VMS

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VMS Install Utility Manual

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VMS Install Utility Manual

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This document describes the Install Utility for the VMS operating system.

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Preface

Intended Audience

This manual is intended for VMS system managers, operators, and system programmers.

Document Structure

This document consists of the following three sections:

- Description—Provides a full description of the Install Utility (INSTALL).
- Usage Summary—Outlines the following INSTALL information:

  -Invoking the utility
  -Exiting from the utility
  -Restrictions or privileges required

- Commands—Describes INSTALL commands, including format, parameters, and examples.

Associated Documents

For additional information on topics covered in this document, see the following manuals:

- *VMS DCL Dictionary*
- *Guide to Setting Up a VMS System*
- *VMS System Messages and Recovery Procedures Reference Manual*
- *VMS Linker Utility Manual*
- *VMS System Generation Utility Manual*
- *VMS System Services Reference Manual*

Conventions

Convention	Meaning
RET	In examples, a key name (usually abbreviated) shown within a box indicates that you press a key on the keyboard; in text, a key name is not enclosed in a box. In this example, the key is the RETURN key. (Note that the RETURN key is not usually shown in syntax statements or in all examples; however, assume that you must press the RETURN key after entering a command or responding to a prompt.)
CTRL/C	A key combination, shown in uppercase with a slash separating two key names, indicates that you hold down the first key while you press the second key. For example, the key combination CTRL/C indicates that you hold down the key labeled CTRL while you press the key labeled C. In examples, a key combination is enclosed in a box.
$ SHOW TIME 05-JUN-1988 11:55:22	In examples, system output (what the system displays) is shown in black. User input (what you enter) is shown in red.
$ TYPE MYFILE.DAT . . .	In examples, a vertical series of periods, or ellipsis, means either that not all the data that the system would display in response to a command is shown or that not all the data a user would enter is shown.
input-file, . . .	In examples, a horizontal ellipsis indicates that additional parameters, values, or other information can be entered, that preceding items can be repeated one or more times, or that optional arguments in a statement have been omitted.
[logical-name]	Brackets indicate that the enclosed item is optional. (Brackets are not, however, optional in the syntax of a directory name in a file specification or in the syntax of a substring specification in an assignment statement.)
quotation marks apostrophes	The term quotation marks is used to refer to double quotation marks ("). The term apostrophe (') is used to refer to a single quotation mark.

New and Changed Features

The Install Utility (INSTALL) has a new DCL command line interface. To invoke the utility, enter the command INSTALL at the DCL prompt.

Note that Version 4.0 command procedures defining INSTALL as a foreign command (INSTALL :== SYSSYSTEM:INSTALL/COMMAND_MODE) will execute successfully with the DCL command interface.

If you wish to continue using the Version 3.0 INSTALL command syntax, which is incompatible with commands described in this manual, enter the command:

```
$ RUN SYS$SYSTEM:INSTALL
```

Alternatively, you can enter the command:

```
$ MCR INSTALL
```

Please be aware, however, that DIGITAL does not guarantee that Version 3.0 INSTALL command syntax will receive future development. DIGITAL recommends that you convert to the command syntax presented in this manual.

INSTALL Description

The Install Utility (INSTALL) improves the performance of executable and shareable images, especially those that run frequently, usually run concurrently with several processes, or require special privileges.

The system defines installed images on internal data structures called *known file lists*. Each entry in the known file list identifies the file name of the installed file and the attributes with which it was installed. A separate known file list exists for all installed images whose device, directory, and file type are identical. For example, all installed images with the file name DISK$VOLUME:[MAIN]filename.EXE would be on one known file list, and all installed images with the file name DISK$VOLUME:[TEST]filename.EXE would be on another known file list.

Known file lists last only while the system is operating. If the system is shut down or fails for any reason, you must reinstall all known images after the system is rebooted. For this reason, the site-independent startup command procedure, SYS$SYSTEM:STARTUP.COM, includes a series of INSTALL commands that install certain system programs as known images. You are encouraged to include in the site-specific command procedure, SYS$MANAGER:SYSTARTUP.COM, additional INSTALL commands that install selected images.

1 Reasons to Install Images

The Install Utility allows you to do the following:

- Make programs that require enhanced privileges available for general use.
- Conserve memory by creating shared images.
- Improve system performance.

A nonprivileged process can perform the privileged functions of an executable image when it is installed as a privileged image. A user-written system service also assumes the privileges it requires when you install it as a privileged, shareable image.

Shared images conserve memory because only one copy of code needs to be in memory at any time, and many users can access the code concurrently. The Install Utility is the only way to create shared images. Use the /SHARED qualifier to install shared images.

System performance improves when programs are installed because the VMS operating system opens any installed file by file ID rather than by file name, thus eliminating costly directory operations. Installing images as header-resident further enhances performance because the system avoids the overhead of a directory operation to read the image header into memory. Frequently accessed images, critical to a site's operations, can be installed as open images. This makes the image resident in memory and entirely avoids the overhead of opening a file.

Because an installed file requires system resources, such as nonpaged dynamic memory, install those files that most improve system performance and site-requirements. The Install Utility's LIST command provides information about installed images that helps you evaluate the merits of installing images. For example, the LIST command calculates the number of times each image is accessed, and shows the number of concurrent accesses, so you can determine if the installation of the images is justified given the expense of installation.

2 Assigning Attributes to Known Images

By specifying appropriate qualifiers to INSTALL commands, you can assign known images the following attributes:

- **Permanently open**—Directory information on the image file remains permanently resident, eliminating the usual directory search required to locate a file. The cost of keeping an image file permanently open is approximately one page of paged dynamic memory per file.
- **Header resident**—The header of the image file (native images only) remains permanently resident, saving one disk I/O operation per file access. For images with single-block file headers, the cost is less than one page of paged dynamic memory per file; for images with multiblock headers, the cost varies according to the header block count. The images must also be declared permanently open.
- **Privileged**—Amplified privileges are temporarily assigned to any process running the image (executable images only), permitting the process to exceed its user authorization file (UAF) privilege restrictions during execution of the image. In this way, users with normal privileges can run programs that require higher-than-normal privileges.
- **Protected**—A shareable image contains protected code, that is, code that runs in Kernel or Executive mode but that can be called by a user-level image. Protected images must be declared shared.
- **Shared**—More than one user can access the read-only and non-copy-on-reference read/write sections of the image concurrently, so that only one copy of those sections ever need be in physical memory. (Copy-on-reference sections always require a separate copy for each process.) The image is implicitly declared permanently open.
- **Writable**—When a shared non-copy-on-reference writable section is removed from physical memory (for paging reasons or because no processes are referencing it), it is written back to the image file. Any updates made by processes mapped to the section, therefore, are preserved (while the initial values are lost). The image must also be declared shared.

3 Installing Images with the Shared Attribute

Before installing an image with the shared attribute (using the /SHARE qualifier), you must understand the distinction between executable and shareable images:

- An **executable image** is one linked with the /EXECUTABLE qualifier (or without the /SHAREABLE qualifier) of the VMS Linker. For information on the VMS Linker, refer to the *VMS Linker Utility Manual.*
- A **shareable image** is one linked with the /SHAREABLE qualifier of the VMS Linker; it must subsequently be linked into an executable image to be used. (Shareable images are sometimes referred to as linkable images, because they can be specified—implicitly or explicitly—as input files to the link of another file.) A shareable image is not copied into the executable images that link with it. Thus, only one copy of the shareable image need be on disk, no matter how many executable images have linked with it.

When you install an image with the shared attribute, permanent system global sections are created. Execution of non-copy-on-reference global sections requires only one copy per section to be in physical memory, no matter how many processes are running the image to which the sections belong.

The number of images you can install with the /SHARED qualifier is restricted by the GBLPAGES and GBLSECTIONS system parameters. See the description of the System Generation Utility in the *VMS System Generation Utility Manual.*

When an image is not installed, or is installed without the shared attribute, each process running the image requires private sections in memory. (A shareable image linked to an executable image need not be installed to be executed. At image execution time, the system creates private sections from the shareable image. The only exception is that a shareable image containing a writable non-copy-on-reference section must be installed as a known image with the shared and writable attributes.)

4 Installing Images with Privileges

The VMS operating system allows images to execute in an enhanced privilege environment through the following mechanisms:

- You can install existing executable images with extra privileges to allow a nonprivileged process to perform the privileged functions of the image.
- You can install privileged shareable images. Privileged shareable images are used to implement user-written system services, thereby allowing nonprivileged images to execute select portions of privileged code without enhancing the privileges of each image that uses the privileged portion of code.

4.1 Privileged Executable Images

Install executable images with enhanced privileges by using the /PRIVILEGED qualifier. Only images linked with the VMS Linker qualifiers /NODEBUG and /NOTRACE should be installed with enhanced privilege. Installing other images with enhanced privilege can compromise system security.

4.2 Privileged Shareable Images

The VMS operating system supports user-written system services through a mechanism called privileged shareable images. See the *VMS System Services Reference Manual* for a description of how to create privileged shareable images. You must link a privileged shareable image with the /PROTECT command qualifier or the /OPTIONS positional qualifier of the VMS Linker, so that the image acquires its particular form of enhanced privileges.

- Use the /PROTECT command qualifier when all parts of an image require protection.
- Use the /OPTIONS positional qualifier when only part of a privileged shareable image requires protection.

Then install the privileged shareable image with the Install Utility, specifying both the /PROTECTED and /SHAREABLE qualifiers. If you do not follow all these steps, you will prevent successful activation of a privileged shareable image.

5 Installing Execute-Only Images

The image activator allows execution of images to which the caller has EXECUTE but not READ access. The support differs slightly for main programs and shareable images.

The /EXECUTE_ONLY qualifier has meaning only for main programs. A main program installed with this qualifier is capable of activating shareable images to which the process has EXECUTE but not READ access. The image activator ignores this qualifier when it is used on images other than main programs.

5.1 Execute-Only Main Programs

When a process runs a main program to which it has EXECUTE but not READ access, the image activator enters a restricted mode of operation similar to that entered when a privileged program is run. That is, all shareable images activated during the life of the execute-only program must be installed. In addition, the image activator directs VMS Record Management Services (RMS) to use only "trusted" logical names when opening image files. Logical names associated with EXEC or KERNEL mode are trusted. User-mode and supervisor-mode names are not.

5.2 Execute-Only Shareable Images

Execute-only shareable images can be executed only in the restricted environment established when a main program that references them is run. The main program must be installed with the /EXECUTE_ONLY qualifier, and all shareable images the program references must be installed.

When an installed execute-only shareable image is run, the image activator enters the same restricted mode of operation that it enters when it detects an execute-only main program. That is, only "trusted" logical names are used by VMS RMS.

6 File Specifications for Installed Images

When using the INSTALL commands, file specifications must name existing executable or shareable images. VMS RMS resolves each file specification using the following defaults:

- A device and directory type of SYS$SYSTEM
- A file type of EXE

Unless a file shares these defaults, specify a device and directory name as well as a file type with each file name. Do not include a version number in the file specification. The highest existing version is always used. Specification of a version number produces unpredictable results because file lookups for known images ignore version numbers.

All images installed with the /SHARE qualifier must be in directory SYS$SHARE, unless you define a logical name for the image. (SYS$SHARE is equivalent to SYS$LIBRARY.)

6.1 Defining Logical Names for Shareable Image Files

After installing a shareable image, define a logical name for it if it is not located in directory SYS$SHARE. For example, if the file specification for STATSHR is SYS$SHARE:STATSHR.EXE, no DEFINE command is necessary. But if you put STATSHR in SYS$DEVICE:[TEST], you must define STATSHR as a logical name before running an executable image that calls it. The logical name must be the same one that was used as the input file specification for the shareable image when it was linked (this is the same name used in installation). For example:

```
$ DEFINE STATSHR SYS$SYSDEVICE:[TEST]STATSHR
```

With logical names, one shareable image can be substituted for another without requiring the calling executable image to relink. You redefine the logical name of the shareable image. For example, the following statement redefines the file name STATSHR. It becomes the logical name of the shareable image SYS$SYSDEVICE:[MAIN]STATSHR.EXE for executable images calling STATSHR.

```
$ DEFINE STATSHR SYS$SYSDEVICE:[MAIN]STATSHR
```

(Logical name redirection in the process or group logical name table is ignored when you run a privileged executable image. Only logical names that can be redirected by privileged users are allowed.)

If the new image is installed with the /SHARED qualifier, executable images linked against the old image are mapped to global sections for the new image. Otherwise, they are mapped to private sections for the new image.

The old and new images can have the same name, but they must reside in different directories. You should not substitute one version of a file for another in the same directory. (Use the REPLACE command to update file versions.)

6.2 Effect of Installing Images on the DCL Command RUN

The DCL command RUN parses search lists in a manner that favors installed images. On its first pass through the search list the RUN command looks up images on known file lists and executes each installed image that it finds. On its second pass through the search list, the RUN command looks up images on disk and executes those images. In essence, then, installing an image alters the ordering of a search list.

7 Installing Shared Images in MA780 Multiport Memory

To install a shared image so that the global sections reside in a MA780 multiport memory unit, you enter the DCL command DEFINE to create a logical name of the following form:

GBL$filename shrmem-name:filename

The following example ensures that any global sections created for an image whose file name is STATSHR reside in the MA780 multiport memory unit whose logical name is SHRMEM1:

```
$ DEFINE GBL$STATSHR SHRMEM1:STATSHR
$ INSTALL
INSTALL> ADD /OPEN/SHARED STATSHR
```

To create global sections in memory shared by multiple processors requires the SHMEM privilege.

8 Deleting Known Images and Dismounting Volumes

System operations are affected by the following characteristics of known images:

- Deletion—A known image is not deleted as soon as the INSTALL DELETE command is entered. The deletion occurs only after all processes using the image have released it.
- Dismounting—A volume cannot be dismounted while any known file lists associated with it contain entries.

To dismount a volume, you must not only delete all known images associated with it. You must wait for all processes using those images to release them and for the system to write writable images back to their files. You can use the DCL command SHOW DEVICES/FILES to determine the status of the files.

9 Summary of INSTALL Commands

Table INS–1 summarizes INSTALL command functions.

Table INS–1 INSTALL Command Summary

Command	Function
ADD	Installs the specified image as a known file entry
CREATE	Installs the specified image as a known file entry (identical to ADD command)
DELETE	Deletes a known file entry
EXIT	Exits from INSTALL
HELP	Describes (interactively) how to use INSTALL
LIST	Displays a description of each specified known file entry, global sections, and the addresses of known file entry data structures
PURGE	Deletes all known file entries installed without the /NOPURGE qualifier
REMOVE	Deletes a known file entry (identical to DELETE command)
REPLACE	Associates a known file entry with the latest version of the image file or modifies the attributes of an installed image

INSTALL Usage Summary

Use the Install Utility (INSTALL) to enhance the performance of selected executable and shareable images, to assign enhanced privileges to images, and to support user-written system services. The system stores the name and attributes of installed images on known file lists.

FORMAT

INSTALL *[command]*

PARAMETER

command

Specifies an INSTALL command. This parameter is optional. If no command is specified, the utility displays its prompt and waits for command input.

usage summary

To invoke INSTALL, enter the DCL command INSTALL at the DCL prompt as follows:

```
$ INSTALL
```

The utility responds with the following prompt:

```
INSTALL>
```

You can then perform INSTALL operations by entering the appropriate INSTALL commands. Alternatively, you can enter a single INSTALL command on the same line as the command that invokes the utility, for example:

```
$ INSTALL LIST/FULL SYS$SYSTEM:LOGINOUT
```

To exit from the Install Utility, enter the EXIT command at the INSTALL> prompt or press CTRL/Z. Either method returns control to the DCL command level.

The Install Utility requires that you have the CMKRNL privilege to invoke it. It requires the SYSGBL privilege to create system global sections and the PRMGBL privilege to create permanent global sections.

INSTALL COMMANDS

This section describes the INSTALL commands and provides examples of their use.

ADD
CREATE
DELETE
EXIT
HELP
LIST
PURGE
REMOVE
REPLACE

ADD

Installs the specified image file as a known image.

FORMAT

ADD *file-spec*

PARAMETER

file-spec

Names the file specification of an image to be installed as a known image. The file specification must name an existing executable or shareable image. If you omit the device and directory specification, the default SYS$SYSTEM is used. The default file type is EXE. A version number must not be specified.

QUALIFIERS

/[NO]ACCOUNTING

Allows you to enable image-level accounting for selected images when image accounting is disabled on the system (with the DCL command SET ACC/DISABLE=IMAGE). When image accounting is enabled on the system, it logs all images. The /NOACCOUNTING qualifier has no effect.

/[NO]EXECUTE_ONLY

The /EXECUTE_ONLY qualifier is only meaningful to main programs. It allows the image to activate shareable images to which the user has EXECUTE access but has no READ access. All shareable images referenced by the program must be installed, and VMS RMS uses "trusted" logical names, those created for use in EXEC or KERNEL mode.

You may not specify this qualifier for an executable image linked with the /TRACEBACK qualifier.

/[NO]HEADER_RESIDENT

Installs the file as a known image with a permanently resident header (native mode images only). The image is made permanently open even if /OPEN is not specified.

/[NO]LOG

Lists the newly added known file entry along with any associated global sections created by the installation.

/[NO]OPEN

Installs the file as a permanently open known image.

/PRIVILEGED[=(priv-name[,...])]

Installs the file as a known image with the privileges specified (executable images only). Then, if the image is not located on the system volume, the image is made permanently open even if /OPEN is not specified.

You can specify one or more of the following privilege names:

ACNT	ALLSPOOL	ALTPRI
BUGCHK	BYPASS	CMEXEC
CMKRNL	DETACH	DIAGNOSE
EXQUOTA	GROUP	GRPNAM
GRPPRV	LOG_IO	MOUNT
NETMBX	OPER	PFNMAP
PHY_IO	PRMCEB	PRMGBL
PRMMBX	PSWAPM	READALL
SECURITY	SETPRV	SHARE
SHMEM	SYSGBL	SYSLCK
SYSNAM	SYSPRV	TMPMBX
VOLPRO	WORLD	

You may not specify this qualifier for an executable image linked with the /TRACEBACK qualifier.

/[NO]PROTECTED

Installs the file as a known image that is protected from user-mode and supervisor-mode write access. You can only write into the image from EXEC or KERNEL mode. The /PROTECTED qualifier together with the /SHARE qualifier are used to implement user-written services, which become privileged shareable images.

/[NO]PURGE

Specifies that the image can be removed by a PURGE operation; if you do not specify /PURGE, it can be removed only by a DELETE or REMOVE operation. /NOPURGE is the default form of the qualifier.

/[NO]SHARED

Installs the file as a shared known image and causes creation of global sections for the image. The image is made permanently open even if /OPEN is not specified.

/[NO]WRITABLE

Installs the file as a writable known image as long as you also specify the /SHARED qualifier. The /WRITABLE qualifier is automatically negated if the /NOSHARED qualifier is specified.

EXAMPLES

1 `INSTALL> ADD /OPEN/SHARED WRKD$:[MAIN]STATSHR`

The command in this example installs the image file STATSHR as a permanently open, shared known image.

2 `INSTALL> ADD /OPEN/PRIVILEGED=(GROUP,GRPNAM) GRPCOMM`

The command in this example installs the image file GRPCOMM as a permanently open known image with the privileges GROUP and GRPNAM.

Any process running GRPCOMM receives the GROUP and GRPNAM privileges for the duration of the execution of GRPCOMM. The full name of GRPCOMM is assumed to be SYS$SYSTEM:GRPCOMM.EXE.

3 `INSTALL> ADD /LOG GRPCOMM`

The command in this example installs the image file GRPCOMM as a known image and then displays the newly added known file entry.

CREATE

Installs the specified image file as a known image. The CREATE command is synonymous with the ADD command.

FORMAT

CREATE *file-spec*

PARAMETER

file-spec

Names the file specification of an image to be installed as a known image. The file specification must name an existing executable or shareable image. If you omit the device and directory specification, the default SYS$SYSTEM is used. The default file type is EXE. A version number must not be specified.

QUALIFIERS

/[NO]ACCOUNTING

Allows you to enable image-level accounting for selected images when image accounting is disabled on the system (with the DCL command SET ACC/DISABLE=IMAGE). When image accounting is enabled on the system, it logs all images. The /NOACCOUNTING qualifier has no effect.

/[NO]EXECUTE_ONLY

The /EXECUTE_ONLY qualifier is meaningful only to main programs. It allows the image to activate shareable images to which the user has EXECUTE access but has no READ access. All shareable images referenced by the program must be installed, and VMS RMS uses "trusted" logical names, those created for use in EXEC or KERNEL mode.

You may not specify this qualifier for an executable image linked with the /TRACEBACK qualifier.

/[NO]HEADER_RESIDENT

Installs the file as a known image with a permanently resident header (native mode images only). The image is made permanently open even if /OPEN is not specified.

/[NO]LOG

Lists the newly created known file entry along with any associated global sections created by the installation.

/[NO]OPEN

Installs the file as a permanently open known image.

/[NO]PRIVILEGED[=(priv-name[,...])]

Installs the file as a known image with the privileges specified (executable images only). Then, if the image is not located on the system volume, the image is made permanently open even if /OPEN is not specified. You may not specify this qualifier for an executable image linked with the /TRACEBACK qualifier.

/[NO]PROTECTED

Installs the file as a known image that is protected from user-mode and supervisor-mode write access. You can only write into the image from EXEC or KERNEL mode. The /PROTECTED qualifier together with the /SHARE qualifier are used to implement user-written services, which become privileged shareable images.

/[NO]PURGE

Specifies that the image can be removed by a PURGE operation; if you do not specify /PURGE, it can be removed only by a DELETE or REMOVE operation. (/NOPURGE is the default form of the qualifier.)

/[NO]SHARED

Installs the file as a shared known image and causes creation of global sections for the image. The image is made permanently open even if /OPEN is not specified.

/[NO]WRITABLE

Installs the file as a writable known image as long as you also specify the /SHARED qualifier. The /WRITABLE qualifier is automatically negated if the /NOSHARED qualifier is specified.

EXAMPLES

1
```
INSTALL> CREATE /OPEN/SHARED WRKD$:[MAIN]STATSHR
```

The command in this example installs the image file STATSHR as a permanently open shared known image.

2
```
INSTALL> CREATE /OPEN/PRIVILEGED=(GROUP,GRPNAM) GRPCOMM
```

The command in this example installs the image file GRPCOMM as a permanently open known image with the privileges GROUP and GRPNAM.

Any process running GRPCOMM receives the GROUP and GRPNAM privileges for the duration of the execution of GRPCOMM. The full name of GRPCOMM is assumed to be SYS$SYSTEM:GRPCOMM.EXE.

3
```
INSTALL> CREATE /LOG GRPCOMM
```

The command in this example installs the image file GRPCOMM as a known image and then displays the newly created known file entry.

DELETE

Deletes a known image.

FORMAT

DELETE *file-spec*

PARAMETER

file-spec
Names the file specification of an image installed as a known image.

QUALIFIERS

None.

DESCRIPTION

The DELETE command deletes an entry from the known image file list. The image's entry on the known file list and any global sections created for the image are deleted. The image itself (that is, the image file) remains unaffected. Writable global sections are written back to disk upon their removal as known images.

If a process is accessing global sections when the DELETE command is entered, the global sections are deleted only after the operation initiated by the process completes. However, once the command is entered, no additional processes can access the global sections because they are "marked for deletion."

The DELETE command is identical to the REMOVE command.

EXAMPLE

```
INSTALL> DELETE WRKD$:[MAIN]STATSHR
```

The command in this example deletes the entry for the image STATSHR from the known file list.

EXIT

Terminates INSTALL and returns control to the DCL command level. You can also exit from INSTALL by pressing CTRL/Z.

FORMAT

EXIT

PARAMETERS

None.

QUALIFIERS

None.

HELP

Interactively displays information about how to use INSTALL.

FORMAT

HELP *[command]*

PARAMETER

command

Specifies the name of a command for which help infomation is to be displayed. If you omit a command name, a list of commands is displayed, and you are prompted for a command name.

EXAMPLES

1

```
INSTALL> HELP
```

The command in this example displays a list of INSTALL topics and a Topic? prompt. Any topic from the list can be entered at the prompt.

2

```
INSTALL> HELP LIST
LIST

  For display of a one-line description of the specified known image, or if
  no file is specified, then for all known images.  Use with /FULL to obtain
  a multiline description.

  Format:         LIST [file-spec] /qualifier

          QUALIFIER COMBINATION   BEHAVIOR

          LIST [file-spec]        List the known file entry for file-spec
          LIST                    List all entries

  Additional information available:

  Qualifiers
  /FULL       /GLOBAL     /STRUCTURE     /SUMMARY
```

The command in this example displays information on the LIST command.

LIST

Displays a description of each specified known image or (if no file is specified) all known images.

FORMAT

LIST *[file-spec]*

PARAMETER

file-spec

Names the file specification of an image installed as a known image. If you omit the file specification, INSTALL displays all known file entries.

QUALIFIERS

/FULL

Displays a multiline description of the specified known image, including the number of accesses, the number of concurrent accesses, and the number of global sections created. The /FULL qualifier with the /GLOBAL qualifier shows information on global sections, plus owner and protection codes and access control entries, if set.

/GLOBAL

Lists global sections for any specified shared image, or if you omit the file specification, lists all global sections.

/STRUCTURE

Lists addresses of known file entry data structures.

/SUMMARY

Used with the /GLOBAL qualifier; displays a summary of global section and global page usage on the system, for local and shared memory global sections.

DESCRIPTION

You can use the LIST command with the /FULL qualifier to display information that is useful in "tuning" the known file database. For example, a high entry access count for an image may indicate that system performance could benefit if the image were installed /OPEN. Similarly, high entry access counts for an image may indicate that installing the image /SHARED—that is, with global sections—could improve performance. For a description of global sections and global pages, including information on how to estimate the size of installed images, see the *VMS System Services Reference Manual.*

EXAMPLES

1 INSTALL> LIST

The command in this example displays a single-line description of all known images. The description includes the file specification of the known image and its attributes.

```
DISK$VAXVMSRL4:<SYS0.SYSEXE>.EXE
    BLISS32;2❶       Open❷    Shar
    CDU;4            Open              Priv
    COPY;4           Open      Shar
    DCL;2            Open      Shar          Lnkbl
    MOUNTSHR;6       Open      Shar      Prot
    SYSMGTMSG;1
    .
    .
    .
```

❶ File specification of the known image.

❷ Attribute of known image, as follows:

Attribute	Meaning
ACNT	Image accounting is enabled for the image (/ACCOUNTING)
CMODE	Image is compatibility mode, set by the VAX-11 RSX Linker
HDR	Image header is permanently resident (/HEADER_RESIDENT)
LNKBL	Image is not executable; it is a shareable (linkable) image, set by the VMS Linker
NOPURG	Image cannot be removed by a PURGE operation; it can only be removed by a DELETE or REMOVE operation (/NOPURGE)
OPEN	Image is permanently open (/OPEN)
PROT	Image contains protected code (/PROTECTED)
PRV	Image has privileges (/PRIVILEGE=)
SHAR	Image is shared (/SHARED)
SHM	Image has global sections installed in shared memory (/SHARED)
WRT	Image is writable (/WRITABLE)
XONLY	Only execute access to image is allowed (/EXECUTE_ONLY)

2 INSTALL> LIST/FULL LOGINOUT

The command in this example displays a multiline description of the known image LOGINOUT.

```
DISK$VAXVMSRL5:<SYS0.SYSEXE>.EXE

    LOGINOUT;3       Open Hdr    Shar Priv
        Entry access count         = 44 ❶
        Current / Maximum shared   = 3 / 5 ❷
        Global section count       = 2 ❸
        Privileges = CMKRNL SYSNAM TMPMBX EXQUOTA SYSPRV ❹
```

❶ Number of times known file entry has been accessed by this node since it became known.

❷ The first number indicates the current count of concurrent accesses of the known file. The second number indicates the highest count of concurrent accesses of the file since it was installed. This number appears only if the image is installed with the /OPEN qualifier.

❸ Number of global sections created for the known file; appears only if the image is installed with the /SHARED qualifier.

❹ Translation of the privilege mask; appears only if the image is installed with privileges.

3 `INSTALL>LIST /GLOBAL`

The command in this example displays all global sections for shared images.

```
                    System Global Sections ❶

LBRSHR_004 ❷ (01000001) ❸ WRT ❹ PRM ❺ SYS ❻ Pagcnt/Refcnt=1/0❼
CRFSHR_003    (010003E8)  WRT  PRM  SYS  Pagcnt/Refcnt=1/1
    .
    .
    .
27 Global Sections Used, 828/3268 Global Pages Used/Unused ❽
```

❶ Display of global sections in local memory.

❷ Name of global section.

❸ Version number (in hexadecimal) of global section; for shareable images only, the high-order byte (01 in CRFSHR_003) contains major identification, and low-order bytes (0003E8 in CRFSHR_003) contain minor identification determined by the programmer at link time. For executable images, the number is a known unique value determined by the system.

❹ The global section is writable.

❺ The global section is permanent; TMP indicates a temporary global section, which would be created by a program other than the Install Utility.

❻ The global section is systemwide; GRP and a group number indicate a groupwide section, which would be created by a program other than Install.

❼ Number of pages in the section and number of page table entries currently mapped to this global section. See the *VMS System Services Reference Manual* for a detailed discussion.

❽ Number of global sections created, number of global pages used, and number of global pages unused in local memory. Note that, because of arithmetic rounding, the number of global sections created will sometimes be greater than the SYSGEN parameter GBLSECTIONS. When the size of the system header is being computed, the values of the GBLSECTIONS and SYSMWCNT parameters are combined with the size of the fixed part of the process header. The result is rounded up to the next page boundary. This rounding process sometimes adds space to the global section table, depending on the values of the two SYSGEN parameters

and the amount of system paging that preceded the running of INSTALL to create all of the global sections.

4 `INSTALL> LIST/GLOBAL/FULL`

The command in this example displays a complete listing of global sections for shared images. The /FULL qualifier adds owner and protection codes to the display.

```
  System Global Sections
NM_MAILSHR_003 (741A6919)              PRM SYS        Pagcnt/Refcnt=10/0
NM_MAILSHR_002 (741A6919)              PRM SYS        Pagcnt/Refcnt=1/0
NM_MAILSHR_001 (741A6919)              PRM SYS        Pagcnt/Refcnt=11/0
               Owner:       [1,4] ❶
               Protection:  S:RWED,O:RWED,G:RWED,W:RE ❷
.
.
.
```

❶ UIC of the owner of the global section

❷ The type of access allowed for the image

5 `INSTALL>LIST /GLOBAL`

When you issue the command in this example, the display shows global sections in multiport memory in addition to the global sections for shared images.

```
System Global Sections ❶
.
.
.
               Global Sections in Multiport Memory "SHM" ❷
VMSRTL_001     (010003FC)              PRM SYS     Creator Port=0 ❸
       Basepfn/Pagcnt=00000000/7 ❹
       Port 0 PTE Refcnt=35 ❺
   .
   .
   .
659 Global Pages Used, 1329 Global Pages Unused
15 Global Sections Used, 17 Global Sections Unused ❻
```

❶ Display of global sections in local memory.

❷ Display of global sections in shared multiport memory unit named SHM by the system manager; one such display appears for each attached multiport memory unit.

❸ Number of the port from which the global section was created.

❹ Base page frame number (in hexadecimal) and number of pages in the section.

❺ Page table entry (PTE) reference count; one appears for each port where the reference count is not 0.

❻ Number of global pages used, number of global pages unused, number of global sections used, and number of global sections unused in shared memory.

PURGE

Deletes all known file entries for images installed without the /NOPURGE qualifier.

FORMAT PURGE

PARAMETERS

None.

QUALIFIERS

None.

DESCRIPTION

The PURGE command deletes all known file entries for images installed without the /NOPURGE qualifier.

If a process is accessing global sections when the PURGE command is entered, the global sections are deleted only after the operation initiated by the process completes. However, once the command is entered, no additional processes can access the global sections because they are "marked for deletion."

EXAMPLE

```
INSTALL> PURGE
```

The command in this example deletes all images except those installed with the /NOPURGE qualifier. The images themselves (that is, the image files) remain unaffected. Writable global sections are written back to disk upon their removal as known images.

REMOVE

Removes an entry from the known image file list. The REMOVE command is synonymous with the DELETE command.

FORMAT

REMOVE *file-spec*

PARAMETER

file-spec
Names the file specification of the known image file entry.

QUALIFIERS

None.

DESCRIPTION

The REMOVE command deletes an entry that appears in the known image file list. The image's entry on the known file list and any global sections for the image are deleted. The image itself (that is, the image file) remains unaffected. Writable global sections are written back to disk upon their removal as known images.

If a process is accessing global sections when the REMOVE command is entered, the global sections are deleted only after the operation initiated by the process completes. However, once the command is entered, no additional processes can access the global sections because they are "marked for deletion."

EXAMPLE

```
INSTALL> REMOVE GRPCOMM
```

The command in this example deletes the entry for the known image GRPCOMM from the known image file list.

REPLACE

Associates a known image with the latest version of the image file, or modifies the attributes of an installed image.

FORMAT

REPLACE *file-spec*

PARAMETER

file-spec

Names the file specification of an image installed as a known image.

QUALIFIERS

/[NO]ACCOUNTING

Allows you to enable image-level accounting for selected images when image accounting is disabled on the system (with the DCL command SET ACC/DISABLE=IMAGE). When image accounting is enabled on the system, it logs all images. The /NOACCOUNTING qualifier has no effect.

/[NO]EXECUTE_ONLY

The /EXECUTE_ONLY qualifier is meaningful only to main programs. It allows the image to activate shareable images to which the user has EXECUTE access but has no READ access. All shareable images referenced by the program must be installed, and VMS RMS uses "trusted" logical names, those created for use in EXEC or KERNEL mode.

You may not specify this qualifier for an executable image linked with the /TRACEBACK qualifier.

/[NO]HEADER_RESIDENT

Installs the file as a known image with a permanently resident header (native mode images only). The image is made permanently open even if /OPEN is not specified.

/[NO]LOG

Lists the newly created known file entry along with any associated global sections created by the installation.

/[NO]OPEN

Installs the file as a permanently open known image.

/[NO]PRIVILEGED[=(priv-name[,...])]

Installs the file as a known image with the privileges specified (executable images only). Then, if the image is not located on the system volume, the image is made permanently open even if /OPEN is not specified. For a complete listing of privileges, see the ADD command.

You may not specify this qualifier for an executable image linked with the /TRACEBACK qualifier.

/[NO]PROTECTED

Installs the file as a known image that is protected from user-mode and supervisor-mode write access. You can only write into the image from EXEC or KERNEL mode. The /PROTECTED qualifier together with the /SHARE qualifier are used to implement user-written services, which become privileged shareable images.

/[NO]PURGE

Specifies that the image can be removed by a PURGE operation; if you do not specify /PURGE, it can be removed only by a DELETE or REMOVE operation. (/NOPURGE is the default form of the qualifier.)

/[NO]SHARED

Installs the file as a shared known image and causes creation of global sections for the image. The image is made permanently open even if /OPEN is not specified.

/[NO]WRITABLE

Installs the file as a writable known image as long as you also specify the /SHARED qualifier. The /WRITABLE qualifier is automatically negated if the /NOSHARED qualifier is specified.

DESCRIPTION

The REPLACE command updates a known file to the latest version found in the specified directory.

You can use the REPLACE command to modify the attributes of currently installed images. Either specify new qualifiers, or change the value of qualifiers used when installing the image with the ADD (or CREATE) command. If you specify no qualifiers, the new image retains the same attributes as the old one. If the old image was installed with the /SHARED qualifier, the global sections are recreated, probably with new identifiers.

If a process is accessing global sections when the REPLACE command is entered, the global sections are deleted only after the operation initiated by the process completes. However, once the command is entered, no additional processes can access the global sections because they are "marked for deletion."

EXAMPLE

```
INSTALL> REPLACE GRPCOMM /ACCOUNTING/NOOPEN
```

The command in this example replaces the known image GRPCOMM with the latest version of the image, while enabling image accounting and removing the OPEN attribute for this version.

The full name of the file specification is assumed to be SYS$SYSTEM:GRPCOMM.EXE.

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