

VSI Fortran Installation Guide

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VSI Fortran Version 8.3 for OpenVMS Alpha
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VSI Fortran Installation Guide



VMS Software

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Preface

1. About VSI

VMS Software, Inc. (VSI) is an independent software company licensed by Hewlett Packard Enterprise to develop and support the OpenVMS operating system.

2. Intended Audience

This guide is intended for system managers who install VSI Fortran.

3. Related Documents

In addition to this guide, the VSI Fortran documentation set includes the following:

- *VSI Fortran Reference Manual* [<https://docs.vmssoftware.com/vsi-fortran-for-openvms-language-reference-manual/>]
- *VSI Fortran User Manual* [<https://docs.vmssoftware.com/vsi-fortran-for-openvms-user-manual/>]
- VSI Fortran online release notes

For the location of the release notes, see Section 1.2.

Once installed, you can use VSI Fortran online HELP, which describes the command qualifiers, explains run-time messages, and provides a quick-reference summary of language topics. To use online HELP, enter **HELP** followed by the command name. For example:

```
$ HELP FORTRAN
```

For help understanding OpenVMS error messages, see the *OpenVMS System Messages and Recovery Procedures Reference Manual* or the online **HELP/MESSAGE** facility.

4. OpenVMS Documentation

The full VSI OpenVMS documentation set can be found on the VMS Software Documentation webpage at <https://docs.vmssoftware.com>.

5. VSI Encourages Your Comments

You may send comments or suggestions regarding this manual or any VSI document by sending electronic mail to the following Internet address: <docinfo@vmssoftware.com>. Users who have VSI OpenVMS support contracts through VSI can contact <support@vmssoftware.com> for help with this product.

6. Conventions

The following product names may appear in this manual:

- OpenVMS Industry Standard 64 for Integrity Servers
- OpenVMS I64
- I64

All three names — the longer form and the two abbreviated forms — refer to the version of the OpenVMS operating system that runs on the Intel ® Itanium ® architecture.

The following conventions might be used in this manual:

Ctrl/x	A sequence such as Ctrl/x indicates that you must hold down the key labeled Ctrl while you press another key or a pointing device button.
PF1 x	A sequence such as PF1 x indicates that you must first press and release the key labeled PF1 and then press and release another key or a pointing device button.
. . .	A horizontal ellipsis in examples indicates one of the following possibilities: <ul style="list-style-type: none"> • Additional optional arguments in a statement have been omitted. • The preceding item or items can be repeated one or more times. • Additional parameters, values, or other information can be entered.
.	A vertical ellipsis indicates the omission of items from a code example or command format; the items are omitted because they are not important to the topic being discussed.
()	In command format descriptions, parentheses indicate that you must enclose choices in parentheses if you specify more than one.
[]	In command format descriptions, brackets indicate optional choices. You can choose one or more items or no items. Do not type the brackets on the command line. However, you must include the brackets in the syntax for OpenVMS directory specifications and for a substring specification in an assignment statement.
	In command format descriptions, vertical bars separate choices within brackets or braces. Within brackets, the choices are optional; within braces, at least one choice is required. Do not type the vertical bars on the command line.
{ }	In command format descriptions, braces indicate required choices; you must choose at least one of the items listed. Do not type the braces on the command line.
bold type	Bold type represents the name of an argument, an attribute, or a reason.
<i>italic type</i>	Italic type indicates important information, complete titles of manuals, or variables. Variables include information that varies in system output (Internal error <i>number</i>), in command lines (/PRODUCER=<i>name</i>), and in command parameters in text (where <i>dd</i> represents the predefined code for the device type).
UPPERCASE TYPE	Uppercase type indicates a command, the name of a routine, the name of a file, or the abbreviation for a system privilege.
monospace	Bold monospace type indicates a command line, command verb, or a qualifier.

-	A hyphen at the end of a command format description, command line, or code line indicates that the command or statement continues on the following line.
numbers	All numbers in text are assumed to be decimal unless otherwise noted. Nondecimal radixes — binary, octal, or hexadecimal — are explicitly indicated.
real	This term refers to all floating-point intrinsic data types as a group.
complex	This term refers to all complex floating-point intrinsic data types as a group.
logical	This term refers to logical intrinsic data types as a group.
integer	This term refers to integer intrinsic data types as a group.
Fortran	This term refers to language information that is common to ANSI FORTRAN-77, ANSI/ISO Fortran 90, ANSI/ISO Fortran 95, and VSI Fortran 90.
Fortran 90	This term refers to language information that is common to ANSI/ISO Fortran 90 and VSI Fortran. For example, a new language feature introduced in the Fortran 90 standard.
Fortran 95	This term refers to language information that is common to ISO Fortran 95 and VSI Fortran. For example, a new language feature introduced in the Fortran 95 standard.
VSI Fortran	Unless otherwise specified, this term refers to language information that is common to the Fortran 90 and 95 standards, and any VSI Fortran extensions, running on the OpenVMS operating system. Since the Fortran 90 standard is a superset of the FORTRAN-77 standard, VSI Fortran also supports the FORTRAN-77 standard. VSI Fortran supports all of the deleted features of the Fortran 95 standard.

Chapter 1. Preparing for VSI Fortran Installation

This chapter discusses the preparations and requirements necessary for installing VSI Fortran.

1.1. What You Need to Know First

For OpenVMS systems running on Alpha, VSI provides two separate compilers (VSI Fortran and Fortran 77) under one license and one name (VSI Fortran). You can choose to install and/or use either compiler or both compilers.

By default, the `FORTTRAN` command invokes the VSI Fortran compiler, which supports the Fortran 90 and 95 standards as well as older versions of the Fortran language. If you choose to also install the older Fortran 77 compiler (Alpha only), programmers can request it by using the `/OLD_F77` qualifier on the `FORTTRAN` command line.

1.2. Reading the Release Notes

You can extract the VSI Fortran release notes to a file and type or print them before starting VSI Fortran installation. The VSI Fortran release notes are also installed on your system after installation.

For information about reading the online release notes before installation, use the `PRODUCT EXTRACT RELEASE_NOTES` command described in Section 2.1 [Step 4](#).

VSI strongly recommends that you read the release notes before installing VSI Fortran. They contain information about changes to the installation and use of VSI Fortran, such as the minimum version of the VSI OpenVMS operating system required for this release of VSI Fortran.

After installation, the release notes are installed as text in:

```
SYS$HELP:FORTTRAN.RELEASE_NOTES
```

1.3. License Registration

During the installation, the system asks whether you have registered the VSI Fortran license and loaded the appropriate PAK. Before you start the installation, you must register and load your license for VSI Fortran to be able to run the Installation Verification Procedure (IVP), and for users to be able to run VSI Fortran.

The license registration information you need is contained in the Product Authorization Key (PAK) file. If you are installing VSI Fortran as an update on a node or cluster that is licensed for this software, you have already completed the License PAK registration requirements.

Note

On Alpha systems, the VSI Fortran compiler license is covered by the ALPHA-LP license PAK.

To determine whether the VSI Fortran license is registered on the current system, enter the `LICENSE LIST` command. If the license is not on the list, you must register it.

To register the PAK on your system, you have the following options:

- Copy the zipped license script (provided as part of the license distribution sent to you by a VMS Software manager) to your target system, unzip it there, rename its extension from .TXT to .COM, and execute it as a simple command procedure.
- Copy the script from the appropriate PDF file (provided as part of the license distribution sent to you by a VMS Software manager) directly into a .COM file on your target system. Execute the created command procedure.
- Run the SY\$UPDATE:VMSLICENSE.COM command procedure and manually enter the PAK data¹ or load the PAK through the **LICENSE REGISTER** command. Refer to the *VSI OpenVMS License Management Utility Guide* for more information on how to do so.

Next, make sure the license is loaded into the license database using the **SHOW LICENSE** command.

```
$ SHOW LICENSE FORTRAN
```

```
Active licenses on node NODE1:
```

```
----- Product ID -----      ---- Rating ----- -- Version --
Product      Producer      Units PCL  Activ Version Release  Termination
FORTRAN      VSI           0  0    1    0.0  (none)  10-MAY-2024
```

If the license is not found, you will need to load it using the **LICENSE LOAD** command.

```
$ LICENSE LOAD FORTRAN
```

```
%LICENSE-I-LOADED, VSI FORTRAN was successfully loaded with 0 units
```

```
$
```

For complete information on using LMF, see the *VSI OpenVMS License Management Utility Guide* or the online **HELP LICENSE** utility.

1.4. Installation Procedure Requirements

After you have registered and loaded the license PAK and read the appropriate parts of this *Installation Guide*, the installation takes approximately 2 to 5 minutes, depending on your system configuration.

1.4.1. Installation Account Privileges and Disk Space

To install VSI Fortran, you must be logged in to an account that has the SETPRV privilege or at least the following privileges enabled:

- BYPASS
- CMKRNL
- SYSLCK
- SYSPRV

The table below shows the disk space requirements for the installation to be performed correctly.

Table 1.1. Disk Space Requirements

Kit Component	Blocks Required
VSI Fortran for OpenVMS x86-64	200,000 blocks

¹When you register a license with VMSLICENSE.COM, you can choose an option to load the license automatically to avoid loading the license manually.

Kit Component	Blocks Required
VSI Fortran for OpenVMS IA-64	62,000 blocks
VSI Fortran for OpenVMS Alpha	28,000 blocks
Fortran 77 for OpenVMS Alpha	16,000 blocks

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

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

1.4.2. System Parameters

Installing VSI Fortran requires certain system parameter settings.

For Alpha and I64 systems, the minimum number of free global pagelets (512-byte subpage units) and global sections needed is 11 global sections and approximately 20,000 contiguous free global pagelets, plus a sufficient number of contiguous free global pagelets to contain the file SYS\$LIBRARY:DCLTABLES.EXE. (See Section 1.4.2.1).

For x86-64 systems, the minimum number of free global pagelets (512-byte subpage units) and global sections needed is 3 global sections, and approximately 75000 contiguous free global pagelets, plus a sufficient number of contiguous free global pagelets to contain the file SYS\$LIBRARY:DCLTABLES.EXE. (See Section 1.4.2.1).

These values represent the number of free global pagelets and global sections required for the installation, not the total number you need to run your system and other software.

Note

If you do not ensure that your system has the necessary global pagelets and global section SYSGEN parameters for the installation, the DCL tables can become corrupted in some situations.

1.4.2.1. Calculating Values for GBLPAGES and GBLSECTIONS

To determine the number of global pagelets required by SYS\$LIBRARY:DCLTABLES.EXE, enter the following DCL command:

```
$ DIR/SIZE SYS$LIBRARY:DCLTABLES.EXE
```

This command returns the size (in blocks) of SYS\$LIBRARY:DCLTABLES.EXE. As an approximation, use this value as the number of global pagelets for the file.

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

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

If the number of free global pagelets or global sections is less than the required value (see Section 1.4.2), you must increase the system parameter setting. The following section describes the procedures for increasing these values using AUTOGEN.

1.4.2.2. Changing System Parameter Values with AUTOGEN

If you do not have enough free global pages or free global sections to install VSI BASIC, use the AUTOGEN command procedure to increase the GBLPAGES or GBLSECTIONS 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:

```
SYSS$SYSTEM:MODPARAMS.DAT
```

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, insert a line in the file that includes both the name of the parameter and its value. For example:

```
WSMAX = 1024
```

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

```
ADD_GBLPAGES = 2000
```

Note

When you set the page file quota, do *not* use a value that exceeds the amount of page file space available on the system.

After you make all your changes, exit from the editor and execute the AUTOGEN procedure to recalculate your system parameters and reboot the system:

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

When you specify **REBOOT**, AUTOGEN does an automatic system shutdown and then reboots the system. Any users logged in to the system are immediately disconnected during the shutdown. The automatic reboot puts the new parameter values into effect.

AUTOGEN 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.

For more information about using AUTOGEN, see the *VSI OpenVMS System Manager's Manual, Volume 1: Essentials* and *VSI OpenVMS System Manager's Manual, Volume 2: Tuning, Monitoring, and Complex Systems*.

1.5. Backing Up Your System Disk

VSI 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 *VSI OpenVMS System Manager's Manual, Volume 1: Essentials*.

Chapter 2. Installing VSI Fortran

This chapter describes how to install VSI Fortran and covers error recovery considerations.

2.1. Installation Procedure

The installation procedure loads VSI Fortran product distribution files on to the system disk on the system where you perform the installation. The VSI Fortran installation procedure consists of a series of questions and informational messages.

When the system prompts you with a question during the installation procedure, the default answer, if any, is enclosed in brackets "[]".

Follow these steps to install VSI Fortran:

1. Make sure you have downloaded the latest kit file. For example, X86VMS-FORTRAN-Xnnnn-nnn.ZIP.
2. Use the UNZIP utility to extract the installation files.

The ZIP/UNZIP utility can be found on your system in the following directories:

```
SYS$COMMON: [SYSHLP.UNSUPPORTED.ZIP]
SYS$COMMON: [SYSHLP.UNSUPPORTED.UNZIP]
```

To be able to use the **UNZIP** command, create a foreign command that will run the UNZIP utility, for example:

```
$ UNZIP == "$SYS$COMMON:[SYSHLP.UNSUPPORTED.UNZIP]UNZIP.EXE"
```

For information on how to use this utility, execute **UNZIP**.

3. Log in to a privileged account on the system (or cluster) where you will install VSI Fortran. This account must have the following privileges enabled:
 - BYPASS
 - CMKRNL
 - SYSLCK
 - SYSPRV

If your process has the SETPRV privilege, you can enable these privileges by entering the following command:

```
$ SET PROCESS/PRIVILEGE=(BYPASS,CMKRNL,SYSLCK,SYSPRV)
```

To check whether your process has these privileges enabled, enter the following command:

```
$ SHOW PROCESS/PRIVILEGES
```

4. To extract the VSI Fortran online release notes before you install VSI Fortran, enter the following command:

```
$ PRODUCT EXTRACT RELEASE_NOTES FORTRAN /SOURCE=disk:[dir] -
$_/FILE=FORTRAN.RELEASE_NOTES
```

In this command, **disk:[dir]** is the specification of the disk and directory containing the product installation files. If your process default directory is the directory that contains the VSI Fortran product distribution files, you can specify the **/SOURCE** directory as **/SOURCE=[]**.

You can view or print the file FORTRAN.RELEASE_NOTES before you continue with the installation. For example:

```
$ TYPE/PAGE FORTRAN.RELEASE_NOTES
```

5. To install the VSI Fortran compiler (as well as the Fortran 77 compiler on Alpha), enter the following **PRODUCT INSTALL** command:

```
$ PRODUCT INSTALL FORTRAN /SOURCE=disk:[dir]
```

Where **disk:[dir]** is the specification of the disk and directory containing the product installation files.

Note

Please do NOT choose to de-install DEC\$FORRTL if you are asked. If you have a currently-installed Fortran and its DEC\$FORRTL, then installing this release - which no longer has a dependency on DEC\$FORRTL - will prompt you with the question whether you would like to remove it.

When installation has been completed, the DCL \$ prompt reappears.

6. To obtain a list of files installed, enter the following command:

```
$ PRODUCT SHOW OBJECT /PRODUCT=FORTRAN
```

To use other features of the PCSI utility, see the *POLYCENTER Software Installation Utility User's Guide*.

2.2. Recovering from Installation Errors

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

- The operating system version is incorrect.
- The privileges or disk space for successful installation are insufficient.

For descriptions of error messages generated by these and related conditions, see the VSI OpenVMS documentation on system messages and software installation or the online **HELP/MESSAGE** command. Take the appropriate action described in the message.

If your installation is not successful, check for the following possible problems:

- The appropriate PAK must be available to the user performing the installation. The PAK must be registered and loaded before you can install VSI Fortran. For information about registering a PAK, see Section 1.3. Then reinstall VSI Fortran.

- The DCLTABLES.EXE file should be in the SYS\$COMMON:[SYSLIB] directory. There should not be a copy of DCLTABLES.EXE in SYS\$SPECIFIC:[SYSLIB].

If a copy of DCLTABLES.EXE is found in a SYS\$SPECIFIC root, rename it to DCLTABLES.OLD, do an **INSTALL REPLACE SYS\$LIBRARY:DCLTABLES**, then reinstall VSI Fortran.

- The system logical name SYS\$SYSROOT should not be modified from the preset definition provided by the VSI OpenVMS operating system.

Chapter 3. After Installing VSI Fortran

This chapter describes the user account requirements needed to work with VSI Fortran and the tasks that can be performed after VSI Fortran is installed. It also contains guidelines on how to remove VSI Fortran.

3.1. Running the Installation Verification Procedure Separately

The VSI Fortran Installation Verification Procedure (IVP) runs automatically during VSI Fortran installation.

If system problems occur, you should run the VSI Fortran IVP separately to ensure the integrity of the installed files. To run the IVP, enter the following command:

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

For information about what to do if you have trouble, see Section 2.2.

3.2. Modifying the System-Wide Startup Command Procedure

Add the following line to the system-wide startup file (if you have not done so previously), such as the file `SYS$MANAGER:SYSTARTUP_VMS.COM` or a command procedure that it invokes:

```
$ @SYS$STARTUP:FORT$STARTUP
```

This command procedure installs VSI Fortran images in memory and performs related actions.

The Fortran startup procedure line does not take any parameters (arguments).

3.3. Making the Product Usable on a VMScluster

If you want to run VSI Fortran on multiple nodes of a VMScluster, first check to see that you have the appropriate software license (see Section 1.3). Then perform the following steps after you install VSI Fortran:

1. Issue the **LICENSE LOAD** command, as described in the *VSI OpenVMS License Management Utility Guide*, to activate the license on each node in the VMScluster on which VSI Fortran is to be executed.
2. The commands in this step should be executed on all cluster nodes, whether or not they are licensed to use VSI Fortran; failure to do so may cause unexpected errors for users.
3. While logged in as **SYSTEM**, or as another username that has the **CMKRNL** and **SYSPRV** privileges enabled, use the OpenVMS **SYSMAN** utility to make the new versions of shareable images available, as follows:

```
$ RUN SYS$SYSTEM:SYSMAN
```

```
SYSMAN> SET ENVIRONMENT/CLUSTER
%SYSMAN-I-ENV, current command environment:
    Clusterwide on local cluster
    Username SYSTEM      will be used on nonlocal nodes
SYSMAN> DO INSTALL REPLACE SYS$LIBRARY:DCLTABLES.EXE
%SYSMAN-I-OUTPUT, command execution on node NODE1
%SYSMAN-I-OUTPUT, command execution on node NODE2
```

If any of the **INSTALL** commands fail, reboot the affected node.

The SYSMAN utility will cause each **DO** command to be executed on all nodes of the local cluster.

4. The SYS\$STARTUP:FORT\$STARTUP.COM file installs the compilers as a known image. This command procedure file should be executed on all cluster nodes using the following **DO** command:

```
SYSMAN> DO @SYS$STARTUP:FORT$STARTUP
%SYSMAN-I-OUTPUT, command execution on node NODE1
%SYSMAN-I-OUTPUT, command execution on node NODE2
```

5. Finally, exit from SYSMAN.

```
SYSMAN> EXIT
$
```

3.4. Making the FORTRAN Command Available After Installation

VSI Fortran is now installed and can be invoked by all users with the **FORTRAN** command.

The installation procedure modifies the DCL command table so that the **FORTRAN** commands are recognized and processed. However, the previous command table is still in effect for those users who are currently logged in.

All logged-in users who want to use the **FORTRAN** command must log out and log in again, or use the following DCL command:

```
$ SET COMMAND /TABLES=SYS$LIBRARY:DCLTABLES
```

3.5. Setting User Account Quotas

No special privileges are needed to use VSI Fortran. There is no benefit from installing the compilers with privileges.

To use VSI Fortran, a user account does not need to meet any special quota requirements. However, for users who will be compiling very large programs (many program units compiled together) or running very large performance-critical programs, consider adjusting the working set (WSDEF, WSQUOTA, WSEXTENT) and page file (PGFLQUOTA) account quotas to improve performance.

Use the OpenVMS AUTHORIZE Utility from a suitably privileged account to change the process quotas in the user authorization file (UAF). Some sites may restrict the use of the AUTHORIZE Utility to certain accounts or people.

After the quotas for the account have been changed, the user should log out of the account and log in again for the new quotas to take effect.

For information on using the AUTHORIZE Utility, see the *VSI OpenVMS System Manager's Manual, Volume 1: Essentials*.

3.6. Enhancing VSI Fortran Performance

After you install VSI Fortran, you might want to adjust your system to enhance performance or lower the use of some system resources.

If users will be compiling very large programs (many program units compiled together) or running very large performance-critical programs, consider the following:

- Check that adequate page file space exists. Large programs need more virtual memory during compilation and execution than small programs. Use the **INSTALL** command to extend an existing page file or create one or more new page files.
- The SYSGEN parameter virtual page count is related to the total amount of page file space. If you create more page file space, review the virtual page count parameter and increase it if necessary.
- The SYSGEN parameter maximum working set (WSMAX) might also be checked if a larger process working set is needed.

For more information on page file use and SYSGEN parameters, see the *VSI OpenVMS System Manager's Manual, Volume 2: Tuning, Monitoring, and Complex Systems*. For information about system tuning and performance investigation, see the *Guide to OpenVMS Performance Management*.

3.7. Removing VSI Fortran

To remove VSI Fortran from the system, use the following command:

```
$ PRODUCT REMOVE FORTRAN
```

After removing VSI Fortran from the system, remove the call to `SY$STARTUP:FORT$STARTUP.COM` from your system startup procedure.

