Digital Extended Math Library for OpenVMS VAX

Installation Guide

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This document contains instructions for installing the Digital Extended Math Library on the OpenVMS operating system running on VAX architectures.

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Preface

This manual describes how to install the Digital Extended Math Library (DXML) on processors running the OpenVMS operating system on VAX platforms.

For information on the compatibility of other software products with this version of DXML, refer to the System Support Addendum (SSA) that comes with the Software Product Description (SPD). You can use the SPD and SSA to verify which versions of your operating system are compatible with this version of DXML.

Intended Audience

This manual is intended for anyone who is responsible for any of the following tasks:

- Planning the installation of DXML and preparing the system
- Installing DXML
- Tuning the system that is running DXML

To install the software, you must:

- Be familiar with VMSINSTAL, the command procedure used to install software products. To locate the description of VMSINSTAL, see the master index of the system documentation set.
- Have access to the SYSTEM account on your machine or to an account with the user privilege SETPRV.

This manual helps you understand the procedures necessary for installing DXML as a shareable library. Please read this manual before you begin the installation.

Structure of This Manual

This manual includes three chapters and two appendixes:

- Chapter 1, Preparing to Install DXML, explains how to plan the installation and prepare your system for the installation.
- Chapter 2, Installing DXML, explains how to install the software.
- Chapter 3, After Installing DXML, explains how to adjust your system for the best performance of the software.
- Appendix A, Sample Installation, presents the log of a sample installation of DXML.
- Appendix B, Installed Files, lists the files that make up the DXML product.

Associated Documents

Please read the release notes before installing the software, in case important information missing from this document has been added to the notes. Application developers should also check the release notes before using the product, in case corrections have been made to the documented performance of the product.

The documentation for DXML also includes the following books:

- *Digital Extended Math Library for OpenVMS VAX User Guide*
- *Digital Extended Math Library Reference Manual*

For general information on installing software, refer to the following manuals:

- *Guide to VAX/VMS Software Installation*
- *VAX/VMS System Manager's Reference Manual*

Conventions Used in This Manual

This manual uses the following conventions:

Convention	Meaning
Ctrl/x	The slash in the key name indicates that you press the two keys simultaneously. In this sequence, hold down the Ctrl key and then press the character key.
⋮	Vertical ellipses in an example indicate that irrelevant information has been omitted.
$	The dollar sign is used to indicate the DCL prompt, which can differ on your system.

1
Preparing to Install DXML

Chapter 1 discusses the preparations and requirements for installing DXML.

Your bill of materials (BOM) and indented bills report (BIL) specify the contents of your kit. If your kit is damaged or if you find that parts of it are missing, contact your Digital representative.

1.1 Required Operating System Components

The OpenVMS VAX operating system comes with a variety of support options, or classes. Classes include such features as networking and RMS journaling. To use DXML, your system must be running a version of OpenVMS VAX that includes the following classes:

- VMS Required Saveset
- Programming Support

1.2 Prerequisite Hardware

DXML runs on most VAX, Micro/VAX, VAXstation, and VAXserver processors. For a complete list of supported processors, see the *DXML System Support Addendum*.

DXML does not run on the VAX–11/725, VAX–11/782, Micro/VAX I, VAXstation I, and VAXstation 8000 processors.

Installing DXML requires at least 8 megabytes of memory on your system. DXML applications provide better response if given additional memory.

1.3 Prerequisite Software

DXML requires Version 5.4 or higher of the OpenVMS VAX operating system.

To compile, link, and run a DXML application program written in a high-level language, you also need the programming language compiler.

The System Support Addendum (SSA) contains a complete list of prerequisite software and required version numbers.

1.4 Optional Hardware

To use vector processing, you need either VAX vector hardware or the the VAX Vector Instruction Emulator Facility (VVIEF), available with the operating system, which executes vector instructions on a scalar VAX processor. DXML supports the vector processing hardware on either the VAX 9000 and the VAX 6000 processors. See the *Guide to Maintaining a VMS System* for more information about VVIEF.

1.5 License Registration

Before you install and run DXML Version 2.0 on a newly-licensed node, you must first register a License Product Authorization Key (License PAK) using the License Management Facility (LMF). The License PAK may be shipped along with the kit if you ordered the license and media together; otherwise, it is shipped separately to a location based on your license order.

You must register and load your license for DXML before you start the installation procedure. Register your License PAK in one of the following ways:

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

Load the PAK using the LICENSE LOAD command. If previous versions of the PAK have been loaded on the system, remove the current license from system memory using the following command:

```
$ LICENSE UNLOAD lmf-name
```

Then load the new license, using the following command:

```
$ LICENSE LOAD lmf-name
```

where:

- *lmf-name* = EXT-MATH-LIB for the Development Kit
- *lmf-name* = EXT-MATH-LIB_RT for the Run-time Kit

1.6 Installation Requirements

This section describes the minimum requirements for installing DXML: time, privileges, disk storage space, system parameters, process account quotas, and VMSINSTAL requirements.

1.6.1 Time

The installation takes less than 30 minutes, depending on your type of media and your system configuration.

1.6.2 Privileges

The account you use to install DXML must have the user privilege SETPRV. As one of the first actions, the VMSINSTAL command procedure grants all privileges (except BYPASS) to the process that invokes it. This command succeeds only if the account has SETPRV. The procedures described in this installation guide refer to the SYSTEM account, but they are the same for any account with SETPRV.

1.6.3 Disk Space

DXML's requirements for free disk storage space are summarized in Table 1–1. To display the number of free disk blocks on the current system disk, enter the following command at the DCL prompt:

```
$ SHOW DEVICE SYS$SYSDEVICE
```

Table 1–1 Required Disk Space

Kit	Blocks During Installation	Blocks After Installation	
		with vector	scalar only
Development	110000	110000	65000
Run-time	90000	90000	50000

1.6.4 System Parameters

The installation of DXML requires the default system parameter settings. After installation, and depending on whether known shared images are used, lower settings of these parameters are possible. Table 1–2 lists the suggested settings for the installation and execution of DXML.

Table 1–2 Suggested Values for System Parameters

System Parameter	Minimum Value
CLISYMTBL	250
GBLPAGES	35000
GBLPAGFIL	1024
GBLSECTIONS	20
LOCKIDTBL	200
LOCKIDTBL_MAX	65535
RESHASHTBL	64
VIRTUALPAGECNT	8192

1.6.4.1 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 Utility (SYSGEN):

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

At the SYSGEN> prompt, enter the SHOW command to display the value of a system parameter. The values displayed should equal or exceed the value of each system parameter listed in Table 1–2. The following example displays the value for the VIRTUALPAGECNT system parameter:

```
SYSGEN> SHOW VIRTUALPAGECNT
```

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

1.6.4.2 Checking Values for GBLPAGES and GBLSECTIONS

To install and run DXML, you must have sufficient free global pages and global sections. You must first check the free global pages and sections you have on your system. Then use AUTOGEN if you need to increase the GLBPAGES and GBLSECTIONS system parameters.

To display the number of free global pages and global sections, use the WRITE command with the F$GETSYI lexical function. The following example shows how to display this information on the SYS$OUTPUT device:

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

If the values of free global pages or global sections are greater than the values in Table 1–2, you do not need to increase the values. If a value is less than the value in Table 1–2, you must increase the system parameter.

Use the AUTOGEN command procedure to change system parameters.

1.6.4.3 Changing System Parameter Values with AUTOGEN

Use the AUTOGEN command procedure 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
```

Use an editor to access the file. To change a parameter value 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:

```
VIRTUALPAGECNT = 19000
```

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

```
ADD_GBLPAGES = 2000
```

After you make all your changes, exit from the editor and execute 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 then reboots the system. 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 SYSGEN 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.

1.6.4.4 Changing Dynamic System Parameter Values with SYSGEN

Use the System Generation Utility (SYSGEN) to set dynamic parameters. Dynamic parameters changed with the SYSGEN WRITE ACTIVE command become active immediately without any need to reboot your system. In fact, rebooting returns dynamic system parameter values to their previous settings.

If you change dynamic parameter values, complete the DXML installation before rebooting the system. After the installation, you can reset the dynamic parameters to their previous values or leave them to be reset automatically the next time you reboot your system. Table 1–3 shows the required dynamic parameter values.

Table 1–3 Required Values for Dynamic Parameters

Dynamic Parameter	Value
CLISYMTBL	250
LOCKIDTBL	200

If the dynamic parameter values on your system are less than the values listed, use the following series of commands to change the values. This example changes the CLISYMTBL value to 250.

```
$ RUN SYS$SYSTEM:SYSGEN
SYSGEN> USE ACTIVE
SYSGEN> SET CLISYMTBL 250
SYSGEN> WRITE ACTIVE
SYSGEN> EXIT
```

1.6.5 Process Account Quotas

The account you use to install DXML must have sufficient quotas to enable you to perform the installation. Table 1–4 shows the process quotas required for the installing account. Except for PGFLQUOTA, all the process quotas are the default values.

Table 1–4 Process Account Quotas

Account Quota	Minimum for DXML
BYTLM	32768
ENQLM	200
FILLM	40
WSQUOTA	512
WSEXTENT	2048
PGFLQUOTA	110000

For more information on modifying account quotas, see the description of the Authorize Utility in the documentation for system management.

1.6.6 VMSINSTAL Requirements

When you invoke VMSINSTAL, it checks whether you have done the following:

- Set your default device and directory to SYS$UPDATE
- Logged in to a privileged account
- Set adequate quotas for installation
- Backed up the system disk

VMSINSTAL also checks to see whether DECnet is running and whether any users are logged in to the system. VMSINSTAL requires that the installation account have a minimum of the following quotas:

```
ASTLM = 24
BIOLM = 18
BYTLM = 18000
DIOLM = 18
ENQLM = 30
FILLM = 20
```

If VMSINSTAL detects any problems during the installation, it notifies you and asks if you want to continue the installation. In some instances, you can type Yes to continue. To stop the installation process and correct the situation, type No or press Return. Then, correct the problem and restart the installation.

1.7 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 do a system disk backup before installing any software.

Use the backup procedures that are established at your site. For details on performing a system disk backup, see the section on the Backup Utility in the System Management Subkit.

2
Installing DXML

Chapter 2 explains how to install the Digital Extended Math Library. Section 2.1 contains a step-by-step description of the installation procedure.

Note

DXML provides online release notes. Digital strongly recommends that you read the release notes before performing the installation. For information on accessing the online release notes, see Section 2.1.

2.1 Installation Procedure

The VMSINSTAL command procedure moves the DXML software from the distribution media to your system disk. The procedure consists of a series of questions and informational messages. Appendix A shows a sample installation.

To abort 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.

To install DXML Version 2.0 on your VMS system, take the following steps:

1. **Invoke VMSINSTAL.**

   To start the installation, run the VMSINSTAL command procedure from a privileged account, such as the SYSTEM account.

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

   where:

   - *saveset-name* is one of the following:

     DXMLDVVV020 (Development Kit)
     DXMLRTVV020 (Run-time Kit)

   - *device-name* is the name of the device on which you plan to mount the media. For example, MTA0: is the device name for a tape drive.

   - *OPTIONS N* is an optional but recommended parameter that causes VMSINSTAL to prompt you about the release notes during the installation procedure. If you do not include the OPTIONS N parameter, VMSINSTAL does not ask you about the release notes. If you have already reviewed the release notes or are restarting the installation, you do not need to specify OPTIONS N. In addition to the N option, you can invoke VMSINSTAL with the following options:

     – Auto_answer option (A): Initially creates a file that contains your answers to VMSINSTAL questions and prompts. You can then use

the option (and the answer file) to save time during a reinstallation (typically after upgrading your system).

- Get save set option (G): Lets you store product save sets temporarily on a magnetic tape or in a disk directory.
- File log option (L): Logs all activity to the terminal during installation.
- Alternate root option (R): Lets you install the product to a system root other than that of the running system.

If you specify more than one option, separate the options with commas (OPTIONS A,N).

If you do not supply the product name or the device name, VMSINSTAL prompts you for this information later in the installation procedure. VMSINSTAL does not prompt you for any options.

2. **Confirm other processes.**

   VMSINSTAL checks for other active processes. If there are other users on the system, VMSINSTAL displays the following inquiry:

```
%VMSINSTAL-W-ACTIVG, The following processes are still active:
      ...
* Do you want to continue anyway? [NO]?
```

   The DXML software does not affect other users of the system. Type YES to continue.

3. **Confirm system backup.**

   VMSINSTAL asks if you are satisfied with your system backup.

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

   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, type NO to stop the installation. After you back up your system disk, you can restart the installation.

4. **Mount the media.**

   VMSINSTAL prompts you to mount the distribution volume on the device you specified when you invoked VMSINSTAL. You should now load the distribution volume. VMSINSTAL then asks you if you are ready to continue with the installation.

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

   When you respond YES, VMSINSTAL displays a message that the media containing DXML has been mounted on the specified device and that the installation has begun.

```
The following products will be processed:
  DXMLDVVV V2.0

       Beginning installation of  DXMLDVVV V2.0 at 14:37

%VMSINSTAL-I-RESTORE, Restoring product save set A...
```

   If you entered the wrong device name when you invoked VMSINSTAL and need to restart the installation, type NO in response to the ‘‘Are you ready?’’ question. To abort the installation for other reasons, press Ctrl/Y.

5. **Select a release notes option.**

   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/Y.

   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.

   Select option 4 if you have already reviewed the release notes and are restarting the installation.

   Next, VMSINSTAL displays the following question:

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

   To continue the installation, type YES. Otherwise, press Return. In either case, the release notes are copied to the file SYS$HELP:DXML020_VV.RELEASE_NOTES.

   If you chose to continue the installation, VMSINSTAL begins to access the remaining files in the kit.

```
%DXMLDVVV-I-INTRO, Beginning the Installation/Verification Procedure for
-DXMLDVVV-I-INTRO, Product Name:  Digital Extended Math Library V2.0
-DXMLDVVV-I-INTRO, Product Option: Development Library for OpenVMS VAX
```

6. **Choose the Installation Verification Procedure (IVP) option.**

   The installation procedure asks if you want to run the IVP during the installation procedure. The IVP for DXML links each component of the product.

```
* Do you want to run the DXML installation verification procedure [YES]?
```

   Digital recommends that you run the IVP during the installation. You can also run the IVP at any time after DXML is installed.

7. **Purge files.**

   You now have the option to purge files from previous versions of DXML that are superseded by this installation.

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

   Purging is recommended; however, if you need to keep files from the previous version, type NO in response to the question.

8. **Install the vector library.**

   You now have the option to include the vector library in the installation.

   ```
   * Do you want the vector library installed? [YES]?
   ```

   DXML contains the option of supporting vector processing. If your system does not have vector hardware, or a need for the vector object files, type NO.

9. **Read informational messages.**

   VMSINSTAL tells you that there are no more questions.

   ```
   %DXMLDVVV-I-NOQUEST, No more questions will be asked. Approximately 30
   -DXMLDVVV-I-NOQUEST, minutes remain to complete this procedure.
   ```

   At this point, VMSINSTAL verifies the license registration for DXML. The installation procedure stops if the Product Authorization Key (PAK) is not loaded. If you have not done so, stop the installation, register and load your PAK, and then restart the installation.

   Next, VMSINSTAL checks for installation requirements, such as the minimum values for system parameters. If any value does not meet the minimum requirement, VMSINSTAL stops the installation. Correct the problem and restart the installation.

   At the installation proceeds, VMSINSTAL displays a number of informational messages that report on the progress of the installation.

   ```
   %VMSINSTAL-I-SYSDIR, This product creates system directory [SYSTEST.DXML]

       If you intend to execute this layered product on other nodes in your
       cluster, and you have the appropriate software license, you must
       prepare the system-specific roots on the other nodes by issuing the
       following command on each node (using a suitably privileged account):

       $ CREATE /DIRECTORY SYS$SPECIFIC:[SYSTEST.DXML]


   %DXMLDVVV-I-EOINST, The primary installation phase has completed.
   %DXMLDVVV-I-EOINST, Be sure to read the release notes.
   ```

   When the files for the product are transferred from the distribution medium to your system, you see the following message:

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

   At this time, files in [SYSTEST.DXML] are purged if that directory already exists and if you chose that option. If this is a new installation, VMSINSTAL creates the directory and moves the files into it.

10. **Observe the Installation Verification Procedure (IVP).**

```
%DXML-I-IVP> Beginning Installation Verification Procedures for
       Product Name: DXML V2.0
       Product Option: Development Library for OpenVMS VAX
```

If you chose to install the vector library, VMINSTAL displays the following message:

```
%DXML-I-Inf> The vector libraries are installed on the system.
%DXML-I-Inf> If the system is not provided with vector support
%DXML-I-Inf> or vector emulation, the installation verification
%DXML-I-Inf> will fail.
```

When the IVP runs successfully, you see the following display:

```
%DXML-I-Inf> Beginning link test verifications of the DXML Development Library
  The link test verification of SPARSE has completed successfully
  The link test verification of BLAS has completed successfully
  The link test verification of LAPACK has completed successfully
  The link test verification of Signal Processing has completed successfully

The link test verifications of DXML have completed successfully


%DXML-I-Inf> Beginning regression test verifications of the DXML Development Library
ivp_test> Regression tests of BLAS scalar completed successfully.
ivp_test> Regression tests of Sparse BLAS scalar completed successfully.
ivp_test> Regression tests of Signal Processing scalar completed successfully.
ivp_test> Regression tests of LAPACK scalar completed successfully.
ivp_test> Regression tests of Sparse Iterative Solver scalar completed successfully.
ivp_test> Regression tests of BLAS vector completed successfully.
ivp_test> Regression tests of Sparse BLAS vector completed successfully.
ivp_test> Regression tests of Signal Processing vector completed successfully.
ivp_test> Regression tests of LAPACK vector completed successfully.
ivp_test> Regression tests of Sparse Iterative Solver vector completed successfully.

DXML-Inf> The regression test verifications of DXML have completed successfully

DXML-I-IVP> Completed DXML V2.0 Installation Verification Procedure
```

11. **End the installation procedure.**

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

```
DXML-I-Inf>Finished the Installation / Verification Procedure for
    Product Name:   DXML V2.0
    Product Option: Development Library for OpenVMS VAX

Be sure to read the release notes.
  Installation of DXMLDVVV V2.0 completed at 15:03

VMSINSTAL procedure done at 15:03
```

You can now log out of the privileged account.

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, log out and log in again.

2.2 Error Recovery

If an error occurs during the installation, VMSINSTAL displays the following message:

```
%VMSINSTAL-E-INSFAIL, The installation of
DXML V2.0 has failed.
```

If an error occurs when the Installation Verification Procedure (IVP) is running, you see these messages:

```
The DXML V2.0
Installation Verification Procedure failed.

%VMSINSTAL-E-IVPFAIL, The IVP for DXML V2.0 has failed.
```

Errors can occur 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 product license has not been registered and loaded.
- The vector library was installed on a system without support for vector processing.

If any of these conditions exist, check the software requirements and the system prerequisites. Table 2–1 lists the error messages, preceded by the kit name (for example, DXMLDVVV020–I–), that are specific to the DXML installation.

Table 2–1 Error Messages for DXML

Error Message	Meaning
–VMSBAD	Wrong version of VMS
–NOSPACE	System disk contains too few free blocks
–PGFLQ	Process does not have a large enough Paging File Quota
–LICFAIL	Improper license
–NOGBLPG	GBLPAGES parameter is set below required minimum
–NOGSECT	GBLSECTIONS parameter is set below required minimum

3
After Installing DXML

Chapter 3 describes the tasks you perform after installing DXML:

- Starting DXML
- Making the product usable on a VAXcluster, if necessary
- Checking the installation by running the IVP
- Reviewing the release notes
- Reporting problems

3.1 Defining the Link Library

DXML's startup command procedure defines the link library for DXML and adds the new definition to the system logical name table. If a definition already exists, the procedure adds to it.

The LNK$LIBRARY logical name directs the linker to the appropriate image library. The default definition of LNK$LIBRARY is the image libary `SYS$LIBRARY:DXML$IMAGELIB_DS.OLB`, indicating the D_floating data type and scalar processing.

Whether you use the default definition or change the definition, see Section 3.3 for instructions on starting DXML.

3.2 Installing DXML as a Known Shared Image

If you expect all or some of DXML's components to be used extensively, you can reduce the system overhead and memory requirements by installing the components as known shared images.

By default, none of the components are known shared images. DXML provides a startup command procedure which you can edit to specify the components you want installed as known shared images. See Section 3.3 for instructions on how to edit and invoke the startup procedure.

3.3 Starting DXML

This section describes how to edit the startup command procedure and start the DXML software.

If you want to use the default startup installation, start at step 5.

If you want to change the link library but do not want to install known shared images, start at step 4B.

If you want to install known shared images, use the following procedure. Digital recommends using this procedure on a system that has been rebooted recently to avoid having fragmented available space in the global page table.

1. Identify the DXML components that are likely to be used by more than one user at a time and would therefore benefit from being installed as known shared images.
2. Refer to Table 3–1 for the required global sections and global pages for each component of DXML. Add the requirements for the components you selected.
3. Verify that the number of available global pages and global sections on your system is adequate, as described in Section 1.6.4.2. If necessary, change the values, as described in Section 1.6.4.3.
4. Edit the DXML command procedure, SYS$STARTUP:DXML$STARTUP.COM.
   A. Remove the comment character from the procedure call statements for the components you want installed as known shared images.
   B. To specify a new default link library, substitute one of the listed parameters for the parameter *DS* in the following command:

      ```
      $  @SYS$LIBRARY:DXML$SET_LIB DS /SYSTEM
      ```

      DV for D_float and vector processing
      GS for G_float and scalar processing
      GV for G_float and vector processing
5. Invoke the command procedure:

   ```
   $ @SYS$STARTUP:DXML$STARTUP.COM
   ```

   Any component you selected is now available as a known shared image and the system logical name is defined.
6. Add the following line to the appropriate system startup command file to ensure that DXML is started whenever the system is started:

   ```
   $ @SYS$STARTUP:DXML$STARTUP.COM
   ```

   The default startup command file is SYS$MANAGER:SYSTARTUP_V5.COM.

Table 3–1 Required Global Pages and Global Sections for DXML Components

	GBLPAGES	GBLSECTIONS
D_floating data, scalar processing		
DXML$FDS_BLAS1	30	2
DXML$FDS_BLAS1E	32	1
DXML$FDS_BLAS2	244	2
DXML$FDS_BLAS3	1330	2
DXML$FDS_COMMON	16	2
DXML$FDS_LAPACK	2920	2
DXML$FDS_SIG_PROC	1754	2
DXML$FDS_SIG_PROC_V1	12	1

(continued on next page)

Table 3–1 (Cont.) Required Global Pages and Global Sections for DXML Components

	GBLPAGES	GBLSECTIONS
D_floating data, scalar processing		
DXML$FDS_SIG_PROC_V2	0	0
DXML$FDS_SPARSE	178	2
TOTAL:	**6516**	**16**
D_floating data, vector processing		
DXML$FDV_BLAS1	30	2
DXML$FDV_BLAS1E	32	1
DXML$FDV_BLAS2	250	2
DXML$FDV_BLAS3	1352	2
DXML$FDV_COMMON	16	2
DXML$FDV_LAPACK	2944	2
DXML$FDV_SIG_PROC	1800	2
DXML$FDV_SIG_PROC_V1	12	1
DXML$FDV_SIG_PROC_V2	0	0
DXML$FDV_SPARSE	182	2
TOTAL:	**6618**	**16**
G_floating data, scalar processing		
DXML$FGS_BLAS1	58	2
DXML$FGS_BLAS1E	76	1
DXML$FGS_BLAS2	1162	2
DXML$FGS_BLAS3	2886	2
DXML$FGS_COMMON	16	2
DXML$FGS_LAPACK	2920	2
DXML$FGS_SIG_PROC	2940	2
DXML$FGS_SIG_PROC_V1	14	1
DXML$FGS_SIG_PROC_V2	0	0
DXML$FGS_SPARSE	296	2
TOTAL:	**10364**	**16**

(continued on next page)

Table 3–1 (Cont.) Required Global Pages and Global Sections for DXML Components

	GBLPAGES	GBLSECTIONS
G_floating data, vector processing		
DXML$FGV_BLAS1	58	2
DXML$FGV_BLAS1E	78	1
DXML$FGV_BLAS2	1164	2
DXML$FGV_BLAS3	2900	2
DXML$FGV_COMMON	16	2
DXML$FGV_LAPACK	2944	2
DXML$FGV_SIG_PROC	2942	2
DXML$FGV_SIG_PROC_V1	14	1
DXML$FGV_SIG_PROC_V2	0	0
DXML$FGV_SPARSE	296	2
TOTAL:	**10412**	**16**

3.4 Running DXML on a VAXcluster

If you want to run DXML on multiple nodes of a VAXcluster, first check to see that you have the appropriate software license. Then repeat the following procedure **on each node** in the cluster licensed to run DXML:

1. Log in to the SYSTEM account or an account that has the SYSPRV privilege.
2. Make sure that the SYSGEN parameters listed in Table 1–2 are properly set.
3. Load the license, as described in Section 1.5. If previous versions of the PAK are still loaded on the system, remove the current license and then load the new license.
4. Start DXML by invoking DXML$STARTUP.COM, as descibed in Section 3.3.
5. Edit the system startup file to include DXML$STARTUP.COM, as described in Section 3.3.
6. Create the SYSTEST account:

   ```
   $ CREATE/DIRECTORY SYS$SPECIFIC:[SYSTEST.DXML]
   ```

7. Execute the IVP:

   ```
   $ @SYS$TEST:DXML$IVP.COM
   ```

3.5 Running the IVP

You usually run the IVP (Installation Verification Procedure) during installation. To run the IVP after installation to ensure the integrity of installed files if system problems occur, execute the following command procedure:

```
$  @SYS$TEST:DXML$IVP.COM
```

The IVP takes a few minutes to run because it must link test programs with the library. When the IVP runs successfully, you see the following display:

```
The installation verification of DXML Version 2.0 has completed successfully
```

When you install DXML, test programs are transferred to your system. For the Development Kit, the IVP checks the DXML installation by linking these test programs with the DXML library. For the Run-time Kit, the IVP does not link the test programs; the IVP merely attempts to execute the programs.

Do not attempt to create executable images from these programs.

3.6 Reviewing Release Notes

At any time after the installation, you can enter the following command to review the release notes:

```
$ TYPE [SYS$HELP]DXML020_VV.RELEASE_NOTES/PAGE
```

3.7 Reporting Problems

If you encounter a problem while using Digital Extended Math Library, 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 Digital Extended Math Library documentation. There are Reader's Comments forms at the back of each manual. Use the form from the manual in which you found the error. Include the section and page number.

A
Sample Installation

This appendix contains a log of a complete installation of the DXML Development Kit. Your own installation might differ from this example because you can make different choices during the procedure.

```
$ @sys$update:vmsinstal dxmldvvv020 disk$dxml:[dxml.kits]

 VAX/VMS Software Product Installation Procedure V5.5


It is 19-JUN-1992 at 14:37.

Enter a question mark (?) at any time for help.
%VMSINSTAL-W-ACTIVE, The following processes are still active:
 BATCH_479
 BATCH_480
* Do you want to continue anyway [NO]? y
* Are you satisfied with the backup of your system disk [YES]?

The following products will be processed:

  DXMLDVVV V2.0

 Beginning installation of DXMLDVVV V2.0 at 14:37

%VMSINSTAL-I-RESTORE, Restoring product save set A ...
%VMSINSTAL-I-RELMOVED, Product's release notes have been moved to SYS$HELP.
%DXMLDVVV-I-INTRO, Beginning the Installation / Verification Procedure for
-DXMLDVVV-I-INTRO, Product Name:   Digital Extended Math Library V2.0
-DXMLDVVV-I-INTRO, Product Option: Development Library for OpenVMS VAX
* Do you want to run the DXML installation verification procedure (IVP) [Y]? y
* Do you want to purge files replaced by this installation [YES]? y
* Do you want the vector library installed? [Y]? y
%DXMLDVVV-I-NOQUEST, No more questions will be asked.  Approximately 30
-DXMLDVVV-I-NOQUEST, minutes remain to complete this procedure
%VMSINSTAL-I-SYSDIR, This product creates system directory [SYSTEST.DXML].
%CREATE-I-EXISTS, VMI$COMMON:[SYSTEST.DXML] already exists
%CREATE-I-EXISTS, VMI$SPECIFIC:[SYSTEST.DXML] already exists

    If you intend to execute this layered product on other nodes in your
    VAXcluster, and you have the appropriate software license, you must
    prepare the system-specific roots on the other nodes by issuing the
    following command on each node (using a suitably privileged account):

 $ CREATE /DIRECTORY SYS$SPECIFIC:[SYSTEST.DXML]
%DXMLDVVV-I-EOINST, The primary installation phase has completed.
-DXMLDVVV-I-EOINST, Be sure to read the release notes.
%VMSINSTAL-I-MOVEFILES, Files will now be moved to their target directories...

DXML-I-IVP> Beginning Installation Verification Procedures for
      Product Name:   Digital Extended Math Library V2.0
      Product Option: Development Library for OpenVMS VAX

DXML-Inf>   The vector libraries are installed on the system.
-DXML-Inf>  If the system is not provided with vector support
-DXML-Inf>  or vector emulation the installation verification
-DXML-Inf>  will fail
```

```
DXML-Inf>  Beginning link test verifications of the DXML Developement Library
  The link test verification of SPARSE has completed successfully
  The link test verification of BLAS has completed successfully
  The link test verification of LAPACK has completed successfully
  The link test verification of Signal Processing has completed successfully

  The link test verifications of DXML have completed successfully

DXML-Inf>  Beginning regression test verifications of the DXML Developement Library

ivp_test> Regression tests of BLAS scalar completed successfully
ivp_test> Regression tests of Sparse BLAS scalar completed successfully
ivp_test> Regression tests of Signal Processing scalar completed successfully
ivp_test> Regression tests of Lapack scalar completed successfully
ivp_test> Regression tests of Sparse Iterative Solver scalar completed successfully
ivp_test> Regression tests of BLAS vector completed successfully
ivp_test> Regression tests of Sparse BLAS vector completed successfully
ivp_test> Regression tests of Signal Processing vector completed successfully
ivp_test> Regression tests of Lapack vector completed successfully
ivp_test> Regression tests of Sparse Iterative Solver vector completed successfully

DXML-Inf> The regression test verifications of DXML have completed successfully


DXML-I-IVP> Completed DXML V2.0 Installation Verification Procedure
DXML-Inf> Finished the Installation / Verification Procedure for
    Product Name:   Digital Extended Math Library V2.0
    Product Option: Development Library for OpenVMS VAX

    Be sure to read the release notes.
 Installation of DXMLDVVV V2.0 completed at 15:03

 VMSINSTAL procedure done at 15:03


$ logout
```

B
Installed Files

Tables B–1, B–2, and B–3 list the files on your system after you install DXML.

Table B–1 Files Installed by Development and Run-Time Kits

SYS$STARTUP:	
DXML$STARTUP.COM	Startup command procedure
SYS$HELP:	
DXML020_VV.RELEASE_NOTES	Online release notes
DXML$HELP.HLB	Help library
SYS$TEST:	
DXML$IVP.COM	IVP command procedure
SYS$LIBRARY:	
DXMLDEF.FOR	Definition file
DXML$SET_LIB.COM	Library selection procedure
DXML$EMACS.ML	Editor support
DXML$EVE.TPU	
DXML$IMAGELIB_DS.OLB	Scalar library
DXML$IMAGELIB_DS_V1.OLB	
DXML$IMAGELIB_GS.OLB	
DXML$IMAGELIB_GS_V1.OLB	
DXML$FDS_BLAS1.EXE	
DXML$FDS_BLAS1E.EXE	
DXML$FDS_BLAS2.EXE	
DXML$FDS_BLAS3.EXE	
DXML$FDS_COMMON.EXE	
DXML$FDS_LAPACK.EXE	
DXML$FDS_SIG_PROC.EXE	
DXML$FDS_SIG_PROC_V1.EXE	
DXML$FDS_SIG_PROC_V2.EXE	
DXML$FDS_SPARSE.EXE	
DXML$FGS_BLAS1.EXE	

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Table B–1 (Cont.) Files Installed by Development and Run-Time Kits

SYS$LIBRARY:	
DXML$FGS_BLAS1E.EXE	
DXML$FGS_BLAS2.EXE	
DXML$FGS_BLAS3.EXE	
DXML$FGS_COMMON.EXE	
DXML$FGS_LAPACK.EXE	
DXML$FGS_SIG_PROC.EXE	
DXML$FGS_SIG_PROC_V1.EXE	
DXML$FGS_SIG_PROC_V2.EXE	
DXML$FGS_SPARSE.EXE	
DXML$IMAGELIB_DV.OLB	Vector library
DXML$IMAGELIB_DV_V1.OLB	
DXML$IMAGELIB_GV.OLB	
DXML$IMAGELIB_GV_V1.OLB	
DXML$FDV_BLAS1.EXE	
DXML$FDV_BLAS1E.EXE	
DXML$FDV_BLAS2.EXE	
DXML$FDV_BLAS3.EXE	
DXML$FDV_COMMON.EXE	
DXML$FDV_LAPACK.EXE	
DXML$FDV_SIG_PROC.EXE	
DXML$FDV_SIG_PROC_V1.EXE	
DXML$FDV_SIG_PROC_V2.EXE	
DXML$FDV_SPARSE.EXE	
DXML$FGV_BLAS1.EXE	
DXML$FGV_BLAS1E.EXE	
DXML$FGV_BLAS2.EXE	
DXML$FGV_BLAS3.EXE	
DXML$FGV_COMMON.EXE	
DXML$FGV_LAPACK.EXE	
DXML$FGV_SIG_PROC.EXE	
DXML$FGV_SIG_PROC_V1.EXE	
DXML$FGV_SIG_PROC_V2.EXE	
DXML$FGV_SPARSE.EXE	
SYS$COMMON:[SYSTEST.DXML]	
SBLAT1.IN	IVP routines
CBLAT1X.IN	

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Table B–1 (Cont.) Files Installed by Development and Run-Time Kits

SYS$COMMON:[SYSTEST.DXML]
DBLAT1X.IN
SBLAT2.IN
ZBLAT2.IN
CBLAT3.IN
DBLAT3.IN
SBLAT3E.IN
ZBLAT3E.IN
CBLASI.IN
DBLASI.IN
2DFFT_OLD_TEST.IN
FFT_TEST.IN
GFFT_TEST.IN
3DFFT_TEST.IN
CONV_EXT_TEST.IN
CORRP_EXT_TEST.IN
SLIN_TEST.IN
ZLIN_TEST.IN
CEIG_TEST.IN
DEIG_TEST.IN
INPUT_TEST_ITSOL.DATA
SUMM.PROT
ZBLAT1.IN

Table B–2 Files Installed by Development Kit Only

SYS$COMMON:[SYSTEST.DXML]	
IVP_TEST_DV.COM	Scalar and Vector IVP
BLAS_BUILD_TEST.OBJ	IVP routines
SIG_PROC_BUILD_TEST.OBJ	
LAPACK_BUILD_TEST.OBJ	
SPARSE_BUILD_TEST.OBJ	
2DFFT_OLD_TEST.GOBJ	
FFT_TEST.DOBJ	
GFFT_TEST.DOBJ	
3DFFT_TEST.GOBJ	
BLAS_AUXD.OLB	
BLAS_AUXG.OLB	
SIG_TEST_AUXD.OLB	

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Table B–2 (Cont.) Files Installed by Development Kit Only

SYS$COMMON:[SYSTEST.DXML]
SIG_TEST_AUXG.OLB
LAPAUXD.OLB
LAPAUXG.OLB
TEST_ITSOL_AUXD.OLB
SBLAT1.DOBJ
ZBLAT1.GOBJ
CBLAT1X.DOBJ
DBLAT1X.GOBJ
SBLAT2.DOBJ
ZBLAT2.GOBJ
CBLAT3.DOBJ
DBLAT3.GOBJ
SBLAT3E.DOBJ
ZBLAT3E.GOBJ
CBLASI.DOBJ
DBLASI.GOBJ
CONV_EXT_TEST.DOBJ
CORRP_EXT_TEST.GOBJ
SLIN_TEST.DOBJ
ZLIN_TEST.GOBJ
CEIG_TEST.DOBJ
DEIG_TEST.GOBJ
TEST_ITSOL.DOBJ

Table B–3 Files Installed by Run-Time Kit Only

SYS$COMMON:[SYSTEST.DXML]	
IVP_TEST_RT.COM	IVP
SBLAT1.SDEXE	IVP scalar routines
ZBLAT1.SDEXE	
CBLAT1X.SDEXE	
DBLAT1X.SGEXE	
SBLAT2.SDEXE	
ZBLAT2.SGEXE	
CBLAT3.SDEXE	
DBLAT3.SGEXE	
SBLAT3E.SDEXE	

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Table B–3 (Cont.) Files Installed by Run-Time Kit Only

SYS$COMMON:[SYSTEST.DXML]	
ZBLAT3E.SGEXE	
CBLASI.SDEXE	
DBLASI.SGEXE	
2DFFT_OLD_TEST.SGEXE	
FFT_TEST.SDEXE	
GFFT_TEST.SDEXE	
3DFFT_TEST.SGEXE	
CONV_EXT_TEST.SDEXE	
CORRP_EXT_TEST.SGEXE	
SLIN_TEST.SDEXE	
ZLIN_TEST.SGEXE	
CEIG_TEST.SDEXE	
DEIG_TEST.SGEXE	
TEST_ITSOL.SDEXE	
SBLAT1.VDEXE	IVP vector routines
ZBLAT1.VGEXE	
CBLAT1X.VDEXE	
DBLAT1X.VGEXE	
SBLAT2.VDEXE	
ZBLAT2.VGEXE	
CBLAT3.VDEXE	
DBLAT3.VGEXE	
SBLAT3E.VDEXE	
ZBLAT3E.VGEXE	
CBLASI.VDEXE	
DBLASI.VGEXE	
2DFFT_OLD_TEST.VGEXE	
FFT_TEST.VDEXE	
GFFT_TEST.VDEXE	
3DFFT_TEST.VGEXE	
CONV_EXT_TEST.VDEXE	
CORRP_EXT_TEST.VGEXE	
SLIN_TEST.VDEXE	
ZLIN_TEST.VGEXE	
CEIG_TEST.VDEXE	
DEIG_TEST.VGEXE	
TEST_ITSOL.VDEXE	