AA–Y303J–TE

VAX DBMS

Installation Guide

July 1990

This manual describes how to install VAX DBMS and run the Installation Verification Procedure. It also explains how to access the online release notes.

Operating System:	VMS
Software Version:	VAX DBMS Version 4.2

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The Reader's Comments forms at the end of this document request your critical evaluation to assist in preparing future documentation.

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Preface

This manual describes how to install VAX DBMS Version 4.2 and how to verify the installation. The installation procedure uses the VMSINSTAL command procedure.

Intended Audience

This document is intended for anyone responsible for installing and maintaining VAX DBMS. To install VAX DBMS, you must have access to the SYSTEM account or an account with SYSTEM privileges.

Operating System Information

To use VAX DBMS Version 4.2, you must be running Version 5.3 or higher of the VMS operating system. To use the two-phase commit protocol, VMS Version 5.4 or higher must be installed on your system. For information on the compatibility of other software products with this version of VAX DBMS, refer to the System Support Addendum (SSA) that comes with the Software Product Description (SPD). You can use the SPD/SSA to verify which versions of your operating system are compatible with this version of VAX DBMS.

Document Structure

This manual contains three chapters and two appendixes:

Chapter 1	Describes the VMS operating system parameters that you must set and disk space requirements.
Chapter 2	Describes the final preparations for installation and the installation procedure.
Chapter 3	Describes the postinstallation procedures.

Appendix A	Shows sample hardcopy terminal output of a full development kit installation.
Appendix B	Shows sample hardcopy terminal output of a run-time only kit installations.

Related Documents

The other manuals in the VAX DBMS documentation set are:

- *VAX DBMS Release Notes*
- *Introduction to VAX DBMS*
- *VAX DBMS Database Design Guide*
- *VAX DBMS Database Security Guide*
- *VAX DBMS Database Maintenance and Performance Guide*
- *VAX DBMS Database Load/Unload Guide*
- *VAX DBMS Programming Guide*
- *VAX DBMS Programming Reference Manual*
- *VAX DBMS Database Administration Reference Manual*
- *VAX DBMS Quick Reference Guide*

Associated Documents

The other manuals referred to in the VAX DBMS documentation set are:

- *VMS Developer's Guide to VMSINSTAL*
- *VMS License Management Utility Manual*
- *VMS System Manager's Manual*
- *VMS Version 5.3 New Features Manual*
- *VMS System Services Volume*
- *VAX CDD/Plus User's Guide*
- *VAX CDD/Plus Installation Guide*
- *VAX DATATRIEVE Installation Guide*

Conventions

The following conventions are used in this manual:

[ ]	Square brackets in the installation procedure enclose the default response value to a query.
. . .	A horizontal ellipsis in an example means that information not directly related to the example has been omitted.
. . .	A vertical ellipsis in an example means that information not directly related to the example has been omitted.
Color	Color in examples shows user input. For the online version of this manual, user input is shown in **bold**.

References to Products

The VAX DBMS documentation set to which this manual belongs often refers to Digital products by their abbreviated names:

- VAX DATATRIEVE software is referred to as DATATRIEVE.
- VAX Language-Sensitive Editor software is referred to as LSE.
- VAX CDD/Plus software is referred to as CDD/Plus or the dictionary.

1

Preparing to Install VAX DBMS

This chapter discusses the preparations and requirements necessary for installing VAX DBMS.

VAX DBMS is a CODASYL-compliant database management system. It is used to access and administer databases ranging in complexity from simple hierarchies to complex networks with multi-level relationships.

Your bill of materials (BOM) and indented bills report (BIL) specify the number and contents of your media. Be sure to verify the contents of your kit with this information. If your kit is damaged or if you find that parts of it are missing, contact your Digital representative.

VAX DBMS provides online release notes. Digital strongly recommends that you read the release notes before proceeding with the installation. For information on accessing the online release notes, see Section 2.1.3.

1.1 Required Operating System Components

VAX DBMS Version 4.2 requires VMS Version 5.3 or higher installed on your system. However, to use the two-phase commit protocol, VMS Version 5.4 or higher is required.

To see which version of VMS is currently installed, enter the following command:

```
$  WRITE SYS$OUTPUT F$GETSYI("VERSION")
V5.3
```

In this example, VMS Version 5.3 is running on your system.

The VMS operating system comes with a variety of support options, or classes. Classes include such features as networking and VMS RMS journaling.

For a complete list of the required classes, see the System Support Addendum (SSA) that comes with the Software Product Description (SPD). For more information on using classes see the *VMS Version 5.3 Upgrade and Installation Procedures* manual.

1.2 Prerequisite and Optional Software

This section discusses the software you must have installed on your system before installing VAX DBMS. Please refer to the SSA for a complete list of prerequisite and optional products and their required version numbers.

To see which version of VAX DBMS is currently installed on your system, enter the following command:

```
$  DBO/SHOW VERSION
Executing DBO for VAX DBMS V4.1
```

In this example, VAX DBMS Version 4.1 is running on your system.

VAX DBMS Version 4.2 requires VAX CDD/Plus Version 4.1 or higher. To see which version of VAX CDD/Plus is currently installed on your system, enter the following CDO command:

```
$  DICTIONARY OPERATOR
Welcome to CDO V1.1
The CDD/Plus V4.1 User Interface
Type HELP for help
CDO>  EXIT
```

In this example, VAX CDD/Plus Version 4.1 is running on your system.

VAX DBMS Version 4.2 can also be used with VAX DATATRIEVE Version 4.2 or higher. If VAX DATATRIEVE is installed on your system before you install VAX DBMS, you do not have to relink VAX DATATRIEVE.

1.3 License Registration

You must register the VAX DBMS license through the VMS License Management Facility (LMF) in accordance with the license agreement signed by your site. The license registration information you need is contained in the Product Authorization Key (PAK) that is shipped with VAX DBMS Version 4.2. The PAK is a paper certificate that contains information about the license you have to run a particular piece of software.

During the installation, the system asks whether you have registered the VAX DBMS license and loaded the appropriate PAK. You must register and load your license for VAX DBMS in order to run the Installation Verification Procedure (IVP) and use the software.

To register a license under VMS, first log in to the system manager's account, SYSTEM. You then have a choice of two ways to perform the registration:

- Invoke the SYS$UPDATE:VMSLICENSE.COM procedure. When it prompts you for information, respond with data from your PAK.
- At the DCL prompt, issue the LICENSE REGISTER command with the appropriate qualifiers that correspond to PAK information.

If you plan to use VAX DBMS on more than one node in a VAXcluster system, you will need to perform a license load on the other nodes after you complete this installation.

Beginning with VAX DBMS the PAK is used to determine functionality. You can load a DBMS-RT PAK on one node and a DBMS PAK on another node within a cluster running full development software. This limits the users on the node with the DBMS-RT PAK to have run-time only capabilities.

For complete information on using LMF, see the *VMS License Management Utility Manual*.

1.4 Special Requirements for Installing VAX DBMS

VAX DBMS has some special requirements before installation. The following sections describe those requirements for installing VAX DBMS Version 4.2.

1.4.1 Backing Up Your VAX DBMS Database

It is recommended that you perform a full back up of your database before installing a new version of VAX DBMS. See the *VAX DBMS Database Maintenance and Performance Guide* and the DBO/BACKUP and DBO/BACKUP/MULTITHREAD commands in the *VAX DBMS Database Administration Reference Manual*.

1.4.2 Ensuring Adequate Physical Memory

Before you install VAX DBMS, ensure that there is adequate physical memory on your system. VAX DBMS requires at least 4 megabytes of physical memory. Additional memory is required by applications with many locks. Insufficient memory will cause thrashing.

To find out how many megabytes of physical memory you have on your system, enter the following command:

```
$  SHOW MEMORY
              System Memory Resources on 15-JAN-1990 11:04:21.49

Physical Memory Usage (pages):     Total    Free    In Use   Modified
  Main Memory (6.00Mb)             12288    918     10984        386
```

In this example, the system has 6 megabytes of memory.

1.4.3 Checking DECnet Object Numbers for DBMSERVER

Before installing VAX DBMS, check that no user-created object exists in the DECnet–VAX database with the number 52. Object number 52 is reserved for the exclusive use of DBMSERVER, which implements the VAX DBMS remote database access capability.

The VAX DBMS installation procedure displays an error message if number 52 is assigned to an object other than DBMSERVER or if an existing DBMSERVER is assigned a number other than 52. Use the Network Control Program (NCP) to confirm that 52 is not being used by any object except DBMSERVER:

```
$  RUN SYS$SYSTEM:NCP
NCP>  SHOW KNOWN OBJECTS SUMMARY

Known Object Volatile Summary as of  4-JAN-1990 11:11:01

   Object   Number  File/PID            User Id    Password

  $MOM           0
  $NICONFIG      0
  CDD$REMOTE     0  SYS$SYSTEM:CDD$REMOTE.COM
  SMISERVER      0  2020010C
  SQLSRV         0  SYS$SYSTEM:SQLSRV$.EXE
  FAL           17  FAL.EXE
  HLD           18
  NML           19  NML.EXE
  REMACP        23  20200122
  MIRROR        25
  EVL           26  20200120
  MAIL          27  MAIL_SERVER.EXE
  NOTES         33  NOTES$SERVER.EXE           NOTES$SERVER
  CTERM         42  20200122
  VPM           51  VPM.EXE
  TESTER        52  TESTER.EXE
  DTR           63
  DQS           66  DQS$SERVER.EXE
```

In this example a user created the image, TESTER.EXE and assigned the number 52. If the object number was defined in the TESTER source code, edit the source code and use a different number. Digital reserves the numbers 128 to 255 for users' objects in the DECnet–VAX database. Select any number between 128 and 255 that is currently unused. Recompile and relink any program that has the object number defined in the source code. Then use NCP again to define an entry for the new TESTER.EXE. First remove the current entry for TESTER:

```
NCP>  PURGE OBJECT TESTER ALL
```

Next, change the object number assigned to TESTER in the permanent DECnet–VAX database:

```
NCP>  DEFINE OBJECT TESTER NUMBER 128
NCP>  DEFINE OBJECT TESTER FILE TESTER.EXE
```

Finally, use the values from the permanent database to affect the current, volatile database and exit the NCP:

```
NCP>  SET OBJECT TESTER ALL
NCP>  EXIT
```

Note *Remote database access using DECnet is not related to VAX DBMS operation in a VAXcluster environment. See the* VAX DBMS Database Maintenance and Performance Guide *for information on using VAX DBMS in a VAXcluster environment.*

1.4.4 Checking the Logical Name LNK$LIBRARY

Before installing VAX DBMS, make sure the logical name LNK$LIBRARY is not defined. To see if LNK$LIBRARY is defined, enter the following command:

```
$  SHOW LOGICAL LNK$LIBRARY

%SHOW-S-NOTRAN, no translation for logical name LNK$LIBRARY
```

In this example, LNK$LIBRARY is not defined.

If LNK$LIBRARY is defined, use the DCL command DEASSIGN to delete it:

```
$  DEASSIGN/EXECUTIVE_MODE/TABLE=(LNM$SYSTEM_TABLE) LNK$LIBRARY
```

1.4.5 Stopping VAX DBMS Monitor

Digital recommends stopping the VAX DBMS monitor before installing VAX DBMS. In a VAXcluster environment, the monitor runs on each node that boots from the common root directory. You should stop the monitor on each node.

To stop the monitor, enter the following command:

```
$  DBO/MONITOR STOP
```

If the monitor is not stopped before installation, the installation procedure will stop it.

1.4.6 Installing in a VAXcluster Environment

When installed on a common root directory, layered products such as VAX DBMS are installed in SYS$COMMON. The VMSINSTAL command procedure does not allow layered products to be installed in the SYS$SPECIFIC portion of a common root directory.

You cannot use the alternate root option of VMSINSTAL to install layered products in the SYS$SPECIFIC portion. If you try this, VMSINSTAL installs the layered product in SYS$COMMON. Therefore, you cannot install multiple versions of VAX DBMS on a VAXcluster system with a single, common root directory.

1.5 Installation Procedure Requirements

The following sections discuss various requirements for installing VAX DBMS. If certain requirements are not met, the installation will abort. Review this section to make sure that you have enough resources to perform the installation.

1.5.1 Time

The installation takes approximately 20 minutes, depending on the type of media and system configuration. The Installation Verification Procedure (IVP), which Digital recommends you run to be sure VAX DBMS is installed properly, takes an additional 35 minutes.

1.5.2 Process Quotas and Privileges

The account you use to install and verify VAX DBMS must have sufficient quotas and privileges to enable you to perform the installation. VMSINSTAL requires that the installation account have a minimum of quotas as listed in Table 1–1.

Table 1–1 Process Quotas

Process Quota	Value
ASTLM	24
BIOLM	18
BYTLM	18,000
DIOLM	18
ENQLM	256
FILLM	20

If disk quotas are enabled for your account, be sure that you have EXQUOTA privilege or the blocks of quota remaining exceed the value required in Table 1–2.

VMSINSTAL requires you to be logged into an account that has SETPRV or the following privileges:

- CMKRNL
- WORLD

VMSINSTAL turns off BYPASS privilege at the start of the installation.

User account quotas and privileges are stored in the file SYSUAF.DAT. Use the VMS Authorize Utility to verify and change user account quotas and privileges. First set your directory to SYS$SYSTEM and then run AUTHORIZE:

```
$  SET DEFAULT SYS$SYSTEM
$  RUN AUTHORIZE
UAF>
```

At the UAF> prompt, use the SHOW command with an account name to check a particular account. For example:

```
UAF>  SHOW SMITH
```

To change a quota or add a privilege, use the MODIFY command. MODIFY has the following format:

MODIFY account-name /quota-name=nnn /privilege=priv-name

The following example changes the FILLM quota, adds SETPRV for the SMITH account, and then exits from the utility:

```
UAF>  MODIFY SMITH /FILLM=50/PRIVILEGE=SETPRV
UAF>  EXIT
```

After you exit from the utility, the system displays messages indicating whether or not changes were made. Once the changes have been made, you must log out and log in again before the new quotas can take effect.

For more information on modifying account quotas and privileges, see the description of the Authorize Utility in the *VMS System Manager's Manual*.

1.5.3 Disk Space

The amount of space required for a database depends on many factors including the complexity and size of the database, overhead, and the number of users. This section describes the disk space requirements for VAX DBMS and other related software.

1.5.3.1 VAX DBMS Disk Requirements

VAX DBMS requires a certain amount of free disk storage space during installation. After VAX DBMS is installed, less storage space is required. Table 1–2 summarizes the storage requirements.

Table 1–2 Maximum Disk Space Requirements

VAX DBMS Kit	Blocks During Installation	Blocks After Installation
Development	29,100	13,800
Run-time only	22,665	8,151

To determine the number of free disk blocks on the current system disk, enter the following command at the DCL prompt:

```
$  SHOW DEVICE SYS$SYSDEVICE

Device         Device        Error    Volume         Free  Trans Mnt
 Name          Status        Count     Label        Blocks Count Cnt

DUA0:          Mounted       0        SYSTEM        277575   240  10
```

In this example there are 277,575 free disk blocks.

1.5.3.2 Related Software Disk Requirements

The space you need for CDD/Plus depends on the number, size, and complexity of your database applications. CDD/Plus software requires approximately 34,000 disk blocks.

VAX DATATRIEVE software requires approximately 7,000 disk blocks. If you plan to access VAX DBMS databases with VAX DATATRIEVE, you will need about 25 percent more space in CDD/Plus per database for VAX DATATRIEVE information.

1.5.4 DECnet Status

Digital recommends shutting down DECnet before installing VAX DBMS. See the VMS System Management Subkit for information on shutting down and starting up DECnet.

1.5.5 System Parameters

Installing VAX DBMS requires certain system parameter settings. This section lists minimum settings and describes how to check and change parameter values. Depending on the kinds of programs and applications running at your site, you might need higher values for some settings.

1.5.5.1 System Parameter Setting

Before you install VAX DBMS, make sure that certain system parameter values are set correctly. The parameters and their recommended values are:

- VIRTUALPAGECNT (maximum number of virtual pages)

  VIRTUALPAGECNT sets the maximum number of virtual pages that any one process can map. Take into account the total number of databases in use at any given time when you allocate VIRTUALPAGECNT. Allocate at least 2,000 virtual pages for each database root file. The need for virtual pages varies according to the number of users and the size of the schema, but 2,000 pages should be sufficient for most applications.

- LOCKIDTBL (initial size of lock ID table)

  LOCKIDTBL establishes the number of entries in the system lock ID table, which limits the number of locks in the system. The VMS lock ID table expands as needed (provided nonpaged memory is available) in increments of the LOCKIDTBL value, up to the limit set by the LOCKIDTBL_MAX parameter. The recommended minimum value is 2,048.

- RESHASHTBL (resource hash table)

  RESHASHTBL defines the number of entries in the lock management resource name hash table. Each entry requires 4 bytes. As a general guideline, there should be one resource hash table entry for every four locks in the system. Therefore, RESHASHTBL should be set to one-quarter the value of LOCKIDTBL_MAX, rounded to the closest power of 2.

- SRPCOUNT and SRPCOUNTV (size of small request packets)

  SRPCOUNT sets the number of preallocated small request packets. SRPCOUNTV establishes the upper limit to which SRPCOUNT can be increased. Resources and locks are allocated with small request packets (SRPs), if possible. If the system is out of SRPs, the nonpaged memory pool is used.

  Set SRPCOUNTV equal to LOCKIDTBL + r, where r is the number of system resources available to the system. Generally, r can be set to 5 percent of the value you assigned to LOCKIDTBL.

  Set SRPCOUNT less than or equal to SRPCOUNTV. A typical setting is one half of SRPCOUNTV. The recommended minimum value for SRPCOUNTV is 1,000.

  See the *VMS System Services Volume* for more information about system resources.

- CHANNELCNT (channel count)

  CHANNELCNT defines the maximum number of I/O channels any process can handle concurrently. CHANNELCNT should be set to a number larger than the largest file limit (FILLM) in the database environment.

1.5.5.2 Checking System Parameter Values To check the values of your system parameters, enter the following command at the DCL prompt to invoke the System Generation (SYSGEN) Utility:

```
$  RUN SYS$SYSTEM:SYSGEN
SYSGEN>
```

At the SYSGEN> prompt, use the SHOW command to display the value of a system parameter. The values displayed should be equal to or exceed the values of each parameter listed in Section 1.5.5.1. The following example displays the value for the LOCKIDTBL system parameter:

```
SYSGEN>  SHOW LOCKIDTBL

Parameter Name   Current  Default  Minimum   Maximum Unit    Dynamic
--------------   -------  -------  -------   ------- ----    -------
LOCKIDTBL            357      200       40     65535 Entries

SYSGEN>
```

In this example, the current value for LOCKIDTBL is 357.

After checking the parameters with the SHOW command, you can enter the EXIT command at the SYSGEN> prompt to return to DCL level.

You can check the actual number of locks your system is using with the DCL MONITOR command:

```
$  MONITOR
MONITOR>  MONITOR LOCK
```

This command displays the maximum number of locks outstanding during the monitor period. You can use this value to fine tune the LOCKIDTBL, LOCKIDTBL_MAX, and RESHASHTBL parameters.

1.5.5.3 GBLPAGES and GBLSECTIONS Settings To install and run VAX DBMS, you must have sufficient free global pages and global sections. You must first find out how many free global pages and sections you have on your system. The installation procedure will abort if there are insufficient GBLPAGES and GBLSECTIONS.

Each active database requires 3 global sections: one for the schema, one for the subschema, and one for the root file. Shareable images also use global sections. The number of global pages required depends on the size of the database root file.

Some images use global sections and global pages. The image names and the global sections and global pages required are listed in Table 1–3.

Table 1–3 Global Section and Page Requirements for Mandatory Images

Image File Name	Global Sections	Global Pages
SYS$LIBRARY:CRFSHR.EXE[1]	2	10
SYS$LIBRARY:DBMPRV.EXE	3	20
SYS$LIBRARY:DBMSHR.EXE	11	650
SYS$LIBRARY:LBRSHR.EXE[1]	2	70
SYS$SYSTEM:DBMSERVER.EXE	2	50
TOTAL	20	800

[1]CRFSHR.EXE and LBRSHR.EXE are supplied with the VMS operating system. They must be installed for the proper execution of DBO.

There are several images you can install optionally. All these images use global sections and global pages as shown in Table 1–4.

Table 1–4 Global Section and Page Requirements for Optional Images

Image File Name	Global Sections	Global Pages
SYS$SYSTEM:DBMDBR.EXE	2	300
SYS$SYSTEM:DBQ.EXE	2	150
SYS$SYSTEM:DDL.EXE[1]	2	550
SYS$SYSTEM:DML.EXE[1]	2	500
SYS$SYSTEM:FORDML.EXE[1]	2	550

[1]DDL.EXE, DML.EXE, and FORDML.EXE are not included in the VAX DBMS run-time only kit.

If you run the IVP, you need 3 additional global sections and 50 global pages.

CDD/Plus also requires global sections. See the *VAX CDD/Plus Installation Guide* for required global pages and global sections.

If you plan to use VAX DATATRIEVE to access VAX DBMS databases, see the *VAX DATATRIEVE Installation Guide* for required global pages and global sections.

1.5.5.4 Checking GBLPAGES and GBLSECTIONS Values

Use the WRITE command with the F$GETSYI lexical function to find the number of free global pages and global sections. The following example shows how to get this information at your terminal (the default for SYS$OUTPUT):

```
$  WRITE SYS$OUTPUT F$GETSYI("FREE_GBLPAGES")
15848
$  WRITE SYS$OUTPUT F$GETSYI("FREE_GBLSECTS")
24
```

In this example there are 15,848 free global pages and 24 free global sections.

If the values displayed by the system are greater than the values calculated in Section 1.5.5.3, you do not need to increase the values for these parameters. If the value of free global pages or global sections is less than the values calculated in Section 1.5.5.3, you must increase the system parameter settings.

Section 1.5.5.5 describes the procedures for increasing these values using the Autogen Utility. Refer to the *VMS System Manager's Manual* on using the Autogen Utility.

1.5.5.5 Changing System Parameter Values

Use the Autogen Utililty to change system parameters. Autogen automatically adjusts values for parameters that are associated with the values you reset manually. To change system parameters with Autogen, edit the following file:

```
SYS$SYSTEM:MODPARAMS.DAT
```

To change a parameter value that is already listed in this file, delete the current value associated with that parameter and enter the new value.

To add a new parameter, add a line to the file that includes both the name of the parameter and its value. For example:

```
LOCKIDTBL = 2048
```

To modify incremental parameters such as GBLPAGES and GBLSECTIONS, use ADD_. The following example increases the global page setting by 2000:

```
ADD_GBLPAGES = 2000
```

After you have made all your changes, exit from the editor and run the Autogen procedure to recalculate your system parameters. Enter the following command at the DCL prompt:

```
$  @SYS$UPDATE:AUTOGEN GETDATA REBOOT
```

When you specify REBOOT, Autogen performs an automatic system shutdown and reboots the system when it has finished. Any users logged on to the system are immediately disconnected during the shutdown. The automatic reboot puts the new parameter values into effect.

The Autogen Utility automatically adjusts some of the system parameters based on the consumption of resources since the last reboot. If you do not want to take advantage of this automatic adjustment, include the /NOFEEDBACK qualifier on the Autogen command line.

For more information about using Autogen, see the *VMS System Manager's Manual*.

1.5.5.6 Setting Dynamic System Parameter Values Use the Sysgen Utility to set dynamic parameters. Dynamic parameters changed with the SYSGEN WRITE ACTIVE command become active immediately without rebooting your system. In fact, rebooting returns dynamic system parameter values to their previous settings.

Once you change dynamic parameter values, you should complete the installation before rebooting the system. After you finish with the installation, you can reset the dynamic parameters to their previous value or let them be reset automatically when you next reboot your system.

VAX DBMS requires the following dynamic parameter values:

- MAXBUF (maximum buffer size)

  MAXBUF sets the maximum size of buffered I/O transfer (card readers, console floppy diskettes, line printers, mailboxes, and terminals). The system default of 1024 bytes for MAXBUF is sufficient for most applications. A lower setting will not be adequate; a higher setting is generally not necessary.

- LOCKIDTBL_MAX (maximum size of lock ID table)

  LOCKIDTBL_MAX specifies an upper limit for the size of the lock ID table. Its default setting is 800 entries, but this value is not high enough for systems running VAX DBMS. The maximum size for a VMS operating system lock table is 65,535 entries. The recommended minimum value is 8,192.

  You can compute the *maximum number* of locks to expect on your system by estimating the greatest expected workload (in terms of facilities using the lock manager) and then allocate that number of locks.

  The lock ID table occupies 4 bytes of memory per lock entry. For each active lock on your system, 96 additional bytes of memory are allocated to hold information about the active lock. Therefore, you must be aware of the size of the lock ID table, as well as the potential for a high percentage of memory to be occupied by the locks themselves if LOCKIDTBL_MAX is set too high. The DCL SHOW MEMORY command can help in estimating safe values for LOCKIDTBL_MAX.

Set a LOCKIDTBL_MAX value greater than the total number of locks you anticipate will occur at any one time on your system. However, this value should not be so high that the lock ID table and the locks occupy too much space in memory. You can check locks with the VMS monitor locks command.

- DEADLOCK_WAIT (time for deadlock wait)

  DEADLOCK_WAIT defines the number of seconds a lock request must wait before the system initiates a deadlock search on behalf of that lock. The recommended minimum value is 3. See the *VMS System Manager's Manual* for optimally setting this parameter. Because DEADLOCK_WAIT is dynamic, you can set it, watch the transaction rates, and then adjust as necessary.

If the dynamic parameter values on your system are less than the values previously listed, use the following series of commands to change the values. This example changes the MAXBUF value to 1584:

```
$  RUN SYS$SYSTEM:SYSGEN
SYSGEN>  USE ACTIVE
SYSGEN>  SET MAXBUF 1584
SYSGEN>  WRITE ACTIVE
SYSGEN>  EXIT
```

1.5.6 Backing Up Your System Disk

At the beginning of the installation, VMSINSTAL asks if you have backed up your system disk. Digital recommends that you back up your system before installing any software. Use the backup procedures that are established at your site. For details on backing up your system disk, see the section on the Backup Utility in the *VMS System Manager's Manual*.

1.5.7 Logging Off Active Users

For best results, have all users log off the system before you install VAX DBMS. If this is impractical, make sure no process uses VAX DBMS or DCL help during the installation. (The VAX DBMS installation updates the help file.) All VAX DBMS databases must be closed before you begin the installation.

2

Installing VAX DBMS

This chapter describes how to install VAX DBMS. Section 2.2 contains a step-by-step description of the installation procedure. The installation procedure stops if there are not enough global sections and global pages available.

2.1 General Information

This section includes information about the following topics:

- Ignoring messages
- Retaining modifications to MONSTART.COM
- Accessing the online release notes
- Determining the files added to the system
- Verifying the installation
- Stopping the installation

2.1.1 Ignoring Messages

During the installation procedure, a message is displayed which you can ignore. This message is preceded by:

```
%LINK-W-USRTFR,...
```

2.1.2 Retaining Modifications to MONSTART.COM

The installation procedure used to place the MONSTART.COM command procedure in SYS$MANAGER. Beginning with VAX DBMS Version 4.1, the installation procedure places MONSTART.COM in SYS$STARTUP and deletes the version of MONSTART.COM in SYS$MANAGER. If you want to retain a version of MONSTART.COM that you have modified, copy MONSTART.COM to another directory before installing VAX DBMS. After the installation, merge your modifications with the version of MONSTART.COM in SYS$STARTUP.

2.1.3 Accessing the Online Release Notes

VAX DBMS provides online release notes. You must specify OPTIONS N when you invoke VMSINSTAL to see the question about online release notes. This question comes near the beginning of the installation and gives you the option of displaying them on the console terminal or sending the file to a print device.

You should review the release notes in case they contain any information about last minute changes in the installation procedure. If you are starting the installation over again and have already reviewed the release notes, you do not need to specify OPTIONS N.

Once VAX DBMS has been installed, the release notes are located in the following file:

```
SYS$HELP:DBM042.RELEASE_NOTES
```

Online help also directs you to the release notes file. After the installation, you can enter the following command to review the release notes through the HELP Facility:

```
$  HELP DBMS RELEASE_NOTES
```

Hardcopy release notes are included in the documentation set for VAX DBMS.

2.1.4 Determining the Files Added to the System

To get a list of the files that are added to your system when you install the VAX DBMS Version 4.2, print or type the following file:

```
SYS$COMMON:[SYSMGR.VAXINFO$PRODUCTS]DBM042_FILES.DAT
```

2.1.5 Verifying the Installation

Running the Installation Verification Procedure (IVP) for VAX DBMS verifies the installation. During the installation, you are asked if you want to run the IVP as part of the installation. If you respond YES, VMSINSTAL runs the IVP. It is recommended that you run the IVP to make sure that VAX DBMS is installed correctly.

After VAX DBMS is installed, you can run the IVP independently to verify that the software is available on your system. You might need to run the IVP after a system failure to make sure users can access VAX DBMS. To run the IVP independently of the installation, see Section 3.7.

2.1.6 Stopping the Installation

To stop the installation procedure at any time, press CTRL/Y. When you press CTRL/Y, the installation procedure deletes all files it has created up to that point and exits. You can then start the installation again.

If VMSINSTAL detects any problems during the installation, it notifies you and a prompt asks if you want to continue. You might want to continue the installation to see if any additional problems exist. However, the copy of VAX DBMS installed will probably not be usable.

2.2 Installation Procedure

The VAX DBMS installation procedure consists of a series of questions and informational messages.

2.2.1 Invoking VMSINSTAL

To start the installation, invoke the VMSINSTAL command procedure. VMSINSTAL is in the SYS$UPDATE directory. Use the following command to invoke VMSINSTAL:

```
@SYS$UPDATE:VMSINSTAL saveset-name device-name OPTIONS N
```

saveset-name
If you are installing the full development kit, enter DBMDEV042. If you are installing the run-time only kit, enter DBMRTO042.

device-name
The name of the device on which you plan to mount the media. For example, MTA0: is the device name for a tape drive. It is not necessary to use the console drive for this installation. However, if you do use the console drive, you should replace any media you removed once the installation is complete.

OPTIONS N
An optional parameter that indicates you want to see the release notes question. You should review the release notes before proceeding with the installation in case they contain new information about the installation.

There are several other options you can select when you invoke VMSINSTAL. See the *VMS Developer's Guide to VMSINSTAL* for information on these options. If you specify more than one option, separate the options with commas (OPTIONS A,N).

The following example invokes VMSINSTAL to install VAX DBMS from tape drive MTA0: and shows the system response. This example uses the OPTIONS N release note parameter:

```
$  @SYS$UPDATE:VMSINSTAL DBMDEV042 MTA0: OPTIONS N

      VAX/VMS Software Product Installation Procedure V5.2

It is 07-JAN-1990 at 10:30.
Enter a question mark (?) at any time for help.
```

If you do not supply any parameters, VMSINSTAL prompts you for the information later in the installation procedure.

2.2.2 Installation Questions

This section discusses the questions you see during the installation. See Appendix A for sample output of a full development installation and Appendix B for sample output of a run-time only installation.

Each installation question is marked with an asterisk (*) at the beginning of the line. Some questions show the default response in brackets, for example [YES]. To use the default response, press the RETURN key.

1 DECnet status

   VMSINSTAL notifies you if DECnet is running and displays a list of all active processes. It then asks if you want to continue the installation. You should install VAX DBMS on a standalone or VAXcluster system with DECnet shut down:

   ```
   %VMSINSTAL-W-DECNET, Your DECnet network is up and running.

   * Do you want to continue anyway [NO]?
   ```

2 System backup

   VMSINSTAL asks if you are satisfied with your system backup. You should always back up your system disk before performing an installation. If you are satisfied with the backup of your system disk, press RETURN. Otherwise, enter NO and press RETURN to discontinue the installation. After you back up your system disk, you can restart the installation:

   ```
   * Are you satisfied with the backup of your system disk [YES]?
   ```

3 Media mounting

   You should now mount the first distribution volume on the device you specified when you invoked VMSINSTAL. The device name appears in the line preceding the question. VMSINSTAL then asks you if you are ready to continue with the installation.

If you respond YES to indicate that you are ready, VMSINSTAL displays a message that the media containing VAX DBMS has been mounted on the specified device and that the installation has begun. If you respond NO to the question, the instructions and question are repeated. If you entered the wrong device name when you invoked VMSINSTAL and need to restart the installation, stop the installation by pressing CTRL/Y:

```
Please mount the first volume of the set on MTA0:.
* Are you ready?  YES

%MOUNT-I-MOUNTED, DBMDEV042 MOUNTED ON _$$MTA0:

The following products will be processed:
  DBMDEV V4.2

    Beginning installation of DBMDEV V4.2 at 20:01

%VMSINSTAL-I-RESTORE, Restoring product saveset A...
```

4 Media mounting for additional volumes

If your installation kit contains more than one volume, VMSINSTAL prompts you to mount the additional volume and then asks you to indicate that you are ready for the installation to proceed:

```
%BACKUP-I-READYREAD, mount volume 2 on _MTA0: for reading

Enter "YES" when ready:
```

5 Release notes options

If you specified OPTIONS N when you invoked VMSINSTAL, you are now asked to choose one of the four options for reviewing the release notes:

```
Release notes included with this kit are always copied to SYS$HELP.

Additional Release Notes Options:

    1. Display release notes
    2. Print release notes
    3. Both 1 and 2
    4. None of the above

* Select option [2]:
```

If you select option 1, VMSINSTAL displays the release notes immediately on the console terminal. You can terminate the display at any time by pressing CTRL/C.

If you select option 2, VMSINSTAL prompts you for the name of the print queue that you want to use:

```
* Queue name [SYS$PRINT]:
```

You can press RETURN to send the file to the default output print device or you can enter another queue name.

If you select option 3, VMSINSTAL displays the release notes immediately on the console terminal and then prompts you for a queue name for the printed version.

If you select option 4, the release notes are neither printed nor displayed. Select option 4 if you have already reviewed the release notes and are restarting the installation.

The installation procedure now asks if you want to continue the installation. To continue, enter YES. Otherwise, press RETURN. In either case, the release notes are copied to the SYS$HELP directory. For example:

```
* Do you want to continue the installation [NO]?:   YES
%VMSINSTAL-I-RELMOVED, The product's release notes have
                   been successfully moved to SYS$HELP.

         VAX DBMS V4.2 Installation
```

The release notes are located in the following file:

```
SYS$HELP:DBM042.RELEASE_NOTES
```

Note *The name of the release notes file installed by VMSINSTAL consists of the abbreviation of the product name and version number. Do not delete release notes for previous versions of VAX DBMS.*

6 Database Conversion

Following this installation you are required to convert each database before you can bind to it. The installation procedure asks if you want to continue:

```
      All VAX DBMS databases must be converted.  Use the DBO/CONVERT
      command in VAX DBMS V4.2-426 to convert your databases.
      You must have BYPASS privilege to convert the databases.  See the
      VAX DBMS Installation Guide for information on converting databases.

        ONCE CONVERTED, A DATABASE CANNOT BE ACCESSED
        BY ANY EARLIER VERSION OF VAX DBMS.

* Do you want to continue the installation [YES]?  YES
```

7 VAX Language-Sensitive Editor verification

VAX DBMS checks to see if the VAX Language-Sensitive Editor (LSE) is installed on your system. If LSE is installed, it will be updated with the DBMS LSE environment files.

If LSE is not installed, the installation procedure asks if you want to continue:

```
This product is not being installed with VAX Language-Sensitive
Editor support because the editor version is of prior to V2.3.
If you want the VAX Language-Sensitive Editor support you must
do the following:

1. Install the VAX Language-Sensitive Editor (V2.3 or later)
2. Reinstall this product

* Do you want to continue the installation [YES]?  YES
```

If you want to stop the installation and install LSE, answer NO to this question. Otherwise, enter YES.

8 License registration verification

The installation procedure displays license information about your product and then asks if you have registered and loaded your authorization key for VAX DBMS. For example:

```
Product:       DBMS
Producer:      DEC
Version:       4.2
Release Date:  1-JUN-1990

* Does this product have an authorization key registered and loaded?
```

You have to register and load your PAK to successfully complete the Installation Verification Procedure (IVP) and use the software. If you have not done so, you can complete the installation, register and load your PAK, and then run the IVP as described in Section 3.7.

9 User identification code and password selection

This installation creates the account DBM$REMOTE if it does not already exist. If the DBM$REMOTE account does already exist you will not be prompted for a UIC and password.

Use this account to access remote databases using the VAX DBMS Version 4.2 DBMSERVER. Choose a UIC and password for this account. See the *VMS System Manager's Manual* for information on UICs and passwords.

Choose a UIC that is not a system UIC. The installation procedure will not proceed until you enter a valid UIC:

```
* Enter UIC used for DBM$REMOTE account: [100,100]
```

The password for DBM$REMOTE and the network object DBMSERVER must be the same. The password you supply for the DBM$REMOTE account will also be used for the network object.

The entire installation will *fail* if you do not enter a valid password for the DBM$REMOTE account. You will be given three chances to verify your password. Your input will not appear on a terminal. The password must have at least 8 characters:

```
* Enter PASSWORD for DBM$REMOTE account:
* Verify the PASSWORD entered for DBM$REMOTE:
```

10 Installation Verification Procedure selection

If your PAK is registered and loaded, the installation procedure now asks if you want to run the Installation Verification Procedure (IVP):

```
* Do you want to run the IVP after the installation [YES]?
```

The IVP for VAX DBMS checks to be sure that the installation is successful. It is recommended that you run the IVP.

The IVP installs the sample database provided with VAX DBMS. The IVP for the full development kit compiles the metadata, creates the database, loads CDD/Plus, executes a DBQ script, and compiles and runs up to five database programs (depending on which VAX languages are installed on your system). For the run-time only kit, the IVP creates the database by restoring a backup file and executes a DBQ script.

11 File purge option

You have the option to purge files from previous versions of VAX DBMS that are superseded by this installation. Purging is recommended; however, if you need to keep files from the previous version, enter NO in response to the question:

```
* Do you want to purge files replaced by this installation [YES]?
```

2.2.3 Informational Messages

At this point, the installation procedure produces a number of informational messages that report on the progress of the installation.

The VAX DBMS installation procedure validates the current DECnet database. If object number 52 is defined for an object other than DBMSERVER or if DBMSERVER is defined to map to another object number, an error occurs. The DECnet database is not altered if it is found to be in error. The installation will continue even if this error occurs. After the product is installed, you must use NCP to correct the permanent DECnet–VAX database. See Section 1.4.3 for information on correcting the permanent DECnet–VAX database. If no problems are encountered, the installation continues.

There are no further questions. If the installation procedure is successful up to this point, VMSINSTAL moves the new or modified files to their target directories, updates the help files, and updates the DCL tables, if necessary. If you chose to purge files, they are purged now. If there is an error in the installation, a message indicates that the procedure failed. See Section 2.3 for information about error recovery.

The following messages are displayed at the end of a successful installation:

```
    There are no more questions.

    Installation takes approximately 20 minutes on a standalone
    VAX-11/780.  If you run the Installation Verification Procedure,
    it will take about 35 additional minutes to complete on a
    standalone VAX-11/780.

Beginning installation...

%VMSINSTAL-I-RESTORE, Restoring product saveset  B...
%VMSINSTAL-I-RESTORE, Restoring product saveset  C...
DBMSERVER has been placed in the DECnet object database as number 52.
%DBMDEV-I-IGNRIVVERB, Please ignore possible %DCL-W-IVVERB warning message.
%DCL-W-IVVERB, unrecognized command verb - check validity and
        spelling \COLLECT\

%VMSINSTAL-I-RESTORE, Restoring product save set D ...
%DBMDEV-I-IGNRUSRTFR, Please ignore the %LINK-W-USRTFR Warning message.
%LINK-W-USRTFR, image $111$DUA0:[SYS0.SYSUPD.DBMDEV042]STBOBJTMP.EXE;1
         has no user transfer address
%VMSINSTAL-I-SYSDIR, This product creates system disk directory
         VMI$ROOT:[SYSTEST.DBM42].

%VMSINSTAL-I-MOVEFILES, files will now be moved to their target directories...
```

2.2.4 Running the Installation Verification Procedure

If you chose to run the IVP, VMSINSTAL runs it now. If the installation is successful, a message indicates that the IVP completed successfully. If there was an error in the IVP, a message indicates that the procedure failed. See Section 2.3 for information about error recovery.

A successful IVP for the full development kit displays the following messages:

```
Executing IVP for VAX DBMS V4.2 at 11-JAN-1990 16:25:27:17

Checking/setting up the environment...
    CDD/Plus dictionary will be created if necessary.
    Check was successful

Deleting databases and schema...
    Delete was successful

Compiling the PARTS DDL files...
    Compiles were successful

Creating the PARTS database files...
    Create was successful

Loading the PARTS database (with after-image journaling)...
    Load was successful

Reloading the PARTS database (DBO /RECOVER)...
    Reload was successful

Executing a DBQ script...
    DBQ was successful

Running BASIC DML program...
    BASIC DML was successful
```

```
Running COBOL DML program...
    COBOL DML was successful

Running FORTRAN DML program...
    FORTRAN DML was successful

Running PASCAL DML program...
    PASCAL DML was successful

Running PLI DML program...
    PLI DML was successful

***********************************

    VAX DBMS V4.2

    Development

    IVP COMPLETED SUCCESSFULLY

***********************************
```

2.2.5 Completing the Installation Procedure

The following messages indicate that the entire installation procedure is complete:

```
IVP completed for VAX DBMS V4.2 at 11-JAN-1990 16:35:34:99
        Installation of VAX DBMS V4.2 completed at 11:35

        VMSINSTAL procedure done at 11:35
```

If you shut down DECnet before you installed VAX DBMS, you can now restart it. Then you can log out of the privileged account:

```
$  LOGOUT
SYSTEM     logged out at 07-JAN-1990 11:36:34.56
```

VMSINSTAL deletes or changes entries in the process symbol tables during the installation. Therefore, if you are going to continue using the system manager's account and you want to restore these symbols, you should log out and log in again.

2.3 Error Recovery

If errors occur during the installation or the IVP, VMSINSTAL displays failure messages. If the installation fails, you see the following message:

```
VMSINSTAL-E-INSFAIL, The installation of VAX DBMS V4.2 has failed.
```

Errors can occur during the installation if any of the following conditions exist:

- The operating system version is incorrect.
- A prerequisite software version is incorrect.
- Quotas necessary for successful installation are insufficient.
- System parameter values for successful installation are insufficient.

- The VMS HELP library is currently in use.
- The product license has not been registered and loaded.

For descriptions of the error messages generated by these conditions, see the VMS documentation on system messages, recovery procedures, and VMS software installation. If you are notified that any of these conditions exist, you should take the appropriate action as described in the message. (You might need to change a system parameter or increase an authorized quota value.) For information on installation requirements, see Chapter 1.

If the IVP fails, you see these messges:

```
***********************************

    VAX DBMS V4.2

    Development

    IVP FAILED
    See SYS$UPDATE:DBMIVP

***********************************
```

Examine the log file, SYS$UPDATE:DBMIVP.LOG, to determine why the IVP failed. If all the installation requirements in Chapter 1 have been met and problems persist, see Section 3.8 for information on how to report a problem.

3

After Installing VAX DBMS

This chapter discusses the tasks you need to perform after installing VAX DBMS. It also explains how to run the Installation Verification Procedure (IVP) independently of the installation.

3.1 Editing the System Files

You must edit the system startup and shutdown files to provide for automatic startup and shutdown of VAX DBMS when your system is rebooted.

Add the command lines that start VAX DBMS to the system startup file, SYS$STARTUP:SYSTARTUP_V5.COM. You must position these new command lines *after* the lines that invoke the network startup command procedure and after the VAX CDD/Plus startup file, CDDSTRTUP.COM. The CDDSTRTUP.COM file is produced by the VAX CDD/Plus installation; it installs the CDDSHR shareable image and initializes the CDD/Plus lock table.

The VAX DBMS startup command lines are:

```
$  @SYS$STARTUP:MONSTART42.COM
$  @SYS$STARTUP:DBMSERVER_NCP.COM
```

Add the following command line to the system shutdown file, SYS$STARTUP:SYSHUTDWN.COM:

```
$  @SYS$MANAGER:MONSTOP42.COM
```

3.2 Meeting VAXcluster Considerations

In a VAXcluster environment, VAX DBMS must be installed on all system root directories from which it will be run. This can be done one of two ways: reboot or execute two command procedures on each of the other nodes on the cluster. In addition, you must also perform a license load on each node in a VAXcluster system as described in Section 1.3.

See the *VAX DBMS Database Maintenance and Performance Guide* for more information about using VAX DBMS in a VAXcluster environment.

3.2.1 Reboot

To update VAX DBMS on other nodes on the cluster, reboot each node.

3.2.2 Running the Command Procedures

Run the following command procedures on each of the other nodes in the VAX cluster:

```
SYS$STARTUP:MONSTART42.COM
 SYS$STARTUP:DBMSERVER_NCP.COM
```

The installation procedure ran MONSTART42.COM and DBMSERVER_NCP.COM from the CPU node where the installation was performed, so it is not necessary to rerun these from that CPU node.

MONSTART42.COM installs several images. These images and the qualifiers used are shown in Table 3–1.

Table 3–1 Installed Images

Image File Name	Qualifiers
SYS$SYSTEM:DBMSERVER.EXE	/OPEN/SHARE/HEAD
SYS$SYSTEM:DBO.EXE	/OPEN/HEAD/PROT/PRIV=(PSWARM, SETPRV,CMKRNL,SYSNAN,PRMGBL, DETACH,SYSPRV,TMPMBX)
SYS$LIBRARY:DBMSHR.EXE	/OPEN/SHARE/HEAD/PROT
SYS$LIBRARY:DBMPRV.EXE	/OPEN/SHARE/HEAD/PROT
SYS$LIBRARY:LBRSHR.EXE	/OPEN
SYS$LIBRARY:CRFSHR.EXE	/OPEN
SYS$MESSAGE:DBMMSG.EXE	/OPEN
SYS$MESSAGE:DBQMSG.EXE	/OPEN
SYS$MESSAGE:DBOMSG.EXE	/OPEN
SYS$MESSAGE:DDLMSG.EXE[1]	/OPEN
SYS$MESSAGE:DMLMSG.EXE[1]	/OPEN

[1]DDLMSG.EXE and DMLMSG.EXE message files are not included in the VAX DBMS run-time only kit.

The command file DBMSERVER_NCP.COM inserts the DBMSERVER.EXE image into the permanent DECnet–VAX object database for each node on which it is run. DBMSERVER.EXE implements the VAX DBMS remote database access capability (using DECnet–VAX). See the *VAX DBMS Database Design Guide* for more information.

3.2.3 The DBMDML.OPT File

The installation procedure writes a new copy of DBMDML.OPT to SYS$COMMON:[SYSLIB]. VAX DBMS database programmers link DBMDML.OPT with their DML programs. If you alter the DBMDML.OPT file to suit specific needs of your database programs and you have installed VAX DBMS in a VAXcluster configuration, be sure to edit the new copy in SYS$COMMON:[SYSLIB] after the installation completes. If an old copy of DBMDML.OPT exists, it might be located in SYS$SPECIFIC:[SYSLIB].

To be sure DML programmers link the correct DBMDML.OPT file, delete all obsolete copies of DBMDML.OPT from SYS$SPECIFIC:[SYSLIB] after the new version is written to SYS$COMMON:[SYSLIB]. The logical name SYS$LIBRARY translates to SYS$SYSROOT:[SYSLIB]. The logical name SYS$SYSROOT points first to SYS$SPECIFIC and then to SYS$COMMON. If an old version of DBMDML.OPT resides in SYS$SPECIFIC:[SYSLIB] and the programmer links with the following command in a VAXcluster environment, the wrong DBMDML.OPT file will be used:

```
$  LINK MYPROGRAM.OBJ,SYS$LIBRARY:DBMDML/OPT
```

3.3 Seting User Account Requirements

This section describes the disk space, quotas, and limits needed by VAX DBMS users. The values suggested in this section are *minimum* settings; the settings required by users on your system might differ substantially. The suggested values are specific only for VAX DBMS. You should add the values required for other layered products to the value you use for VAX DBMS and modify the values for each user as needed.

3.3.1 Disk Requirements

Each active user application needs at least 1,000 blocks of scratch space for the recovery-unit journal file and error dumps. The size of the scratch space varies with the number of changes and the length of transactions.

3.3.2 User Account Quotas

Each active user requires certain parameter settings. See the VMS System Managers Subkit for information on using the Authorize Utility. The following are pertinent parameters:

- ASTLM (asynchronous trap limit)

  A limit on the number of outstanding asynchronous traps (ASTs) for a process. For a single stream, set ASTLM to the number of database page buffers you specify for the database using the /BUFFERS qualifier on the DBO/CREATE and DBO/MODIFY commands. For multiple streams, the ASTLM value should be based on the stream that has the largest number of buffers. The database buffers are written back to the database in parallel. Therefore, there might be an outstanding AST for each buffer. Locking activity might also require a higher AST limit. The recommended minimum value is 24.

- BYTLM (byte limit)

  A buffered I/O limit of at least 10,240 bytes. Each additional stream requires an additional 1,600 bytes.

- DIOLM (direct I/O limit)

  The number of outstanding disk I/O requests. You should set DIOLM to a value 2 less than ASTLM.

- ENQLM (enqueue limit)

  A limit on the maximum number of locks that a process can use at any one time.

  For each user, choose an ENQLM value sufficient to enable that user to run the facilities needed. A process that attempts to use CDD/Plus without a sufficiently high enqueue limit receives a quota exceeded error message. Raise the ENQLM of processes that receive this message.

  Although the VMS system default ENQLM is 10, most VAX DBMS users should have an ENQLM of at least 250. Users who compile large schemas (greater than 100 record types) or have transactions that lock large numbers of records might need a still larger ENQLM.

  Compute the number of locks needed using the following guidelines:

  - 10 to 50 general database locks (depending on configuration and journaling options)
  - 2 locks per area readied
  - 1 lock per page in the buffer pool (default is 50)
  - 1 lock per currency indicator in the program
  - 1 lock per record in a keeplist

  If you have enough run-time locks, you usually have enough compile-time locks.

Note *The number of locks needed by a VAX DBMS user is application-dependent, with multiple-user databases requiring proportionally more locks than single-user databases. The number of locks needed is based on the actual level of contention. However, the VMS default will rarely be sufficient.*

- FILLM (open file quota)

  A limit on the number of files a user can have open at any given time. You should set the FILLM value according to Table 3–2.

Table 3–2 Estimating the Appropriate Value for FILLM

File Type	File Limit
Root file (.ROO)	1
Storage areas (.DBS)	1 for each area readied by the run-unit
Snapshot files (.SNP)	1 for each area readied by the run-unit (only if snapshots are enabled for that area)
Recovery-unit journal files (.RUJ)	1 if database updates have been performed by the run-unit
After-image journal files (.AIJ)	1 if database has AIJ enabled and the run-unit has done updates to the database

  Add the numbers shown in Table 3–2 to the numbers for the executable and shareable images. An acceptable default value is 50. Certain operations, such as restoring a database when it is necessary to reinsert a schema into CDD/Plus, require more files.

- WSQUOTA (working set quota)

  The VAX DBMS utilities DBO and DBQ run in a working set of 300 pages with few page faults. The FORTRAN/DML (FDML) preprocessor runs in a working set of 300 pages. The DDL compiler can use a working set of about 400 pages, although the exact count depends on the size and complexity of the DDL source. The DML precompiler runs in a working set of about 300 pages. Check the process working set values and modify as necessary. Larger working sets demand larger ASTLM, BYTLM, ENQLM, and PGFLQUOTA quotas, so modify accordingly.

Be sure the AUTOGEN parameter LOCKIDTBL_MAX is also set high enough. See Section 1.5.5.1 for information on selecting LOCKIDTBL and LOCKIDTBL_MAX values.

3.3.3 Special Privileges

VAX DBMS users who need to stop and start the VAX DBMS monitor process must have WORLD privilege. System managers and database administrators should have WORLD privilege. However, in most situations, application programmers and end users should not have WORLD privilege.

3.4 Enhancing Product Performance

If users will be developing VAX DBMS programs, you might be able to enhance VAX DBMS performance.

3.4.1 Installing Images

By installing certain images, VAX DBMS performance might be enhanced. Install the images using the install qualifiers shown in Table 3–3.

Table 3–3 Qualifiers for Optional Images

Image File Name	Qualifiers
SYS$SYSTEM:DBMDBR.EXE[1]	/OPEN/SHARE/HEAD
SYS$SYSTEM:DBQ.EXE	/OPEN/SHARE/HEAD
SYS$SYSTEM:DDL.EXE[2]	/OPEN/SHARE/HEAD
SYS$SYSTEM:DML.EXE[2]	/OPEN/SHARE/HEAD
SYS$SYSTEM:FORDML.EXE[2]	/OPEN/SHARE/HEAD

[1]Installing the DBMDBR.EXE file might improve the performance of database recovery after a cluster failover or a system crash. DBMDBR.EXE is not used to roll forward (DBO/RECOVER).

[2]DDL.EXE, FORDML.EXE, and DML.EXE are not included in the VAX DBMS run-time only kit.

Use the Install Utility on each CPU node on the cluster to install these additional images interactively. In addition include these commands in a site-specific system startup command procedure to be effective when nodes are rebooted.

Installing images requires additional GBLPAGES and GBLSECTIONS. See the VMS System Managers Subkit for more information about using the Install Utility.

3.4.2 Setting LOCKDIRWT

Setting the SYSGEN parameter, LOCKDIRWT, is important to ensure optimum database performance following cluster state transitions. After a cluster state transition, database locks could be remastered from a more powerful to a less powerful node, causing poor database performance.

If LOCKDIRWT is set greater than 0 on a node, it makes that node more likely to master locks. If LOCKDIRWT is set to 0, it makes that node not likely to master locks. For example, to establish the priority of Computer Interconnect (CI) nodes over Network Interconnect (NI) nodes, give the CI nodes a LOCKDIRWT value of 1 and the NI nodes a LOCKDIRWT value of 0.

When a node with LOCKDIRWT of 0 joins a cluster, the lock database is not rebuilt, provided there are already at least 2 nodes with LOCKDIRWT greater than 0 in the cluster. In addition, when a node with LOCKDIRWT of 0 leaves a cluster, a full lock rebuild is avoided if at least two nodes with LOCKDIRWT greater than 0 remain. This will speed cluster state transitions. If a full lock rebuild is avoided, no lock mastering changes occur except for those resources mastered on a node being removed from the cluster.

3.5 Meeting After-Image Journal Requirements

You can enable or disable after-image journaling to disk using the /AFTER_JOURNAL qualifier on the DBO/CREATE and DBO/MODIFY commands. The command DBO/BACKUP/AFTER_JOURNAL spools the existing contents of the disk-resident after-image journal (.AIJ) file to another file, either on disk or tape. This method of handling the .AIJ file means that the disk requirements of your .AIJ file could change, depending on the frequency of the DBO/BACKUP/AFTER_JOURNAL operations.

3.6 Converting Root Files

With each new release, you must convert the root file of each database using the DBO/CONVERT command before you can bind to it. For additional reasons you need to convert your database for this version of VAX DBMS, see the *VAX DBMS Release Notes*.

The DBO/CONVERT command performs the necessary changes to allow a database to run under the current version. The BYPASS privilege is required to execute the DBO/CONVERT command.

The DBO/CONVERT command converts the root file only. Database area, .AIJ file, and snapshop files do not have to be converted. Execution time for the DBO/CONVERT command is thus very brief. After you convert a database, you cannot bind to it with earlier version of VAX DBMS software.

If you have problems converting your database, use the DBO/RESTORE command to restore the backup you made before installation as instructed in Section 1.4.1. DBO/RESTORE will automatically convert the root file.

For further information on the DBO/CONVERT and DBO/RESTORE commands, refer to the *VAX DBMS Database Administration Reference Manual*.

3.7 Running the IVP After VAX DBMS Is Installed

If you chose not to run the Installation Verification Procedure (IVP) during the installation or if you want to run it again, this section describes how to run the IVP from DCL. You have to register and load you PAK as described in Section 1.3 to successfully complete the IVP and use the software.

The VAX DBMS IVP writes metadata for the sample DBMPARTS database to the CDD/Plus dictionary at SYS$COMMON:[SYSTEST.DBM42.CDDPLUS]. Use a command with the following format to execute the IVP for the full development kit:

```
@SYS$COMMON:[SYSTEST]DBMIVP.COM [device:directory]
```

Use the optional parameters to specify where the files generated by the IVP should be written. If you do not specify a location, the default device and directory will be used.

Use a command with the following format to execute the IVP for the run-time only kit:

```
@SYS$COMMON:[SYSTEST]DBMRTOIVP.COM [device:directory]
```

If the IVP is successful, a message tells you that it finished successfully. If the IVP is unsuccessful, a message tells you that it failed.

See Appendix A for sample output of the full development IVP and Appendix B for sample output of the run-time only IVP.

3.8 Determining and Reporting Problems

If you encounter a problem while using VAX DBMS, report it to Digital. Depending on the nature of the problem and the type of support you have, you can take one of the following actions:

- Call Digital if your software contract or warranty agreement entitles you to telephone support.
- Submit a Software Performance Report (SPR).

- Fill out and submit a Reader's Comments form if the problem has to do with the VAX DBMS documentation. Reader's Comments forms are at the back of each manual. Use the form from the manual in which you found the error. Include the section and page number.

Review the Software Product Description (SPD) and Warranty Addendum for an explanation of warranty. If you encounter a problem during the warranty period, report the problem as indicated above or follow alternate instructions provided by Digital for reporting SPD nonconformance problems.

A

Full Development Sample Installation Session

This appendix lists the hardcopy terminal output from an installation of the VAX DBMS Version 4.2 full development kit on VMS Version 5.4.

```
$ @SYS$UPDATE:VMSINSTAL DBMDEV042 MTA0: OPTIONS N

        VAX/VMS Software Product Installation Procedure V5.4

It is 28-APR-1990 at 17:55.

Enter a question mark (?) at any time for help.

* Are you satisfied with the backup of your system disk [YES]? YES

The following products will be processed:

  DBMDEV V4.2

        Beginning installation of DBMDEV V4.2 at 17:55

%VMSINSTAL-I-RESTORE, Restoring product saveset A ...

    Additional Release Notes Options:

        1.  Display release notes
        2.  Print release notes
        3.  Both 1 and 2
        4.  None of the above

* Select option [2]: 4
* Do you want to continue the installation [NO]? YES
%VMSINSTAL-I-RELMOVED , The product's release notes have been
                                       successfully moved to SYS$HELP.

         VAX DBMS V4.2-426 Installation

    *************************************************************

    All VAX DBMS databases must be converted.  Use the DBO/CONVERT
    command in VAX DBMS V4.2-426 to convert your databases.

    You must have BYPASS privilege to convert the databases.  See the
    VAX DBMS Installation Guide for information on converting databases.
```

```
    ONCE CONVERTED, A DATABASE CANNOT BE ACCESS BY ANY EARLIER
    VERSION OF VAX DBMS.

    *************************************************************

* Do you want to continue the installation [YES]? YES

    *************************************************************

    The installed version of the VAX Language Sensitive Editor
    will be updated with the new DBMS LSE environment files

    *************************************************************

        Product:      DBMS
        Producer:     DEC
        Version:      4.2
        Release Date: 1-JUN-1990

* Does this product have an authorization key registered and loaded? YES

    *************************************************************

    This installation will create the DBM$REMOTE42
    account.  You will be prompted for the UIC and password for
    the account.

    **************************************************************

* Enter UIC for DBM$REMOTE account: [12,100]

* Enter PASSWORD for DBM$REMOTE account:

* Verify the PASSWORD entered for DBM$REMOTE:

* Do you want to run the IVP after the installation [YES]? YES

* Do you want to purge files replaced by this installation [YES]? YES

    There are no more questions.

    Installation takes approximately 9 minutes on a standalone
    VAX 8800. If you run the Installation Verification Procedure,
    it will take about 13 additional minutes to complete on a
    standalone VAX 8800.

Beginning installation...

%VMSINSTAL-I-RESTORE, Restoring product saveset B ...
%VMSINSTAL-I-RESTORE, Restoring product saveset C ...

DBMSERVER has been placed in the DECnet object database as number 52.

    *************************************************************

    SYSTEM MANAGER:

    If your DECnet object database is not configured to be in
    the cluster common directory, then you will need to perform
    the following:

    In order to have remote access on another node which shares
    this cluster common root directory, you must insert
    DBMSERVER into that node's DECnet object database by:

        a) Logging into that node, and
        b) Invoking SYS$COMMON:[SYSMGR]DBMSERVER_NCP.COM.
```

```
    This command procedure inserts DBMSERVER into the node's
    permanent DECnet object database.  This procedure only needs
    to be executed ONCE per node.

    *************************************************************

%DBMDEV-I-ACCOUNT, This installation creates an account named DBM$REMOTE.
%VMSINSTAL-I-ACCOUNT, This installation updates an ACCOUNT named DBM$REMOTE.
%UAF-I-MDFYMSG, user record(s) updated
%EPC-S-FACINS, Facility definition(s) was successfully inserted

%VMSINSTAL-I-RESTORE, Restoring product saveset D ...

%DBMDEV-I-IGNRUSRTFR, Please ignore the %LINK-W-USRTFR warning message.
%LINK-W-USRTFR, image $111$DUA11:[SYS2.SYSUPD.DBMDEV042]STBOBJTMP.EXE;1 has no
                        user transfer address

%VMSINSTAL-I-SYSDIR, This product creates system disk directory
                                            VMI$ROOT:[SYSTEST.DBM].

%VMSINSTAL-I-MOVEFILES, Files will now be moved to their target directories...


Executing IVP for VAX DBMS V4.2-426 at 28-APR-1990 18:10:29.97

Checking/setting up the environment...
    CDD/Plus dictionary will be created if necessary.
     Check was successful.

Deleting databases and schema...
    Delete was successful

Compiling the PARTS DDL files...
    Compiles were successful

Creating the PARTS database files...
    Create was successful

Loading the PARTS database (with after image journaling)...
    Load was successful

Reloading the PARTS database (DBO /RECOVER)...
    Reload was successful

Executing a DBQ script...
    DBQ was successful

Running BASIC DML program...
    BASIC DML was successful

Running COBOL DML program...
    COBOL DML was successful

Running FORTRAN DML program...
    FORTRAN DML was successful

Running PASCAL DML program...
    PASCAL DML was successful

Running PLI DML program...
    PLI DML was successful

    ****************************************

    VAX DBMS V4.2-426

    Development

    IVP COMPLETED SUCCESSFULLY
```

```
    ****************************************

IVP completed for VAX DBMS V4.2-426 at 28-APR-1990 18:36:50.22
        Installation of DBMDEV V4.2 completed at 18:36

        VMSINSTAL procedure done at 18:37
```

B

Run-Time Sample Installation Session

This appendix lists the hardcopy terminal output from an installation of the VAX DBMS Version 4.2 run-time only kit on VMS Version 5.3.

```
$ @SYS$UPDATE:VMSINSTAL DBMRTO042 MTA0: OPTIONS N

        VAX/VMS Software Product Installation Procedure V5.3

It is 16-APR-1989 at 13:19.

Enter a question mark (?) at any time for help.

* Are you satisfied with the backup of your system disk [YES]? YES

The following products will be processed:
  DBMRTO V4.2

        Beginning installation of DBMRTO V4.2 at 13:20

%VMSINSTAL-I-RESTORE, Restoring product saveset A ...

    Release Notes Options:

        1.  Display release notes
        2.  Print release notes
        3.  Both 1 and 2
        4.  None of the above
* Select option [2]: 4

%VMSINSTAL-I-RELMOVED, The product's release notes have been successfully
                                   moved to SYS$HELP

         VAX DBMS V4.2-246 Installation

    *************************************************************

    All VAX DBMS databases must be converted.  Use the DBO/CONVERT
    command in VAX DBMS V4.2-246 to convert your databases.

    You must have BYPASS privilege to convert the databases.  See the
    VAX DBMS Installation Guide for information on converting databases.
```

```
    ONCE CONVERTED, A DATABASE CANNOT BE ACCESSED BY ANY EARLIER
    VERSION OF VAX DBMS.
    *************************************************************

* Do you want to continue the installation [YES]? YES

    *************************************************************

    The installed version of the VAX Language Sensitive Editor
    will be updated with the new DBMS LSE environment files

    *************************************************************

          Product:      DBMS-RT
          Producer:     DEC
          Version:      4.2
          Release Date: 1-JUN-1989

* Does this product have an authorization key registered and loaded? YES

* Do you want to run the IVP after the installation [YES]?  YES

* Do you want to purge files replaced by this installation [YES]? YES

    There are no more questions.
    Installation takes approximately 9 minutes on a standalone
    VAX 8800. If you run the Installation Verification Procedure,
    it will take about 13 additional minutes more to complete on a
    standalone VAX 8800.

Beginning installation...

%VMSINSTAL-I-RESTORE, Restoring product saveset B ...
%VMSINSTAL-I-RESTORE, Restoring product saveset C ...

DBMSERVER has been placed in the DECnet object database as number 52.

    *************************************************************

    SYSTEM MANAGER:

    If your DECnet object database is not configured to be in
    the cluster common directory, then you will need to perform
    the following:

    In order to have remote access on another node which shares
    this cluster common root directory, you must insert
    DBMSERVER into that node's DECnet object database by:

        a) Logging into that node, and
        b) Invoking SYS$COMMON:[SYSMGR]DBMSERVER_NCP.COM.

    This command procedure inserts DBMSERVER into the node's
    permanent DECnet object database.  This procedure only needs
    to be executed ONCE per node.

    *************************************************************

%VMSINSTAL-I-RESTORE, Restoring product saveset D ...
%DBMRTO-I-IGNRUSRTFR, Please ignor the %LINK-W-USRTFR warning message.
%LINK-W-USRTFR, image $111$DUA11:[SYS2.SYSUPD.DBMRTO042]STBOBJTMP.EXE;1
                has no user transfer address
%VMSINSTAL-I-MOVEFILES, Files will now be moved to their target directories...
```

```
Executing IVP for VAX DBMS V4.2 at 16-APR-1990 13:39:13.50

Checking/setting up the environment...
    CDD/Plus dictionary will be created if necessary.
        Check was successful.

Deleting databases and schema...
    Delete was successful

Creating the PARTS database files...
    Create was successful

Loading the PARTS database (with after image journaling)...
    Load was successful

Reloading the PARTS database (DBO /RECOVER)...
    Reload was successful

Executing a DBQ script...
    DBQ was successful

    ****************************************

    VAX DBMS V4.2-246

    Run Time Only

    IVP COMPLETED SUCCESSFULLY

    ****************************************

IVP completed for VAX DBMS V4.2-246 at 16-APR-1989 13:45:34.46
        Installation of DBMRTO V4.2 completed at 13:45

        VMSINSTAL procedure done at 13:45
```