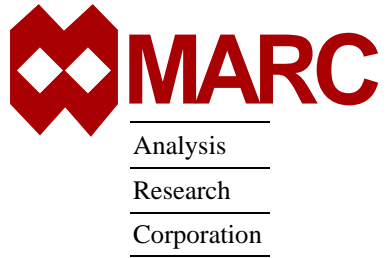


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MARC[®] K7.3.2
Network Version for Windows NT

Installation and User Notes

If you encounter a problem during the installation, please contact the customer support staff at the nearest MARC office. See the addresses listed below.

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Introduction

The current document is divided into three parts:

- Part I provides the general description about the hardware and software requirements, command line options for parallel runs, and definitions.
- Part II provides a step-by-step approach to installation in a shared directory.
- Part III provides miscellaneous information about execution with distributed I/O and use of user subroutines.

The list of supported capabilities in parallel can be found in Section VI of the Release Notes while additional notes on memory management for multi-processor jobs can be found in Section III, Item 4.

Part I General Information

MARC K7.3.2 NT 4.0 Network Version

The MARC K7.3.2 network version for Windows NT uses Genias PaTENT MPI v. 4.0.12 from Genias Software. The latter is included on the MARC CD.

Hardware and Software Requirements:

Although no specific hardware requirements exist for MARC to run in network mode, it is preferable to have fast network connections between the machines.

It is recommended that the network should have a speed of at least 100 MBit per second. If only two machines are to be used, a hub or a cross-over cable can be used to connect them. If more than two machines are to be used, a switch is preferable.

Only Intel-based machines can be used with this version. The O/S must be Windows NT 4.0, Service Pack 3 or later. Windows 2000 is not supported at this time. It is recommended to have a Fortran compiler installed. This version supports Digital Fortran with Microsoft Visual Studio, versions 5 and 6. If version 5 is used, the service pack 3 must be installed. It can be downloaded from <http://msdn.microsoft.com/vstudio/sp/vs97>.

Definitions

- 1. Local machine:**
The machine on which the MARC job is started.
- 2. Remote machine:**
Any machine other than the local machine which is part of a distributed MARC run on the network.
- 3. Shared installation:**
MARC is installed in a UNC shared directory on one machine only. Other machines can access the MARC executable since the directory is shared.
- 4. Distributed installation:**
MARC is installed on all machines. Each machine accesses its own MARC executable.
- 5. Distributed execution:**
MARC is run on multiple machines which are connected with a network. Each machine loads the MARC executable either from a shared or a local directory and then executes the executable.
- 6. Shared I/O (Figure 1):**
MARC reads and writes data in a UNC shared directory. Each MARC executable running on the network reads/writes to the same directory.
- 7. Distributed I/O (Figure 2):**
MARC reads and writes data in a directory located on each machine. The user must make the input available in each directory and collect the results files after the analysis.
- 8. UNC – Uniform Naming Convention.**

Restriction

A distributed job cannot be started from within Mentat in this version. The job must be started from a Command Prompt.

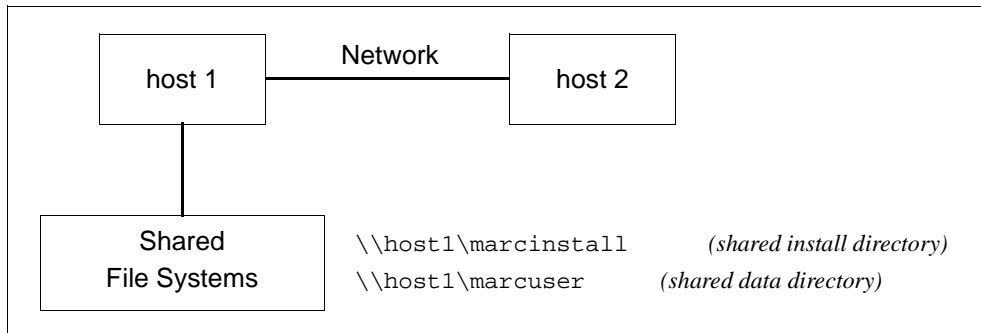


Figure 1 Shared Installation, Shared I/O

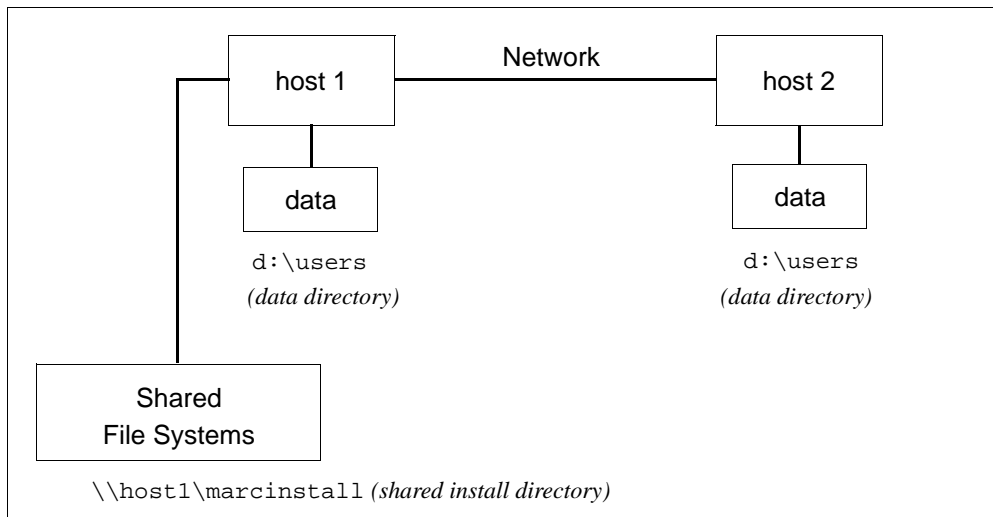


Figure 2 Shared Installation, Distributed I/O

Installation:

It is recommended that MARC is installed in a UNC shared directory on one machine only (Figure 3). The installation must be performed with Administrator privileges.

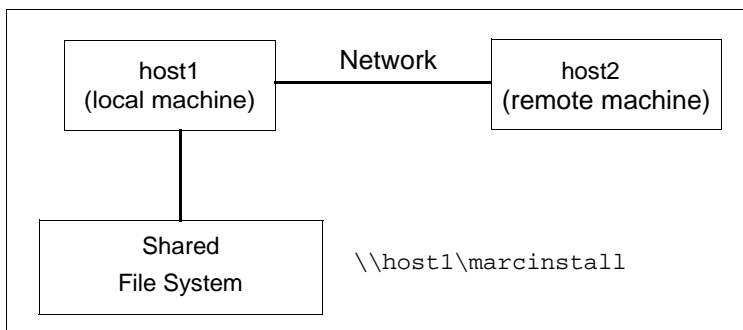


Figure 3 Shared Installation

New MARC Command Line Options for Parallel Runs

1. `-host hostfile`

If distributed execution is desired, specifies the name of a host file containing the host names of the machines on which to run the job. If this option is omitted, it is assumed that the job will run on the local machine only.

2. `-dist yes|no`

If distributed execution is desired, specifies that I/O must be distributed as well. If this option is omitted but the host file option is present, the execution will be distributed but all I/O will be performed in the current directory on the local machine. If this option is omitted and the host file option also is omitted, the execution of the job will occur on the local machine only and all I/O will occur on the local machine only.

Part II Installation Notes

MARC K7.3.2 NT 4.0 Network Version

MPI Version: Genias PaTENT MPI v. 4.0.12

Steps 1–7 must be performed as Administrator

Step 1 Assume that `host1` and `host2` are the host names of two machines on which MARC K7.3.2 is to be run in network, parallel mode. Assume that MARC is to be installed on `host1`, which will be called the local machine. Log onto `host1` as Administrator and check that the second machine can be reached by accessing it with Network Neighborhood.

Step 2 Assume that MARC is to be installed under `c:\MARC`. Make this directory shared by associating a UNC sharename with it (Figure 3) as follows. Use **My Computer** and locate the directory to be shared. Right click on the directory and choose **Sharing**. Choose **Share as** and give it a **Share Name** (this is the UNC name) and click **OK**. Please note that MARC restricts the UNC name to have a maximum of 10 characters and the name of the shared directory to have a maximum of 30 characters. If necessary, a directory higher up in the path can be shared (for instance, `c:\` instead of `c:\MARC`). It is sufficient that either `c:\` or `c:\MARC` is shared.

Suppose the directory `c:\MARC` is shared using the UNC name `marcinstall` on host `host1`. Test that the directory `c:\MARC` on `host1` can be accessed by typing `pushd \\host1\marcinstall` from the Command Prompt.

Step 3 Install MARC from the CD into `c:\MARC` on the local machine. See *Installation Instructions for Windows NT*.

Install PaTENT MPI, which is also on the CD, on both the local machine and the remote machine(s). If PaTENT MPI is already installed on a machine, it must be uninstalled. Note that MARC only needs to be installed on the local machine but PaTENT MPI must be installed on all machines used in an analysis. Enter any number when asked for the serial number.

Step 4 Set up Patent MPI on each machine. Go to **My Computer/Control Panel/Services** and select **PaTENT MPI**. Then, select **Startup...** and set the **Startup Type** to **Automatic**. Select **This Account** under **Log On As**. An existing user name and password should be entered here. This user must be different than Administrator and it must be the same on all connected machines.

Now check that the machines can exchange messages. Bring up a command window and type:

```
c:
cd \MARC\marck73\test_ddm\mpi
```

at the Command Prompt. Edit the file called `hostfile`, and replace `thishost` with the host name of the local host, `host1`, `otherhost` with the host name of the other machine, `host2`, and `uncpathtomarck73` with the actual UNC path name to the install directory, `\\host1\marcinstall\marck73`. Now type:

```
.\testmpi
```

This starts a program which should run on `host1` and `host2` in parallel to calculate the value of pi. When prompted, enter a value of 1000 for the number of intervals. If successful, the value of pi is printed to the screen. If not, see the section in this document on “[Trouble Shooting](#)”.

Step 5 Create a MARC file with the shared naming information:

```
c:
cd \MARC\marck73\tools
net share > marck73.net
```

This file has to be re-created each time the shared names of installation or working directories are changed. The file `marck73.net` contains the connection between the path names on the local machine and the UNC names, and can be created only by the Administrator.

Step 6 Test the MARC installation for single processor execution by typing from host1:

```
c:
cd \MARC\marck73\test_ddm\exmpl2\exmpl2_1
run_marc -j cyl2
```

and MARC should exit in about three minutes if it is a successful run.

Step 7 Test the MARC installation for multi-processor, distributed execution by typing from host1:

```
c:
cd \MARC\marck73\test_ddm\exmpl2\exmpl2_2
```

and edit the file `hostfile` in this directory by replacing `thishost` with `host1` and `otherhost` with `host2`. Finally, type:

```
run_marc -j cyl2 -nproc 2 -host hostfile
```

and MARC should exit in about two minutes if it is a successful, parallel run on `host1` and `host2` using one processor on each. If the job stalls or hangs at start-up time, exit it by typing `control-C` in the window in which it was started. See [“Trouble Shooting”](#) in this document.

Part III User Notes

MARC K7.3.2 NT 4.0 Network Version

MPI Version: Genias PaTENT MPI v. 4.0.12

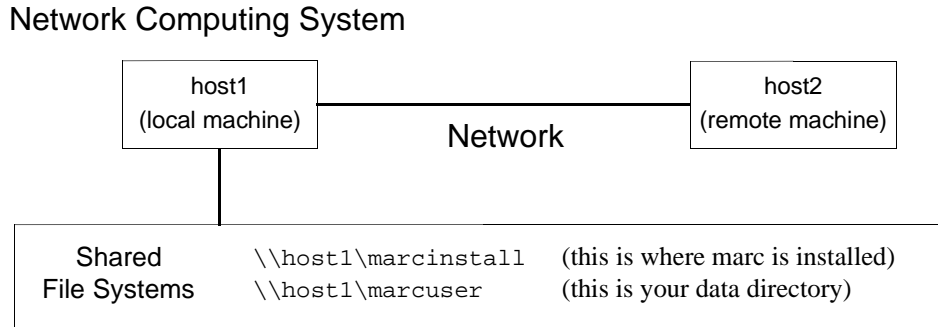
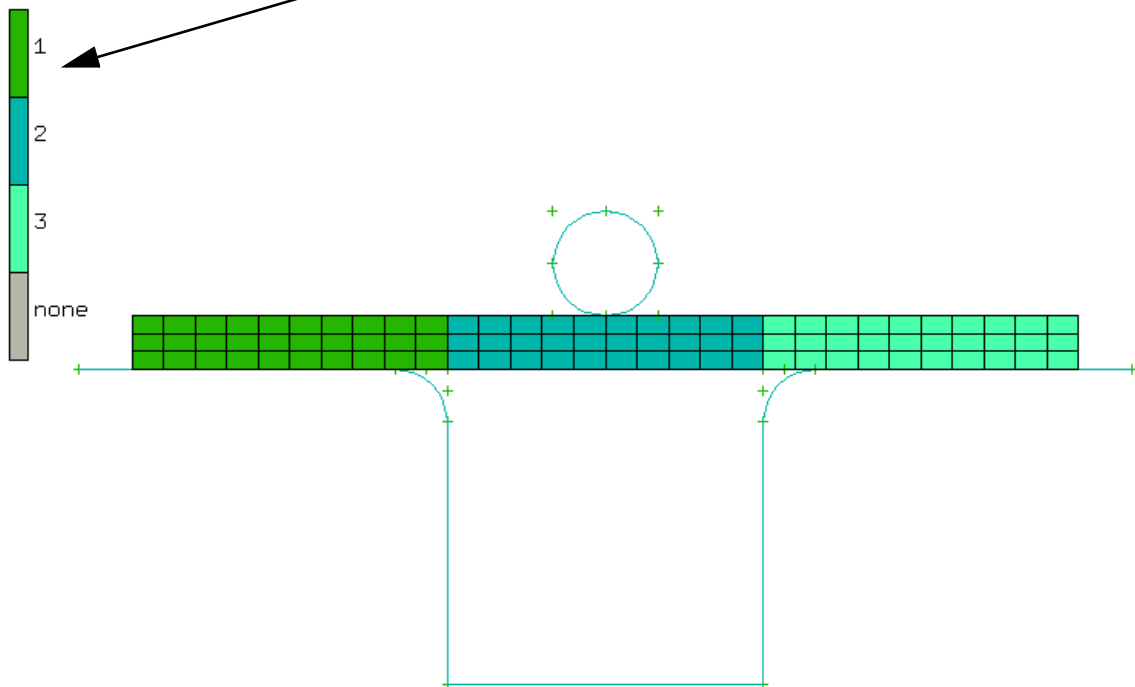
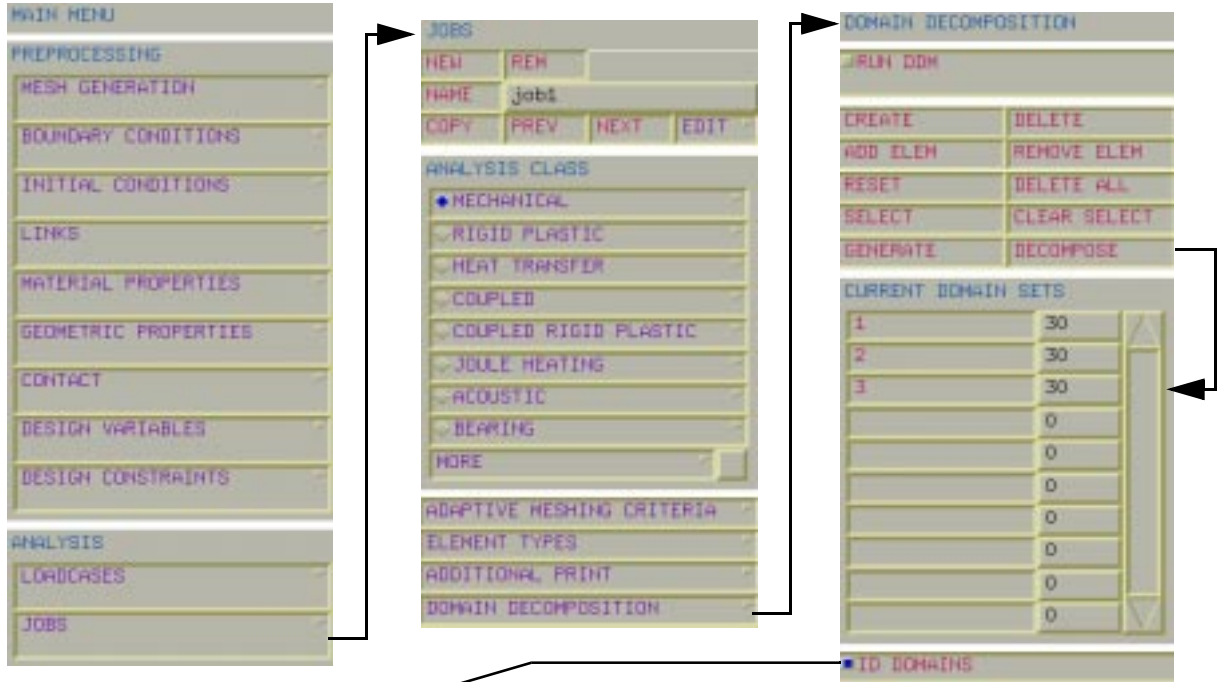


Figure 4 Shared Installation, Shared I/O

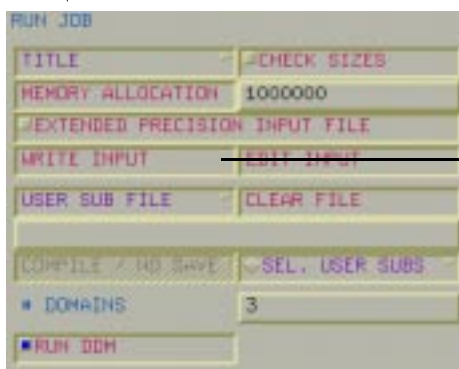
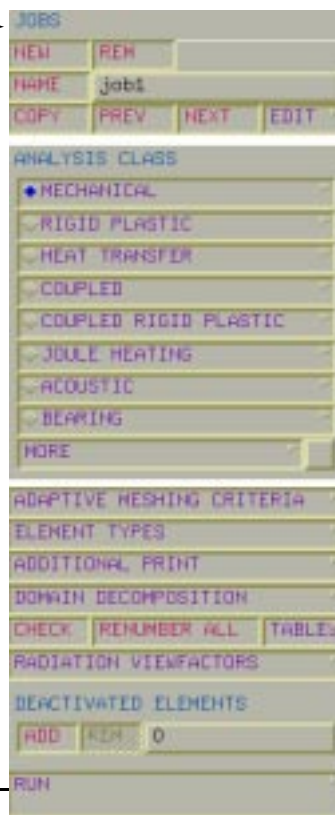
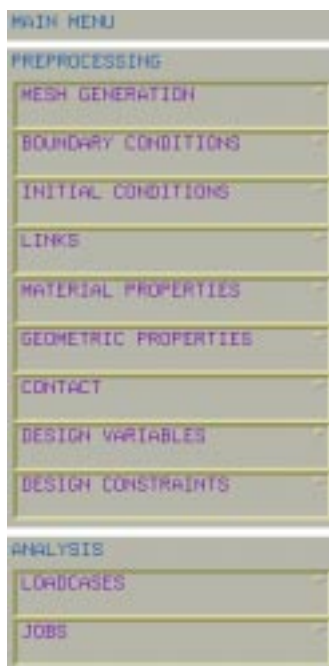
- Step 1** Assume that host1 and host2 are the host names of two machines on which MARC K7.3.2 is to be run in network, parallel mode. Check that the second machine can be reached by accessing it with Network Neighborhood.
- Step 2** Assume that host1 has been selected as the machine on which all MARC data is located. Create or locate on host1, a directory which is to be used for the MARC user data and make it UNC shared (see Step 2 in Part II above). Assume that this directory is called `c:\mydata` and that it is shared as `marcuser`.
- Step 3** Create a host file called `hostfile` in `c:\mydata`. This file specifies the machines to use and the number of processors to use on each. A typical host file should look as follows:
- ```

host1 2
host2 2
#this is a comment
hostn m

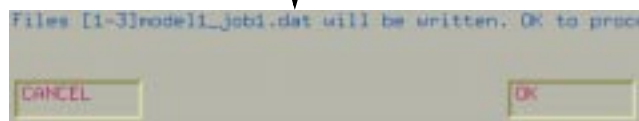
```
- where `hostn` is a typical host name on which `m` processors are to be used. MARC will create parallel processes such that processes 1 and 2 will run on host1, processes 3 and 4 on host2, etc. The name of the host from which the job is started must occur first; each host name must occur only once; all lines starting with a # sign or with a control character are ignored; finally, all blank lines are ignored.
- Step 4** Use Mentat to build your test model. As an example, use the Mentat procedure file, `example.proc`, in the `marck73\notes` subdirectory. Enter Mentat and execute the procedure file to build your model as shown in the next step. Select and confirm your three domains as shown below on the following page.



**Step 5** Write The MARC Input



Select RUN DDM



**Step 6** Edit hostfile to contain:

```
host1 2
host2 1
```

The hostfile places two domains on host1 and one domain on host2.

Run MARC from host1 with the command:

```
run_marc -j modell_job1 -nproc 3 -host hostfile
```

**Sample output from MARC**

MARC K7.3.2 Windows\_NT version

```

Program name :
Job ID : marck73
User subroutine name :
Restart file job ID :
Substructure file ID :
Post file job ID :
Defaults file ID :
View Factor file ID :
Save generated module : no
Number of tasks : 3
Host file : hostfile
Distributed i/o :
:
```

Wed Apr 22 10:44:03 PST 1999

```
marc job \\host1\marcinstall\marck73\notes\lmodell_job1 begins execution
(c) COPYRIGHT 1999 MARC ANALYSIS RESEARCH CORPORATION,
all rights reserved
```

memory in main program initially set to = 6250000

number of processors set to = 3

VERSION April 12, 1999

marc execution begins

e n d o f i n c r e m e n t 0

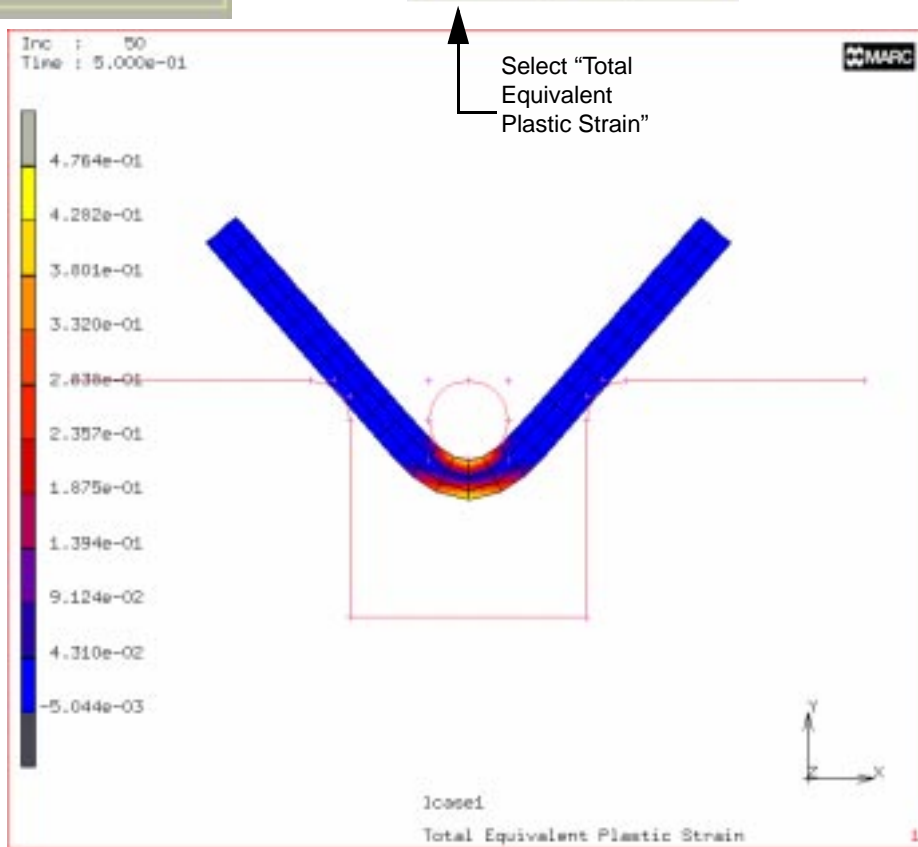
Lines Omitted

e n d o f i n c r e m e n t 50

marc exit number 3004

**Step 7** Check your results

The image shows the MARC software interface. On the left is the 'MAIN MENU' with sections for PREPROCESSING, ANALYSIS, and POSTPROCESSING. The 'POSTPROCESSING RESULTS' window is open, showing a 'FILE' menu with options like 'OPEN DEFAULT', 'CLOSE', 'NEXT INC', 'REWIND', and 'MONITOR'. A 'DEFORMED SHAPE' section is set to 'DEF ONLY'. A 'SCALAR PLOT' section is set to 'CONTOUR BANDS'. Arrows point from the 'RESULTS' option in the main menu to the 'POSTPROCESSING RESULTS' window. Other arrows point from text labels to specific options in the 'POSTPROCESSING RESULTS' window: 'Open Default' points to 'OPEN DEFAULT', 'Skip to Inc 50' points to 'NEXT INC', 'Def Only' points to 'DEF ONLY', and 'Contour Bands' points to 'CONTOUR BANDS'.



MARC created a post file associated with each domain as well as a root post file associated with the job id. For the previous model, `1model1_job1.t19`, `2model1_job1.t19`, and `3model1_job1.t19` are the processor files, while `model1_job1.t19` is the root file.

To postprocess the entire model, select `model1_job1.t19` as the postprocess file. If the model is very large, it can be convenient to view only a portion of the model by selecting any one of the processor post files, such as `3model1_job1.t19`. This file contains only data associated with domain 3 as selected in the **Domain Decomposition** menu under [Step 4](#). As specified in the host file in [Step 3](#), this file was created by host2.

## Distributed I/O

For jobs with very large post or restart files, it is usually more efficient to use distributed I/O. [Figure 1](#) and [Figure 2](#) show the difference between shared and distributed I/O. Note that the local directories must have the same names on the different machines. With distributed I/O, the input files and the post files are located on the host's local disks. The user must make sure that the input files are available on all hosts before the job is started. In the case of the previous model, for instance, the host file specifies that the first two domains are placed on host1 and the third on host2. Therefore, `1model1_job1.dat` and `2model1_job1.dat` must be located under `c:\mydata` on host1, and `3model1_job1.dat` must be located under `c:\mydata` on host2. The root input file, `model1_job1.dat`, always must be located under `c:\mydata` on the local machine host1.

To run a job using distributed I/O, add the `-dist yes` option to the command line:

```
run_marc -j jobname -nproc 2 -host hostfile -dist yes
```

It is recommended to make the local disks shared even though the I/O is distributed. This will make it easier to collect the post files from the different hosts. The `-dist yes` option ensures that the I/O will take place locally despite the fact that the local disk can be reached from a remote host.

## Information for Jobs with User Subroutine

If user subroutines will be used, it is necessary that the working directory on the host on which the job is started is shared. MARC will compile the user subroutine on the local host, and place a new executable on this host. The new executable is then available to other hosts if the directory is shared. For information on how to create shared directories, see Part II, [Step 2](#) of this document. An error message saying that the UNC name cannot be found is given if the working directory is not shared. Remember to re-create the file `marck73.net` as Administrator if a new directory sharing has been defined (see Part II, [Step 5](#) of this document).

## Solver Information

Solver type 6 (hardware provided sparse) is not available on the NT platform.

Solver types 0 (direct profile), 2 (sparse iterative) and 4 (sparse direct) are supported in parallel.

Out-of-core solution is not supported in parallel.

## Trouble Shooting

Use the Event Viewer on the local host by selecting **Start/Programs/Administrative Tools/Event Viewer** to read the System, Security, and Application log files under the **Log** button. To read these files on a remote host, select **Log/Select Computer** and pick the remote host from the list. Look for log entries related to PaTENT MPI.

Check that:

1. Your user ID is recognized by the remote hosts.
2. The remote hosts have permission to read from and write to the local host. In particular, check that the sharing is giving full access; i.e., not being restricted to read only.
3. Your MARC and PaTENT licenses are valid.

4. The host names are valid.
5. The PaTENT MPI Service is running. Select **My Computer/Control Panel/Services** and look for PaTENT MPI in the list. Check that it has **Status: Started**. This must be done on all hosts. Also check that the user name used for this service is the same on all hosts. Select PaTENT MPI from the list and select **Startup. Log On As** should be set to **This Account** with a user name which is the same on all hosts.
6. The file `marck73.net` in the `marck73\tools` directory is up to date. See Part II, [Step 5](#) of this document.