The IMSL® C Numerical Library

Getting Started Guide – A Technical Guide by Rogue Wave Software

RogueWave SOFTWARE

Accelerating Great Code

www.roguewave.com

The IMSL® C Numerical Library
Getting Started Guide

by Rogue Wave Software

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Installing IMSL C Numerical Library

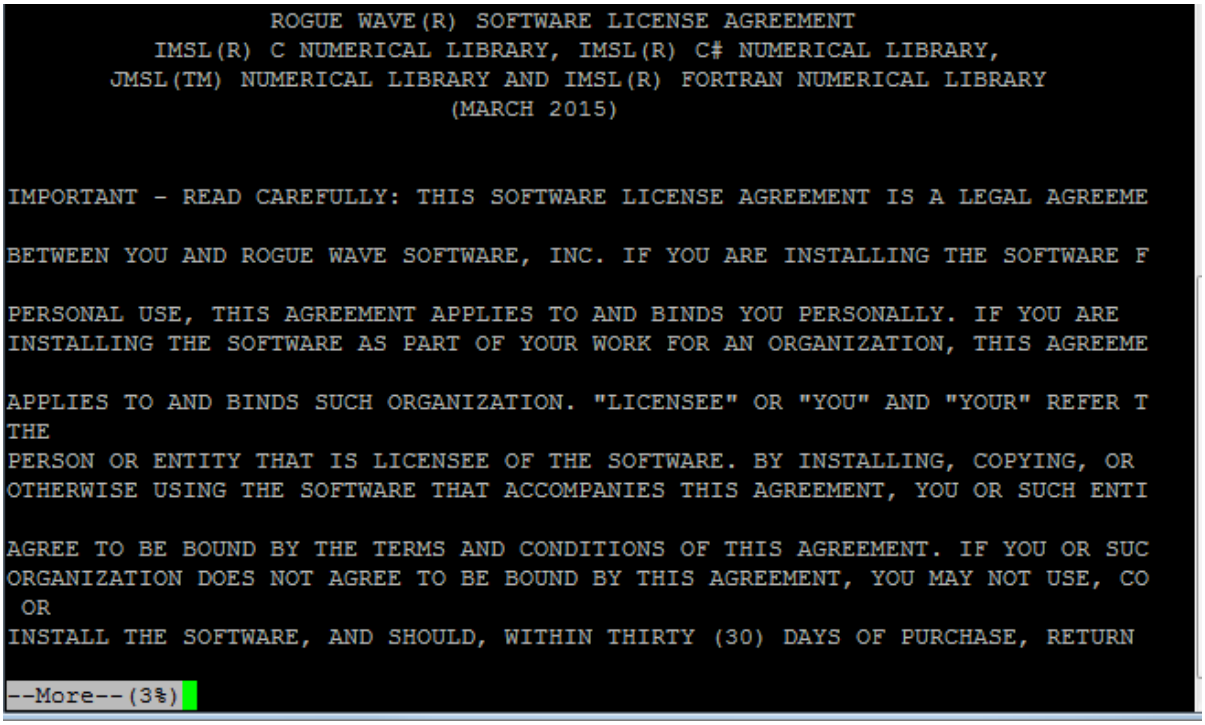
1. Executing the install program

Confirm you have the appropriate tar file for the hardware platform and operating system. The `<tarfile>` in the commands below display the name `cnl-2016.0.0sus121gc485x64.tar`. Execute the following commands from the directory that contains the downloaded archive:

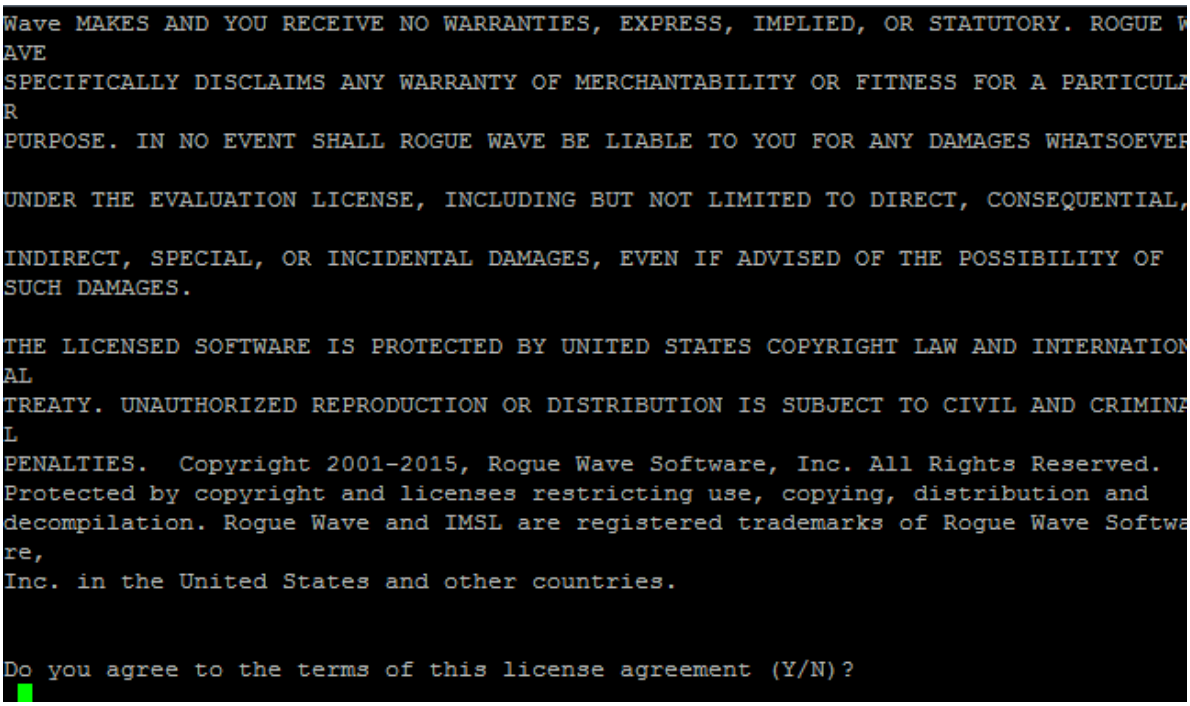
```
tar xzf <tarfile>
imsl/install/imsl_install
```

2. License Agreement

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

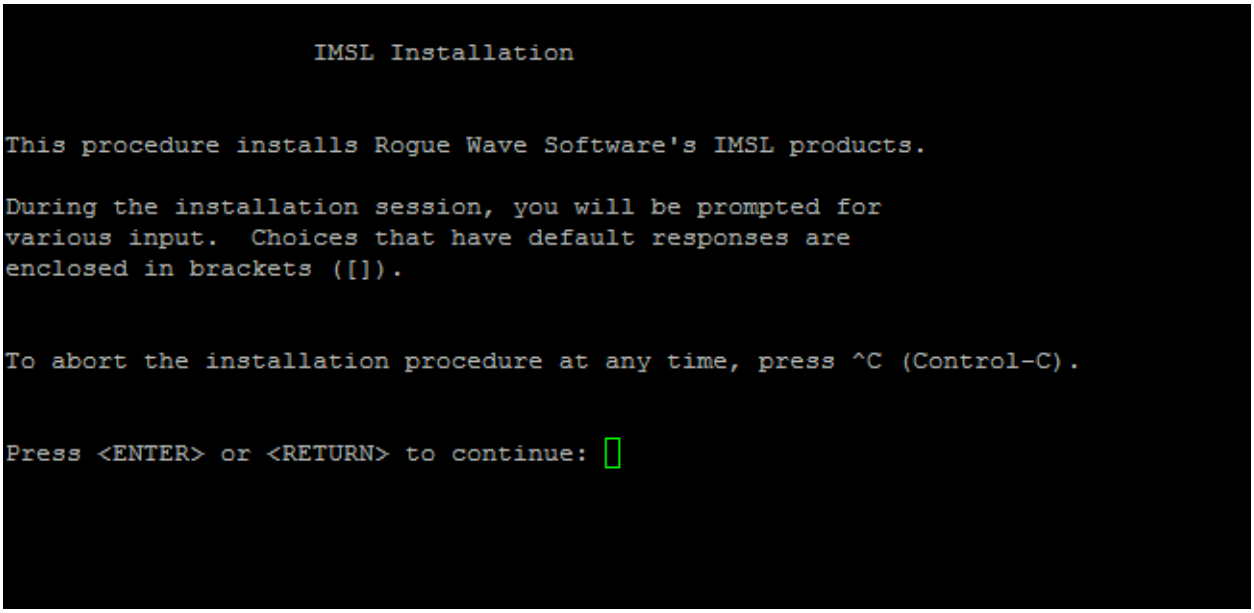


When you reach the end of the license agreement, enter "y" and then <Enter> to continue the installation.



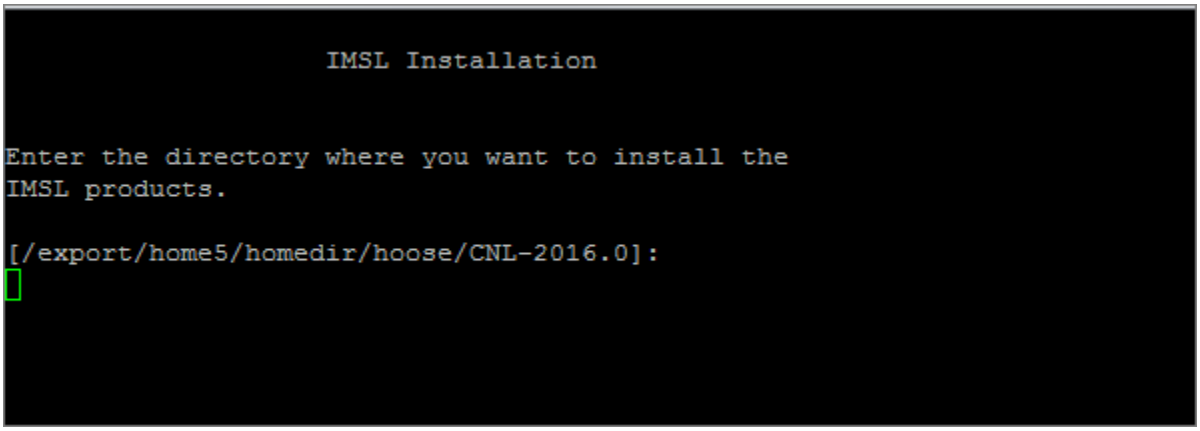
4. Installation Information

This dialog introduces the install procedure. Press <Enter> to continue.



5. Install Directory

Set the installation directory.The default is the directory in which the installation script is executed. You are prompted for confirmation. Press <Enter>.



At the next dialog, confirm your selection by pressing "y" and <enter> again.

```
                    IMSL Installation


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

[/export/home5/homedir/hoose/CNL-2016.0]:


The directory where you want to install is

/export/home5/homedir/hoose/CNL-2016.0.

Is this correct ([Y]/N)?
```

6. Introduction to the CNL Modules

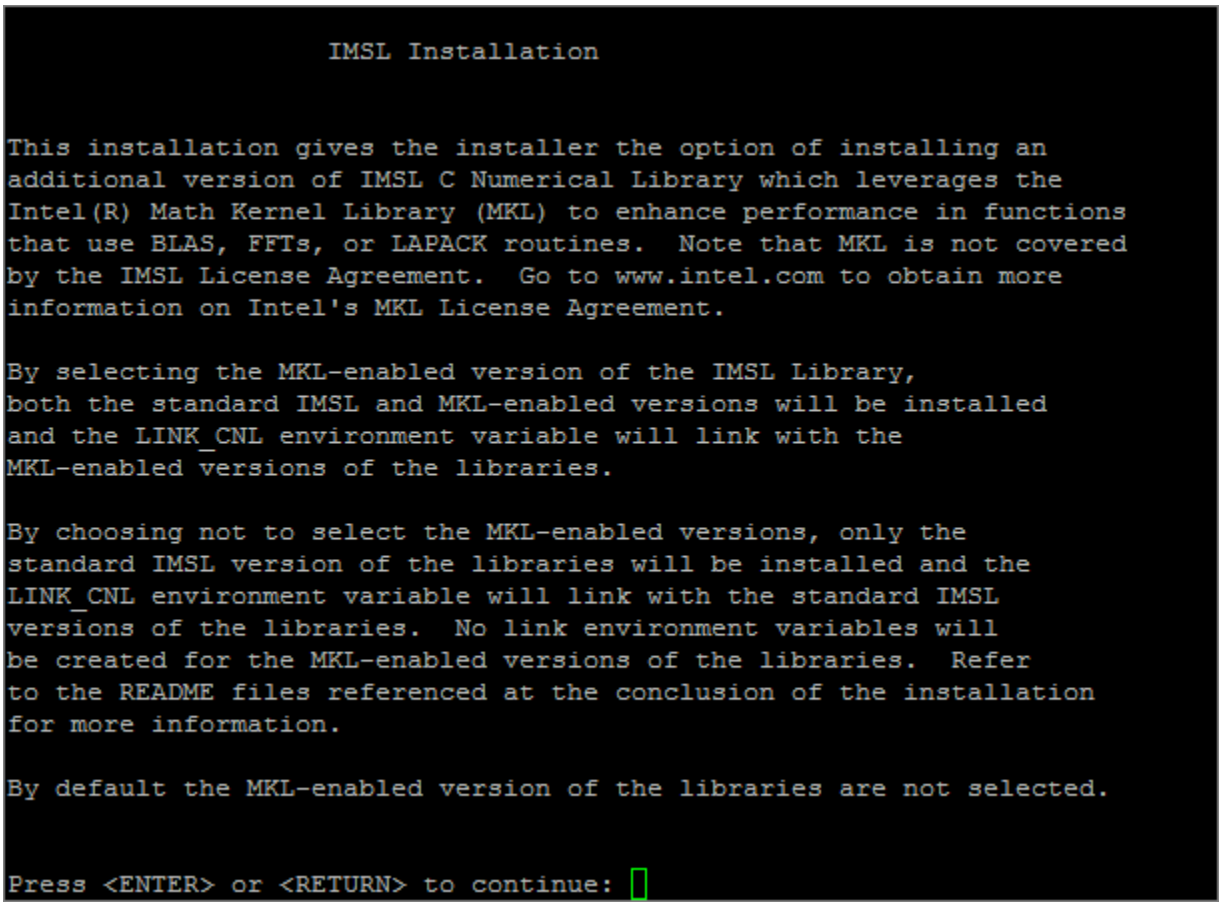
This dialog introduces the modules that are available for installation as part of the IMSL C Numerical Library. Press <Enter> to continue to the selection screen.

```
                    IMSL Installation


The Options Menu that follows this message contains options that
allow you to select modules for the supported environment.

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. MKL Information

You may optionally install an MKL performance version of the IMSL C Numerical Library. This dialog is simply informational and does not configure the installer to install the module.

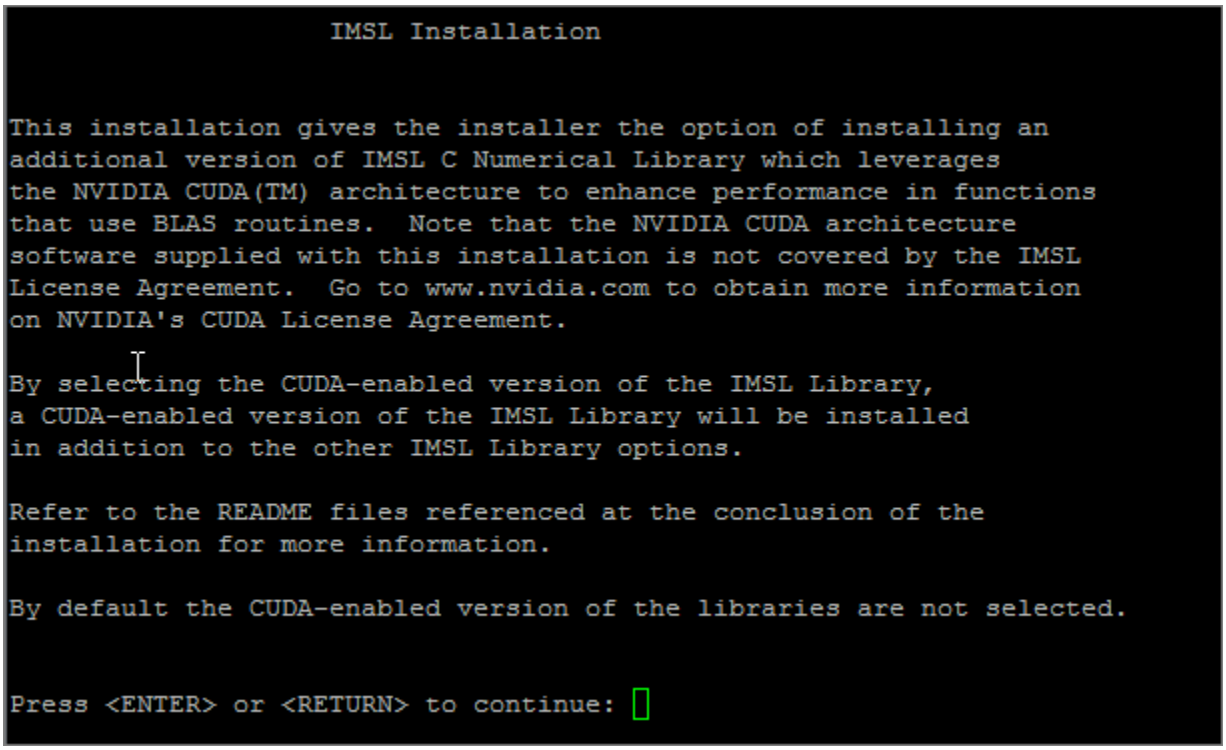
Press <Enter> to continue.



8. CUDA Information

You may optionally install a CUDA performance version of the IMSL C Numerical Library. This dialog is simply informational and does not configure the installer to install the module.

Press <Enter> to continue.



9. Module Selection

Review the list of available modules for Linux and type the corresponding numbers to toggle the selection. Select `x` to exit this menu and continue with installation.

```
                    IMSL Installation


MOD                 SIZE
NUM  Selection      (KB)      DESCRIPTION
___  _________     ____   ___________
 1   MANDATORY     51512  C Numerical Library (Standard), Linux (x64), gcc 4.8.5
 2   NOT SELECTED 290064 C Numerical Library (MKL-enabled), Linux (x64), gcc 4.8.5
 3   NOT SELECTED 184040 C Numerical Library (CUDA-enabled), Linux (x64), gcc 4.8.5
 4   SELECTED      84652  C Numerical Library Online Documentation
 x   Exit Options Menu -- continue with installation


Space Required For Selected Modules:  136164 KB

To toggle modules between SELECTED and NOT SELECTED, enter the
number of the module (i.e. 2 or 3) and press RETURN.

Enter option:
```

10. Hard Disk Space Confirmation

The required disk space is computed and compared to the amount of disk space available. To continue, enter `C` and press <Enter>. Press `Q` to quit the install program or `M` to modify the selected modules.

```
                    IMSL Installation


The installation that you have selected requires 136164 KB of disk space.

It appears that you have 30432256 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:
```

11. License Number

If you have a License Number, enter it. If you do not yet have a license number, or are evaluating the product, use the default `999999`. Press `<Enter>` and then "`y`" to continue to the installation.

```
                    IMSL Installation

Enter your Rogue Wave Software license number.

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

License Number [999999]:
```

12. Installation Complete

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

```
                    IMSL Installation

The IMSL files 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
/export/home5/homedir/hoose/CNL-2016.0/imsl/<product>/<arch>/notes.

Here <arch> is the environment mnemonic for the installed product(s)
and <product> is either fnl-xxx and/or cnl-xxx 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.


[hoose@cnl900cen715gc485x64 ~/CNL-2016.0]$
```

License Key Setup

This step is necessary only if you have an evaluation copy of IMSL C Numerical Library.

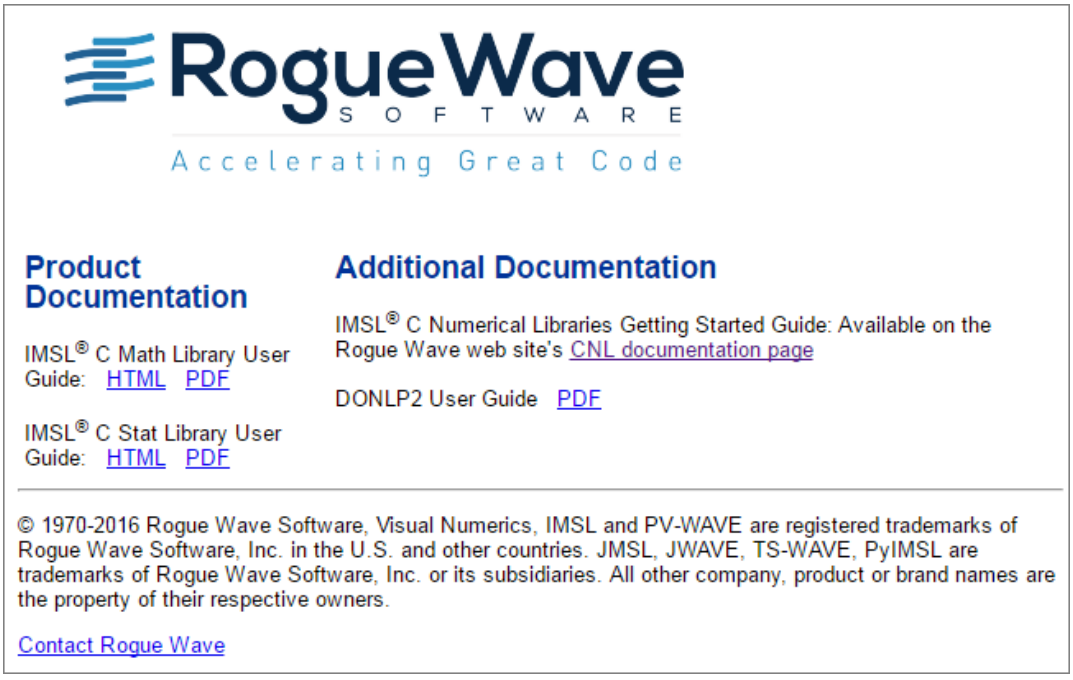
Using a text editor, create the license file `<install_dir>/license/imsl_eval.dat`, where `<install_dir>` is the IMSL C Numerical Library installation directory. Then, cut and paste the contents of the file you received via e-mail from the Rogue Wave License Administrator.

Note: To customize the license file name, set the environment variable `IMSL_LIC_FILE` to point to the license file name and the location of your choice (`<path>/<name>`).

Using the IMSL C Numerical Library

1. Documentation

Documentation is supplied in both PDF and HTML formats, available from the main documentation page at `<install_dir>/imsl/cnl-2016.0.0/help`. Open the file `imsl.html` using your web browser.



2. Creating a program

This simple example program solves the following system of linear equations:

```
33x + 16y +72z =129
-24x -10y-57z= -96
18x -11y +7z =8.5
```

Copy the following text into an editor and save the file as `cnl.c`.

```
/* Program start */
/* The header file for Mathematics of the IMSL C Numerical Library. */
/* For Statistics, use <imsls.h>. */
#include <imsl.h>

main()
{
    /* variable declaration */
    int n = 3;
    float *x;
    static float a [ ] = {33.0, 16.0, 72.0,
                          -24.0, -10.0, -57.0,
                          18.0, -11.0, 7.0};

    static float b [ ] = {129.0, -96.0, 8.5};
    float *p_inva;

    /* The main IMSL function call to solve for x in Ax=B.

     * This is the floating point version, to use
     * double-precision arguments, call
     * imsl_d_lin_sol_gen */
    x = imsl_f_lin_sol_gen(n, a, b, 0);

    /* Optional arguments are included after required

     * arguments. These are usually preceded by a constant
     * named IMSL_* indicating which optional argument is
     * being passed. In this example, we request the
     * inverse of the a matrix */
```

```
    x = imsl_f_lin_sol_gen(n, a, b, IMSL_INVERSE, &p_inva, 0);

    /* Print the solution x and the inverse of a using
     * write_matrix, a printing utility */
    imsl_f_write_matrix("Solution x", 1, n, x, 0);
    imsl_f_write_matrix("Inverse of A", n, n, p_inva, 0);
}

/* Program end */
```

3. Compiling and running the program

The following steps detail how to compile and execute a program that uses the IMSL C Numerical Library for UNIX/Linux.

Setting the Environment Variables

Configure a setup shell script with the necessary environment variables required for compilation. Which shell script to use depends on the shell:

For the IMSL C Numerical Library Version 8.6 on Linux

C Shell

```
source <install_dir>/imsl/cnl-2016.0.0/<env>/bin/cnlsetup.csh
```

bash, bourne, K Shell

```
. <install_dir>/imsl/cnl-2016.0.0/<env>/bin/cnlsetup.sh
```

Compile the program

Shared Library

```
 $CC $CFLAGS cnl.c -o cnl $LINK_CNL_SHARED
```

Static Library

```
 $CC $CFLAGS cnl.c -o cnl $LINK_CNL_STATIC
```

Execute the program

```
./cnl
                    Solution x

                1                 2                 3
             1.0              1.5              1.0


                    Inverse of A

                    1                 2                 3
1         0.1464         0.1899         0.0403
2         0.1802         0.2237        -0.0321
3        -0.0933       -0.1367        -0.0113
```

For more information, refer to the readme files in `<install_dir>/imsl/cnl-2016.0.0/<env>/notes`.