPLACEMENT: 7500
Enter BEAM: 0
Enter PRICE: 10000
ABORT: Bad value for BEAM
DTR>
```

Define a procedure to write a report on the current collection. Abort the entire procedure if there is no current collection to report on:

```
DTR> DEFINE PROCEDURE YACHT_REPORT
DFN> SET ABORT
DFN> PRINT "HAVE YOU ESTABLISHED A CURRENT COLLECTION?"
DFN> IF *."YES or NO" CONTAINING "N" THEN
DFN>      ABORT "SORRY--NO COLLECTION, NO REPORT."
DFN> REPORT
DFN> PRINT BOAT
DFN> AT BOTTOM OF REPORT PRINT COUNT, TOTAL PRICE
DFN> END_REPORT
DFN> END_PROCEDURE
DTR> :YACHT_REPORT

HAVE YOU ESTABLISHED A CURRENT COLLECTION?
Enter YES or NO: NO
ABORT: SORRY--NO COLLECTION, NO REPORT.
DTR>
```

Define a procedure to update the OWNERS domain after the sale of a boat. Check the boat in question against the inventory in the YACHTS domain and abort the procedure if the boat is not in YACHTS. Then, check the OWNERS domain for a record of the boat. If a record exists, change the owner's name and update the boat name if desired. If no record exists, store a new record in the OWNERS domain. The procedure requires MODIFY or WRITE access to OWNERS for the update and EXTEND or WRITE access for the entry of a new record.

The example aborts because there is no YACHTS record for an ALBERG 42. The value expression specified in the ABORT statement includes the variables BLD and MOD:

```
DTR> SHOW SALE_BOAT
PROCEDURE SALE_BOAT
READY YACHTS, OWNERS WRITE
SET ABORT
DECLARE BLD PIC X(10).
DECLARE MOD PIC X(10).
BLD = *."BUILDER'S NAME"
MOD = *."MODEL"
IF NOT ANY YACHTS WITH (BUILDER = BLD AND
              MODEL = MOD) THEN
              BEGIN
                   PRINT SKIP, "RECORD NOT FOUND IN YACHTS.", SKIP
                   ABORT "POSSIBLE INVENTORY ERROR FOR--"||BLD|||MOD
              END ELSE
              PRINT SKIP, "YACHTS RECORD FOUND FOR "|BLD|||MOD
```

```
IF ANY OWNERS WITH (BUILDER = BLD AND
              MODEL = MOD) THEN
              BEGIN
                   FOR OWNERS WITH (BUILDER = BLD AND
                        MODEL = MOD)
                   MODIFY USING
                        BEGIN
                        PRINT COL 10, NAME, SKIP
                        NAME = *."NEW OWNER'S NAME"
                        PRINT COL 10, BOAT_NAME, SKIP
                        IF *."CHANGE BOAT NAME? Y/N"
                             CONTAINING "Y" THEN PRINT SKIP THEN
                             BOAT_NAME = *."NEW BOAT NAME"
                        END
              END ELSE

              STORE OWNERS USING
                   BEGIN
                        NAME = *."NEW OWNER'S NAME"
                        BOAT_NAME = *."BOAT NAME"
                        BUILDER = BLD
                        MODEL = MOD
                   END
END_PROCEDURE
DTR> :SALE_BOAT
Enter BUILDER'S NAME: ALBERG
Enter MODEL: 42
RECORD NOT FOUND IN YACHTS.
ABORT: POSSIBLE INVENTORY ERROR FOR--ALBERG 42
DTR>
```

7.4 ADT Command

Invokes the Application Design Tool (ADT), an interactive aid that helps you define a domain, its associated record, and its data file.

Format

```
ADT
```

Arguments

None.

Restrictions

- You cannot invoke ADT from an application program using the DATATRIEVE Call Interface.
- Do not use the ADT command in a command file.
- The record definition and data file definition created by ADT do not contain all the features, clauses, and options available when using the DATATRIEVE DEFINE or REDEFINE commands.
- The length of the domain name cannot exceed 27 characters.
- The length of the record name cannot exceed 9 characters.
- See the following commands for the access privileges needed to add the domain and record definitions to the CDD and to define the data file for the domain: DEFINE DOMAIN, DEFINE RECORD, DEFINE FILE, and DELETE.
- You cannot use ADT to create a new version of a domain or record definition.

Results

- DATATRIEVE invokes the Application Design Tool, which asks you a series of questions about the domain, the size and type of the fields you want in the record, and the name and type of the data file. On VT100 and VT200 family terminals, the current state of the record definition is displayed in the upper part of the screen. There is a reverse facility, enabling you to return to an earlier stage of your dialogue with ADT. Refer to Chapter 1 of the *VAX DATATRIEVE Handbook* for additional information on ADT.
- ADT gives you the option of having ADT enter your definitions immediately into the CDD or having ADT write a command file you can invoke at a later time.
- If you respond to any of ADT's questions with a CTRL/Z, DATATRIEVE returns control to command level (indicated by the DTR> prompt), and displays the following message on your terminal:

  ```
  ADT exited by user request
  DTR>
  ```

Example

Invoke the Application Design Tool:

```
DTR> ADT
Do you want detailed prompts? (YES or NO) :
```

See the *VAX DATATRIEVE Handbook* for a sample ADT session.

7.5 ALLOCATION Clause

Specifies the type of word boundary alignment DATATRIEVE uses when storing records in a data file associated with a record definition. It also controls the way DATATRIEVE retrieves data from files created by user programs or other applications software.

Format

$$\text{ALLOCATION IS} \left\{ \begin{array}{l} \text{MAJOR\_MINOR} \\ \text{ALIGNED\_MAJOR\_MINOR} \\ \text{LEFT\_RIGHT} \end{array} \right\}$$

Arguments

MAJOR_MINOR

Causes DATATRIEVE to use MAJOR_MINOR alignment when storing or retrieving data in a data file. MAJOR_MINOR forces word boundary alignments according to data types for elementary fields defined with the SYNCHRONIZED clause and forces group fields to the maximum alignment of the elementary fields they contain. MAJOR_MINOR is the default for DATATRIEVE, VAX COBOL, and COBOL-81.

ALIGNED_MAJOR_MINOR

Causes DATATRIEVE to use ALIGNED_MAJOR_MINOR alignment when storing or retrieving data in a data file. ALIGNED_MAJOR_MINOR forces word boundary alignments according to data types for all elementary fields in the record and group fields to the maximum alignment of the elementary fields they contain.

LEFT_RIGHT

Causes DATATRIEVE to use LEFT_RIGHT alignment when storing or retrieving data in a data file. LEFT_RIGHT forces word boundary alignment for elementary fields defined as COMP, COMP_1, COMP_2, and DATE. LEFT_RIGHT is the default alignment for DATATRIEVE-11, COBOL-11, and COBOL-74.

Restriction

When defining a record for an existing data file, the alignment type of the record definition must match that of the data file.

Results

- For records with ALIGNED_MAJOR_MINOR allocation and for fields with SYNCHRONIZED clauses in records with MAJOR_MINOR allocation, DATATRIEVE aligns fields on word boundaries. When DATATRIEVE shifts a field to the next word boundary, it considers the bytes it skips as part of the record. These bytes are called filler bytes.
- The number of filler bytes DATATRIEVE inserts when MAJOR_MINOR and ALIGNED_MAJOR_MINOR are in effect depends on the data type of the field.
- Fields begin on quadword boundaries if they are declared DATE, COMP_2 (or DOUBLE), and QUAD (COMP for numbers from PICTURE 9(10) to 9(18)).
- Fields begin on longword boundaries if they are declared LONG (COMP for numbers from PICTURE 9(5) to 9(9)), and COMP_1 (or REAL).
- Fields begin on word boundaries if they are declared WORD (COMP for numbers from PICTURE 9(1) to 9(4)).
- When the allocation is either ALIGNED_MAJOR_MINOR or MAJOR_MINOR, the group field boundaries are aligned according to the maximum alignment of the elementary fields that comprise the group.
- When the allocation is LEFT_RIGHT, fields begin on word boundaries if they are declared DATE, QUAD, COMP_2 (or DOUBLE), LONG, COMP_1 (or REAL), and WORD.

Usage Notes

- The ALLOCATION clause is an optional record definition clause. If you include it in your record definition, it can affect the way DATATRIEVE handles the internal storage and retrieval of data in some or all of the fields in your data file.
- If you want to use VAX DATATRIEVE on data files created with DATATRIEVE-11, you must add an ALLOCATION LEFT-RIGHT clause to the DATATRIEVE-11 record definition to ensure that VAX DATATRIEVE can interpret your data correctly.

7.6 Assignment Statement

The Assignment statement assigns a value to an elementary field, a group field, or a variable.

7.6.1 Assigning a Value to an Elementary Field

Assigns a value to an elementary field in a MODIFY or STORE statement.

Format

```
field-name = value-expression
```

Arguments

field-name

Is the name of an elementary field.

=

Is an equal sign indicating assignment, *not* the relational operator EQ or EQUAL.

value-expression

Is the value to be assigned to the field. This argument can be any DATATRIEVE value expression.

Restrictions

- This type of Assignment statement can be used only in a MODIFY...USING or STORE...USING statement. See the sections on MODIFY and STORE in this chapter for more information.
- To use the Assignment statement inside a STORE...USING statement, you must ready the domain for WRITE or EXTEND access. To use this statement inside a MODIFY...USING statement, you must ready the domain for WRITE or MODIFY access. See the section on READY in this chapter for more information.
- You cannot assign a value to a COMPUTED BY field.

Results

- DATATRIEVE stores the value of the value expression in the specified field, performing any data type conversions necessary.
- If the value expression is a prompting value expression (*.prompt-name), DATATRIEVE prompts for the value of the field. DATATRIEVE rejects your input and reprompts for the value if any of the following occurs:
  - Truncation error. You have entered more characters than the field definition allows.
  - Conversion error. You have entered a character that is inappropriate for the field, such as a letter for a numeric field.
  - Sign error. You have entered a minus sign for an unsigned numeric field.
  - VALID IF failure. You have entered an invalid value for the field. That is, the value results in a Boolean expression (specified in a VALID IF clause in the record definition) that is "False." See Chapter 6 for more information on record definitions and field definition clauses.
- If the value expression is not a prompting value expression and truncation, conversion, or sign errors occur, DATATRIEVE accepts the value with a warning:
  - If you enter too many digits for a numeric field, DATATRIEVE truncates the high-order digits, stores the remaining digits in the field, and issues an error message.
  - If you enter too many characters for an alphanumeric field, DATATRIEVE truncates the rightmost characters, stores the remaining characters in the field, and issues an error message.
  - If a VALID IF failure occurs, DATATRIEVE does not execute the Assignment statement and does not execute the STORE or MODIFY statement containing the Assignment statement.

Usage Notes

- When using this type of Assignment statement, you may want DATATRIEVE to check your values for validity and give you the opportunity to recover from an error caused by invalid input. The prompting value expression, shown in the Assignment statement below, provides the only means for you to recover from truncation, conversion, or sign errors, or VALID IF failures. This facility is especially useful when you are creating records with the STORE...USING statement.

  ```
  field-name = *.prompt-name
  ```

- If you are unsure of the name of a field or the general type of data it contains, use the SHOW FIELDS command (see the section in this chapter on the SHOW command). SHOW FIELDS displays a brief description of each field in a readied domain.

Examples

Ready the YACHTS domain for WRITE access, and then store a record in the domain for the manufacturer CHALLENGER:

```
DTR> READY YACHTS WRITE
DTR> STORE YACHTS USING MANUFACTURER = "CHALLENGER"
DTR> PRINT YACHTS WITH BUILDER EQ "CHALLENGER"

                              LENGTH
                               OVER
MANUFACTURER   MODEL     RIG   ALL   WEIGHT BEAM  PRICE

 CHALLENGER                               0  00
 CHALLENGER   32        SLOOP  32    12,800  11  $31,835
 CHALLENGER   35        SLOOP  35    14,800  12  $39,215
 CHALLENGER   41        KETCH  41    26,700  13  $51,228

DTR>
```

Ready the YACHTS domain for MODIFY access, and then change the value of the PRICE field to a new value specified by the user:

```
DTR> READY YACHTS MODIFY
DTR> FIND YACHTS
[113 records found]
DTR> SELECT
DTR> PRINT PRICE THEN MODIFY USING PRICE = *."NEW PRICE"
```

```
 PRICE

$36,951
Enter NEW PRICE: 39000
DTR> PRINT PRICE

 PRICE

$39,000

DTR>
```

7.6.2 Assigning a Value to a Group Field

Assigns a value to a group field in a MODIFY or STORE statement.

Format

```
group-field-name-1 = group-field-name-2
```

Arguments

group-field-name-1

Is the name of a group field to which you want to assign a value.

=

Is an equal sign indicating assignment, *not* the relational operator EQ or EQUAL.

group-field-name-2

Is the name of a group field containing the values you want to assign to group-field-1. This group field must have at least one elementary field with the same name as an elementary field in group-field-1.

Restrictions

- This type of Assignment statement can be used only in a MODIFY...USING or STORE...USING statement. See the sections in this chapter on the MODIFY and STORE statements for more information.

- To use the Assignment statement in a MODIFY...USING statement, you must ready the domain containing group-field-1 for MODIFY or WRITE access. To use it in a STORE...USING statement, you must ready the domain for WRITE or EXTEND access. See the section in this chapter on the READY command for more information.
- Both group-field-1 and group-field-2 must have at least one elementary field with the same field name or query name.

Results

DATATRIEVE changes the values of all fields in group-field-1 to the values of identically named fields in group-field-2. All other elementary fields in group-field-1 are set to zero or blank in a STORE statement or remain unchanged in a MODIFY statement.

Examples

Store a record in the YACHTS domain with the same values in the group field SPECIFICATIONS as the selected record:

```
DTR> SET NO PROMPT
DTR> READY YACHTS WRITE
DTR> FIND YACHTS
[113 records found]
DTR> SELECT
DTR> PRINT SPECS

       LENGTH
        OVER
 RIG    ALL   WEIGHT BEAM  PRICE

KETCH   37    20,000  12  $36,951

DTR> STORE YACHTS USING
CON> BEGIN
CON>     BUILDER = *.BUILDER
CON>     SPECS = SPECS
CON> END
Enter BUILDER: HUGHES
DTR> PRINT YACHTS WITH BUILDER = "HUGHES"

                                     LENGTH
                                      OVER
MANUFACTURER   MODEL     RIG    ALL   WEIGHT BEAM  PRICE

 HUGHES                 KETCH   37    20,000  12  $36,951

DTR>
```

Store records into a new domain PRICED_YACHTS. Store only the boats that have a price:

```
DTR> DEFINE DOMAIN PRICED_YACHTS USING YACHT ON PYACHT.DAT;
DTR> DEFINE FILE FOR PRICED_YACHTS
DTR> READY PRICED_YACHTS WRITE
DTR> SET NO PROMPT
DTR> FOR YACHTS WITH PRICE NE 0

CON>      STORE PRICED_YACHTS USING BOAT = BOAT
DTR> FIND PRICED_YACHTS
[50 records found]
DTR>
```

7.6.3 Assigning a Value to a Variable

Assigns a value to a variable.

Format

```
variable-name = value-expression
```

Arguments

variable-name

Is the name of a variable that has been defined with a DECLARE statement.

=

Is an equal sign indicating assignment, *not* the relational operator EQ or EQUAL.

value-expression

Is a value expression, the value of which you want to assign to the specified variable.

Restrictions

- You can use this type of Assignment statement anywhere a DATATRIEVE statement is allowed.
- The variable-name must be defined with the DECLARE statement.

Results

- DATATRIEVE assigns the specified value to the variable.
- If the value expression is a prompting value expression (*.prompt-name) DATATRIEVE prompts for the value of the field. DATATRIEVE rejects your input and reprompts for the value if any of the following occurs:
  - Truncation error. You have entered more characters than the field definition allows.
  - Conversion error. You have entered a character that is inappropriate for the field, such as a letter for a numeric field.
  - Sign error. You have entered a minus sign for an unsigned numeric field.
  - VALID IF failure. You have entered an invalid value for the field. That is, the value results in a Boolean expression (specified in a VALID IF clause in the record definition) that is false. See Chapter 6 for more information on record definitions and field definition clauses.
- If the argument value expression is not a prompting value expression and truncation, conversion, or sign errors occur, DATATRIEVE accepts the value with a warning:
  - If you enter too many digits for a numeric field, DATATRIEVE truncates the high-order digits, stores the remaining digits in the field, and issues an error message.
  - If you enter too many characters for an alphanumeric field, DATATRIEVE truncates the rightmost characters, stores the remaining characters in the field, and issues an error message.
  - If a VALID IF failure occurs, DATATRIEVE does not execute the Assignment statement.

Usage Note

When using this type of Assignment statement, you may want DATATRIEVE to check your values for validity and give you the opportunity to recover from an error caused by invalid input. The prompting value expression shown in the following Assignment statement example provides the only means for you to recover from truncation, conversion, or sign errors or VALID IF failure.

```
variable-name = *.prompt-name
```

Examples

Declare the global variable NEW_PRICE. Assign a value to it:

```
DTR> DECLARE NEW_PRICE PIC 9(5) EDIT_STRING IS $$$,$$$.
DTR> NEW_PRICE = "$25,000"
DTR> PRINT NEW_PRICE

  NEW
 PRICE

$25,000

DTR>
```

Declare two global variables. Assign the value in the PRICE field of the first boat in YACHTS, and then assign the value of OLD_PRICE to NEW_PRICE.

```
DTR> DECLARE NEW_PRICE PIC 9(5).
DTR> DECLARE OLD_PRICE PIC 9(5).
DTR> FIND YACHTS; SELECT; PRINT PRICE

 PRICE

$36,951

DTR> OLD_PRICE = PRICE
DTR> PRINT OLD_PRICE

 OLD
 PRICE

$36,951

DTR> NEW_PRICE = OLD_PRICE
DTR> PRINT NEW_PRICE

 NEW
 PRICE

$36,951

DTR>
```

7.7 AT Statements (Report Writer)

The Report Writer AT statements display header and summary lines at the top and bottom of the report, and at the top and bottom of pages and control groups (groups of sorted records with the same value in one or more fields).

With the two forms of the AT statement, you can specify the value, position, and format of the print objects in the header and summary lines:

- The AT TOP statement is used primarily to print header lines at the top of reports, report pages, and control groups. It can also be used for summary lines. But an AT TOP statement summarizes information for the entire group of records in the current collection, not the records of the page, group, or report that you specify in the statement.

  The AT TOP statement accepts the same types of print objects as a PRINT statement.

- The AT BOTTOM statement prints summary lines at the bottoms of reports, report pages, and control groups. It calculates the summary information based on the records of the page, group, or report that you specify in the statement.

  The AT BOTTOM statement accepts the same types of print objects as a PRINT statement.

Examples

See Chapter 3 of the *VAX DATATRIEVE Guide to Writing Reports* for numerous examples of AT TOP and AT BOTTOM statements.

7.7.1 AT TOP Statement (Report Writer)

Format

```
            { REPORT     }         { header-element  }
AT TOP OF   { PAGE       }  PRINT  {                 }  [,...]
            { field-name }         { summary-element }
```

Arguments

field-name

Is a field from the record definition for the report's record stream or a variable.

header-element
summary-element

Specifies the value, position, and format of the fields. These elements are summarized in Table 7-3.

Table 7-3: AT TOP Statement Header and Summary Elements

Header or Summary Element	Function	Usage Notes
AVERAGE value-expression	Displays the average value of the value expressions in the current collection.	Does not indicate the average for the detail lines of the report, page, or control group.
COL n	Specifies where the output of the next header or summary element begins.	Same usage as in the PRINT statement.
COLUMN_HEADER	Displays the column headers.	Overrides the suppression of column headers for AT TOP OF REPORT or PAGE.
COUNT	Displays the number of records in the current collection.	Does not indicate the number of detail lines of control group specified.

(continued on next page)

Table 7-3: AT TOP Statement Header and Summary Elements (Cont.)

Header or Summary Element	Function	Usage Notes
field-name [modifier]	In AT TOP OF field-name, prints the common field value at the top of each control group.	Same usage as in the PRINT statement.
MAX value expression	Displays the maximum value of all value expressions in the current collection.	Does not indicate the maximum value for the detail lines of the report, page, or control group specified.
MIN value expression	Displays the minimum value of all value expressions in the current collection.	Does not indicate the minimum value for the detail lines of the report, page, or control group specified.
NEW_PAGE	Starts a new page for the report.	Same usage as in the PRINT statement. Cannot be used with AT TOP OF PAGE or AT BOTTOM OF PAGE.
NEW_SECTION	Starts a new page and a new section numbered as page 1.	Produces a new section for each control group in AT TOP OF field-name. Cannot be used with AT TOP OF PAGE or AT BOTTOM OF PAGE.
REPORT_HEADER	Displays the report header, including the report name, date, and page number.	Overrides the suppression of a report header in AT TOP OF REPORT or PAGE.
RUNNING COUNT	In AT TOP OF field-name, prints the number of control breaks for that field to that point in the report.	In AT TOP OF PAGE, prints the number of pages to that point in the report.

(continued on next page)

Table 7-3: AT TOP Statement Header and Summary Elements (Cont.)

Header or Summary Element	Function	Usage Notes
SKIP [n]	Prints the next header or summary element n lines from the current line.	Same usage as in the PRINT statement.
SPACE [n]	Inserts spaces between the output of the preceding and following elements.	Same usage as in the PRINT statement.
STD_DEV value expression	Displays the standard deviation for the value expressions in the current collection.	Does not indicate the standard deviation for the detail lines of the report, page, or control group specified.
TAB [n]	Inserts the space of one or more tabs before the output of the next element.	Same usage as in the PRINT statement. DATATRIEVE assumes that tabs are set every 8 spaces and inserts enough spaces to begin the next in the appropriate column.
TOTAL value expression	Displays the total for the value expressions in the current collection.	Does not indicate the total for the detail lines of the report, page, or control group.
value expression	Displays the value in a header or summary line.	Same usage as in the PRINT statement.

Restrictions

- You cannot specify a statistical expression in an AT TOP statement unless you have already formed a current collection. DATATRIEVE evaluates the statistical expression based on the records in the current collection.
- You cannot specify the summary elements NEW_PAGE and NEW_SECTION in an AT TOP OF PAGE PRINT statement.

Results

- If an AT TOP OF REPORT is included in a report specification, DATATRIEVE displays the header line or summary line above the detail lines on the first page of the report and suppresses the report header on the first page of the report. The report header is diplayed on the following pages of the report, and the page numbers begin with page 1 on the second physical page of the report. To specify a title page for your report, end the print list with NEW_PAGE or NEW_SECTION.
- If an AT TOP OF PAGE is included in a report specification, DATATRIEVE displays the header line or summary line at the top of each page of the report and replaces the report header on every page.
- The AT TOP OF field-name statement establishes a pattern of control breaks for the entire report, dividing the report into groups of records with a common value for the field. DATATRIEVE displays the header line or summary line at the top of the control group for which the field name is the sort key.

Usage Notes

- The header and summary elements may contain modifiers to specify edit strings or to suppress headers.
- DATATRIEVE checks the sort order of the collection or record stream you want to report. You can establish a sort order with the FIND, SORT, or REPORT statements.

  If you use AT TOP OF field-name without having sorted the records, the Report Writer divides the detail lines into control groups anyway. A new control group is formed every time the value in the specified field changes.

Examples

See Chapter 3 of the *VAX DATATRIEVE Guide to Writing Reports* for examples of the AT TOP statement.

7.7.2 AT BOTTOM Statement (Report Writer)

Format

```
                 { REPORT     }
AT BOTTOM OF     { PAGE       }    PRINT  summary-element [,...]
                 { field-name }
```

Arguments

field-name

Is a field from the record definition for the report's record stream or a variable.

summary-element

Specifies the value, position, and format of the fields. These elements are summarized in Table 7-4.

Table 7-4: AT BOTTOM Statement Summary Elements

Summary Element	Function	Usage Notes
AVERAGE value-expression	Displays the average value of the value expressions.	Calculated for the detail lines of the report, page, or group specified.
COL n	Specifies where the output of the next element begins.	Same usage as in the PRINT statement.
COUNT	Displays the number of detail lines.	Calculated for the detail lines of the report, page, or group specified.
field-name [modifier]	In AT BOTTOM OF field-name, prints the common value for a control group.	Same usage as in the PRINT statement.
MAX value expression	Displays the maximum value of the value expressions.	Calculated for the detail lines of the report, page, or group specified.

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Table 7-4: AT BOTTOM Statement Summary Elements (Cont.)

Summary Element	Function	Usage Notes
MIN value expression	Displays the minimum value of the value expressions.	Calculated for the detail lines of the report, page, or group specified.
NEW_PAGE	Causes the Report Writer to start a new page before the output of the next summary element.	Same usage as in the PRINT statement. Cannot be used with AT BOTTOM OF PAGE.
NEW_SECTION	Starts a new page and a new sequence of page numbers, beginning with page 1.	Can be used only in AT TOP or AT BOTTOM statements with the REPORT and field-name options.
RUNNING COUNT	In AT BOTTOM OF field-name, prints the number of control breaks for that field to that point in the report.	In AT BOTTOM OF PAGE, prints the number of pages to that point in the report.
SKIP [n]	Prints the next element n lines down.	Same usage as in the PRINT statement.
SPACE [n]	Inserts spaces between the output of the preceding and following elements.	Same usage as in the PRINT statement.
STD_DEV value expression	Displays the standard deviation of values for the value expressions.	Calculated for the detail lines of the report, page, or group specified.
TAB [n]	Inserts the space of one or more tabs before the output of the next element.	Same usage as in the PRINT statement. DATATRIEVE assumes that tabs are set every 8 spaces and inserts enough spaces to begin the next in the appropriate column.

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Table 7-4: AT BOTTOM Statement Summary Elements (Cont.)

Summary Element	Function	Usage Notes
TOTAL value expression	Displays the total of values for the expressions.	Calculated for the detail lines of the report, page, or group specified.
value expression	Displays the value in a summary line.	Same usage as in the PRINT statement.

Restriction

You cannot specify the summary elements NEW_PAGE and NEW_SECTION in an AT BOTTOM OF PAGE PRINT statement.

Results

- The AT BOTTOM OF field-name statement establishes a pattern of control breaks for the entire report, dividing the report into groups of records with a common value for the field. DATATRIEVE displays the summary line at the bottom of the control group for which the field name is the sort key. Statistical expressions are computed for the records for the detail lines in that control group.

  When you specify AT BOTTOM OF field-name PRINT field-name, the Report Writer prints the value in the specified field of the last detail line in the control group.

- If you use AT BOTTOM OF field-name, DATATRIEVE checks the sort order of the collection or record stream you want to report. You can establish a sort order with the FIND, SORT, or REPORT statements.

- If AT BOTTOM OF REPORT is included in a report specification, DATATRIEVE displays the header line or summary line below the detail lines on the last page of the report. Statistical expressions are computed for the records for all of the detail lines in the report.

- If AT BOTTOM OF PAGE statement is included in a report specification, DATATRIEVE displays the header line or summary line at the bottom of each page of the report. Statistical expressions are computed for the records for the detail lines on that page.

Usage Note

If you use AT BOTTOM OF field-name without having sorted the records, the Report Writer divides the detail lines into control groups anyway. A new control group is formed every time the value in the specified field changes. If no values in that field are repeated in consecutive detail lines, the Report Writer treats each line as a separate control group and prints the header and summary lines above and below each line as indicated in the record specification.

You may want to follow this approach in the following situation. For example, the records may already be sorted according to an indexed key field. If there is only one level of control break, the Report Writer divides the control groups at the appropriate places. But if you want multiple levels of control groups, you must sort the records in advance with a FIND, SORT, or REPORT statement.

Examples

See Chapter 3 of the *VAX DATATRIEVE Guide to Writing Reports* for examples of the AT BOTTOM statement.

7.8 BEGIN-END Statement

Groups DATATRIEVE statements into a single compound statement called a BEGIN-END block.

Format

```
BEGIN

      statement-1

     [statement-2]
          .
          .
          .

END
```

Arguments

BEGIN

Marks the beginning of a BEGIN-END block.

statement

Is a DATATRIEVE statement. Within the BEGIN-END block, end each statement with a semicolon, a RETURN, or both.

END

Marks the end of the BEGIN-END block.

Restrictions

- You must observe all restrictions on the statements included in the BEGIN-END block. This manual lists these restrictions in the descriptions of the various statements.
- Do not use FIND, SELECT, or DROP statements in a BEGIN-END block.

- You cannot use DATATRIEVE commands in a BEGIN-END block. Consequently, a BEGIN-END block cannot include a procedure that contains DATATRIEVE commands.
- You cannot invoke a command file in a BEGIN-END block. That is, you cannot have a line in a BEGIN-END block that contains an at sign (@) followed by a file specification. DATATRIEVE treats a command file invocation as a command and does not execute command files specified within a BEGIN-END block.

Results

- Within a BEGIN-END block, DATATRIEVE executes the statements in the order you entered them.
- When the BEGIN-END block includes a DECLARE statement, the variable it defines is a local variable. You cannot refer to a local variable from outside the BEGIN-END block. DATATRIEVE automatically releases all local variables when it completes the BEGIN-END block in which they are defined.

  If a BEGIN-END block that defines a local variable is in a FOR loop or REPEAT statement, the local variable is initialized each time DATATRIEVE executes the BEGIN-END block. The variable is initialized to zero, space, the DEFAULT value, or the MISSING value depending on the way you defined the variable in the DECLARE statement. See the sections on the DECLARE statement and the DEFAULT VALUE and MISSING VALUE clauses for more information.
- When you create a single BEGIN-END block interactively, DATATRIEVE prompts you, after you press the RETURN key, for the elements needed to complete an individual statement or to complete the block. The CON> prompt indicates that DATATRIEVE is ready for you to continue entering statements or elements of statements into the BEGIN-END block.

  After you enter END, DATATRIEVE executes all the statements in the BEGIN-END block. When DATATRIEVE completes the last statement in the BEGIN-END block, you see the DTR> prompt, indicating you have returned to DATATRIEVE command level. If you are entering nested BEGIN-END blocks, DATATRIEVE continues to prompt you with the CON> until you have entered the END that completes the outermost BEGIN-END block.

  DATATRIEVE does not execute any of the statements in the nested blocks until you enter the END that completes the outermost BEGIN-END block.

- If you enter CTRL/C while DATATRIEVE is executing the statements in a BEGIN-END block, DATATRIEVE does not execute any of the remaining statements that follow in the block.

  DATATRIEVE treats the whole BEGIN-END block as one statement, regardless of the number of statements or nested BEGIN-END blocks it contains. Because CTRL/C cancels the execution of the current statement, it cancels the execution of the remainder of the entire, outermost BEGIN-END block, regardless of its complexity or the number of levels of other BEGIN-END blocks nested in it.

  If a statement in a BEGIN-END block prompts you for a value and you enter a CTRL/C, DATATRIEVE reprompts you for the value; it does not end the execution of the BEGIN-END block. To end the execution of a BEGIN-END block when DATATRIEVE is prompting you for a value, enter CTRL/Z. DATATRIEVE then ends the execution of the outermost BEGIN-END block and returns you to DATATRIEVE command level.

Usage Notes

- You can use a BEGIN-END block anywhere you can use a DATATRIEVE statement.
- You can nest BEGIN-END blocks. There is virtually no limit on the levels of nested BEGIN-END blocks you can form.
- To repeat an entire sequence of DATATRIEVE statements, put the statements in a BEGIN-END block, and put the BEGIN-END block in a REPEAT statement.
- If you invoke a procedure in a REPEAT statement (using the form REPEAT n :procedure-name), DATATRIEVE repeats the first statement of the procedure n times and then executes the other statements in the procedure once each.

  To repeat all the statements of a procedure you invoke in a REPEAT statement, put the procedure invocation in a BEGIN-END block, and put the BEGIN-END block in the REPEAT statement.
- Use a BEGIN-END block to include more than one DATATRIEVE statement in a FOR loop.
- Use a BEGIN-END block to include more than one DATATRIEVE statement in the THEN and ELSE clauses in an IF-THEN-ELSE statement.

- When storing or modifying records, use BEGIN-END blocks to include more than one statement in the USING and VERIFY USING clauses of the STORE and MODIFY statements.
- If you write a procedure that uses consecutive PRINT statements to format your output, the line spacing changes when you put the procedure in a BEGIN-END block. The one blank line between the result of each PRINT statement disappears. To preserve that spacing when you include the procedure in a BEGIN-END block, edit the procedure and insert a SKIP print-list element at the beginning of the second and each succeeding PRINT statement.

Examples

Store five records in the domain PHONES, each having LOCATION MB1-H2 and DEPARTMENT CE. The SET NO PROMPT command suppresses the "[Looking for . . .]" prompts preceding each CON> prompt. This example also shows how DATATRIEVE responds to CTRL/C and CTRL/Z when it is prompting you for input:

```
DTR> READY PHONES WRITE
DTR> SET NO PROMPT
DTR> REPEAT 5 STORE PHONES USING
DTR> BEGIN
CON>      NAME=       *.NAME
CON>      NUMBER=     *.NUMBER
CON>      LOCATION=   "MB1-H2"
CON>      DEPARTMENT= "CE"
CON> END
Enter NAME: FRED
Enter NUMBER: 555-1234
Enter NAME: GERRY
Enter NUMBER:<CTRL/C>
^C
Enter NUMBER: <CTRL/Z>
Execution terminated by operator
DTR>
```

Use a BEGIN-END block to put three statements in the USING clause of a MODIFY statement. Print a YACHTS record, modify the price, and print the result of the modification:

```
DTR> READY YACHTS WRITE
DTR> SET NO PROMPT
DTR> FOR YACHTS WITH PRICE = 0
CON> MODIFY USING
CON> BEGIN
CON>         PRINT
CON>         PRICE = *."NEW PRICE"
CON>         PRINT
CON> END

                            LENGTH
                             OVER
MANUFACTURER  MODEL     RIG   ALL   WEIGHT BEAM  PRICE

 BLOCK I.    40        SLOOP   39    18,500  12
Enter NEW PRICE: 30000

                            LENGTH
                             OVER
MANUFACTURER  MODEL     RIG   ALL   WEIGHT BEAM  PRICE

 BLOCK I.    40        SLOOP   39    18,500  12  $30,000
 BUCCANEER   270       SLOOP   27     5,000  08
Enter NEW PRICE:<CTRL/Z>
Execution terminated by operator

DTR>
```

This example shows how a BEGIN-END block is treated as a single statement:

```
DTR> DEFINE PROCEDURE LOOP_EXAMPLE
DFN> PRINT "SHOW HOW A BEGIN-END WORKS WITH REPEAT"
DFN> PRINT "AND MORE THAN ONE STATEMENT"
DFN> END_PROCEDURE
DTR>
DTR> REPEAT 2 :LOOP_EXAMPLE
SHOW HOW A BEGIN-END WORKS WITH REPEAT
SHOW HOW A BEGIN-END WORKS WITH REPEAT
AND MORE THAN ONE STATEMENT

DTR> REPEAT 2 BEGIN :LOOP_EXAMPLE; END
SHOW HOW A BEGIN-END WORKS WITH REPEAT
AND MORE THAN ONE STATEMENT
SHOW HOW A BEGIN-END WORKS WITH REPEAT
AND MORE THAN ONE STATEMENT

DTR>
```

7.9 CHOICE Statement

Causes DATATRIEVE to execute one of a series of statements or compound statements depending on the evaluation of a series of conditional, or Boolean, expressions. The CHOICE statement is a convenient substitute for nested IF-THEN-ELSE statements.

Format

```
CHOICE  [OF]
        boolean-expression-1  [THEN]  statement-1
       [boolean-expression-2  [THEN]  statement-2]
                  .              .      .
                  .              .      .
                  .              .      .
       [ELSE statement-n]
END_CHOICE
```

Arguments

CHOICE

Marks the beginning of a CHOICE statement.

OF

Is an optional language element you can use to clarify syntax.

boolean-expression

Is a Boolean expression. (See Chapter 3.)

THEN

Is an optional language element you can use to clarify syntax.

statement

Is a simple or compound statement you want DATATRIEVE to execute if the corresponding Boolean expression evaluates to true.

ELSE statement-n

Specifies the statement you want DATATRIEVE to execute if all the preceding Boolean expressions evaluate to false.

END_CHOICE

Marks the end of the CHOICE statement.

Restrictions

- You must observe all restrictions on the statements used in the CHOICE statement. This manual lists these restrictions in the descriptions of the various statements.
- DATATRIEVE does not evaluate view domain fields defined with an OCCURS clause when you use such fields in CHOICE statements.

Results

- DATATRIEVE evaluates each Boolean expression in order. When a Boolean expression evaluates to true, DATATRIEVE executes the corresponding statement in the THEN clause. Then DATATRIEVE goes on to execute the next command or statement after END_CHOICE.
- If you specify an ELSE clause and all the preceding Boolean expressions evaluate to false, DATATRIEVE executes statement-n in the ELSE clause.
- If you do not specify an ELSE clause and all the preceding Boolean expressions evaluate to false, DATATRIEVE does not execute any of the statements in the THEN clauses and is ready to execute the next command or statement it encounters.

Usage Note

If any of the statements in the THEN clauses is a compound statement, you must enclose the set of statements within a BEGIN-END block.

Examples

Define a procedure MODIFY_YACHTS. Prompt the user to identify a record by specifying the BUILDER and MODEL of a yacht. Then print the record and prompt the user to modify a field from YACHTS. Continue this process until the user replies to a prompt that no further changes need to be made:

```
DTR> SHOW MODIFY_YACHTS
PROCEDURE MODIFY_YACHTS
READY YACHTS WRITE
FOR YACHTS WITH BUILDER = *."the builder" AND
     MODEL = *."the model"
```

(continued on next page)

```
BEGIN
  PRINT
  PRINT SKIP
  PRINT "The fields you can modify are: RIG,LOA,DISP,BEAM,PRICE"
  MODIFY USING
  WHILE *."Y to modify a field, N to exit" CONT "Y"
    BEGIN
      DECLARE FLD PIC X(5).
      FLD = *."field to modify"
      CHOICE
           FLD = "RIG" THEN RIG = *.RIG
           FLD = "LOA" THEN LOA = *.LOA
           FLD = "DISP" THEN DISP = *.DISP
           FLD = "BEAM" THEN BEAM = *..BEAM
           FLD = "PRICE" THEN PRICE = *.PRICE
           ELSE PRINT "That's not a field in YACHTS."
      END_CHOICE
      PRINT
      PRINT SKIP
    END
  PRINT SKIP, "No more changes."
END
END_PROCEDURE

DTR> :MODIFY_YACHTS
Enter the builder: ALBIN
Enter the model: 79

                               LENGTH
                                OVER
MANUFACTURER   MODEL   RIG      ALL   WEIGHT BEAM  PRICE

 ALBIN      79        SLOOP     26     4,200  10  $17,900

The fields you can modify are: RIG, LOA, DISP, BEAM, PRICE
Enter Y to modify a field, N to exit: Y
Enter field to modify: RIG
Enter RIG: KETCH
```

```
                                  LENGTH
                                   OVER
MANUFACTURER   MODEL     RIG       ALL   WEIGHT BEAM  PRICE

 ALBIN       79         KETCH    26     4,200  10  $17,900


Enter Y to modify a field, N to exit: Y
Enter field to modify: RUG
That's not a field in YACHTS.
 ALBIN       79         KETCH    26     4,200  10  $17,900


Enter Y to modify a field, N to exit: N

No more changes.

DTR>
```

Print the TYPE and PRICE of the yachts by ALBERG and ALBIN, indicating whether the price is inexpensive, moderate, or expensive. Suppress the column headers:

```
DTR> READY YACHTS
DTR> FOR YACHTS WITH BUILDER = "ALBERG" OR BUILDER = "ALBIN"
CON> CHOICE
CON> PRICE LT 20000 THEN PRINT TYPE(-),PRICE(-),"INEXPENSIVE"
CON> PRICE LT 30000 THEN PRINT TYPE(-),PRICE(-),"MODERATE"
CON> ELSE PRINT TYPE(-), PRICE(-), "EXPENSIVE"
CON> END_CHOICE

ALBERG      37 MK II    $36,951 EXPENSIVE
ALBIN       79          $17,900 INEXPENSIVE
ALBIN       BALLAD      $27,500 MODERATE
ALBIN       VEGA        $18,600 INEXPENSIVE

DTR>
```

7.10 CLOSE Command

Closes a Record Management System (RMS) trace file you created with an OPEN command as a log for your interactive dialogue with DATATRIEVE.

Format

```
CLOSE
```

Arguments

None.

Restriction

The CLOSE command must be entered at DTR command level.

Results

- DATATRIEVE closes the log file created by the OPEN command. The CLOSE command has no effect on the location of the log file, which is cataloged in the VMS directory determined by the file specification entered in the OPEN command. See the section on the OPEN command for more information.
- DATATRIEVE also closes a log file when you:
  - Enter another OPEN command
  - Exit from DATATRIEVE

Usage Notes

The CLOSE command allows you to close the log file without ending your DATATRIEVE session.

Example

Enter a CLOSE command:

```
DTR> CLOSE
```

7.11 COMMIT Statement

Makes permanent all the changes you made to relational and DBMS databases since the most recent COMMIT or ROLLBACK statement or since the first database READY command if you have not performed a COMMIT or ROLLBACK.

Collections are maintained. For DBMS databases, the COMMIT statement performs a COMMIT RETAINING. For relational databases, the COMMIT starts a new transaction which gives you a new look at the database.

When you have both relational and DBMS databases readied, the COMMIT statement commits all DBMS and relational databases, whether or not you made any changes to their data.

RMS domains are not affected by the COMMIT statement.

Format

```
COMMIT
```

Arguments

None.

Restriction

Do not include COMMIT statements in compound statements containing RSEs that operate on data from relational sources. You must keep the COMMIT statement independent of the compound statement containing the RSE in order for it to work.

Usage Note

The COMMIT statement for both relational and DBMS databases starts a new transaction. COMMIT maintains collections. After a COMMIT, a relational database collection will include changes other users have made to the records in your collection since you formed the collection.

Examples

The following DBMS example connects an employee named Hill to a part LA36 in the RESPONSIBLE_FOR set. The COMMIT statement makes this change permanent:

```
DTR> FIND E IN EMPLOYEES WITH EMP_LAST_NAME = "HILL"
DTR> SELECT 1
DTR> FOR P IN PART WITH PART_DESC = "LA36"
CON>   CONNECT P TO E.RESPONSIBLE_FOR
DTR> COMMIT

DTR>
```

The following relational database example stores a record in the relation DEPARTMENTS. The COMMIT statement makes this change permanent:

```
DTR> READY DATABASE PERSONNEL USING DEPARTMENTS WRITE
DTR> STORE DEPARTMENTS
Enter DEPARTMENT_CODE: SENG
Enter DEPARTMENT_NAME: SOFTWARE ENGINEERING
Enter MANAGER_ID: 87215
DTR> COMMIT

DTR>
```

7.12 COMPUTED BY Clause

Describes a COMPUTED BY field.

Format

```
COMPUTED BY   value-expression
```

Argument

value-expression

Is a DATATRIEVE value expression.

Restrictions

- This clause is valid for elementary fields only.
- You cannot use an OCCURS clause or a VALID IF clause in a COMPUTED BY field.
- Because it does not exist in the record, you cannot assign a value to a COMPUTED BY field. STORE and MODIFY statements cannot refer to a COMPUTED BY field.
- You cannot redefine a COMPUTED BY field with the REDEFINES clause.
- Do not use MISSING VALUE, PICTURE, or USAGE clause in defining a COMPUTED BY field. Because a COMPUTED BY field is a virtual expression, you cannot use a clause that specifies how the value is stored.

Results

When you refer to the COMPUTED BY field in a statement, DATATRIEVE resolves the field name to the nearest single record context and evaluates the value expression using the field value(s) in that record.

Usage Notes

- COMPUTED BY fields are useful if you display arithmetic computations frequently. COMPUTED BY fields allow you to specify the computation once in the record definition, and then print its value simply by referring to its field name. Generally, the computation includes the name of one or more fields in the record definition.

- A COMPUTED BY field does not occupy space in a record. It exists solely in the record definition. The value of a COMPUTED BY field is calculated only when you use it in a statement.
- You can use the CHOICE or IF-THEN-ELSE value expression in defining a COMPUTED BY field. This is useful if the value of the field depends on other field values.
- You can use a COMPUTED BY field as a sort key in SORT and SUM statements and in the SORTED BY clause of record selection expressions. You can also use a COMPUTED BY field to form control groups in the AT TOP and AT BOTTOM statements of the DATATRIEVE Report Writer.
- If you include a COMPUTED BY clause in a field definition, you do not have to include any other field definition clause. However, you may want to use an EDIT_STRING clause to format the computed value when it is printed.
- Edit strings are not inherited from the fields that make up a COMPUTED BY value. If you want a specific representation for the COMPUTED BY field, explicitly specify an edit string for that field.
- The value expression of a COMPUTED BY field in a record definition cannot refer to a list field in the same domain. To compute the value of a list field in the same domain, ready the domain containing the list field and then declare a variable outside the record definition to include the COMPUTED BY value expression.
- When a COMPUTED BY field refers to a list field in another domain, you must ready the domain with the list field before you ready the domain with the COMPUTED BY field. You must finish the domains in the reverse order: the domain with the COMPUTED BY field first and the domain with the list field last.

Examples

Compute the price per pound of a yacht as the price divided by the displacement. In this case, both the PRICE and DISP fields are defined in the record definition:

```
06 PRICE_PER_POUND
   EDIT_STRING $$$,$$9.99
   COMPUTED BY PRICE/DISP.
```

When the PRICE_PER_POUND field is used in a command or statement, DATATRIEVE divides the value of the record's PRICE field by the value of its DISP field. The result of the computation is then the value of the PRICE_PER_POUND field.

Compute the discount price of a yacht. The amount of the discount varies with the price of a yacht. The field PRICE is defined in the record definition for YACHTS:

```
06 DISCOUNT_PRICE   COMPUTED BY
     CHOICE
        PRICE LT 20000 THEN (PRICE * .9)
        PRICE LT 30000 THEN (PRICE * .8)
        PRICE LT 40000 THEN (PRICE * .7)
        ELSE (PRICE * .6)
     END_CHOICE
     EDIT_STRING IS $$$,$$$.
```

When DISCOUNT_PRICE is used in a command or statement, DATATRIEVE evaluates each Boolean expression in order until one evaluates to true. Then it performs the corresponding computation on PRICE.

Derive the value of the SALESFORCE field from a dictionary or domain table named SALES_TABLE:

```
06 SALESFORCE
   EDIT_STRING IS X(20)
   COMPUTED BY MANUFACTURER VIA SALES_TABLE.
```

In this example, DATATRIEVE uses the value of the MANUFACTURER field in the current record to search the dictionary or domain table SALES_TABLE for a matching code. If one is found, DATATRIEVE uses its translation as the value of the SALESFORCE field.

7.13 CONNECT Statement

Makes explicit connections between a record and the DBMS set(s) you specify in the TO list. Before establishing the connection(s), DATATRIEVE sets up a currency indicator for each set specified in the TO list.

Format

```
CONNECT  context-name-1

     [TO]  {  [context-name-2  .  ]  set-name-1  }  [,...]
```

Arguments

context-name-1

Is the name of a valid context variable or the name of a collection with a selected record. It must identify a record occurrence of a domain with a record type that participates in the specified set type. That record *must not* be a member of the set(s) specified by the TO list, but its record type must be a valid member type in the specified set type(s).

context-name-2

Is the name of a valid context variable or the name of a collection with a selected record. It must identify a record that participates in the specified set. If the SYSTEM owns the set, you do not need to establish a context for the set. If the set is not owned by the SYSTEM and the context name is not present, DATATRIEVE uses the most recent single record context of a domain with a record type that participates in the specified set type.

set-name

Is the name of a set type.

Example

The following example connects an employee named Hill to a part LA36 in the RESPONSIBLE_FOR set. P and E in the following example are context names. E refers to a collection with a selected record and P to a record stream. The records in these contexts are all owner records or member records in the set:

```
DTR> FIND E IN EMPLOYEES WITH EMP_LAST_NAME = "HILL"
DTR> SELECT 1
DTR> FOR P IN PART WITH PART_DESC = "LA36"
CON>   CONNECT P TO E.RESPONSIBLE_FOR
DTR>
```

7.14 DECLARE Statement

Defines a global or a local variable.

Format

```
DECLARE  variable-name  variable-definition
```

Arguments

variable-name

Is the name of the variable being defined. The name must conform to the rules for names listed in Chapter 1.

variable-definition

Is the definition of the variable, which consists of field definition clauses. If you include more than one such clause, separate them with spaces, TAB, or RETURN. Refer to Chapter 6 and the entries in this chapter for information on field definition clauses.

. (period)

Ends the DECLARE statement.

Restrictions

- In the variable definition, you must include at least one COMPUTED BY, PICTURE (PIC), or USAGE clause to specify the data type, length, scale, and edit string of the variable.
- Although you can include other field definition clauses, you cannot use an OCCURS clause or REDEFINES clause in the variable definition. A variable can have the properties of only an elementary, nonrepeating field in a DATATRIEVE record definition.

Results

- When you use a DECLARE statement at the DATATRIEVE command level, DATATRIEVE creates a global variable. A global variable exists until you end the DATATRIEVE session, until you explicitly release the variable with the RELEASE command, or until you enter a DECLARE statement for a variable of the same name.

- Unless you define a global variable with a COMPUTED BY clause, the global variable retains the value you assign it until you explicitly release the variable with a RELEASE command, assign a new value to the variable, or end your DATATRIEVE session. The value of a global variable defined with a COMPUTED BY clause depends on the value expression that controls the computation. If the value expression is based on the value of a field in a record, the variable has a value only when there is a valid single record context in which to resolve the value expression.

- When you use a DECLARE statement as part of any other DATATRIEVE statement, such as a BEGIN-END or THEN statement, DATATRIEVE creates a local variable. A local variable exists only within the statement in which it is defined. DATATRIEVE releases all local variables created within a statement when it encounters the end of that statement.

  For example, if you define a local variable in the third BEGIN-END block in a series of four nested BEGIN-END blocks, you can refer to, assign values to, and retrieve values from the variable in the third and fourth blocks. That is, after DATATRIEVE executes the DECLARE statement in the third block, the value of the variable can be changed or retrieved by any of the remaining statements in the third block, including any of the statements in the fourth and innermost block. That local variable, however, has no meaning for any statement outside those two inner blocks. No statement in the first or second block and outside the two inner blocks can refer to the local variable defined in the third one.

- If the statement that defines a local variable is in a FOR loop or REPEAT statement, the local variable is initialized each time DATATRIEVE executes the statement.

  The initial value assigned to the variable by DATATRIEVE depends on the field definition clauses included in the DECLARE statement in which the variable was defined. DATATRIEVE assigns the DEFAULT value to the variable if one is defined. If no DEFAULT value is defined but a MISSING value is, DATATRIEVE assigns the MISSING value to the variable. If neither a DEFAULT nor MISSING value is defined, numeric variables are initialized as zero, and alphanumeric and alphabetic variables are initialized as spaces.

Usage Notes

- To assign a value to the variable, use the following format of the Assignment statement:

  variable-name = value-expression

  See Chapter 3 and the section on the DECLARE statement for more information on assigning values to variables.

- Two SHOW commands let you display on your terminal the names and types of the global variables currently defined: SHOW FIELDS and SHOW VARIABLES. See the section on the SHOW command in this chapter for more information.

```
DTR> DECLARE X REAL.
DTR> DECLARE Y PIC 9(5).
DTR> DECLARE A PIC XX.
DTR> DECLARE B PIC AAA.
DTR> SHOW VARIABLES
Global variables
   X <Number>
   Y <Number>
   A <Character string>
   B <Character string>

DTR>
```

- Use the RELEASE command (see the section on the RELEASE command in this chapter) to remove global variables from your workspace and from the context stack:

```
DTR> SHOW VARIABLES
Global variables
   X <Number>
   Y <Number>
   A <Character string>
   B <Character string>

DTR> RELEASE X, A
DTR> SHOW VARIABLES
Global variables
   Y <Number>
   B <Character string>

DTR>
```

Examples

Declare the global variable NEW_BEAM as a 2-digit numeric field with a DEFAULT value of 10:

```
DTR> DECLARE NEW_BEAM PIC 99 DEFAULT VALUE IS 10.
DTR> PRINT NEW_BEAM

NEW
BEAM

 10

DTR>
```

Declare the global variable X as a single-precision floating-point number, with a MISSING VALUE of 36:

```
DTR> DECLARE X REAL MISSING VALUE IS 36.
DTR> PRINT X

    X

36.0000000

DTR> SHOW VARIABLES
Global variables
   X          <Number>

DTR> RELEASE X
DTR> SHOW FIELDS
No ready sources or global variables declared.
DTR>
```

Declare the variable DUE as a date. Assign today's date to DUE and suppress the header with a hyphen in parentheses:

```
DTR> DECLARE DUE USAGE IS DATE.
DTR> DUE = "TODAY"
DTR> PRINT DUE (-)

22-Sep-82

DTR>
```

7.15 DECLARE PORT Statement

Creates a temporary DATATRIEVE port with the name you specify and readies the port for WRITE access. DATATRIEVE does not enter a definition of the port in the Common Data Dictionary.

Format

```
DECLARE PORT   port-name   USING

         level-number-1       field-definition-1.

        [level-number-2       field-definition-2.]

                .                    .
                .                    .
                .                    .
        [level-number-n      field definition-n.]
;
```

Arguments

port-name

Is the name of the port. It cannot duplicate a DATATRIEVE keyword or the given name of any domain you may bring into your workspace.

level-number

Is the level number for the field in the port declaration and indicates the relationship of the field to the other fields of the port.

field-definition

Is a field definition. A port declaration must have at least one field definition. Each field definition ends with a period. See Chapter 6 and the entries in this chapter for descriptions of the field definition clauses.

; (semicolon)

Ends the port declaration.

Restrictions

- You cannot invoke a procedure in a port declaration.
- In the port declaration, you must include at least one PICTURE (or PIC) clause or one USAGE clause.

Results

- If you press the RETURN key before typing the semicolon, DATATRIEVE prompts you to continue the declaration with the CON> prompt. DATATRIEVE continues to prompt you with the CON> prompt until you type a semicolon and press the RETURN key, or until it detects a syntax error.

  If you make a syntax error while entering the port declaration, DATATRIEVE returns to command level (indicated by the DTR> prompt) without creating the port.
- If your application program declares a port at the DATATRIEVE command level, DATATRIEVE creates a port that is available to your application program until you end your access to it with the FINISH command or until you exit from your session. Such a port is a **global port** and, in this respect, is similar to a global variable.
- If your application program declares the port at some level in a compound statement, the port is valid only for the remainder of the statement in which it is declared and for those statements contained in the statement in which it is declared. Such a port is a **local port** and, in this respect, is similar to a local variable.

Usage Notes

- See the *VAX DATATRIEVE Guide to Programming and Customizing* for information about using a port to transfer data between DATATRIEVE and your application program.
- You cannot ready a port that is already declared. When you declare a port, DATATRIEVE automatically readies the port for WRITE access.

Examples

See the program examples in the *VAX DATATRIEVE Guide to Programming and Customizing.*

7.16 DECLARE SYNONYM Command

Defines a synonym for a DATATRIEVE keyword.

Format

```
DECLARE SYNONYM  {synonym  [FOR]  keyword}  [,...]
```

Arguments

synonym

Is the name of the synonym being defined. The name must conform to the rules for names listed in Chapter 1.

FOR

Is an optional word to clarify syntax.

keyword

Is the name of a DATATRIEVE keyword for which a synonym is being defined. (See Chapter 1.)

Restrictions

- You cannot define a synonym for the keyword CURRENT.
- You cannot use the DECLARE SYNONYM command within a BEGIN-END block.
- You cannot use the DECLARE SYNONYM command within a FOR loop.
- You cannot define a keyword as a synonym for another keyword. For example, you cannot define PRINT as a synonym for FIND.
- You cannot define the same synonym for two different keywords. For example, if you have already defined A as a synonym for ALL, you cannot define A as a synonym for AVERAGE.

Results

- DATATRIEVE interprets the synonym exactly as the keyword with which you associated it.

- This synonym is in effect for the current DATATRIEVE session only. When you exit from DATATRIEVE, all the synonyms you defined with DECLARE SYNONYM are released.

Usage Notes

- Use DECLARE SYNONYM to define temporary synonyms during a particular DATATRIEVE session.
- You can define a synonym for a user-defined keyword.
- You can define a synonym for another synonym. For example:

```
DTR> DECLARE SYNONYM P FOR PRINT
DTR> DECLARE SYNONYM PR FOR P
```

  Now PR is a synonym for the keyword PRINT. You can use PR, PRINT, or P interchangeably.

- If you want to define synonyms that will remain in effect in future DATATRIEVE sessions, include the assignment of synonyms in your DTR$STARTUP command file.
- You can also assign synonyms using a DTR$SYNONYM file. (The DECLARE SYNONYM command replaced this method for assigning synonyms in Version 2.0 and is still the recommended method for users of Version 2.0 or later.)

  Create a file containing a list of keywords and their corresponding abbreviations. Use one keyword/abbreviation pair per line. Capitalize all keywords and definitions and leave at least one space between the keyword and the abbreviation. Assign the logical name DTR$SYNONYM to this file. When you invoke DATATRIEVE, it uses this file to find any synonyms you have defined. If you make an incorrect synonym file entry, DATATRIEVE does not produce an error message, but the synonym does not work.

Examples

Define synonyms for the keywords FIND and PRINT. Use the synonyms to form a collection of the first two yachts, and then print the collection:

```
DTR> READY YACHTS
DTR> DECLARE SYNONYM FD FOR FIND, PT FOR PRINT
DTR> FD FIRST 2 YACHTS; PT CURRENT

                                   LENGTH
                                    OVER
MANUFACTURER   MODEL      RIG      ALL    WEIGHT BEAM  PRICE

 ALBERG      37 MK II   KETCH    37     20,000  12  $36,951
 ALBIN       79         SLOOP    26      4,200  10  $17,900

DTR>
```

Calculate the price per foot and per pound for the first five yachts. To save typing, define synonyms for COMPUTED, EDIT_STRING, and PRINT:

```
DTR> SET NO PROMPT
DTR> DECLARE SYNONYM CD FOR COMPUTED
CON>     E_S FOR EDIT_STRING, PT FOR PRINT
DTR> DECLARE PER_FT CD BY (PRICE/LOA) E_S $$$$.99.
DTR> DECLARE PER_LB CD BY (PRICE/DISP) E_S $$.99.
DTR> FOR FIRST 5 YACHTS
CON>     PT TYPE, PRICE, PER_FT, PER_LB

                                       PER      PER
MANUFACTURER   MODEL      PRICE      FT       LB

 ALBERG      37 MK II   $36,951   $998.68  $1.85
 ALBIN       79         $17,900   $688.46  $4.26
 ALBIN       BALLAD     $27,500   $916.67  $3.78
 ALBIN       VEGA       $18,600   $688.89  $3.67
 AMERICAN    26          $9,895   $380.58  $2.47

DTR>
```

7.17 DEFAULT VALUE Clause

Specifies a default value for initializing a field to which you do not make a direct assignment in STORE or Restructure statements.

Format

```
DEFAULT  [VALUE]  [IS]  literal
```

Argument

VALUE IS

Are optional keywords you can use to clarify the syntax of the clause.

literal

Is either a numeric or character string literal. (See Chapter 3 for a discussion of these two types of literals.)

Restriction

This clause is valid for elementary fields only.

Results

- When you create a record with Assignment statements in the USING clause of a STORE statement but make no assignment to a field, DATATRIEVE does the following. If the field has a DEFAULT VALUE clause in its field definition, DATATRIEVE initializes the field with the default value specified in that clause.

- When you create a record by responding to prompts from a STORE statement without a USING clause or from prompting value expressions in the USING clause of a STORE statement, DATATRIEVE does the following. If you respond to a prompt by pressing TAB once and pressing RETURN, DATATRIEVE initializes a field with the value specified in the DEFAULT VALUE clause.

Examples

Define a field in a student record that sets a default value for tuition owed at registration:

```
09 TUITION_DUE PIC Z(4)9.99
   EDIT_STRING IS $$$,$$$.99
   DEFAULT VALUE IS 4800.
```

Define a date field with the default value of the day you store the record:

```
03 DATE_IN USAGE DATE DEFAULT "TODAY".
```

7.18 DEFINE DATABASE Command

Defines a path name for a relational database (Format 1) or a path name for a DBMS database instance (Format 2).

Format 1

```
DEFINE DATABASE  rdb-database-path  ON  root-file-spec;
```

Format 2

```
DEFINE DATABASE  dbms-database-path

        [USING]  [SUBSCHEMA]  subschema-name

        [OF]  [SCHEMA]  schema-path-name

        ON  root-file-spec;
```

Arguments

rdb-database-path

Is the CDD path name you want for the relational database.

root-file-spec

Is the name of the database root file. For relational databases, the default file type is .RDB; for DBMS, the default file type is .ROO.

dbms-database-path

Is the CDD path name you choose for the DBMS database instance.

subschema-name

Is the name of a subschema for the specified schema.

schema-path-name

Is the CDD path name of a DBMS schema.

Restrictions

Relational and DBMS database path names do not have version numbers.

Format 2

You cannot use the same path name for both the database and the schema.

Examples

Define a relational database path name:

```
DTR> DEFINE DATABASE CDD$TOP.DEPT29.PERSONNEL ON
DFN>                 DBA2:[D29.DAT]PERSONNEL.RDB;
DTR>
```

Define a DBMS database instance. The CDD path name of the schema is CDD$TOP.DBMS.PARTS. The name of the subschema is PARTSS1, and the root file is DB0:[BULGAKOV]PARTSDB.ROO:

```
DTR> DEFINE DATABASE PARTS_DB
DFN>     USING PARTSS1
DFN>     OF CDD$TOP.DBMS.PARTS
DFN>     ON DB0:[BULGAKOV]PARTSDB.ROO;
DTR>
```

7.19 DEFINE DICTIONARY Command

Creates a dictionary directory in the Common Data Dictionary (CDD).

Format

```
DEFINE DICTIONARY   path-name
```

Argument

path-name

Is the given name, the full dictionary path name, or a relative dictionary path name of the directory you want to create in the CDD.

Restrictions

- All ancestors of the dictionary directory you want to create must exist.
- The name you assign to the dictionary directory you want to create must not duplicate the name of any other directory or dictionary object in the parent directory.
- The dictionary path name does not have a version number.
- To define a dictionary directory you must have the following access privileges:
  - P (PASS_THRU) access to all ancestors of the dictionary directory you want to create
  - P (PASS_THRU) and X (EXTEND) access to the parent directory

Results

- DATATRIEVE creates an empty directory in the CDD. In this directory, you can catalog other dictionary directories and the definitions of dictionary objects.
- If you do not enter the path name on the same input line as DEFINE DICTIONARY, DATATRIEVE prompts you for it with DFN>. After you enter the completed command, you return to the DATATRIEVE command level.

- DATATRIEVE does *not* make the newly created directory your default dictionary directory. Your default dictionary directory is unaffected by the DEFINE DICTIONARY command, regardless of its relationship in the CDD hierarchy to the new directory.

- The CDD provides the new directory with a default access control list. Two user identification criteria are supplied: the UIC matches any UIC, and the user name specified is the user name of your process. Six privileges are granted: C (CONTROL), D (LOCAL_DELETE), H (HISTORY), (PASS_THRU), S (SEE), and X (EXTEND). No privileges are denied, and none are banished. The access privileges you have to the new directory depend on the privileges that are granted, denied, and banished by the ancestors of the new directory. Chapter 2 explains access control lists and the DATATRIEVE and CDD access privileges.

Usage Notes

- You can verify the creation of the new dictionary directory. Use the SET DICTIONARY command to make the parent of the new directory your default dictionary directory. Then enter the SHOW DICTIONARIES command. DATATRIEVE displays on your terminal the name of the new directory along with those of any other dictionary directories cataloged in your default directory.

- To change your default directory to the newly created directory, use the SET DICTIONARY command. If your current default directory is the parent of the new directory, you can specify the new directory's given name in the SET DICTIONARY command.

  If your current default directory is not the parent of the new directory, you can use either the new directory's full dictionary path name or the appropriate relative path name in the SET DICTIONARY command.

  Once you have changed your default directory, you can use the SHOW DICTIONARY command to display the complete dictionary path name of your new default directory.

- You do not have to set your default dictionary directory to the newly created directory to define either dictionary objects or directories in that new directory. In the appropriate DEFINE command, you need only specify the full or relative dictionary path name of the directory or object you want to define.

- To enter definitions of dictionary elements in a directory you create, use the following commands: DEFINE DOMAIN, DEFINE PORT, DEFINE PROCEDURE, DEFINE RECORD, DEFINE TABLE. (See the sections on these commands in this chapter.)
- To create new version of dictionary elements use the following commands: REDEFINE DOMAIN, REDEFINE PORT, REDEFINE PROCEDURE, REDEFINE RECORD, REDEFINE TABLE. (See the section in this chapter on REDEFINE.)
- To change the access control list for a dictionary directory, use the DEFINEP command.
- Use the SHOWP command to see the access control list for the new dictionary directory.
- To show your access privileges to your current default dictionary directory, enter the SHOW PRIVILEGES command.

Examples

Use a given name to define a dictionary directory named TEST when CDD$TOP.RESEARCH is your default directory:

```
DTR> SHOW DICTIONARY
The default directory is CDD$TOP.RESEARCH
DTR> DEFINE DICTIONARY TEST
DTR> SHOW DICTIONARIES
Dictionaries:
        DEMO            TEST
DTR> SET DICTIONARY TEST
DTR> SHOW DICTIONARY
The default dictionary is CDD$TOP.RESEARCH.TEST
DTR> SHOW PRIVILEGES
Privileges for CDD$TOP.RESEARCH.TEST
 R (DTR_READD)       - may ready for READ, use SHOW and EXTRACT
 W (DTR_WRITE)       - may ready for READ, WRITE, MODIFY, or EXTEND
 M (DTR_MODIFY)      - may ready for READ, MODIFY
 E (DTR_EXTEND/EXECUTE) - may ready to EXTEND, or access table or procedure
 C (CONTROL)         - may issue DEFINEP, SHOWP, DELETEP commands
 D (LOCAL_DELETE)    - may delete a dictionary object
 F (FORWARD)         - may create a subdictionary
 H (HISTORY)         - may add entries to object's history list
 P (PASS_THRU)       - may use given name of directory or object in pathname
 S (SEE)             - may see (read) dictionary
 U (UPDATE)          - may update dictionary object
 X (extend)          - may create directory or object within directory

DTR>
```

Use a relative dictionary path name to define a dictionary directory in the CDD$TOP.MANUFACTURING when CDD$TOP.DTR$LIB is your default directory:

```
DTR> SHOW DICTIONARY
The default directory is CDD$TOP.DTR$LIB
DTR> DEFINE DICTIONARY
DFN> -.MANUFACTURING.TEST
DTR> SET DICTIONARY -.MANUFACTURING
DTR> SHOW DICTIONARIES
      INVENTORY       TEST
DTR> SHOWP TEST
  1:    [*,*], Username: "JONES"
        Grant - CDHPSX, Deny - None, Banish - none

DTR>
```

7.20 DEFINE DOMAIN Command

Stores a domain definition in the Common Data Dictionary (CDD). You can define domains based on single RMS files, views based on one or more domains, and network domains based on domains residing at other DECnet nodes. Defining domains based on VAX DBMS and relational databases is discussed further in the *VAX DATATRIEVE User's Guide.*

7.20.1 Defining an RMS Domain

Stores a definition of an RMS domain in the specified or implied directory of the CDD and creates an access control list for the domain.

Format

```
DEFINE DOMAIN   path-name   USING   record-path-name   ON   file-spec

      [FORM   [IS]   form-name   [IN]   form-library]  ;
```

Arguments

path-name

Is the given name, full dictionary path name, or relative dictionary path name of the domain being defined. The path name cannot resolve to the full dictionary path name of any other object or directory in the CDD.

record-path-name

Is the given name, full dictionary path name, or relative dictionary path name of the record definition to be associated with the domain. You must enter this record definition in the CDD (with the DEFINE RECORD command) before you can ready the domain. The dictionary path name of the record cannot resolve to the full dictionary path name of any other directory or object in the CDD.

file-spec

Is the VMS file specification of the RMS file containing the data for the domain. This file must exist when you ready the domain. A complete file specification has the following format:

```
node-spec::device:[directory]file-name.type;version
```

form-name

Is the name of the form to be used with the domain.

form-library

Is the file specification of the form library file containing the form.

; (semicolon)

Ends the domain definition.

Restrictions

- You cannot create a new version of a domain unless you use the REDEFINE command.
- You cannot invoke a procedure in a domain definition.
- Do not assign to domains a given name that duplicates a DATATRIEVE keyword.
- The field names of the form must be the same as the corresponding DATATRIEVE field names.
- The length and the data types of the DATATRIEVE and form fields must match.
- The form field names can contain underscores (_) but not hyphens (-).
- When using a form with the DATATRIEVE Call Interface, all fields are passed as strings. This can create problems for COMP fields and for numeric fields with implicit decimal points.
- To initialize the DATATRIEVE interface to forms, SET FORM must be in effect when you ready a domain that contains a FORM clause or when you use the DISPLAY_FORM statement.
- You cannot use the forms interface in batch processing of DATATRIEVE commands and statements.
- For domains defined with a FORM clause, DATATRIEVE uses the forms interface for these statements:
  - PRINT, PRINT [ALL] [OF] rse
  - MODIFY, MODIFY ALL OF rse
  - STORE domain-name

For domains defined with a FORM clause, DATATRIEVE does *not* use the forms interface for these statements:

- PRINT print-list
- MODIFY { [USING statement] [VERIFY USING statement] }
- STORE domain-name
          { [USING statement] [VERIFY USING statement] }

Results

- If you press the RETURN key before typing the semicolon, DATATRIEVE prompts you to continue the definition with the DFN> prompt. DATATRIEVE continues to prompt you with the DFN> prompt until you type a semicolon and press the RETURN key or until it detects a syntax error. If you make a syntax error while entering the domain definition, DATATRIEVE returns to command level (indicated by the DTR> prompt) without creating a domain definition.
- DATATRIEVE enters the domain definition into the directory of the Common Data Dictionary determined by the dictionary path name you specify in the DEFINE DOMAIN command. DATATRIEVE stores the domain definition in the parent directory determined by the full dictionary path name of the domain. In the full dictionary path name, the name of the parent directory immediately precedes the given name of the domain.
- DATATRIEVE creates a default access control list for the domain. The UIC identification matches any UIC ([*,*]), and the user name is set to your current VMS user name. The privileges granted are C (CONTROL), D (LOCAL_DELETE), E (DTR_EXTEND/EXECUTE), H (HISTORY), M (DTR_MODIFY), R (DTR_READ), S (SEE), U (UPDATE), and W (DTR_WRITE). C (CONTROL) allows you to change the access control list to suit your needs.

- If you omit a field in the file specification of the data file, DATATRIEVE uses the following defaults:

Field	Default
node-spec::	Your local node
device:	Your default device
[directory]	Your default directory
file-name	Null string
.type	.DAT
;version	1 or next higher version number

The minimum file specification consists of a period (.); the specification of such a file stored in your default VMS directory ends with ".;n", where n is the version number and both the file name and the extension are null strings.

Usage Notes

- The record definition and the data file associated with the domain need not be defined when you enter a DEFINE DOMAIN command.
- You cannot modify a domain definition with the DEFINE DOMAIN command. To change an existing domain definition, use the EDIT command. The EDIT command places a REDEFINE DOMAIN command with the old definition into the main buffer of the editor. Then you can use the editor to make the desired changes. When you exit from the editor, DATATRIEVE places the updated domain definition with a new version number into the CDD. If SET EDIT_BACKUP is in effect, the old definition is retained in an earlier version. (See Chapter 6 and the section on EDIT in this chapter for information on changing the definitions of domains and other dictionary objects.)
- To increase the ease of transporting your domain definitions, specify the domain name as a given name and the record name as a full dictionary path name.
- Use a more complete file specification than just the file name and type. Then you can access your data even though you may be in a different VMS directory than the one where you first defined the domain.

Examples

Define the domain PHONES. Use the record definition PHONE_REC that is cataloged in the directory CDD$TOP.DEPARTMENT. Specify PHONE.DAT as the data file:

```
DTR> DEFINE DOMAIN PHONES USING
DFN> CDD$TOP.DEPARTMENT.PHONE_REC ON PHONE.DAT;
DTR>
```

Define the domain YACHTS. Use YACHT as the associated record and store the data in the file DB3:[WORK.DATA]YACHT.DAT:

```
DTR> DEFINE DOMAIN YACHTS USING YACHT ON
DFN> DB3:[WORK.DATA]YACHT.DAT;
```

7.20.2 Defining a View Domain

Stores the definition of a view domain in the specified or implied directory of the CDD and creates an access control list for the view domain.

Format

```
DEFINE DOMAIN view-path-name OF domain-path-name-1 [,...]  [ BY    ]
                                                           [ USING ]

        level-number-1 field-name-1     OCCURS FOR rse-1 .

                                       { OCCURS FOR rse-n         }
        level-number-2 field-name-2    { FROM domain-path-name-n  } .

             .            .                   .
             .            .                   .
             .            .                   .

        [FORM [IS] form-name [IN] form-library]
 ;
```

Arguments

view-path-name

Is the given name, full dictionary path name, or relative dictionary path name of the view being defined. The path name cannot resolve to the full dictionary path name of any other object or directory in the CDD.

domain-path-name-1
domain-path-name-n

Is either the given name, full dictionary path name, or relative dictionary path name of a domain containing records to be included in the view. If the domain name is a domain path name, it cannot duplicate the name of the view.

When specifying more than one domain path name, use a comma to separate each name from the next.

level-number

Is the level number for a field in the view definition.

field-name

Is the name of a field in the view definition.

If field-name is followed by an OCCURS FOR clause, field-name has no relationship to any field in the domain or domains specified in the RSE. Whether or not field-name is the same as the names of any of those fields does not matter.

If field-name is followed by a FROM clause, field-name must be the name of a field in a domain specified in the OF domain-path-name-1 [,...] clause.

OCCURS FOR rse

Indicates that the associated field is to be included in the view only for those records specified by the RSE. The RSE must contain a reference to one of the domains, relations, or DBMS records listed in the OF clause.

FROM domain-path-name

Indicates that the definition of the associated field is identical to that of the field of the same name in the domain, relation, or DBMS record specified by domain-path-name-n. The argument domain-path-name must be the same as that used in the preceding OCCURS FOR clause.

. (period)

Ends a field definition.

form-name

Is the name of a form.

form-library

Is the file specification of a forms library.

; (semicolon)

Ends the domain definition.

Restrictions

- The view definition must contain an OCCURS FOR clause as the top-level field.
- The view definition must contain at least one FROM clause for each source.
- Statements cannot refer to the field defined in the OCCURS FOR clause to retrieve or update data. For example, in the BOAT_VIEW domain defined in the following examples, the statement PRINT BOAT_INFO OF BOAT_VIEW will generate an error.
- The restrictions on defining RMS domains apply to defining views.

Results

- If you press the RETURN key before typing the semicolon, DATATRIEVE prompts you to continue the definition with the DFN> prompt. DATATRIEVE continues to prompt you with the DFN> prompt until you type a semicolon and press the RETURN key or until it detects a syntax error. If you make a syntax error while entering the view domain definition, DATATRIEVE returns to command level (indicated by the DTR> prompt) without creating a view domain definition.
- DATATRIEVE enters the view domain definition into the directory of the CDD determined by the dictionary path name you specify in the DEFINE DOMAIN command. If you do not specify the dictionary path name, DATATRIEVE saves the full path name of each of the domains the view references. DATATRIEVE stores the view domain definition in the parent directory determined by the full dictionary path name of the view domain. In the full dictionary path name, the name of the parent directory immediately precedes the given name of the view domain.

- DATATRIEVE creates a default access control list for the domain. The UIC identification matches any UIC ([*,*]), and the user name is set to your current VMS user name. The privileges granted are C (CONTROL), D (LOCAL_DELETE), E (DTR_EXTEND/EXECUTE), H (HISTORY), M (DTR_MODIFY), R (DTR_READ), S (SEE), U (UPDATE), and W (DTR_WRITE). C (CONTROL) allows you to change the access control list to suit your needs.

Usage Notes

Refer to the *VAX DATATRIEVE User's Guide* for more information on using views.

Examples

Define a view of big yachts:

```
DTR> DEFINE DOMAIN BIGGEST-YACHTS OF YACHTS BY
DFN> 01 BIGGEST-YACHT    OCCURS FOR YACHTS WITH LOA GT 40.
DFN>    03 BUILDER       FROM YACHTS.
DFN>    03 MODEL         FROM YACHTS.
DFN>    03 PRICE         FROM YACHTS.
DFN> ;
DTR>
```

Define a view of yacht and owner information:

```
DTR> SHOW BOAT_VIEW
DOMAIN BOAT_VIEW OF YACHTS, OWNERS USING
01 BOAT_INFO OCCURS FOR YACHTS.
   03 TYPE FROM YACHTS.
   03 SKIPPERS OCCURS FOR OWNERS WITH TYPE EQ BOAT.TYPE.
      05 NAME FROM OWNERS.
      05 BOAT_NAME FROM OWNERS.
;

DTR> READY BOAT_VIEW
DTR> PRINT FIRST 4 BOAT_VIEW

                                           BOAT
MANUFACTURER   MODEL       NAME            NAME

 ALBERG      37 MK II
 ALBIN       79
 ALBIN       BALLAD
 ALBIN       VEGA       STEVE      DELIVERANCE
                        HUGH       IMPULSE

DTR>
```

You can use a view domain such as BOAT_VIEW as a source for modifying data in an RMS domain. See the *VAX DATATRIEVE User's Guide* for more examples of view definitions.

7.20.3 Defining a DBMS Domain

This special form of the DEFINE DOMAIN command specifies a DBMS record type within a database instance.

Format

```
DEFINE DOMAIN   domain-path-name   [USING]   record-name

        OF   [DATABASE]   database-path-name

        [FORM   [IS]   form-name   [IN]   form-library]   ;
```

Arguments

domain-path-name

Is the CDD path name of the domain you are defining.

record-name

Is the name of a record type contained in a subschema of the specified database.

database-path-name

Is the DATATRIEVE definition of the database instance.

form-name

Is a form name.

form-library

Is the name of a form library.

Restriction

Do *not* use the same path name for both the domain and the database instance.

Usage Notes

- You do not need to define a DBMS domain to access a DBMS database.
- You need to define a DBMS domain to:
  - Create a view that includes DBMS data
  - Use a DBMS domain from a remote system
  - Associate a form with a DBMS record

Examples

Define the DBMS domain EMPLOYEES. The name of the record-type is EMPLOYEE, and the name of the database instance is PARTS_DB. The domain definition includes the FORM clause:

```
DTR> DEFINE DOMAIN EMPLOYEES
DFN>     USING EMPLOYEE OF DATABASE PARTS_DB
DFN>     FORM IS EMPFOR IN FORMS:PARTS.FLB;
DTR>
```

Define the DBMS domain COMPONENTS:

```
DTR> DEFINE DOMAIN COMPONENTS USING COMPONENT OF
CON> DATABASE PARTS_DB;
DTR>
```

7.20.4 Defining a Relational Domain

This special form of the DEFINE DOMAIN command specifies a record in a relational database.

Format

```
DEFINE DOMAIN  domain-path-name  [USING]  relation-name

       [OF]  [DATABASE]  database-path-name

       [FORM  [IS]  form-name  [IN]  form-library];
```

Arguments

domain-path-name

Is the CDD path name you want for the domain.

relation-name

Is the name assigned to the relation when the database was created.

database-path-name

Is the CDD path name of a relational database.

form-name

Is a form name.

form-library

Is the name of a form library.

Usage Notes

- You do not need to define a domain for a relation in order to ready it. When you ready a database directly, DATATRIEVE response time is faster than when you use domains to access relational records.
- You need to define domains for relations to
  - Create a view which includes data from a relation
  - Use relational domains from a remote system
  - Associate a form with a relation

Examples

For the relation EMPLOYEES, define a DATATRIEVE domain that automatically uses a form:

```
DTR> DEFINE DOMAIN EMPLOYEES
DFN>     USING EMPLOYEES OF DATABASE PERSONNEL
DFN>     FORM IS EMPFOR IN FORMSLIB;
DTR>
```

For the view relation MAILING_INFO, define a DATATRIEVE domain that automatically uses a form:

```
DTR> DEFINE DOMAIN ADDRESSES USING
DFN>     MAILING_INFO OF PERSONNEL
DFN>     FORM IS ADDRFOR IN FORMSLIB;
DTR>
```

7.20.5 Defining a Network Domain

Stores the definition of a network domain in the specified or implied directory of the CDD and creates an access control list for the domain.

Format

```
DEFINE DOMAIN  path-name  USING  domain-path-name  AT  node-spec

       [FORM  [IS]  form-name  [IN]  form-library]  ;
```

Arguments

path-name

Is the given name, full dictionary path name, or relative dictionary path name of the domain being defined. The path name cannot resolve to the full dictionary path name of any other object or directory in the CDD.

domain-path-name

Is the given name, full dictionary path name, or relative dictionary path name of a domain definition at another node in a network of VAX computers linked by DECnet. That domain, its associated record definition, and its associated data file must be defined in the CDD at the remote node before you can ready the network domain.

node-spec

The node-spec consists of a node name and an optional access control string.

A node name is a one- through six-character name that identifies the location on the network. Examples are NATHAN or UTICA.

An access control string indicates a particular account on the remote node. It consists of a user name, followed by one or more blanks or tabs, a password, and an optional account name.

The following three node specifications are valid:

NATHAN
NATHAN"MORRISON RYLE"
NATHAN"MORRISON RYLE KANT"

On DECnet links with some PDP-11 systems, you can use the UIC number in place of the user name. For example:

NATHAN"[240,240] RYLE"
NATHAN"[240,240] RYLE KANT"

In the examples, the remote node is NATHAN, the user name is MORRISON, the UIC is [240,240], the password is RYLE, and the account name is KANT.

You can also use a prompting value expression to prompt the user for the user name, password, account name, or UIC. Use single quotes for the prompt string. For example:

```
DTR> DEFINE DOMAIN REMOTE_YACHTS USING
CON>     CDD$TOP.DTR32.MORRISON.YACHTS AT
CON>     NATHAN"*.'username' *.'password'";
DTR> READY REMOTE_YACHTS
Enter username: MORRISON
Enter password:
DTR>
```

form-name

Is the name of a form.

form-library

Is the file specification of a forms library.

; (semicolon)

Ends the domain definition.

Restrictions

- You can define network domains only if your VMS system is linked by DECnet to one or more VMS systems on which DATATRIEVE has been installed.
- If you include the FORM IS clause in the network domain definition, the form library must reside on your own VAX system.
- Other restrictions on network domains are the same as those for RMS domains.

Results

- DATATRIEVE stores the network domain definition in your local CDD. The CDD on the remote system is unaffected by the DEFINE command entered on your local system. The directory in which the definition is stored depends on the full dictionary path name of the definition.
- DATATRIEVE creates a default access control list for the domain. The UIC identification matches any UIC ([*,*]), and the user name is set to your current VMS user name. The privileges granted are C (CONTROL), D (LOCAL_DELETE), E (DTR_EXTEND/EXECUTE), H (HISTORY), M (DTR_MODIFY), R (DTR_READ), S (SEE), U (UPDATE), and W (DTR_WRITE). C (CONTROL) allows you to change the access control list to suit your needs.

Usage Notes

- If the dictionary path name specified for the remote domain is a relative one, DATATRIEVE resolves it based on the translation of the logical name CDD$DEFAULT resulting from starting a VMS process with the node specification indicated.

  If no user name and password are specified in the node specification argument, the remote process logs in under the default DECnet account. If a user name and password are specified, the remote process logs in as that user.

  If CDD$DEFAULT is not defined as a system, group, or process logical name when the remote process logs in on the remote node, a relative dictionary path name for the remote domain resolves from CDD$TOP as the default dictionary directory.
- For further discussion of network domains, see the *VAX DATATRIEVE User's Guide.*

Example

Define a network domain called REMOTE_YACHTS:

```
DTR> DEFINE DOMAIN REMOTE_YACHTS USING
DFN>    CDD$TOP.DTR$LIB.DEMO.YACHTS AT
DFN>    VAX32"SMITH ADRIENNE" FORM IS YACHT1 IN DTRFRM;
DTR>
```

7.21 DEFINE FILE Command

Creates an RMS sequential or indexed sequential data file for the DATATRIEVE RMS domain specified by the dictionary path name.

For Defining a Sequential File

Format

```
DEFINE FILE [FOR] path-name

    ┌ ALLOCATION = n ┐
    │ SUPERSEDE      │   [,...]
    └ MAX            ┘
```

For Defining an Indexed File

Format

```
DEFINE FILE [FOR] path-name

    ┌ ALLOCATION = n ┐
    │ SUPERSEDE      │   [,...]
    └ MAX            ┘
    { KEY = field-name-1  [ ( [NO] CHANGE [,]   [NO] DUP ) ] }  [,...]
```

For Defining an RMS File Using a File Definition Language (FDL) File

Format

```
DEFINE FILE  [FOR]  domain-name  USING fdl-file-spec
```

Arguments

path-name

Is the dictionary path name of the DATATRIEVE RMS domain for which you want to create a data file.

domain-name

Is the name of the DATATRIEVE domain for which you want to create a data file.

ALLOCATION = n

Specifies an unsigned, nonzero integer n that determines the number of disk blocks initially allocated for the data file. If you omit this argument, zero blocks are allocated for the file.

SUPERSEDE

Deletes any data file with a complete file specification, including version number, exactly duplicating that specified in the RMS domain definition and replaces it with the new file DATATRIEVE creates. If you do not specify a version number for the file in your domain definition, the new file does not replace the old one but is assigned the next higher version number.

MAX

Causes DATATRIEVE to create a fixed-length RMS file for a domain whose record definition contains an OCCURS...DEPENDING clause. The length of every record in the data file has the maximum possible size, as determined by the value of the MAX argument in the OCCURS...DEPENDING clause:

```
OCCURS min TO max TIMES DEPENDING ON field-name
```

Each record can then store the maximum number of items in the list defined by the OCCURS...DEPENDING clause.

If you omit this argument, DATATRIEVE does not create a file with fixed-length records of the maximum possible size. The size of each record is determined when you store the record. If the file is defined as a sequential file, a record size cannot be increased to include more list items after it is initially stored.

KEY = field-name

Causes DATATRIEVE to create an RMS indexed file and specifies a field in the domain's record definition to be used as an index key for the domain's data file. The first key field specified in the DEFINE FILE command is the primary key, and all subsequent ones are alternate keys. If you specify more than one KEY clause, use a comma (,) to separate each clause from the next. If you are defining a file for a hierarchical record, do not make a list field the primary key.

If you omit this clause, DATATRIEVE creates an RMS sequential file.

CHANGE
NO CHANGE

Determines whether or not you can modify the content of the associated key field. See Tables 7-5 and 7-6 for the defaults and allowed combinations of key field attributes.

DUP
NO DUP

Determines whether or not you can assign the same value to the specified key fields of two or more records. See Tables 7-5 and 7-6 for defaults and allowed combinations of key field attributes.

Table 7-5: Default Values for Key Fields

Default Values		
Options	**Primary Key**	**Alternate Key(s)**
CHANGE NO CHANGE	NO CHANGE	CHANGE
DUP NO DUP	NO DUP	DUP

Table 7-6: Allowed Combinations of Key Field Attributes

Combinations of Key Field Attributes				
Key Type	CHANGE + DUP	CHANGE + NO DUP	NO CHANGE + DUP	NO CHANGE + NO DUP
Primary	Not Allowed	Not Allowed	Allowed	Allowed
Alternate	Allowed	Allowed	Allowed	Allowed

USING fdl-file-spec

Specifies the FDL file to be used in creating the RMS file.

Restrictions

- To define a data file for an RMS domain, you must have the following privileges:
  - P (PASS_THRU) access to the parent directories cataloging the domain definition and the record definition
  - P (PASS_THRU), R (DTR_READ), and S (SEE) access privileges to the domain definition
  - E (DTR_EXTEND/EXECUTE), P (PASS_THRU), and S (SEE) access to the associated record definition
- You cannot assign the CHANGE attribute to a primary key. See Table 7-6 for the allowed combinations of key field attributes.
- If you are defining a file for a hierarchical record, you cannot designate a list field as the primary key.
- If you define a group field key with DATATRIEVE or a segmented key with RMS, DATATRIEVE uses only the first elementary item for indexed access. However, DATATRIEVE does not use any part of a multiple field key when one of the subordinate items is numeric. Therefore, all elementary fields in a multiple field key must be nonnumeric for DATATRIEVE to use the first elementary field for indexed access.
- DATATRIEVE does not use keyed access when the record source is a collection.
- The domain specified by the dictionary path name must be an RMS domain, not a view domain, DBMS domain, relational domain, remote domain, or port.

Results

- If you include no KEY clause, DATATRIEVE creates an RMS sequential data file for the domain specified by the dictionary path name.
- If you include one or more KEY clauses, DATATRIEVE creates an RMS indexed sequential data file for the domain specified by the dictionary path name.

- The file specification of the RMS file created by this command is the same as that of the data file in the definition of the domain specified by the dictionary path name. (Note that if you are using the USING fdl-file-spec format of the DEFINE FILE command, the name of the RMS file is also taken from the domain definition, not from any file name specified in the FDL file.)

  If the domain definition omits a field in the file specification, DATATRIEVE uses the following defaults:

Field	Default
node-spec::	Your local node
device:	Your default device
[directory]	Your default directory
file-name	Null string
.type	.DAT
;version	1 or next higher version number than any existing file with the same name

- If you omit the ALLOCATION = n clause, DATATRIEVE sets the initial disk space allocation for the data file to zero blocks. When you store records into the data file, RMS automatically extends the data file according to the cluster size established by your VMS system manager.
- If the record definition associated with the specified domain contains no OCCURS...DEPENDING clause, DATATRIEVE creates a data file with a fixed-length record format.
- If you do not include the MAX argument and the record definition associated with the specified domain contains an OCCURS...DEPENDING clause, DATATRIEVE creates a data file with a variable-length record format.
- If you include the MAX argument and the record definition associated with the specified domain contains an OCCURS...DEPENDING clause, DATATRIEVE creates a data file with a fixed-length record format.

- If you include the SUPERSEDE argument and the file specification in the domain definition specifies a version number, DATATRIEVE deletes any existing data file having that file specification (including the version number) and replaces it with the new data file created by the DEFINE FILE command. The new file has the same file specification (including the version number) as that of the deleted file.

Usage Notes

- If you define a sequential file, you cannot erase records with the DATATRIEVE ERASE statement. You can, however, change the value of any field in a record.
- If you define an indexed file, you can erase records with the DATATRIEVE ERASE statement. You cannot, however, change the value of the primary key field of a record, nor the value of any secondary key field with the NO CHANGE attribute.
- If you change the size of a record, you also need to define a new file to agree with the new record definition. Otherwise, you receive an error message indicating "bad record size" when you try to ready the domain.

  To avoid defining a new file, you can define filler fields in your record definition to allow space for future additions.
- If you define a sequential file for a record with an OCCURS ... DEPENDING clause and do not use MAX, then you cannot extend the length of the list without defining a new file.
- See the *VAX DATATRIEVE Handbook* for more information on defining data files.
- If you are using the USING fdl-file-spec format of the DEFINE FILE command, you should also note the following:
  - DATATRIEVE does not verify the validity of the FDL file specifications. For example, DATATRIEVE does not check to see that offsets of any specified keys match fields defined for the record; nor does it check for valid record formats, file organization, segmented keys, etc.

    DATATRIEVE does check the record size, however, and generates an error message if the size of the record differs from the record size specified in the FDL file.

- DATATRIEVE ignores any CONNECT-related options included in the FDL file because the file is being created, not opened.
- DATATRIEVE dynamically activates the FDLSHR image the first time you request a DEFINE FILE with the USING fdl-file-spec clause. Subsequent requests do not incur the overhead of activating that image.
- If DATATRIEVE receives any kind of error or warning messages from the FDL parse of the file, DATATRIEVE does not call FDL to create the RMS file. (Note that this includes syntax warnings. If you used FDL outside of DATATRIEVE, such warnings might be ignored and the file would be created.) DATATRIEVE instead returns an appropriate error message. The error message may contain the statement number of the line in the FDL file that caused the error if the statement number is returned from FDL. The message will not include any additional information about the error.

  You should therefore debug your FDL file at the DCL level before attempting to use it from within DATATRIEVE.

For more information on using FDL files to improve the performance of your application, see the *VAX DATATRIEVE User's Guide* and the VMS documentation on File Definition Language and on file applications.

Examples

Define an indexed file for the domain PAYABLES. Use the field NAME as the primary key and TYPE as the alternate key, allowing no changes to the alternate key:

```
DTR> DEFINE FILE FOR PHONES KEY = NAME (DUP), KEY = TYPE (NO CHANGE)
DTR>
```

Define a sequential file for the domain FAMILIES:

```
DTR> DEFINE FILE FOR FAMILIES
DTR>
```

Define a new indexed file for the domain YACHTS. Use the group field TYPE as the primary key, allowing duplicate values for this key. This command replaces the previous data file for YACHT:

```
DTR> DEFINE FILE FOR YACHTS SUPERSEDE, KEY=TYPE (DUP)
DTR>
```

Define a new file for the YACHTS domain using the specifications included in YACHTS.FDL, a file created outside of DATATRIEVE:

```
DTR> DEFINE FILE FOR YACHTS USING YACHTS.FDL
DTR>
```

7.22 DEFINE PORT Command

Enters the definition of a DATATRIEVE port in the specified or implied directory of the Common Data Dictionary (CDD) and creates an access control list for the port.

Format

```
DEFINE PORT   path-name   [USING]   record-path-name   ;
```

Arguments

path-name

Is the given name, full dictionary path name, or relative dictionary path name of the port being defined. The path name cannot resolve to the full dictionary path name of any other object or directory in the CDD.

record-path-name

Is the given name, full dictionary path name, or relative dictionary path name of the record definition to be associated with the port. The dictionary path name of the record cannot resolve to the full dictionary path name of any other object or directory in the CDD.

; (semicolon)

Ends the port definition.

Restrictions

- Do not use a DATATRIEVE keyword as the given name of a port or as the given name of the record definition associated with the port.
- You cannot use a DEFINE PORT command as part of a compound statement.
- You cannot invoke a procedure in a port definition.
- You must enter the port definition in the CDD before using it to transfer data between DATATRIEVE and your application program.

Results

- If you press the RETURN key before typing the semicolon, DATATRIEVE prompts you to continue the definition with the DFN> prompt. DATATRIEVE continues to prompt you with the DFN> prompt until you type a semicolon and press the RETURN key or until it detects a syntax error. If you make a syntax error while entering the port definition, DATATRIEVE returns to command level (indicated by the DTR> prompt) without entering the port definition in the CDD.
- DATATRIEVE enters the port definition into the directory of the CDD determined by the dictionary path name you specify in the DEFINE PORT command. DATATRIEVE stores the port definition in the parent directory determined by the full dictionary path name of the port. In the full dictionary path name, the name of the parent directory immediately precedes the given name of the port.
- DATATRIEVE creates a default access control list for the port. The UIC identification matches any UIC ([*,*]), and the user name is set to your current VMS user name. The privileges granted are C (CONTROL), D (LOCAL_DELETE), E (DTR_EXTEND/EXECUTE), H (HISTORY), M (DTR_MODIFY), R (DTR_READ), S (SEE), U (UPDATE), and W (DTR_WRITE). C (CONTROL) allows you to change the access control list to suit your needs.

Usage Notes

- Before you can use the port, you must enter in the CDD the record definition associated with the port. Use the DEFINE RECORD command.
- Use the SHOW path-name command to display the definition of the port on your terminal.
- Use the SHOW DOMAINS command to display the names of all the ports in your default dictionary directory.
- See the *VAX DATATRIEVE Guide to Programming and Customizing* for information about using a port to transfer data between DATATRIEVE and your application program.

Example

Define a port for transferring records between the YACHTS domain and an application program:

```
DTR> DEFINE PORT YPORT USING CDD$TOP.DTR$LIB.DEMO.YACHT;
DTR>
```

7.23 DEFINE PROCEDURE Command

Enters a procedure definition into the Common Data Dictionary (CDD) and creates an access control list for the procedure.

Format

```
DEFINE PROCEDURE   procedure-name

              .
              .
              .

END-PROCEDURE
```

Arguments

procedure-name

Is the given name, full dictionary path name, or relative dictionary path name of the procedure you want to define. That path name cannot resolve to the full dictionary path name of any other object or directory in the CDD.

END_PROCEDURE

Ends the procedure definition.

Restrictions

- You must enter the DEFINE PROCEDURE command at DATATRIEVE command level (indicated by the DTR> prompt). It cannot be part of a DATATRIEVE statement.
- To define a procedure, you must have the following access privileges:
  - P (PASS_THRU) access to the ancestors of the procedure
  - P (PASS_THRU) and X (EXTEND) access to the parent directory

Results

- After you type DEFINE PROCEDURE procedure-name and press the RETURN key, you see displayed on your terminal the DFN> prompt. This prompt indicates that DATATRIEVE expects a procedure definition and that the commands and statements you enter before the END_PROCEDURE clause are included in the procedure.

  Until you end the procedure definition with END_PROCEDURE, DATATRIEVE treats your input as input to the procedure and continues to prompt you with the DFN> prompt.

- DATATRIEVE enters the procedure definition in the dictionary directory determined by the full dictionary path name of the procedure. If you use only the given name of the procedure in the DEFINE command, DATATRIEVE stores the definition in your default dictionary directory.

- DATATRIEVE creates a default access control list entry for the procedure. The UIC matches any UIC ([*,*]), and the user name is set to your current VMS user name. The privileges granted are C (CONTROL), D (LOCAL_DELETE), E (DTR_EXTEND/EXECUTE), H (HISTORY), M (DTR_MODIFY), R (DTR_READ), S (SEE), U (UPDATE), and W (DTR_WRITE). C (CONTROL) access allows you to change the access control list to suit your needs.

- If you include comments in a procedure (by preceding your input line with an exclamation point), DATATRIEVE stores the comments in the CDD as part of the procedure definition. If you include comments in the procedure, DATATRIEVE does not display them when you invoke the procedure and DATATRIEVE executes it.

Usage Notes

- To invoke a procedure, enter a colon (or its synonym, EXECUTE) followed by the given name, full dictionary path name, or relative path name of the procedure. You can invoke a procedure in response to any DATATRIEVE prompts, except those of ADT, Guide Mode, and the editor. You can also invoke procedures in the midst of input lines.

- To invoke a procedure with a VMS command line, you must use the keyword EXECUTE instead of the colon.

- To modify a procedure after it has been stored in the CDD, use the DATATRIEVE editor, since DEFINE PROCEDURE can only create the initial version of a procedure.

- You cannot modify a procedure definition with the DEFINE PROCEDURE command. To change an existing procedure definition, use the EDIT command. The EDIT command places a REDEFINE PROCEDURE command with the old procedure definition into the main buffer of the editor. Then you can use the editor to make the desired changes. When you exit from the editor, DATATRIEVE places the updated procedure definition with a new version number into the CDD. If SET EDIT_BACKUP is in effect, the old definition is retained in an earlier version. See the section on the EDIT command in this chapter for more information on changing the definitions of procedures and other dictionary objects.
- You must take care when using a procedure in a loop formed by a REPEAT or FOR statement. To ensure that DATATRIEVE executes all the statements in the procedure each time through the loop, enclose the procedure in a BEGIN-END block. Remember, though, that if you use a procedure in this way, it cannot include any commands or FIND, SELECT, or DROP statements.
- For more information on procedures, see the *VAX DATATRIEVE User's Guide.*

Examples

Define a procedure to set your default directory to the DEMO directory, which contains the sample data for the YACHTS, OWNERS, and FAMILIES domains:

```
DTR> DEFINE PROCEDURE DEMO
DFN> SET DICTIONARY CDD$TOP.DTR$LIB.DEMO
DFN>     SHOW DICTIONARY
DFN> END_PROCEDURE
DTR> :DEMO
The default directory is CDD$TOP.DTR$LIB.DEMO
DTR>
```

Define a procedure that displays a group of boats with a price less than a figure you supply when the procedure runs:

```
DTR> DEFINE PROCEDURE PRICE_LIST
DFN>     READY YACHTS
DFN>     PRINT SKIP, COL 20,
DFN>           '*** Price List of YACHTS ***', SKIP
DFN>     FOR YACHTS WITH PRICE NE 0 AND
DFN>         PRICE LE *.'the ceiling price'
DFN>           PRINT BOAT
DFN>     PRINT SKIP, COL 10, 'See anything interesting?'
DFN> END_PROCEDURE
DTR> :PRICE_LIST

                   *** Price List of YACHTS ***

Enter the ceiling price: 5,000

                               LENGTH
                                OVER
MANUFACTURER   MODEL     RIG    ALL   DISPLACEMENT BEAM  PRICE

 CAPE DORY   TYPHOON    SLOOP   19        1,900     06   $4,295
 VENTURE     21         SLOOP   21        1,500     07   $2,823
 VENTURE     222        SLOOP   22        2,000     07   $3,564
 WINDPOWER   IMPULSE    SLOOP   16          650     07   $3,500

         See anything interesting?

DTR>
```

Using a VMS command line, invoke the procedure created in the first example:

```
$ DTR32 EXECUTE DEMO
The default directory is CDD$TOP.DTR$LIB.DEMO

$
```

7.24 DEFINE RECORD Command

Enters a record definition in the Common Data Dictionary (CDD) and creates an access control list for the record.

Format

```
DEFINE RECORD path-name [USING] [OPTIMIZE]

    ┌                  ┌ MAJOR-MINOR         ┐ ┐
    │ ALLOCATION IS   <  ALIGNED-MAJOR-MINOR  > │
    └                  └ LEFT-RIGHT          ┘ ┘

    level-number-1  field-name-1  [field-definition-1] .

    [level-number-2  field-name-2  field-definition-2 .]

              .          .          .
              .          .          .
              .          .          .

;
```

Arguments

path-name

Is the given name, full dictionary path name, or relative dictionary path name of the record being defined. The path name cannot resolve to the full dictionary path name of any other object or directory in the CDD.

OPTIMIZE

Allows you to optimize record definitions, reducing the central processing unit (CPU) time needed to ready a domain that refers to the record. See the Usage Notes for special considerations.

```
                MAJOR-MINOR
ALLOCATION IS   ALIGNED-MAJOR-MINOR
                LEFT-RIGHT
```

Specifies the type of word-boundary alignment DATATRIEVE uses when storing records in the data file. It also controls the way DATATRIEVE retrieves data from data files created by user programs or other application software. The default allocation is no alignment. See the VAX COBOL documentation set for more information on word-boundary alignment and allocation of fill bytes.

level-number

Is the level number for the field in the record definition. It indicates the relationship of the field to the other fields in the record definition.

field-name

Is the name of the field. Every field must have a name. The keyword FILLER is a special field name that can be repeated at the same level in the record definition.

field-definition

Is a field definition. A record definition must contain at least one field definition. Elementary fields must have at least one field definition clause, but group fields are not required to have any field definition clauses.

Each field definition must end with a period (.). See the entries in this chapter for more information on record definition clauses.

; (semicolon)

Ends the record definition.

Restrictions

- You cannot invoke a procedure in a record definition.
- The level number must be an integer between 1 and 65.
- A record definition must contain the field definition of at least one elementary field.
- The field definition of an elementary field must contain at least one field definition clause.
- No field name can duplicate the domain name.

Results

- If you press the RETURN key before typing the semicolon, DATATRIEVE prompts you to continue the definition with the DFN> prompt. DATATRIEVE continues to prompt you with the DFN> prompt until you type a semicolon and press return or until it detects a syntax error. If you make a syntax error while entering the record definition, DATATRIEVE returns to command level (indicated by the DTR> prompt) without creating the record definition.

- When you end the record definition, DATATRIEVE displays the following message on your terminal to indicate the length of the new record in bytes:

  ```
  [Record is n bytes long]
  ```

- DATATRIEVE enters the record definition in the dictionary directory determined by the full dictionary path name of the record. If you use only the given name of the record definition in the DEFINE RECORD command, DATATRIEVE stores the definition in your default dictionary directory.

- When you specify the OPTIMIZE qualifier, DATATRIEVE stores its internal representation of the record (called the field tree) in the CDD. This means DATATRIEVE does not have to reconstruct the field tree each time you ready a domain that refers to the record. DATATRIEVE constructs a new field tree only when the record is redefined using the OPTIMIZE qualifier. (Note that the DEFINE FILE command also uses record definitions. Its performance will also improve by optimizing records.)

  DATATRIEVE does *not* perform this optimization by default. When defining a new record, you must specify the OPTIMIZE qualifier to optimize a record. To optimize existing record definitions, you must redefine the records (using the EDIT or EXTRACT commands) and include the OPTIMIZE qualifier.

- DATATRIEVE creates a default access control list entry for the record definition. The UIC matches any UIC ([*,*]), and the user name is set to your current VMS user name. The privileges granted are C (CONTROL), D (LOCAL_DELETE), E (DTR_EXTEND/EXECUTE), H (HISTORY), M (DTR_MODIFY), R (DTR_READ), S (SEE), U (UPDATE), and W (DTR_WRITE). C (CONTROL) access allows you to change the access control list to suit your needs.

Usage Notes

- This command creates a record definition but cannot modify or replace one. To modify a record definition, use the EDIT command.
- The EDIT command places a REDEFINE RECORD command with the old definition into the main buffer of the editor. Then you can use the editor to make the desired changes. When you exit from the editor, DATATRIEVE places the updated record definition with a new version number into the CDD. If SET EDIT_BACKUP is in effect, the old definition is retained in an earlier version. See the section on the EDIT command in this chapter for information on changing the definitions of records, tables, and other dictionary objects.
- If you change a record definition, you may not be able to use old data files. If the new record definition is not the same length or the new field definitions change to data types incompatible with the previous definition, you have to define a new data file.

  The safest method for changing record definitions is to define a new domain and a new file to accompany the new record definition. Then use the STORE statement or the Restructure statement to transfer the values from the data file of the old domain to the data file of the new one.
- There are *performance and storage tradeoffs* you should consider before using the OPTIMIZE qualifier:

  1. The major benefit of the OPTIMIZE qualifier is the decrease in CPU time when readying a domain with an optimized record. On sample records, CPU times decreased anywhere from 50 to 95 percent. Larger records showed the greater improvement.
  2. Using the OPTIMIZE qualifier increases the CPU time necessary to define a record. The elapsed CPU time for a DEFINE RECORD command increases anywhere from a few percentage points to nearly double the time. The smaller percentage increases occur for small records. Larger records cause the larger percentage increases in CPU time.

     You can avoid increased record definition time by not using the OPTIMIZE qualifier while designing a record. Instead, edit the final version of the record and add the OPTIMIZE qualifier. This way you still benefit from the READY performance improvements. Note also that the increase in definition time is essentially a one-time occurrence. Once you define your record, you experience the improved performance each time you ready a domain that uses that record.

3. Disk usage for a record definition in the CDD increases by at least 50 percent when the record is optimized. Larger records will have a greater percentage increase, approaching double the original disk usage.

The sample record definition ACCOUNT_BALANCES_REC (located in CDD$TOP.DTR$LIB.DEMO) uses the new OPTIMIZE qualifier, allowing you to see the performance improvements and tradeoffs involved in using OPTIMIZE.

Examples

Define the record PHONE_REC:

```
DTR> DEFINE RECORD PHONE_REC USING
DFN> 01 PHONE.
DFN>    02 NAME PIC X(20).
DFN>    02 NUMBER PIC 9(7) EDIT_STRING IS XXX-XXXX.
DFN>    02 LOCATION PIC X(9).
DFN>    02 DEPARTMENT PIC XX.
DFN> ;
[Record is 38 bytes long.]
DTR>
```

Define the record FAMILY:

```
DTR> DEFINE RECORD FAMILY USING
DFN> 01 FAMILY.
DFN>    03 PARENTS.
DFN>        06 FATHER PIC X(10).
DFN>        06 MOTHER PIC X(10).
DFN>    03 NUMBER_KIDS PIC 99 EDIT_STRING IS Z9.
DFN>    03 KIDS OCCURS 0 TO 10 TIMES DEPENDING ON NUMBER_KIDS.
DFN>        06 EACH_KID.
DFN>            09 KID_NAME PIC X(10) QUERY_NAME IS KID.
DFN>            09 AGE PIC 99 EDIT_STRING IS Z9.
DFN> ;
[Record is 142 bytes long.]
DTR>
```

Define the record ACCOUNT_BALANCE_REC using the OPTIMIZE qualifier. Note that the USING clause is optional:

```
DTR> DEFINE RECORD ACCOUNT_BALANCE_REC USING OPTIMIZE
      .
      .
      .
DFN> ;
DTR>
```

7.25 DEFINE TABLE Command

With VAX DATATRIEVE, you can define dictionary tables and domain tables. Each type has its own syntax and its own method of maintenance. However, you invoke both types of tables in the same ways.

7.25.1 Dictionary Tables

Enters a dictionary table in the Common Data Dictionary (CDD) and creates an access control list for the dictionary table.

Format

```
DEFINE TABLE path-name

      [QUERY_HEADER [IS] "header-segment"[ /...]]

      [EDIT_STRING [IS] edit-string]

      { "code-1" }     { "translation-1" }
      {  code-1  }  :  {  translation-1  }        [,]

     [{ "code-2" }     { "translation-2" }]
     [{  code-2  }  :  {  translation-2  }]        [,]

             .                 .
             .                 .
             .                 .

     [          { "translation-n" }]
     [  ELSE    {  translation-n  }]
END_TABLE
```

Arguments

path-name

Is the given name, full dictionary path name, or relative dictionary path name of the dictionary table being defined. The full dictionary path name of the table cannot resolve to the full dictionary path name of any other object or directory in the CDD.

"code" : "translation"
code : translation

Is a code-and-translation pair. You must separate each pair with a colon. The comma after each pair is optional. If the code or translation conforms to the rules for DATATRIEVE names given in Chapter 1, you do not have to enclose it in quotation marks. However, DATATRIEVE converts to uppercase any lowercase letters in an unquoted code or translation.

If the code or translation does not conform to the rules for DATATRIEVE names (especially if it contains any spaces), or if you want to preserve lowercase letters, you must enclose the code or translation in quotation marks and follow the rules for character string literals (see Chapter 3).

ELSE "translation"
translation

Is the translation to be used if you specify a code not defined in the dictionary table. The rules for specifying this translation string are the same as those for codes and translations.

END_TABLE

Ends the dictionary table definition.

Restrictions

- You cannot include the invocation of a procedure (:procedure-name) in a dictionary table definition.
- The given name of a dictionary table cannot duplicate a DATATRIEVE keyword.
- If, in different directories, the CDD contains two tables with the same given name, you cannot have both tables in your workspace at the same time. After you refer to one of them with an IN clause or a VIA clause, you cannot use the second one until you remove the first from your workspace with a RELEASE command.
- The total length of all the code-and-translation pairs in a single dictionary table cannot exceed 63,000 bytes.

Results

- If you press the RETURN key before entering END_TABLE, DATATRIEVE prompts you to continue with DFN>. DATATRIEVE continues to prompt with DFN> until you end the definition with the keyword END_TABLE.
- DATATRIEVE enters the dictionary table in the dictionary directory determined by the full dictionary path name of the table. If you use only the given name of the table in the DEFINE command, DATATRIEVE enters the definition in your default directory.
- DATATRIEVE creates a default access control list entry for the table. The UIC matches any UIC ([*,*]), and the user name is set to your current VMS user name. The privileges granted are C (CONTROL), D (LOCAL_DELETE), E (DTR_EXTEND/EXECUTE), H (HISTORY), M (DTR_MODIFY), R (DTR_READ), S (SEE), U (UPDATE), and W (DTR_WRITE). C (CONTROL) access allows you to change the access control list to suit your needs.

Usage Notes

- When you invoke a dictionary table with an IN or VIA clause, the table is loaded into your workspace and remains available to you until you remove it from your workspace by entering a RELEASE table-name command or by exiting from DATATRIEVE.
- Use the SHOW READY command to display on your terminal the names of the dictionary tables loaded in your work space.
- A dictionary table loaded in your workspace remains available to you even if you change default dictionary directories.
- To remove a dictionary table from your workspace, use the RELEASE table-name command.
- DATATRIEVE uses a default edit string of 10 characters when it displays the translation string on your terminal or writes the value to another output device. You can specify an edit string each time you use a VIA value expression. With the EDIT_STRING clause in the table definition, you can also give one edit string to apply to all the translations.
- You can specify a column header each time you use a VIA value expression. You can also specify, with the QUERY_HEADER clause in the table definiton, one query header to apply to all the translations.
- For more information on using dictionary tables, see the *VAX DATATRIEVE Handbook*.

- The definition of a dictionary table differs from the definitions of domains and records because it contains values, not just a data description.
- You can change a dictionary table by using the EDIT command. DATATRIEVE loads the table definition into the main buffer of the editor. Then you edit the definition, modifying any codes and translations. When you exit from the editor, DATATRIEVE stores the updated definition with a new version number in the CDD. If SET EDIT_BACKUP is in effect, the old definition is retained in an earlier version.

Examples

Define a table of department codes and specify a query header for the translations of the table:

```
DTR> DEFINE TABLE DEPT_TABLE
DFN> QUERY_HEADER IS "Responsible"/"Department"
DFN> CE : "Commercial Engineering"
DFN> PE : "Plant Engineering"
DFN> CS : "Customer Support"
DFN> RD : "Research and Development"
DFN> SD : "Sales Department"
DFN> ELSE "UNKNOWN DEPARTMENT"
DFN> END_TABLE
DTR>
```

Define a table with a translation for each possible rig and include an edit string in the definition that displays the translation in a 10 character-wide column:

```
DTR> DEFINE TABLE RIGGING
DFN> EDIT_STRING IS T(10)
DFN> QUERY_HEADER "TYPE OF"/"RIGGING"
DFN> SLOOP : "ONE MAST"
DFN> KETCH : "TWO MASTS, BIG ONE IN FRONT"
DFN> YAWL  : "SIMILAR TO KETCH"
DFN> MS    : "SAILS AND A BIG MOTOR"
DFN> ELSE    "SOMETHING ELSE"
DFN> END_TABLE
DTR> PRINT "KETCH" VIA RIGGING

 TYPE OF
 RIGGING

TWO MASTS,
BIG ONE IN
FRONT

DTR>
```

7.25.2 Domain Tables

Enters the definition of a domain table in the CDD and creates an access control list for the domain table.

Format

```
DEFINE TABLE path-name FROM [DOMAIN] domain-path-name

     [QUERY_HEADER [IS] "header-segment"[/...]]

     [EDIT_STRING [IS] edit-string]

     [USING] code-field : translation-field [,]

     [        { "translation-string" } ]
     [ ELSE   {  translation-string  } ]

END_TABLE
```

Arguments

path-name

Is the given name, full dictionary path name, or relative dictionary path name of the domain table being defined. The full dictionary path name of the domain table cannot resolve to the full dictionary path name of any other object or directory in the CDD.

code-field : translation-field

Is the code-and-translation pair for domain tables. You must separate the pair with a colon. This pair specifies which two fields in the records of the specified domain provide the code and translation values in the table.

ELSE "translation-string"
    translation-string

Is the translation to be used if you specify a value that does not match one of the values in the code field of the specified domain. If the translation string conforms to the rules for DATATRIEVE names given in Chapter 1, you do not have to enclose it in quotation marks. However, DATATRIEVE converts to uppercase any lowercase letters in an unquoted translation string.

If the translation string does not conform to the rules for DATATRIEVE names (especially if it contains any spaces), or if you want to preserve lowercase letters, you must enclose the translation string in quotation marks and follow the rules for character string literals (see Chapter 3).

END_TABLE

Ends the domain table definition.

Restrictions

- You cannot include the invocation of a procedure (:procedure-name) in a domain table definition.
- The given name of the domain table cannot duplicate a DATATRIEVE keyword.
- If, in different directories, the CDD contains two tables with the same given name, you cannot have both tables in your workspace at the same time. After you refer to one of them with an IN clause or a VIA clause, you cannot use the second one until you remove the first from your workspace with a RELEASE command.
- To get access to a domain table, you need these privileges:
  - P (PASS_THRU) to the parent directory of the domain table definition
  - P (PASS_THRU), S (SEE), and E (DTR_EXTEND/EXECUTE) privileges to the domain table definition
  - P (PASS_THRU), S (SEE), and R (DTR_READ) privileges to the domain containing the code and translation fields
  - P (PASS_THRU), S (SEE), and E (DTR_EXTEND/EXECUTE) privileges to the record definition associated with the domain containing the code and translation fields
- Do not bring a domain table and a domain with the same *given names* into your workspace at the same time.
- Do not ready a domain with an alias that is the same as the given name of a domain table in your workspace.

Results

- If you press the RETURN key before entering END_TABLE, DATATRIEVE prompts you to continue with DFN>. DATATRIEVE continues to prompt with DFN> until you end the definition with the keyword END_TABLE.
- DATATRIEVE enters the definition of the domain table in the dictionary directory determined by the full dictionary path name of the table. If you use only the given name of the table in the DEFINE command, DATATRIEVE enters the definition in your default directory.
- DATATRIEVE creates a default access control list entry for the table. The UIC matches any UIC ([*,*]), and the user name is set to your current VMS user name. The privileges granted are C (CONTROL), D (LOCAL_DELETE), E (DTR_EXTEND/EXECUTE), H (HISTORY), M (DTR_MODIFY), R (DTR_READ), S (SEE), U (UPDATE), and W (DTR_WRITE). C (CONTROL) access allows you to change the access control list to suit your needs.

Usage Notes

- When you invoke a domain table with an IN or VIA clause, DATATRIEVE implicitly readies the domain containing the code and translation fields, and loads the table into your workspace. The domain table remains available to you until you remove it from your workspace by entering a RELEASE table-name, by entering a FINISH table-name command, or by exiting from DATATRIEVE.
- The IN and VIA operators are case-sensitive. DATATRIEVE finds the values on the table only if they agree with the case of the characters.
- Use the SHOW READY command to display on your terminal the names of the domain tables loaded in your workspace.
- A domain table loaded in your workspace remains available to you even if you change default dictionary directories.
- To remove a domain table from your workspace, use either the RELEASE table-name command or the FINISH table-name command. A FINISH ALL command also removes all domain tables from your workspace.
- DATATRIEVE does *not* use the query header in the field definition of the translation field. To specify a query header for the translation field, use the QUERY_HEADER clause in the command when defining the domain table.

- You can use the EDIT_STRING clause to specify an edit string for the translation field.

  If you do not use the EDIT_STRING clause in the table definition, DATATRIEVE uses the edit string of the code field to format its output of the translation field only if there is no ELSE clause in the domain table definition. If there is an ELSE clause in the domain table definition, DATATRIEVE assigns an edit string of X(n), where n is the number of characters in the longer of the edit string of the translation field or the ELSE translation string.

- When you specify a query header for a VIA value expression, you must enclose the entire expression in parentheses for the query header to take effect.

- If the data file associated with a domain table contains duplicate values for a code field specified in a VIA value expression, DATATRIEVE outputs the value of the translation field corresponding to the *first* code field it encounters as it searches the data file. The order of records for the search is determined by the physical order or records in sequential data files and by the sequence of values in the key fields of indexed records.

- For more information on using domain tables, see the *VAX DATATRIEVE Handbook.*

- You can replace the definition of a domain table by deleting it from the CDD with the DELETE command and entering another DEFINE TABLE command.

  To change individual codes or translations associated with a domain table, you can use the DATATRIEVE MODIFY and ERASE statements on the records in the domain containing the values for the code and translation fields. Use the READY command to get access to the domain containing those fields and change the field values the way you would those of any other domain. To change the values of the fields, you must have P (PASSTHRU), S (SEE), and M (DTR_MODIFY), or P (PASSTHRU), S (SEE), and W (DTR_WRITE) access privileges to the domain, and P (PASSTHRU), S (SEE), and E (DTR_EXTEND/EXECUTE) access privileges to the record associated with the domain.

- You cannot change the value of a code or translation field if the field is the primary key of an indexed file.

- To modify an existing definition of a domain table, use the EDIT command. DATATRIEVE places a REDEFINE command with the old definition in the main buffer of the editor so that you can modify the definition. If SET EDIT_BACKUP is in effect, the old definition is retained in an earlier version. When you exit from the editor, DATATRIEVE places the updated table definition with a new version number in the CDD.

- When you define a domain table using the given name of the associated domain, DATATRIEVE stores the full dictionary path name of the domain as an attribute of the table. If you copy the table to another part of the CDD, the definition still points to the old CDD location for the domain. Therefore, you must redefine the table if you use the DMU COPY command to move it.

  See the *VAX Common Data Dictionary User's Guide* for more information.

Example

Define a domain table that returns the price of a yacht when you enter a value for LENGTH_OVER_ALL. Specify a query header and an edit string for the translation field:

```
DTR> DEFINE TABLE LOA_PRICE_TABLE
DFN>     FROM YACHTS
DFN>     QUERY_HEADER IS "SAMPLE"/"PRICE"
DFN>     EDIT_STRING IS $$$,$$$
DFN>     USING LOA : PRICE
DFN>     ELSE "NO BOATS IN STOCK WITH THAT LOA."
DFN> END_TABLE
DTR> PRINT 26 VIA LOA_PRICE_TABLE

SAMPLE
PRICE

$17,900

DTR>
```

See the *VAX DATATRIEVE Handbook* for further examples of the definition and use of domain tables.

7.26 DEFINEP Command

Adds an entry to the access control list (ACL) for a dictionary object or dictionary directory.

Format

```
DEFINEP [FOR] path-name sequence-number [,]

 ⎧ PW = password                         ⎫
 ⎪ UIC = [uic-spec]                      ⎪
 ⎪ USER = username                       ⎪              ⎧⎧ GRANT ⎫     ⎧ privilege-list ⎫⎫
 ⎨                                       ⎬ [,...] {,}   ⎨⎨ DENY  ⎬  =  ⎨ ALL            ⎬⎬ [,...]
 ⎪                  ⎧ TTnn:     ⎫        ⎪              ⎩⎩ BANISH⎭     ⎩                ⎭⎭
 ⎪                  ⎪ LOCAL     ⎪        ⎪
 ⎪ TERMINAL =       ⎨ NONLOCAL  ⎬        ⎪
 ⎪                  ⎪ BATCH     ⎪        ⎪
 ⎩                  ⎩ NETWORK   ⎭        ⎭
```

Arguments

path-name

Is the given name, full dictionary path name, or relative dictionary path name of the dictionary object or dictionary directory whose ACL list you want to change.

sequence-number

Is the sequence number of the entry to be added to the ACL. This number must be an unsigned, nonzero integer.

PW = password

Specifies a password to be appended to the given name of the dictionary object or dictionary directory when used alone in a command or statement or as part of a full or relative dictionary path name.

UIC = [uic-spec]

Specifies the UIC or group of UICs to which the added ACL entry applies. The UIC specification must be enclosed in square brackets and must conform to the VMS rules for specifying UICs (see the VMS documentation set). You can specify numeric and alphanumeric UICs and rights identifiers. (A rights identifier is a single text string enclosed in brackets. The system manager defines a rights identifier in the system rights database. The identifier indicates all members of a particular group.)

USER = username

Specifies the VMS user name to which the added ACL entry applies. Do not put the user name in parentheses or square brackets.

```
           TTnn:
           LOCAL
TERMINAL = NONLOCAL
           BATCH
           NETWORK
```

Specifies a particular terminal or a type of terminal to which the added ACL entry applies.

- TTnn: is the number of a specific terminal line to which the added ACL entry applies.
- LOCAL specifies that the added ACL entry applies to all terminals hardwired to your local system.
- NONLOCAL specifies that the added ACL entry applies to the local system's dial-up terminal lines, to batch jobs on the local system, to remote terminals logged in to the system by DECnet, and to processes initiated by a DATATRIEVE Distributed Data Manipulation Facility on a remote node in a network of VAX computers.
- BATCH specifies that the added ACL entry applies to all batch jobs run on the local system.
- NETWORK specifies that the added ACL entry applies to all processes initiated by a DATATRIEVE Distributed Data Manipulation Facility on a remote node in a network of VAX computers.

, (comma)

Separates user identification criteria and privilege specifications.

GRANT

Specifies the privileges granted by the added ACL entry.

DENY

Specifies the privileges denied by the added ACL entry.

BANISH

Specifies, for a dictionary directory and all its descendants, the access privileges that the entry denies and that no ACL of any of the descendants can grant.

privilege-list

Is a letter or string of letters, each one of which is the abbreviation for the access privilege granted, denied, or banished by the added ACL entry.

Table 7-7 lists the abbreviation and cursory description for each of the privileges you can specify in an ACL entry.

Table 7-7: Access Privileges

Letter	Privilege
R	DATATRIEVE domain READ access or SHOW access
M	DATATRIEVE domain MODIFY access
W	DATATRIEVE domain WRITE access
E	DATATRIEVE domain extend or execute access
C	CDD control access
D	CDD local delete access
F	CDD subdictionary file create access
G	CDD global delete access
H	CDD history list update access
P	CDD pass through access
S	CDD see (read) access
U	CDD update (write) access
X	CDD directory extend access
ALL	All thirteen DATATRIEVE and CDD privileges

Restrictions

- To define an entry in an ACL, you must have P (PASS_THRU) access to the parent of the dictionary object or directory to which the ACL applies.

  You must also have P (PASS_THRU) and C (CONTROL) access privileges to the dictionary object.

- In a DEFINEP command, you must specify *at least one* user identification criteria (PW=, USER=, UIC=, or TERMINAL=). You can specify one of each in an ACL entry, but you cannot specify two criteria of the same type. In one ACL entry you can, for example, specify a password, a user name, a UIC, and a terminal type, but you cannot specify two passwords.

- In a DEFINEP command, you must enter *at least one* privilege specification (GRANT=, DENY=, or BANISH=). You can enter one of each in an ACL entry, but you cannot enter two criteria of the same type. In one ACL entry, for example, you can enter a GRANT=, a DENY=, and BANISH=, but you cannot enter more than one GRANT=.

Results

- DATATRIEVE creates an entry in the ACL. Depending on the sequence number you supply, DATATRIEVE may change the sequence number of other ACL entries:

  - If the sequence number already exists in the ACL, DATATRIEVE adds the entry immediately before the existing entry with the same number. DATATRIEVE then increments by one the sequence number of all entries after the new entry.

  - If the sequence number you supply is greater than the last sequence number plus one, DATATRIEVE ignores your sequence number and adds the entry to the end of the list. Its sequence number becomes the next sequential number in the list.

- Privileges are cumulative. A privilege granted by the ACL of a dictionary directory is also granted for all its descendants unless that privilege is explicitly denied or banished in the ACL of a particular descendant. If a GRANT clause includes a privilege the user had to the parent directory, the CDD takes no action regarding that privilege.

- A privilege denied by the ACL of a dictionary directory is also denied for all the descendants of that directory unless the ACL of a descendant explicitly grants the privilege. If a DENY clause includes a privilege the user did not have to the parent directory, the CDD takes no action regarding that privilege.
- A privilege banished by the ACL of a dictionary directory can never be granted by the ACL of any descendant of that directory, even if the descendant's ACL explicitly grants the privilege. If a GRANT clause or a DENY clause includes a privilege banished by the ACL of an ancestor, the CDD takes takes no action regarding that privilege.
- You can specify more than one privilege by including a string of letters (such as RWPS for READ, WRITE, PASS_THROUGH, and SEE access). Do *not* put spaces between letters in a string of letters. You can enter the letters in any order.
- You can specify all thirteen DATATRIEVE and CDD privileges by using the keyword ALL in place of a string of letters. If you grant some privileges with the GRANT clause but specify ALL in the DENY or BANISH clause, no privileges are granted by the ACL entry. The DENY and BANISH clauses take precedence over the GRANT clause when you include the same privilege abbreviation in more than one clause in the same ACL entry.
- If the ACL of a dictionary object or directory is empty, you have the same privileges to that object or directory as you have to its parent directory.
- If the ACLs of all the ancestors of dictionary object or directory are empty, then all users have all privileges to the object.

Usage Notes

- When designing an ACL, put the entries with the most specific user identification criteria at the top of the list. Put the entries with most general user identification criteria at the bottom of the list. When you access a dictionary object or directory, the CDD begins at the top of the list and applies the first entry in which all the user identification criteria apply to you.

For example, the first ACL entry specifies a terminal line number as the only user identification criterion in the entry, and you are using that terminal line. You match all the user identification criteria for that entry. Neither your UIC or user name nor any password you supply matters. If the first ACL entry with the terminal number is the first one in the ACL that matches you, the privilege specifications in that entry apply to you. That you also match other entries in the ACL is of no consequence; your other user identification characteristics would not get checked by other ACL entries until you used another terminal to access the dictionary object or directory in question.

- When you specify a rights identifier with the DEFINEP command, you can use only identifiers that are currently in the system rights database. Your system manager can check valid identifiers using the Authorize Utility:

```
$ RUN AUTHORIZE

UAF> SHOW/ID INVENTORY
```

- You can enter user identification criteria and privilege specifications in any order. You need not put the user identification criteria before the privilege specifications.
- To avoid errors when making an addition, display on your terminal a copy of the current ACL with the SHOWP command before issuing the DEFINEP command. See the section in this chapter on the SHOWP command for more information. Because DATATRIEVE can change sequence numbers, a new entry can affect the numbering of other table entries.
- To remove an entry from an ACL, use the DELETEP command.
- To display on your terminal the privileges you have for a dictionary object or directory, use the SHOW PRIVILEGES command.
- Chapter 2 of this manual discusses the use of ACLs.

Example

Define an ACL entry for a dictionary directory that uses all the user identification criteria and all the privilege specifications:

```
DTR> DEFINEP FOR MONTHLY_DATA 1 PW = "SECRET", USER = JONES,
[Looking for define privilege option]
CON>    UIC = [240,240], TERMINAL = NETWORK, GRANT = PSRWME,
[Looking for define privilege option]
CON>    DENY = CDUXH, BANISH = FG
DTR>
```

7.27 DELETE Command

Deletes one or more dictionary objects and their access control lists from the Common Data Dictionary (CDD).

Format

```
DELETE  path-name-1  [,...]  ;
```

Arguments

path-name

Is the given name, full dictionary path name, or relative path name of the dictionary object you want to remove from the CDD. If you specify more than one dictionary path name, separate each path name from the next with a comma.

; (semicolon)

Ends the DELETE command.

Restrictions

- To delete a dictionary object, you must have the following access privileges:
  - P (PASS_THRU) access to the ancestors of the dictionary object
  - P (PASS_THRU) and X (EXTEND) access to the parent directory of the object
  - P (PASS_THRU) and *either* D (LOCAL_DELETE) *or* G (GLOBAL_DELETE) access to the object
- You can delete dictionary objects in directories other than your default directory, but you must have at least P (PASS_THRU) access to all the ancestors of the object and P (PASS_THRU) and X (EXTEND) to the parent directory of the object.
- If you do not explicitly include a version number in the path name, DATATRIEVE deletes the highest version of the object.

- You *cannot* delete a dictionary directory with the DELETE command, even if the directory is empty. To delete a directory from the CDD, you must use the DELETE command of the Dictionary Management Utility (DMU). See the *VAX Common Data Dictionary Utilities Manual* for an explanation of how to delete dictionary directories.

Results

- If you specify the dictionary path name of a domain definition or a record definition in the DELETE command, DATATRIEVE deletes the highest or the specified version of the *definition* of the domain or record; the associated data file and its contents are unaffected.

  A readied domain in your workspace is not affected by the deletion of the domain definition or the definition of its associated record. However, after you finish a domain whose definition or record definition has been deleted from the CDD, you cannot ready the domain again.

- If the dictionary object you specify in a DELETE command is a procedure, DATATRIEVE deletes the procedure itself from the data dictionary. You cannot invoke a procedure after it has been deleted from the CDD.

- If the dictionary object you specify in a DELETE command is a dictionary table, DATATRIEVE deletes the dictionary table itself from the data dictionary.

- If the dictionary object you specify in a DELETE command is the definition of a domain table, DATATRIEVE deletes the *definition* of the domain table from the data dictionary; the definitions of the associated domain and record are unaffected, and the associated data file and its contents are unaffected.

- A dictionary or domain table loaded in your workspace remains there until you release it, even if you delete its definition while the table is loaded in your workspace.

- When DATATRIEVE deletes a dictionary object, it also deletes from the CDD the ACL associated with the object.

- If you enter the names of more than one dictionary object in a DELETE command, DATATRIEVE deletes the objects in the order you specify in the command.

Usage Notes

- Be sure to specify the version number of the object you want to delete. If you do not specify a version number in the path name, DATATRIEVE deletes the highest version number of the specified object.
- You must include a semicolon at the end of the DELETE command, regardless of whether you specify a version number:
  - If you specify a version number, the command will have two semicolons:

    ```
    DTR> DELETE PERSONNEL;1;
    ```
  - If you do not specify a version number, the command will have one semicolon (and DATATRIEVE will delete the version with highest version number):

    ```
    DTR> DELETE PERSONNEL;
    ```

Examples

Delete two domain versions from your default dictionary:

```
DTR> SHOW DOMAINS
Domains:
    YACHTS;4    YACHTS;3    YACHTS;2    YACHTS;1
```

The following example does not specify a version number, so DATATRIEVE deletes the highest version, YACHTS;4.

```
DTR> DELETE YACHTS;
DTR> SHOW DOMAINS
Domains:
    YACHTS;3    YACHTS;2    YACHTS;1

DTR> DELETE YACHTS;2;
DTR> SHOW DOMAINS
Domains:
    YACHTS;3    YACHTS;1
```

7.28 DELETEP Command

Deletes an entry from the access control list (ACL) of an object or directory in the Common Data Dictionary (CDD).

Format

```
DELETEP   path-name   sequence-number
```

Arguments

path-name

Is the dictionary path name of the object or directory whose ACL you want to change.

sequence-number

Is a nonzero integer indicating the entry's position in the ACL.

Restrictions

- To delete an entry from an ACL you must have the following access privileges:
  - P (PASS_THRU) access to the parent directory of the object or directory whose ACL you want to change
  - P (PASS_THRU) and C (CONTROL) access to the dictionary object or directory whose ACL you want to change
- You must enter one DELETEP command for each ACL entry you want to delete. You cannot delete more than one ACL entry with one DELETEP command.
- There must be an entry with the sequence number you specify.

Results

- DATATRIEVE deletes the entry with the specified sequence number from the ACL of the object or directory.

- If the sequence number you specify is greater than the number of entries in the ACL, DATATRIEVE displays this message from the CDD on your terminal:

```
DTR> DELETEP YACHTS 26
%CDD-E-ACLNOTFND, Access control list entry not found
DTR>
```

- When you remove an entry from any position in the ACL, except the last one, DATATRIEVE renumbers the remaining entries so that the sequence numbers begin at one and increase in steps of one.

Usage Notes

- To ensure that you delete the correct entry, display the ACL on your terminal with the SHOWP command before entering the DELETEP command.
- If you need to remove many entries from a long ACL, begin with the entries at the bottom of the list and work your way toward the top. This method preserves the original sequence numbers of the entries you want to remove. If you start removing entries at the top of the list, every time you remove an entry the numbers of all the other ones you want to remove change.
- Do not delete the one ACL entry whose user identification criteria identify all users. Users not identified by any entry in an ACL have all the privileges to the object or directory that they have to the parent directory.

Examples

Show the ACL of the YACHTS domain and delete an entry from it:

```
DTR> SHOWP YACHTS
  1:    [*,*], Username: "STARKEY"
        Grant - CDEFGHMPRSUWX, Deny - none, Banish - none
  2:    [*,*], Username: "DUNCAN"
        Grant - EHMPRSUW, Deny - CDFGX, Banish - none
  3:    [*,*], Username: "HARRISON"
        Grant - CDEFGHMPRSUWX, Deny - none, Banish - none
  4:    [*,*]
        Grant - none, Deny - CDEFGHMPRSUWX,  Banish - none
```

(continued on next page)

```
DTR> DELETEP YACHTS 2
DTR> SHOWP YACHTS
  1:    [*,*], Username: "STARKEY"
        Grant - CDEFGHMPRSUWX, Deny - none, Banish - none
  2:    [*,*], Username: "HARRISON"
        Grant - CDEFGHMPRSUWX, Deny - none, Banish - none
  3:    [*,*]
        Grant - none, Deny - CDEFGHMPRSUWX,  Banish - none

DTR>
```

See Chapter 2 of this manual for other examples of working with ACLs.

7.29 DISCONNECT Statement

Removes records from the set(s) you specify in the TO list of the CONNECT statement. The DISCONNECT statement can be used only for sets in which DBMS retention is optional.

Format

```
DISCONNECT   context-name-1

      [FROM]   set-name-1   [,...]
```

Arguments

context-name-1

Is the name of a valid context variable or the name of a collection with a selected record. The target record must be a member of the specified set(s).

set-name

Is the name of a DBMS set.

Examples

Remove a part with a specified PART_ID from its membership in the set ALL_PARTS_ACTIVE:

```
DTR> FOR P IN PART WITH PART_ID = "TU4722AS"
CON>     DISCONNECT P FROM ALL_PARTS_ACTIVE
DTR>
```

Remove the group named PLANT ENGINEERING from the set MANAGES.

```
DTR> FIND GROUPS WITH GROUP_NAME = "PLANT ENGINEERING"
DTR> SELECT
DTR> DISCONNECT CURRENT FROM MANAGES
DTR>
```

7.30 DISPLAY Statement

Displays on your terminal the value of a single DATATRIEVE value expression. The value displayed is not formatted by any edit string associated with the value expression.

Format

```
DISPLAY   value-expression
```

Argument

value-expression

Is a DATATRIEVE value expression.

Restrictions

- To display the value of a field in a record, the domain containing that record must be readied for READ, WRITE, or MODIFY access. If the domain is readied for EXTEND access, DATATRIEVE displays an error message on your terminal when you try to specify a field name from that domain in the DISPLAY statement.
- If you specify a field name as the value expression in a DISPLAY statement, you must establish a valid context for the record or records containing the value(s) you want to display. For a discussion of DATATRIEVE context, see the *VAX DATATRIEVE User's Guide.*

Results

- DATATRIEVE displays on your terminal the current value of the specified value expression.
- If the value expression has an edit string associated with it, the DISPLAY command ignores the edit string when displaying the value on your terminal.
- If the value expression you specify is a group field, the DISPLAY command concatenates the values of the elementary fields and leaves no spaces between fields except the blanks that pad character fields.
- The value DATATRIEVE displays on your terminal is not affected by the COLUMNS_PAGE setting. See the section in this chapter on the SET command for more information.

Examples

Declare a numeric variable with a money edit string, give it a value, and use both the PRINT statement and the DISPLAY statement to display that value:

```
DTR> DECLARE SALARY PIC Z(5)9V99 EDIT_STRING $$$$$$.99.
DTR> SALARY = 15753.67
DTR> PRINT SALARY

 SALARY

$15753.67

DTR> DISPLAY SALARY
DISPLAY: 15753.67
DTR>
```

Redeclare the above variable as a character variable, assign a new value, and display that value:

```
DTR> DECLARE SALARY PIC X(15).
DTR> SALARY = "MUCH TOO LOW"
DTR> PRINT SALARY

   SALARY

MUCH TOO LOW

DTR> DISPLAY SALARY
DISPLAY: MUCH TOO LOW

Display the group fields TYPE and SPECS from the domain YACHTS:

DTR> READY YACHTS
DTR> FIND FIRST 1 YACHTS
[1 Record found]
DTR> SELECT; PRINT

                               LENGTH
                                OVER
MANUFACTURER   MODEL     RIG    ALL   WEIGHT BEAM  PRICE

 ALBERG      37 MK II   KETCH   37    20,000  12  $36,951

DTR> DISPLAY TYPE
DISPLAY: ALBERG    37 MK II
DTR> DISPLAY SPECS
DISPLAY: KETCH 37 200001236951
DTR>
```

7.31 DISPLAY_FORM Statement

Lets you display data on a form and collect data from a form.

Format

```
DISPLAY_FORM  form-name  IN  form-library

        [USING  statement-1]

        [RETRIEVE  [USING]  statement-2]
```

Arguments

form-name

Is the name of the form to be used with the domain.

form-library

Is the file specification of the form library file containing the form.

statement-1

Is a DATATRIEVE statement or a series of statements within a BEGIN-END block. Statement-1 can include one or more PUT_FORM assignment statements for assigning values to fields on a form.

The format of the PUT_FORM statement is:

PUT_FORM form-field = value-expression

form-field

Is the name of a field in a form.

value-expression

Is any DATATRIEVE value expression.

statement-2

Is a DATATRIEVE statement or a series of statements within a BEGIN-END block. Statement-2 can include GET_FORM value expressions for assigning values on a form to DATATRIEVE fields or variables.

The format of the GET_FORM value expression is:

GET_FORM form-field

form-field

Is the name of a field in a form.

Restriction

If SET NO FORM is in effect, DATATRIEVE does not use its form interface and does not attempt to open a form library.

Result

DATATRIEVE displays the form specified. If you have included the USING clause, DATATRIEVE displays only the fields specified in the PUT_FORM assignment statements.

Usage Note

The DISPLAY_FORM statement lets you use forms to modify and store data for specified fields. See the *VAX DATATRIEVE User's Guide* for more information on using forms with DATATRIEVE.

Examples

You can display a form for a domain even if the form was not specified in the domain definition:

```
DTR> DISPLAY_FORM YACHTF IN FORMSLIB;
```

Display the MANUFACTURER and MODEL fields on a form for the first five records of YACHTS:

```
DTR> FOR FIRST 5 YACHTS
CON>      DISPLAY_FORM YACHTF IN FORMSLIB USING
CON>          BEGIN
CON>             PUT_FORM MANUFA = MANUFACTURER
CON>             PUT_FORM MODEL = MODEL
CON>          END;
```

Display the MANUFACTURER and MODEL fields on a form for the first record of YACHTS and assign the values to two variables, BUILT and MODELLER:

```
DTR> DECLARE BUILT PIC X(10).
DTR> DECLARE MODELLER PIC X(10).
DTR> FOR FIRST 1 YACHTS
CON> DISPLAY_FORM BOATS IN [MORRIS]DTR32.FLB USING
CON>     BEGIN
CON>       PUT_FORM MANUFA = MANUFACTURER
CON>       PUT_FORM MODEL = MODEL
CON>     END  RETRIEVE USING
CON>        BEGIN
CON>          BUILT = GET_FORM MANUFA
CON>          MODELLER = GET_FORM MODEL
CON>        END
DTR> PRINT BUILT

  BUILT

ALBERG

DTR> PRINT MODELLER

 MODELLER

37 MK II

DTR>
```

You can use a form to store and modify values for selected fields. You can also associate more than one form with a single domain. See the *VAX DATATRIEVE User's Guide* for illustrative examples.

7.32 DROP Statement

Removes the selected record from a collection, but does not remove that record from the data file in which it resides.

Format

```
DROP  [collection-name]
```

Argument

collection-name

Is the name of a collection. If the DROP statement does not contain this argument, it affects the CURRENT collection.

Restrictions

- You must use the SELECT statement to establish a selected record in a collection before entering a DROP statement.
- You cannot drop a record you have already dropped. If you have dropped the selected record of a collection, DATATRIEVE responds with the following message when you enter a DROP statement:

```
Target record has already been dropped.
```

- You cannot drop a record that has been erased. If you have erased the selected record of a collection, DATATRIEVE responds with the following message when you enter a DROP statement:

```
No collection with selected record for DROP.
```

- If you have no established collections, or if no collection has a selected record, DATATRIEVE responds with the following message when you enter a DROP statement:

```
No collection with selected record for DROP.
```

Results

- When you drop a record from a collection, the record is no longer available to you for retrieval or update. The dropped record is *not* erased from the data file, and it can be retrieved again by forming a record stream or another collection that contains it.
- When you enter a DROP statement without specifying a collection name, DATATRIEVE drops the selected record in the nearest single record context.

  If the CURRENT collection has a selected record, DATATRIEVE drops it from the CURRENT collection. If the CURRENT collection has no selected record but other named collections do, DATATRIEVE drops the selected record from the most recently formed of those collections.

  If the selected record in the nearest single record context has been dropped, DATATRIEVE responds to a DROP statement with the following message:

  ```
  Target record has already been dropped.
  ```
- When you specify a collection name in the DROP statement, DATATRIEVE drops the selected record in the specified collection. If the named collection has no selected record, or if the selected record has been erased, DATATRIEVE responds to the DROP statement with the appropriate message as described above.

Usage Notes

- By using the DROP statement, you can refine a collection until it contains exactly the records you want.
- To see if a selected record has been dropped or erased, use the SHOW collection-name command.
- Before dropping a selected record in the nearest single record context, display the record on your terminal by typing PRINT and pressing the RETURN key.

Example

Store a record in YACHTS and form a series of collections. Use the SELECT, DROP, ERASE, and PRINT statements and the SHOW collection-name command to illustrate the use of the DROP statement:

```
DTR> READY YACHTS WRITE
DTR> STORE YACHTS USING BUILDER = "HINKLEY",
DTR> FIND YACHTS WITH BUILDER = "HINKLEY"
[1 record found]
DTR> FIND A IN CURRENT
[1 record found]
DTR> FIND B IN YACHTS
[114 records found]
DTR> SELECT B; PRINT B.BOAT

                                 LENGTH
                                  OVER
MANUFACTURER   MODEL     RIG     ALL    WEIGHT BEAM  PRICE

 ALBERG      37 MK II   KETCH   37     20,000  12  $36,951

DTR> FIND C IN YACHTS
[114 records found]
DTR> SELECT LAST; PRINT

                                 LENGTH
                                  OVER
MANUFACTURER   MODEL     RIG     ALL    WEIGHT BEAM  PRICE

 WRIGHT      SEAWIND II SLOOP   32     14,900  00  $34,480

DTR> SHOW C
Collection C
    Domain: YACHTS
    Number of Records: 114
    Selected Record: 114
DTR> DROP
DTR> SHOW C
Collection C
    Domain: YACHTS
    Number of Records: 114
    Selected Record: 114 (Dropped)
DTR> PRINT
```

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```
                                  LENGTH
                                   OVER
MANUFACTURER   MODEL     RIG      ALL    WEIGHT BEAM   PRICE

 ALBERG      37 MK II   KETCH    37     20,000  12    $36,951

DTR> DROP

Target record has already been dropped.
DTR> SHOW B
Collection B
    Domain: YACHTS
    Number of Records: 114
    Selected Record: 1
DTR> DROP B
DTR> SHOW B
Collection B
    Domain: YACHTS
    Number of Records: 114
    Selected Record: 1 (Dropped)
DTR> RELEASE C
DTR> DROP
Target record has already been dropped.
DTR> ERASE
No target record for ERASE.
DTR> RELEASE B
DTR> PRINT
No record selected, printing whole collection

                                  LENGTH
                                   OVER
MANUFACTURER   MODEL     RIG      ALL    WEIGHT BEAM   PRICE

 HINKLEY                                      0   00

DTR> DROP
No collection with selected record for DROP.
DTR> SHOW CURRENT
Collection A
    Domain: YACHTS
    Number of Records: 1
    No Selected Record
DTR> SELECT; ERASE; SHOW CURRENT
Collection A
    Domain: YACHTS
    Number of Records: 1
    Selected Record: 1 (Erased)
DTR> DROP
No collection with selected record for DROP.
DTR>
```

7.33 EDIT Command

Invokes an editor to edit the previous command or statement, one or more types of object definitions, or the dictionary object specified by the dictionary path name.

Format

```
       ┌                                                 ┐
       │        ┌ DOMAINS    ┐                           │
       │        │ PLOTS      │                           │
       │ [ALL]  │ PROCEDURES │  [,...]  [RECOVER]        │
       │        │ RECORDS    │                           │
EDIT   │        └ TABLES     ┘                           │
       │                                                 │
       │ ALL  [RECOVER]                                  │
       │                                                 │
       │ [path-name]  [RECOVER]                          │
       └                                                 ┘
```

Arguments

ALL

Places all the objects in your CDD default directory in an editing buffer. The keyword ALL is optional when used with the object types but required when used alone or with only [RECOVER].

path-name

Is the given name, full dictionary path name, or relative path name of a DATATRIEVE domain, record, procedure, or table definition you want to edit.

DOMAINS
PLOTS
PROCEDURES
RECORDS
TABLES

You can specify one or more *types* of object definitions with the EDIT command. This allows you to edit all the domains, plots, procedures, records, or tables from your current default CDD directory.

RECOVER

Allows recovery for edited CDD objects.

Restrictions

- To edit a DATATRIEVE domain, record, procedure, or table definition, you must have the following access privileges:
  - P (PASS_THRU) and X (EXTEND) access to the parent directory of the definition
  - P (PASS_THRU), S (SEE), and R (DTR_READ) access to the procedure to get the definition into the main buffer of the editor
  - U (UPDATE) if you are editing in EDIT_BACKUP mode
  - Either D (LOCAL_DELETE) or G (GLOBAL_DELETE) if you are editing in NO EDIT_BACKUP mode
- When you use the EDIT command, the definition you are editing must have access privileges that allow creation of later versions. Typically, you need not worry about these privileges. The CDD is usually set up by the system manager to include the ACL access privileges you need. See Chapter 2 of this manual for a description of privileges necessary to edit definitions.
- When you specify multiple CDD objects for the EDIT command, the length of the names of the dictionary objects together cannot exceed 227 characters.
- You *cannot* specify both object types and object path names in the same argument list. The following combination of RECORDS and object path name would generate an error message:

  ```
  DTR> EDIT RECORDS, CDD$TOP.DTR$LIB.DEMO.YACHTS
  ```

  Argument list cannot contain both the object path name and the object type.
- If you specify the RECOVER option to restore changes made to CDD objects during an aborted edit session, use exactly the same syntax you used for the original editing session (with the addition of the keyword RECOVER):

  ```
  DTR> EDIT ALL DOMAINS, RECORDS
  DTR> EDIT ALL DOMAINS, RECORDS RECOVER
  ```
- If you use the EDIT command in a procedure, the statements and commands affected by the edit do not execute until the rest of the procedure has finished.

Results

- When you specify the dictionary path name in the EDIT command, DATATRIEVE invokes the editor and places the text of the object in the edit buffer. The main buffer of the editor contains a REDEFINE command for the object, followed by the contents of the dictionary object. If SET EDIT_BACKUP is in effect, DATATRIEVE saves the original definition in the CDD when you exit the editor.

- When you omit the dictionary path name from the EDIT command, DATATRIEVE invokes the editor and loads the previous command or statement into the main text buffer of the editor.

- While you are editing CDD objects, DATATRIEVE places a journal file for the editing session in your default VMS directory. The journal file is automatically deleted upon successful completion of the editing session. The following are the default file types for journal files:

EDT	.JOU
LSE	.TJL
VAXTPU	.TJL

  If you exit an editing session abnormally (if you enter a CTRL/Y or the operating system fails), you can recover the editing session with the RECOVER qualifier:

  ```
  DTR> EDIT YACHTS RECOVER;
  ```

- DATATRIEVE automatically executes the content of the main text buffer if you end the editing session with an EXIT command. This lets you use the editor to correct typographical, syntax, and logical errors in less time than you could retype most commands and statements.

  The content of the main text buffer when you exit need not have any relationship to the content it had when you invoked the editor.

- To end an editing session, use either the EXIT command or the QUIT command.

  QUIT causes DATATRIEVE to ignore the contents of the editor's main buffer and to return you to DATATRIEVE command level (indicated by the DTR> prompt).

EXIT causes DATATRIEVE to take one of two actions depending on how you invoked it:

- If you specified a dictionary path name and DATATRIEVE is in EDIT_BACKUP mode, EXIT causes DATATRIEVE to create a new definition of the object, with the next highest version number. The original version of that object remains in the CDD. The new version of the object contains the ACL and the history list entries from the previous version.
- If you invoked the editor with only the keyword EDIT, the EXIT command causes DATATRIEVE to execute the commands and statements in the editor's main buffer. If the commands and statements are incomplete and SET PROMPT is in effect, DATATRIEVE prompts you for the next syntax element in the command or statement.

• The editor does not check the syntax of any DATATRIEVE commands or statements in the main buffer. If you make a syntax error when correcting your definition or your previous command or statement, DATATRIEVE responds to the error only when it executes the commands or statements after you exit from the editor or when you invoke the edited procedure or ready the domain.

Usage Notes

• If SET VERIFY is in effect, DATATRIEVE displays the contents of the buffer when you exit from the editor. Then DATATRIEVE executes any commands and statements. If SET NOVERIFY or SET NO VERIFY is in effect, DATATRIEVE does not provide this display.

• Object types are placed in the edit buffer in the order you specify. In the following example, the record object definitions are placed in the edit buffer before the domain object definitions:

```
DTR> EDIT ALL RECORDS, DOMAINS
```

• You can use EDIT in two modes, EDIT_BACKUP and NO EDIT_BACKUP:

- When you edit a definition in EDIT_BACKUP mode, DATATRIEVE creates a new definition of the object, with the next highest version number.

  - When you edit a definition in NO EDIT_BACKUP mode, DATATRIEVE places a DELETE command, a REDEFINE command, and the text of the object in the edit buffer. When you exit the edit buffer, DATATRIEVE deletes the highest existing version, or the version you specified, and replaces it with the definition in the edit buffer. You receive the informational message "object to be redefined not found" during this process. You can ignore this message.

    Because DATATRIEVE deletes the highest version before it redefines the new version, you will lose the existing definition, the definition's ACL, and its history list if you exit the edit buffer and the definition fails. When you exit the edit buffer and the definition succeeds, DATATRIEVE gives the new definition the ACL and the history list of the highest existing version. If there is no existing version of the definition, DATATRIEVE gives the new definition the default ACL and history list.

- To delete previous versions of an object in the CDD, use the DELETE command with an explicit version number or use the PURGE command.

- If you invoke a procedure that contains one or more errors, DATATRIEVE stops executing the procedure and displays an error message on your terminal. If you invoke the editor with the keyword EDIT, DATATRIEVE puts the faulty command or statement and the remainder of the commands and statements in the main buffer. When you have corrected the error and leave the editor with the EXIT command, DATATRIEVE executes the remaining commands and statements in the procedure.

  The changes you make in these circumstances are not lasting changes to the procedure's definition that is stored in the CDD. To make the correction permanent, you must include the procedure name when you invoke the editor and make changes to the CDD definition of the procedure.

- Be careful when editing record definitions. If you change the length of the record definition, you have to create a new data file and transfer the old information from the old file to the new one.

  If you change the name of any fields, any procedures and reports that refer to those fields have to be edited to reflect the changes.

If you change the definition of a domain or its associated record definition while you have that domain readied in your workspace, the changes do not take effect until you finish the domain with the FINISH command and ready it again. Simply rereadying the domain without finishing it does not use any new dictionary definitions you may have entered into the CDD since you first readied the domain.

Example

Edit the definition for the record YACHT:

```
DTR> EDIT YACHT
REDEFINE RECORD YACHT USING
01 BOAT.
  03 TYPE.
     06 MANUFACTURER PIC X(10)
        QUERY_NAME IS BUILDER.
     06 MODEL PIC X(10).
  03 SPECIFICATIONS
     QUERY_NAME SPECS.
     06 RIG PIC X(6)
        VALID IF RIG EQ "SLOOP","KETCH","MS","YAWL".
     06 LENGTH_OVER_ALL PIC XXX
        VALID IF LOA BETWEEN 15 AND 50
        QUERY_NAME IS LOA.
     06 DISPLACEMENT PIC 99999
        QUERY_HEADER IS "WEIGHT"
        EDIT_STRING IS ZZ,ZZ9
        QUERY_NAME IS DISP.
     06 BEAM PIC 99 MISSING VALUE IS 0.
     06 PRICE PIC 99999
        MISSING VALUE IS 0
        VALID IF PRICE>DISP*1.3 OR PRICE EQ 0
        EDIT_STRING IS $$$,$$$.
;
[Record is 41 bytes long.]
```

You can now edit the record definition. If SET EDIT_BACKUP is in effect, the old version of the YACHT record is retained in the CDD when you exit the editor.

See the *VAX DATATRIEVE Handbook* for examples of using the editor to edit previous commands and statements in an interactive DATATRIEVE session.

7.34 EDIT_STRING Clause

Specifies the output format of a field value.

Format

```
EDIT_STRING  [IS]  edit-string
```

Argument

edit-string

Is one or more edit string characters describing the output format of the field value.

Restrictions

- This clause is valid only for elementary fields.
- Edit strings must consist of valid edit string characters. See Table 7-8 for a list of edit string characters and their descriptions.

Result

DATATRIEVE uses the edit string as the default format when writing a field value to a file or output device.

Usage Notes

- If you do not include an EDIT_STRING clause in a field definition, the PICTURE clause determines the default output format. However, DATATRIEVE does not display a sign specified in a PICTURE clause unless you specify those characters in an edit string.
- You can override the default output format specified by either a PICTURE or an EDIT_STRING clause. With the print list modifier USING edit-string, you can specify an output format for a value within the PRINT statement.
- You specify the format of the field value with a string of one or more edit characters. Specify the edit characters as a string without embedded spaces. In general, each edit character corresponds to one character position in the printed output. For example, 999999 specifies that the output will be six digits in six character positions.

- To enter more than one of the same edit character, you can shorten the edit string by placing a repeat count in parentheses following the edit character. For example, the edit string 9(6) is equal to 999999.

Table 7-8 contains a list of edit string characters. The edit string characters you can specify for a field depend on the class of the field: alphabetic, alphanumeric, numeric, or date. Do not use editing characters designated only alphabetic or alphanumeric on numeric fields (or vice versa). If you do, you can get unexpected results. Remember that field type is determined by the PIC or USAGE clause, not the value in the field. A field defined as PIC X(10) might contain only numbers, for example, but you should use only alphanumeric editing characters to format the way you want to display those numbers.

Table 7-8: Edit String Characters

Character Type	Edit String Character	Description
Alphabetic Replacement	A	Each A is replaced by an alphabetic character from the field's content. An asterisk is placed in the position of each digit or nonalphabetic character in the field's content.
Alphanumeric Replacement	X	Each X is replaced by one character from the field's content.
	T	Indicates text. Each T reserves a column on a line for the associated print list element. For example, PRINT "1234567890" USING T(5) displays 12345 in the first five columns of one line and 67890 in the first five columns of the next line. Edit strings containing a T cannot contain other characters.
	A	Each A is replaced by an alphabetic character from the field's content. An asterisk is placed in the position of each digit or nonalphabetic character in the field's content.

(continued on next page)

Table 7-8: Edit String Characters (Cont.)

Character Type	Edit String Character	Description
Numeric Replacement	9	Each 9 is replaced by one digit from the field's content. Nondigit characters are ignored, and the digits are right justified in the output and the leading character positions (if any) are filled with zeros.
	Z	If a Z matches a leading zero in the field's content, it is replaced by a space. If not, Z is replaced by a digit from the field's content.
	* (asterisk)	If an asterisk (*) matches a leading zero in the field's content, an asterisk is placed in that character position. If not, it is replaced by a digit from the field's content.
	. (period)	A period specifies the character position of the decimal point.
Alphanumeric Insertion	+ (plus)	If only one plus sign is specified for an alphanumeric field, it is inserted in that position.
	- (hyphen)	A hyphen is inserted in that character position.
	. (period)	A period is inserted in that character position.
	, (comma)	A comma is inserted in that character position.
Numeric Insertion	+ (plus)	If only one plus sign is specified, it is replaced by either a plus sign if the field's content is positive or a minus sign if it is negative.
	– (minus)	If only one minus sign is specified, it is replaced by either a blank if the field's content is positive or a minus sign if it is negative.
	. (decimal)	A decimal point is inserted in that character position. Put only one decimal point in a numeric edit string.

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Table 7-8: Edit String Characters (Cont.)

Character Type	Edit String Character	Description
	, (comma)	If all the digits to the left of the comma are suppressed zeros, the comma is replaced by a blank. If not, a comma is inserted in that character position.
	CR	If the field's content is negative, the letters CR are inserted. If the field's content is positive, CR is replaced by two blanks. Put only one CR in an edit string, either at the far right or the far left.
	DB	If the field's content is negative, the letters DB are inserted. If the field's content is positive, DB is replaced by two blanks. Put only one DB in an edit string, either at the far right or the far left.
	(( )) (parentheses)	If the field's content is negative, single left and right parentheses are inserted before and after the field value.
Alphanumeric and Numeric Insertion	B	A space is inserted in that character position.
	0 (zero)	A 0 is placed in that character position.
	$	If only one dollar sign is specified, it is printed in that character position.
	%	A percent sign is inserted in that character position.
	/ (slash)	A slash is inserted in that character position.
	"literal"	The character string literal enclosed in single or double quotation marks is inserted at that position. The outer quotation marks are not inserted in the output.
Numeric Floating Insertion	$	If more than one dollar sign is specified to the left of the other edit string characters, leading zeros are suppressed, and one dollar sign is displayed to the immediate left of the leftmost digit.

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Table 7-8: Edit String Characters (Cont.)

Character Type	Edit String Character	Description
	+ (plus)	If more than one plus sign is specified to the left of the other edit string characters, any leading zeros are suppressed, and the sign of the field's value (plus or minus) is displayed to the immediate left of the leftmost character position determined by the other edit string characters.
	– (minus)	If more than one minus sign is specified to the left of the other edit string characters, any leading zeros that the minus sign matches are suppressed. If the value of the field is negative, a minus sign is displayed to the immediate left of the leftmost character position determined by the other edit string characters.
Floating-Point Edit String	E	The E divides the edit string into two parts for floating-point or scientific notation. The first part is the mantissa edit string and the second part is the exponent edit string.
Missing Value Edit String	?	If the field has a MISSING VALUE clause, the question mark separates two edit strings. If the field value *is not* the missing value, the first edit string controls the output of the field. If the content of the field *is* the missing value, the second edit string controls the output of the field.
Date Replacement	D	Each D is replaced by the corresponding digit of the day of the month. Put no more than two Ds in a date edit string; the use of DD is recommended.
	M	Each M is replaced by the corresponding letter of the name of the month. An edit string of M(9) prints the entire name of the month.
	N	Each N is replaced by a digit of the number of the month. Put no more than two Ns in a date edit string; the use of NN is recommended.

(continued on next page)

Table 7-8: Edit String Characters (Cont.)

Character Type	Edit String Character	Description
	Y	Each Y is replaced by the corresponding digit of the numeric year. Put no more than four Ys in a date edit string; the use of YY or YYYY is recommended.
	J	Each J is replaced by the corresponding digit of the Julian date. Put no more than three Js in a date edit string; the use of JJJ is recommended.
	W	Each W is replaced by the corresponding letter from the name of the day of the week. An edit string of W(9) prints the entire day. Put no more than 9 Ws in a date edit string.
	B	Each B is replaced by a space in that character position.
	/ (slash)	A slash is inserted in that character position.
	- (hyphen)	A hyphen is inserted in that character position.
	. (period)	A period is inserted in that character position.

7.34.1 Alphanumeric Fields

The edit string for an alphanumeric field specifies the number and type of characters to be printed, except for T edit strings, which print all the characters. The edit character X is replaced by one character from the field's content. The characters are transferred from the field to the output in left-to-right order.

DATATRIEVE always left justifies alphanumeric fields. If the edit string contains X and the field's content has more characters than the edit string, only the leftmost characters are printed. If it has fewer characters than its edit string, DATATRIEVE pads the output with blanks on the right.

If the field contains only digits, you may use a numeric edit string. The restrictions on edit strings for numeric fields are explained in the section on EDIT_STRING clause. If you use a field in any arithmetic computations, you should define it as a numeric field. You can perform computations with alphanumeric fields that contain only digits, but because alphanumeric fields are padded with spaces on the right, the results may not be valid.

DATATRIEVE drops leading zeros from alphanumeric fields when it converts from a numeric to an alphanumeric field.

The edit string characters B, slash, and hyphen allow you to insert those characters in the output, in the position you indicate in the edit string. The B and slash characters are also valid for numeric edit strings but not T edit strings. The hyphen is valid only for a field with an edit string containing X.

The following table contains some sample edit strings and the format of the DATATRIEVE output for two field values: CHALLENGER and 123. The table also shows the picture-string characters used in the field's PICTURE clause to specify the internal format of the field value. In the table, a number sign (#) represents a space.

Picture String	Edit String	Output If Field Value Is: CHALLENGER	123
X(10)	X(10)	CHALLENGER	123#######
X(10)	X(3)	CHA	123
X(10)	XX/X(8)	CH/ALLENGER	12/3#######
X(10)	X(5)/X(5)	CHALL/ENGER	123##/#####
X(10)	X(5)-XX	CHALL-EN	123##-##

The edit character T allows you to print alphanumeric field values on one or more lines. The primary use of T is to print fields containing large amounts of text. The number of Ts in the edit string indicates the maximum number of characters to be printed on one line. For example, the edit string T(20) indicates that a line of output will contain no more than 20 characters (unless a single word contains more than 20 characters).

If the field contains more characters than specified in the edit string, DATATRIEVE prints as many full words on the line as possible. (A word, in this sense, is a string of characters delimited by a space.) DATATRIEVE then prints the remaining characters on the next line and following lines, if necessary. DATATRIEVE does not print out trailing spaces when you use a T edit string.

DATATRIEVE prints only full words. It does not divide words unless a word is longer than the edit string. In that case, DATATRIEVE truncates some characters and prints them on the next line.

The following example uses data from EMP_REVIEW, a domain set up to keep information about employee reviews. Here is the record definition:

```
DTR> SHOW EMP_REVIEW_REC
RECORD EMP_REVIEW_REC USING
     01 EMP_REC.
        05 BADGE      PIC IS 9(5).
        05 NAME       PIC IS X(10).
        05 JOB        PIC IS X(15).
        05 EVALUATION PIC IS X(60).
        05 EVAL_DATE  USAGE IS DATE
              EDIT_STRING IS  DD-MMM-YY.
;
```

In the following DATATRIEVE session, a PRINT statement specifies a T(20) edit string for the EVALUATION field:

```
DTR> FOR EMP_REVIEW
[Looking for statement]
CON> PRINT NAME, EVALUATION USING T(20), EVAL_DATE, SKIP

                                  EVAL
  NAME           EVALUATION       DATE

BRAD H.    Brad did a fine job  29-Apr-83
           in implementing
           staged output.

DAVID D.   David is a master of 12-Mar-83
           developing report
           specifications.

TERRY C.   Terry is an          21-Mar-83
           exceptional system
           manager and
           developer.

DTR>
```

Note that when you print a long field value, the field name can be in any position within the print list. EVAL_DATE followed EVALUATION in the print list, but its value was printed on the same line as the first line of text.

7.34.2 Numeric Fields

An EDIT_STRING clause prints numeric field values in a format that is easy to read. With edit strings, you can suppress leading zeros and print dollar signs, percent signs, commas, decimal points, and plus or minus signs. For example, in the YACHT record, the EDIT STRING clause for the PRICE field ($$$,$$$) causes DATATRIEVE to print the value 09870 as $9,870.

You can use three types of edit characters in edit strings for numeric fields: replacement characters, insertion characters, and floating characters.

7.34.2.1 Replacement Characters – The replacement characters for numeric fields are 9, Z, and * (asterisk). Each 9 causes one digit from the field value or one digit to be displayed. Each Z causes one digit from the field value or one space to be displayed. Each asterisk causes one digit from the field value or one asterisk to be displayed.

A leading zero is any zero in a field value that has only zeros to the left of it. If there is an implied decimal place to the left of a zero, then it is not a leading zero. If a Z corresponds to a leading zero in a field, a space is printed instead of a zero. If an asterisk corresponds to a leading zero in a field, then an asterisk is printed instead of a zero. The following table shows the differences between the various replacement characters. In the table, a number sign (#) represents a space.

Picture String	Edit String	Field Content	Output
99999	9(5)	04092	04092
99999	Z(5)	04092	#4092
99999	*(5)	04092	*4092
99V99	99.99	0001	00.01
99V99	ZZ.99	0001	##.01

Before printing a field, DATATRIEVE computes the number of digits to the left of the decimal point. (If there is no V in the picture string, all digits are to the left of the decimal.) If there are more digits to the left of the decimal than the edit string specifies (either with replacement characters or floating characters), DATATRIEVE prints an asterisk in each character position specified by the edit string. If the field has fewer digits than the edit string specifies, DATATRIEVE pads the output with leading zeros. (These are suppressed by the Zs or floating characters you use. If there are more leading zeros than Zs or floating characters, the remaining zeros are displayed at the left of the field value but to the right of any floating character.)

For example, a PICTURE clause could specify four digits for a field and its edit string only two digits:

```
03 MODEL_NUMBER
PICTURE IS 9999
EDIT_STRING IS 99.
```

If the field value is 1234, DATATRIEVE prints two asterisks (**) for the field value. Therefore, be careful to specify edit strings that are long enough for numeric fields.

If you define a numeric field with the clauses PIC 9(4) and USAGE IS COMP, then the field can contain numbers as high as 32,768. To print the field when it contains a five-digit number, you must use an edit string that specifies five digits.

7.34.2.2 Insertion Characters — With insertion characters, you can print the sign of a field, a decimal point, a dollar sign, DB or CR or parentheses for a negative value, a percent sign, commas, zeros, slashes, and character string literals.

Printing a Sign

To print a sign (+ or −) in a field value (indicated by an S in its PICTURE clause), you must specify a + or − in the edit string for that field. The sign must be the first or last character in the edit string.

If you specify only one sign in the edit string, DATATRIEVE prints the sign in the position you indicate. If you specify more than one sign in the leftmost part of the edit string, the sign is a floating character.

You can also use the edit characters DB and CR to indicate the sign of a field value. You can use only one DB or CR in an edit string, and it must be the leftmost or rightmost element of the edit string.

If you specify double parentheses around the edit string, DATATRIEVE prints single left and right parentheses around a field value if it is negative.

The following table shows the use of the edit characters +, −, DB, CR, and parentheses. In the table, a number sign (#) represents a space.

Picture String	Edit String	Field Content	Output
S9999	None	−1234	1234
S9999	−9999	−1234	−1234
S9999	−9999	+1234	#1234
S9999	9999+	−1234	1234−
S9999	+9999	+1234	+1234
S9999	9999DB	−1234	1234DB
S9999	9999CR	−1234	1234CR
S9999	CR9999	+1234	##1234
S9999	((9999))	−1234	(1234)

Printing a Decimal Point

By default, DATATRIEVE prints the implied decimal point in a field value (indicated by a V in its PICTURE clause). You can, however, control the placement of the decimal point (.) by specifying one in the edit string for that field. When DATATRIEVE prints the field content, it aligns all output on the decimal point.

DATATRIEVE matches the decimal point in the edit string with the implied decimal place in the field. If the edit string contains fewer digits to the right of the decimal, the extra digits are not printed. If the edit string contains fewer digits to the left of the decimal, DATATRIEVE prints asterisks. Thus it is best to place the period in the edit string in the same position as the V in the picture string.

The following table shows printing decimal points in several different numeric fields. In the table, a number sign (#) represents a space.

Picture String	Edit String	Field Content	Output
99V99	(None)	1234	12.34
99V99	Z9.99	1234	12.34
99V99	999.9	1234	012.3
99V99	9.999	1234	*****
99V99	9.999	0123	1.230
99V99	Z(4)	1234	##12

If the last character of the edit string is a period and is not followed by other input on the same line, DATATRIEVE treats the period as the termination of the field definition and not as part of the edit string. If the EDIT STRING clause is the last part of the field definition, specify two periods; the first period is part of the edit string and the second period ends the field definition. If the EDIT STRING clause is not the last part of the field definition, place the next clause on the same line or place a hyphen at the end of the line.

Printing Other Characters

To print a comma, slash, percent sign, dollar sign, or zero, specify that character in the edit string. If there are only spaces to the left of a comma, DATATRIEVE prints a space instead of a comma. If you include more than one dollar sign, it is a floating character. The following table shows how these characters are used. In the table, a number sign (#) represents a space.

Picture String	Edit String	Field Content	Output
99	99%	45	45%
9(6)	$999,999	100000	$100,000
9(6)	$$$$,$$$	100000	$100,000
9(6)	ZZZ,ZZZ	000040	#####40
9(6)	999/999	123456	123/456

Printing Literals

You can include character string literals in edit strings. Do not leave any spaces between the elements of the edit string. You can have spaces embedded in the quoted character strings, but do not leave spaces between the quotation marks and the other edit string characters.

Here are two examples of using character strings in edit strings. Field definition clauses in DECLARE statements perform just as they do when you use them in field definitions.

```
DTR> DECLARE NUM PIC 9(5).
DTR> NUM = 12345
DTR> PRINT NUM USING "THIS NUMBER, "ZZ,Z99", WILL SURPRISE YOU."

                  NUM

THIS NUMBER, 12,345, WILL SURPRISE YOU.

DTR> DECLARE NOTE USAGE DATE EDIT_STRING IS
[Looking for picture or edit string]
CON> "Today is "W(9)", the "DD"th day of "M(9)", in the year "Y(4).
DTR> NOTE = "TODAY"
DTR> PRINT NOTE

                              NOTE

Today is Monday, the 17th day of August, in the year 1981

DTR>
```

7.34.2.3 Floating Characters – You can specify three edit string characters ($, –, and +) as floating characters. A floating character replaces all but the last leading zero with spaces. The last leading zero is replaced by the edit string character ($, –, or +). Floating characters that correspond to digits are replaced by those digits. Since one character is replaced by a +, –, or $, you must specify one more character than the number of digits in the field.

To use a floating character, you must specify two or more of the same character. You can specify only one floating character in an edit string. For example, you cannot have both a floating minus sign and a floating dollar sign in the same edit string. The floating characters must be the leftmost characters in an edit string.

The following table shows the use of floating characters in edit strings. In the table, a number sign (#) represents a space.

Picture String	Edit String	Field Content	Output
S9(4)	++++9	+0187	#+187
S9(4)	++++9	–5764	–5764
S9(4)	––––9	+0187	##187
S9(4)	––––9	–0001	###–1
9(5)V99	$9(5).99	0015786	$00157.86
9(5)V99	$$$,$$$.99	0015786	###$157.86
9(5)V99	$$$,$$$.00	0015786	###$158.00
S9(5)	$$$,$$$CR	+54362	$54,362CR

7.34.2.4 Changing the Defaults for Currency Symbols – You can change the default displays for the currency symbol, for the decimal point, and for the digit separator. To make your output conform to other conventions for numeric and monetary notation, you can override the system defaults for these symbols by redefining three logical names:

SYS$CURRENCY
SYS$RADIX_POINT
SYS$DIGIT_SEP

You can use the necessary DCL DEFINE commands in your LOGIN.COM file at DCL command level. You can also have your system manager set up system logical names for these symbols.

7.34.3 Date Fields

A field defined as USAGE IS DATE is stored internally as a binary value. To print this field, DATATRIEVE must convert it to another format. If you do not include an EDIT_STRING clause in the field definition for a date field, DATATRIEVE prints the field value in the following format:

DD-MMM-YYYY

To print the date in any other format, you must include an EDIT_STRING clause in the field's definition. (You can also specify the output format with the print list modifer USING edit-string in your output statement.) The edit string for a date field gives you several formatting choices for printing a date.

For example, you can print the date January 1, 1980, in any of the following formats:

```
1 Jan 80

1980/001

Tuesday /January 01

Jan 01 80

1/01/80

1-Jan-1980 Tue
```

There are many more formats that you can use to print a date. The date can include:

- The name of the day of the week (such as Monday, Tuesday) or just the first characters of the name (such as Mon, Tue, Wed)
- The day of the month (such as 1, 2, 3)
- The name of the month (such as January, February) or just the first characters of the name (such as Jan, Feb, Mar)
- The number of the month (for example, 1 for January and 12 for December)

- The year (such as 1980) or just the last two digits of the year (80)
- The Julian date (for example, 001 for January 1 and 366 for December 31 in a leap year)
- Delimiters to separate the parts of the date (such as a slash or period after the month and day)

To print just the day part of a date field, extract the day using the FN$DAY function:

```
DTR> PRINT ("TODAY") USING DD-MMM-YYYY
15-Nov-1985

DTR> PRINT FN$DAY("TODAY")

 FN$DAY

        15
```

You specify the characters to be printed (letters, digits, spaces, slashes, hyphens, or periods) and the order in which the parts of the date are to appear (such as month, day, year). The edit string characters that you use to specify the format of the date are shown in Table 7-8.

DATATRIEVE does not always output the total number of characters you specify with an alphabetic edit string such as M(9) or W(9). If the content of the field is shorter than its edit string specifies, DATATRIEVE output equals the length of the field value, not the length of the edit string. For example, an edit string can specify a nine-letter month: M(9). If the field contains a month with a name shorter than nine letters (such as June), DATATRIEVE prints only four characters, "June". DATATRIEVE does not pad the output with blanks.

The following table contains some edit strings and the format of the output for two field values: June 4, 1980 and November 27, 1978. In the table, a number sign (#) represents a space.

Edit String	Output if Field Value Is: June 4, 1980	November 27, 1978
DD-MMM-YY	#4-Jun-80	27-Nov-78
MMMBDDBY(4)	Jun##4#1980	Nov#27#1978
M(9)BDDBY(4)	June##4#1980	November#27#1978
NN/DD/YY	#6/04/80	11/27/78
W(9)	Wednesday	Monday
YYYY/JJJ	1980/156	1978/331
DDBMMMBYY/WWW	#4#Jun#80/Wed	27#Nov#78/Mon
DD.NN.YY	#4.06.80	27.11.78

7.35 END_REPORT Statement (Report Writer)

The END_REPORT statement ends the report specification.

Format

```
END_REPORT
```

Restriction

The END_REPORT statement must be the last statement in the report specification.

Results

Following the END_REPORT statement, the Report Writer takes one of three courses of action:

- Prompts you for the values you specified with a *.prompt in the record specification and then produces the report.
- Sends you a message indicating a syntax error in the report specification. When you see the DTR> prompt, type EDIT and press the RETURN key so that you can make the needed changes. When you leave the editor with the EXIT command, DATATRIEVE executes the new report specification. You can also edit a report specification by enclosing it in a procedure by using the DEFINE PROCEDURE command.
- Produces the report and sends it to the device or file you have specified in the REPORT command.

Examples

For examples of report specifications, see the *VAX DATATRIEVE Guide to Writing Reports*.

7.36 ERASE Statement

Permanently removes one or more data records from an indexed or relative data file, a DBMS database, or a relational database.

Format

```
ERASE  [ALL  [OF rse]]
```

Arguments

ALL

Causes DATATRIEVE to permanently remove from the data file every record in the current collection.

ALL OF rse

Causes DATATRIEVE to permanently remove from the data file every record identified by the record selection expression.

Restrictions

- The domain containing the targeted records must be readied for WRITE access. (See the section on the READY command.)
- The data file containing the targeted records must be an indexed sequential file or a relative file. You cannot delete records from a sequential file.
- You cannot delete a record from a view domain or a port.
- You cannot use the ERASE statement to change or remove fields from a list in a hierarchical record.
- When you erase a DBMS record from DATATRIEVE, you erase not only that record, but all records in all sets owned by the erased record, all records in all sets owned by those records, and so forth. This effect is more far-reaching than that of the DML ERASE statement, so use caution when erasing DBMS records from DATATRIEVE.

Results

- DATATRIEVE deletes the targeted records from the domain. If the domain is a DBMS domain or a relational domain or relation, the changes are not permanent until you enter a COMMIT statement, a FINISH statement, or you exit from DATATRIEVE.
- If you use the argument ALL, DATATRIEVE deletes from the domain every record in the current collection.
- If you use the argument ALL OF rse, DATATRIEVE permanently deletes from the domain every record identified by the record selection expression.
- If you put the keyword ERASE by itself in a FOR statement, DATATRIEVE permanently deletes from the domain each record specified by the FOR statement.

  If you erase a collection or record stream that contains a selected record, the values of the fields of that record are still available in your workspace, even though the record has been removed from the domain by the ERASE statement. You can display the fields of that selected record, and you can use those field values in value expressions. Those values remain in your workspace until you change the single record context with another SELECT statement or with a DROP statement or a RELEASE or FINISH command.
- The ERASE statement permanently removes the selected record from the data file if you do not establish a target record stream with a FOR statement, with the OF rse clause, or with the keyword ALL. If you have no selected record in any collection, DATATRIEVE displays this message on your terminal:

  ```
  DTR> ERASE
  No target record for ERASE.
  DTR>
  ```

Usage Note

Before using this command, you can check the current collection and selected record with the SHOW CURRENT command (see the section on SHOW command) or the PRINT statement.

Examples

Erase all the yachts built by Albin:

```
DTR> FIND YACHTS WITH BUILDER EQ "ALBIN"
[3 records found]
DTR> ERASE ALL
```

Define a procedure to erase selected yachts:

```
DTR> DEFINE PROCEDURE SELL_BOAT
DFN>     FIND YACHTS WITH BUILDER EQ *.BUILDER AND
DFN>          MODEL = *.MODEL
DFN>     PRINT ALL
DFN>     IF *."Y IF BOAT SOLD" CONT "Y" THEN ERASE ALL
DFN> END_PROCEDURE
DTR>
```

7.37 EXIT Command

Stops a DATATRIEVE session.

Format

```
{ EXIT   }
{ CTRL/Z }
```

Arguments

None.

Restriction

To stop your DATATRIEVE session by typing EXIT, you must issue the command in response to the DTR> prompt.

Results

- EXIT stops a DATATRIEVE session and returns you to the DCL command level (indicated by the dollar sign prompt).
- When you stop your DATATRIEVE session by typing either EXIT or CTRL/Z, DATATRIEVE automatically finishes all readied domains and releases all collections, global variables, and tables.
- Entering CTRL/Z from the DTR> prompt acts as an EXIT command and stops a DATATRIEVE session.
- Entering CTRL/Z from the DFN>, CON>, and RW> prompts brings you back to DATATRIEVE command level.
- Using CTRL/Z does not stop your DATATRIEVE session if you are in HELP, ADT, Guide Mode, or the editor. Three consecutive CTRL/Zs in response to the line mode prompt of the editor act like a QUIT command and return you to DATATRIEVE command level.
- Entering CTRL/Z does not stop your DATATRIEVE session when you enter it in response to an Enter prompt during the execution of a STORE or MODIFY statement. Entering CTRL/Z in response to an Enter prompt returns you to DATATRIEVE command level and aborts the STORE or MODIFY statement.

- When changes have been made to a DBMS or relational database, entering EXIT or CTRL/Z from the DTR> prompt is equivalent to issuing a DBMS or relational database COMMIT.

Examples

End a DATATRIEVE session:

```
DTR> EXIT
$
```

Enter CTRL/Z to the Enter prompt of a STORE statement:

```
DTR> READY YACHTS WRITE
DTR> STORE YACHTS
Enter MANUFACTURER: <CTRL/Z>
Execution terminated by operator
DTR>
```

7.38 EXTRACT Command

Copies the Common Data Dictionary (CDD) definition of one or more dictionary objects or types of object definitions to a command file.

Format

```
          ⎛        ⎧ DOMAINS    ⎫                          ⎞
          ⎜        ⎪ PLOTS      ⎪                          ⎟
          ⎜ [ALL]  ⎨ PROCEDURES ⎬  [,...]  [ON]  file-spec ⎟
          ⎜        ⎪ RECORDS    ⎪                          ⎟
          ⎜        ⎩ TABLES     ⎭                          ⎟
EXTRACT   ⎨                                                ⎬
          ⎜ ALL  [ON]  file-spec                           ⎟
          ⎜                                                ⎟
          ⎜ [ON]  file-spec path-name [,...]               ⎟
          ⎜                                                ⎟
          ⎝ path-name  [,...]  [ON]  file-spec             ⎠
```

Arguments

ALL

Causes DATATRIEVE to copy into the specified command file the definitions of one or more dictionary objects in your default dictionary directory.

The keyword ALL is optional when used with the types of object definitions such as PLOTS or DOMAINS.

Note that the keyword ALL is *required*, however, when used with the EXTRACT ALL [ON] file-spec syntax.

DOMAINS
PLOTS
PROCEDURES
RECORDS
TABLES

Allows you to extract all the domains, plots, procedures, records, or tables from your current default CDD directory.

file-spec

Is the VMS specification of the RMS file to contain the definition(s).

A complete file specification has this format:

node-spec::device:[directory]file-name.type;version

path-name

Is the given name, full dictionary path name, or relative path name of the dictionary object whose definition you want to copy. If you specify more than one dictionary path name, use a comma to separate each one from the next.

Restrictions

- To extract the definition of a dictionary object from the CDD, you must have the following access privileges to it:
  - P (PASS_THRU) and X (EXTEND) access to the parent directory of the dictionary object
  - P (PASS_THRU), S (SEE), and R (DTR_READ) access to the object you want to extract

  To check what privileges you have to a dictionary object, use the SHOW PRIVILEGES command (see the section on the SHOW command.)

- You *cannot* specify both object types and object path names in the same argument list. The following combination of RECORDS and object path name would generate an error message:

  ```
  DTR> EXTRACT RECORDS, CDD$TOP.DTR$LIB.DEMO.YACHTS
  ```

  Argument list cannot contain both the object path name and the object type.

- An ON file-spec clause may precede or follow the list of dictionary path names, but it must occur exactly once.
- You must specify at least one field of the file specification.
- Do not extract a procedure containing comment lines that end with a hyphen. DATATRIEVE interprets the hyphen as a continuation mark and appends the next line to the comment line.

- If you do not specify an explicit version number, DATATRIEVE copies the highest version of the definition to a command file preceded by the DELETE and REDEFINE commands.

Results

- DATATRIEVE creates a command file with the file specification you provide. For each dictionary object you name, DATATRIEVE enters a DELETE command and a REDEFINE command in the command file. The REDEFINE command operates on the highest or a specified version of the object.
- For all dictionary objects entered in the CDD by DATATRIEVE, the EXTRACT command copies the text of the highest or a specified version of the definition, exactly as it was entered. For example, when you extract a domain definition, the dictionary path names of the domain and the record are extracted just as they were entered. DATATRIEVE does not adjust or generalize the path names. If the path name was stored as a relative path name, the relative path name is copied into the command file.
- When DATATRIEVE constructs the DELETE command, it puts only the given name of the dictionary object in the DELETE command.
- When the EXTRACT command copies the definition(s) into the command file, DATATRIEVE does not delete the definition(s) from the CDD.
- If a record definition has been stored in the CDD by something other than DATATRIEVE, you *can* extract a definition of that record. When DATATRIEVE extracts such a record, however, it translates the field definition clauses into DATATRIEVE terminology and puts those clauses into a DATATRIEVE DEFINE RECORD command.

  You cannot extract and edit a record definition defined using the Common Data Dictionary Data Definition Language's (CDDL) VARIANT field unless each VARIANT field has a STRUCTURE statement. If the CDDL record definition includes a STRUCTURE field description statement for each VARIANT field, you can extract and edit the record definition.
- When you invoke the command file, each DELETE command in that file causes DATATRIEVE to delete from the CDD the definition of any dictionary object with the same dictionary path name as that of the extracted dictionary object.

- When you invoke the command file, each DEFINE command in it enters its definition in the directory determined by the dictionary path name of the object specified in the command.

  If the path name in the command is a full dictionary path name, DATATRIEVE enters the definition in the specified directory, whether or not it happens to be your default dictionary directory.

  If the path name in the command is a relative dictionary path name, DATATRIEVE first checks whether the path name is valid relative to your default dictionary directory. If it is valid, DATATRIEVE enters the definition in the appropriate directory. If it is not valid, DATATRIEVE displays an error message on your terminal and the definition is not entered into any CDD directory.

- If you omit a field in the file specification, DATATRIEVE uses these defaults:

Field	Default
node-spec::	Your local node
device:	Your default device
[directory]	Your default directory
file-name	Null string
.type	.COM
;version	1 or next higher version number

  The minimum file specification consists of a period (.). The specification of such a file stored in your default VMS directory ends with .;n, where n is the version number and both the file name and the type are null strings.

Usage Notes

- You can use the EDIT command in place of EXTRACT to edit dictionary objects. If SET NO EDIT_BACKUP is in effect, EDIT enters a DELETE command to delete the old definition from the CDD and places the old definition into the main buffer of the editor in the form of a REDEFINE command. This allows you to modify the old definition. Essentially, EDIT combines the EXTRACT, DELETE, and REDEFINE commands. If SET EDIT_BACKUP is in effect, the old definition is retained in an earlier version.

- DATATRIEVE extracts object types in the order you specify. In the following example, the record object definitions are extracted before the domain object definitions:

```
DTR> EXTRACT ALL RECORDS, DOMAINS ON SAMPLE.DTR
```

- The EXTRACT command lets you modify dictionary objects and redistribute data definitions in the CDD without ending your DATATRIEVE session and without having to work directly on the CDD with the Dictionary Management Utility.

  Without ending your DATATRIEVE session, you can use this method to manipulate your data descriptions and minimize the risk of corrupting the CDD:

  - Extract the definition(s) you want to change.
  - Edit the definition(s) in the command file with the editor.
  - Invoke the command file to replace the old definition(s).

  See the section on the EDIT command in this chapter and the *VAX DATATRIEVE User's Guide* for details about using the editor to change command files.

- The EXTRACT command enables you to create backup copies of your CDD objects in a file that you specify.

- The EXTRACT command enables you to transport the definitions to other CDD directories.

- To invoke the command file, type an at sign (@) and the command file name in response to the DTR> prompt. If the file type is not .COM, you must give the file type when entering the file specification.

- When you are moving a definition from one dictionary directory to another, use a SHOW path-name command to see if an object exists in the new directory with the same given name as that in the DELETE command or with the same path name as the one specified in the REDEFINE command.

  If one exists, you must decide whether or not you want it deleted when you invoke the command file. If you do not want that object deleted, you must edit the command file to change one or both of the names in the DELETE and REDEFINE commands.

Be sure to anticipate the problems that might arise when you change default dictionary directories. No two objects in the same dictionary directory can have the same name, but if you shift to a new default dictionary directory, that new directory may legitimately contain an object with the same given name or the same relative path name (especially if the relative path name in the command file contains a minus sign to indicate "the next level up" in the CDD hierarchy).

For example, you extract the definition of a procedure ABC from the directory CDD$TOP.WIDGETS. You then set your default directory to CDD$TOP.THINGS, which contains a domain table called ABC. If you invoke the command file, the DELETE ABC command in the command file deletes the domain table definition from CDD$TOP.THINGS, and the REDEFINE DOMAIN ABC command enters the procedure definition.

- To invoke a command file produced by the EXTRACT command, you must have these privileges:
  - P (PASS_THRU) and X (EXTEND) to the parent directory
  - P (PASS_THRU) and *either* D (LOCAL_DELETE) *or* G (GLOBAL_DELETE) access to the object named in the DELETE command
- To invoke the command file, you must have VMS R (read) access privilege to it. If you create the file, you are the owner of it and have R (read), W (write), E (execute), and D (delete) access to the command file, or whatever you or your LOGIN.COM file establish as the default file protection setting for your process.
- The EXTRACT command does not copy the ACL of the dictionary object. After you invoke the command file, the access control list for the dictionary object is the default ACL assigned by the CDD. Use the DEFINEP command to add other entries to the ACL.
- When you execute the command file, the existing object and its associated ACL may be deleted before the REDEFINES command can execute and propagate a new definition. Therefore, you may want to remove the DELETE command from the command file.

Example

Extract all the definitions in a dictionary directory to create a backup file:

```
DTR> EXTRACT ALL ON BAKUP1
DTR>
```

7.39 FIND Statement

Establishes a collection of records from a domain, view, collection, or list. The collection formed with the FIND statement becomes the current collection.

Format

```
FIND  rse
```

Argument

rse

Is a record selection expression specifying the records to be included in the collection.

Restrictions

- The domain(s) containing the records specified in the RSE must be readied for READ, WRITE, or MODIFY access. The source domain cannot be readied for EXTEND access (see the section on the READY command).
- The source domain cannot be a port.
- Do not use a FIND statement in a compound statement, such as a BEGIN-END, FOR, REPEAT, or THEN statement. (To establish single record context in compound statements, use the RSE clauses of FOR, PRINT, or MODIFY statements. These RSEs can establish the record streams needed to control the name recognition and single record context inside compound statements.)
- The following restrictions apply to the number of records you can include in a collection:
  - The maximum number of RMS records that can be included in a collection is 1,301,264. Only half this many are allowed when you create collections by crossing two sources. This is because each record created by a CROSS operation is considered two records. A collection created by crossing three sources can contain only a third of 1,301,264 records as a maximum (each record in the collection is made up of three records, one from each source), and so on.

Because a collection is formed when a SORT is performed, 1,301,264 is also the maximum number of RMS records that can be sorted from within DATATRIEVE.

- The maximum number of DBMS records that can be included in a collection is approximately 979,776 records. The maximum is half this number in a collection created by crossing two sources, one-third this number in a collection involving three DBMS sources, and so on.
- The maximum number of relational database records that can be included in a collection from a single relation is 979,776 records. The maximum is half this number in a collection from an Rdb/VMS or Rdb/ELN view relation that involves two relations or a collection created by crossing two relational sources. The maximum is one-third this number in collections created by crossing three relations, and so on.

- You cannot use the FIND statement to find a record by its position. For example, FIND nth YACHTS does not work. You can use FIND FIRST n YACHTS and then use the SELECT statement with the LAST argument.

Results

- When you issue a FIND statement, DATATRIEVE forms a current collection. If you specify a context variable in the RSE, the collection has two names: CURRENT and that of the context variable.
- When the collection has been formed, DATATRIEVE displays the following message on your terminal (n is the number of records in the collection):

  ```
  [n records found]
  ```

  If you put the FIND statement inside a procedure, DATATRIEVE does not display this message unless the FIND statement is the last one in the procedure.

  If you put the FIND statement on the same input line with other DATATRIEVE statements or commands, using semicolons (;) to separate them, DATATRIEVE does not display this message unless the FIND statement is the last one on the line.
- DATATRIEVE collects the records in the order it finds them in the data file. Do not assume there is any order to the collection unless you include the SORTED BY clause in the record selection expression or unless the domain uses an indexed file.

Examples

Form a collection of yachts longer than 30 feet. Give the collection the name BIG-ONES:

```
DTR> FIND BIG-ONES IN YACHTS WITH LOA GT 30
[57 records found]
DTR>
```

Form a collection of the ten most expensive yachts:

```
DTR> FIND FIRST 10 YACHTS SORTED BY DESC PRICE
[10 records found]
DTR>
```

7.40 FINISH Command

Ends your access to domains, domain tables, relations, and DBMS records. The FINISH command also releases any collections associated with the domains. For DBMS, when the last DBMS domain or record is finished, collections are purged, a commit with no retention is performed, and databases are unbound. This FINISH commits all DBMS databases. For relational sources, when the last domain or relation is finished, a commit is performed and no collections are retained.

A commit is not done until you finish the last DBMS record or relation.

Format

```
           ┌ ALL                                   ┐
           │                                       │
           │  ┌ domain-name       ┐                │
FINISH     │  │ dbms-record-name  │   [....]       │  .
           └  └ rdb-relation-name ┘                ┘
```

Arguments

domain-name

Is the given name of a readied domain or domain table you want to finish. If you specify the names of more than one domain or domain table, separate each from the next with a comma (,).

rdb-relation-name

Is the given name of a readied relation you want to finish. If you specify the names of more than one relation, separate each from the next with a comma (,).

dbms-record-name

Is the given name of a DBMS record readied with the READY database command. If you specify the names of more than one record, separate each from the next with a comma (,).

Restrictions

- You must enter the FINISH command at DATATRIEVE command level.
- You cannot use a full or relative dictionary path name when you specify the name of a domain or domain table.
- You cannot specify a database name.

Results

- If you use the keyword ALL or do not specify any domains, relations, DBMS records, or domain tables in the FINISH command, DATATRIEVE ends your control over *all* readied domains, relations, DBMS records, and all domain or dictionary tables loaded in your workspace.
- If you specify one or more domains, relations, records, or domain tables in the FINISH command, DATATRIEVE ends your control over only those specified.
- DATATRIEVE releases all collections associated with the domains, relations, and records you finish.
- The FINISH command can commit changes made to a DBMS or relational database. A COMMIT statement executes when you finish the last readied domain, relation, or record, or when you finish all of them at once.

Usage Notes

- With the FINISH command, you can clear your workspace of unneeded domains, relations, records, and tables.
- With the FINISH command, you can end your access to the data associated with a readied domain, relation, or DBMS record. For example, if you ready a domain for exclusive use, no one else can get access to the data file associated with that domain until you use the FINISH command or ready the domain again with a less restrictive access control option.
- You need not issue a FINISH command before an EXIT command. EXIT automatically finishes all readied domains and all domain tables, releases all collections and dictionary tables, and does a COMMIT for DBMS and relational sources if necessary.

- If you redefine the format of the record associated with a readied RMS domain, the change in the record definition *does not* take effect until you use the FINISH command to finish the domain and the READY command to ready it again. Simply readying the domain again does not activate the new record definition.
- If you delete from the CDD the domain or record definition associated with a readied domain, you can continue to work with the domain, performing any operations consistent with the mode of your access to the domain. You can also ready the domain again to change your access mode to it, as long as you avoid any conflicts of access control options (see the section on the READY command). Under these circumstances, however, when you use the FINISH command to end your control over the domain, the domain definition is no longer in the CDD, and you can no longer get any access to the domain.
- If you delete a domain table definition from the CDD, you can continue to use the domain table. However, when you use the FINISH or RELEASE command to end your control over the domain table, the definition of the domain table is no longer in the CDD, and you can no longer get any access to the domain.

Example

Release control of the domain YACHTS:

```
DTR> SHOW READY
Ready sources:
   YACHTS:  Domain, RMS indexed, protected read
          <CDD$TOP.DTR$LIB.DEMO.YACHTS;1>
No loaded tables.

DTR> FINISH YACHTS
DTR> SHOW READY
No ready sources.
No loaded tables.
DTR>
```

7.41 FOR Statement

Causes DATATRIEVE to execute a statement or group of statements once for each record in the record stream formed by a record selection expression. This statement provides repeating loops for DATATRIEVE operations.

Format

```
FOR  rse  statement
```

Arguments

rse

Is a record selection expression that forms the record stream that controls the number of times DATATRIEVE executes the statement and controls the single record context for the statement (see the *VAX DATATRIEVE User's Guide* for a discussion of DATATRIEVE context).

statement

Is either a simple or a compound statement you want DATATRIEVE to execute once for each record in the record stream formed by the RSE. You can form compound DATATRIEVE statements with the BEGIN-END, IF-THEN-ELSE, and THEN statements (see the appropriate sections in this chapter).

Restrictions

- Each domain associated with the record selection expression must be readied for READ, WRITE, or MODIFY access.
- Do not include FIND, SELECT, SORT, DROP, or RELEASE statements in a FOR statement.
- You cannot include a DATATRIEVE command in a FOR statement.

Results

- For each record in the record stream, DATATRIEVE executes the statement once, unless an ABORT statement, a CTRL/C, or a CTRL/Z to an "Enter...:" prompt forces an early end to the repetitions of the statement.

- For each record in the record stream, DATATRIEVE executes the statements of a BEGIN-END block in the order you entered them.
- Each time DATATRIEVE executes the statement in the FOR loop, it establishes a single record context for one record from the record stream.

  However, a statement nested in a BEGIN-END block in a FOR loop can create its own single record context. The new context lasts until DATATRIEVE completes the execution of the nested statement. The single record context then returns to its state before the execution of the statement.

  Similarly, when DATATRIEVE completes the execution of the FOR loop the single record context returns to its state prior to the execution of the FOR loop.

Usage Notes

- Use the FOR statement to repeat sequences of DATATRIEVE statements. You do not have to know how many records the record stream contains to control the number of times DATATRIEVE loops through the statement. You can use an ABORT statement in the statement to end the loop when certain conditions are met, regardless of the number of records remaining in the record stream.
- You can nest FOR statements. You can use nested FOR loops to work with lists (the repeating fields contained in hierarchical records).

  You establish the single record context in the outer loop, and the single list-item context in the inner loop. The statement acts on all list items in one target record before acting on any in the next record in the record stream.

  You can, however, use the CROSS clause in record selection expressions to simplify work with lists (see Chapter 5).
- Inside a FOR loop, you can force an exit from the loop by specifying the exit conditions in the IF clause of an IF-THEN-ELSE statement and putting an ABORT statement in the THEN clause.

  You can also stop the execution of a FOR loop by entering a CTRL/C during the execution of a statement, or you can enter a CTRL/Z in response to an "Enter...:" prompt.

- Inside the FOR loop, you can use a variable as a counter to force an exit from the loop before all records in the record stream have been acted upon:

  1. Declare the variable outside the FOR loop.
  2. Inside the loop, increase the value of the variable by one during each repetition of the loop.
  3. Put an ABORT statement in the THEN clause or the ELSE clause of an IF-THEN-ELSE statement, and specify the conditions for the exit, based on the value of the variable, in the conditional expression of the IF clause.

Examples

Assign a value to the field PRICE for three yachts with prices equal to zero:

```
DTR> READY YACHTS MODIFY
DTR> SET NO PROMPT
DTR> FIND FIRST 3 A IN YACHTS WITH PRICE = 0
[3 records found]
DTR> PRINT A

                                 LENGTH
                                  OVER
MANUFACTURER   MODEL      RIG     ALL    WEIGHT  BEAM  PRICE

 BLOCK I.    40         SLOOP    39     18,500  12
 BUCCANEER   270        SLOOP    27      5,000  08
 BUCCANEER   320        SLOOP    32     12,500  10

DTR> FOR A
CON>                    MODIFY USING PRICE = DISP * 1.3 + 5000
DTR> PRINT A

                                 LENGTH
                                  OVER
MANUFACTURER   MODEL      RIG     ALL    WEIGHT  BEAM  PRICE

 BLOCK I.    40         SLOOP    39     18,500  12   $29,050
 BUCCANEER   270        SLOOP    27      5,000  08   $11,500
 BUCCANEER   320        SLOOP    32     12,500  10   $21,250

DTR>
```

Use a variable to force an end to a FOR loop before all records in the record stream have been acted upon:

```
DTR> READY YACHTS
DTR> DECLARE A PIC 9.
DTR> PRINT A

A

0

DTR> SET NO PROMPT
DTR> FOR YACHTS
CON> BEGIN
CON>                    A = A + 1
CON>                    PRINT A, BOAT
CON>                     IF A = 5 THEN ABORT "END OF LOOP"
CON> END

                                   LENGTH
                                    OVER
A MANUFACTURER   MODEL     RIG      ALL    WEIGHT BEAM  PRICE

1  ALBERG       37 MK II   KETCH    37     20,000  12  $36,951

2  ALBIN        79         SLOOP    26      4,200  10  $17,900
3  ALBIN        BALLAD     SLOOP    30      7,276  10  $27,500
4  ALBIN        VEGA       SLOOP    27      5,070  08  $18,600
5  AMERICAN     26         SLOOP    26      4,000  08   $9,895
ABORT: END OF LOOP

DTR>
```

Use nested FOR loops to increase by one year the age of each child in the first two records of the domain FAMILIES:

```
DTR> READY FAMILIES MODIFY
DTR> PRINT FIRST 2 FAMILIES

                        NUMBER    KID
  FATHER      MOTHER     KIDS     NAME     AGE

JIM         ANN           2    URSULA       7
                               RALPH        3
JIM         LOUISE        5    ANNE        31
                               JIM         29
                               ELLEN       26
                               DAVID       24
                               ROBERT      16
```

(continued on next page)

```
DTR> SET NO PROMPT
DTR> FOR FIRST 2 FAMILIES
CON>                     FOR KIDS
CON>                       MODIFY USING AGE = AGE + 1
DTR> PRINT FIRST 2 FAMILIES

                         NUMBER    KID
  FATHER      MOTHER      KIDS     NAME    AGE

JIM        ANN             2   URSULA      8
                               RALPH       4
JIM        LOUISE          5   ANNE       32
                               JIM        30
                               ELLEN      27
                               DAVID      25
                               ROBERT     17
DTR>
```

7.42 HELP Command

Provides online information about the use of DATATRIEVE commands, statements, and language elements.

Format

```
{ HELP }   [ERROR] [topic...]
{ ?    }
```

Arguments

ERROR

Provides additional information on the last error message that you received or on any other error that you specify.

topic

Is a DATATRIEVE command, statement, statement element, or error. Use commas to separate each topic from the next.

? (question mark)

Is a synonym for HELP.

Note

If you enter HELP HELP, DATATRIEVE displays on your terminal an explanation of the HELP command.

Restrictions

- You must issue the HELP command at DATATRIEVE command level in response to the DTR> prompt.
- When you use DECLARE SYNONYM to customize DATATRIEVE language elements, you cannot display the appropriate Help message on your terminal if you specify a synonym in the Help command. You can customize the DATATRIEVE Help library to accommodate any site-specific synonyms or shared user-defined functions.

Results

- DATATRIEVE displays on your terminal the Help message for each topic you list. If prompting for Help is in effect, you receive the Help prompt for Help topics or subtopics. For more information, type HELP SET HELP.
- The Help messages for each command or statement contain online information about optional arguments associated with it.
- On VT100-type video terminals, Help messages can appear in a window of the screen. For more information, type HELP VIDEO or HELP SET HELP.
- In most circumstances, after DATATRIEVE has displayed an error message on your terminal, you can enter HELP ERROR and DATATRIEVE displays on your terminal the Help text pertaining to the error you have made.

Usage Note

You can write your own Help messages for the use of specific domains and procedures, site-specific synonyms, user-defined functions, and any other topic you find appropriate. DATATRIEVE uses the VMS Librarian Utility to access the Help messages. Refer to the chapter on the Librarian Utility in the *VAX DATATRIEVE Guide to Programming and Customizing* for information and instructions on creating and maintaining a private Help library.

Examples

Ask for a list of the Help that is available:

```
DTR> HELP
```

Ask for Help on the screen-oriented Help facility:

```
DTR> HELP VIDEO
```

Ask for Help on the last error message you received. For example, if you use the SORT statement without first forming a collection, DATATRIEVE displays an error message:

```
DTR> READY YACHTS
DTR> SORT BY LOA
No collection for sort.
```

You can type HELP ERROR to find out the reason for the error message, possible actions to correct the error, and how to obtain more online information:

```
DTR> HELP ERROR
No collection for sort.


ERROR

  NOCOLSOR


    EXPLANATION:

    You can only use the SORT statement with a collection.


    USER ACTION:

    Form a collection  with  a  FIND  statement.  You  can  sort  the
    collection  by including a SORTED BY clause in the RSE of the FIND
    statement.  Or you can use a SORT statement after  the  collection
    is established.


    FOR MORE INFORMATION TYPE:

    HELP SORT
    HELP RSE


Topic?
```

In response to the "Topic?" prompt, you can type SORT or RSE for more information on these topics. Or you can press the RETURN key to return to the DATATRIEVE command level. At the DATATRIEVE command level, you can type HELP SORT or HELP RSE for more information on these topics.

Ask for Help on adjusting the window for Help on video terminals:

```
DTR> HELP SET HELP
```

Ask for Help in using the FIND command:

```
DTR> HELP FIND
```

7.43 IF-THEN-ELSE Statement

Causes DATATRIEVE to execute one of two statements or compound statements depending on the evaluation of a conditional, or Boolean, expression.

Format

```
IF  boolean-expression  [THEN]  statement-1  [ELSE  statement-2]
```

Arguments

boolean-expression

Is a Boolean expression (see Chapter 3).

THEN

Is an optional language element you can use to clarify syntax.

statement-1

Is a simple or compound statement you want DATATRIEVE to execute if the Boolean expression evaluates to true.

ELSE statement-2

Specifies the statement you want DATATRIEVE to execute if the Boolean expression evaluates to false.

Restriction

You must observe all restrictions on the statements used in the IF-THEN-ELSE statement.

Results

- If the Boolean expression evaluates to true, DATATRIEVE executes statement-1 in the THEN clause.
- If you specify an ELSE clause and the Boolean expression evaluates to false, DATATRIEVE executes statement-2 in the ELSE clause.
- If you do not specify an ELSE clause and the Boolean expression evaluates to false, DATATRIEVE does not execute statement-1 in the THEN clause and is ready to execute the next command or statement it encounters.

Usage Notes

- You can press the RETURN key before all elements of the statement except ELSE. If you press the RETURN key before typing ELSE, DATATRIEVE considers the syntax of the statement complete. It executes or ignores the THEN clause depending on the evaluation of the Boolean expression. It then tries to execute the ELSE clause as though it were a separate statement and displays an error message on your terminal.

  When you have to break lines in an IF-THEN-ELSE statement, put ELSE at the end of a line rather than at the beginning of the next. This practice is especially important when you are writing a procedure, because DATATRIEVE does not check the syntax of the statements in the procedure until you invoke it.

- You can use an IF-THEN-ELSE statement to force an exit from a BEGIN-END block or from a FOR loop. Put an ABORT statement in either the THEN clause or the ELSE clause, and put the resulting IF-THEN-ELSE statement in an appropriate place in the BEGIN-END block or FOR loop.

- You can nest IF-THEN-ELSE statements by using an IF-THEN-ELSE statement as either statement-1 or statement-2, or both.

Examples

Print each yacht built by Pearson, and modify the price if you want to:

```
DTR> SET NO PROMPT
DTR> READY YACHTS WRITE
DTR> FOR YACHTS WITH BUILDER = "PEARSON"
CON>    BEGIN
CON>         PRINT
CON>         IF *."Y TO MODIFY PRICE, N TO SKIP" CONT "Y"
CON>            THEN MODIFY PRICE ELSE
CON>            PRINT "NO CHANGE"
CON>         IF *."Y TO CONTINUE" NOT CONT "Y" THEN
CON>            ABORT "END OF PRICE CHANGES"
CON>    END
```

(continued on next page)

```
                                 LENGTH
                                  OVER
MANUFACTURER   MODEL     RIG     ALL    WEIGHT BEAM  PRICE

 PEARSON     10M        SLOOP   33    12,441  11
Enter Y TO MODIFY PRICE, N TO SKIP: N
NO CHANGE
Enter Y TO CONTINUE, N TO ABORT: Y
 PEARSON     26         SLOOP   26     5,400  08
Enter Y TO MODIFY PRICE, N TO SKIP: N
NO CHANGE
Enter Y TO CONTINUE, N TO ABORT: N
ABORT: END OF PRICE CHANGES

DTR>
```

Use the IF statement to select families with fathers named Jim, and list the kids in those families:

```
DTR> READY FAMILIES
DTR> FOR FAMILIES WITH ANY KIDS
CON>     IF FATHER EQ "JIM" THEN
CON>        PRINT "The Kids of JIM and"|||MOTHER,
CON>        ALL KID_NAME ("Kids with Fathers"/
CON>            "Named Jim") OF KIDS, SKIP

                              Kids with Fathers
                                  Named Jim

The Kids of JIM and ANN          URSULA
                                 RALPH

The Kids of JIM and LOUISE       ANNE
                                 JIM
                                 ELLEN
                                 DAVID
                                 ROBERT


DTR>
```

7.44 LIST Statement

Causes DATATRIEVE to format and write to your terminal, to a file, or to a unit record device one or more values of implied or specified fields from records in one or more readied domains.

Format

Retrieving from Selected Records and Target Record Streams Formed by FOR Loops

```
LIST [print-list]  [ ON  { file-spec } ]
                         { *.prompt  }
```

Retrieving from the Current Collection

```
LIST ALL [print-list]  [ ON  { file-spec } ]
                             { *.prompt  }
```

Retrieving From Record Streams Formed by the LIST Statement

1. One RSE

```
LIST [print-list OF] rse  [ ON  { file-spec } ]
                                { *.prompt  }
```

2. Two RSE's (Inner print list follows another print list)

```
LIST print-list, ALL print-list OF rse-1 [,print-list] OF rse-2

    [ ON  { file-spec } ]
          { *.prompt  }
```

3. Two RSE's (Inner print list precedes any other print list)

```
LIST ALL ALL print-list OF rse-1 [,print-list] OF rse-2

    [ ON  { file-spec } ]
          { *.prompt  }
```

Arguments

print-list

Is a list of field names and can also include only the print list elements SKIP, NEW_PAGE, and inner print lists. See Table 7-15 for a description of these two print-list elements. You can control the format in which DATATRIEVE displays values from the specified fields with the USING edit-string modifiers described in Table 7-16.

ALL

When used alone following LIST, causes the records in the current collection to be displayed on your terminal or written to the specified file or device.

When used with a print list, ALL causes the print list to be evaluated for each record in the current collection.

When used with the OF rse clause, ALL is optional. You can use it to clarify the LIST statement, but, regardless of the presence of ALL, DATATRIEVE evaluates the LIST statement once for each record in the record stream formed by the RSE.

When the print list begins with an inner print list, ALL is required to establish the proper context in which to resolve references to the items in the hierarchical list.

rse

Is a record selection expression that creates the record stream DATATRIEVE uses to evaluate the elements of the print list.

file-spec

Is the file specification to which you want to write the output of the statement.

A complete file specification has the following format:

```
node-spec::device:[directory]file-name.type;version
```

If you omit a field in the file specification, DATATRIEVE uses the following defaults:

Field	Default
node-spec::	Your local node
device:	Your default device
[directory]	Your default directory
file-name	Null string
.type	.LIS
;version	1 or next higher version number

The minimum file specification consists of a period (.). The specification of such a file stored in your default VMS directory ends with ".;n", where n is the version number and both the file name and the type are null strings.

*.prompt-name

Is a prompting value expression that prompts you for a device name or file specification to which you want to write the output of the statement.

Restrictions

- To list data from records in a domain, you must ready the domain for READ, WRITE, or MODIFY access. You cannot list data from domains readied for EXTEND access because you cannot establish collections or record streams from domains readied for EXTEND access. See the section in this chapter on the READY command for more information.
- If you specify a device name in a LIST statement, the device must be one to which you have access, such as a line printer, a tape drive, your own terminal, or another terminal. You cannot cause DATATRIEVE to display the output of the LIST statement on another terminal that is logged in.
- To send your output to a tape drive, you must mount your tape and assign the tape drive to your process at DCL command level before you run DATATRIEVE. Only then can you specify a tape drive as the output device for the LIST statement.

- When you use ON LP: to send LIST statement output directly to a line printer, DATATRIEVE assumes your system has a line printer. If your system does not have a device defined as LPA0:, using the clause ON LP: does not work.

  Although this restriction applies to any system without a line printer, you may encounter it unexpectedly if your system is part of a VAXcluster with a common line printer. The ON LP: clause does not work in a VAXcluster that uses a common printer not directly connected to your system.

  If the nodes in the cluster are connected with DECnet, you can work around this restriction. To send output from a node without a line printer, you must include the node name of the system with the line printer in the LP: specification. For example, if the cluster's line printer is on a node named BIGVAX, the following list statement sends output to it:

  ```
  DTR> LIST YACHTS ON BIGVAX::LP:
  ```

  Note that you cannot directly specify the line printer on BIGVAX by using the cluster device-name BIGVAX$LPA0: in the ON clause.

Results

- The LIST statement causes DATATRIEVE to display each field and its value on one line. The value displayed is the one in the field of the record in the single record context. DATATRIEVE evaluates the LIST statement once for the selected record, or once for each record in the CURRENT collection or in the record stream formed by a FOR statement or the OF rse clause of the LIST statement.

  For record streams or collections containing more than one record, DATATRIEVE inserts a blank line in the display between the blocks of fields that derive from the evaluation of the records in the record stream.

- If you do not include ALL or an RSE in a LIST statement, DATATRIEVE evaluates the print list once in the context of the nearest selected record and creates one or more lines of output, depending on the number of fields and the type and number of formatting options you specify.

- If you specify the argument ALL and do not include an RSE, DATATRIEVE uses the data in the records of the CURRENT collection to evaluate the value expressions in the print list. DATATRIEVE evaluates the print list once for each record in the CURRENT collection and creates one or more lines of output for each record depending on the number of fields and the type and number of formatting options you specify.
- If you include an RSE in a LIST statement, DATATRIEVE uses the data in each record in the record stream to evaluate the print list. DATATRIEVE evaluates the print list once for each record in the record stream and creates one or more lines of output for each record depending on the number of fields and the type and number of formatting options you specify.
- If you put a LIST statement in a FOR loop, DATATRIEVE uses the data in each record in the record stream created by the RSE in the FOR statement. DATATRIEVE evaluates the print list once for each record and creates one or more lines of output for each record, depending on the number of fields and the type and number of formatting options you specify.
- If you do not put the LIST statement in a FOR loop and do not include an RSE or the argument ALL, DATATRIEVE uses the data from the selected record in the nearest single record context to evaluate the print list. DATATRIEVE evaluates the print list once and creates one or more lines of output, depending on the number of fields and the type and number of formatting options you specify.
- If you end your file specification with the name of a line printer or another terminal that is not a spooled device, the output of a LIST statement can be immediately displayed on the device. Consult the VMS documentation set for details regarding spooled devices.

Usage Notes

- You can use inner print lists to output hierarchical displays of data contained in the lists of variable length records.
- With SET SEARCH in effect, you can print the data in lists by letting DATATRIEVE generate implicit inner print lists.

Examples

List three records from YACHTS:

```
DTR> READY YACHTS
DTR> LIST FIRST 3 YACHTS

MANUFACTURER    : ALBERG
MODEL           : 37 MK II
RIG             : KETCH
LENGTH_OVER_ALL : 37
DISPLACEMENT    : 20,000
BEAM            : 12
PRICE           : $36,951

MANUFACTURER    : ALBIN
MODEL           : 79
RIG             : SLOOP
LENGTH_OVER_ALL : 26
DISPLACEMENT    :  4,200
BEAM            : 10
PRICE           : $17,900

MANUFACTURER    : ALBIN
MODEL           : BALLAD
RIG             : SLOOP
LENGTH_OVER_ALL : 30
DISPLACEMENT    :  7,276
BEAM            : 10
PRICE           : $27,500
```

List the first two records in FAMILIES:

```
DTR> READY FAMILIES
DTR> LIST FIRST 2 FAMILIES

FATHER      : JIM
MOTHER      : ANN
NUMBER_KIDS :  2
    KID_NAME    : URSULA
    AGE         :  7
    KID_NAME    : RALPH
    AGE         :  3
```

```
FATHER      : JIM
MOTHER      : LOUISE
NUMBER_KIDS :  5
    KID_NAME    : ANNE
    AGE         : 31
    KID_NAME    : JIM
    AGE         : 29
    KID_NAME    : ELLEN
    AGE         : 26
    KID_NAME    : DAVID
    AGE         : 24
    KID_NAME    : ROBERT
    AGE         : 16

DTR>
```

7.45 MATCH Statement

Relates two list names with their subordinate elementary fields, so that data from the second list can be stored in the first list.

Format

```
MATCH   list-rse-1,   list-rse-2   statement
```

Arguments

list-rse-1

Is an RSE containing a list name, from the record definition of the domain that is to receive the data.

list-rse-2

Is an RSE containing a list name, from the record definition of the source domain for the data.

statement

Is a DATATRIEVE Assignment statement or series of Assignment statements enclosed by a BEGIN-END block.

Restrictions

- The MATCH statement should be used only when you need to reorganize the structure of lists; for example, when you want to restructure two list fields into one list field.
- In each Assignment statement, the expression to the left of the "=" must be an elementary field subordinate to the list name in list-rse-1. The expression to the right of the "=" must be an elementary field subordinate to the list name in list-rse-2.

Result

DATATRIEVE associates the left field name in each Assignment statement with the list name list-rse-1. DATATRIEVE associates the right field name in each Assignment statement with the list name in list-rse-2. When the MATCH statement is included within a STORE statement, DATATRIEVE stores data from the second list into the first list.

Usage Notes

Use the MATCH statement to transfer data from one list to another. The MATCH statement can be part of a BEGIN-END block in the USING clause of a STORE statement, associating list names and elementary field names. The BEGIN-END block can also include Assignment statements for data transfer between fields that are not part of lists.

Use the following compound statement to reorganize data from one hierarchical domain to another:

```
FOR domain-name-1
   STORE domain-name-2 USING statement
```

The records of the first domain are the source of the data for the second domain. The first domain can be a view domain.

Example

Consider the following record definition for the domain FAM:

```
DTR> SHOW FAM_REC
RECORD FAM_REC USING
  01 FAMILY.
     03 PARENTS.
        06 FATHER PIC X(10).
        06 MOTHER PIC X(10).
     03 NUMBER_KIDS PIC 99 EDIT_STRING IS Z9.
     03 KIDS_N OCCURS 10 TIMES.
        06 EACH_KID.
            09 KID_NAME PIC X(10) QUERY_NAME IS KID.
     03 KIDS_A OCCURS 10 TIMES.
        06 EACH_KID.
            09 AGE PIC 99 EDIT_STRING IS Z9.
;
```

The fixed-length list format means that values are displayed for 10 KIDS_N and 10 KIDS_A, no matter what the value for NUMBER_KIDS. In displays and reports, this means that most FAM records would be separated by strings of blanks (for "empty" occurrences of KIDS_N) and zeros (for "empty" occurrences of KIDS_A):

```
DTR> PRINT FAM

                           NUMBER    KID
  FATHER       MOTHER       KIDS     NAME     AGE

JIM          ANN             2   URSULA       7
                                 RALPH        3
                                              0
                                              0
                                              0
                                              0
                                              0
                                              0
                                              0
                                              0
JIM          LOUISE          5   ANNE        31
                                 JIM         29
                                 ELLEN       26
                                 DAVID       24
                                 ROBERT      16
                                              0
                                              0
                                              0
                                              0
                                              0
                 .             .           .
                 .             .           .
                 .             .           .
```

To improve display and report formats for this domain, you could restructure it using the MATCH statement so that it contains one variable-length list field. In other words, the modified record definition would look like the current one for the FAMILIES domain:

```
DTR> SHOW FAMILY_REC
RECORD FAMILY_REC
01 FAMILY.
   03 PARENTS.
      06 FATHER PIC X(10).
      06 MOTHER PIC X(10).
   03 NUMBER_KIDS PIC 99 EDIT_STRING IS Z9.
   03 KIDS OCCURS 0 TO 10 TIMES DEPENDING ON NUMBER_KIDS.
      06 EACH_KID.
         09 KID_NAME PIC X(10) QUERY_NAME IS KID.
         09 AGE PIC 99 EDIT_STRING IS Z9.
;
```

If you attempted to restructure FAM without using the MATCH statement, DATATRIEVE would not store the list elements. This problem occurs because the modified record definition combines two list fields into one. Therefore, to restructure the FAM domain, you must use the MATCH statement within a STORE statement that is controlled by a FOR loop. The following series of statements stores the data from the records in FAM into the records in FAMILIES and then prints the results:

```
DTR> READY FAM
DTR> DEFINE FILE FOR FAMILIES
DTR> READY FAMILIES WRITE
DTR> FOR FAM
CON> STORE FAMILIES USING
CON>   BEGIN
CON>     PARENTS = PARENTS
CON>     NUMBER_KIDS = NUMBER_KIDS
CON>     MATCH KIDS, KIDS_N
CON>       KID_NAME = KID_NAME
CON>     MATCH KIDS, KIDS_A
CON>       AGE = AGE
CON>   END
DTR> PRINT FAMILIES

                        NUMBER    KID
  FATHER     MOTHER      KIDS     NAME    AGE

JIM        ANN            2    URSULA      7
                               RALPH       3
JIM        LOUISE         5    ANNE       31
                               JIM        29
                               ELLEN      26
                               DAVID      24
                               ROBERT     16
              .          .          .
              .          .          .
              .          .          .
```

7.46 MISSING VALUE Clause

Designates a value for a field that DATATRIEVE recognizes, not as the literal value, but as a marker that no value is stored in the field. DATATRIEVE ignores fields containing the "missing value" marker when evaluating statistical expressions (AVERAGE, MAX, MIN, TOTAL, and STD_DEV).

When you store a record and do not directly assign a value to a field with a MISSING VALUE defined, DATATRIEVE uses the missing value to initialize the field if it contains no DEFAULT VALUE clause.

Format

```
MISSING  [VALUE [IS]]  literal
```

Arguments

VALUE IS

Are optional keywords you can use to clarify the syntax of the clause.

literal

Is either a numeric or character string literal (see Chapter 3 for a discussion of these two types of literals).

Restrictions

- This clause is valid only for elementary fields that are not OCCURS fields.
- The missing value for a field must be consistent with the data type for that field.

Results

- If part of an expression is missing, then the expression is missing. It will still have a value that is the result of the calculation, but it will be considered missing for assignments and edit string processing.
- The MISSING VALUE clause is ignored on fields or variables with the COMPUTED BY clause. The COMPUTED BY value is missing if the computed expression is missing. The EDIT_STRING clause is applied and may have a missing component.

- If the source value of an assignment is missing and the target field has a missing value clause, then the value specified in the missing value clause of the target field is stored in the target field.

Usage Notes

- When you create a record with Assignment statements in the USING clause of a STORE statement but make no assignment to a field that has a MISSING VALUE clause and no DEFAULT VALUE clause in its field definition, DATATRIEVE initializes the field with the missing value.
- When you create a record by responding to prompts from a STORE statement without a USING clause or from prompting value expressions in the USING clause of a STORE statement, DATATRIEVE does the following: If you respond to a prompt by pressing the TAB key once and pressing the RETURN key, DATATRIEVE initializes a field with the value specified in the MISSING VALUE clause.
- In the YACHT record definition, the definition of the field PRICE includes a MISSING VALUE clause designating that the missing value is zero. Having zero in the PRICE field means that no price was available when the record was stored, not that the boat is free.
- If you include a MISSING VALUE clause in a field definition, you can also include a MISSING VALUE edit string to control the output format when you retrieve the missing value from the field. The question mark (?) divides an edit string into two parts. The first part applies to the output of the field value if that value is not the missing value. The second part of the edit string applies if the field contains the designated missing value. Because you can include character string literals in edit strings, you do not have to display the actual value stored in the field. You can display a text message or a string of repeated characters for easy recognition of records with missing values.
- DATATRIEVE also has a relational operator you can use on fields with missing values to establish selected records and form record streams and collections. The Boolean expression has this form:

  field-name MISSING.

  A record selection expression using this form of Boolean looks like this:

  ```
  YACHTS WITH PRICE MISSING.
  ```

When DATATRIEVE does a statistical calculation on fields that contain missing values, it displays a message on your terminal telling you the total number of records in the record stream or collection and the number of records in the collection that were used in the calculation.

Examples

Define a record that contains MISSING VALUE clauses:

```
DTR> DEFINE DOMAIN THINGS USING THINGREC ON THINGS;
DTR> DEFINE RECORD THINGREC USING
DFN> 01 THINGS.
DFN>    03 NUM PIC 9(5)
DFN>       MISSING VALUE IS 11111
DFN>       EDIT_STRING IS ZZ,Z99?"***MISSING***".
DFN>    03 STR PIC X(10) MISSING VALUE IS "EMPTY"
DFN>       EDIT_STRING IS X(10)?"***MISSING***".
DFN> ;

DTR>
```

Define a new domain based on YACHTS that uses a new missing value and a MISSING VALUE edit string:

```
DTR> DEFINE DOMAIN YACHTS_PRICE_LIST USING YPL_REC ON YPL.DAT;
DTR> DEFINE RECORD YPL_REC USING
DFN> 01 BOAT.
DFN>    03 TYPE.
DFN>       05 BUILDER PIC X(10).
DFN>       05 MODEL PIC X(8).
DFN>    03 PRICE PIC 9(5) MISSING VALUE IS 0
DFN>       EDIT_STRING $$$,$$$?"NOT LISTED".
DFN> ;
[Record is 23 bytes long.]
DTR> DEFINE FILE FOR YACHTS_PRICE_LIST KEY = TYPE
DTR> READY YACHTS_PRICE_LIST AS YPL WRITE
DTR> READY YACHTS
DTR> YPL = YACHTS WITH LOA GT 35
DTR> FIND YPL WITH PRICE MISSING
[12 records found]
DTR> PRINT FIRST 3 CURRENT

 BUILDER    MODEL     PRICE

BLOCK I.   40       NOT LISTED
CABOT      36       NOT LISTED
DOWN EAST  38       NOT LISTED

DTR>
```

7.47 MODIFY Statement

Changes the value of one or more fields in a selected record or in any or all records in a collection or record stream.

Format

Format 1

```
MODIFY [ALL]  [ field-name [,...]  ]
              [ USING statement-1  ]

        [VERIFY [USING] statement-2]

        [OF rse]
```

Format 2

```
MODIFY [ALL] rse

        USING statement-1

        [VERIFY [USING] statement-2]
```

Arguments

ALL

Specifies that you want to modify either all records in the CURRENT collection or all records in the record stream specified by the OF rse clause.

field-name

Specifies the name of a field in the target record(s) you want to modify. If you specify more than one field name, use a comma to separate each field name from the next. DATATRIEVE prompts you to supply a value for each field you specify.

USING statement-1

Specifies a simple or compound DATATRIEVE statement that assigns value(s) to one or more fields in the target record(s) you want to modify. This clause can also contain any other DATATRIEVE statements, such as PRINT, STORE, and other MODIFY statements.

VERIFY [USING] statement-2

Specifies a statement that DATATRIEVE executes before modifying the target record.

OF rse

Is a record selection expression that forms a record stream of the records you want to modify. An OF rse clause is optional in format 1 of the MODIFY statement. In format 2, an RSE without OF is required.

Restrictions

- The domain containing the records you want to modify must be readied for MODIFY or WRITE access. See the section in this chapter on the READY command for more information.
- For data stored in an RMS indexed file, you cannot modify a primary key or an alternate key with the NO CHANGE attribute. (See the section on the DEFINE FILE command.)
- You cannot modify a COMPUTED BY field.
- You cannot modify list fields or their subordinates in hierarchical records in remote domains.
- When entering a complex MODIFY statement, you must use the hyphen continuation character if you want to press the RETURN key before typing the keywords USING, VERIFY, or OF rse. If you must break an input line near one of these keywords, you can also type the keyword at the end of a line and press the RETURN key.
- You cannot use a prompting value expression in a USING clause to assign a value to a group field.
- You must establish a context to specify the records on which the MODIFY statement acts. You can establish context in four ways:
  - By forming a collection with a FIND statement and using a SELECT statement to identify a selected record (see Table 7-9).
  - By forming a CURRENT collection with a FIND statement and specifying ALL (see Table 7-10).

  - By forming a record stream with an RSE within the MODIFY statement (see Table 7-11)
  - By using a FOR loop and forming a record stream with the rse in the FOR statement (see Table 7-12)

- Do not use ALL without an OF rse clause in a MODIFY statement that is part of a FOR loop. The result is a series of redundant changes to the records; all the records in the CURRENT collection get modified each time through the FOR loop.

  You should also avoid similarly redundant loops when using the OF rse clause in MODIFY statements used in FOR loops. The OF rse clause should contain a Boolean expression that matches each record to be modified with one record from the record stream providing the data. (See the fourth example.)

- If you specify one or more field names in a MODIFY statement, they must be the names of group or elementary fields that DATATRIEVE can recognize in the context established for the MODIFY statement. If you specify more than one field name, use a comma to separate each field name from the next.

- If you specify a record stream with an OF rse clause in the MODIFY statement and omit the field list or the USING clause, you must include the keyword ALL: MODIFY ALL OF rse. This special case of the MODIFY statement syntax reminds you that this statement makes all the records in the record stream identical.

- If you want to use a form to display the records you are changing with the MODIFY statement, you can use one of two methods:

  - Include a FORM clause in the definition of the domain you wish to access. Then you must omit the field list and the USING clauses of the MODIFY statement. That is, you must retrieve entire records from the target collection or record stream.
  - Use the DISPLAY_FORM statement with the GET_FORM value expression to collect data from a form. With the DISPLAY_FORM statement, you *can* specify a field list in the USING clause of the MODIFY statement.

  See the sections on DEFINE DOMAIN and DISPLAY_FORM in this chapter. SET FORM must be in effect when you ready the domain *and* when you enter the MODIFY statement. Check the status of the SET FORM/NO FORM setting with the SHOW SET_UP command.

Results

- When DATATRIEVE executes a MODIFY statement, it immediately changes the information in the data file.
- DATATRIEVE prompts you for field values with this message:

```
Enter field-name:
```

- When DATATRIEVE prompts for a field value, you can enter any of the following responses:
  - To *leave the value unchanged*, press the TAB key and then the RETURN key.
  - To *change the value* of the field, type a new value, and then press the RETURN key. The new value should conform to the data description of the field, as defined in the record definition.
  - To *change to spaces* the value of an alphabetic or alphanumeric field, press the SPACE bar and then press the RETURN key.
  - To *change to zero* the value of a numeric field, enter a zero (0) or press the SPACE bar and then the RETURN key.
  - To *end the prompting cycle*, press CTRL/Z. DATATRIEVE discards the changes made to the one record being modified when you enter the CTRL/Z. That record is unchanged, but if you have already modified records from the collection or record stream, those changes remain in effect. Each of those records was changed in the data file as soon as you entered your response to the last prompt for that record.
- If you press the RETURN key in response to a prompt for a field value, DATATRIEVE reprompts you for a field value.
- If, in response to a prompt, you enter a value that is longer than the length of the field to which it is being assigned, DATATRIEVE displays an error message on your terminal and reprompts you for the value.
- If you omit from a MODIFY statement both a list of field names and a USING clause, DATATRIEVE prompts for each elementary field in the record.

- If you include a list of field names, DATATRIEVE prompts you for each elementary field specified or implied by the list. If you include a group field name in the list, DATATRIEVE prompts you for each elementary field contained in the group field.

- If you specify a USING clause, DATATRIEVE uses any Assignment statements in statement-1 to modify the values of the specified fields. DATATRIEVE does not then prompt you for any field values unless the USING clause contains an Assignment statement with a prompting value expression (value-expression = *.prompt-name). See Tables 7-9, 7-10, 7-11, and 7-12 for syntax examples of the USING clause.

- If you do not include ALL or an RSE in a MODIFY statement and do not put the statement in a FOR loop, DATATRIEVE modifies the selected record. It assigns to each specified or implied field in the selected record the value you supply to the corresponding prompt or in the Assignment statements in the USING clause.

  DATATRIEVE prompts you to supply a value for each specified or implied field in the selected record, unless you specify a USING clause that contains no prompting value expressions. (See the first example.)

  If, however, in the USING clause, you assign a value to the field with an arithmetic calculation that involves a prompting value expression (USING PRICE = PRICE * *.EXCHANGE_RATE), DATATRIEVE uses your response to the prompt to calculate the value of the arithmetic expression. The value of that arithmetic expression is the value put in the updated field, not the value you enter in response to the prompt. (See the third example.)

  Table 7-9 lists the syntax, prompts, and results of the statements that modify selected records.

Table 7-9: Modifying the Selected Record

Syntax	Result
MODIFY	Prompts once for each elementary field in the record definition. Changes each elementary field in the selected record to the value you supply in response to the corresponding prompt.

(continued on next page)

Table 7-9: Modifying the Selected Record (Cont.)

Syntax	Result
MODIFY field-list	Prompts once for each elementary field specified or implied by the list. Changes each elementary field specified or implied by the list to the value you supply in response to the corresponding prompt.
MODIFY USING statement-1	No prompts unless statement-1 contains prompting value expressions. Changes each specified or implied elementary field in the selected record to the values supplied by the Assignment statements in statement-1

For these forms of the MODIFY statement, the context is determined by the selected record of the most recently established collection.

If no selected record exists for the CURRENT collection, then the context is determined by the most recently established collection that has a selected record.

If there is no selected record for any existing collection, DATATRIEVE issues an error message.

- If you specify the argument ALL but do not include an RSE clause in a MODIFY statement, DATATRIEVE changes all the records in the CURRENT collection. It assigns the same value to each specified and implied field of every record in the CURRENT collection. If, however, in the USING clause, you assign a value to the field with an arithmetic calculation that involves the old value of the field, DATATRIEVE uses the value of each calculation to modify the field value in the corresponding record.

  DATATRIEVE prompts you *only once* to supply a value for each specified or implied field. If you specify a USING clause that contains no prompting value expressions, DATATRIEVE does not prompt you for the field values.

Table 7-10 lists the syntax, prompts, and results of the statements that modify all the records in the CURRENT collection.

Table 7-10: Modifying All Records in the CURRENT Collection

Syntax	Result
MODIFY ALL [CURRENT]	Prompts once for each field in the record definition. Changes each field of every record in the CURRENT collection to the value you supply in response to the corresponding prompt.
MODIFY ALL field-list	Prompts once for each elementary field specified or implied by the list. Changes each specified or implied field of every record in the CURRENT collection to the value you supply in response to the corresponding prompt.
MODIFY ALL [CURRENT] USING statement-1	No prompts unless statement-1 contains prompting value expressions. Changes each specified or implied elementary field of every record in the CURRENT collection to the value supplied by the Assignment statements in statement-1.

- If you use an RSE in a MODIFY statement, DATATRIEVE changes all the records in the record stream specified by the RSE. It assigns the same value to each specified and implied field of every record in the record stream. If, however, in the USING clause, you assign a value to the field with an arithmetic calculation that involves the old value of the field, DATATRIEVE uses the value of each calculation to modify the field value in the corresponding record.

  DATATRIEVE prompts you only once to supply a value for each specified and implied field, unless you specify a USING clause that contains no prompting value expressions.

  Table 7-11 lists the syntax, prompts, and results of the statements that modify all the records in a target record stream.

Table 7-11: Modifying All Records in a Record Stream

Syntax	Result
MODIFY [ALL] OF rse	
	Use with care. MODIFY ALL OF domain-name changes *all the records* in the domain.
	Prompts once for each field in the record definition.
	Changes each field of every record in the record stream to the value you supply in response to the corresponding prompt.
MODIFY [ALL] field-list OF rse	
	Prompts once for each elementary field specified or implied by the list.
	Changes each specified or implied field of every record in the record stream to the value you supply in response to the corresponding prompt.
MODIFY [ALL] rse USING statement-1	
MODIFY [ALL] USING statement-1 OF rse	
	No prompts unless statement-1 contains prompting value expressions.
	Changes each specified or implied elementary field of every record in the record stream to the value supplied by the Assignment statements in statement-1.

When using a MODIFY statement that contains an RSE, you do not change the result by including the optional ALL or by excluding it.

- If you include a MODIFY statement within a FOR loop, DATATRIEVE modifies the records specified by the RSE in the FOR statement, but it handles the prompts differently from the other methods of changing records in record streams and collections. When you want DATATRIEVE to prompt for field values of each record that it modifies, include the MODIFY statement within a FOR statement.

Table 7-12 lists the syntax, prompts, and results of the statements that modify each record of a record stream specified by the RSE in a FOR statement.

Table 7-12: Modifying Records in a Record Stream Formed by a FOR Loop

Syntax	Result
FOR rse MODIFY	Prompts once for every elementary field in the record definition for each record in the record stream. Changes each field of each record to the value you supply in response to the corresponding prompt.
FOR rse MODIFY field-list	Prompts once for every elementary field specified or implied by the list for each record in the record stream. Changes each specified or implied field of each record to the value you supply in response to the corresponding prompt.
FOR rse MODIFY USING statement-1	No prompts unless statement-1 contains prompting value expressions. A * .prompt value expression prompts once for each record in the record stream. A **.prompt value expression prompts only once, during the first execution of the FOR loop. Changes each specified or implied elementary field of each record in the record stream to the value supplied by the Assignment statements in statement-1.
FOR rse MODIFY list-rse USING statement-1	Useful for modifying list items within hierarchical records. The first RSE specifies the records to be modified, and the second RSE (list-rse) specifies the occurrences of the list to be modified. Changes each specified or implied elementary field of each list of each record in the record stream. (See the last example.)

- If you include a VERIFY clause in a MODIFY statement, DATATRIEVE executes statement-2 for each target record before changing that record. If statement-2 contains an ABORT statement and a target record causes the abort conditions to be met, DATATRIEVE aborts the MODIFY statement without changing that record. Any previous records changed by that MODIFY statement, however, remain changed, and DATATRIEVE returns you to command level (indicated by the DTR> prompt).
- If a MODIFY statement with an ABORT statement in the VERIFY clause is not part of a procedure or command file, neither SET ABORT nor SET NO ABORT has an effect on the result of the ABORT.
- If a MODIFY statement with an ABORT statement in a VERIFY clause is part of a procedure or command file and SET ABORT is in effect, DATATRIEVE aborts the MODIFY statement without changing the record that caused the abort. DATATRIEVE returns you to command level without executing the rest of the procedure or command file.

  On the other hand, if SET NO ABORT is in effect, DATATRIEVE aborts the MODIFY statement without changing the record that caused the abort and executes the next statement in the procedure or command file.

Usage Notes

- You should use the MODIFY statement with the utmost care because it changes the information in the data file. DATATRIEVE catches any syntax errors you might make in entering the statement. But even if the syntax is correct, the statement may still contain a logical error that causes the wrong records to be changed or the wrong values to be entered into the fields.

  If DATATRIEVE prompts you for a field you did not expect, enter CTRL/Z to prevent changing records or fields you do not wish to change. A good practice is to print each record before you modify it.
- Once you have modified the value(s) in one or more fields, you can recover the previous information only by explicitly changing the new values back to the old ones. You may have to use several MODIFY statements to make the necessary changes.
- When modifying records in relations that are dependent on other relations because of a definition constraint, ready all the involved relations.

- The statement in the USING statement-1 clause of a MODIFY statement is usually an Assignment statement or a BEGIN-END block containing more than one Assignment statement. See the section in this chapter on the Assignment statement for more information.

- When you change all the records in the CURRENT collection or in a record stream created by an RSE, you do not have to assign the same field value to every target record. In the USING clause, you can put an Assignment statement that makes the new value of a field in the target record depend on the old value of that field. For example, you change the price of a collection of yachts with a MODIFY statement containing an assignment such as PRICE = PRICE * 1.1, or PRICE = PRICE + 500. (See the third example.)

  The same calculation must apply to each target record, but the new values derived for each record are independent of one another. The operation performed on a field value, however, must be appropriate to the data type of that field. Do not, for example, try to do arithmetic with the nonnumeric data in an alphanumeric field.

- With the MODIFY statement, you can transfer information from one domain to another, from one group field to another, and from one elementary field to another. Use one of the following Assignment statements in the USING clause:

  ```
  field-name-1 = field-name-2

  group-field-name-1 = group-field-name-2
  ```

  In each case, put the target field name on the left side of the Assignment statement and the source field name on the right side. Each field name must be adequately qualified to establish the proper context for each side of the Assignment statement. (See the discussion of context in the *VAX DATATRIEVE User's Guide*.)

  This transfer of data is easiest when the field definitions are exactly the same on both sides of the Assignment statement. If the field definitions differ, make sure you understand the truncations that may result if the lengths of the fields do not match.

  You must also anticipate any conflicts between data types. For example, you can modify an alphanumeric field with the content of a numeric, but modifying a numeric field with the content of an alphanumeric gives you a warning if your alphanumeric field contains nondigit characters.

For further information about using field names in Assignment statements, see the section in this chapter on the Assignment statement.

- To include other DATATRIEVE statements in the USING clause of a MODIFY statement, put them in a BEGIN-END block. For example, to see the target record before changing it you can precede the Assignment statement(s) in the BEGIN-END block with a PRINT statement.
- With a BEGIN-END block in the USING clause of a MODIFY statement, you can create an audit trail of the previous values of the records you modify. You need to define and ready another domain that uses the same record definition as the one whose records you intend to modify. You then put an appropriate STORE statement in a BEGIN-END block in the USING clause of a MODIFY statement. (See the fifth example.)
- Typically, statement-2 in a VERIFY clause contains an IF-THEN-ELSE statement and an ABORT statement (see the sections on these statements in this chapter).
- The values you supply to the prompts of the MODIFY statement are first checked against any validation conditions specified for that field in the record definition. If the value conforms to the conditions specified in the appropriate VALID IF clause in the record definition, only then is it checked against the conditions in the VERIFY clause of the MODIFY statement.

  If you always use the same validation conditions for modifying and storing data, put those conditions in VALID IF clauses in the record definition. That way, DATATRIEVE reprompts you for another value for the same field. When you couple the validation conditions with an ABORT statement in the VERIFY clause of a MODIFY statement, you return to DATATRIEVE command level and must reenter the MODIFY statement.
- If you try use the first format of MODIFY and the name of a field duplicates the name of a readied domain, DATATRIEVE interprets the field name as a readied domain. In addition, if the field name duplicates the name of a DATATRIEVE keyword such as FIRST, DATATRIEVE interprets the field name as the beginning of an RSE. To avoid these outcomes, use a query name for the field that does not duplicate the name of a keyword or domain.

Examples

Change one field value in a selected record:

```
DTR> READY YACHTS MODIFY
DTR> FIND FAMILIES WITH FATHER = "JOHN"
[2 records found]
DTR> PRINT
No record selected, printing whole collection.

                      NUMBER    KID
  FATHER     MOTHER    KIDS     NAME    AGE
JOHN       JULIE         2   ANN        29
                             JEAN       26
JOHN       ELLEN         1   CHRISTOPHR  0

DTR> SELECT 1
DTR> MODIFY FATHER
Enter FATHER: JON
DTR> PRINT

                      NUMBER    KID
  FATHER     MOTHER    KIDS     NAME    AGE

JON        JULIE         2   ANN        29
                             JEAN       26

DTR>
```

Make a 10 percent increase in the price of the first five yachts. Each yacht begins and ends with a unique price, but the new price of each yacht is 10 percent greater than the old price of that same yacht.

```
DTR> MODIFY FIRST 5 YACHTS USING PRICE = PRICE * 1.1
DTR> PRINT FIRST 5 YACHTS

                                   LENGTH
                                    OVER
MANUFACTURER   MODEL     RIG        ALL    WEIGHT BEAM  PRICE

 ALBERG      37 MK II   KETCH      37     20,000  12  $40,646
 ALBIN       79         SLOOP      26      4,200  10  $19,690
 ALBIN       BALLAD     SLOOP      30      7,276  10  $30,250
 ALBIN       VEGA       SLOOP      27      5,070  08  $20,460
 AMERICAN    26         SLOOP      26      4,000  08  $10,885

DTR>
```

Form a collection of yachts. Modify all the elementary fields within the group field SPECIFICATIONS for the first record:

```
DTR> SET NO PROMPT
DTR> READY YACHTS MODIFY
DTR> FIND YACHTS WITH BEAM = 0
[5 records found]
DTR> FOR CURRENT MODIFY USING
CON> BEGIN
[Looking for statement]
CON>     PRINT SPECS
CON>     RIG = **.RIG
CON>     LOA = **.LOA
CON>     DISP = *.WEIGHT
CON>     BEAM = *.BEAM
CON>     PRICE = PRICE * 1.1
CON> END

       LENGTH
        OVER
 RIG    ALL  WEIGHT BEAM PRICE

SLOOP  32     9,500  00
Enter RIG: <TAB>
Enter LOA: 33
Enter WEIGHT: 12000
Enter BEAM: 10
SLOOP   32    11,000 00  $29,500
Enter WEIGHT: <TAB>
Enter BEAM: 11
SLOOP   31    13,600 00  $32,500
Enter WEIGHT: 15000
Enter BEAM: 12
SLOOP   35    23,200 00
Enter WEIGHT: <TAB>
Enter BEAM: 13
SLOOP   32    14,900 00  $34,480
Enter WEIGHT: <TAB>
Enter BEAM: 9
DTR> PRINT ALL

                               LENGTH
                                OVER
MANUFACTURER   MODEL     RIG    ALL   WEIGHT BEAM  PRICE

 METALMAST   GALAXY     SLOOP   33    12,000  10
 O'DAY       32         SLOOP   33    11,000  11  $32,450
 RYDER       S. CROSS   SLOOP   33    15,000  12  $35,750
 TA CHIAO    FANTASIA   SLOOP   33    23,200  13
 WRIGHT      SEAWIND II SLOOP   33    14,900  09  $37,928

DTR>
```

Use a MODIFY statement in a FOR loop to update a master file with the data in a transaction file:

```
DTR> FOR UPDATES
DTR>     MODIFY USING
DTR>         PRICE = UPDATE.PRICE OF
DTR>     YACHTS WITH TYPE = UPDATE.TYPE
DTR>
```

To provide an audit trail, form a domain AUDIT_YACHTS to store records of changes made to YACHTS. The record definition for AUDIT_YACHTS is the same as the one for YACHTS except for the addition of a field CHANGE_DATE. This field enables you to store data on the date of the change. A DEFAULT VALUE clause automatically assigns the current system date as the value for the field. The field definition is:

```
06 CHANGE_DATE USAGE IS DATE
                DEFAULT VALUE IS "TODAY".
```

The following statement allows you to modify records in YACHTS while storing the changes in AUDIT_YACHTS:

```
DTR> SHOW AUDIT_YACHTS
DOMAIN AUDIT_YACHTS USING
AUD_REC ON AUDYACHT;

DTR> FOR A IN YACHTS MODIFY USING
CON> BEGIN
CON>   BUILDER = *.BUILDER
CON>   MODEL   = *.MODEL
CON>   RIG     = *.RIG
CON>   LOA     = *.LOA
CON>   DISP    = *.DISP
CON>   BEAM    = *.BEAM
CON>   PRICE   = *.PRICE
CON>  STORE B IN AUDIT_YACHTS USING
CON>      B.BOAT = A.BOAT
CON> END
DTR
```

Modify the name of the child of TOM and ANNE from “PATRICK” to “PATRICIA”. Print the record before and after the change:

```
DTR> READY FAMILIES MODIFY
DTR> FOR FAMILIES WITH FATHER = "TOM" AND MOTHER = "ANNE"
CON>    BEGIN
CON>      PRINT
CON>      MODIFY KIDS WITH KID_NAME = "PATRICK" USING
CON>        KID_NAME = "PATRICIA"
CON>      PRINT
CON>    END

                       NUMBER    KID
  FATHER      MOTHER    KIDS     NAME    AGE

TOM         ANNE          2   PATRICK     4
                              SUZIE       6

                       NUMBER    KID
  FATHER      MOTHER    KIDS     NAME    AGE

TOM         ANNE          2   PATRICIA    4
                              SUZIE       6

DTR>
```

7.48 OCCURS Clause

The OCCURS clause defines multiple occurrences (or repetitions) of a field or group of fields. The multiple occurrences, called a list, create a hierarchy in the domain. (See the *VAX DATATRIEVE User's Guide* for more information on hierarchies.)

The OCCURS clause has two formats: one format for a fixed number of occurrences and one for a variable number of occurrences. Each is described in the following sections.

7.48.1 Fixed Number of Occurrences

Defines a fixed number of occurrences for a field or group of fields.

Format

```
OCCURS  n  TIMES
```

Argument

n

Is a positive integer specifying the number of occurrences for the field.

Restrictions

- A field definition cannot contain both an OCCURS and a COMPUTED BY clause. You cannot specify multiple occurrences of a COMPUTED BY field.
- You cannot use an OCCURS clause and a MISSING VALUE clause to describe the same field in a record definition.

Results

This format of the OCCURS clause defines a list with a fixed number of occurrences. It reserves enough space in each record to contain all the occurrences of the field (or fields), whether or not they contain data.

Usage Notes

- A record definition can contain any number of OCCURS clauses in this format.
- A field in a group field with an OCCURS clause can contain an OCCURS clause. The result is a sublist: a list nested within a list. (See the third example.)
- Retrieving and modifying data in fields defined with the OCCURS clause requires more complicated syntax than retrieving data from other types of fields. For information on alternatives to defining records using the OCCURS clause, see the chapter on using hierarchies in the *VAX DATATRIEVE User's Guide.*

Examples

The following field definition reserves enough space in every record for two occurrences of the elementary field KIDS_NAMES; each occurrence is 10 characters long:

```
03 KIDS_NAMES PIC X(10)
   OCCURS 2 TIMES.
```

Thus, you can store up to two names (containing up to 10 characters each) in any record. The following definition specifies that the group field KIDS_NAMES is repeated twice. Each group field contains two fields: FIRST_NAME (10 characters long) and MIDDLE_INIT (1 character). A total of 22 characters is reserved in every record for the group field:

```
03 KIDS_NAMES OCCURS 2 TIMES.
   05 FIRST_NAME PIC X(10).
   05 MIDDLE_INIT PIC X.
```

In the record, the fields are stored in the following order:

```
KIDS_NAMES
   FIRST_NAME
   MIDDLE_INIT KIDS_NAMES
   FIRST_NAME
   MIDDLE_INIT
```

By nesting a sublist within a list, reserve enough space in a record to store up to three nicknames for each KIDS_NAMES:

```
03 KIDS_NAMES OCCURS 2 TIMES.
   05 FIRST_NAME PIC X(10).
   05 MIDDLE_INIT PIC X.
   05 NICKNAME PIC X(10)
      OCCURS 3 TIMES.
```

The fields are stored in the following order:

```
KIDS_NAMES
   FIRST_NAME
   MIDDLE_INIT
   NICKNAME
   NICKNAME
   NICKNAME
KIDS_NAMES
   FIRST_NAME
   MIDDLE_INIT
   NICKNAME
   NICKNAME
   NICKNAME
```

7.48.2 Variable Number of Occurrences

Defines a variable number of occurrences of a group of fields.

Format

```
OCCURS  min  TO  max  TIMES  DEPENDING  ON  field-name
```

Arguments

min

Is a nonnegative integer specifying the minimum number of occurrences of the field. This value can be 0. DATATRIEVE does not check this value.

max

Is a positive integer specifying the maximum number of occurrences of the field. This value must be greater than 0.

field-name

Is the name of a field in the same record definition. The value of the field determines the number of occurrences of this field. The field must be a numeric field containing a nonnegative integer; it cannot be defined with digits to the right of the decimal point.

Restrictions

- No other field definition can follow the last elementary field in the group field containing this clause.
- A record definition can contain only one OCCURS clause in this format.
- A field definition cannot contain both an OCCURS and a REDEFINES clause or an OCCURS and a COMPUTED BY clause.
- You cannot use a qualified field name, such as TYPE.BUILDER, as the DEPENDING ON variable in an OCCURS clause.

Results

The number of occurrences of the group field in any record is equal to the value of the field specified in the OCCURS clause. Therefore, the sizes of records in the domain can vary. If you use the MAX argument when you define the data file, all records in the file have the same length. See the section on the DEFINE FILE command.

Usage Notes

- A group field containing this format of the OCCURS clause can contain one or more fields with an OCCURS clause. The nested OCCURS clause, however, must specify a fixed number of occurrences of the field.
- Retrieving and modifying data in fields defined with the OCCURS clause requires more complicated syntax than retrieving data from other types of fields. For information on alternatives to defining records using the OCCURS clause, see the chapter on using hierarchies in the *VAX DATATRIEVE User's Guide.*

Example

The FAMILY_REC record definition shows the use of an OCCURS clause in this format:

```
01 FAMILY.
03 PARENTS.
   06 FATHER PIC X(10).
   06 MOTHER PIC X(10).
03 NUMBER_KIDS PIC 99 EDIT_STRING IS Z9.
03 KIDS OCCURS 0 TO 10 TIMES DEPENDING ON NUMBER_KIDS.
   06 EACH_KID.
      09 KID_NAME PIC X(10) QUERY_NAME IS KID.
      09 AGE PIC 99 EDIT_STRING IS Z9.
```

The number of occurrences of the KIDS field depends on the value of the NUMBER_KIDS field. If the value is 0, there are no occurrences of the field; if it is 1, there is one occurrence, and so on. Each occurrence of KIDS contains three fields: the group field EACH_KID and the elementary fields KID_NAME and AGE.

7.49 ON Statement

Sends the output of all indicated statements to the specified output file or device.

Format

```
ON  { file-spec }  statement
    { *.prompt  }
```

Arguments

file-spec

Specifies the file to which you want to write the output of the statement. The format for the file specification is:

node-spec::device:[directory] file-name.type;version

The minimum file specification consists of a period (.). The specification of such a file stored in your default VMS directory ends with ".;n", where n is the version number and both the file name and the type are null strings.

If you omit a field in the file specification, DATATRIEVE uses the defaults listed in Table 7-13.

Table 7-13: Output File Specification Defaults

Field	Default
node-spec::	Your local node
device:	Your default device
[directory]	Your default directory
file-name	Null string
.type	.LIS
;version	Highest version number

statement

Is a simple or compound statement you want DATATRIEVE to execute and write the output to the specified file.

Restrictions

- If you specify a compound statement, you must enclose the simple statements within a BEGIN-END block.
- When you use ON LP: to send output directly to a line printer, DATATRIEVE assumes your system has a line printer. If your system does not have a device defined as LPA0:, the clause ON LP: will not work. Although this restriction applies to any system without a line printer, you may encounter it unexpectedly if your system is part of a VAXcluster with a common line printer. The ON LP: clause does not work in a VAXcluster that uses a common printer not directly connected to your system.

  If the nodes in the cluster are connected with DECnet, you can work around this restriction. To send output from a node without a line printer, you must include the node name of the system with the line printer in the LP: specification. For example, if the cluster's line printer is on a node named BIGVAX, the following PRINT statement sends output to it:

  ```
  DTR> PRINT YACHTS ON BIGVAX::LP:
  ```

  Note that you cannot directly specify the line printer on BIGVAX by using the cluster device-name BIGVAX$LPA0: in the ON clause.

- Use the ON statement, not the ON clause, to generate multiple reports within iterations of a loop.

  The following example generates a new version of the file Y for each iteration of the WHILE loop. The example uses a domain and record definition that are not in the DATATRIEVE samples. The company in this example uses invoices, each having a unique, identifying number. INVOICE_NUM represents these invoice numbers. CURRENT_NUM is the count of all invoices plus one.

```
DTR> READY INVOICES
DTR> WHILE INVOICE_NUM LT CURRENT_NUM
CON>   BEGIN
CON>   ON Y
CON>     REPORT INVOICE WITH PRICE = *
CON>     PRINT INVOICE_HEADER
CON>     END_REPORT
CON>  !
CON>  ! further processing of invoices
CON>  !
CON>  END
```

To generate a single version of the Y file containing all the WHILE reports, use the ON clause of the REPORT statement.

Result

DATATRIEVE writes the output of the simple or compound statement to the file specified.

Usage Notes

- Use the ON file-spec statement to file output of REPORT, PRINT, SUM, or LIST statements.
- To write the output to more than one file, nest the ON statement. Do not use a comma to separate each occurrence of ON file-spec. (See the second example.)

Examples

For all yachts built by AMERICAN, print the TYPE, PRICE, and RIG for each sloop. If the yacht is not a sloop, skip a line and print the message "NOT A SLOOP". Write the output to an RMS file.

If you use an IF-THEN-ELSE statement and specify the same file name in the THEN and ELSE clauses, DATATRIEVE creates two versions of the file.

```
DTR> FOR YACHTS WITH BUILDER = "AMERICAN"
CON> IF RIG = "SLOOP" THEN
CON>     PRINT TYPE, PRICE, RIG ON BOAT.RNO ELSE
CON>     PRINT SKIP, "NOT A SLOOP" ON BOAT.RNO
Creating file DB0:[MORRISON.REF]BOAT.RNO;1 ...
Creating file DB0:[MORRISON.REF]BOAT.RNO;2 ...
```

The content of BOAT.RNO;1 is:

```
MANUFACTURER   MODEL     PRICE   RIG

 AMERICAN    26          $9,895 SLOOP
```

The content of BOAT.RNO;2 is:

```
NOT A SLOOP
```

However, if you use the ON statement, all of the data can be written to the same file:

```
DTR> ON SHIP.RNO
CON> FOR YACHTS WITH BUILDER = "AMERICAN"
CON> IF RIG = "SLOOP" THEN PRINT TYPE, PRICE, RIG ELSE
CON> PRINT SKIP, "NOT A SLOOP"
Creating file DB0:[MORRISON.REF]SHIP.RNO;1 ...
```

The contents of SHIP.RNO is:

```
MANUFACTURER   MODEL     PRICE   RIG

 AMERICAN    26          $9,895 SLOOP

NOT A SLOOP
```

Write the output of a LIST statement to three files and display the output on the terminal. Include data on every family with three children:

```
DTR> ON FAM1.RNO
CON> ON FAM2.RNO
CON> ON FAM3.RNO
CON> ON TT:
CON> LIST FAMILIES WITH NUMBER_KIDS = 3
Creating file DB0:[MORRIS.REF]FAM1.RNO;1 ...
Creating file DB0:[MORRIS.REF]FAM2.RNO;1 ...
Creating file DB0:[MORRIS.REF]FAM3.RNO;1 ...
Sending output to terminal TT.
```

(continued on next page)

```
FATHER      : GEORGE
MOTHER      : LOIS
NUMBER_KIDS :  3

    KID_NAME    : JEFF
    AGE         : 23

    KID_NAME    : FRED
    AGE         : 26

    KID_NAME    : LAURA
    AGE         : 21

FATHER      : HAROLD
MOTHER      : SARAH
NUMBER_KIDS :  3

    KID_NAME    : CHARLIE
    AGE         : 31

    KID_NAME    : HAROLD
    AGE         : 35

    KID_NAME    : SARAH
    AGE         : 27

DTR>
```

DATATRIEVE sends the output to the terminal and creates the three files specified. All three files contain the data displayed on the terminal.

7.50 OPEN Command

Opens an RMS file to serve as a log of your interactive dialogue with DATATRIEVE. DATATRIEVE copies both your input and its own output to the file exactly as displayed on your terminal.

Format

```
OPEN   file-spec
```

Argument

file-spec

Is the VMS file specification of the file to be opened. The file specification must be in the following format:

node-spec::device:[directory]file-name.type;version

Restrictions

- None of your input to nor the output from the editor or Guide Mode is written to the log file.
- If you use the OPEN command in a procedure, no statements or commands in the procedure are written to the log file. The output of a procedure, however, is written to the file.
- If you invoke a procedure after you have used the OPEN command, none of the commands or statements in the procedure are written to the log file.
- You cannot use the OPEN command in BEGIN-END, FOR, or REPEAT statements.
- You cannot have two log files open at the same time. If you enter a second OPEN command without closing the first log file, DATATRIEVE automatically closes the first log file and opens another one, even if you give the same file specificiation in both OPEN commands.

Results

- Except for the dialogue with the editor, Guide Mode, and procedures, DATATRIEVE writes both your input and its own output to the VMS file you specify in the command.
- If you have a log file open when you invoke a command file, DATATRIEVE includes the various DATATRIEVE prompts (such as DTR> and CON>) in the log file, even though it does not display those prompts on your terminal when it executes the commands and statements in the command file.
- DATATRIEVE closes the file under four circumstances:
  - When you enter another OPEN command
  - When you enter a CLOSE command
  - When you exit from DATATRIEVE with the EXIT command or with CTRL/Z
  - When you exit from DATATRIEVE with CTRL/Y
- If you close the file with a CLOSE or EXIT command, that command is also included in the file. If you close the file by exiting from DATATRIEVE with a CTRL/Z or CTRL/Y, neither the control character nor any of the input line is included in the file.

Usage Notes

- Keeping log files of your dialogue with DATATRIEVE can provide you with a transaction log.
- Keeping a log file of your dialogue with DATATRIEVE can aid in development and debugging of DATATRIEVE applications.
- Keeping a log file of your dialogue with DATATRIEVE is essential when submitting a Software Performance Report (SPR) to DIGITAL. See Appendix C for more information on submitting an SPR.
- To include the contents of a procedure into a log file, enter a SHOW procedure-name command before invoking the procedure.

Example

This example opens a log file, displays the contents of a procedure, invokes the procedure, closes the log file with a CTRL/Z exit from DATATRIEVE, and uses the VMS TYPE command to display the contents of the log file:

```
DTR> OPEN LOG
DTR> !THIS IS A TEST OF THE OPEN COMMAND.
DTR> READY YACHTS
DTR> SHOW SELL_BOAT
PROCEDURE SELL_BOAT
FIND YACHTS WITH BUILDER EQ *.BUILDER AND MODEL EQ *.MODEL
PRINT ALL
IF *."Y IF BOAT SOLD" EQ "Y" THEN ERASE ALL ELSE
       PRINT "SELL IT NOW!"
END_PROCEDURE

DTR> :SELL_BOAT
Enter BUILDER: ALBIN
Enter MODEL: VEGA

                                  LENGTH
                                   OVER
MANUFACTURER   MODEL     RIG       ALL    WEIGHT BEAM  PRICE

 ALBIN       VEGA       SLOOP    27     5,070  08  $18,600

Enter Y IF BOAT SOLD: N

SELL IT NOW!
DTR> CTRL/Z
$ TYPE LOG.LIS
DTR> !THIS IS A TEST OF THE OPEN COMMAND.
DTR> READY YACHTS
DTR> SHOW SELL_BOAT
PROCEDURE SELL_BOAT
FIND YACHTS WITH BUILDER EQ *.BUILDER AND MODEL EQ *.MODEL
PRINT ALL
IF *."Y IF BOAT SOLD" EQ "Y" THEN ERASE ALL
PRINT "SELL IT NOW !"
END_PROCEDURE

DTR> :SELL_BOAT
Enter BUILDER: ALBIN
Enter MODEL: VEGA

                                  LENGTH
                                   OVER
MANUFACTURER   MODEL     RIG       ALL    WEIGHT BEAM  PRICE

 ALBIN       VEGA       SLOOP    27     5,070  08  $18,600

Enter Y IF BOAT SOLD: N

SELL IT NOW!
$
```

7.51 PICTURE Clause

Specifies the format of the field value as it is stored.

Format

```
PIC[TURE] [IS] picture-string
```

Argument

picture-string

Is one or more picture-string characters describing the format in which the field value is stored.

Restrictions

- This clause is valid for elementary fields only.
- Specify the picture-string characters as a string. Do not embed a space in the picture string.

Results

The storage format for the field's content is determined by the specified picture string. In general, each character in the string corresponds to one character position in the field value.

Usage Notes

- For numeric fields, you can also include a USAGE clause to specify the internal format of the digits. For example, for a numeric field without a USAGE clause, 999999 specifies six digits in six character positions, occupying six bytes of storage.
- To enter a series of identical picture characters, you can shorten the string by placing a repeat count in parentheses following the picture character. For example, the picture string 9(6) is equal to 999999.

Table 7-14 contains a list of the picture-string characters. The picture-string characters you specify for a field depend on the class of the field: alphabetic, alphanumeric, or numeric.

Table 7-14: Picture String Characters

Field Class	Picture Character	Meaning
Alphabetic	A	Each A represents one alphabetic character in the field.
Alphanumeric	X	Each X represents one character in the field.
Numeric	9	Each 9 represents one digit in the field. You can specify from 1 to 31 digits for a numeric field.
	S	An S indicates that a sign (+ or −) is stored in the field. A picture string can have only one S and it must be the leftmost character. If there is no SIGN clause for the field, the sign shares the rightmost character position with the lowest-valued digit.
	V	A V indicates an implied decimal point. The decimal point does not occupy a character position in the field, although DATATRIEVE uses its location to align data in the field. A picture string can contain only one V.
	P	Each P specifies a decimal scaling position. Each P represents a "distance" in digits from an implied decimal point. (A P does not count toward the limit of 31 digits per field.) A P can appear at the right or left of the picture string. A V is unnecessary for any picture string containing a P.

7.51.1 Alphabetic Fields

The picture string for an alphabetic field specifies the number of characters in the field. Only the picture character A is valid in the picture string for an alphabetic field. Each A corresponds to a single character position in the field. For example, the following field definition specifies an alphabetic field of six characters:

```
06 LETTERS_ONLY PIC A(6).
```

7.51.2 Alphanumeric Fields

The picture string for an alphanumeric field specifies the number of characters in the field. Only the picture character X is valid in the picture string for an alphanumeric field. Each X corresponds to a single character position in the field. For example, the following field definition specifies that the MODEL field contains ten alphanumeric characters:

```
06 MODEL PIC X(10).
```

7.51.3 Numeric Fields

A numeric field can contain the characters 9, S, V, and P in its picture string to specify: the number of digits in the field, a sign, an implied decimal point, and a decimal scaling factor.

Specifying the Number of Digits

The picture character 9 represents one digit in the field value. For example, the picture string 9(4) indicates four digits; the field value can range from 0 to 9999. There is one exception to this; if you specify PIC 9999 and USAGE IS COMP, then it is possible to store numbers as large as 32,768. You can specify from 1 to 31 digits for a numeric field.

The following field definition specifies that the BEAM field contains two digits:

```
03 BEAM PIC 99.
```

Specifying a Sign

To specify that a numeric field can contain a sign (+ or −), you must include an S in its picture string. The S must be the leftmost character in the picture string; a picture string can contain only one S. For example, the picture string S9(4) indicates a signed field, four digits in length; the field value can range from −9999 to +9999.

The sign specified with the PICTURE clause is not printed unless you include an EDIT_STRING clause with the field definition. For example, the following field definition specifies a sign in the picture string, which is printed following the last digit of the field value:

```
03 CURRENT_BALANCE
   PICTURE IS S9999V99
   EDIT_STRING IS $$$$9.99-.
```

Specifying a Decimal Place

The picture character V specifies the position of an "implied" decimal point. For example, the picture string 9(5)V99 specifies a 7-digit field; the last two digits of the field value follow the decimal point.

The decimal point does not occupy a character position in the record; DATATRIEVE uses the implied decimal point in computations, Boolean expressions, and other arithmetic operations.

DATATRIEVE does, however, display the implied decimal point when you retrieve the value from a field with a V in the picture string. You do not have to use an edit string solely for the purpose of expressing the decimal point in the output format.

If there is no V in the picture string, DATATRIEVE treats the field value as an integer (that is, as if a V were specified to the right of the rightmost digit). Thus, the picture strings 999 and 999V are equal.

Scaling Factor

The picture character P specifies a decimal scaling position. Each P represents one decimal position between the value stored in the field and the implied decimal point of the value. A P does not occupy a character position in the field.

The P (or multiple Ps) must be the leftmost or rightmost characters in the picture string. If the P is the leftmost character(s), the decimal point is assumed to be to the left of the leftmost P. For example, the picture strings PPP99 and VPPP99 are equal. (If you specify a P in a picture string, the V character is optional.) If the P is the rightmost character(s), the decimal point is assumed to be to the right of the rightmost P. Thus, 999PP and 999PPV are equal.

DATATRIEVE treats each P in a picture string as a zero. The string PPP99 specifies that the field can contain values in the range 0 to .00099; the three leftmost digits are assumed to be zeros. The range of values for a field with a picture string of 999PP is 0 and 100 to 99,900, but the two rightmost digits are assumed to be zeros.

You do not need to use an edit string to display the decimal point in fields with P picture string characters in them.

If the picture string of a field contains one or more Ps at the left of its picture string, DATATRIEVE includes the implied decimal in the default formats when you retrieve a value from the field. The scaling positions are displayed as zeros between the decimal point and the value stored in the field.

If the picture string of a field contains one or more Ps at the right of its picture string, DATATRIEVE includes the implied decimal in the default formats when you retrieve a value from the field. The scaling positions are displayed as zeros between the decimal point and the value stored in the field.

7.52 PLOT Statement

Causes DATATRIEVE to format and then write a plot to your terminal, to a file, or to a unit record device.

Format

```
PLOT plotname  [USING]  [ALL]

        [arg [,  arg]...]  [OF rse]

          [ON { file-spec }]
              { *.prompt  }
```

Arguments

plotname

Is the name of the plot.

USING

Is an optional keyword.

arg

Is a value expression and an optional label. The label is a quoted string that follows the value expression and is enclosed in parentheses.

ALL
OF rse

Specifies the record stream to be used in the plot.

- The keyword ALL is optional if you use the OF rse clause.
- The keyword ALL is required if you use the current collection without any qualification.

file-spec

Is the file specification of the file to which you want to write the output of the PLOT statement. A complete file specification has the following format:

```
node-spec::device:[directory]file-name.type;version
```

*.prompt-name

Is a prompting value expression that prompts you for a file specification to which you want to write the output of the PLOT statement. .

Restriction

You cannot plot data that includes null date values. To exclude records with null date values from a plot, put the expression WITH DATE NE " " in the RSE of your PLOT statement.

Usage Note

The *VAX DATATRIEVE Guide to Using Graphics* illustrates the results of all the PLOT statements and presents many other examples.

Examples

Produce a simple bar chart showing the salary for each employee in PERSONNEL:

```
DTR> FIND PERSONNEL SORTED BY DEPT
DTR> PLOT BAR ALL LAST_NAME, SALARY
DTR>
```

Plot a marsupial:

```
DTR> PLOT WOMBAT
DTR>
```

7.53 PRINT Statement

Causes DATATRIEVE to format and write one or more values of specified or implied DATATRIEVE value expressions to your terminal, to a file, or to a unit record device.

Format

Retrieving from Selected Records and Target Record Streams Formed by FOR Loops

```
PRINT [print-list]   [ON  { file-spec }]
                          { *.prompt  }
```

Retrieving from the Current Collection

```
PRINT ALL [print-list]   [ON  { file-spec }]
                              { *.prompt  }
```

Retrieving From Record Streams Formed by the PRINT Statement

1. One RSE

```
PRINT [print-list OF] rse   [ON  { file-spec }]
                                 { *.prompt  }
```

2. Two RSE's (Inner print list follows another print list)

```
PRINT print-list, ALL print-list OF rse-1 [,print-list] OF rse-2

      [ON  { file-spec }]
           { *.prompt  }
```

3. Two RSE's (Inner print list precedes any other print list)

```
PRINT ALL ALL print-list OF rse-1 [,print-list] OF rse-2

      [ON  { file-spec }]
           { *.prompt  }
```

Arguments

print-list

Is a list of value expressions and formatting specifications. Table 7-15 describes the print-list elements. Table 7-16 describes the modifiers you can use to control the column header and format for each data field in the output of the PRINT statement

ALL

When used alone following PRINT, ALL causes the records in the current collection to be displayed on your terminal or written to the specified file or device.

When used with a print list, ALL causes the print list to be evaluated for each record in the current collection.

When the print list begins with an inner print list, ALL is required to establish the proper context in which to resolve references to the items in the hierarchical list.

rse

Is a record selection expression that creates the record stream DATATRIEVE uses to evaluate the elements of the print list.

file-spec

Is the file specification of the file to which you want to write the output of the statement.

A complete file specification has the following format:

```
node-spec::device:[directory]file-name.type;version
```

If you omit a field in the file specification, DATATRIEVE uses the following defaults.

Field	Default
node-spec::	Your local node
device:	Your default device
[directory]	Your default directory
file-name	Null string
.type	.LIS
;version	1 or next higher version number

The minimum file specification consists of a period (.); the specification of such a file stored in your default VMS directory ends with .;n, where n is the version number and both the file name and the type are null strings.

*.prompt-name

Is a prompting value expression that prompts you for a file specification to which you want to write the output of the statement.

Restrictions

- To print data from records in a domain, you must ready the domain for READ, WRITE, or MODIFY access. You cannot print data from domains readied for EXTEND access because you cannot establish collections or record streams from domains readied for EXTEND access. See the section in this chapter on the READY command for more information.
- If you specify a device name in a PRINT statement, the device must be one to which you have access, such as a line printer, a tape drive, your own terminal, or another terminal. You cannot cause the output of the PRINT statement to be displayed on another terminal that is logged in.
- When you use ON LP: to send PRINT statement output directly to a line printer, DATATRIEVE assumes your system has a line printer. If your system does not have a device defined as LPA0:, the clause ON LP: will not work.

Although this restriction applies to any system without a line printer, you may encounter it unexpectedly if your system is part of a VAXcluster with a common line printer. The ON LP: clause does not work in a VAXcluster that uses a common printer not directly connected to your system.

If the nodes in the cluster are connected with DECnet, you can work around this restriction. To send output from a node without a line printer, you must include the node name of the system with the line printer in the LP: specification. For example, if the cluster's line printer is on a node named BIGVAX, the following print statement sends output to it:

```
DTR> PRINT YACHTS ON BIGVAX::LP:
```

Note that you cannot directly specify the line printer on BIGVAX by using the cluster device-name BIGVAX$LPA0: in the ON clause.

- To print character string literals, you must enclose the string with quotation marks. Single and double quotation marks may be used, but you must use like types of quotation marks in pairs. That is, you cannot begin a string with a single quotation mark and end it with a double quotation mark.

  Either kind of quotation mark may be contained in a character string literal defined by the other kind. Here are two valid examples:

```
DTR> PRINT "THEY'RE GONE."
THEY'RE GONE."

DTR> PRINT 'THEY SAID, "GOOD-BYE!"'
THEY SAID, "GOOD-BYE!"

DTR>
```

  To include a quotation mark of the same type as the ones that define the literal, you must type two quotation marks for every one you want to include in the output of the statement. The following two examples illustrate the type of alternatives you can choose for complex character string literals.

```
DTR> PRINT 'THEY SAID, "WE''RE GOING."'
THEY SAID, "WE'RE GOING."

DTR> PRINT 'THEY SAID, "WE''RE GOING."'
THEY SAID, "WE'RE GOING."

DTR>
```

- If you want to use a form to display the records with the PRINT statement, the definition of the domain with which you get access to the records must include a FORM clause. The domain and form definitions must adhere to the restrictions listed in the section on the DEFINE FILE command.

  SET FORM must be in effect when you ready the domain *and* when you enter the PRINT statement. Check the status of the SET FORM/NO FORM setting with the SHOW SET_UP command.

  DATATRIEVE uses a form to display records only if you omit the print list from the PRINT statement. That is, you must retrieve entire records from the target collection or record stream.

- To suppress or specify a column header on a print list element that includes a CDD object, you must enclose the entire value expression in parentheses. Examples of such print list elements include the following:

  - A field from a domain table or dictionary table using a VIA clause. This following example shows such a print list element:

    ```
    RW> PRINT (RIG VIA RIG_TABLE) (-)
    ```

  - A value that is determined by a procedure. For example:

    ```
    RW> PRINT (:DURATION) ("DURATION")
    ```

  You must use parentheses around the CDD object expression in these cases to avoid confusing the column header specification with a password for the CDD object.

Results

- DATATRIEVE evaluates the print list and writes the resulting output to the specified or implied file or device. The format and content of the output depends on the print list elements you include in the statement. Unless a COL n, SPACE [n], or TAB [n] element changes the position of the cursor, all output begins at column 1.

- If you do not put the PRINT statement in a FOR loop and do not include an RSE or the argument ALL, DATATRIEVE uses the data from the selected record of the most recently formed collection with a selected record to evaluate the print list. DATATRIEVE evaluates the print list once and creates one or more lines of output, depending on the formatting options you specify.

- If you specify the argument ALL and do not include an RSE, DATATRIEVE uses the data in the records of the CURRENT collection to evaluate the value expressions in the print list. DATATRIEVE evaluates the print list once for each record in the CURRENT collection and creates one or more lines of output for each record, depending on the formatting options you specify.
- If you include a record selection expression in a PRINT statement, DATATRIEVE uses the data in each record in the record stream to evaluate the value expressions in the print list. DATATRIEVE evaluates the print list once for each record in the record stream and creates one or more lines of output for each record, depending on the formatting options you specify.
- If you put a PRINT statement in a FOR loop, DATATRIEVE uses the data in each record in the record stream created by the RSE in the FOR statement. DATATRIEVE evaluates the value expressions in the print list once for each record and creates one or more lines of output for each record, depending on the formatting options you specify.
- Table 7-15 describes the print list elements you can include in the PRINT statement.

Table 7-15: Print List Elements

Print List Element	Function and Results
field-name [modifier] list-field-name [modifier]	Specifies the field whose contents are to be output. The optional modifier describes the column header for the field, or the format of the output, or both (Table 7-16). If the field is a group field, DATATRIEVE displays all elementary fields contained in that group field. If the field is a list and SET SEARCH is in effect, DATATRIEVE outputs one value of the list field per line per record. If you omit this element, all elementary fields are output.
literal [modifier] *.prompt-name [modifier] **.prompt-name [modifier] arithmetic-exp [modifier] statistical-exp [modifier]	Specifies a value expression to be evaluated and output. The optional modifier describes the column header for the value expression, or the format of the output, or both (see Table 7-16). Chapter 3 discusses these value expressions.

(continued on next page)

Table 7-15: Print List Elements (Cont.)

Print List Element	Function and Results
SPACE [n]	Inserts n horizontal spaces before the next print list element. If you omit n, DATATRIEVE inserts one space before the next print list element.
TAB [n]	Inserts the space of n tab characters before the next print list element. If you omit n, DATATRIEVE inserts the space of one tab before the next print list element. DATATRIEVE assumes that tabs are set every 8 spaces and inserts enough spaces (not actually tab characters) in the print line to start the next print list element in the appropriate column.
COL n	Determines that the following print list element begins in column n of the detail line. If n is less than the current column number, DATATRIEVE skips a line and begins the next print list element in column n. The first column in the line is column 1.
SKIP [n]	Begins the output of the next print list element at the beginning of the nth line from the current line. If n is greater than 1, the intervening lines are blank. If you omit n, DATATRIEVE moves the cursor to the beginning of the next line. If you omit this print list element, DATATRIEVE displays multi-lined output on consecutive lines.
NEW_PAGE	Moves the cursor to the top of a new print page. Column headers are suppressed, and output begins at column 1 unless another print list element changes the position of the cursor.
ALL print-list OF rse	Specifies an inner print list. DATATRIEVE evaluates the inner print list once for each record specified by the outer RSE. This print list element is generally used with a list in a hierarchical record to display all the values in the list for each of the records. When dealing with lists, the list name is the source of the RSE in the print list element. If an inner print list is the first element in a print list, you must add a required ALL before the inner print list (ALL ALL print-list OF rse OF rse). This additional ALL is *not* required if another print list element precedes the inner print list.

- Table 7-16 describes the modifiers you can use to control the column header displayed above a value expression and to specify the edit string that determines the format of each individual value expression in the print list.

Table 7-16: Print List Modifiers

("header-segment"[/...])	
	Specifies one or more character string literals to be displayed as a column header above the first line of output from the PRINT statement. The entire modifier must be enclosed in parentheses and must immediately follow its associated field name or value expression. If you specify one header segment, the literal is printed on one line above the first line of output from the PRINT statement. If the header is shorter than the field reserved for that value, the header is centered above the field. If the header is longer than the field reserved for its associated value by the edit string, the field is centered under the header. In this case, however, DATATRIEVE determines the placement of the other output fields relative to the length of the header, not the length of the field. If you specify more than one header segment ("header-1"/"header-2"[/...]), the segments are printed on successive lines, centered above the associated field. The width of the field is determined by the edit string for the field or the longest header segment, whichever is longer.
(-)	
	If you specify a hyphen in parentheses (-) following a field name or a dictionary table value expression, DATATRIEVE does not display any query header associated with the field in its record definition or with the dictionary table in its CDD definition. If you omit the column header modifier after a field name, variable, or dictionary table value expression, DATATRIEVE uses the query header for the element if one has been defined. If no query header has been defined for a dictionary table, no header is displayed. If no query header has been defined for the elementary field, the field name is used. If the field name has underscores in it, DATATRIEVE suppresses the underscores and converts the field name to a multiline header (for example, see LENGTH_OVER_ALL). If no query header has been defined for the variable, the variable name is used.

(continued on next page)

Table 7-16: Print List Modifiers (Cont.)

	For the header of value expressions formed with the statistical functions, MAX, MIN, AVERAGE, STD_DEV, and TOTAL (for example, MAX PRICE), DATATRIEVE combines the name of the function and the field name to form a multiline query header. For functions (beginning with FN$), DATATRIEVE uses the function name to form a column header. For all other value expressions, DATATRIEVE does not output a column header.
USING edit-string	Imposes the characteristics of the specified edit string on the preceding field or value expression. The edit string must conform to the rules that govern the EDIT_STRING clause of a DATATRIEVE record definition. See the section in this chapter on the EDIT_STRING clause for more information. If you follow an edit string with other print list items, be sure to put a space between the last character of the edit string and the comma that separates the edit string from the next print list element. If you omit this modifier for a field name or statistical expression, DATATRIEVE uses the edit string specified for the field in the record definition or the PICTURE (or PIC) clause if no edit string is given. If you omit this modifier for a variable, DATATRIEVE uses either the edit string specified in the DECLARE statement that created the variable or the PICTURE (or PIC) clause if no edit string was given. If you omit this modifier for a prompting value expression, DATATRIEVE uses a default alphanumeric edit string 10 characters long, that is, X(10).

- If you use a prompting value expression to specify the output file or device, DATATRIEVE prompts you for the name when it executes the PRINT statement. If you omit this argument, DATATRIEVE displays the output on your terminal.
- If you end your file specification with the name of a line printer or another terminal that is not a spooled device, the output of a PRINT statement can be immediately displayed on the device. Consult the VMS documentation set for details regarding spooled devices.

Usage Notes

- The print list argument allows you to specify the following types of information:
  - The *data* to be included in the output. Data can be the contents of a field, the value of a variable, or any other value expression.
  - The *format* of the data in the output. You can specify an edit string to override any edit string in the field or variable definition or to format a value expression.
  - The *spacing* (both horizontal and vertical) for the output. You can insert tabs or spaces between columns or skip lines between lines of output.
  - *Column headers* for each column of data in the output. You can also indicate that no header is to be printed above a column.
- When you enter a PRINT statement that has no print list (PRINT ALL or PRINT rse), DATATRIEVE automatically formats the output for you. DATATRIEVE uses the following defaults when you omit the print list:
  - The *data* included in the output is the contents of all fields in the selected record (PRINT), the records in the CURRENT collection (PRINT ALL), or the records in the record stream formed by the RSE in the PRINT statement (PRINT rse).
  - The *format* of the field contents is determined by the record definition.
  - The horizontal *spacing* is based on the longest of three items: the edit string if one is specified, the longest segment of the header, or the length of the value of the print-list element.

    The output begins in column 1. The output is single-spaced with a single blank line following the header line.
  - *Column headers* for fields are the query headers or the field names if there is no query header. If the field name contains an underscore, DATATRIEVE suppresses the underscore and places each part of the field name on a separate line. The header is centered above the column of data. If the query header contains only a hyphen, DATATRIEVE does not print any header.
- You can use inner print lists to display data in the lists of hierarchical records.

- You can use the ON clause of the PRINT statement to specify only one output file at a time. Use nested ON statements to write the output of the PRINT, LIST, REPORT, or SUM statements to multiple files.
- With SET SEARCH in effect, you can print the data in lists by letting DATATRIEVE generate implicit inner print lists. You must, however, establish the appropriate context for the target record containing the list and for the list itself. SET SEARCH supplies the ALL and OF rse elements of the inner print list; you supply the print list.

  For example, display the father and kids of the first two families:

```
DTR> SET SEARCH
DTR> READY FAMILIES
DTR> PRINT FATHER, EACH_KID OF FIRST 2 FAMILIES

              KID
  FATHER      NAME    AGE

JIM        URSULA      7
           RALPH       3
JIM        ANNE       31
           JIM        29
           ELLEN      26
           DAVID      24
           ROBERT     16

DTR>
```

Examples

- Retrieving Data from Selected Records

```
DTR> FIND FIRST 2 YACHTS
DTR> SELECT; PRINT TYPE, LOA, PRICE

                           LENGTH
                            OVER
MANUFACTURER    MODEL       ALL     PRICE

 ALBERG       37 MK II      37    $36,951
```

- Retrieving Data from Target Streams Formed by FOR Loops

```
DTR> FOR FIRST 2 YACHTS
CON> PRINT TYPE, LOA, PRICE

                           LENGTH
                            OVER
MANUFACTURER   MODEL        ALL     PRICE

 ALBERG      37 MK II     37     $36,951
 ALBIN       79           26     $17,900

DTR>
```

- Retrieving Data from Hierarchical Records Using Nested FOR Loops

```
DTR> FOR FIRST 2 FAMILIES
CON> FOR KIDS
CON> PRINT MOTHER, FATHER, KID_NAME

                           KID
  MOTHER      FATHER       NAME

ANN         JIM         URSULA
ANN         JIM         RALPH
LOUISE      JIM         ANNE
LOUISE      JIM         JIM
LOUISE      JIM         ELLEN
LOUISE      JIM         DAVID
LOUISE      JIM         ROBERT

DTR>
```

- Retrieving Data from the CURRENT Collection

```
DTR> FIND FIRST 2 YACHTS
DTR> PRINT ALL TYPE, LOA, PRICE

                           LENGTH
                            OVER
MANUFACTURER   MODEL        ALL     PRICE

 ALBERG      37 MK II     37     $36,951
 ALBIN       79           26     $17,900

DTR>
```

- Retrieving Data from Record Streams Formed by the PRINT Statement
  - One RSE

```
DTR> PRINT TYPE, LOA, PRICE OF FIRST 2 YACHTS

                             LENGTH
                              OVER
MANUFACTURER   MODEL          ALL    PRICE

 ALBERG      37 MK II     37     $36,951
 ALBIN       79           26     $17,900

DTR>
```

  - Two RSEs (inner print list follows another print list)

```
DTR> PRINT FATHER, MOTHER,
CON>    ALL KID-NAME OF KIDS OF FIRST 1 FAMILIES

                             KID
  FATHER     MOTHER          NAME

JIM        ANN         URSULA
                       RALPH

DTR>
```

  - Two RSEs (inner print list precedes any other print list)

```
DTR> PRINT ALL ALL KID-NAME OF FIRST 1 KIDS,
CON>    MOTHER OF FIRST 2 FAMILIES

   KID
   NAME      MOTHER

URSULA     ANN
ANNE       LOUISE

DTR>
```

7.54 PRINT Statement (Report Writer)

Specifies the following characteristics of the detail lines in a report:

- The content of the detail lines—field values or other desired values and text strings
- The format of fields in the detail lines—order, column position, and edit string format of print objects
- Column headers for the print objects in the detail line

You can include only one PRINT statement in a report specification. If your report specification contains an AT statement, then it does not have to contain a PRINT statement.

Format

```
PRINT   print-list-element   [,...]
```

Argument

print-list-element

Specifies values, position, and format of the print objects in the detail line.

Table 7-17 indicates the parameters of the report controlled by various print list elements.

Table 7-17: Report Parameters Controlled by Print List Elements

Parameter	Print List Element	Usage Notes
Content of Detail Line	Field-name [modifier]	Can include elementary, group, list, REDEFINES or COMPUTED BY fields; to print all fields, specify the top-level field name.
	Related value-expression [modifier]	Derived from field values using arithmetic operators or RUNNING TOTAL.

(continued on next page)

Table 7-17: Report Parameters Controlled by Print List Elements (Cont.)

Parameter	Print List Element	Usage Notes
	Other value-expression [modifier]	Can include literals, variables, or RUNNING COUNT.
Format of Detail Line	COL n	Specifies where the output of the next print list element begins.
	TAB [n]	Inserts the space of n tab characters before the output of the next print list element.
	SKIP [n]	Begins printing the next print list element n lines from the current line.
	SPACE [n]	Inserts spaces between the output of the preceding and following print list elements.
Beginning of New Page	NEW_PAGE	Causes the Report Writer to start a new report page.

Table 7-18 indicates the parameters of the report controlled by modifiers of print list elements.

Table 7-18: Report Parameters Affected by Print List Modifiers

Parameter	Print List Modifier	Usage Notes
Column headers for print items	("header-segment"[/...])	Specifies one or two line headers for the preceding field or value expression, overriding the field name or query header from the record definition.
	(-)	Suppresses the header indicated for the field in the record definition.

(continued on next page)

Table 7-18: Report Parameters Affected by Print List Modifiers (Cont.)

Parameter	Print List Modifier	Usage Notes
Format of the detail line item	USING edit-string	Imposes the characteristics of the edit string on the line item preceding field name or value expression.

Restriction

To suppress or specify a column header on a print list element that includes a CDD object, you must enclose the entire value expression in parentheses. Examples of such print list elements include the following:

- A field from a domain table or dictionary table using a VIA clause. An example of such a print list element would be:

```
RW> PRINT (RIG VIA RIG_TABLE) (-)
```

- A value that is determined by a procedure. For example:

```
RW> PRINT (:DURATION) ("DURATION")
```

You must use parentheses around the CDD object expression in these cases to avoid confusing the column header specification with a password for the CDD object.

Usage Notes

- Unlike the PRINT statement used at the DATATRIEVE command level, the Report Writer PRINT statement must be followed by at least one print list element. If you enter PRINT without a print list element, the Report Writer prompts you for one.

- If the value of COLUMNS_PAGE is too small to accommodate all the fields, the Report Writer carries the overflow fields onto the next line. No field is split between lines, but the column headers of the overflow fields may be lost.

- When specifying the detail line, you are not restricted to the field order of the record definition. In the PRINT statement, you can list the fields (and their column headers and edit strings) in any order you choose.

- When the data you are reporting includes a list, use an inner print list element (ALL [print-list] of rse) in the PRINT statement to specify the value, position, and format for fields in the list. Each item of the list takes at least one physical line of printing.
- If you do not specify positions or edit strings for any of the fields in a detail line, the Report Writer determines the format for those fields using these criteria:
  - If the field definition contains an edit string, that edit string determines the format for the field.
  - If the field definition has no edit string, the PICTURE clause determines the format for the field.
  - If the field definition has neither an edit string nor a PICTURE clause, the Report Writer invents a picture clause to accommodate the data in the field.

  To gain full control over the formats of the fields of your detail lines, explicitly define edit strings with a USING clause.
- If the print list includes a field name and the running total for that field, the Report Writer puts both values in the same column, even if you specify a separate column header with RUNNING TOTAL:

```
DTR> REPORT FIRST 3 PAYABLES
RW> PRINT WHSLE_PRICE,
RW>  RUNNING TOTAL WHSLE_PRICE ("TOTAL"/"OWED") USING $$$,$$$
RW> END_REPORT

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                                        WHSLE
                                        PRICE

                                       $40,000
                                       $40,000
                                       $28,500
                                       $68,500
                                       $13,500
                                       $82,000

DTR>
```

You can print the running total in a separate column by specifying a column assignment:

```
DTR> REPORT FIRST 3 PAYABLES
RW> PRINT WHSLE_PRICE,
RW>  COL 15, RUNNING TOTAL WHSLE_PRICE ("TOTAL"/"OWED") USING $$$,$$$
RW> END_REPORT

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    WHSLE      TOTAL
    PRICE      OWED

   $40,000    $40,000
   $28,500    $68,500
   $13,500    $82,000

DTR>
```

Examples

For examples of the PRINT statement in the Report Writer, see the *VAX DATATRIEVE Guide to Writing Reports.*

7.55 PURGE Command

Deletes all but the highest version of specified dictionary objects.

Format

```
PURGE ┌path-name  [,...]┐  [KEEP  [=]  n]
      └ALL              ┘
```

Arguments

path-name

Specifies the object you want to purge. The path name must include the name of a domain, record, procedure, or table. The path name cannot contain a version number or a semicolon. If you do not specify a path name, DATATRIEVE purges all objects in your default dictionary directory.

ALL

Purges all the definitions in the default dictionary directory. ALL is the default.

KEEP [=] n

Specifies the number of versions of each object you want to keep. The number must be greater than zero. The default is KEEP=1.

Usage Notes

- By default, PURGE with no arguments is the same as PURGE ALL KEEP = 1.
- Because dictionary directories cannot have multiple versions, PURGE does not delete them. PURGE deletes only the objects in the directory. Specifying a dictionary as the final object in a path name generates an error message.
- You need P (PASS_THRU), S (SEE), R (DTR_READ), and either D (LOCAL_DELETE) or G (GLOBAL_DELETE) access privileges for each object to be deleted.
- If you do not have S (SEE) and R (DTR_READ) access to every object in a directory, PURGE and PURGE ALL do not delete any versions of any object in that directory.

Examples

The following example shows how PURGE deletes all but the highest versions of objects in a user's CDD directory:

```
DTR> SHOW ALL
Domains:
        FAMILIES;3     FAMILIES;2     FAMILIES;1     OWNERS;2
        OWNERS;1       PETS;2         PETS;1         PROJECTS;3
        PROJECTS;2     PROJECTS;1     YACHTS;5       YACHTS;4

Records:
        FAMILY_REC;2   FAMILY_REC;1   OWNER_RECORD;2 OWNER_RECORD;1
        PET_REC;1      PROJECT_REC;1  YACHT;2        YACHT;1

The default directory is CDD$TOP.DTR$USERS.BELL
No established collections.
No ready sources.
No loaded tables.

DTR> PURGE
DTR> SHOW DOMAINS, RECORDS
Domains:
        FAMILIES;3     OWNERS;2       PETS;2         PROJECTS;3
        YACHTS;5
Records:
        FAMILY_REC;2   OWNER_RECORD;2 PET_REC;1      PROJECT_REC;1
        YACHT;2

DTR>
```

The next example illustrates the error message generated if you specify a dictionary directory as the final object in the path name. It then shows how PURGE works with the path name and KEEP arguments.

```
DTR> SHOW DICTIONARY
The default directory is CDD$TOP.DTR$USERS.BELL

DTR> PURGE CDD$TOP.DTR$USERS.BELL
Element "CDD$TOP.DTR$USERS.BELL" is not a Domain, Record, Procedure,
or Table.
No objects purged for dictionary element "CDD$TOP.DTR$USERS.BELL".
DTR> SHOW RECORDS
```

```
Records:
        FAMILY_REC;4   FAMILY_REC;3   FAMILY_REC;2  FAMILY_REC;1
        OWNER_RECORD;2 OWNER_RECORD;1 PET_REC;1     PROJECT_REC;1
        YACHT;2        YACHT;1

DTR> PURGE CDD$TOP.DTR$USERS.BELL.FAMILY_REC KEEP=2
DTR> SHOW RECORDS
Records:
        FAMILY_REC;4  FAMILY_REC;3  OWNER_RECORD;2  OWNER_RECORD;1
        PET_REC;1     PROJECT_REC;1 YACHT;2         YACHT;1

DTR>
```

7.56 QUERY_HEADER Clause

Specifies the column header DATATRIEVE uses when it formats the display of a field value for the PRINT statement or for the Report Writer AT and PRINT statements.

Format

```
QUERY_HEADER  [IS]  {"header-segment"}  [/...]
```

Argument

"header-segment"

Is the column header displayed above a column of data. If you specify only one character string literal, that string is printed on one line above the column. You can specify more than one character string literal by separating each from the next with a slash (/). The literals are printed on successive lines, centered above the column.

Restriction

This clause is valid for elementary fields only.

Results

- If you include this clause, DATATRIEVE uses the specified query header as the default column header when printing this field.
- If you omit this clause, DATATRIEVE uses the field name as the default column header when printing this field.

Usage Notes

- The column header can include any character except carriage return, line feed, or a control character. To include a quotation mark in a column header, precede it with another quotation mark. (See the third example.)
- You can perform the functions of the QUERY_HEADER clause with the column-header modifier for print list elements in the PRINT statement and the Report Writer AT and PRINT statements. The column-header modifier overrides the default query header specified in the field definition. (See Table 7-16 for more information on the print list modifiers.)

Examples

When the DISPLACEMENT field is displayed, use a column header of WEIGHT above the column of data:

```
06 DISPLACEMENT PIC 99999
            QUERY_HEADER IS "WEIGHT"
            EDIT_STRING IS ZZ,ZZ9
            QUERY_NAME IS DISP.
```

DATATRIEVE prints the column header as:

```
WEIGHT
```

When the LENGTH_OVER_ALL field is printed, use a column header of LENGTH (IN FEET) on two separate lines:

```
06 LENGTH_OVER_ALL PIC XXX
   QUERY_HEADER IS "LENGTH" /"(IN FEET)".
```

DATATRIEVE prints the column header as:

```
LENGTH (IN FEET)
```

When the LENGTH_OVER_ALL field is printed, use a column header of Length Over All ("LOA") on two separate lines:

```
06 LENGTH_OVER_ALL PIC XXX
   QUERY_HEADER IS "Length Over All"/"(""LOA"")".
```

DATATRIEVE prints the column header as:

```
Length Over All
    ("LOA")
```

When the LENGTH_OVER_ALL field is printed, use a three-line column header with one letter per line:

```
06 LENGTH_OVER_ALL PIC XXX
   QUERY_HEADER IS "L"/"O"/"A".
```

DATATRIEVE prints the column header as:

```
   L
   O
   A
```

7.57 QUERY_NAME Clause

Specifies an alternate name for the field.

Format

```
QUERY_NAME [IS] query-name
```

Argument

query-name

Is the query name. The rules for forming and using a query name are the same as those for a field name.

Restriction

The query name must conform to the rules for names (see Chapter 1).

Result

You can specify the query name as an alternate name for the field name.

Usage Notes

- This clause is valid for both group and elementary fields.
- Use the QUERY_NAME clause when a field name is too long to use easily.
- Like a field name, a query name can duplicate another query name (or a field name) in the record. A query name can also be qualified by other query names or field names.

Examples

Define DISP as an alternate name for the DISPLACEMENT field:

```
06 DISPLACEMENT PIC 99999
   QUERY_NAME IS DISP.
```

Define SPECS as an alternate name for the group field SPECIFICATIONS:

```
03 SPECIFICATIONS
   QUERY_NAME SPECS.
```

Define a query name of SPECIAL_HANDLING for the field DELINQUENT_ACCOUNT_STATUS:

```
09 DELINQUENT_ACCOUNT_STATUS
   PIC X
   QUERY_NAME IS SPECIAL_HANDLING.
```

7.58 READY Command

Gives you access to one or more domains, relations, databases or record types and controls the access of other users to those domains or databases. You can also use the READY command to ready a domain or database again in order to change your access mode or access option.

Format 1

```
READY   domain-path-name [AT node-spec] [AS alias-1]

           ┌ PROTECTED ┐   ┌ READ   ┐   ┌             ┐
           │ SHARED    │   │ WRITE  │   │ CONSISTENCY │
           └ EXCLUSIVE ┘   │ MODIFY │   │ CONCURRENCY │  [,...]
                           └ EXTEND ┘   └             ┘
           [SNAPSHOT]
```

Format 2

```
READY database-path-name

           [SNAPSHOT]

           ┌ PROTECTED ┐   ┌ READ   ┐   ┌             ┐
           │ SHARED    │   │ WRITE  │   │ CONSISTENCY │
           └ EXCLUSIVE ┘   │ MODIFY │   │ CONCURRENCY │
                           └ EXTEND ┘   └             ┘

          ┌                                                              ┐
          │ USING  { rdb-relation-name }  [AS alias]                     │
          │        { dbms-record-name  }                                 │
          │                                                              │
          │        [SNAPSHOT]                                            │  [,...]
          │                                                              │
          │        ┌ PROTECTED ┐   ┌ READ   ┐   ┌             ┐          │
          │        │ SHARED    │   │ WRITE  │   │ CONSISTENCY │          │
          │        └ EXCLUSIVE ┘   │ MODIFY │   │ CONCURRENCY │          │
          │                        └ EXTEND ┘   └             ┘          │
          └                                                              ┘
```

Arguments

domain-path-name

Is the dictionary path name of a domain to which you want access or the domain table whose access option you want to change.

node-spec

The node-spec consists of a node name and an optional access control string.

A node name is a 1- to 6-character name that identifies the location on the network. Examples are NATHAN or STAR.

An access control string indicates a particular account on the remote node. It consists of a user name, followed by one or more blanks or tabs, a password, and an optional account name.

The following three node specifications are valid:

```
NATHAN
NATHAN"MORRISON RYLE"
NATHAN"MORRISON RYLE KANT"
```

On DECnet links to some non-VMS systems, you can use the UIC number in place of the user name. For example:

```
NATHAN"[240,240] RYLE"
NATHAN"[240,240] RYLE KANT"
```

In the examples, the remote node is NATHAN, the user name is MORRISON, the UIC is [240,240], the password is RYLE, and the account name is KANT.

You can also use a prompting value expression to prompt the user for the user name, password, account name, or UIC. Use single quotation marks for the prompt string. For example:

```
DTR> READY CDD$TOP.DTR32.MORRISON.YACHTS AT
CON>     NATHAN"*.'username' *.'password'"
Enter username: MORRISON
Enter password:
DTR>
```

alias

Is a name you use if you include the AS clause in the READY command to refer to the domain, relation, or DBMS record specified. You use the alias in place of the given name of the domain, relation, or DBMS record where the syntax of a statement calls for that domain, relation, or DBMS record name. If you are using an alias for a domain name, do not use the alias in full or relative dictionary path names.

database-path-name

Is the CDD path name defined for the DATATRIEVE definition of the DBMS, Rdb/VMS, Rdb/ELN, or VAX-IBM Data Access (VIDA) facility database, or for the relational database definition created by Rdb/VMS. If you ready a DBMS or relational database without specifying any relation or record names, DATATRIEVE readies all relations or records in the database.

relation-name

Is the name assigned to the relation when the relational database was created. The relation name can be the name of a view relation.

record-name

Is the name assigned to the DBMS record when the database was created.

SNAPSHOT
PROTECTED
SHARED
EXCLUSIVE

Are the options you can select to control the access of other users to a domain, relation, or DBMS record you ready. The specific constraints are explained in the following table.

Table 7-19: Access Options

Option	Access Constraints
SNAPSHOT	SNAPSHOT is a READ access for databases that takes a "picture" of the database when it is readied. In order to have SNAPSHOT access, all relations or records pertaining to the database must be readied with SNAPSHOT access. Any other user can access the same database with any access mode and option. In general, you do not see other users' changes until the end of the transaction. If you use SNAPSHOT with another option, such as CONCURRENCY, you may see other users' changes, depending on the database system. SNAPSHOT is the default for relational databases, relations, and domains based on relational sources.
PROTECTED	Any other user can have only READ access to records in the domain or relation. No other user can have WRITE, MODIFY, or EXTEND access to the records in the domain or relation. This option is the default for domains containing records from VAX RMS files and for all view domains.
SHARED	Any other user can have access to the domain, database, relation, or DBMS record at the same time, in any access mode. This option is the default for DBMS domains, DBMS databases, and DBMS records.
EXCLUSIVE	No other user can have access to the domain, database, relation, or DBMS record at the same time, in any access mode. If the domain is an RMS domain, the file containing the data is locked by RMS.

READY
MODIFY
WRITE
EXTEND

Are the options you can select to request a mode of access to a domain, database, relation, or DBMS record. When using Format 1, whether you get that mode of access is determined by privileges assigned to you in the access control list of the domain. (See Chapter 2.) When using Format 2, whether you get that mode of access is determined by privileges assigned to you in the access control list of the database definition. When you are using either Format 1 or Format 2 and you are accessing a DBMS or relational database, you must also have appropriate privileges in the DBMS, Rdb/VMS or Rdb/ELN access control lists to request the access mode you select. For DBMS, you need access to the schema, subschema, record and DATATRIEVE database definitions in the CDD. Table 7-20 explains the access modes and lists the privileges (in the DATATRIEVE access control list) that give you each mode of access to a domain.

Table 7-20: Access Modes

Mode	Type of Access	Privileges Needed
READ	You can only retrieve records. (Default)	P (PASS_THRU), S (SEE), and R (DTR_READ), M (DTR_MODIFY), or W (DTR_WRITE)
MODIFY	You can retrieve and modify records.	P (PASS_THRU), S (SEE), and M (DTR_MODIFY) or W (DTR_WRITE)
WRITE	You can retrieve, modify, store, and erase records.	P (PASS_THRU), S (SEE), and W (DTR_WRITE)
EXTEND	You can only store records.	P (PASS_THRU), S (SEE), and W (DTR_WRITE) or E (DTR_EXTEND/EXECUTE)

CONSISTENCY
CONCURRENCY

Are the options you can select to determine whether you can see changes made by other users to the data you are accessing. CONSISTENCY guarantees that while you are accessing data, you do not see updates made by other users. CONSISTENCY is the DATATRIEVE default for the first ready of a relational source. For subsequent readies, the DATATRIEVE default is the consistency option from the most recent ready still in effect for a relational source. The CONSISTENCY option is not supported for VIDA databases.

CONCURRENCY allows you to see other users' updates to the data you are accessing.

Currently, Rdb/ELN, Rdb/VMS and VIDA implement CONSISTENCY and CONCURRENCY in different ways. See the *VAX DATATRIEVE User's Guide* for more information and for examples of how to access databases using CONSISTENCY and CONCURRENCY.

Table 7-21 summarizes the effects of various combinations of access options and access modes for RMS domains.

Table 7-21: Multi-User Access to RMS Domains

You Ready a Domain	Another User Can Then Ready the Domain	Your Effect on Other Users	Other Users' Effect on You
EXCLUSIVE READ EXCLUSIVE WRITE	No access.	No one else can read the file.	No effect.
PROTECTED READ	PROTECTED READ SHARED READ	No one else can write to the file.	No effect.
PROTECTED WRITE	SHARED READ	No one else can write to the file.	No effect.
SHARED READ	PROTECTED READ PROTECTED WRITE SHARED READ SHARED WRITE	No one with WRITE access can select your selected record.	Users with WRITE access may change records you are reading or have read.

(continued on next page)

Table 7-21: Multi-User Access to RMS Domains (Cont.)

You Ready a Domain	Another User Can Then Ready the Domain	Your Effect on Other Users	Other Users' Effect on You
SHARED WRITE	SHARED READ SHARED WRITE	No one else can modify your selected record or the target record of your MODIFY or ERASE statement. You can modify a record another user has just modified.	You cannot write to the selected record of any other user. You cannot write to the target record of a MODIFY or ERASE statement entered by a SHARED WRITE user. A SHARED WRITE user can also write to a record you have just modified.

When two applications try to access the same RMS domain, RMS may lock a record that DATATRIEVE needs to access. DATATRIEVE then tries for 12 seconds to access the record. At the end of this period, DATATRIEVE takes one of two actions, depending on whether SET LOCK_WAIT is in effect:

- *If SET NO LOCK_WAIT is in effect,* you receive an RMS$_RLK message: "Target record currently locked by another stream." Then DATATRIEVE aborts the statement. SET NO LOCK_WAIT is the default.
- *If SET LOCK_WAIT is in effect,* DATATRIEVE turns control over to RMS to wait for the record. You cannot use CTRL/C to cancel the wait. RMS waits until the record is released, or, in case of deadlock, you receive the RMS deadlock error message.

Table 7-22 summarizes the effects of various combinations of access options and access modes for DBMS domains and Rdb/VMS or Rdb/ELN domains and relations.

Table 7-22: Multi-User Access to DBMS, Rdb/VMS, and Rdb/ELN Sources

You Ready a Domain Database, Relation, DBMS Record	Another User Can Then Ready the Domain, Database, Relation, DBMS Record	Your Effect on Other Users	Other Users' Effect on You
EXCLUSIVE READ EXCLUSIVE WRITE	No access.	No one else can read the realm or relation.	No effect.
PROTECTED READ	PROTECTED READ SHARED READ	No one else can write to the realm or relation.	No effect.
PROTECTED WRITE	SHARED READ	No one else can write to the realm or relation. Other users may encounter write locks during your transaction.	You may encounter read locks other users have put on a record when you try to modify it.
SHARED READ	PROTECTED READ PROTECTED WRITE SHARED READ SHARED WRITE	A SHARED WRITE user may have to wait until you release your read locks.	You may encounter write locks during another user's transaction.
SNAPSHOT for Rdb/VMS or Rdb/ELN domains and DBMS records	With any access and mode.	No effect on users.	You do not see changes other users make to the database until a COMMIT or ROLLBACK is performed.
SHARED WRITE	SHARED READ SHARED WRITE	Other users may encounter read and write locks during your transaction.	You may encounter read and write locks during another user's transaction.

Restrictions

Format 1

- You can ready only one version of a domain at any one time. To achieve the effect of readying multiple versions of the same domain, ready the most recent version by the domain name and then ready other versions using aliases.
- When you move a domain definition from one part of the CDD to another using the CDD's Dictionary Management Utility (DMU) COPY command, you may not be able to ready the domain in its new location.

  Certain DATATRIEVE objects in the CDD, such as domains, refer to other objects. For example, domain definitions refer to record definitions and domain table definitions refer to domain definitions. DATATRIEVE stores pointers to referred objects by full path name even if you used relative path names for those objects in your definitions. Whenever DATATRIEVE processes these definitions, it translates references into full CDD path names. Because of this, you must redefine any object that you copy elsewhere in the CDD hierarchy using the DMU COPY command. For more information, see the *VAX Common Data Dictionary User's Guide.*
- PROTECTED READ is the default access for RMS domains.
- SNAPSHOT is the default access for relational domains. All readied domains pertaining to a relational database must be readied SNAPSHOT to have SNAPSHOT access.
- SHARED READ is the default access for DBMS domains.
- To ready a domain, you must have E (DTR_EXTEND/EXECUTE), S (SEE), and P (PASS_THRU) access privileges to the record definition associated with that domain. (See Chapter 2.)

  To ready a domain associated with a relation in a relational database, you must also have E (DTR_EXTEND/EXECUTE), S (SEE), and P (PASS_THRU) access privileges to the database definition associated with that domain.
- You must have the privilege to the domain that gives you access to the domain in the mode you specify. See Table 7-22 for a list of the privileges that you need for each access mode.
- The dictionary path name of a domain to be readied must include any passwords associated with the domain and the dictionary directories in its full dictionary path name.

- To ready a domain whose definition is stored in a dictionary directory other than the default one, you must have at least P (PASS_THRU) access to all the ancestors in the domain's path name.
- To ready a domain whose associated record definition is stored in a dictionary directory other than the default one, you must have at least P (PASS_THRU) access to all the ancestors in the record's path name.
- You cannot ready a domain unless the data file specified in the domain definition exists.
- You cannot ready a domain unless the data file associated with it is stored in a VMS directory that matches the file specification included in the domain definition (including any defaults for devices, directories, file name, and file type).
- To ready a domain for READ access, you must have at least VMS READ access to the data file associated with it.
- To ready a domain for WRITE, MODIFY, or EXTEND access, you must have VMS WRITE access to the data file.
- If another user has readied the domain for EXCLUSIVE use, you cannot ready the domain.
- If another user has readied the domain for PROTECTED use, you can ready the domain only for READ access.
- You cannot specify the SHARED access option for a domain using an RMS sequential data file.
- If a conflict occurs between the access mode and the access option you specify (such as trying to ready an RMS sequential file for PROTECTED WRITE), DATATRIEVE automatically readies the domain with the EXCLUSIVE access option.
- RMS does not enforce the EXCLUSIVE access option when you combine it with the READ access mode.

Format 2

- For information about the restrictions on readying VIDA databases, see the *VAX DATATRIEVE User's Guide* or the *Guide to VIDA Operations.*
- SNAPSHOT is the default access for Rdb/VMS and Rdb/ELN databases and domains and gives users read-only access to the database. Any other user can access the database with any access option and mode. You do not see changes other users make to the database until you perform a COMMIT, ROLLBACK, or a READY that starts a new transaction.
- SNAPSHOT is the default access for VIDA databases. But, you do see changes that other users make to the data you are accessing when you use SNAPSHOT access for VIDA databases or when you use SNAPSHOT with CONCURRENCY for either VIDA or Rdb/ELN databases. When you ready a VIDA or Rdb/ELN database with both SNAPSHOT and CONCURRENCY, DATATRIEVE behaves as though the access were SHARED READ. Because you must ready VIDA databases with the CONCURRENCY option, you see changes other users make to the data.
- You must use SET LOCK_WAIT whenever you access a VIDA database. SET NO LOCK_WAIT is the DATATRIEVE default. Therefore, for VIDA databases, you must specify SET LOCK_WAIT and leave the setting in effect until you finish all VIDA sources.
- You can ready VIDA databases only with the CONCURRENCY option. CONSISTENCY, or the last consistency option specified, is the DATATRIEVE default. Therefore, you must specify CONCURRENCY when you ready a VIDA database.
- To ready a database, relation, or DBMS record, you must have E (DTR_EXTEND/EXECUTE), S (SEE), and P (PASS_THRU) access privileges to the database definition associated with the relation or the DBMS schema and subschema, the DATATRIEVE/DBMS database definition that points to the DBMS schema and subschema, and the DATATRIEVE definition that points to the Rdb/VMS relation.

  You must have the privilege for the database definition that gives you access to the relations or DBMS records in the mode you specify. See Table 7-22 for a list of the privileges that you need for each access mode.
- The dictionary path name of a database to be readied must include any passwords associated with the database and the dictionary directories in its full dictionary path name.

- To ready a database whose definition is stored in a dictionary directory other than the default one, you must have at least P (PASS_THRU) access to all the ancestors in the database path name.
- You cannot ready a database unless the database root file specified in the database definition exists.
- You cannot ready a database unless the root file specification in the database CDD definition matches the VMS file specification (including any defaults for devices, directories, file name, and file type).
- To ready a database, one or more relations, or one or more DBMS records for READ access, you must have at least VMS READ access to the database root file associated with it.
- To ready a database, a relation, or a DBMS record for WRITE, MODIFY, or EXTEND access, you must have VMS WRITE access to the database root file.
- If another user has readied a database, relation, or DBMS record for EXCLUSIVE use, you cannot ready the relation or record.
- If another user has readied the database, relation, or DBMS record for PROTECTED use, you can ready the relation or record only for PROTECTED READ access, for SNAPSHOT access, or for SHARED READ access.
- You cannot mix access options when you use SNAPSHOT access. In order to have SNAPSHOT access for any DBMS record, you must ready all DBMS records with SNAPSHOT access.
- DATATRIEVE ignores commit operations while any DBMS, Rdb/VMS, and Rdb/ELN sources are readied in SNAPSHOT mode. If you ready two databases and use SNAPSHOT mode for one of them, you must finish the database readied in SNAPSHOT mode or ready it again in a mode other than SNAPSHOT before you can commit changes to the database that is not in SNAPSHOT mode.
- You cannot ready any part of a remote Rdb/VMS or DBMS database directly. You can, however, create Rdb/VMS and DBMS domain definitions on the remote node and ready the remote databases using those domains. In the case of Rdb/VMS, you must define a DATATRIEVE domain on the remote node for each relation you wish to access. To ready a record type in a remote DBMS database, you must define a domain on the remote node for each record type you wish to access in the remote database.
- You cannot ready a relational database that contains no relations.

Results

- DATATRIEVE gives you access to one or more databases, domains, relations, or DBMS records with the access options and access modes you specify.
- The default access option for RMS domains is PROTECTED, and the default access mode is READ. If you accept the defaults, other users can have READ access to the domain, but not WRITE, MODIFY, or EXTEND. You can retrieve records, but you cannot store, modify, or erase records.
- The default access option for relational sources is SNAPSHOT. Other users can have READ, WRITE, MODIFY, or EXTEND access to the database, domain, or relation. You can retrieve records but cannot store, modify, or erase records.
- The default access option for a DBMS database, domain, or DBMS record, is SHARED. The default access mode is READ. With these defaults, other users can have READ, WRITE, MODIFY, or EXTEND access to the domain, database, or DBMS record. There is read locking, and you do see changes other users make to the data.
- If you use Format 2 and do not specify any relations or DBMS record names, DATATRIEVE gives you access to all the relations or DBMS records in the database with the access options and access mode you specify.
- If you use the USING clause, DATATRIEVE readies only those relations and DBMS records you specify.
- If you want to ready a relation or DBMS record with an access mode and option different from the default, you must specify the access mode and option for each relation or DBMS record.
- If you ready a DBMS database and specify a record with more restrictive access than the access specified in the ready, the following occurs:
  - SHOW READY displays the specified access mode and option for the domains or records.
  - You limit the access of other users to those records or domains until you rollback, commit, and then ready any DBMS domain or record, or until you finish the database.

- If you ready an Rdb/VMS or an Rdb/ELN database with the SNAPSHOT access option and specify a relation with a more restrictive access, the following occurs:
  - The domains or relations are shown as readied with the specified access mode and option.
  - You can access the database and relations that were readied SNAPSHOT with only the more restrictive SHARED READ mode until all relations are readied with SNAPSHOT access.
- If you ready a DBMS source with SNAPSHOT access and then ready a second DBMS source with a mode other than SNAPSHOT, DATATRIEVE gives you SHARED READ access to the first source. SHOW READY indicates SNAPSHOT access, but the access mode is SHARED READ. DATATRIEVE returns the access mode on the first source to SNAPSHOT when you finish the second source or ready the second source again in SNAPSHOT mode.
- CONSISTENCY is the default access option for the first ready of a relational source. CONSISTENCY access means that while you are accessing data, you cannot see updates made by other users. CONCURRENCY access to relational sources allows you to see other users' updates to the data that you are accessing. Currently, Rdb/ELN, Rdb/VMS, and VIDA implement CONSISTENCY and CONCURRENCY in different ways. See the chapter on accessing relational data in the *VAX DATATRIEVE User's Guide* for more information and for examples of how to access databases using CONSISTENCY and CONCURRENCY.
- Once you specify CONSISTENCY or CONCURRENCY, that option becomes the default until you change the option in a subsequent ready or you finish the database.
- If you supply no alias for a domain, relation, or DBMS record in the READY command, DATATRIEVE uses the given name of the domain, relation, or DBMS record to respond to your commands and statements dealing with that domain, relation, or DBMS record. From then until you release control over the domain, relation, or DBMS record with the FINISH command, you can use the given name in commands, and you must use the given name in all statements requiring a domain name.
- If you assign an alias for a domain, relation, or DBMS record in the READY command, DATATRIEVE assigns that alias as the name of the domain, relation, or DBMS record and you cannot perform operations using its given name.

- If you assign an alias as the name of a database, you receive an error message, and DATATRIEVE ignores the alias.
- If you ready a domain, relation, or DBMS record as SHARED READ and then establish a selected record, DATATRIEVE retrieves the record from storage every time you enter a statement referring to that record.
- If you issue a READY command for a relational or DBMS database, relational or DBMS domain, a relation, or DBMS record that is ready:
  - You can use only the given name or the alias of the domain, relation, or record.
  - The access option and access mode specified in the new READY command replace those previously in effect.
  - You must end access to the database, domain, relation, or DBMS record with the COMMIT, ROLLBACK, or FINISH statement before you can ready any part of the database again. DATATRIEVE can then start a new transaction if the READY command changes an access mode or option.
  - DATATRIEVE preserves collections from databases, domains, records, or relations even if you issue a READY statement that changes access mode.

Usage Notes

- You can optimize record definitions using the OPTIMIZE qualifier for the DEFINE RECORD and REDEFINE RECORD commands. This greatly reduces the CPU time needed to ready a domain that refers to the record.

  DATATRIEVE does *not* perform this optimization by default; you must specify the OPTIMIZE qualifier in the record definition to optimize a record.

  There are performance and storage tradeoffs you should carefully consider when using the OPTIMIZE qualifier. See the DEFINE RECORD section in this chapter for more information.
- If you have defined a new data file for an RMS domain, you must finish the domain and ready it again for the new file to take effect.
- If you change the database definition associated with a relational database or DBMS database, you must finish all ready sources associated with the database and then ready it again for the modified database definition to take effect.

- To show the domains, relations, and DBMS records that are ready, use the SHOW READY command. SHOW READY displays the name, file type (for RMS domains), access option, access mode, and full dictionary path name of all readied RMS, DBMS, and relational domains. For readied relations and DBMS records, SHOW READY displays the name, type, access option, access mode, and dictionary path name of the database. For relational sources, SHOW READY also displays the consistency option (either CONCURRENCY or CONSISTENCY) that you specified. The SHOW READY command displays the most recently readied domain, relation, or DBMS record first.
- The access mode you specify determines the commands and statements you can use on this domain, relation, or DBMS record. The access modes needed for the commands and statements are listed in Table 7-23. Before issuing any other command or statement, you can enter a SHOW READY command to check that you have readied the target domain, relation, or DBMS record with the appropriate access mode.

Table 7-23: Access Modes Required by DATATRIEVE Statements

Statement	Access Mode Required
DISPLAY	MODIFY, READ, or WRITE
ERASE	WRITE
FIND	MODIFY, READ, or WRITE
LIST	MODIFY, READ, or WRITE
MODIFY	MODIFY or WRITE
PRINT	MODIFY, READ, or WRITE
REPORT	MODIFY, READ, or WRITE
Restructure	WRITE or EXTEND
SORT	MODIFY, READ, or WRITE
STORE	WRITE or EXTEND
SUM	MODIFY, READ, or WRITE

- You can define your own default access option using the logical name DTR$READY_MODE. DATATRIEVE checks the definition of DTR$READY_MODE only when an access option is not found on the READY command line. DTR$READY_MODE will be applied when you ready RMS, relational, and DBMS sources.

  DATATRIEVE uses the following default access options if you do not specify a default using DTR$READY_MODE:

  ```
  RMS:          PROTECTED
  Relational:   SNAPSHOT
  DBMS:         SHARED
  ```

  There are several ways you can assign a default to DTR$READY_MODE:

  - Use the DATATRIEVE function FN$CREATE_LOG:

    ```
    DTR> FN$CREATELOG ("DTR$READYMODE", "SHARED")
    DTR> FINISH
    DTR> READY YACHTS
    DTR> SHOW READY
    Ready sources:
       YACHTS:  Domain, RMS indexed, shared read
             <CDD$TOP.DTR32.DAB.YACHTS;3>
    ```

  - Use either of the DIGITAL Command Language (DCL) commands, ASSIGN or DEFINE:

    ```
    $ ASSIGN "SHARED" DTR$READYMODE

    $ DEFINE DTR$READYMODE "SHARED"
    ```

  If you define DTR$READY_MODE using FN$CREATE_LOG, the definition lasts only until the end of the DATATRIEVE session. DATATRIEVE checks the value of DTR$READY_MODE every time a READY command is executed. Therefore, you can use FN$CREATE_LOG to change the definition numerous times during a DATATRIEVE session.

  You can also override a system-wide definition of DTR$READY_MODE by making a user or process level definition.

  The logical name translation of DTR$READY_MODE is not iterative. If there are multiple equivalence names for DTR$READY_MODE, the first will be used as the translation. The translation of DTR$READY_MODE is not case sensitive.

DATATRIEVE performs the following error handling only if you have not included an access option on the READY command line and DTR$READY_MODE is specified but cannot be used:

- DATATRIEVE verifies if the definition of DTR$READY_MODE is a valid access option or synonym for an access option. If it is not valid, DATATRIEVE displays the following message:

  ```
  The value of DTR$READYMODE, "NOGOOD", is not
  a valid access option.
  ```

  The preceding error occurred while translating DTR$READYMODE. Therefore, DATATRIEVE will use the default access option.

  The readying will continue using the DATATRIEVE default access option.

- You might specify an access option for DTR$READY_MODE that is not valid for the type of source you are readying. In this instance, DATATRIEVE treats the error as if the invalid access option had been included on the command line.

• When you create a DBMS database, you can specify whether SNAPSHOT access is available. If you allow SNAPSHOT access, you can use the DBO/MODIFY/SNAPSHOTS=NOENABLE command later to disallow it.

  When you ready a DBMS source using SNAPSHOT, and SNAPSHOT is not allowed for that source, DATATRIEVE attempts to ready the source using SHARED READ and displays an informational message. If the source cannot be readied using SHARED READ, DATATRIEVE does not ready it and displays a message that indicates the source has not been readied.

• When you specify access options for a database, domain, relation, or DBMS record, impose as few restrictions on other people as the needs of your task allow. Remember that if you specify EXCLUSIVE access, no other person can get access to the database, domain, relation, or DBMS record. However, EXCLUSIVE access gives better performance with DBMS as no locking is done.

• If you have a database, domain, relation, or DBMS record readied for SHARED WRITE, you are permitting another user to modify records from the file or database. No other user can modify your selected record or the current target record of your MODIFY statement. Other users cannot modify DBMS records held in collections.

However, when you modify a record, make sure that you see the current record before you change any values. For example, in the following case, you may not be aware that another user has modified your selected record:

```
DTR> PRINT FIRST 1 YACHTS

                                  LENGTH
                                   OVER
MANUFACTURER   MODEL     RIG      ALL   WEIGHT BEAM  PRICE
 ALBERG      37 MK II   KETCH    37    20,000  12  $36,951

DTR> FIND FIRST 1 YACHTS
[1 record found]
DTR> SELECT
DTR> MODIFY USING PRICE = PRICE * 1.1
```

Because you displayed the record before you selected it, another user could have modified the record in the interval between entering your PRINT and your SELECT statements.

To guarantee that the record you are modifying is the same as the record you see, enter the statements in this order: select the record, print it, and then modify it. DATATRIEVE locks the record from the time you select it until you have finished your update. For example:

```
DTR> FIND YACHTS
[113 records found]
DTR> SELECT 1
DTR> PRINT

                                  LENGTH
                                   OVER
MANUFACTURER   MODEL     RIG      ALL   WEIGHT BEAM  PRICE

 ALBERG      37 MK II   KETCH    37    20,000  12  $36,951

DTR> MODIFY USING PRICE = PRICE * 1.1
```

Another safe method is to set up a FOR loop with an RSE controlling a BEGIN-END block. You can include the PRINT and MODIFY statements in the BEGIN-END block. DATATRIEVE locks the record that is current in the loop, displays it, and then modifies it according to your MODIFY statement. For example:

```
DTR> FOR YACHTS
CON> BEGIN
CON> PRINT
CON> MODIFY PRICE
CON> PRINT
CON> END

                                      LENGTH
                                       OVER
MANUFACTURER   MODEL      RIG      ALL   WEIGHT BEAM  PRICE

 ALBERG      37 MK II   KETCH   37    20,000  12  $36,951
Enter PRICE:
```

- If you include a password in the domain, relation name, or DBMS database to get access to records in the mode you need, you can prevent the display of the password on your terminal. Enter an asterisk (*) in place of the password in the parentheses following the segment of the dictionary path name with which the password is associated. After you enter the READY command, DATATRIEVE prompts you for the password. As you enter the password, DATATRIEVE does not echo the characters on your terminal.

  You can also include a password prompt in a domain or database definition. Put the asterisk (*) in parentheses after the path name of the record in the domain definition. When you ready an RMS domain, DATATRIEVE prompts you for the password and uses your response to search the entries of the access control list of the record definition to determine which privileges you have to the record definition.

- A database, domain, relation or DBMS record stays ready until you release it with the FINISH command or you end your DATATRIEVE session with EXIT or CTRL/Z. The FINISH command releases the collections of records from, allows other users access to, and frees computer resources used by databases, domains, relations, or DBMS records. See the FINISH command section in this manual for more information.

  If you are working with DBMS sources or relational sources and you end your session with EXIT or CTRL/Z, or you finish the last readied source, DATATRIEVE commits any changes you made to the data.

- If you redefine the record associated with a readied RMS domain, the change in the record definition *does not* take effect until you use the FINISH command to finish the domain and the READY command to ready it again. Simply readying the domain again does not activate the new record definition.

  You can make use of this fact if you want to change a record definition or change the type of file organization of a data file. Follow these steps to change the record definition or file organization without redefining the domain. In both cases, you define a new data file and transfer the data with the Restructure statement:

  - Ready the domain as an alias.

    ```
    DTR> READY YACHTS AS OLD_YACHTS
    DTR> SHOW READY
    Ready domains:
       OLD_YACHTS:  Domain, RMS sequential, protected read
             <CDD$TOP.INVENTORY.YACHTS;1>
    No loaded tables.

    DTR>
    ```

  - Change the record definition with the REDEFINE RECORD command, if you wish.

  - Define a new data file for the domain. Do not use the SUPERSEDE option of the DEFINE FILE command. This creates a new version of the file associated with the readied domain but does not interfere with the link between that readied domain and the original version of the data file.

    ```
    DTR> DEFINE FILE FOR YACHTS KEY = TYPE (NODUP)
    DTR>
    ```

  - Ready the domain using a different alias and specify WRITE access. This READY command uses the new record definition, if you created one, and opens the new data file created by the DEFINE FILE command.

    ```
    DTR> READY YACHTS AS NEW_YACHTS WRITE
    DTR> SHOW READY
    Ready domains:
       NEW_YACHTS:  Domain, RMS indexed, protected write
       OLD_YACHTS:  Domain, RMS sequential, protected read
             <CDD$TOP.INVENTORY.YACHTS;1>
    No loaded tables.

    DTR>
    ```

- Now use the Restructure statement to move the data from the original data file to the new one. DATATRIEVE transfers data from fields in the original data file into fields with the same names in the new data file.

  ```
  DTR> NEW_YACHTS = OLD_YACHTS
  DTR>
  ```

Note

You cannot reorganize relational databases using DATATRIEVE. You can, however, use the DATATRIEVE Restructure statement to store records from an RMS data file into an Rdb/VMS or Rdb/ELN database or relation, or a DBMS database. This can be useful if you are converting RMS files to relations. You can also store records from a relational database or relation into an RMS data file. Similarly, you can store records from one Rdb/VMS or Rdb/ELN database or relation into another Rdb/VMS or Rdb/ELN database or relation. Because VIDA databases are read-only databases, you can use the Restructure statement to store VIDA data in an RMS data file, but you cannot store RMS data in a VIDA source.

Examples

Ready the domain YACHTS for WRITE access:

```
DTR> READY YACHTS WRITE
```

Ready the domain PHONES for EXTEND access:

```
DTR> READY PHONES (*) EXTEND
Enter password for PHONES:
DTR>
```

Define a domain with the prompt built into the domain definition (DATATRIEVE does not display the password):

```
DTR> DEFINE DOMAIN PROMPT_YACHTS USING YACHT(*) ON YACHT;
DTR> READY PROMPT_YACHTS AS PYTS
Enter password for YACHT:

DTR>
```

Ready the relations EMPLOYEES and SALARY_HISTORY in the Rdb/VMS database PERSONNEL for SNAPSHOT access:

```
DTR> READY PERSONNEL USING EMPLOYEES, SALARY_HISTORY
DTR>
```

Ready the SALARY_HISTORY relation in the Rdb/VMS database PERSONNEL for SHARED WRITE access with the CONCURRENCY option:

```
DTR> READY PERSONNEL SHARED WRITE USING SALARY_HISTORY CONCURRENCY
```

Ready the DBMS domain VENDORS for the default access mode SHARED READ:

```
DTR> READY VENDORS
DTR>
```

7.59 RECONNECT Statement

Removes a record from the set occurrence in which it participates and connects it to the set occurrence specified by the TO list. Before the RECONNECT is performed, DATATRIEVE sets up a currency indicator for each set specified in the TO list.

Format

```
RECONNECT   context-name-1

        [TO]  [context-name-2  .  ]  set-name-1  [,...]
```

Arguments

context-name-1

Is the name of a valid context variable or the name of a collection with a selected record. The target record must be a member of the set(s) specified by the TO list.

context-name-2

Is the name of a valid context variable or the name of a collection with a selected record. It must identify a record that participates in the specified set. If the SYSTEM owns the set, you do not need to establish a context for the set. If the set is not owned by the SYSTEM and the context name is not present, DATATRIEVE uses the most recent single record context of a domain with a record type that participates in the specified set type.

set-name

Is the name of a set type.

Example

The following example uses nested FOR loops to create the necessary contexts. The procedure uses prompting value expressions to get information from the user:

```
DTR> DEFINE PROCEDURE NEW_MANAGER
DFN> FOR G IN GROUPS WITH GROUP_NAME = *."the name of the group"
DFN> FOR E IN EMPLOYEES WITH EMP_ID =
DFN> *."the id of the new manager"
DFN> RECONNECT G TO E.MANAGES
DFN> END_PROCEDURE
DTR>
```

7.60 REDEFINE Command

Creates a new version of an object.

Format

```
            ( DATABASE  )
            | DOMAIN    |
REDEFINE    < PORT      >  definition
            | PROCEDURE |
            | RECORD    |
            ( TABLE     )
```

Argument

definition

Is the path name of the definition and any other keywords, path names, or arguments that an object takes. (For an explanation of these arguments, see the DEFINE command for each object. For example, to understand REDEFINE DOMAIN see the DEFINE DOMAIN command in this manual.)

Restrictions

- To redefine a DATATRIEVE definition, you must have P (PASS_THRU) and X (EXTEND) access privileges to the parent directory of the definition and S (SEE), P (PASS_THRU), and U (UPDATE) privileges to the highest existing version.
- You cannot specify a relative version number in the REDEFINE command.
- You cannot specify a version number in the REDEFINE command if an object of the same name and version number already exists in the CDD.
- You cannot redefine a dictionary.
- When you use the REDEFINE command, the definition you are redefining must have access privileges that allow creation of later versions. Typically, you need not worry about these privileges. The CDD is usually set up by the system manager to include the ACL access privileges you need. See Chapter 2 for a description of privileges necessary to redefine definitions.

Results

- The REDEFINE command creates a new version of the object in the CDD. The previous version remains in the CDD.
- When you specify an explicit version number as part of the REDEFINE command, DATATRIEVE creates the object with that version number.
- When you issue a REDEFINE command for an object which does not exist, DATATRIEVE creates a version 1 of that object after issuing a warning.
- When you specify a version number as part of the REDEFINE command and the object already exists in the CDD with that version number, DATATRIEVE issues an error message.
- The new object always has the ACL and the history list from the previous highest version. If a previous version did not exist, DATATRIEVE gives the new object the default ACL.

Usage Notes

- The REDEFINE command is less useful than the EDIT command if you are revising existing CDD objects, because DATATRIEVE does not place the text of the earlier version of the object in the buffer as it does with the EDIT command.
- You can use the REDEFINE command everywhere you can use the DEFINE command, except for DEFINE DICTIONARY and DEFINE FILE.

Examples

Redefine the domain YACHTS. Use the record definition YACHT and store the data in the file DB2:[SMYTHE]YACHT.DAT:

```
DTR> SHOW DOMAINS
Domains:
      YACHTS;1

DTR> REDEFINE DOMAIN YACHTS
DFN> USING YACHT ON DB2:[SMYTHE]YACHT.DAT;

DTR> SHOW DOMAINS
Domains:
      YACHTS;2       YACHTS;1
```

Redefine the domain YACHTS and specify 4 as the explicit version number:

```
DTR> SHOW DOMAINS
Domains:
       YACHTS;2       YACHTS;1

DTR> REDEFINE DOMAIN YACHTS;4
DFN> USING YACHT ON DB2:[SMYTHE]YACHT.DAT;

DTR> SHOW DOMAINS
Domains:
       YACHTS;4     YACHTS;2     YACHTS;1
```

7.61 REDEFINES Clause

Provides an alternate way to define a field.

Format

```
level-no   field-name-1   REDEFINES field-name-2
```

Arguments

level-no

Is the level number of field-name-1. Although not a part of the REDEFINES clause, the level number is shown in the format to clarify its position relative to the clause.

field-name-1

Is the name of the REDEFINES field. You use this name when you want to refer to this field. Although not a part of the REDEFINES clause, the field name is shown in the format to clarify its function and its position relative to the clause.

field-name-2

Is the name of the field being redefined.

Restrictions

- The field to be redefined (field-name-2) must appear in the record definition before its REDEFINES field (field-name-1). Both fields must have the same level number.
- The definition of field-name-2 cannot contain a REDEFINES clause. However, it can be subordinate to a group field with a REDEFINES clause.
- Neither field-name-1 nor field-name-2 can be defined with or contain a field defined with an OCCURS...DEPENDING clause.
- Neither field-name-1 nor field-name-2 can contain a COMPUTED BY clause. (You cannot redefine a COMPUTED BY field.)
- In the definition of field-1, the REDEFINES clause must immediately follow the field name. No other clause can be used between the field name and the keyword REDEFINES.

- The REDEFINES field cannot describe an area larger than the area of field-name-2. However, the area can be smaller than that of field-name-2.
- You cannot use a qualified field name, such as TYPE.BUILDER, as the field to be redefined in a REDEFINES field.

Result

The REDEFINES clause redefines an elementary or group field. The redefinition refers to the same area of the record as the original definition, but it uses the content of the field in a different way.

Usage Note

If you need to refer to parts of a numeric field as well as to the field itself, you can redefine the field as a group field. The subordinate fields of the group fields would contains the parts of the numeric field value that you refer to. Thus, the REDEFINES clause allows you to redefine a numeric field as a group field. (A group field cannot be numeric; a group field is always alphanumeric.)

Example

The following record definition shows a redefinition of the field PART_NUMBER. PART_NUMBER is a numeric field containing 10 digits. Two group fields redefine PART_NUMBER: PART_NUMBERS_PARTS and PART_NUMBER_GROUPS. Each redefinition specifies a group field containing a total of 10 digits (the total number of digits in all subordinate fields):

```
05 PART_NUMBER PIC 9(10)
05 PART_NUMBER_PARTS REDEFINES PART_NUMBER.
   07 PRODUCT_GROUP PIC 99.
   07 PRODUCT_YEAR PIC 99.
   07 ASSEMBLY_CODE PIC 9.
   07 SUB_ASSEMBLY PIC 99.
   07 PART_DETAIL PIC 999.
05 PART_NUMBER_GROUPS REDEFINES PART_NUMBER.
   07 PRODUCT_GROUP_ID PIC 9(4).
   07 PART_DETAIL_ID PIC 9(6).
```

In this example, the field PRODUCT_GROUP refers to the lowest-valued digits of PART_NUMBER; PRODUCT_YEAR refers to the next two lowest-valued digits, and so on.

7.62 REDUCE Statement

Retains only the unique field values or combinations of field values in a DATATRIEVE collection, dropping all other values, depending on the reduce key or keys specified.

Format

```
REDUCE  [collection-name]  TO  reduce-key-1  [,...]
```

Arguments

collection-name

Is the name of a collection from which you want to retrieve unique occurrences of values.

reduce-key

Is a field whose values form the basis for the reduction. You can also use a value expression as a reduce key, if the value expression refers to at least one field of the records forming the collection.

Use a comma to separate multiple reduce keys.

Restrictions

- You can use the REDUCE statement only on a collection you have already formed with a FIND statement.
- You cannot use the REDUCE statement in a compound statement.
- You must specify at least one reduce key.
- You cannot specify more than 255 reduce keys in an RSE or in a REDUCE statement.

Results

- If you use one reduce key and it is a field name, DATATRIEVE retains in the collection each unique value of the field. All other field values are dropped from the collection.

  DATATRIEVE does not retain in the collection:

  - Duplicate occurrences of each value
  - Values of other fields in the record

  For example:

```
DTR> READY YACHTS
DTR> FIND YACHTS
[113 records found]
DTR> REDUCE CURRENT TO BEAM
DTR> PRINT CURRENT

BEAM

 00
 06
 07
 08
 09
 10
 11
 12
 13

DTR>
```

  The field name BEAM is a reduce key. DATATRIEVE retains only the unique values for BEAM in the collection.

- If you use a value expression as a reduce key, DATATRIEVE searches the collection for each unique occurrence of the value expression. DATATRIEVE retains the field value that is a component of the value expression. All other field values are dropped from the collection:

```
DTR> FIND YACHTS
[113 records found]
DTR> REDUCE CURRENT TO (BEAM * 2)
DTR> PRINT CURRENT
```

(continued on next page)

```
BEAM

 00
 06
 07
 08
 09
 10
 11
 12
 13

DTR>
```

The value expression (BEAM * 2) is a reduce key. DATATRIEVE retains the unique values for BEAM, not for double the value of BEAM.

- If you use a virtual field as a reduce key you must include the name of the field on which the virtual field depends as an additional reduce key. In this example, the reduce key is a COMPUTED BY field that is based on another field in the record. You can include such a field as a reduce key only if you also name the dependent field or expression as an additional reduce key:

```
DTR> DECLARE BEAM_PLUS_TWO COMPUTED BY (BEAM + 2).
DTR> PRINT YACHTS REDUCED TO BEAM_PLUS_TWO
"BEAM" is undefined or used out of context.

DTR> PRINT YACHTS REDUCED TO BEAM, BEAM_PLUS_TWO


     BEAM
     PLUS
BEAM TWO

 00     2
 06     8
 07     9
 08    10
 09    11
 10    12
 11    13
 12    14
 13    15

DTR>
```

- If you use two or more reduce keys, DATATRIEVE retains in the collection all the unique combinations of values, based on the reduce keys specified. DATATRIEVE does not retain any other field values in the collection:

```
DTR> FIND FIRST 12 YACHTS
[12 records found]
DTR> REDUCE CURRENT TO BUILDER, RIG
DTR> PRINT CURRENT

MANUFACTURER  RIG

 ALBERG       KETCH
 ALBIN        SLOOP
 AMERICAN     MS
 AMERICAN     SLOOP
 BAYFIELD     SLOOP
 BLOCK I.     SLOOP
 BOMBAY       SLOOP
 BUCCANEER    SLOOP
 CABOT        SLOOP

DTR>
```

  BUILDER and RIG are reduce keys. The unique combination of values for the two fields is retained. AMERICAN appears twice because it is the only manufacturer in the collection that makes yachts with more than one type of rig.

Usage Notes

- If you omit the collection name, DATATRIEVE reduces the CURRENT collection to unique field values.
- To reduce record streams to unique field values, use the REDUCED TO clause of the record selection expression that creates the record stream. To reduce collections when you first form them, use the REDUCED TO clause of the RSE in the FIND statement. (See Chapter 5.)

Examples

For each type of RIG, indicate the prices of all the boats that cost over $35,000:

```
DTR> DEFINE PROCEDURE RIG_QUERY
DFN> FIND YACHTS
DFN> REDUCE CURRENT TO RIG
DFN> PRINT SKIP, RIG, ALL PRICE OF YACHTS WITH
DFN>      PRICE GT 35000 AND RIG = Y.RIG OF Y IN CURRENT
DFN> END_PROCEDURE
DTR> :RIG_QUERY
```

(continued on next page)

```
 RIG    PRICE

KETCH  $36,951
       $51,228
       $41,350
       $39,500
       $36,950
       $54,970
       $50,000
       $80,500

MS     $35,900

SLOOP  $37,850
       $39,215
       $37,850
       $48,490

DTR>
```

Note the format of this PRINT statement:

PRINT print-list, ALL print-list OF rse-1 OF rse-2

RSE-1 is: ALL PRICE OF YACHTS WITH PRICE GT 35000 AND RIG = Y.RIG
RSE-2 is: Y IN CURRENT

RSE-2 controls the printing of the first print list (SKIP, RIG) and RSE-1 controls the printing of the second print-list (PRICE). For more information on inner print lists, see the section in this chapter on the PRINT statement.

You can use the REDUCED TO clause of the statement to match values of a date field for the month and year. The following example uses the domain PAYABLES described in the *VAX DATATRIEVE Guide to Writing Reports*. Records in PAYABLES have the same TYPE field as in YACHTS, a date field (INVOICE_DUE), and a field for wholesale price (WHSLE_PRICE).

Display the records in PAYABLES where INVOICE_DUE is later than January 1, 1983. Separate the records according to the month they are due. Use the REDUCED TO clause of the statement to identify the unique values of month and year for PAYABLES. Then search the records for matches on these values:

```
DTR> SHOW MONTHLY_RPT
PROCEDURE MONTHLY_RPT
READY PAYABLES
FIND PAYABLES WITH INVOICE_DUE AFTER "JAN 1, 1983"
REDUCE CURRENT TO FORMAT INVOICE_DUE USING YYNN
FOR A IN CURRENT
```

```
   BEGIN
     PRINT SKIP, "Invoices Due for the Month of"|||
       FORMAT A.INVOICE_DUE USING M(9), SKIP
     FOR PAYABLES WITH FORMAT INVOICE_DUE USING YYNN =
       FORMAT A.INVOICE_DUE USING YYNN SORTED BY INVOICE_DUE
     PRINT INVOICE_DUE, TYPE, WHSLE_PRICE
   END
END_PROCEDURE

DTR> :MONTHLY_RPT

Invoices Due for the Month of January

INVOICE                         WHSLE
  DUE      VENDOR    ITEM_TYPE  PRICE

 1/02/83 ALBERG     37 MK II   $28,500
 1/25/83 SALT       19          $4,850
 1/31/83 AMERICAN   26-MS      $15,150

Invoices Due for the Month of February

 2/12/83 WINDPOWER  IMPULSE     $1,500
    .        .         .           .
    .        .         .           .
    .        .         .           .

Invoices Due for the Month of April

 4/01/83 BAYFIELD   30/32      $13,000
 4/01/83 IRWIN      37 MARK II $29,999
 4/15/83 ALBIN      VEGA       $14,250

DTR>
```

7.63 RELEASE Command

Ends your control over one or more collections, tables, or global variables and frees the workspace occupied by them.

Format

```
          ┌ ALL             ┐
          │ collection-name │
RELEASE   │ form-name       │   [,...]
          │ table-name      │
          └ variable-name   ┘
```

Arguments

ALL

Causes DATATRIEVE to release all collections, tables, or variables.

form-name
collection-name
table-name
variable-name

Is the name of a form, a collection, a dictionary or domain table, or a variable you want to release. If you specify more than one item, use a comma to separate each from the next.

Restrictions

- You must issue this command at DATATRIEVE command level (indicated by the DTR> prompt).
- You cannot use the RELEASE command to release a form that was loaded when a domain was readied. The form must have been loaded with the DISPLAY_FORM statement.

Results

- If RELEASE or RELEASE ALL is specified, DATATRIEVE releases all collections, dictionary tables, domain tables, and variables, freeing the workspace they occupied. The effect is very much like the FINISH command.

- DATATRIEVE releases the collection, dictionary table, domain table, or global variable and frees the workspace it occupied.
- The records and domains associated with the collection you want to release are not changed by this command.
- If you specify more than one item in the command, DATATRIEVE releases the items in left-to-right order. If the command fails before all items are released, DATATRIEVE prints a message indicating which item could not be released. In such a case of failure, DATATRIEVE releases all items in the command preceding the one that failed and does not release the ones that follow it.

Usage Notes

- To learn which collections you have in the workspace and in which order you created them, enter a SHOW COLLECTIONS command.
- To learn which dictionary tables and domain tables you have in your workspace, enter a SHOW READY command.
- To learn which global variables you can release, enter a SHOW VARIABLES command or a SHOW FIELDS command.
- When you have two or more collections in your workspace and you release the CURRENT one, the remaining collection you formed most recently becomes the new CURRENT collection.
- The RELEASE command is implicit in the following cases:
  - A FIND statement that successfully forms a collection releases an existing collection with the same name. If the CURRENT collection has no other name, a new collection formed by a FIND statement releases and replaces the previous CURRENT collection. DATATRIEVE releases the previous collection, even if the new collection contains no records.
  - Ending a session (with EXIT or CTRL/Z) releases all collections, all dictionary tables, all domain tables, and all global variables in your workspace.
  - When you use a FINISH command, DATATRIEVE releases all collections associated with the specified domain(s).
  - When you declare a global variable that has the same name as one that exists, DATATRIEVE releases the old global variable.

- You cannot assign a value to or retrieve a value from a global variable once you release it. You can redefine the variable with the DECLARE statement, but, if you do, the previous value is lost and the variable is initialized to the default value: zero, the null string, or the default value established by the DEFAULT VALUE clause or the MISSING VALUE clause in the DECLARE statement that created the variable.

Examples

Release one of two named collections, then release the other:

```
DTR> SHOW COLLECTIONS
Collections:
      BIG-ONES         (CURRENT)
      A

DTR> RELEASE BIG-ONES
DTR> SHOW COLLECTIONS
Collections:
      A                (CURRENT)

DTR> RELEASE A
DTR> SHOW COLLECTIONS
No established collections.
DTR>
```

Release the dictionary table DEPT-TABLE and the global variables X and Y:

```
DTR> SHOW READY
No ready sources.

Loaded tables:
   DEPT_TBL:  Dictionary table
         <CDD$TOP.WORK.DEPT_TBL>

DTR> SHOW VARIABLES
Global variables
   X                  <Character string>
   Y                  <Number>

DTR> RELEASE DEPT_TBL, X, Y

DTR> SHOW READY; SHOW VARIABLES
No ready sources.
No loaded tables.
No global variables are declared.
DTR>
```

Release the collections LITTLE_ONES and B, and release the global variables T and TERRY with one command–RELEASE ALL:

```
DTR> SHOW COLLECTIONS
Collections:
       B                (CURRENT)
       LITTLEONES

DTR> SHOW VARIABLES
Global variables
   T                    <Date>
   TERRY                <Character string>

DTR> RELEASE ALL
DTR> SHOW COLLECTIONS
No established collections.

DTR> SHOW VARIABLES
No global variables are declared.

DTR>
```

7.64 RELEASE SYNONYM Command

Releases the definition of a synonym for a DATATRIEVE keyword.

Format

```
RELEASE  SYNONYM  synonym-name-1    [,...]
```

Argument

synonym-name

Is a synonym already defined for a DATATRIEVE keyword.

Restriction

You must issue this command at DATATRIEVE command level (indicated by the DTR> prompt).

Result

DATATRIEVE releases the synonym or synonyms specified. You can no longer use them in place of DATATRIEVE keywords.

Usage Notes

- To learn what synonyms you have defined, enter a SHOW SYNONYMS command.
- To release more than one synonym, separate the synonym names by commas.

Example

Define synonyms for PRINT and READY. Then release the synonym definitions:

```
DTR> DECLARE SYNONYM P FOR PRINT, R FOR READY
DTR> R OWNERS; P FIRST 1 OWNERS

                 BOAT
   NAME          NAME         BUILDER     MODEL

SHERM      MILLENNIUM FALCON ALBERG     35

DTR> RELEASE SYNONYM R, P
DTR> R YACHTS
R YACHTS

Expected statement, encountered "R".
DTR> P OWNERS
P OWNERS

Expected statement, encountered "P".
DTR>
```

7.65 REPEAT Statement

Causes DATATRIEVE to execute a simple or compound DATATRIEVE statement a specified number of times.

Format

```
REPEAT   value-expression   statement
```

Arguments

value-expression

Is a value expression indicating the number of times to execute the statement. This argument must evaluate to a positive integer less than or equal to 2,147,483,647.

statement

Is any simple or compound DATATRIEVE statement (except a FIND, SELECT, DROP, or SORT statement).

Restrictions

- Do not use a FIND, SELECT, DROP, or SORT statement in a REPEAT statement.
- You must observe all restrictions on the simple or compound statements you use in a REPEAT statement.
- If the statement in the REPEAT statement is the invocation of a procedure (for example, REPEAT n :procedure-name), the procedure cannot contain a command or a FIND, SELECT, DROP, or SORT statement as its first element.
- If you invoke a procedure in a compound statement in a REPEAT statement (for example, REPEAT n BEGIN :procedure-name; END) that procedure cannot contain a DATATRIEVE command, a FIND, SELECT, DROP, or SORT statement as its first element.

Results

- DATATRIEVE executes the statement the number of times specified by the value expression. Then DATATRIEVE executes the command or statement following the REPEAT statement.
- If you invoke a procedure in a REPEAT statement (for example, REPEAT n :procedure-name), only the first statement (whether simple or compound) in the procedure is executed the number of times specified in the value expression. Each succeeding statement in the procedure is executed only once.

Usage Notes

- Use the REPEAT statement to repeat a simple or compound statement a fixed number of times.
- You have three ways to force an exit from a loop created by a REPEAT statement:
  - Type CTRL/Z in response to any prompt within the loop.
  - Use an IF-THEN-ELSE statement with an ABORT statement in the THEN or ELSE clauses to exit from the loop according to the conditions specified in the IF clause. See the sections in this chapter on ABORT and IF-THEN-ELSE for more information.
  - Type CTRL/C at any time during the execution of the statement (but not in response to a prompt).

  Having SET ABORT or SET NO ABORT in effect does not change the DATATRIEVE response to an ABORT statement in a REPEAT loop. If the conditions for the ABORT are met in either case, DATATRIEVE executes no statement following the ABORT statement in the REPEAT loop. When the ABORT occurs in a REPEAT loop, DATATRIEVE returns you to command level (indicated by the DTR> prompt).
- You can nest REPEAT statements. DATATRIEVE executes each inner REPEAT statement the specified number of times each time it loops through the outer REPEAT statement.

Examples

```
Print "TEST REPEAT" three times:

DTR> REPEAT 3 PRINT "TEST REPEAT"
TEST REPEAT
TEST REPEAT
TEST REPEAT

DTR>
```

Abort a REPEAT statement by responding to a prompt with a CTRL/Z:

```
DTR> READY YACHTS WRITE
DTR> REPEAT 5 STORE YACHTS
Enter MANUFACTURER: HOBIE
Enter MODEL: CAT
Enter RIG: SLOOP
Enter LENGTH-OVER-ALL: 22
Enter DISPLACEMENT:  4000
Enter BEAM: 8
Enter PRICE: 6500
Enter MANUFACTURER: <CTRL/Z>
Execution terminated by operator
DTR> FIND YACHTS WITH BUILDER = "HOBIE"
[1 record found]
DTR>
```

Show the effect of nesting REPEAT statements in procedures. The procedure NUM1 contains two PRINT statements. The procedure NUM2 contains two REPEAT statements, one nested in the other. The inner REPEAT statement causes DATATRIEVE to execute the first PRINT statement in NUM1 twice each time DATATRIEVE loops through the outer REPEAT statement:

```
DTR> SET NO PROMPT
DTR> SHOW NUM1
PRINT SKIP, "ONE, TWO, THREE"
PRINT "ONE, TWO, THREE, FOUR, FIVE"

DTR> :NUM1

ONE, TWO, THREE

ONE, TWO, THREE, FOUR, FIVE

DTR> SHOW NUM2
REPEAT 2
     BEGIN
        REPEAT 2 :NUM1
     END
:NUM1
```

```
DTR> :NUM2

ONE, TWO, THREE

ONE, TWO, THREE
ONE, TWO, THREE, FOUR, FIVE

ONE, TWO, THREE

ONE, TWO, THREE
ONE, TWO, THREE, FOUR, FIVE

ONE, TWO, THREE
ONE, TWO, THREE, FOUR, FIVE

DTR>
```

7.66 REPORT Statement

Invokes the Report Writer and is the first entry in a report specification. In the REPORT statement you can specify:

- The data you want to report
- The output device for the report

The other statements in the report specification are AT TOP, AT BOTTOM, SET, PRINT, and END_REPORT. These statements are discussed in separate sections of this chapter.

Format

```
REPORT [rse]  [ ON   { file-spec } ]
              [      { *.prompt  } ]
```

Arguments

rse

Specifies the data for your report. To create a record stream for your report, enter the appropriate RSE in the REPORT statement. You can make reports on the following kinds of data:

- Readied domains
- Collections
- Lists

When you omit the RSE, the Report Writer uses the data in your current collection for the report. If there is no current collection, DATATRIEVE displays the following error message:

```
A current collection has not been established.
```

file-spec

Is the file to which you want to write the report.

A complete file specification has the following format:

node-spec::device:[directory]file-name.type;ver

The minimum file specification consists of a period (.). The specification of such a file stored in your default VMS directory ends with ".;n", where n is the version number and both the file name and the type are null strings.

If you omit a field in the file specification, DATATRIEVE uses the defaults as listed in Table 7-24.

Table 7-24: Output File Specification Defaults

Field	Default
node-spec::	Your local node
device:	Your default device
[directory]	Your default directory
file-name	Null string
.type	.LIS
;version	Highest version number

node-spec

The node specification consists of a node name and an optional access control string.

A node name is a 1- through 6-character name that identifies the location on the network. Examples are NATHAN or STAR.

An access control string indicates a particular account on the remote node. It consists of a user name, followed by one or more blanks or tabs, a password, and an optional account name.

The following three node specifications are valid:

```
NATHAN::
NATHAN"MORRISON RYLE"::
NATHAN"MORRISON RYLE KANT"::
```

For DECnet links with some non-VMS systems, you can use the UIC number in place of the user name. For example:

```
NATHAN"[240,240] RYLE"::
NATHAN"[240,240] RYLE KANT"::
```

In these examples, the remote node is NATHAN, the user name is MORRISON, the UIC is [240,240], the password is RYLE, and the account name is KANT.

You can also use a prompting value expression to prompt the user for the user name, password, account name, or UIC. Use single quotation marks for the prompt string. For example:

```
DTR> REPORT CURRENT ON NATHAN"*.'username' *.'password'"
                .         .        .
                .         .        .
                .         .        .
Enter username: MORRISON
Enter password:
```

device

If you specify another terminal as the device to display your report, that terminal cannot be logged in to the system or allocated to another user.

To send your report to a tape drive, you must mount your tape and allocate the tape drive before specifying the tape drive in the REPORT statement.

You can write a report to a file in any VMS directory you have W (WRITE) access to:

- A file in your own default VMS directory:

```
DTR> REPORT FIRST 5 YACHTS ON YACHTS.REP
RW>
```

- A file in another directory:

```
DTR> REPORT FIRST 5 YACHTS ON DEPT43$DB0:[MORRISON]YACHTS.REP
RW>
```

- A file in a remote node:

```
DTR> REPORT YACHTS ON NOVA"SWAYZE USER"::DB2:[SWAYZE]BOAT.RPT
```

When you omit the ON clause in a REPORT statement, DATATRIEVE displays the report on your terminal.

*.prompt

Is a prompting value expression that allows you to specify a file specification when DATATRIEVE processes the report specification.

Restriction

When you use ON LP: to send REPORT statement output directly to a line printer, DATATRIEVE assumes your system has a line printer. If your system does not have a device defined as LPA0:, ON LP: will not work.

You may also encounter this restriction if you have a common line printer on a VAXcluster. The ON LP: clause does not work in a VAXcluster that uses a common printer not directly connected to your system.

If the nodes in the cluster are connected with DECnet, work around this restriction by including the node name of the system with the line printer in the LP: specification. For example, if the cluster's line printer is on a node named BIGVAX, the following REPORT statement sends output to it:

```
DTR> REPORT YACHTS ON BIGVAX::LP:
```

Note that you cannot directly specify the line printer on BIGVAX by using the cluster device-name BIGVAX$LPA0: in the ON clause.

Usage Notes

- You can report on data only in domains readied for READ, WRITE, or MODIFY access. Because you cannot establish collections or record streams in domains readied for EXTEND access, you cannot report on data in domains readied for EXTEND access.
- The data you report must be contained in the current collection or in the record stream established by the RSE in the REPORT statement.
- You can only specify one output file at a time in the ON clause of the PRINT statement. If you include a PRINT statement with the ON clause in a loop, DATATRIEVE writes a new version of the file each time it executes the PRINT statement in the loop.

  If you want all of the data written to the same file, use a single ON statement and nest the PRINT statement in the ON statement.

  If you want to write the output of a PRINT, LIST, REPORT or SUM statement to multiple files, use nested ON statements. See the ON statement article in this chapter for an example.

Examples

Many examples of report specifications and reports may be found in the *VAX DATATRIEVE Guide to Writing Reports.*

7.67 Restructure Statement

Transfers data from the fields of records in a record stream to fields with the corresponding names in a domain.

Format

```
domain-name = rse
```

Arguments

domain-name

Is the given name or alias of a domain readied for EXTEND or WRITE access. That domain receives data from the records identified by the RSE.

rse

Is an RSE that identifies records containing one or more fields corresponding to fields of the same name in the domain that receives the data.

Restrictions

- You must ready the receiving domain for WRITE or EXTEND access.

  The domain(s) referred to in the RSE must be readied for READ, MODIFY, or WRITE access.

- To update the receiving domain you must have these access privileges to its definition in the CDD:
  - P (PASS_THRU), S (SEE), and W (DTR_WRITE) or E (DTR_EXTEND/EXECUTE) access to the domain definition
  - P (PASS_THRU), S (SEE), and E (DTR_EXTEND/EXECUTE) access to the record definition

- To form the record stream with the RSE, you must have these access privileges to the domain(s) providing the source of the record stream:
  - P (PASS_THRU), S (SEE), and R (DTR_READ) access to the definition(s) of the domain(s) from which the record stream derives
  - P (PASS_THRU), S (SEE), and E (DTR_EXTEND/EXECUTE) access to the record definition associated with the domain(s) from which the record stream derives
- The receiving domain and the source in the RSE must have the name of at least one field in common.
- The source in the RSE cannot have two elementary field names with the same name, associated with different group fields. The same rule holds for the receiving domain. DATATRIEVE does not always associate the elementary fields with the appropriate group fields. In these cases, a STORE domain-name USING statement is the best approach. See the section in this chapter on the STORE statement.
- If the record is hierarchical, there should not be any changes in the structure of a list. In such a case, use the MATCH statement with a STORE domain-name USING statement. See the section in this chapter on the MATCH statement.

Results

- DATATRIEVE copies values from the record stream to new records in the data file of the receiving domain. DATATRIEVE also makes any datatype conversions that might be necessary.
- If the record stream produced by the RSE contains no records, then no records are stored in the receiving domain.

Usage Notes

The Restructure statement provides a simple way of copying data from one domain to another. This statement is especially useful when you modify a record definition or want to change the file organization of a domain's data file. After entering the appropriate READY and DEFINE commands, you use the Restructure statement to transfer data from the old domain to the new.

The Restructure statement matches fields from the new domain with fields of the same name in the old one and then transfers data from the fields in the old data file to those in the new one.

If you define a new record, you can add new fields, omit old ones, change the data type of fields, and change the length of fields. DATATRIEVE does the data conversions automatically. The lengths and data types of the corresponding fields do not have to be the same. If they are different, you need to anticipate any problems (such as truncations or overflows) that might arise. Only the field names or query names of the corresponding fields must be the same.

You can also use the Restructure statement when you want to change the type of file organization of a domain's data file. You can change from a sequential file to an indexed file without defining a new domain. This process uses the AS alias clause of the READY command and is explained in the section on the READY command.

Note

You cannot reorganize DBMS or relational databases using DATATRIEVE. You can, however, use the DATATRIEVE Restructure statement to store records from an RMS data file in a relational database or relation, and in a DBMS domain or record. You can also use the Restructure statement to store records from a relational database or relation in an RMS data file, and to store records from a DBMS domain or record in an RMS data file.

Examples

Define a new domain using FAMILY_REC and store only those records of families that have no kids younger than 15:

```
DTR> DEFINE DOMAIN NEWFAMS USING FAMILY_REC ON FAMS;
DTR> DEFINE FILE FOR NEWFAMS MAX, KEY = MOTHER (DUP)
DTR> NEWFAMS = FAMILIES WITH NOT ANY KIDS WITH AGE LE 15
DTR> FIND NEWFAMS
[8 records found]
DTR> FIND FAMILIES
[16 records found]
DTR>
```

Define a new domain called YACHTS_PRICE_LIST, which contains only the fields TYPE and PRICE from the old YACHT record definition. Check for the number of records transferred (with the FIND statement) and the accuracy of the transfer (with the CROSS statement). Display some of the records from the new domain to check the presence of the MISSING VALUE edit string:

```
DTR> DEFINE DOMAIN YACHTS_PRICE_LIST USING YPL_REC ON YPL.DAT;
DTR> DEFINE RECORD YPL_REC USING
DFN> 01 BOAT.
DFN>    03 TYPE.
DFN>       05 BUILDER PIC X(10).
DFN>       05 MODEL PIC X(8).
DFN>    03 PRICE PIC 9(5) MISSING VALUE IS 0
DFN>       EDIT_STRING $$$,$$$?"NOT LISTED".
DFN> ;
[Record is 23 bytes long.]
DTR> DEFINE FILE FOR YACHTS_PRICE_LIST KEY = TYPE
DTR> READY YACHTS_PRICE_LIST AS YPL WRITE
DTR> READY YACHTS
DTR> SHOW READY
Ready domains:
   YACHTS:  Domain, RMS indexed, protected read
            <CDD$TOP.DTR32.WAJ.YACHTS;1>
   YPL:  Domain, RMS indexed, protected write
            <CDD$TOP.DTR32.WAJ.YACHTS_PRICE_LIST;1>
No loaded tables.

DTR> YPL = YACHTS WITH LOA GT 35
DTR> FIND YACHTS WITH LOA GT 35
[23 records found]
DTR> FIND YPL
[23 records found]
DTR> FIND A IN YPL CROSS B IN YACHTS OVER
[Looking for field name]
CON> TYPE WITH A.PRICE NE B.PRICE
[0 records found]
DTR> FIND YPL WITH PRICE MISSING
[12 records found]
DTR> PRINT FIRST 3 CURRENT

 BUILDER    MODEL     PRICE

BLOCK I.   40       NOT LISTED
CABOT      36       NOT LISTED
DOWN EAST  38       NOT LISTED

DTR>
```

Restructure

Use the Restructure statement to transfer data from an indexed file to a sequential file:

```
DTR> SET NO PROMPT
DTR> READY YACHTS AS OLD
DTR> DEFINE FILE FOR YACHTS
DTR> READY YACHTS AS NEW WRITE
DTR> NEW = OLD
DTR> FIND NEW
[113
DTR>
```

7.68 ROLLBACK Statement

Undoes all the changes you made to the database since the last COMMIT or ROLLBACK statement, or since your first READY if you have not done a ROLLBACK or a COMMIT. The ROLLBACK statement performs a DBMS or relational rollback and releases all collections associated with DBMS domains and records and with relational domains and relations. ROLLBACK then readies DBMS realms again or finishes and starts a new relational source transaction.

The ROLLBACK statement also acts as an ABORT in procedures, nested statements, and command files.

The ROLLBACK statement affects all readied parts of DBMS and relational databases, whether or not you made any changes to the data they contain. RMS domains are not affected by the ROLLBACK statement.

Format

```
ROLLBACK
```

Usage Notes

- If you do a FINISH that did not cause a COMMIT, the ROLLBACK undoes changes made since the previous COMMIT, ROLLBACK, or the first READY.
- If you have done a final FINISH on a database, ROLLBACK undoes changes to that FINISH.

Example

The following example for the DBMS database PARTS_DB connects an employee named Hill to a part LA36 in the RESPONSIBLE_FOR set. The ROLLBACK statement undoes the change:

```
DTR> FIND E IN EMPLOYEES WITH EMP_LAST_NAME = "HILL"
DTR> SELECT 1
DTR> FOR P IN PART WITH PART_DESC = "LA36"
CON>     CONNECT P TO E.RESPONSIBLE_FOR
DTR> ROLLBACK
DTR>
```

7.69 SCALE Clause

Establishes explicitly the scale factor to be applied to the value stored in the field.

Format

```
SCALE  [IS]  [-]  integer
```

Arguments

– (minus sign)

Is an optional minus sign to indicate a negative scale factor.

integer

Indicates the number of decimal places the implied decimal point is from the right or left end of the value stored in the field.

Restriction

Do not use a SCALE clause in the same definition with a V or one or more Ps in the picture string.

Results

Scale factors help determine the position of the implied decimal point associated with the value stored in the field. A positive scale determines how many places the implied decimal point is to the right of the digits stored in the field. If the scale factor is 2 and the field contains the digits 12, the value of the field is 1200.

A negative scale factor determines how many places the implied decimal point is to the left of the digits stored in the field. If the scale factor is −2 and the field contains the digits 12, the value of the field is .12.

Examples

Use a positive scale factor to store a large number in a small field:

```
03 BARRELS_PER_DAY WORD
   SCALE 6
   EDIT_STRING Z(5)" Million".
```

Use a negative scale factor to store a minute number in a small field:

```
03 PROJECT.
   05 PROBABILITY_OF_FINISHING.
      07 EVER DEFAULT VALUE IS 1
         PIC 99 SCALE -2.
      07 ON_TIME 99 SCALE -6
         MISSING VALUE 0
         EDIT_STRING 0.9(6)?"Better late than never".
```

7.70 SELECT Statement

Establishes a target record in a collection.

Format

```
        ┌ FIRST            ┐
        │ NEXT             │
SELECT  │ PRIOR            │  [collection-name] [WITH boolean]
        │ LAST             │
        │ value-expression │
        └ NONE             ┘
```

Arguments

FIRST

Selects the first record in the target collection.

NEXT

Selects the next record in the target collection. (See the second and third items in Results.) When you omit a position specification, NEXT is the default.

PRIOR

Selects the previous record in the target collection. (See the fifth and sixth items in Results.)

LAST

Selects the last record in the target collection.

value-expression

Evaluates to a positive number. DATATRIEVE uses the integer part of the number to select the record with that position number in the collection.

NONE

Releases the selected record so that no selected record exists for the current collection. If the collection was formed from a file structured database, SELECT NONE also releases the RMS lock on the selected record.

collection-name

Is the name of the target collection containing the record to be selected. If you omit the collection-name, the target collection is the current collection.

WITH boolean

Causes DATATRIEVE to select the record that satisfies both the Boolean expression and the collection position references (FIRST, LAST, NEXT, PRIOR, and value-expression).

Restrictions

- You must establish the target collection with a FIND statement before entering this statement.
- The target collection cannot be empty.
- With the SELECT statement, you can move the collection cursor (which points to the selected record in a collection) to the position of a record that has been dropped, but you cannot retrieve any data from the record that occupied that position before you dropped it. You must form a new collection or record stream containing that record to retrieve its data. See the section in this chapter on the DROP command.
- Do not use a SELECT statement in a compound statement.
- Do not use a SELECT statement in FOR, REPEAT, or WHILE statements.
- If you specify a value expression, the expression must evaluate to a positive number between 1 and 1,301,265, which is the limit on collection size for records in RMS data files. The integer part of the number must not exceed the number of records in the collection. If the value expression exceeds the number of records in the collection, DATATRIEVE displays this message on your terminal:

```
Record number out of range for collection.
```

- You cannot use a SELECT statement with a Boolean expression on a remote collection. For example:

```
DTR> READY REMOTE-YACHTS
DTR> FIND REMOTE-YACHTS
[113 records found]
DTR> SELECT FIRST WITH PRICE = 0

SELECT with a boolean is not supported for remote
collections.

DTR>
```

Results

- The SELECT statement establishes a selected record in the target collection and, thus, establishes a single record context for one record in that collection.

  When you enter this statement, the record DATATRIEVE selects depends on the arguments you supply, the content of the target collection, and the existence and position of a previous selected record in the collection.

- If you have established a selected record for a collection and that record is not the last one, entering SELECT NEXT causes the next record in the collection to become the selected record.

- If you have not established a selected record in a collection and you enter SELECT NEXT, the first record in the collection becomes the selected record.

- If the collection cursor points to the last record in the collection and you specify SELECT NEXT, DATATRIEVE displays an error message on your terminal, and the last record in the collection is still the selected record.

- If you have not established a selected record in a collection and you enter SELECT PRIOR, DATATRIEVE displays an error on your terminal and does not select any record in the collection.

- If the first record in the collection is the selected record and you specify SELECT PRIOR, DATATRIEVE displays an error message on your terminal, and the first record in the collection is still the selected record.

- If the record identified by the SELECT statement has been dropped from the collection with a DROP statement, DATATRIEVE displays a message on your terminal and moves the collection cursor (which points to the selected record in a collection) to the position of the dropped record.

- If the target collection is not the CURRENT collection, selecting a record from it does not make it the CURRENT collection.
- When you omit the argument that determines the position of the selected record, DATATRIEVE responds as though you had entered SELECT NEXT. (See the second, third, and fourth items in Results.)
  - If no selected record exists for the target collection, DATATRIEVE selects the first record.
  - If a selected record exists for the target collection and that selected record is not the last one in the collection, DATATRIEVE selects the next record in the collection.
  - If the last record in the target collection is the selected record, DATATRIEVE displays an error message on your terminal, and the last record in the collection is still the selected record.
- When you specify a value expression in a SELECT statement, remember that the positive integer to which the expression evaluates is the position number of the *one* selected record in the collection.

  The integer does *not* designate the number of records that are selected. For example, if you type SELECT 5, you select the fifth record in the target collection, not five records from the collection. You can never select more than one record at a time per collection.
- If you select a record from the CURRENT collection and then select a record from another collection, the CURRENT collection and its selected record remain unchanged.
- If you include a Boolean expression in the SELECT statement, DATATRIEVE forms a temporary record stream of records that match the conditions specified by the Boolean expression. DATATRIEVE then uses the position references FIRST, NEXT, LAST, and PRIOR to select a record from that temporary record stream.

Usage Notes

- Use the SELECT statement to establish a single record context for a record in a collection. Having a selected record allows you to retrieve and compare values in the fields of a selected record without specifying a target record stream.

When referring to fields of records in a single record context, you can frequently use the field names without field name qualifiers, almost as though they were variables.

- When you use a field name by itself in a value expression, its value is retrieved from the "nearest" selected record with a field of that name. That field name is said to resolve to the nearest single record context for that name.

  DATATRIEVE establishes the "nearness" of selected records based on the order in which you created the collections with the FIND statement. For example, suppose that you have three established collections, created in the order A, then B, then C, and that each collection has a selected record. If you use a field name by itself, DATATRIEVE first tries to retrieve the field name value from C's selected record, then B's, then A's.

- Use a SELECT statement to establish a target record for the ERASE and MODIFY statements.

- Use a SELECT statement to establish a target record for PRINT and LIST statements in which you include only the print list or in which you use only the statement name. (See the third and fourth examples.)

- To show the position of the selected record in the target collection, use the SHOW command:

  ```
  SHOW collection-name
  ```

  This command prints the name of the collection, the name of the domain or domains from which the collection is derived, the number of records in the collection, the names of any fields used to establish the sort order of the collection, and the position number of the selected record in the target collection. It also tells you if the selected record has been dropped from the collection by a previous DROP statement.

  To show the name and attributes of the CURRENT collection, use the SHOW CURRENT command. See the section in this chapter on the SHOW command.

- If you use the SELECT statement to establish a selected record for the CURRENT collection, you need type only PRINT and press the RETURN key to display that selected record.

  If the CURRENT collection has no selected record, DATATRIEVE displays on your terminal the selected record from the most recently established named collection that has a selected record.

If you enter a PRINT statement without a print list and no existing collection has a selected record, DATATRIEVE displays a message on your terminal and displays the entire CURRENT collection.

- To display all fields of the selected record of a named collection that is not the CURRENT collection, you must provide a properly qualified top-level field name in the print list of a PRINT statement. Use the collection name as the qualifier.

  For example, a collection of YACHTS called BIGGIES is not the CURRENT collection, and the CURRENT collection has a selected record. To display the selected record in BIGGIES, type PRINT BIGGIES.BOAT and press RETURN.

  If you created the collections in question from different domains, you do not have to qualify the top-level field names if they are not the same.

  If the top level-field names of the different domains are the same, you can use the domain name to qualify the top-level field names.

- You can refer to the fields of the selected record as though they were variables. DATATRIEVE resolves an unqualified field name to the most recently formed collection with a selected record containing a field with that name.

  To refer to a field name beyond the most recently formed collection with a selected record containing that same name, you must provide a suitable qualifier to establish the appropriate context. Use the name of the collection containing the target record as qualifier.

- To distinguish between two or more selected records referred to in one complex DATATRIEVE statement, use context variables. Context variables can be particularly useful if you derived the collections from the same domain and the field names of the collections in question are identical.

- If you want to perform the same set of statements on each record in the CURRENT collection, *do not* use a SELECT statement in a BEGIN-END block inside a REPEAT statement.

  The following example illustrates the proper method of looping through the CURRENT collection:

```
FOR CURRENT
  BEGIN
     PRINT
     MODIFY ...
     PRINT
  END
```

- See the *VAX DATATRIEVE User's Guide* for a discussion of name recognition and single record context in DATATRIEVE.

Examples

Select the last record in the CURRENT collection:

```
DTR> SELECT LAST
DTR>
```

Select the fifth record in the collection BIG_ONES:

```
DTR> SELECT 5 BIG_ONES
DTR>
```

From the CURRENT collection, select the last 30-foot boat in the YACHTS inventory:

```
DTR> FIND YACHTS
[113 records found]
DTR> SELECT LAST WITH LOA = 30
DTR> PRINT

                                    LENGTH
                                     OVER
MANUFACTURER   MODEL     RIG     ALL    WEIGHT BEAM  PRICE

 SOLNA CORP  SCAMPI     SLOOP   30      6,600  10

DTR>
```

From the CURRENT collection, select a record and modify a field value. Then release the selected record (and, in this case, the RMS lock on the record):

```
DTR> READY YACHTS SHARED MODIFY
DTR> FIND YACHTS WITH BUILDER = "SOLNA CORP"
[1 record found]
DTR> SELECT
DTR> PRINT
```

```
                                      LENGTH
                                       OVER
MANUFACTURER   MODEL     RIG    ALL   WEIGHT BEAM  PRICE

 SOLNA CORP  SCAMPI     SLOOP   30     6,600  10

DTR> MODIFY PRICE
Enter PRICE: 50000
DTR> PRINT

                                      LENGTH
                                       OVER
MANUFACTURER   MODEL     RIG    ALL   WEIGHT BEAM  PRICE

 SOLNA CORP  SCAMPI     SLOOP   30     6,600  10  $50,000

DTR> SELECT NONE
DTR>
```

7.71 SET Command

- Controls the DATATRIEVE response to ABORT statements.
- Sets the keypad mode (application or numeric) within DATATRIEVE.
- Sets the maximum number of columns per page for DATATRIEVE output.
- Establishes your default directory in the Common Data Dictionary.
- Determines whether DATATRIEVE creates a DTREDIT.DTR backup file when you edit dictionary objects.
- Determines whether DATATRIEVE uses its forms interface to control the video display of your terminal.
- Starts DATATRIEVE Guide Mode.
- Permits or inhibits automatic syntax prompting for continued commands and statements.
- Permits or inhibits creation of an implicit inner print-list in a PRINT statement and an implicit ANY in a Boolean expression.
- Determines whether a semicolon is required at the end of each command or statement.
- Controls whether commands and statements in command files are displayed at the terminal when the command file is invoked

Format

```
        ⎧ [NO] ABORT                   ⎫
        ⎪ [NO] APPLICATION_KEYPAD      ⎪
        ⎪ COLUMNS_PAGE = n             ⎪
        ⎪ DICTIONARY path-name         ⎪
        ⎪ [NO] EDIT_BACKUP             ⎪
        ⎪ [NO] FORM                    ⎪
        ⎪ GUIDE [ADVANCED]             ⎪
SET     ⎨ KEYDEFS file-spec            ⎬   [,...]
        ⎪ [NO] LOCK_WAIT               ⎪
        ⎪ PLOTS path-name              ⎪
        ⎪ [NO] PROMPT                  ⎪
        ⎪ [NO] SEARCH                  ⎪
        ⎪ [NO] SEMICOLON               ⎪
        ⎪ [NO] VERIFY                  ⎪
        ⎩ NOVERIFY                     ⎭

To change settings for HELP:

        ⎧ [NO] HELP_PROMPT   ⎫
SET     ⎨ [NO] HELP_WINDOW   ⎬   [,...]
        ⎩ HELP_LINES n TO m  ⎭
```

Arguments

ABORT

Causes DATATRIEVE to abort the remainder of a procedure or command file when DATATRIEVE executes an ABORT statement, when you enter a CTRL/Z to a prompt, or when a syntax or logical error occurs during the execution of a command or statement.

(The exception to the logical error condition is the DELETE command. If you list two or more objects as arguments for the DELETE command, DATATRIEVE does not abort if it fails to find an object of a specified name. Instead, DATATRIEVE continues to delete the remaining objects in the list.)

NO ABORT

Causes DATATRIEVE, when processing a procedure or a command file, to abort only the one statement containing an ABORT statement. SET NO ABORT also causes DATATRIEVE to take the same action when you respond with a CTRL/Z to a prompt in a procedure or command file. DATATRIEVE then executes the next command or statement in the procedure or command file. SET NO ABORT is in effect when you start a DATATRIEVE session.

APPLICATION_KEYPAD

Sets the keypad mode as application keypad within DATATRIEVE.

The default keypad mode for DATATRIEVE is application keypad mode.

(You can also set the keypad mode using the function FN$KEYPAD_MODE.)

NO APPLICATION_KEYPAD

Sets the keypad mode as numeric keypad within DATATRIEVE.

The default keypad mode for DATATRIEVE is application keypad mode.

(You can also set the keypad mode using the function FN$KEYPAD_MODE.)

COLUMNS_PAGE = n

Establishes the number of columns per page for DATATRIEVE output and the default page width for the Report Writer. When you start your session, the default COLUMNS_PAGE setting is 80.

(To set the terminal's width, use the DATATRIEVE function FN$WIDTH. See the chapter in this manual on functions for more information about FN$WIDTH.)

DICTIONARY path-name

Causes DATATRIEVE to set your default directory node of the Common Data Dictionary to the node specified by the dictionary path-name. When you start your DATATRIEVE session, your default CDD directory is either CDD$TOP or the directory designated by the logical name CDD$DEFAULT.

EDIT_BACKUP

Causes DATATRIEVE to save the original definition in the CDD when you use the EDIT command to edit a dictionary object. When you start your DATATRIEVE session, SET EDIT_BACKUP is in effect. Use the SHOW EDIT command to see whether or not SET EDIT_BACKUP is currently in effect.

NO EDIT_BACKUP

Causes DATATRIEVE to delete the highest version of the object in the CDD, or the version you specify, and replace it with the definition in the edit buffer when you use the EDIT command to edit a dictionary object.

FORM

Determines whether or not DATATRIEVE uses its forms interface when you use the PRINT, MODIFY, and STORE statements. For terminals supported by the forms product you are using, SET FORM causes DATATRIEVE to display and use forms when you enter the PRINT, MODIFY, or STORE statement. If SET NO FORM was in effect when you accessed the domain with the READY command, you can use the associated form by entering a SET FORM command.

To use forms with a domain, you can use one of two methods. You can define a domain with a FORM clause in it to specify the name of the form and the name of the form library in which the form definition is stored. Or, you can display a form with the DISPLAY_FORM statement, even if the form has not been associated with a domain in a domain definition.

When you start your DATATRIEVE session, SET FORM is in effect.

NO FORM

Prevents DATATRIEVE from using its forms interface. If SET NO FORM is in effect when you use the PRINT, MODIFY, or STORE statements, DATATRIEVE does not use the forms interface.

GUIDE

Starts Guide Mode, the tutorial mode of DATATRIEVE. Refer to the *VAX DATATRIEVE Handbook* for a description of Guide Mode.

KEYDEFS file-spec

Lets you define multiple keypad keys from a file containing DCL DEFINE/KEY commands (See the VMS documentation on the Digital Command Language for more information on the DEFINE/KEY command.) By using SET KEYDEFS, you do not have to make multiple calls to the FN$DEFINE_KEY function.

The file specification is the *full* DCL file specification for the file containing the DCL DEFINE/KEY commands.

LOCK_WAIT

When two applications try to access the same file, RMS may lock a record that DATATRIEVE needs to access. DATATRIEVE tries for 12 seconds to access a locked record. SET LOCK_WAIT causes DATATRIEVE to turn control over to RMS after this period. RMS then waits for the locked record until it is released, or RMS sends you a deadlock message. The default is SET NO LOCK_WAIT.

NO LOCK_WAIT

Instructs DATATRIEVE not to try to access a locked record after 12 seconds. At the end of this period, you receive an RMS message informing you that the record is locked. When you begin your DATATRIEVE session, SET NO LOCK_WAIT is in effect.

PLOTS

Establishes the default CDD directory for your DATATRIEVE plot definitions. For more information, see the *VAX DATATRIEVE Guide to Using Graphics*.

PROMPT

Causes DATATRIEVE to prompt for elements needed to complete the syntax of the current command or statement. When you press the RETURN key before completing a command or statement, DATATRIEVE prompts you for the next syntactic element of that statement or command. The prompt takes this form:

```
[Looking for element]
```

At the start of a DATATRIEVE session, SET PROMPT is in effect.

NO PROMPT

Prevents DATATRIEVE from prompting for elements needed to complete the syntax of the current command or statement.

SEARCH

Causes the DATATRIEVE Context Searcher to create implicit inner print lists in PRINT statements and implicit ANYs in Boolean expressions. When you work with DBMS domains, the SET SEARCH command causes the DATATRIEVE Context Searcher to walk sets looking for a context to resolve references to field names.

NO SEARCH

Prevents the DATATRIEVE Context Searcher from creating implicit inner print lists in PRINT statements and implicit ANYs in Boolean expressions. At the start of a DATATRIEVE session, SET NO SEARCH is in effect.

SET SEMICOLON

Causes DATATRIEVE to require a semicolon at the end of commands or statements.

SET NO SEMICOLON

Causes DATATRIEVE to make semicolons at the end of commands or statements *optional.* At the start of a DATATRIEVE session, SET NO SEMICOLON is in effect.

VERIFY

Causes lines from command files to be displayed when a command file is invoked.

NO VERIFY

Suppresses the display of lines from command files when a command file is invoked. At the start of your DATATRIEVE session, the current setting for SET VERIFY/NOVERIFY at DCL level is in effect.

NOVERIFY

Suppresses the display of lines from command files when a command file is invoked.

HELP_PROMPT

Causes DATATRIEVE to prompt for the topic or subtopic when the Help text is displayed.

NO HELP_PROMPT

Suppresses the prompting for the topic or subtopic when the Help text is displayed.

HELP_WINDOW

Causes the Help text to be displayed in a scrolling region of a video terminal.

NO HELP_WINDOW

Causes the Help text to be displayed in a nonscrolling region of a video terminal.

HELP_LINES n TO m

Sets the lines for the scrolling Help between n and m.

Restrictions

- You must enter SET commands at DATATRIEVE command level, indicated by the DTR> prompt.
- You cannot use SET commands in compound statements: neither in THEN, IF-THEN-ELSE, or BEGIN-END statements.
- You cannot use SET commands in FOR, REPEAT, or WHILE statements.
- In the SET COLUMNS-PAGE command, the argument n must be an unsigned, nonzero integer less than or equal to 255.
- You must have at least P (PASS_THRU) access to all nodes of the dictionary path name of the directory node you specify in the SET DICTIONARY command.
- The value for n in SET HELP HELP_LINES must be at least 1. The value for m must be no greater than 24. In addition, m must be at least 4 greater than n.
- You should not have two users operating out of the same VMS directory with different settings for EDIT_BACKUP. DATATRIEVE could delete a backup file of the user who specified SET EDIT_BACKUP, because the other user had specified SET NO EDIT_BACKUP. This result is possible because SET NO EDIT_BACKUP instructs DATATRIEVE to delete the backup file created last.

Results

- When SET ABORT is in effect and DATATRIEVE is executing a procedure or command file, DATATRIEVE aborts the entire procedure or command file if it executes an ABORT statement or you enter a CTRL/Z in response to a prompt.
- When SET NO ABORT is in effect and DATATRIEVE is executing a procedure or command file, DATATRIEVE aborts only the statement containing the ABORT statement or prompt and executes the next statement in the procedure or command file.
- With the SET COLUMNS_PAGE command, you can affect the output of a PRINT statement that contains no implicit line feeds, that is, no SKIP, no NEW_PAGE, or no COL n with n less than the column reserved for previous print list elements.

  If an element in a print list would extend beyond the right column limit determined by the value of the COLUMNS_PAGE setting, DATATRIEVE shifts that element to the second line. By adjusting the COLUMNS_PAGE setting, you can control the way DATATRIEVE breaks the detail lines of its output.
- If you use a relative dictionary path name in the SET DICTIONARY command, DATATRIEVE uses your default CDD directory to supply the missing part of the relative path name.
- If a SET DICTIONARY command fails because the specified CDD directory does not exist or because you do not have adequate privileges, your default directory does not change. That is, you remain at the directory node where you were before you issued the SET DICTIONARY command.
- When SET HELP HELP_WINDOW is in effect, the location and size of the scrolling region is determined by the values for n and m in the SET HELP HELP_LINES command. The default location for the scrolling region is the upper part of the video terminal screen.

Usage Notes

- To display the settings of ABORT/NO ABORT, APPLICATION_KEYPAD/NO APPLICATIONKEYPAD, PROMPT/NO PROMPT, SEARCH/NO SEARCH, COLUMNS_PAGE, FORM/NO FORM, and VERIFY/NO VERIFY use the SHOW SET_UP command. See the section in this chapter on the SHOW command for more information.

- To display your default CDD directory, use the SHOW DICTIONARY command.
- To display the names of the CDD directories cataloged in your default directory, use the SHOW DICTIONARIES command. To set your dictionary to any descendant of your default directory, you do not have to specify the entire dictionary path name beginning with CDD$TOP. You can use a relative dictionary path name. For more information about dictionary path names and the CDD, see the *VAX DATATRIEVE User's Guide.*
- You can assign a logical name to the full DCL file specification, then use the logical name with the SET KEYDEFS command. This is useful if you want to switch between different sets of key definitions for different applications:

```
DTR> FN$CREATELOG("KYPD1",
CON> "YOUR$DISK:[YOURDIR]DTRKEYS1.COM")
DTR> FN$CREATELOG("KYPD2",
CON> "YOUR$DISK:[YOURDIR]DTRKEYS2.COM")
DTR> SET KEYDEFS KYPD1
DTR> SET KEYDEFS KYPD2
```

- You can assign two file specifications in succession with the SET KEYDEFS command. DATATRIEVE implements the key definitions in both files:

```
DTR> SET KEYDEFS YOUR$DISK:[YOURDIR]SHOWKEYS.COM,
CON> KEYDEFS YOUR$DISK:[YOURDIR]SHOWKEYS2.COM
```

  If there is a conflict in key definitions (if a particular key is defined in both files), DATATRIEVE uses the definition from the file you specify last. In this example, DATATRIEVE would resolve key definition conflicts by using the definition from the file SHOWKEYS2.COM.

Examples

Display the default settings and change the default settings with one SET statement:

```
DTR> SHOW SET_UP
Set-up:
    Columns-page: 80
    No abort
    Prompt
    No search
    Form
    No verify
    No semicolon
    No lock_wait
    Application keypad mode
```

```
DTR> SET COLUMNS_PAGE = 132, ABORT, NO PROMPT, SEARCH,
[Looking for SET option]
CON> NO FORM, VERIFY, SEMICOLON, LOCK_WAIT, NO APPLICATION_KEYPAD

DTR> SHOW SET_UP
Set-up:
    Columns-page: 132
    Abort
    No prompt
    Search
    No form
    Verify
    Semicolon
    Lock_wait
    Numeric keypad mode
DTR>
```

Set your default dictionary directory at CDD$TOP and use a variety of path names to change your default directory:

```
DTR> SET DICTIONARY CDD$TOP
DTR> SET DICTIONARY DTR$LIB.DEMO
DTR> SHOW DICTIONARY
The default directory is CDD$TOP.DTR$LIB.DEMO
DTR> SHOW DICTIONARIES
Dictionaries:
DTR> SET DICTIONARY -.-;
DTR> SHOW DICTIONARY
The default directory is CDD$TOP
DTR> SET DICTIONARY CDD$TOP.DTR32
Element "CDD$TOP.DTR32.JONES" not found in dictionary.
DTR> SET DICTIONARY CDD$TOP.DTR32.TEST
DTR> SHOW DICTIONARIES
Dictionaries:
DTR> SET DEF -; SHOW DICTIONARY
The default directory is CDD$TOP.DTR32
DTR> SHOW DICTIONARIES
Dictionaries:
        AWS             BRADS           BRENT          DBF
        DDD             DEMO            DENN           DETRIC
        DUNCAN          JAS             KELLERMAN      LANDAU
        MARISON         PLOTS           STRONG         TEST
        WAYNE

DTR> SET DICTIONARY WAYNE
DTR>
```

Use the SET SEARCH command to walk sets in a DBMS database:

```
DTR> READY SUPPLIES, VENDORS, PART_S
DTR> SET SEARCH
DTR> PRINT VEND_NAME, PART_DESC OF
[Looking for name of domain, collection, or list]
CON>    VENDORS WITH VEND_NAME = "QUALITY COMPS"
Not enough context. Some field names resolved by Context Searcher.
--------------Vendor Name---------------

QUALITY COMPS
VT100 KEYBOARD ASSY
NUMERIC KEYPAD FRAME
VT52 HOUSING
```

When SET SEARCH is not in effect, you need to provide explicitly the inner print lists to give DATATRIEVE the necessary context:

```
DTR> SET NO SEARCH
DTR> PRINT VEND_NAME, ALL ALL PART_DESC OF PART_S OWNER OF
[Looking for set name]
CON>    PART_INFO OF SUPPLIES MEMBER OF VENDOR_SUPPLY OF
[Looking for name of domain, collection, or list]
CON>    VENDORS WITH VEND_NAME = "QUALITY COMPS"
--------------Vendor Name---------------

QUALITY COMPS
VT100 KEYBOARD ASSY
NUMERIC KEYPAD FRAME
VT52 HOUSING

DTR>
```

7.72 SET Statement (Report Writer)

Controls the report header and defines the size of report pages and the length of the report.

With Report Writer SET statements, you can specify:

- The report header—the report name (if any), the date, and page numbering
- The size of report pages—the number of columns and the number of lines per page
- The length of the report—the maximum number of lines and the maximum number of pages
- Whether or not column headers are printed

Format

For naming the report:

```
SET   REPORT_NAME =  { "string"[/...] }
                     { *.prompt      }
```

For controlling the printing of default page numbers:

```
SET  [ NUMBER    ]
     [ NO NUMBER ]
```

For specifying the beginning page number at the upper right of a page:

```
SET   NUMBER =  { n        }
                { *.prompt }
```

For controlling the printing of a date:

```
SET   NO DATE
```

For specifying a data or string at the upper right of each page:

```
SET   DATE =  "string"
```

For controlling the printing of the entire report headers:

```
SET   NO REPORT_HEADER
```

For controlling the printing of column headers:

```
SET   NO COLUMN_HEADER
```

For specifying page width or length, or overall report length:

```
SET  { { COLUMNS_PAGE = }                }
     { { LINES_PAGE =   }  { n        }  }  [,...]
     { { MAX_LINES =    }  { *.prompt }  }
     { { MAX_PAGES =    }                }
```

Arguments

Table 7-25 summarizes information about each type of SET statement.

The first column indicates the general objective for the setting.

The next three columns indicate the argument, the function of the statement, and the Report Writer's default setting if the statement is not used.

The Prompt Option column indicates whether or not a prompting value expression may be included with a form of the SET statement. If you include a prompt, the Report Writer prompts you for a value when it processes the report specification.

The Maximum Value column indicates the largest value you can specify for a form of the SET statement.

Table 7-25: SET Statement Arguments

Setting For	Argument	Function	Default	Prompt Option	Maximum Value
Report Header					
	REPORT_NAME	Centers a report name on the first line of each page	No report name	Yes (Response to prompt must be enclosed in quotation marks.)	–
	DATE	Specifies a date or string that is printed on the upper right of each page	Current system date	No	–
	NO DATE	Suppresses the printing of a date	Current system date	No	–

(continued on next page)

Table 7-25: SET Statement Arguments (Cont.)

Setting For	Argument	Function	Default	Prompt Option	Maximum Value
Report Header					
	NUMBER	Causes the printing of a page number below the date	Current page number	Yes	99,999
	NO NUMBER	Suppresses the printing of a page number	Current page number	No	–
	* NO REPORT_HEADER	Suppresses the printing of report name, date, column headers, and page number on each page	Header printed on each page	No	–
Column Headers					
	NO COLUMN_HEADER	Suppresses the printing of column headers	Headers printed on each page	No	–
	COLUMNS_PAGE	Specifies the page width in columns	Value at DCL or 80 columns	Yes	255
Page Size					
	LINES_PAGE	Specifies the page length in number of lines	60 lines	Yes	About 2 billion

(continued on next page)

Table 7-25: SET Statement Arguments (Cont.)

Setting For	Argument	Function	Default	Prompt Option	Maximum Value
Report Size	MAX_LINES	Specifies the maximum lines for the report	No line limit	Yes	About 2 billion
	** MAX_PAGES	Specifies the maximum pages for the report	No page limit	Yes	About 2 billion

* SET NO REPORT_HEADER overrides all other SET commands that control or specify elements in the report header.

** Although the maximum number of pages is about 2 billion, the maximum page number printed at the upper right of a page is 99,999.

Usage Note

DATATRIEVE calculates the maximum lines set for a report at the end of a page, not in the middle of a page, even if the MAX_LINES setting is reached in the middle of a page. If DATATRIEVE reaches the MAX_LINES setting mid-page, it prints out the full page before stopping the report.

Examples

There are examples of each type of SET statement in the *VAX DATATRIEVE Guide to Writing Reports.*

7.73 SHOW Command

Displays information about the Common Data Dictionary (CDD) and its contents.

Format

```
       / ALL                                                                  \
      |  collection-name                                                       |
      |  COLLECTIONS                                                           |
      |  CURRENT                                                               |
      |  database-name                                                         |
      |  DATABASES                                                             |
      |  DICTIONARIES                                                          |
      |  DICTIONARY                                                            |
      |  domain-name                                                           |
      |  DOMAINS                                                               |
      |  EDIT                                                                  |
      |                  [       ( domain-name       ) ]                       |
      |  FIELDS          [ FOR  { dbms-record-name    } ]   [,...]             |
      |                  [       ( rdb-relation-name ) ]                       |
SHOW <   FORMS                                                                  >
      |  HELP                                                                  |
      |  KEYDEFS                                                               |
      |  path-name                                                             |
      |  PLOTS                                                                 |
      |  PRIVILEGES [ [FOR] path-name]                                         |
      |  procedure-name                                                        |
      |  PROCEDURES                                                            |
      |  READY                                                                 |
      |  record-name                                                           |
      |  RECORDS                                                               |
      |  SET_UP                                                                |
      |  SETS                                                                  |
      |  SYNONYMS                                                              |
      |  table-name                                                            |
      |  TABLES                                                                |
       \ VARIABLES                                                            /
```

Arguments

ALL

Displays the names of all the objects and directories cataloged in your default CDD directory, the name of your default directory, and the names of the collections, the other readied RSE sources (domains, relations, DBMS records), and the loaded tables in your workspace.

collection-name

Displays the collection name, the name of the domain, relation, or DBMS record within which the collection has been established, the number of records in the collection, the status of the selected record within the collection, and the names of the keys on which the collection has been sorted.

COLLECTIONS

Displays the names of the collections in your workspace.

CURRENT

Displays the name of the domain, relation, or DBMS record within which the current collection has been formed, the number of records in the current collection, the status of the selected record in the current collection, and the names of the keys on which the collection has been sorted.

database-name

For relational databases, displays the name and the file specification of the database.

For DBMS, displays the name, the subschema name, the schema path name, and the root file specification of the database.

DATABASES

Displays the names of the relational and DBMS databases cataloged in your default directory.

DICTIONARIES

Displays the names of the CDD directories cataloged in your default directory.

DICTIONARY

Displays the full dictionary path name of your default directory.

domain-name

Displays the name, the record definition name, and the file specification of the RMS domain. Displays the domain name, the associated DBMS record, and the database name associated with the DBMS domain. Displays the domain name, the associated relation name, and the database name associated with the relational domain.

DOMAINS

Displays the names of all domains cataloged in your default directory.

EDIT

Indicates whether SET EDIT_BACKUP or SET NO EDIT_BACKUP is in effect in your DATATRIEVE session.

$$\text{FIELDS} \left[\text{FOR} \begin{Bmatrix} \text{domain-name} \\ \text{dbms-record} \\ \text{rdb-relation-name} \end{Bmatrix} \right]$$

Displays the names, data types, and index key information of the fields of all readied domains, relations, and records or for the domain, relation, or record specified in the FOR clause. The SHOW FIELDS command also displays the names and data types of global variables.

For RMS sources, the SHOW FIELDS command indicates whether or not a key field is the primary key or an alternate key. For fields from non-RMS sources, SHOW FIELDS indicates simply *indexed key.*

FORMS

Displays the form name and form library of all loaded forms.

HELP

Indicates which of the settings for the HELP command is in effect. The settings are HELP_LINES, HELP_PROMPT, and HELP_WINDOW.

KEYDEFS

Shows all current key definitions in all states. (A state allows the same key to be assigned multiple definitions by associating each definition with a different state key.)

In addition to SHOW KEYDEFS, you can use the function FN$SHOW_KEYDEFS to show all key definitions.

path-name

Displays the source text of a domain, record, procedure, or table definition specified by the dictionary path name.

PLOTS

Displays the names of the loaded plots from the directory specified in the SET PLOTS command.

PRIVILEGES [[FOR] path-name]

Displays the access privileges you have to your default directory or to the object or directory specified by the dictionary path name in the FOR clause.

procedure-name

Displays the name of the procedure, the commands and statements contained in the procedure, and the END_PROCEDURE clause.

PROCEDURES

Displays the names of all procedures cataloged in your default directory.

READY

Displays for each readied RMS domain the full dictionary path name, the file organization of the associated data file, the access control option, and the access mode. For all readied DBMS domains and records and relational domains and relations, displays the name, type, access option, access mode, the domain path for relational and DBMS domains, and the dictionary path to the database for relations and DBMS records. The most recently readied domain, relation, or DBMS record is at the top of the list displayed on your terminal. (See the section in this chapter on the READY command for further information.) The SHOW READY command also displays the full dictionary path name and table type of all tables loaded in your workspace.

record-name

Displays the name, level numbers, fields, and field definitions of the record.

RECORDS

Displays the names of all record definitions cataloged in your default directory.

SET_UP

Displays the current status of options you can control with the SET command: ABORT/NO ABORT, APPLICATION_KEYPAD/NO APPLICATION_KEYPAD, COLUMNS_PAGE, FORM/NO FORM, PROMPT/NO PROMPT, SEARCH/NO SEARCH, SEMICOLON/NO SEMICOLON, and VERIFY/NOVERIFY.

SETS

Displays the names of any available DBMS sets and their DBMS insertion and retention classes.

SYNONYMS

Displays the names of any synonyms for DATATRIEVE keywords in effect in the current DATATRIEVE session.

table-name

Displays the name of the table, the code and translation pairs, and END_TABLE clause.

TABLES

Displays the names of all dictionary tables and domain tables cataloged in your default directory.

VARIABLES

Displays the global variables in effect in the current DATATRIEVE session.

Restrictions

- In the SHOW command, you can use the arguments ALL, DOMAINS, RECORDS, PROCEDURES, TABLES, and DICTIONARIES to display the given names of the objects and directories cataloged in your default CDD directory. To establish a CDD directory as your default directory, you must have at least P (PASS_THRU) access to the directory and all its ancestors. Thus, if you have P (PASS_THRU) access to a directory and its ancestors, you have access to the given names of all objects and directories cataloged in that directory.

- To use the SHOW path-name command to display information about a dictionary object, you must have these access privileges:
  - P (PASS_THRU) access to it and its ancestors
  - S (SEE) access to the object
  - R (DTR_READ) access to the object
- You cannot specify the dictionary path name of a CDD directory in the SHOW path-name command.
- To display, with a SHOW path-name command, information about the definition of a domain, record, procedure, or table, that dictionary object must have been defined by a person using DATATRIEVE.
- You must have at least P (PASS_THRU) access to a dictionary object and its ancestors to display your access rights to it with a SHOW PRIVILEGES command.

Results

- DATATRIEVE displays the information you request on your terminal, in the order requested.
- DATATRIEVE displays the objects you specify with version numbers at the end of the path name.
- You need only P (PASS_THRU) access to your default directory to use the SHOW command with these arguments: COLLECTIONS, collection-name, CURRENT, READY, FIELDS, VARIABLES, and SET_P. Any other access privileges you may have are irrelevant for these SHOW command options because DATATRIEVE does not access the CDD for the information you request with these options.
- You do not need P (PASS_THRU) access to the objects or directories in your default directory to see their given names when you enter a SHOW command with one of these options: ALL, DOMAINS, RECORDS, PROCEDURES, TABLES, and DICTIONARIES.
- If you do not have the access privileges needed to obtain information for the SHOW PRIVILEGES or SHOW path-name commands, DATATRIEVE displays an error message on your terminal and returns you to DATATRIEVE command level.

- When you have more than one existing collection and you enter a SHOW COLLECTIONS command, the order in which DATATRIEVE displays the collections reverses the order in which you established them. The CURRENT collection is always at the top of the list, and the "oldest" existing collection is always at the bottom of the list.

  Knowing this order of the collections is useful because you can see the order in which DATATRIEVE searches for a selected record to establish a single record context for the MODIFY, LIST, PRINT, ERASE, and DISPLAY statements and for resolving field names in value expressions.

- The SHOW SET_UP command lets you check the current status of set options that affect your DATATRIEVE session. The second example in the Examples section shows the default settings for these options. The section in this chapter on the SET command discusses the meaning of these options.

Examples

Display the record definition OWNER_REC:

```
DTR> SHOW OWNER_REC
RECORD OWNER_REC
01 OWNER.
   03 NAME PIC X(10).
   03 BOAT_NAME PIC X(17).
   03 TYPE.
      06 BUILDER PIC X(10).
      06 MODEL PIC X(10).
;

DTR>
```

Display the status of the SET command options that affect your DATATRIEVE session.

```
DTR> SHOW SET_UP
Set-up:
    Columns-page: 80
    No abort
    Prompt
    No search
    Form
    No verify
    No semicolon
    No lock wait
    Application keypad mode

DTR>
```

7.74 SHOWP Command

Prints the access control list of an object or directory in the CDD.

Format

```
SHOWP   path-name
```

Argument

path-name

Is the given name, full dictionary path name, or relative path name of the dictionary object or directory whose access control list you want to display on your terminal.

Restrictions

To display the access control list of an object or directory in the CDD, you must have the following access privileges:

- P (PASS_THRU) access to the parent directory of the object or directory
- P (PASS_THRU) and C (CONTROL) access to the object or directory

Result

DATATRIEVE displays on your terminal the entire access control list for the specified dictionary object or directory.

Usage Notes

- Before you use the DELETEP command to remove an entry from an access control list, use the SHOWP command to verify the sequence number of the entry you want to delete.
- To see what access privileges you have to an object, use the SHOW PRIVILEGES command. See the section in this chapter on the SHOW command for further information.
- Chapter 2 of this manual discusses access control lists and CDD protection. See also the *VAX Common Data Dictionary Utilities Manual.*

Examples

Display the access control list for the YACHTS domain:

```
DTR> SHOWP YACHTS
  1:    [*,*], Username: "JONES"
        Grant - CDEHMRSUW, Deny - none, Banish - none

DTR>
```

Use a password to gain C (CONTROL) access to the record YACHT and display its access control list:

```
DTR> SHOWP YACHT (*)
Enter password for YACHT:       !You enter CEP, which is not echoed.
DTR> SHOWP YACHT
  1:    [*,*], Password: "P"
        Grant - P, Deny - CDESUX, Banish - none
  2:    [*,*], Password: "DP"
        Grant - DP, Deny - CESUX, Banish - none
  3:    [*,*], Password: "EP"
        Grant - EP, Deny - CDSUX, Banish - none
  4:    [*,*], Password: "PS"
        Grant - PS, Deny - CDEUX, Banish - none
  5:    [*,*], Password: "PU"
        Grant - PU, Deny - CDESX, Banish - none
  6:    [*,*], Password: "PX"
        Grant - PX, Deny - CDESU, Banish - none
  7:    [*,*], Password: "CEP"
        Grant - CEP, Deny - DSUX, Banish - none
  8:    [*,*], Password: "CDP"
        Grant - CDP, Deny - ESUX, Banish - none

DTR>
```

7.75 SIGN Clause

Specifies the location and representation of a sign (+ or −) in a numeric elementary field.

Format

```
            { LEADING  }
SIGN [IS]   {          }   [SEPARATE]
            { TRAILING }
```

Arguments

LEADING
TRAILING

Indicates that the sign is at the left (LEADING) or right (TRAILING) of the field value.

SEPARATE

Indicates that the sign occupies its own character position in the field. If this argument is omitted, the sign shares a character position with the field's leftmost (if it is LEADING) or rightmost (TRAILING) digit.

Restrictions

- This clause can be used only with numeric elementary fields.
- A field definition cannot contain both a SIGN and a USAGE clause.

Results

If you do not include a SIGN clause with a numeric field, the sign shares a character position with the field's rightmost digit. You must include this clause if a program written in COBOL (or other language) uses the record and requires that the sign be a separate character or share the leftmost character position. A sign clause does not affect the output format of a field.

Examples

Define the field CURRENT_BALANCE as a 6-digit signed field, with the sign sharing the leftmost character position:

```
03 CURRENT_BALANCE
   PIC IS S9999V99
   EDIT_STRING IS $$$$9.99-
   SIGN IS LEADING.
```

Define the field NEW_PRICE as a 4-digit signed field. The sign is a separate character in the rightmost character position:

```
03 NEW_PRICE PIC S99V99
   SIGN TRAILING SEPARATE
   EDIT_STRING +++.99.
```

7.76 SORT Statement

Arranges a DATATRIEVE collection according to the order you specify for the contents of one or more fields in the records.

Format

```
SORT   [collection-name]   [BY]   sort-key-1 [,...]
```

Arguments

collection-name

Is the name of the collection to be sorted.

BY

Is an optional language element you can use to clarify syntax.

sort-key

Is a field whose contents form the basis for the sort. You can also use a value expression as a sort key as long as the value expression does not contain a SORTED BY or REDUCED TO clause.

The sort key can be preceded or followed by a keyword that determines the order in which DATATRIEVE sorts the records in the collection. ASCENDING is the default order.

To specify the sort order for each sort key, use one of the following terms:

ASC[ENDING]
DESC[ENDING]
INCREASING
DECREASING

If you specify more than one sort key, use a comma to separate each sort key from the next.

Restrictions

- You can use the SORT statement only to rearrange a collection you have already formed with a FIND statement.

- You cannot use the SORT statement in a compound statement.
- You must specify at least one sort key.
- You cannot specify more than 255 sort keys in an RSE or in a SORT statement.
- A sort field cannot be a direct table lookup.

Results

- DATATRIEVE sorts the collection according to the order and fields you specify. Appendix B describes the order by which DATATRIEVE sorts alphanumeric fields.
- If you omit the collection name, DATATRIEVE sorts the current collection.
- If you specify ASC[ENDING] or INCREASING in the sort key, DATATRIEVE puts the record with the lowest value in the specified field first in the collection and the one with the highest value last. This is the default.

  If you specify DESC[ENDING] or DECREASING, DATATRIEVE puts the record with the highest value in the specified field first in the collection and the one with the lowest value last.
- If you specify more than one sort key, DATATRIEVE uses the first field name as the major sort key and each successive field name as an increasingly minor key.
- If, in the first sort key, you omit a keyword specifying the sort order (for example, ASCENDING or DESCENDING), DATATRIEVE arranges the collection according to the ascending order of the contents of that field.

  If, in the second or subsequent sort keys, you omit a keyword specifying the sort order, DATATRIEVE uses the sort order implied or specified for the preceding sort key.
- When DATATRIEVE executes the SORT statement, any selected record for the target collection is released, and the collection cursor does not point to any record in the collection. In addition, the number of records shown in the SHOW CURRENT display no longer includes records dropped from the collection.

Usage Notes

- To sort record streams, use the SORTED BY clause of the record selection expression that creates the record stream (see Chapter 5).
- To sort collections when you first form them, use the SORTED BY clause of the RSE in the FIND statement.

Examples

Sort the first ten yachts by the ratio of PRICE to DISPLACEMENT:

```
DTR> FIND FIRST 10 YACHTS
[10 records found]
DTR> SORT BY PRICE/DISP
DTR> PRINT ALL TYPE, PRICE, DISP,
[Looking for next element in list]
CON> PRICE/DISP ("$/LB."/"RATIO") USING $$$.99

                                          $/LB.
MANUFACTURER   MODEL      PRICE  WEIGHT RATIO

 BLOCK I.     40                 18,500   $.00
 BUCCANEER    270                 5,000   $.00
 ALBERG       37 MK II   $36,951 20,000  $1.85
 AMERICAN     26          $9,895  4,000  $2.47
 BOMBAY       CLIPPER    $23,950  9,400  $2.55
 AMERICAN     26-MS      $18,895  5,500  $3.44
 BAYFIELD     30/32      $32,875  9,500  $3.46
 ALBIN        VEGA       $18,600  5,070  $3.67
 ALBIN        BALLAD     $27,500  7,276  $3.78
 ALBIN        79         $17,900  4,200  $4.26

DTR>
```

Form a collection of FAMILIES CROSS KIDS, and sort the collection by decreasing age of the kids:

```
DTR> FIND FIRST 6 FAMILIES CROSS KIDS
[6 records found]
DTR> SORT BY DESC AGE
DTR> PRINT ALL FATHER, MOTHER, EACH_KID

                          KID
  FATHER      MOTHER      NAME    AGE

JIM        LOUISE     ANNE       31
JIM        LOUISE     JIM        29
JIM        LOUISE     ELLEN      26
JIM        LOUISE     DAVID      24
JIM        ANN        URSULA      7
JIM        ANN        RALPH       3
```

7.77 STORE Statement

Creates a record in a DATATRIEVE domain and stores values in one or more fields of the record. For information on using STORE with DBMS and relational databases, see the section in this chapter entitled STORE (for DBMS and Relational Sources).

Format

```
STORE  domain-name

         [USING  statement-1]

         [VERIFY [USING] statement-2]
```

Arguments

domain-name

Is the given name or alias of the domain to contain the new record. You can prefix a context variable to the domain name with this format:

[context-variable IN] given-name

See Chapter 5 of this manual and the *VAX DATATRIEVE User's Guide* for discussions of context variables.

USING statement-1

Specifies a DATATRIEVE statement that can store one value for one or more fields in the new record.

VERIFY [USING] statement-2

Specifies a statement DATATRIEVE executes just before storing the new record.

Restrictions

- The domain to contain the new record must be readied for WRITE or EXTEND access (see the section on the READY command.)
- You cannot store a new record in an RMS relative file or a view.

- With the USING clause you cannot store values in the fields of a list unless you include a MATCH statement (see the section on the MATCH statement). You can also store values into list fields by omitting the USING clause and having DATATRIEVE prompt you for a value for each field in the record. Or you can make no reference to the list fields in the USING clause, and use the MODIFY statement later to enter values in the list fields.
- If you include the keyword USING when specifying statement-1, you must put USING on the same input line as the domain name, unless you end the input line with a continuation character hyphen (-). If you omit the keyword USING and the continuation character, you must put at least the first element of statement-1 on the same input line as the domain name.
- Unless you end your input line with the continuation character hyphen (-), do not press the RETURN key immmediately before typing the keyword VERIFY.
- For data contained in an RMS indexed file, you cannot store a new record that duplicates the information in either a primary or alternate key field with the NO DUP attribute.
- You cannot store a value in a COMPUTED BY field.
- You cannot store list fields or their subordinates in hierarchical records in remote domains.
- To use the name of a REDEFINES field when storing a record, you must specify the name in a USING clause. Otherwise, DATATRIEVE prompts you with the name of the elementary field from which the REDEFINES field takes its value.

Results

- If you omit the USING statement-1 clause, DATATRIEVE prompts you to supply a value for the first elementary field in the record with this message:

  ```
  ENTER field-name:
  ```

  After you enter a value, DATATRIEVE prompts you to supply a value for the next elementary field in the record, and so on, until you have entered a value for every elementary field in the record.

  After you supply a value to the last elementary field in the record, DATATRIEVE adds the record to the data file.

- If you press only the RETURN key in response to a prompt, DATATRIEVE repeats the prompt.
- To enter all spaces in an alphabetic or alphanumeric field or to enter all zeros in a numeric field, respond to the STORE statement's prompt with one or more spaces and press the RETURN key.
- If a field definition contains a DEFAULT VALUE clause and you enter *one* TAB when prompted for a value in that field, DATATRIEVE enters the default value in the field. DATATRIEVE enters the default value whether the field definition contains a MISSING VALUE clause or not.
- If you enter two or more TABs to a prompt for an alphanumeric field, DATATRIEVE stores the TAB characters in the field. If you enter two or more TABs to a prompt for a numeric field, DATATRIEVE displays an error message on your terminal and reprompts you for valid numeric data.
- If a field definition contains a MISSING VALUE clause and *no* DEFAULT VALUE clause, DATATRIEVE stores the missing value in the field when you respond to the prompt with *one* TAB.
- If you press CTRL/Z any time between the first prompt and entering your response to the last prompt, DATATRIEVE aborts the STORE statement and returns you to DATATRIEVE command level. No new record is stored.
- If in response to a prompt for a field value you enter more characters or digits than the field definition specifies, DATATRIEVE displays an error message on your terminal and reprompts you for another value.
- If you enter data that conflicts with the conditions specified by a VALID IF clause in the record definition, DATATRIEVE reprompts you for valid data.
- If you specify a VERIFY USING clause, no data is stored until DATATRIEVE successfully executes statement-2. If the VERIFY USING clause contains an ABORT statement in an IF-THEN-ELSE statement and the abort conditions are met, DATATRIEVE aborts the STORE statement and returns you to DATATRIEVE command level. This abort occurs whether you have SET ABORT or SET NO ABORT in effect. When DATATRIEVE aborts a STORE statement, no record is stored.

Usage Notes

- In the USING statement-1 clause, you can include an Assignment statement or a BEGIN-END block containing a series of Assignment statements. You can use the following two forms of the Assignment statement:

  ```
  field-name = value-expression

  group-field-name-1 = group-field-name-2
  ```

  See the Assignment section of this chapter for more information on assigning a value to an elementary field and assigning a value to a group field.

- Each time DATATRIEVE completes the execution of a STORE statement, the new record is part of the data file. If a STORE statement is part of a loop and it creates a record each time DATATRIEVE executes the loop, DATATRIEVE enters each new record in the data file when it executes the STORE statement. If you abort the loop with a CTRL/Z, CTRL/C, or ABORT statement, the records already stored are unaffected.

  Once the records are in the data file, you must, when working with DATATRIEVE, use either the ERASE statement for indexed files or the MODIFY statement for sequential files to remove data from the files.

- To store more than one record in a domain, you can use the following form of the REPEAT statement:

  ```
  REPEAT n STORE domain-name
  ```

  The argument n represents the number of records to be stored in the domain. You can avoid counting the new records you want to store by making n much larger than the estimated number of new records. When you finish storing records, stop the prompts for additional data by entering a CTRL/Z in response to the prompt. DATATRIEVE then returns you to command level.

- You can use the VERIFY clause to check data before DATATRIEVE stores a new record. Put an ABORT statement in an IF-THEN-ELSE statement that establishes the conditions for the abort. In statement-2 of the VERIFY clause, you can also put a BEGIN-END block containing a series of IF-THEN-ELSE statements.

- The values you supply to the prompts of the STORE statement are first checked against any validation conditions specified for that field in the record definition. If the value conforms to the conditions specified in the appropriate VALID IF clause in the record definition, only then is it checked against the conditions in the VERIFY clause of the STORE statement.

If you always use the same validation conditions when storing data, put those conditions in VALID IF clauses in the record definition. That way, DATATRIEVE reprompts you for a value if you enter invalid data. Otherwise, the ABORT statement in a VERIFY clause returns you to DATATRIEVE command level, and you have to reissue the STORE command to resume entering data.

- With the STORE statement, you can transfer information from one domain to another. Use the following syntax to nest the STORE statement in a FOR loop:

```
FOR domain-1
      STORE domain-2 USING
          group-field-name-2 = group-field-name-1
```

The group fields need not contain identical elementary fields, but DATATRIEVE transfers values only between elementary fields with identical field names. You should use this method (instead of a RESTRUCTURE statement) when a record contains duplicate elementary field names subordinate to different group fields.

Note, however, that DATATRIEVE still needs to know which elementary fields in the source domain are to be matched with the fields of the same names in the target domain. The specified group field names must unambiguously identify the fields in question. For example, do not specify a higher level group field that includes multiple elementary fields of the same name; specify the lower level group field that can distinguish the appropriate elementary field.

You can use this method to transfer data between RMS sequential files and RMS indexed files. Both domains can share the same record definition, but the definition of one domain specifies a sequential file, and the other an indexed file. See the DEFINE FILE command for details on specifying types of file organization.

In a similar manner, you can also transfer elementary field values from one domain to another. Put a STORE statement in a FOR statement whose RSE selected the desired source records, and put the necessary Assignment statements in the USING clause of the STORE statement.

If the definition of an elementary field of the target domain contains a DEFAULT VALUE clause and there is no matching field in the source domain, DATATRIEVE stores the default value in the field. This default value is stored whether or not the field definition contains a MISSING VALUE clause.

If the definition of an elementary field of the target domain contains a MISSING VALUE clause and no DEFAULT VALUE clause, and there is no matching field in the source domain, DATATRIEVE stores the missing value in the field.

If the definition of an elementary field contains neither a DEFAULT VALUE clause nor a MISSING VALUE clause and there is no matching field in the source domain, DATATRIEVE stores blanks in alphabetic and alphanumeric fields and zeros in numeric fields.

- You can also transfer information from one domain to another with the Restructure statement:

  domain-name = rse

  This form of the Assignment statement creates an implicit FOR loop and an implicit STORE statement with the appropriate USING clause. See the section in this chapter on the Restructure statement for further details about restructuring domains.

- Take special care when storing data in primary key fields of RMS indexed files and in other fields with the NO CHANGE attribute. Values in these fields cannot be changed with the MODIFY command, and errors can be corrected only by creating a new record with the correct value and erasing the old record.

- Use a context variable with the domain name in the STORE statement if you want to refer to the values you have entered before DATATRIEVE stores the record. You can use the values for VERIFY USING clauses (as in the second example), or you can use the values of one field to calculate the values of other fields in the record as you store them. For example, you want to store a yearly total after storing the quarterly quantities:

```
DTR> STORE X IN ACCOUNTS USING
CON> BEGIN
CON>      Q1 = *.Q1
CON>      Q2 = *.Q2
CON>      Q3 = *.Q3
CON>      Q4 = *.Q4
CON>      FY = X.Q1 + X.Q2 + X.Q3 + X.Q4
CON> END
Enter Q1: . . .
```

Examples

Store two records in the FAMILIES domain:

```
DTR> READY FAMILIES WRITE
DTR> REPEAT 2 STORE FAMILIES
Enter FATHER: GEORGE
Enter MOTHER: SANDY
Enter NUMBER_KIDS: 2
Enter KID_NAME: DANA
Enter AGE: 12
Enter KID_NAME: DACIA
Enter AGE: 9

Enter FATHER: WAYNE
Enter MOTHER: SHEEL
Enter NUMBER_KIDS: 2
Enter KID_NAME: BETE
Enter AGE: 8
Enter KID_NAME: ALEX
Enter AGE: 5
DTR> FIND FAMILIES WITH MOTHER = "SANDY", "SHEEL"
[2 records found]
DTR> PRINT ALL

                         NUMBER    KID
  FATHER     MOTHER       KIDS     NAME    AGE

GEORGE     SANDY           2    DANA      12
                                DACIA      9
WAYNE      SHEEL           2    BETE       8
                                ALEX       5

DTR>
```

Store a record in the YACHTS domain, using a context variable and a VERIFY clause:

```
DTR> SHOW HINKLEY_STORE
PROCEDURE HINKLEY_STORE
STORE A IN YACHTS USING
BEGIN
     BUILDER = "HINKLEY"
     MODEL = "BERMUDA 40"
     RIG = "YAWL"
     LOA = 40
     DISP = 20000
     BEAM = 12
     PRICE = 82000
END VERIFY USING
```

```
BEGIN
     PRINT A.BOAT, SKIP
     IF *.CONFIRMATION CONT "N" THEN
     PRINT SKIP THEN ABORT "BAD RECORD"
END
END-PROCEDURE

DTR> READY YACHTS WRITE
DTR> :HINKLEY_STORE

                               LENGTH
                                OVER
MANUFACTURER   MODEL      RIG   ALL    WEIGHT BEAM  PRICE

 HINKLEY     BERMUDA 40 YAWL    40     20,000  12  $82,000

Enter CONFIRMATION: N

ABORT: BAD RECORD

DTR>
```

Define a domain for single digit integers and their squares, and use a WHILE statement to control the number of records stored in the domain:

```
DTR> DEFINE DOMAIN SQUARES USING
DFN> SQUARES_REC ON SQUARES.DAT;
DTR> DEFINE RECORD SQUARES_REC USING
DFN> 01 SQUARES.
DFN>    03 NUMBER PIC 9.
DFN>    03 ITS_SQUARE PIC 99.
DFN> ;
[Record is 3 bytes long.]
DTR> DEFINE FILE FOR SQUARES;
DTR> READY SQUARES WRITE
DTR> DECLARE N PIC 99.
DTR> N = 0
DTR> WHILE N NE 10 STORE SQUARES USING
CON> BEGIN
CON>     NUMBER=N
CON>     ITS_SQUARE = N * N
CON>     N = N + 1
CON> END
DTR> FIND SQUARES
[10 records found]
DTR> PRINT ALL
```

(continued on next page)

```
       ITS
NUMBER SQUARE

  0      00
  1      01
  2      04
  3      09
  4      16
  5      25
  6      36
  7      49
  8      64
  9      81

DTR>
```

Store data from the WORKER domain into the expanded NEW_WORKER domain. These domains have duplicate elementary field names that are subordinate to different group field names. Use a FOR statement to control the STORE statement so that DATATRIEVE stores the data from the elementary fields correctly. Here are the record definitions and the STORE statement:

```
DTR> SHOW WORK_REC
RECORD WORK_REC USING
01 WORK.
    03 LOCAL.
         05 CITY   PIC X(10).
         05 STATE  PIC X(2).
    03 REMOTE.
         05 CITY   PIC X(10).
         05 STATE  PIC X(2).
;
DTR> SHOW NEW_WORK_REC
RECORD NEW_WORK_REC USING
01 WORK.
    03 NEW_LOCAL.
         05 CITY   PIC X(10).
         05 STATE  PIC X(2).
    03 NEW_REMOTE.
         05 CITY   PIC X(10).
         05 STATE  PIC X(2).
    03 NAME.
         05 FIRST PIC X(10).
         05 LAST  PIC X(15).
;
DTR> READY NEW_WORKER WRITE
DTR> FOR WORKER
CON>   STORE NEW_WORKER USING
CON>     BEGIN
CON>       NEW_LOCAL = LOCAL
CON>       NEW_REMOTE = REMOTE
CON>     END
DTR>
```

7.78 STORE Statement (for DBMS and Relational Sources)

Adds a new record to the database.

Format

```
STORE domain-name
        [USING statement-1]
        [VERIFY [USING] statement-2]
```

Arguments

rdb-domain-name

Is the given name of the domain to contain the new relation.

rdb-relation-name

Is the name assigned to the relation when the database was created. The relation name can be the name of a view relation.

dbms-domain-name

Is the given name of the domain to contain the new record.

dbms-record-name

Is the name assigned to the record when the database was created and to the record which will be stored.

USING statement-1

Specifies a DATATRIEVE statement that can store one value for one or more fields in the new record.

VERIFY [USING] statement-2

Specifies a statement DATATRIEVE executes just before storing the new record.

CURRENCY

Is a keyword that is used only with DBMS records or domains.

context-name

Is the name of a valid context variable or the name of a collection with a selected DBMS record. It must identify a record that participates in the specified set. If the SYSTEM owns the set, you do not need to establish a context for the set. If the set is not owned by the SYSTEM and the context name is not present, DATATRIEVE uses the most recent single record context of a domain with a record type that participates in the specified set type.

set-name

Is the name of a DBMS set. The record being stored must be an AUTOMATIC member of that set. Use the CONNECT statement to connect the record to MANUAL insertion sets.

It is not necessary to put SYSTEM-owned sets in the currency list. For all other AUTOMATIC sets, you must establish currency, but it is not necessary to put them in the currency list.

Usage Note

When storing records in relations that are dependent on other relations because of a constraint definition, ready all the involved relations.

Examples

Store a new record in the relation JOB_HISTORY and make the change permanent by entering a COMMIT statement:

```
DTR> READY PERSONNEL USING JOB_HISTORY WRITE
DTR> STORE JOB_HISTORY
Enter DEPARTMENT_CODE: HENG
Enter EMPLOYEE_ID: 78645
Enter JOB_CODE: B-78
Enter JOB_END: 021783
Enter JOB_START: 052181
DTR> COMMIT
```

Add a new COMPONENT record to the database. You must establish a valid context for current records in the sets PART_USED_ON and PART_USES to store a COMPONENT. The STORE_COMP procedure prompts for values so that DATATRIEVE knows which record you want to be current. The nested FOR loop establishes the context, and the CURRENCY clause translates DATATRIEVE contexts into DBMS currencies. After you enter your response to the last prompt for the values in a record, DBMS automatically inserts the record into the specified set occurrences:

```
DTR> DEFINE PROCEDURE STORE_COMP
DFN> DECLARE USED_ON PIC X(8).
DFN> DECLARE SUB_PART PIC X(8).
DFN> SUB_PART = *."I.D. number of the component part"
DFN> USED_ON = *."I.D. number of the part it is used on"
DFN> FOR A IN PART WITH PART_ID = USED_ON
DFN>     FOR B IN PART WITH PART_ID = SUB_PART
DFN>         STORE COMPONENTS USING

DFN>                               BEGIN
DFN>                 COMP_SUB_PART = SUB_PART
DFN>                 COMP_OWNER_PART = USED_ON
DFN>                 COMP_MEASURE = *."component measure"
DFN>                 COMP_QUANTITY = *."quantity"
DFN>             END CURRENCY A.PART_USED_ON , B.PART_USES
DFN> END_PROCEDURE
DTR>
```

7.79 SUM Statement

Provides a summary of totals for one or more numeric fields in the current collection. The summary is sorted according to the values in one or more fields of the current collection. The summary includes subtotals for control groups. The summary can be written to a file or an output device.

Format

```
SUM print-list BY sort-list  [ ON { file-spec } ]
                                  { *.prompt  }
```

Arguments

print-list

Is a list of one or more numeric fields, other value expressions, and modifiers. The format of the print list is:

{value-expression [{modifier} [...]]} [,...]

The section on the PRINT statement describes both the value expressions and modifiers you can use in a print list.

sort-list

Is a list of one or more sort keys that determine the order in which DATATRIEVE presents the summary totals. An item in the sort list consists of the name of a field whose contents form the basis for the sort, preceded or followed by a keyword that determines the order DATATRIEVE uses to sort the data.

To specify the sort order for each sort key, use one of these keywords:

ASC[ENDING]
DESC[ENDING]
INCREASING
DECREASING

If you specify more than one sort key, use a comma to separate each sort key from the next.

file-spec

Is the file specification to which you want to write the output of the statement.

A complete file specification has the following format:

node-spec::device:[directory]file-name.type;version

*.prompt-name

Is the prompting value expression that prompts you for the file specification to which you want to write the output of the statement.

Restrictions

- You must have established a current collection before issuing this statement.
- You must include only numeric fields in the print list.
- You cannot use table translation values as sort keys in a SUM statement. You can declare a variable using the COMPUTED BY clause and a translation value and then use the variable as the sort key.
- When you use ON LP: to send SUM statement output directly to a line printer, DATATRIEVE assumes your system has a line printer. If your system does not have a device defined as LPA0:, the clause ON LP: will not work.

  Although this restriction applies to any system without a line printer, you may encounter it unexpectedly if your system is part of a VAXcluster with a common line printer. The ON LP: clause does not work in a VAXcluster that uses a common printer not directly connected to your system.

  If the nodes in the cluster are connected with DECnet, you can work around this restriction. To send output from a node without a line printer, you must include the node name of the system with the line printer in the LP: specification. For example, if the cluster's line printer is on a node named BIGVAX, the following SUM statement sends output to it:

  ```
  DTR> SUM 1 ("NUMBER"/"OF YACHTS") USING 9,
  CON>    PRICE USING $$$$,$$$ BY BUILDER ON BIGVAX::LP
  ```

  Note that you cannot directly specify the line printer on BIGVAX by using the cluster device-name BIGVAX$LPA0: in the ON clause.

Results

- DATATRIEVE creates a record stream based on the current collection. It sorts the records of the record stream according to the specifications in the sort list. It displays the summary on your terminal or writes it to the device or file you specify in the ON clause.

  The summary consists of totals for the fields you specify in the print list. For each control group created by the sort list, there is a total for each field in the print list. At the end of the summary is a total for each value expression in the print list of the values for all the records in the record stream.

- The order and format of the data in the report depends on the arguments you select.

- If you omit the ON clause, DATATRIEVE displays the output on your terminal.

- If you omit a field in the file specification, DATATRIEVE uses the following defaults:

Field	Default
node-spec::	Your local node
device:	Your default device
[directory]	Your default directory
file-name	Null string
.type	.LIS
;version	1 or next higher version number

  The minimum file specification consists of a period (.). The specification of such a file stored in your default VMS directory ends with ".;n", where n is the version number and both the file name and the type are null strings.

Usage Note

Use edit strings to format the output of the totals for items in the print list.

Example

Form a collection of yachts. Use the SUM statement to summarize the prices of yachts in the collection and to display the number of yachts built by each builder. Use edit strings to format the values:

```
DTR> READY YACHTS; FIND FIRST 6 YACHTS
[6 records found]
DTR> SUM 1 ("NUMBER"/"OF YACHTS") USING 9,
CON>    PRICE USING $$$$,$$$ BY BUILDER

              NUMBER              NUMBER
MANUFACTURER OF YACHTS  PRICE   OF YACHTS  PRICE

 ALBERG         1       $36,951
 ALBIN          3       $64,000
 AMERICAN       2       $28,790
                                     6     $129,741

DTR>
```

7.80 SYNCHRONIZED Clause

Causes word boundary alignment of an elementary field.

Format

```
{ SYNCHRONIZED }      [ LEFT  ]
{ SYNC         }      [ RIGHT ]
```

Arguments

LEFT

An optional argument that allows compatibility with COBOL record definitions. DATATRIEVE accepts the argument but ignores the boundary alignment specification that the field begin at the left boundary of the unit of storage the field occupies.

RIGHT

An optional argument that allows compatibility with COBOL record definitions. DATATRIEVE accepts the arguments but ignores the boundary alignment specification that the field end at the right boundary of the unit of storage the field occupies.

Restriction

The SYNC clause forces word boundary alignment on elementary fields only if the allocation for the record is MAJOR_MINOR.

Results

A SYNC clause can force word boundary alignment on an elementary field and thus increase the amount of memory needed to store the value. For compatibility with COBOL record definitions, DATATRIEVE accepts the optional arguments LEFT and RIGHT but ignores the distinction between the two types of word boundary alignment.

The filler bytes created by word boundary alignment are added to the length of any group fields to which the elementary field belongs.

Example

This example illustrates the difference in storage allocation a SYNC clause can make. A field of USAGE type LONG occupies four bytes of storage (the equivalent of one longword):

```
DTR> DEFINE RECORD NOSYNC_REC USING
DFN> 01 TOP.
DFN>    03 ONE PIC X.
DFN>    03 TWO LONG.
DFN> ;
[Record is 5 bytes long.]
DTR> DEFINE RECORD SYNC_REC USING
DFN> 01 TOP.
DFN>    03 ONE PIC X.
DFN>    03 TWO SYNC RIGHT LONG.
DFN> ;
[Record is 8 bytes long.]
DTR>
```

7.81 THEN Statement

Joins two or more DATATRIEVE statements into a compound statement.

Format

```
statement-1   {THEN statement-2}   [...]
```

Argument

statement

Is a DATATRIEVE statement.

Restrictions

- You must observe all restrictions on the statements included in the compound statement. Restrictions are listed in the descriptions of each statement.
- You cannot use DATATRIEVE commands in a compound statement.
- A procedure you invoke in a compound statement cannot contain DATATRIEVE commands.
- Do not include FIND and SELECT in the same compound statement.
- Do not include FIND and SORT in the same compound statement.
- Do not include SELECT and DROP in the same compound statement.

Results

- DATATRIEVE executes the individual statements of the compound statement in the order you enter them.
- If any statement in the compound statement contains a syntax error, DATATRIEVE does not execute any of the statements in the compound.

Usage Notes

- You can use a compound statement anywhere you can use a single statement.
- Use THEN statements rather than BEGIN-END blocks to form short compound statements.

- If you use any statement that creates a context in the compound statement, do not use any other statement in that compound that refers to or depends on that context information.

Example

Use THEN to join a PRINT statement and a MODIFY statement in a FOR loop:

```
DTR> SET NO PROMPT
DTR> READY YACHTS MODIFY
DTR> FOR YACHTS WITH BUILDER EQ "ALBIN"
CON>     PRINT THEN MODIFY

                              LENGTH
                               OVER
MANUFACTURER   MODEL     RIG   ALL    WEIGHT BEAM  PRICE

 ALBIN       79         SLOOP  26      4,200  10  $17,900
Enter MANUFACTURER: CTRL/Z
Execution terminated by operator

DTR>
```

7.82 USAGE Clause

Specifies the internal format of a numeric field or specifies a date field.

Format

```
                 ⎧ DISPLAY         ⎫
                 ⎪ BYTE            ⎪
                 ⎪ WORD            ⎪
                 ⎪ LONG            ⎪
                 ⎪ QUAD            ⎪
                 ⎪ { COMP    }     ⎪
                 ⎪ { INTEGER }     ⎪
                 ⎪ { COMP-1  }     ⎪
                 ⎪ { REAL    }     ⎪
                 ⎪ { COMP-2  }     ⎪
USAGE [IS]      ⎨ { DOUBLE  }     ⎬
                 ⎪ G_FLOATING      ⎪
                 ⎪ H_FLOATING      ⎪
                 ⎪ { COMP-3  }     ⎪
                 ⎪ { PACKED  }     ⎪
                 ⎪ { COMP-5  }     ⎪
                 ⎪ { ZONED   }     ⎪
                 ⎩ DATE            ⎭
```

Arguments

DISPLAY

Indicates that each digit occupies one byte of storage. DISPLAY is the default if you do not include a USAGE clause.

BYTE

Indicates that field value is stored in binary format and that the value is stored in one byte of storage.

WORD

Indicates that field value is stored in binary format and that the value is stored in one word (two bytes) of storage.

LONG

Indicates that field value is stored in binary format and that the value is stored in one longword (four bytes) of storage.

QUAD

Indicates that field value is stored in binary format and that the value is stored in one quadword (eight bytes) of storage.

COMP
INTEGER

Indicates that the field value is stored in binary format. INTEGER is a synonym for COMP.

COMP-1
REAL

Indicates that the field value is stored in single-precision real format. REAL is a synonym for COMP-1.

COMP-2
DOUBLE

Indicates that the field value is stored in double-precision real format. DOUBLE is a synonym for COMP-2.

G_FLOATING

Indicates that a field is a floating point number with precision to approximately 15 decimal digits.

H_FLOATING

Indicates that a field is a floating point number with precision to 33 decimal digits.

COMP-3
PACKED

Indicates that the field value is stored in packed-decimal format. PACKED is a synonym for COMP-3.

COMP-5
ZONED

Indicates that the field value is stored in signed decimal format. ZONED is a synonym for COMP-5.

DATE

Indicates that the field is a date field.

Restrictions

- This clause is valid for elementary numeric or date fields only.
- A field definition cannot contain both a USAGE clause and a SIGN clause.

Results

- The internal storage format of a numeric field is determined by the USAGE clause specified. If a numeric field definition does not have a USAGE clause, each digit in the field value occupies one character position in the record.
- If USAGE IS DATE is specified in a field definition clause, the field is identified as a DATATRIEVE date field.

Usage Notes

- Use the appropriate form of the USAGE clause when a program written in COBOL, BASIC-PLUS-2, or other language uses the record and requires a different internal format.
- The USAGE clause can cause DATATRIEVE to align fields on hardware storage boundaries. See the section in this chapter on the ALLOCATION clause.

- A COMP (or INTEGER) field stores its value in binary format. The size of a COMP data type COMP (or INTEGER) field depends on the number of digit positions specified in its PICTURE clause. You can avoid having both a USAGE IS COMP clause and a PICTURE clause by using the keywords WORD, LONG, and QUAD to specify the three types of storage allocation available with COMP:

PIC Clause	Size of Field	Alternate USAGE Type
9(1) to 9(4)	2 bytes	WORD
9(5) to 9(9)	4 bytes	LONG
9(10) to 9(18)	8 bytes	QUAD

7.82.1 COMP-1 (or REAL) Fields

A COMP-1 (or REAL) field stores its value in single-precision real (floating-point) COMP-1 data type format. COMP-1 fields are four bytes long.

Example

Define the field SALE_PRICE as a REAL (COMP-1) field:

```
05 SALE_PRICE PIC 9(5)
   USAGE REAL
   EDIT_STRING IS $(6).
```

7.82.2 COMP-2 (or DOUBLE) Fields

A COMP-2 (or DOUBLE) field stores its value in double-precision real (floating-point) format. COMP-2 fields are eight bytes long.

7.82.3 G_FLOATING Fields

A G_FLOATING field is an extended range 64-bit floating point number with precision to approximately 15 decimal digits.

7.82.4 H_FLOATING Fields

An H_FLOATING field is an extended range 128-bit floating point number with precision to approximately 33 decimal digits.

7.82.5 COMP-3 (or PACKED) Fields

A COMP-3 (or PACKED) field stores its value in packed-decimal format. The value is stored two digits per byte. The value of a COMP-3 field must contain a sign. The sign occupies the four low-ordered bits in the rightmost byte. The size of the field depends on the number of digit positions specified by the field's PICTURE clause:

$$\text{size (in bytes)} = \frac{\text{digit-positions} + 1}{2}$$

For example, a field with three digit positions is two bytes long. If the field contains an even number of digits, the size is rounded up. Thus, a 6-digit field is stored in four bytes.

7.82.6 COMP-5 (or ZONED) Fields

A COMP-5 (or ZONED) field stores its value in signed decimal format. A value in a COMP-5 field is stored one digit per byte. Therefore, the size of a COMP-5 field is the number of digit positions specified in its PICTURE clause.

The sign of a COMP-5 value shares the rightmost byte with the lowest-valued digit of the value. The lowercase letters p through y represent a negative sign for the values 0 through 9.

7.82.7 DATE Fields

A DATATRIEVE date field stores a date as an eight-byte binary value. Other languages may not interpret the date field correctly. The date is expressed as the number of clunks (100-nanosecond units) since the base date of 00:00:00 AM on November 17, 1858.

When you print a date field, DATATRIEVE translates the number of clunks to the format you specify in the EDIT_STRING clause (or to the default format if no EDIT_STRING clause is included in the field definition). The default format is DD-MMM-YYYY.

When you enter a date value, DATATRIEVE translates the input value to clunks before storing it.

The default edit string for date fields is 11 characters. When you concatenate two fields defined as USAGE IS DATE, DATATRIEVE converts the date values to 23-character string literals. This results in longer concatenated strings than you may have expected. To force the use of the default when concatenating date fields, use a FORMAT value expression or specify an edit string for the concatenated fields in the PRINT statement.

Example

Define the field SALE_DATE as a date field, to be printed in the default format for date fields:

```
06 SALE_DATE USAGE IS DATE.
```

7.83 VALID IF Clause

Validates a field value before it is stored in the record.

Format

```
VALID IF   boolean-expression
```

Argument

boolean-expression

Is a DATATRIEVE Boolean expression.

Restrictions

- A field definition cannot contain both a VALID IF and a COMPUTED BY clause.
- The Boolean expression of a VALID IF clause cannot refer to a list field from the same domain.
- When you assign a value to a variable or a field that contains a VALID IF clause, the variable or field can end up containing an invalid value under the following conditions:
  - If you prompt for the value, enter an invalid value, and then stop the statement execution with CTRL/Z, the invalid value may be stored in the variable.
  - If you assign a value directly to a variable and the value is invalid, DATATRIEVE issues an invalid value message but still assigns the invalid value.

Results

When a value is entered for the field with a MODIFY or STORE statement, DATATRIEVE evaluates the Boolean expression. If the Boolean expression is true, DATATRIEVE stores the value in the field. If it is false, DATATRIEVE prints an error message and reprompts for the field value.

Usage Notes

When a VALID IF clause in one field refers to a list field in another domain, you must ready the domain with the list field before you ready the domain with the VALID IF clause. You must finish the domains in the reverse order: the domain with the VALID IF clause first and the domain with the list field last.

Examples

Compare the value entered for the RIG field to the character strings SLOOP, KETCH, MS, and YAWL. Store the value in the field if it is one of those character strings:

```
06 RIG PIC X(6)
      VALID IF RIG EQ "SLOOP", "KETCH", "MS", "YAWL".
```

Store a value in the LOA field if it is between 15 and 50:

```
06 LENGTH_OVER_ALL PIC XXX
       VALID IF LOA BETWEEN 15 AND 50
       QUERY_NAME IS LOA.
```

Store a value in the PRICE field if it is greater than 1.3 times the displacement or if it is zero:

```
06 PRICE PIC 99999
      VALID IF PRICE>DISP*1.3 OR PRICE EQ 0
      EDIT_STRING IS $$$,$$$.
```

7.84 WHILE Statement

Causes DATATRIEVE to repeat a statement as long as the condition specified in the Boolean expression is true.

Format

```
WHILE  boolean-expression statement
```

Arguments

boolean-expression

Is a Boolean expression (see Chapter 3). In the WHILE statement, Boolean expressions are limited to this format:

```
{ variable-name }
{ *.prompt      }   boolean-operator     value-expression
```

statement

Is a simple or compound statement you want DATATRIEVE to execute if the Boolean expression evaluates to true.

Restrictions

- The restrictions for particular statements are documented in this chapter in the section for each statement. You must observe these restrictions for any statements you include in the WHILE statement.
- You cannot use a field name as a value expression on the left side of the Boolean expression of a WHILE statement.

Results

DATATRIEVE repeats the specified statement as long as the Boolean example evaluates to true. If the relationship between the two values in the Boolean never changes (for example, if 2 GT 1), the loop repeats infinitely until you end it with a CTRL/C or CTRL/Z.

Usage Notes

- Use the WHILE statement to form and control the execution of loops.
- You can use a prompting value expression or a variable as the first member of the Boolean expression.

Example

Group the boats with LOA less than 35 according to the value of BEAM. Display the TYPE, LOA, and BEAM of the shortest boat from each group of boats with the same value for BEAM:

```
DTR> SHOW WHILE_EX
PROCEDURE WHILE_EX
BEGIN
DECLARE X PIC 99.
X = 0
FOR YACHTS WITH LOA < 35 AND
    BEAM NE 0 SORTED BY BEAM, LOA
    WHILE X < BEAM
    BEGIN
        PRINT TYPE, LOA, BEAM, X
        X = BEAM
    END
END
END_PROCEDURE

DTR> :WHILE_EX

                         LENGTH
                          OVER
MANUFACTURER   MODEL      ALL   BEAM X

CAPE DORY     TYPHOON     19     06  00
WINDPOWER     IMPULSE     16     07  06
ERICSON       23/ SPECIA  23     08  07
EASTWARD      HO          24     09  08
ALBIN         79          26     10  09
BOMBAY        CLIPPER     31     11  10
IRWIN         25          25     12  11

DTR>
```

VAX DATATRIEVE Keywords A

This appendix contains the keywords and function names that you should not use when you are naming items.

The following table lists all VAX DATATRIEVE keywords.

Table A-1: DATATRIEVE Keywords

*	(asterisk)
@	(at sign)
:	(colon)
,	(comma)
**	(double asterisk)
“	(double quotation mark)
=	(equal sign)
!	(exclamation point)
>	(greater than sign)
-	(hyphen or minus sign)
(	(left parenthesis)
<	(less than sign)
.	(period)
+	(plus sign)
?	(question mark)
)	(right parenthesis)
;	(semicolon)
/	(slash)
—	(underscore)
|	(vertical bar)
ABORT	
ADT	
ADVANCED	
AFTER	
ALIGNED_MAJOR_MINOR	
ALIN_MAJ_MIN	
ALL	
ALLOCATION	
AND	
ANY	
APPLICATION_KEYPAD	
ARGUMENTS	
AS	
ASC	
ASCENDING	
AT	
AVERAGE	
BANISH	
BATCH	
BEFORE	
BEGIN	
BETWEEN	
BLANK	
BOOLEAN	
BOTTOM	
BT	

(continued on next page)

Table A-1: DATATRIEVE Keywords (Cont.)

BUT	DEPENDING
BY	DESC
BYTE	DESCENDING
CHANGE	D_FLOATING
CHARACTER	DICTIONARY
CHARACTERS	DICTIONARIES
CHOICE	DIGIT
CLOSE	DIGITS
COL	DISCONNECT
COLLECTIONS	DISPLAY
COLUMN	DISPLAY_FORM
COLUMN_HEADER	DO
COLUMNS_PAGE	DOMAIN
COMMIT	DOMAINS
COMP	DOUBLE
COMP_1	DROP
COMP_2	DUP
COMP_3	EDIT
COMP_5	EDIT_BACKUP
COMP_6	EDIT_STRING
COMPUTED	ELSE
CONCURRENCY	END
CONNECT	END_CHOICE
CONSISTENCY	END_PLOT
CONT	END_PROCEDURE
CONTAINING	END_REPORT
COUNT	END_TABLE
CROSS	ENDING
CURRENCY	ENTRY
CURRENT	EQ
DATABASE	EQUAL
DATABASES	ERASE
DATATYPE	EXCLUSIVE
DATE	EXECUTE
DEBUG	EXIT
DECIMAL	EXTEND
DECLARE	EXTRACT
DECREASING	F_FLOATING
DEFAULT	FIELDS
DEFINE	FILE
DEFINEP	FILL
DELETE	FILLER
DELETEP	FIND
DENY	FINISH

(continued on next page)

Table A-1: DATATRIEVE Keywords (Cont.)

FIRST	LIST
FOR	LOCAL
FORM	LOCK_WAIT
FORMAT	LONG
FORMS	LONGWORD
FROM	LT
GE	MAJOR_MINOR
GET_FORM	MATCH
G_FLOATING	MAX
GRANT	MAX_LINES
GREATER_EQUAL	MAX_PAGES
GREATER_THAN	MEMBER
GROUP	MIN
GT	MISSING
GUIDE	MODIFY
HELP	NE
HELP_LINES	NETWORK
HELP_PROMPT	NEW_PAGE
HELP_WINDOW	NEW_SECTION
H_FLOATING	NEXT
IF	NO
IN	NONE
INCR	NONLOCAL
INCREASING	NOT
INIT_VECTOR	NOT_EQUAL
INSERT	NOVERIFY
INTEGER	NUMBER
IS	NUMERIC
JUST	OCCURS
JUSTIFIED	OCTA
JUSTIFY	OCTAWORD
KEEP	OF
KEY	ON
KEYDEFS	OPEN
KEYWORD	OPTIMIZE
LAST	OR
LE	OVER
LEADING	OVERPUNCHED
LEAVE	OWNER
LEFT	PACKED
LEFT_RIGHT	PAGE
LESS_EQUAL	PATH
LESS_THAN	PIC
LINES_PAGE	PICTURE

(continued on next page)

Table A-1: DATATRIEVE Keywords (Cont.)

PLOT	SEPARATE
PLOTS	SET
PORT	SETS
PRINT	SET_UP
PRIOR	SHARED
PRIVILEGES	SHOW
PROCEDURE	SHOWP
PROCEDURES	SIGN
PROMPT	SIGNED
PROTECTED	SIZE
PURGE	SKIP
PUT_FORM	SNAPSHOT
PW	SORT
QUAD	SORTED
QUADWORD	SOURCE
QUERY_HEADER	SPACE
QUERY_NAME	STARTING
READ	STD_DEV
READY	STORE
REAL	STRING
RECONNECT	STRUCTURE
RECORD	SUBSCHEMA
RECORDS	SUM
RECOVER	SUPERCEDE
REDEFINE	SUPERSEDE
REDEFINES	SYNC
REDUCE	SYNCHRONIZED
REDUCED	SYNONYM
RELEASE	SYNONYMS
REPEAT	TAB
REPORT	TABLE
REPORT_HEADER	TABLES
REPORT_NAME	TERMINAL
RETRIEVE	TEXT
RIGHT	THE
ROLLBACK	THEN
RSE	TIMES
RUNNING	TO
SCALE	TOP
SCHEMA	TOTAL
SCHEMAS	TRAILING
SEARCH	UIC
SELECT	UNSIGNED
SEMICOLON	USAGE

(continued on next page)

Table A-1: DATATRIEVE Keywords (Cont.)

USER	WHEN
USING	WHILE
VALID	WITH
VALUE	WITHIN
VARIABLES	WORD
VARYING	WRITE
VECTOR	ZERO
VERIFY	ZONED
VIA	

The following table lists all the DATATRIEVE functions. As with the keywords in the preceding table, you should not use function names when you are naming items.

Table A-2: DATATRIEVE Function Names

FN$ABS	FN$MOD
FN$ATAN	FN$MONTH
FN$COMMAND_KEYBOARD	FN$NINT
FN$COS	FN$OPENS_LEFT
FN$CREATE_LOG	FN$PROMPT_KEYBOARD
FN$DATE	FN$SECOND
FN$DAY	FN$SHOW_KEY
FN$DCL	FN$SHOW_KEYDEFS
FN$DEFINE_KEY	FN$SHOW_TIMER
FN$DELETE_KEY	FN$SIGN
FN$DELETE_LOG	FN$SIN
FN$EXP	FN$SPAWN
FN$FLOOR	FN$SQRT
FN$HEX	FN$STR_EXTRACT
FN$HOUR	FN$STR_LOC
FN$HUNDREDTH	FN$TAN
FN$INIT_TIMER	FN$TIME
FN$JULIAN	FN$TODAY
FN$KEYPAD_MODE	FN$TRANS_LOG
FN$KEYTABLE_ID	FN$UPCASE
FN$LN	FN$VERSION
FN$LOAD_KEYDEFS	FN$WEEK
FN$LOG10	FN$WIDTH
FN$MINUTE	FN$YEAR

VAX DATATRIEVE Sort Order B

The order and "value" associated with alphanumeric characters is determined by the ASCII collating sequence. *Lowercase letters have a higher ASCII value than uppercase letters.*

Table B-1 lists the printing characters in ascending order of ASCII value. Read down the left column and then down the right column to see the sort order.

Table B-1: Ascending ASCII Value of Printing Characters

Character		Character	
	Space	+	Plus sign
!	Exclamation point	,	Comma
"	Double quotation marks	-	Hyphen, minus sign
#	Number sign	.	Period, decimal point, radix point
$	Dollar sign	/	Slash
%	Percent sign	0	
&	Ampersand	1	
'	Right single quotation mark, apostrophe	2	
(	Left parenthesis	3	
)	Right parenthesis	4	
*	Asterisk	5	

(continued on next page)

Table B-1: Ascending ASCII Value of Printing Characters (Cont.)

Character	Character
6	Q
7	R
8	S
9	T
: Colon	U
; Semicolon	V
< Left angle bracket, less-than sign	W
= Equal sign	X
> Right angle bracket, greater-than sign	Y
? Question mark	Z
@ At sign	[Left bracket
A	\ Backslash
B	] Right bracket
C	^ Circumflex, caret, up-arrow
D	_ Underscore
E	‘ Left single quotation mark
F	a
G	b
H	c
I	d
J	e
K	f
L	g
M	h
N	i
O	j
P	k

(continued on next page)

Table B-1: Ascending ASCII Value of Printing Characters (Cont.)

Character	Character
l	v
m	w
n	x
o	y
p	z
q	{ Left brace
r	| Vertical line
s	} Right brace
t	~ Tilde
u	

VAX DATATRIEVE Error Messages C

DATATRIEVE error messages fall into two categories: common and severe. Common error messages indicate that you have made an error in a command or statement. Severe error messages, which occur rarely, include the name of a module and subroutine.

C.1 Common Error Messages

Common error messages are DATATRIEVE responses to detectable user errors. If your input to DATATRIEVE contains faulty syntax or a detectable error in logic, DATATRIEVE recovers from the error, displays an error message, and returns you to DATATRIEVE command level (indicated by the DTR> prompt). All data items remain the same as they were before you made the error. The messages describe the error. For example, when you use an undefined name in a FIND command, DATATRIEVE responds with an error message:

```
DTR> FIND ZORK
"ZORK" is not a readied source, collection, or list
DTR>
```

DATATRIEVE recovers from the error and returns you to DATATRIEVE command level. All data items remain unchanged. At this point you have two alternatives:

- Retype the FIND statement and use the name of a valid readied domain, collection, or list.
- Use the editor to correct the error.

If you do not know what to do in response to an error message, you can type HELP ERROR in response to error messages that return you to the DTR> prompt. For messages that are not simply warnings or informational text, DATATRIEVE then displays further explanation of the error and suggests actions you can take to correct the error. For example:

```
DTR> FIND ZORK
"ZORK" is not a readied source, collection, or list.
DTR> HELP ERROR
"ZORK" is not a readied source, collection, or list.


ERROR

  NOTDOMAIN


      EXPLANATION:

      The source for a DATATRIEVE collection must be a readied domain,
      collection, or list.


      USER ACTION:

      Ready the appropriate domain and re-enter the FIND statement. The
      format of the FIND statement is FIND rse.


      FOR MORE INFORMATION, SEE:

      HELP FIND


Topic?
DTR>
```

C.2 Error Messages from Other Software Facilities

DATATRIEVE also displays messages from other facilities, such as the CDD and RMS. The display of these messages depends on the status of your SET MESSAGE options. If the default options are set, a message consists of four parts: the facility name prefix preceded by a percent sign (%), the severity level, the identification prefix (an abbreviation that identifies the message), and the message text. You can suppress any of the parts of the error messages with the DCL SET MESSAGE command (see the VMS documentation for a complete listing of DCL commands).

For example, if you try to add an entry to the access control list of a dictionary object but you do not have C (control) access to it, DATATRIEVE displays the CDD error message on your terminal:

```
%CDD-E-NOPRIV, Privilege violation -- access denied
```

C.3 DATATRIEVE Syntax Prompts

Do not confuse these error messages with DATATRIEVE prompts for syntax elements. When you press the RETURN key before an input line is syntactically complete, DATATRIEVE prompts you for the next acceptable element of syntax and displays the CON> prompt on your terminal. You can continue the command or statement or enter a CTRL/C to return to DATATRIEVE command level (indicated by the DTR> prompt). These syntax prompts are enclosed in brackets. For example, if you enter an incomplete FIND statement, DATATRIEVE responds with a syntax prompt:

```
DTR> FIND FIRST 5
[Looking for name of domain,collection, or list]
CON>
```

You can supply the missing name and continue, or you can enter a CTRL/C or CTRL/Z to return to DATATRIEVE command level:

```
CON> YACHTS
[5 records found]
DTR> FIND FIRST 5
[Looking for name of domain,collection, or list]
CON> CTRL/C
^C

Execution terminated by operator
DTR> FIND FIRST 5
[Looking for name of domain,collection, or list]
CON> CTRL/Z
Execution terminated by operator
DTR>
```

Note

You can prevent DATATRIEVE from displaying the prompt messages by entering the SET NO PROMPT command.

C.4 Severe Error Messages

Severe error messages are DATATRIEVE responses to its own software errors. If you see a severe error message, you have probably discovered a problem in the software.

A severe error message consists of an error name and a message about the type of error. You can see a list of the severe error messages by accessing the complete text of the DATATRIEVE messages available on line at the following file specification:

```
DTR$LIBRARY:DTRMSGS.MEM
```

Following some of these errors, you return to DATATRIEVE command level and can continue with your session.

Sometimes a severe error returns you to DCL command level. In rare cases, the system or DATATRIEVE does not respond to input from your terminal.

If you encounter one of these messages, report it to the person responsible for DATATRIEVE on your system and contact your DIGITAL software support representative.

C.5 Reporting Severe Errors

If you encounter a severe error and have SPR support, submit a Software Performance Report (SPR) on one of the forms provided by DIGITAL. With the report, send a trace file of the error condition, copies of the dictionary definitions of all associated records, domains, procedures, tables, and databases, and copies of your DTR$STARTUP and DTR$SYNONYM files. If you use many synonyms, include one trace file of the error condition using your synonyms and one using the original DATATRIEVE keywords. If any of the above information is more than one page, send a tape, diskette, or DECtape II of sample definitions and data which can be used to reproduce the problem.

C.6 Making a Trace File

To make a trace file, invoke DATATRIEVE and use the OPEN command. (See Chapter 7.) Everything displayed on your terminal, except your input and output in the editor and Guide Mode, is captured in the trace file.

After entering the OPEN command, recreate the situation that resulted in the severe error. Your trace file documents the error condition. To close the trace file, use the CLOSE command (see the reference chapter of this manual) or exit from DATATRIEVE.

C.7 Copying Definitions

Use the EXTRACT command to copy the relevant dictionary definitions of domains, records, tables, and procedures to a command file.

C.8 Error Submission

After you have reproduced the error and extracted the dictionary definitions, print a hard copy of the trace file, the command file containing the definitions, and a sample data file, if appropriate. If these files are lengthy, copy them to a tape, diskette, or DECtape II and send it with the SPR form.

Index

In this index, a page number followed by a "t" indicates a table reference. A page number followed by an "f" indicates a figure reference. A page number followed by an "e" indicates an example reference.

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