

IMSL C# Library for .NET Applications

A White Paper by Rogue Wave Software.



Rogue Wave Software
5500 Flatiron Parkway,
Suite 200
Boulder, CO 80301, USA
www.rougewave.com

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by Rogue Wave Software

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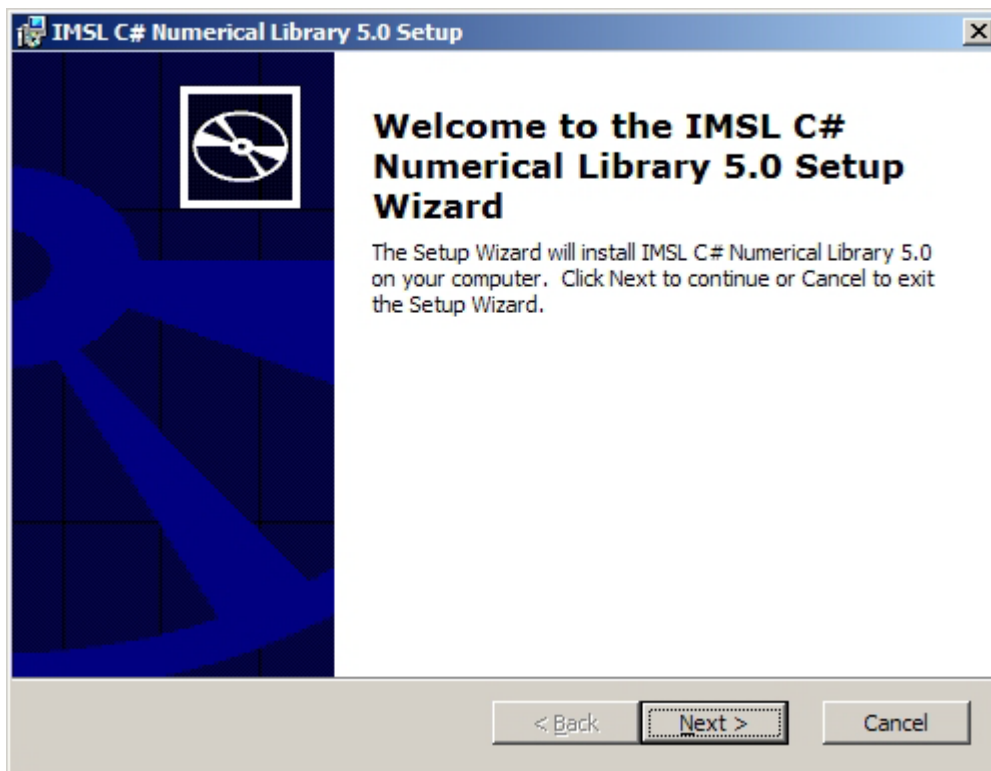
Installing the IMSL C# Library for .NET

1. Executing the install program

Insert the CD, and the install program should start automatically. If it does not start, run setup.exe in the root directory of the CD.

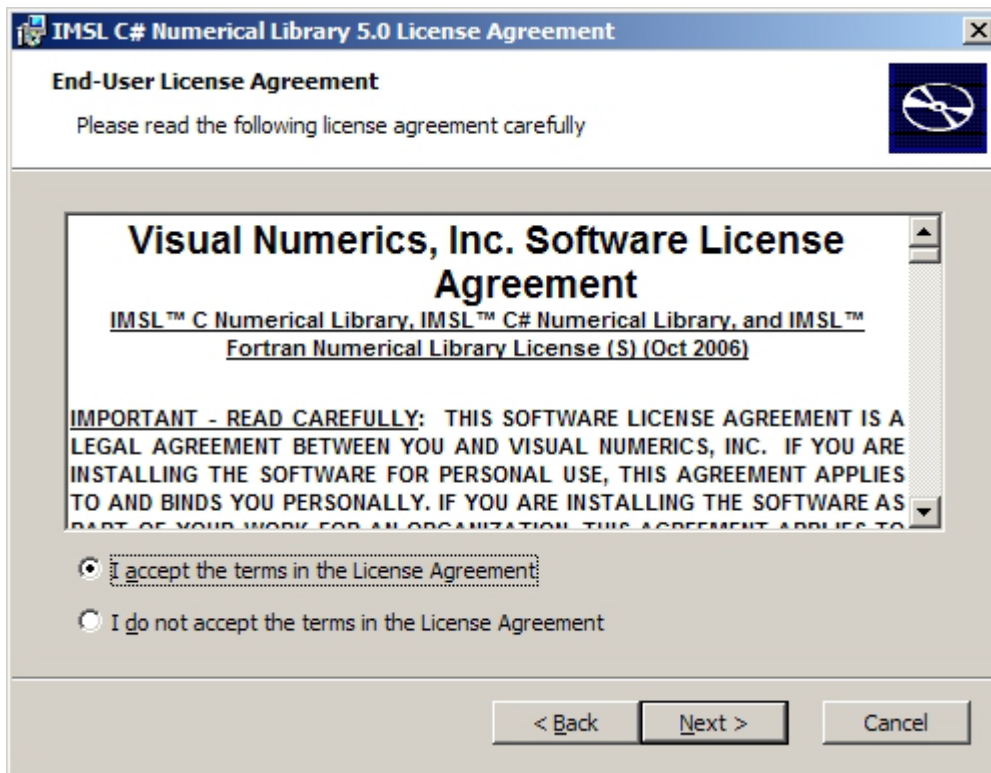
2. Welcome

The first window introduces the Setup Wizard program for the IMSL C# Library. Click Next > to start the installation.



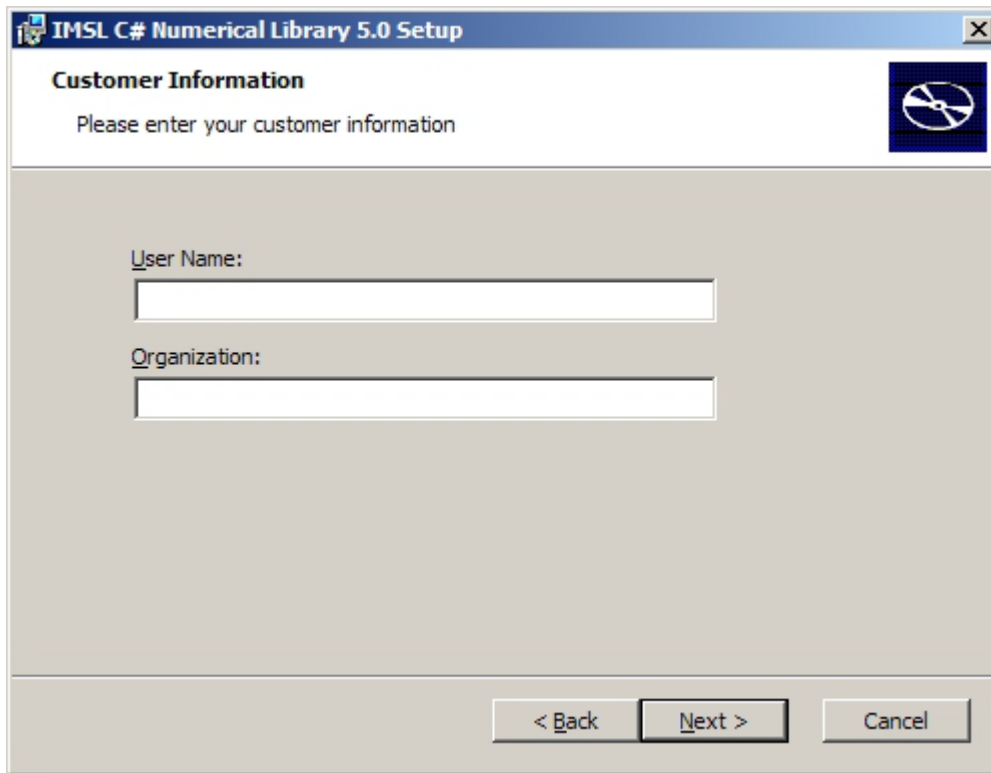
3. License Agreement

This screen presents the end user license agreement. When you have read the contents and agree, click I accept... and press Next > to continue.



4. User Information

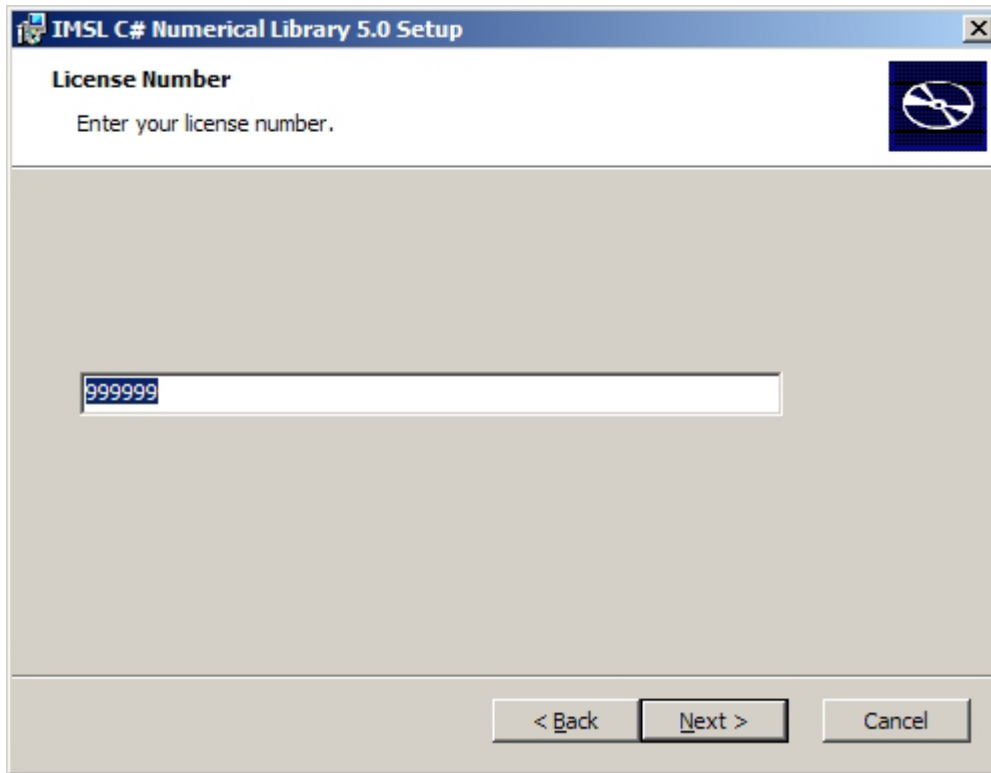
Enter your user name and organization information and press Next > to continue the installation.



The screenshot shows a Windows-style dialog box titled "IMSL C# Numerical Library 5.0 Setup". The main heading is "Customer Information" with a sub-instruction "Please enter your customer information". There are two text input fields: "User Name:" and "Organization:". At the bottom, there are three buttons: "< Back", "Next >", and "Cancel". A small logo is visible in the top right corner of the dialog box.

5. 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, input 999999. Press Next > to continue.



IMSL C# Numerical Library 5.0 Setup

License Number

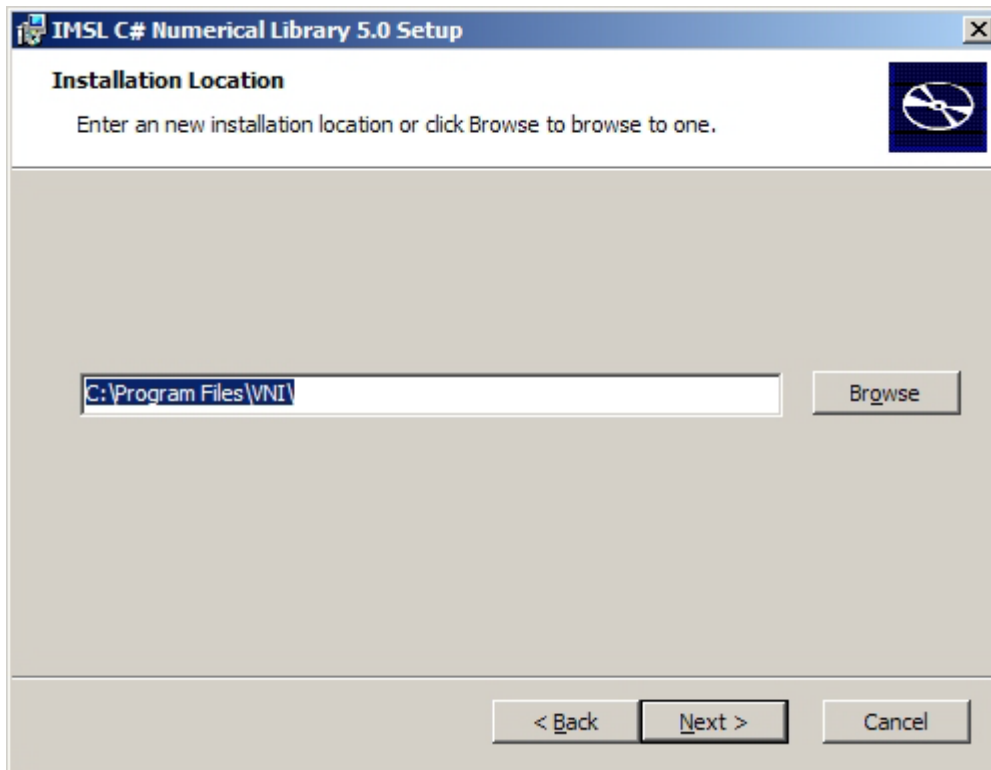
Enter your license number.

999999

< Back Next > Cancel

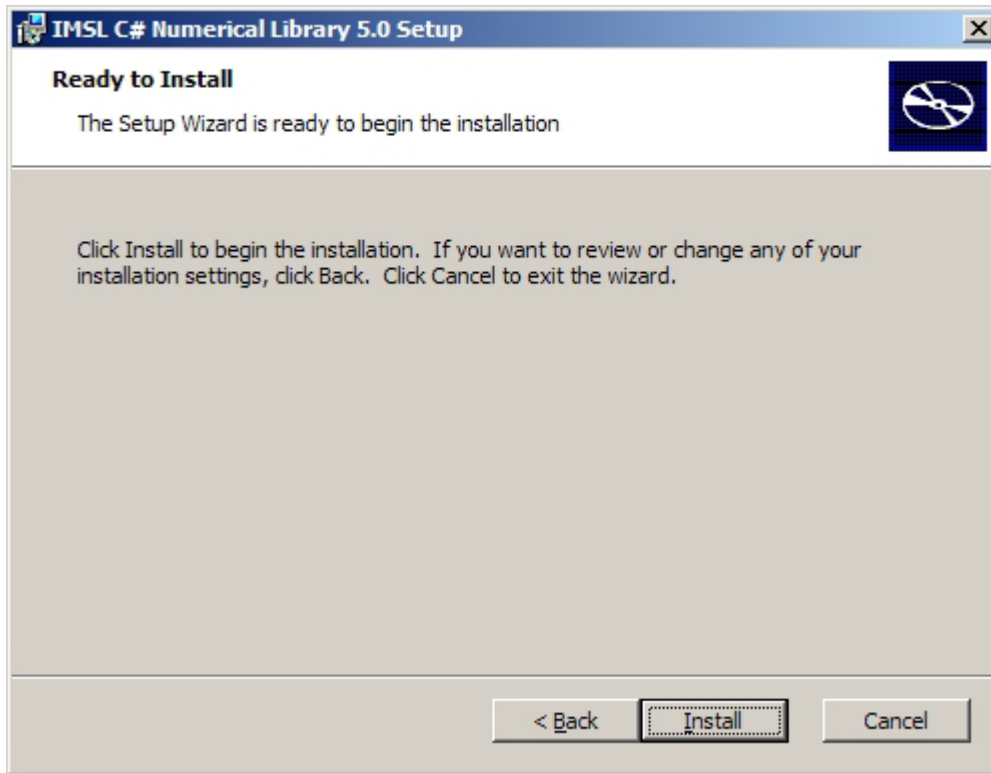
6. Install directory

Set the directory where the IMSL C# Library will be installed. The default is C:\Program Files\VNI\. Use the Browse button to select an alternate location. You may be prompted to create a directory if it does not exist. Press Next > when you are satisfied with the selection.



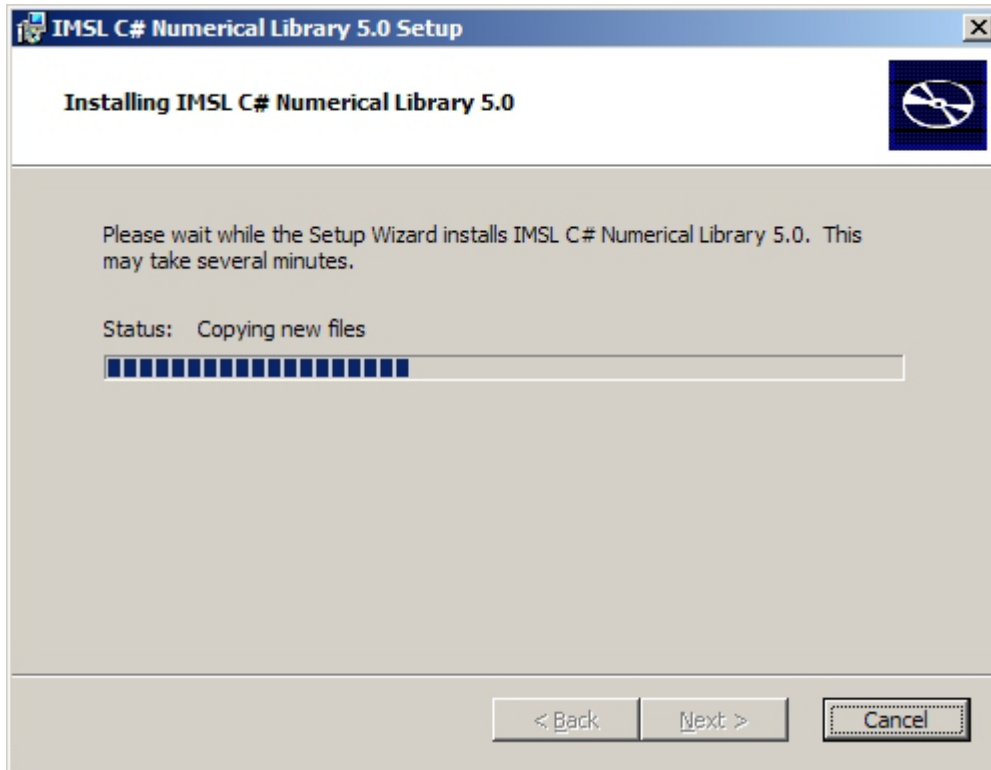
7. Ready to Install

The library is ready to be installed. Click Install to continue or < Back to change the previous selections.



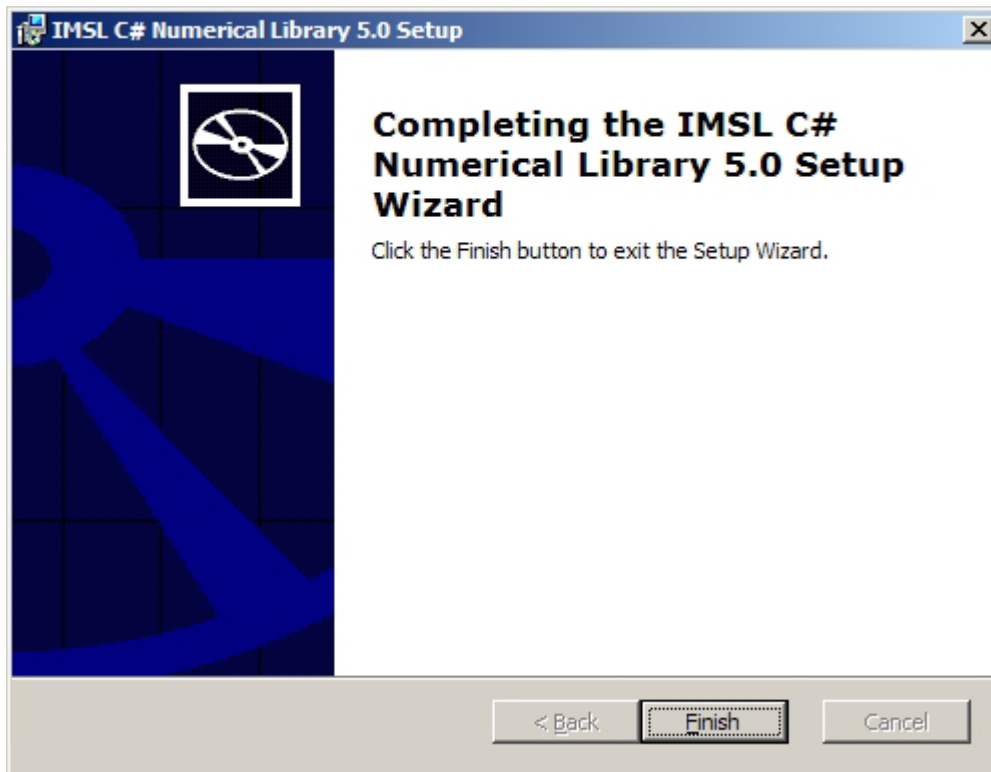
8. Installation progress

You will be updated as the installation proceeds.



9. Installation complete

The installation is complete. Click Finish to close the Setup Wizard.



License Key setup

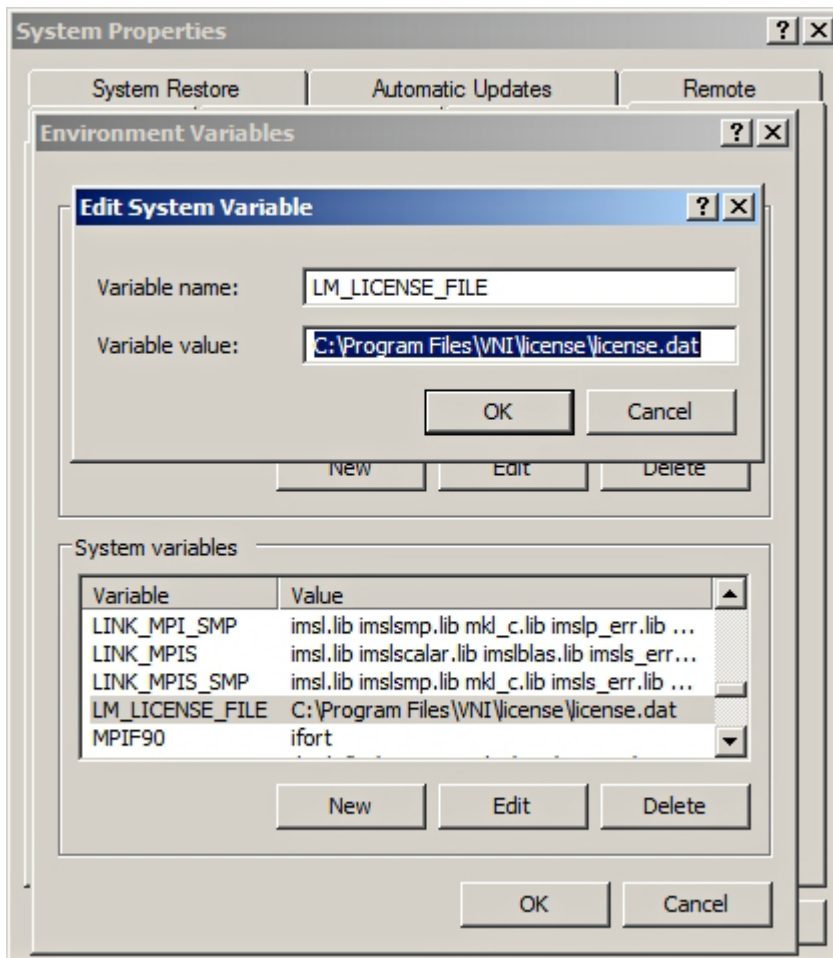
FlexLM License Key setup for the IMSL C# Library for .NET

Depending on the installation, not all steps are required.

- Evaluations: To enter a temporary demo key, follow Steps 1 and 3.
- Unlimited Server: For an uncounted server key, follow Steps 1 through 3.
- Per User: For node-locked or floating keys, follow Steps 1 through 6.

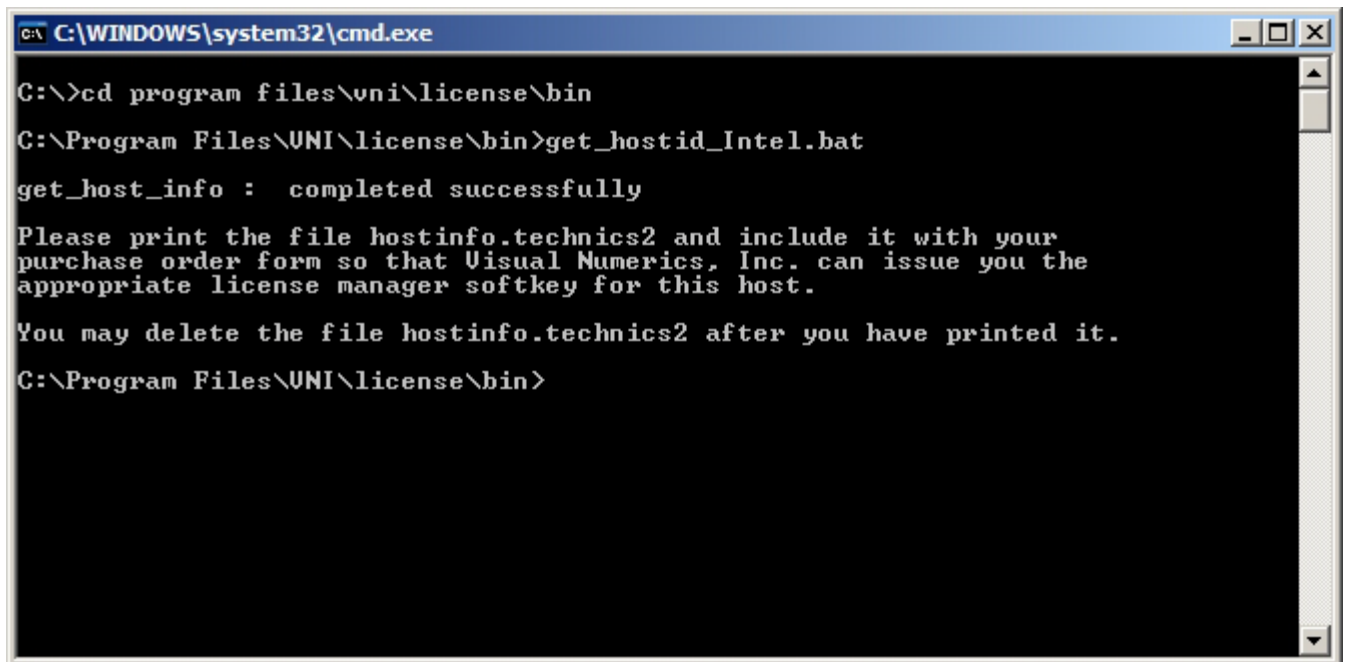
1. License environment variable

The environment variable LM_LICENSE_FILE is used to locate the license file and is set during installation. In most cases the default location of the file is OK, but if necessary you may change the location of the file in the System settings. In the Control Panel, click on the System icon, the Advanced tab, then click Environment Variables. Under the System variables, you can locate and edit LM_LICENSE_FILE.



2. Permanent License Key information

For a permanent License Key, specific information about your system is required. To obtain this information open My Computer or Windows Explorer and browse to the directory, C:\Program Files\VNI\license\bin and run the script, get_hostid_intel.bat. You can also open a Command Prompt and change to that directory. Run the script by typing get_hostid_intel.bat and press Enter. Either method will create a file named hostinfo.<hostname> where <hostname> is the name of the computer.



```
C:\WINDOWS\system32\cmd.exe
C:\>cd program files\vni\license\bin
C:\Program Files\UNI\license\bin>get_hostid_Intel.bat
get_host_info : completed successfully
Please print the file hostinfo.technics2 and include it with your
purchase order form so that Visual Numerics, Inc. can issue you the
appropriate license manager softkey for this host.
You may delete the file hostinfo.technics2 after you have printed it.
C:\Program Files\UNI\license\bin>
```

The information contained in hostinfo.<hostname> should be emailed to lmgr@vni.com so that a permanent License Key for this system can be created.

PLEASE SEND THIS LICENSE MANAGER INFORMATION TO VISUAL NUMERICS, INC.

The VNI license manager software, which provides per-seat (floating) and/or node-locked software access, will be configured to run on the CPU identified below. This information is required for the generation of your permanent softkey. Please return this by FAX, mail, or e-mail at your earliest convenience. Thank you.

Mon Mar 21 16:42:10 2005

Server host name: [tookie-tookie]
Server host id: ["005070f50ada"]
["DISK_SERIAL_NUM=75195e0"]

This information was extracted from the CPU where the
get_host_info program was run.

3. License Key input

Once you receive your permanent License Key, or if you are using a temporary DEMO key, the information needs to be copied into the license.dat file. The default location of this file is C:\Program Files\VNI\license\license.dat. Below are two example license.dat files.

Permanent License Key for one user

SERVER imslserver 1111abcd 27000

DAEMON VNI

FEATURE IMSLCS VNI 5.000 01-jan-00 1 2DA1B701F310D86D039A8 ""

Temporary DEMO key for evaluation

FEATURE IMSLCS VNI 5.000 30-jun-2006 0 FCAD4309EC7B816EC846 "" DEMO

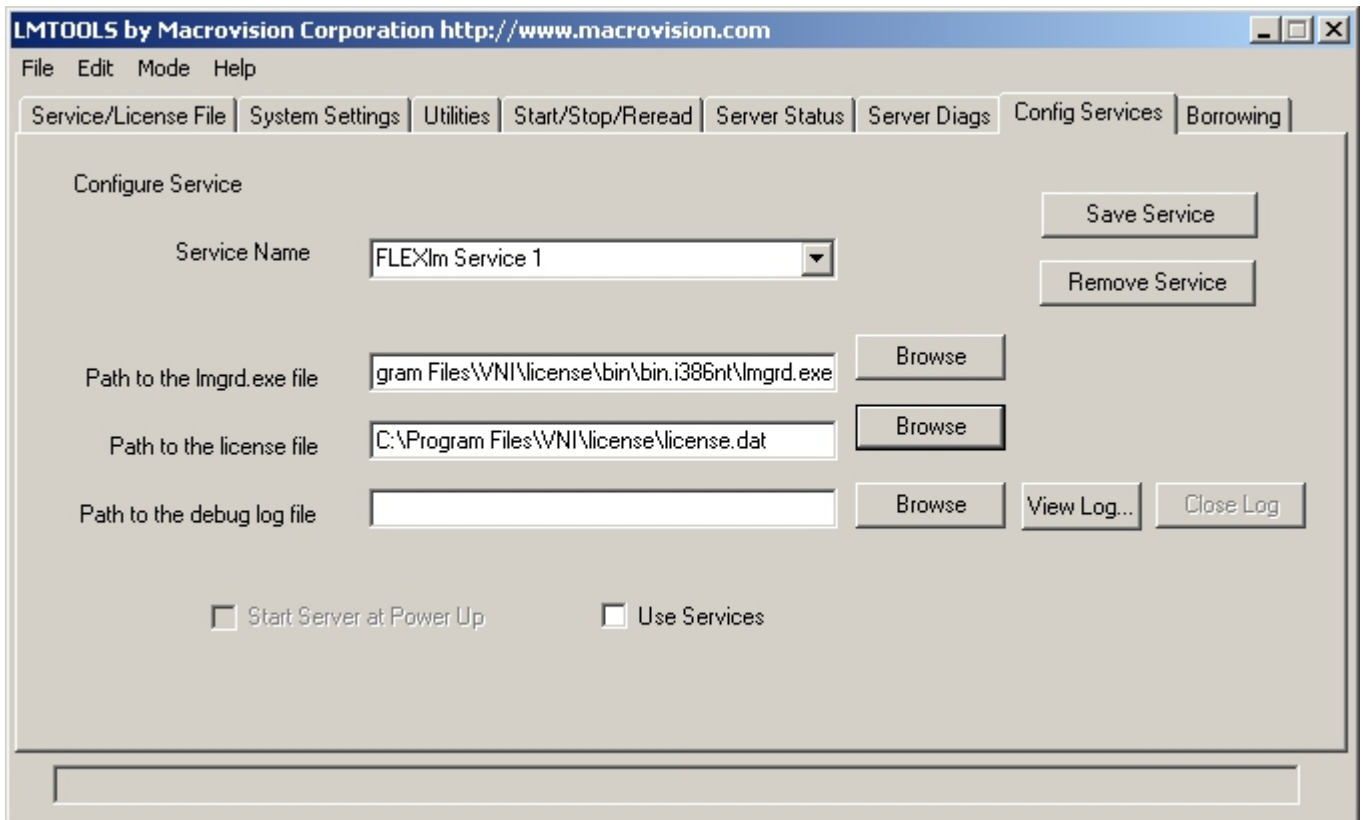
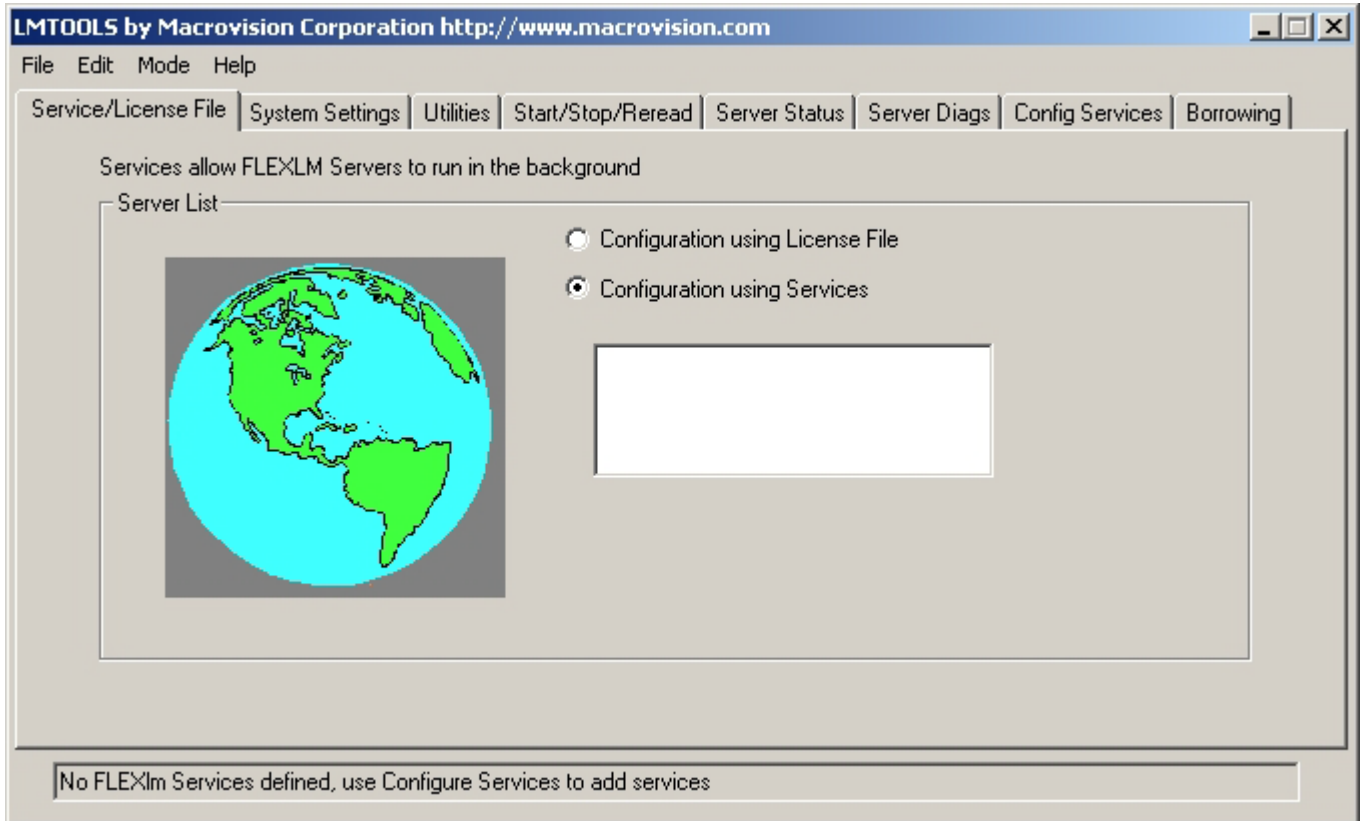
4. Configuring the license server

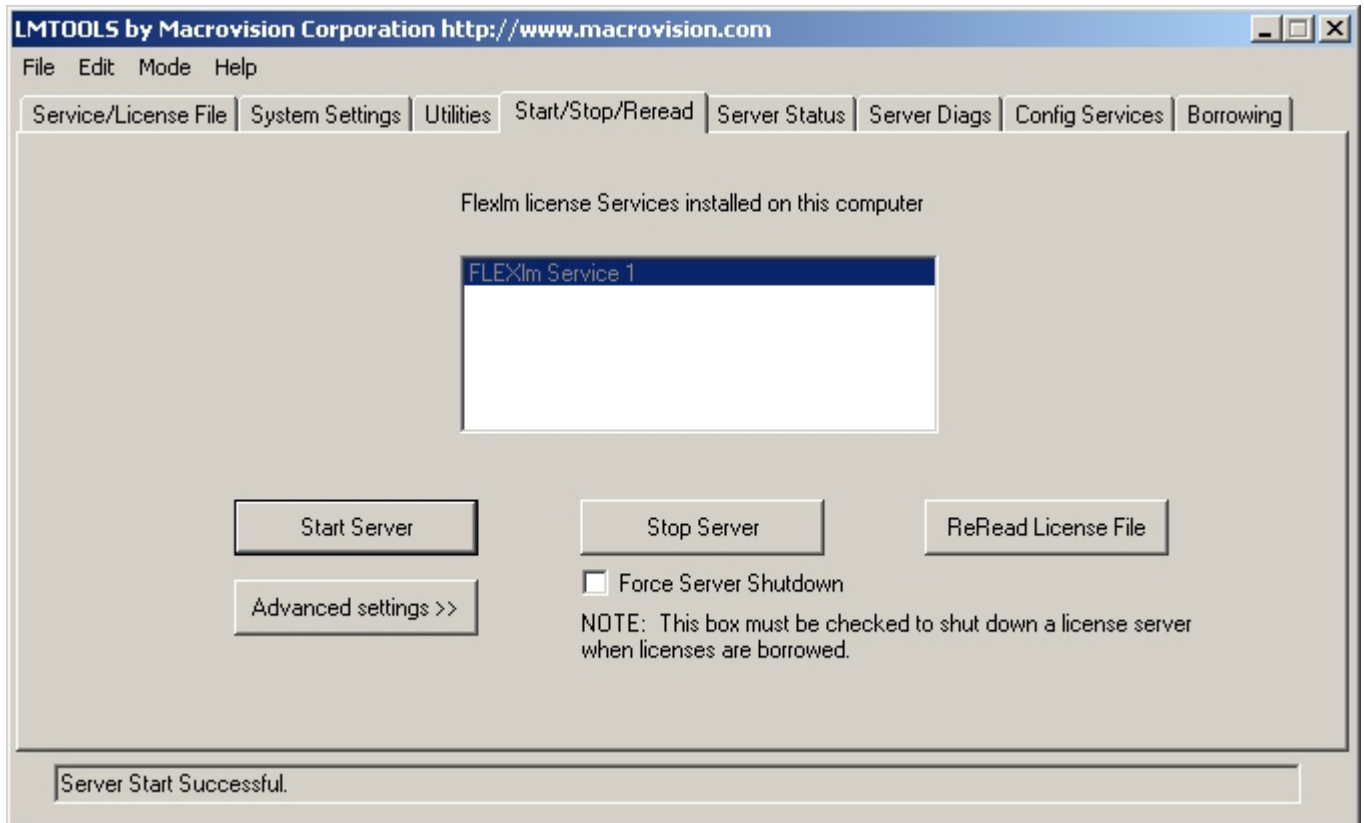
To configure the license server, follow the these steps:

- a) Start the program c:\Program Files\VNI\license\bin\bin.i386nt\lmtools.exe
- b) Use Config Services to configure the name of the service and the location of the lmgrd.exe file and license.dat files as well as the log file.
- c) You can also perform diagnostics to be sure the server is operational.

The images below show these various steps:

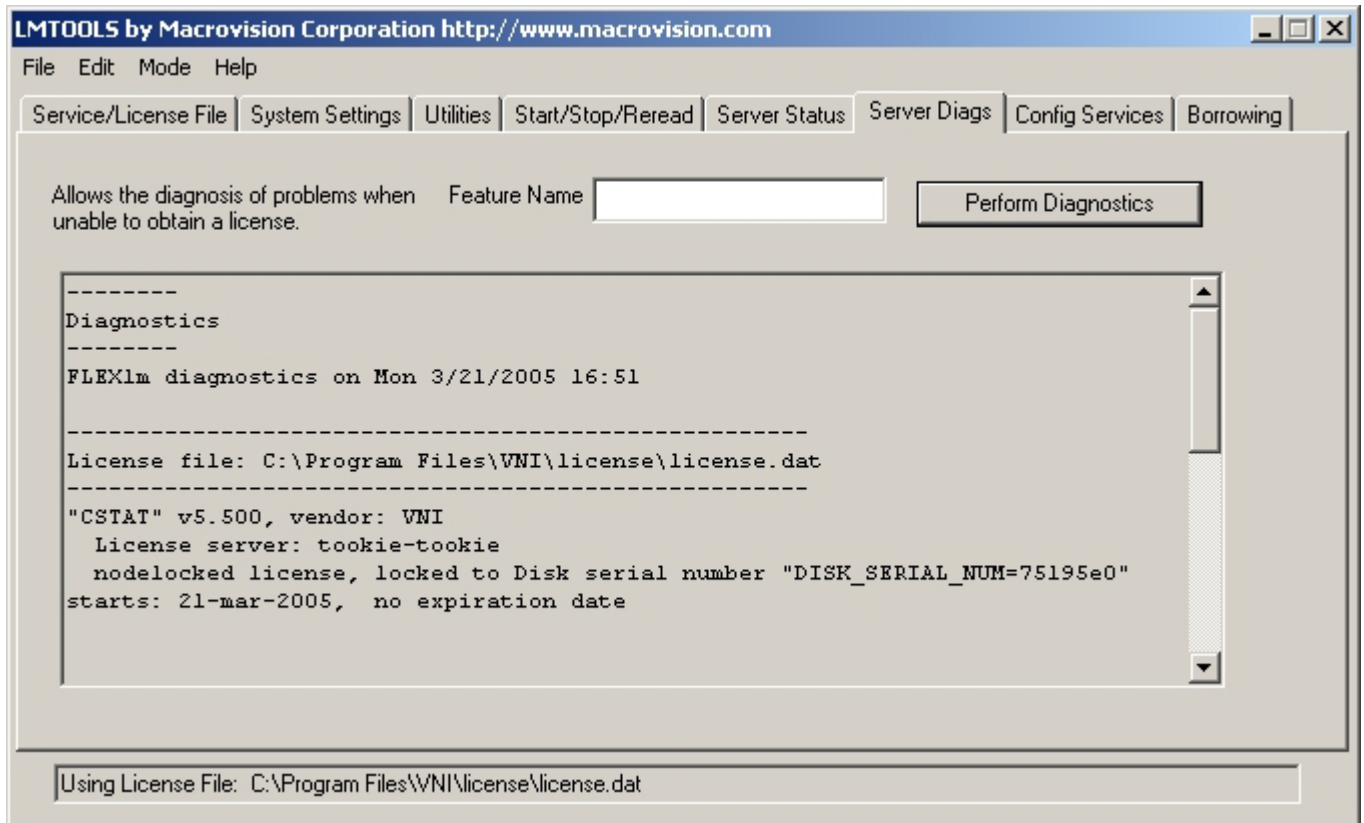






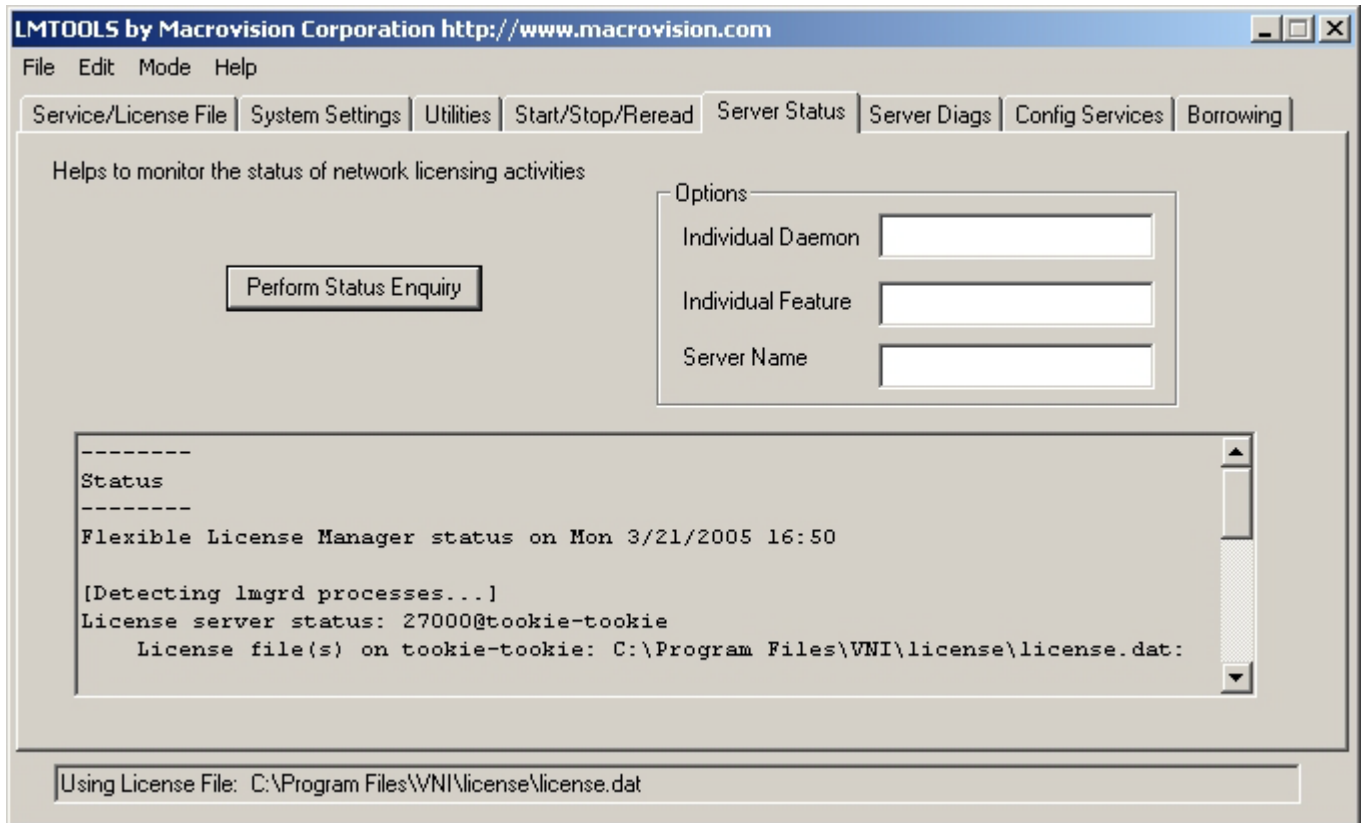
5. Start the license server

To start the license server, select Start Server. This program may also be used to stop the server or reread the license file. After the server is started, a log file is created as configured in Step 4b above. If you have problems with the license server, the log file is the first place to look.



6. Confirm the license server is running

Click Perform Status Enquiry to check the status of the license server.



Other information which may be useful

- If there is ever a problem checking out licenses, the first step should be to stop and restart the server using the Start/Stop/Reread tab of LMTOOLS.
- Additional information is available from Macrovision, the distributors of the FLEXlm software: <http://www.macrovision.com/services/support/flexlm/lmgrd.shtml>
- The email address of the license manager at Visual Numerics is lmgr@vni.com

Using IMSL C#

Using the IMSL C# Library for .NET

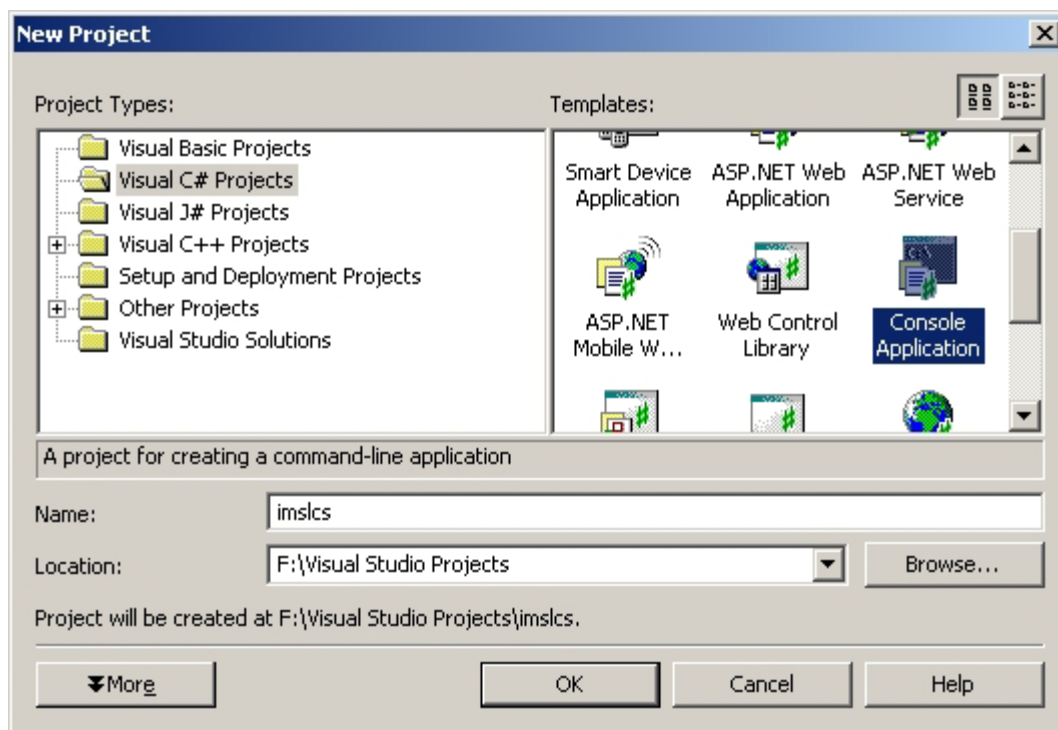
1. Creating a program

This simple example program will solve the following system of linear equations:

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

2. Start a new project

Start Visual Studio and create a new Visual C# Console Project named imslcs.



3. Add the code

Copy the following text into the Class1.cs source file and save it.

```
/* Program start */
// The Mathematics package for the JMSL Library.
// For Statistics, use Imsl.Stat
using Imsl.Math;

class Class1 {
    static void Main(string[] args) {
        // variable declaration
    }
}
```

```

double[,] a = {{33.0, 16.0, 72.0},
               {-24.0, -10.0, -57.0},
               {18.0, -11.0, 7.0}};
double[] b = {129.0, -96.0, 8.5};
double[] x;
double[,] ainv;

// The main IMSL function call to solve for x in Ax=B.
// In Java, the LU object first has to be instantiated.
LU lu = new LU(a);
// Then we can call the solve method.
x = lu.Solve(b);

// Optional outputs are obtained using other method
// calls. In this example, we request the inverse
// of the a matrix
ainv = lu.Inverse();

// Write the solution x and the inverse of a using
// PrintMatrix class, a printing utility */
new PrintMatrix("Solution x").Print(x);
new PrintMatrix("Inverse of A").Print(ainv);
}
}
/* Program end */

```

Compiling and running the program

Compiling and executing a program calling the IMSL C# Library for .NET 1.1

For Visual Studio 2005, you should have installed the IMSL C# Library for .NET 2.0.

1a. Compile the program from the command line

To use the csc command line compiler, start the Visual Studio 2003 .NET Command Prompt from the Start Menu: Start -> Programs -> Microsoft Visual Studio .NET 2003 -> Visual Studio .NET Tools -> Visual Studio 2003 .NET Command Prompt.

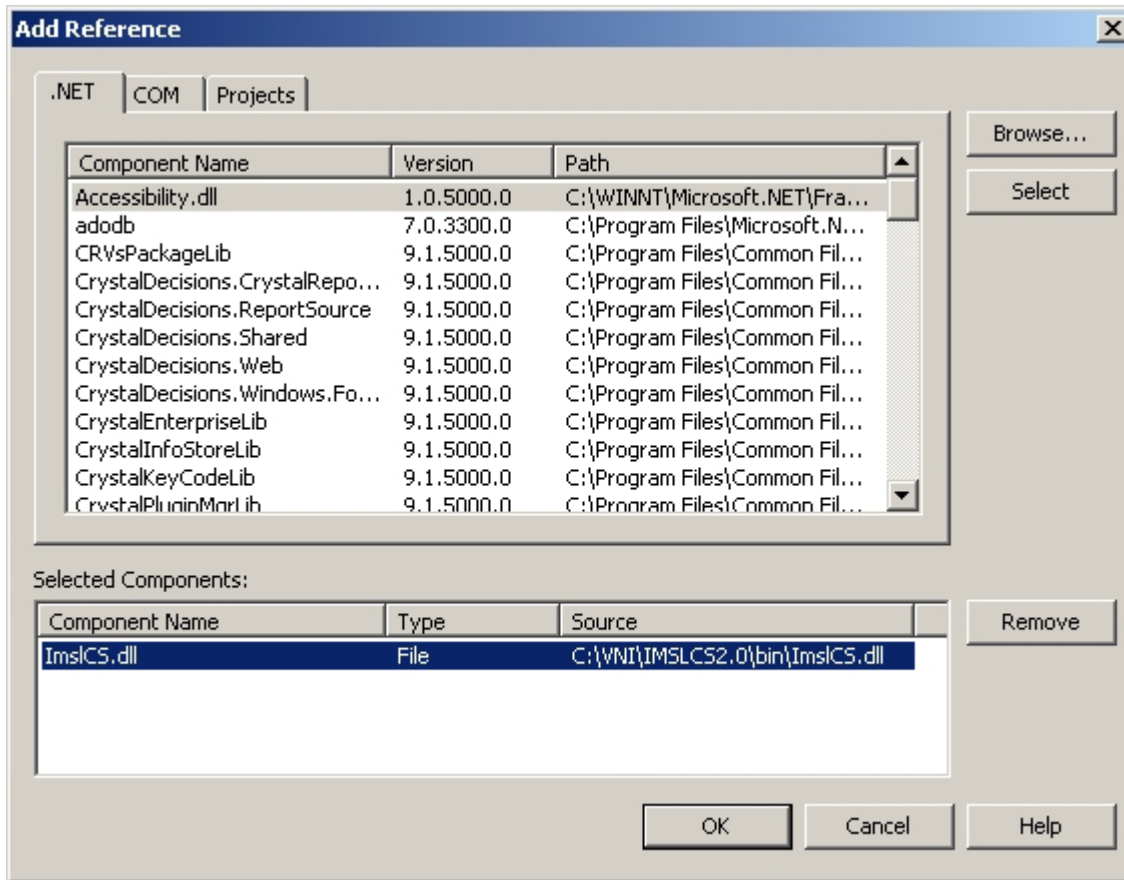
```
> csc /r:"c:\Program Files\VNI\IMSLC5.0\bin\ImslCS.dll" Class1.cs
```

1b. Compile the program using Visual Studio .NET

With the source code entered and saved from the previous document, the properties of the project must be configured to find the IMSL C# Library. From the menu bar, select Project -> Add Reference and Browse to the ImslCS.dll. This will add an entry "ImslCS" to the References list in the Solution Explorer.

To compile the project, choose Build -> Build Solution from the toolbar.





2a. Execute the program from the command line

```
> Class1.exe
Solution x
  0
0  1
1  1.5
2  1
```

```

                                Inverse of A
                                0          1          2
0  0.146397815584961    0.189876076454526    0.0403276622558286
1  0.180214240705734    0.223692501575299    -0.0321361058601134
2  -0.0932577189666036  -0.136735979836169    -0.0113421550094518
```

2b. Execute the program from Visual Studio .NET

From the menu, select Debug -> Start.

```
Solution x
  0
0  1
1  1.5
2  1
```

```

                                Inverse of A
```

```
          0          1          2
0  0.146397815584961  0.189876076454526  0.0403276622558286
1  0.180214240705734  0.223692501575299 -0.0321361058601134
2 -0.0932577189666036 -0.136735979836169 -0.0113421550094518
Press any key to continue.
```

For more information, refer to the ReadMe.html reference.

