The IMSL® Fortran Library on UNIX/Linux
Installation Guide
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Installation Guide

by Rogue Wave Software

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Installing the IMSL Fortran Library for UNIX/Linux

1. Executing the install program

With an installation CD

Insert the CD and mount the device. You may need administrative rights to do this. The command may be different depending on your operating system.

1. Mount the CD. This differs by operating system.
2. Create the installation target directory: % mkdir /usr/local/vni
3. Start the installation program: % /cdrom/imsl/install/cd_install

Note: The name of the cdrom drive (/cdrom above) may vary by system

With downloaded files

Confirm you have the appropriate tar file for the hardware platform and operating system. The <tarfile> in the following commands will have a name like fnl710lnxin140x64.tar. For this example and all examples in this guide, /usr/local/vni will be used as the product installation target directory, but can be any valid directory. Create a temporary directory (/usr/local/vni/tmp in this example) for the installation files. This temporary directory and its contents may be deleted following successful installation.

Execute the following commands from the directory that contains the downloaded archive:

% mkdir /usr/local/vni/tmp
% mv <tarfile> /usr/local/vni/tmp
% cd /usr/local/vni/tmp
% tar xf <tarfile>
% imsl/install/cd_install
2. License Agreement

This screen presents the end user license agreement. Press the <space bar> to scroll through to read its contents.

ROGUE WAVE® SOFTWARE LICENSE AGREEMENT
IMSL® C NUMERICAL LIBRARY, IMSL® C# NUMERICAL LIBRARY,
JMSL™ NUMERICAL LIBRARY AND IMSL® FORTRAN NUMERICAL LIBRARY
(MARCH 2013)

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1. DEFINITIONS.

--More--(4%)
3. License Agreement, continued

When you reach the end of the license agreement, enter y and press Enter to continue the installation.

Do you agree to the terms of this license agreement (Y/N)?
4. Installation information

This is the introduction to the rest of the install procedure. Press Enter to continue.

This procedure installs Rogue Wave Software's IMSL products.

During the installation session, you will be prompted for various input. Choices that have default responses are enclosed in brackets ([]).

To abort the installation procedure at any time, press ^C (Control-C).

Press <ENTER> or <RETURN> to continue:
5. Install directory

Set the directory where the IMSL Fortran Library will be installed. The default is the current directory. Here it is /usr/local/vni. You will be prompted for confirmation. Press Enter when you are satisfied with the target directory.

Enter the directory where you want to install the IMSL products.

[/media/imsl/install]:
/usr/local/vni

The directory where you want to install is

/usr/local/vni.

Is this correct ([Y]/N)?
6. Module selection

This introduces the various modules that are available for installation as part of the IMSL Fortran Library. Press Enter to continue to the selection screen.

The Options Menu that follows this message contains options that allow you to select modules for each supported environment, select Online Documentation and Demo modules, execute a complete installation (all modules), execute an Online Documentation only installation, or show the selected modules.

Choosing a 'Select...modules' option from the Options Menu gives you a list of modules and allows you to toggle them between selected and not selected.

This installation procedure selects certain modules by default. To view the default modules, choose the 'Show selected modules' option from the Options Menu prior to selecting or deselecting any modules.

Press <ENTER> or <RETURN> to continue:
7. Module selection, continued

Select which platform modules to install. For the Linux x64 installation pictured, enter 1 and press Enter. To select all the modules, enter "5".

Options Menu:

1) Select Linux (x64) modules
2) Select Documentation modules
3) Install all modules
4) Install Online Documentation ONLY (deselects all other modules)
5) Show selected modules
x) Exit Options Menu -- continue with install

Space Required For Selected Modules: 215924 KB

Enter option: [ ]
8. Module selection, continued

Review the list of available modules for Linux and type the corresponding numbers to toggle the selection.

<table>
<thead>
<tr>
<th>ENV</th>
<th>NUM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>IMSL Installation</strong></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Linux(x64)/Intel Compiler</td>
</tr>
</tbody>
</table>

Enter the number of the environment whose options you want to select and press RETURN. Press RETURN without input to go back to the Options Menu.

1
9. NVIDIA License Agreement

Review information regarding NVIDIA CUDA options.

IMSL Installation

This installation gives the installer the option of installing an additional version of IMSL Fortran Numerical Library which leverages the NVIDIA CUDA(TM) architecture to enhance performance in functions that use BLAS routines. Note that the NVIDIA CUDA architecture software supplied with this installation is not covered by the IMSL License Agreement. Go to www.nvidia.com to obtain more information on NVIDIA's CUDA License Agreement.

By selecting the CUDA-enabled version of the IMSL Library, a CUDA-enabled version of the IMSL Library will be installed in addition to the other IMSL Library options.

Refer to the README files referenced at the conclusion of the installation for more information.

By default the CUDA-enabled version of the libraries are not selected.

Press <ENTER> or <RETURN> to continue:
10. Module Selection continued

Review the selected options, and change if needed by entering the number of the option and pressing ENTER. Once you are satisfied with the options selected, press ENTER to exit to previous menus.

<table>
<thead>
<tr>
<th>MOD</th>
<th>SIZE</th>
<th>NUM INST (KB)</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>YES</td>
<td>145712</td>
<td>Fortran Numerical Library, Linux(x64), Intel Compiler, Static</td>
</tr>
<tr>
<td>2</td>
<td>YES</td>
<td>97212</td>
<td>Fortran Numerical Library, Linux(x64), Intel Compiler, Shared</td>
</tr>
<tr>
<td>3</td>
<td>NO</td>
<td>82080</td>
<td>Fortran Numerical Library(CUDA-enabled option), Linux(x64), Intel Compiler, Static</td>
</tr>
<tr>
<td>4</td>
<td>NO</td>
<td>27484</td>
<td>Fortran Numerical Library(CUDA-enabled option), Linux(x64), Intel Compiler, Shared</td>
</tr>
<tr>
<td>5</td>
<td>YES</td>
<td>14120</td>
<td>Fortran Numerical Library Examples, Linux(x64), Intel Compiler</td>
</tr>
</tbody>
</table>

To toggle modules between SELECTED and NOT SELECTED, enter the numbers of the modules (i.e. 1 2) and press RETURN. Enter ALL to select all modules listed. To get to the previous menu press RETURN or ENTER. (In the INST column, YES indicates the module is selected):
11. Installation begins

Once all the desired modules have been selected and you have returned to this menu, enter x and press Enter to continue installing the IMSL Fortran Library.

Options Menu:

1) Select Linux (x64) modules
2) Select Documentation modules
3) Install all modules
4) Install Online Documentation ONLY (deselects all other modules)
5) Show selected modules
x) Exit Options Menu -- continue with install

Space Required For Selected Modules: 271620 KB

Enter option: x
12. **Hard disk space confirmation**

Before any files are copied, the required disk space is computed and compared to that available. If there are no problems, enter C and press Enter to continue. Enter Q or M to quit the install program or to modify the selected modules.

The installation that you have selected requires 242134 KB of disk space.

It appears that you have 2166848 KB of disk space. This is sufficient space to allow the installation to complete successfully.

Enter C to continue with the installation, Q to quit the installation, or M to modify the selected modules:
13. License Number

If you have a License Number, enter it at this point. If you do not yet have a license number, or are evaluating the product, use the default 999999. Press Enter to continue.

License Number [999999]:

IMSL Installation

Enter your Rogue Wave Software license number.

If you are an evaluation site, the license number is 999999.
14. Installation complete

When the install program is finished decompressing and copying files, you will be presented with a summary and returned to the command prompt.

![IMSL Installation](image)

Uncompressing files...
- Processed 200 of 2542 files
- Processed 400 of 2542 files
- Processed 600 of 2542 files
- Processed 800 of 2542 files
- Processed 1000 of 2542 files
- Processed 1200 of 2542 files
- Processed 1400 of 2542 files
- Processed 1600 of 2542 files
The IMSL Tiles have been loaded to disk.

The installation program has successfully completed.

Complete the installation by following the instructions located in the file README located in the directory /usr/local/vni/imsl/<product>/<arch>/notes.

Here <arch> is the environment mnemonic for the installed product(s) and <product> is either fnlxxx and/or cnlxxx depending on whether you installed IMSL Fortran Numerical Library or IMSL C Numerical Library respectively. Here xxx represents the version number of the product.

Before using any IMSL product the user will be required to reference the README files documented above. These files contain important information on the installation and use of the products.

Users familiar with our products may want to refer to the instructions in the file QuickStart for abbreviated, less detailed, instructions.
License Key setup

Note: For users who have a permanent license, this step is not necessary. Skip to “Using IMSL”.

1. Editing the License File
Using a text editor, create the license file /usr/local/vni/license/imsl_eval.dat. Then cut and paste the license key that you received via email from the Rogue Wave License Administrator into this file and save.
Using IMSL

Using the IMSL Fortran Library for UNIX/Linux

1. Creating a program
This simple example program will solve the following system of linear equations:

\[
\begin{align*}
33x + 16y + 72z &= 129 \\
-24x - 10y - 57z &= -96 \\
18x - 11y + 7z &= 8.5
\end{align*}
\]

Copy the following text into an editor and save the file as fnl.f90

```fortran
! ================ Program start ==============
! Declare which IMSL functions will be used
  USE LSARG_INT
  USE WRRRN_INT
! Declare variables
  PARAMETER (LDA=3, N=3)
  REAL A(LDA,LDA), B(N), X(N)
!
!               Set values for A and B
!
!               A = (33.0 16.0 72.0)
!                   (-24.0 -10.0 -57.0)
!                   (18.0 -11.0  7.0)
!               B = (129.0 -96.0  8.5)
!
!               DATA A/33.0, -24.0, 18.0, 16.0, -10.0, -11.0, 72.0, -57.0, 7.0/
!               DATA B/129.0, -96.0, 8.5/
!
! The main IMSL function call to solve for x in Ax=B.
! This is the floating point version, to use
! double-precision arguments, call DLSARG.
!
  CALL LSARG(A,B,X)
!
! Now print the solution x using WRRRN, a printing utility
!
  CALL WRRRN('X',X,1,N,1)
  END
! ================ Program End ==============
```
Compiling and running the program

Compiling and executing a program calling the IMSL Fortran Library for UNIX/Linux

1. Setting the environment variables
The various environment variables used in compilation must be configured using the setup shell script. Which shell script command to use depends on the shell:

C Shell
> source /usr/local/vni/imsl/fnl710/\<env>/bin/fnlsetup.csh

bash, K Shell
> ./usr/local/vni/imsl/fnl710/\<env>/bin/fnlsetup.sh

where \<env> is the environment mnemonic.

Example using environment mnemonic \lnxin140x64:

C Shell
> source /usr/local/vni/imsl/fnl710/lnxin140x64/bin/fnlsetup.csh

bash, K Shell
> ./usr/local/vni/imsl/fnl710/lnxin140x64/bin/fnlsetup.sh

2. Compile the program
Shared Library
> $F90 $F90FLAGS fnl.f90 \-o fnl $LINK_FNL

Static Library
> $F90 $F90FLAGS fnl.f90 \-o fnl $LINK_FNL_STATIC

3. Execute the program

> ./fnl

```
   x
1.000  1.500  1.000
   2
   3
```

For more information, refer to the $SFNL_DIR/<env>/notes/README reference.