

WMPI
Message Passing Interface

For

WINDOWS

Installation Manual

Version 1.5.5

Critical Software
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Chapter 1

Installation

The installation of WMPI is performed by a standard procedure using InstallShield for Windows Installer. From an *Administrator* account, you only have to start the provided setup file. Be aware that during the installation process you will need a valid license string.

1.1 Pre-Installation Issues

This section describes the requirements of WMPI and the changes the installation performs in your system.

Before installing any WMPI edition please make sure that TCP/IP is correctly installed and configured within your environment and your systems drive has at least 5 MB of free disk space for a full installation (**Typical**) of WMPI. If you have disk space restrictions, choose the **Compact** option or choose your own features to be installed (**Custom**).

1.1.1 Installation Requirements

- Account with administrator privileges (belong to the Administrator Group)
- 5 MB of free disk space

1.1.2 Runtime Requirements

- Windows NT (Service Pack 4) *or*
- Windows 2000
- 64 MB of Memory
- Pentium II
- TCP/IP is correctly installed

1.1.3 Development Requirements

- Runtime Requirements plus
- If developing in C
 1. MS Visual Studio C++ 6 *or*
 2. Absoft C++
- If developing in FORTRAN
 1. Compaq Visual FORTRAN *or*
 2. Lahey FORTRAN *or*
 3. Absoft FORTRAN

1.2 Installation Files

1.2.1 Files Description

The following files are installed in your computer:

Files	Location WMPI_BASE	Description
*.h	include\	Include files to compile WMPI applications
wmpi.lib	lib\	Library file to compile WMPI applications (VC++)
wmpif_vf.lib	lib\	Library file to compile WMPI applications (VF)
wmpi.dll	bin\	WMPI DLL
wmpi_tcp.dll	bin\	TCP device's DLL
WMPITCPDaemon.exe	bin\	Daemon for the TCP device
wmpi_tcp service.exe	bin\	NT service for the TCP Device
wmpi_shmem.dll	bin\	Shared Memory device's DLL
mpiexec.exe	bin\	Tool to start MPI programs
wmpi_service.exe	bin\	NT service used to start programs
WMPiRegUser.exe	bin\	Tool to manage WMPI user passwords
wmpitestconf.exe	bin\	Tool to read and check the configuration file
PI Example	examples\pi_calc\	Well known PI calculation example
Multi PingPong Example	examples\MultiPingPong\	Simple multithreaded example
Mandel Example	examples\Mandel\	An example of an MFC application using WMPI
PI Example	examples\pi_calcf90\	FORTAN 90 PI calculation example
PingPong Example	examples\pingpongf\	FORTAN 77 PingPong example
WMPI Documentation	doc\	Documentation about WMPI v1.5

Table 1.1: Installation Files Description

1.2.2 Environment Changes

WMPI's installation performs minor changes in your environment system. The setup installs *MSI - Microsoft Service Installer* if it doesn't find it on the system (may happen in *Windows 9x* and *NT* Systems). The following variables are set to ease the use of WMPI:

- **MPI_ROOT** is set to the install base directory (with a trailing slash)
- **PATH** variable is changed to include the WMPI bin directory.

1.3 Installation Process Step by Step

1.3.1 Step 1 - Starting Installation

After downloading the WMPI installation executable, and receiving your WMPI license, it's time to proceed to the installation phase.

Be aware of the requirements presented on the previous subsection 1.1.

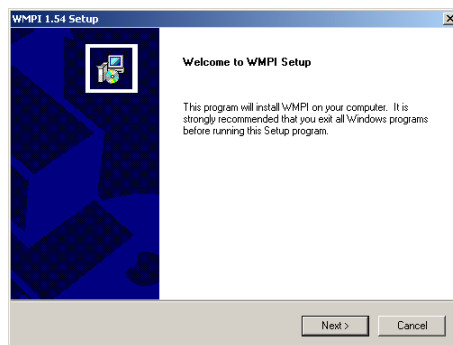


Figure 1.1: WMPI Setup

You must run the WMPI installation executable to start the installation procedure. Then, it will appear the start menu (figure 1.1), where you must click *Next* to start your installation.

1.3.2 Step 2 - License Agreement

Install/Use WMPI requires your acceptance of the license agreement. You should read it with full attention, and answer to the presented menu on figure 1.2.

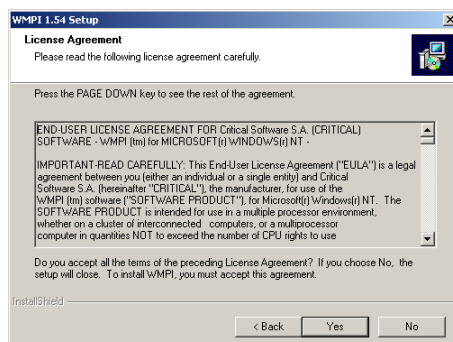


Figure 1.2: WMPI License Agreement

If it is a mutual consent, then you must agree with it to go for the next stage, otherwise you should stop the installation and erase the setup file from your computer.

1.3.3 Step 3 - Customer Information

The WMPI Setup will recognize the machine's user name and the organization that the machine belongs to. Even so, it's possible to change it. After, copy your license string (received by email) to this dialog.

Figure 1.3: WMPI Customer Information

Figure 1.4: WMPI Customer Information with License

It is advised to *copy and paste* the string from your WMPI License email (*line 12 of the WMPI License email*) directly to the dialog, otherwise it can be easy to miss writing it.

WMPI License Email

When downloading and registering your personal information, you receive an email, with the respective WMPI License. All the indispensable information concerning the WMPI support and Licensing will be provided.

```

1  To: your@email
2  Subject: Your WMPI License
3
4  Dear WMPI User,
5
6  You have downloaded the free trial version of the WMPI 1.5 library.
7  This version is full feature, though limited in time.
8
9  During install your will be asked for the license, please insert the
10 following string:
11
12 08021:727BAB882B62:01008
13
14 This license has the duration of 120 days starting from today.
15
16 After its enormous success as an academic project, WMPI is now a
17 commercial product by Critical Software. The change into an enterprise
18 environment has allowed WMPI to continue its development with the
19 original team. It has also provided the necessary structure to provide
20 a full range of support services to ensure that you get the most out
21 of your product and maintain the highest levels of productivity.
22
23 If you wish additional information about WMPI prices and support please
24 contact wmpi-sales@criticalsoftware.com.
```

25
 26 We also appreciate your feedback - if you have a suggestion, problem or
 27 desire for a new feature in WMPI, don't hesitate sharing your issue
 28 with the developers, send an email to wmapi-support@criticalsoftware.com.
 29
 30 Thanks for your interest in WMPI.

1.3.4 Step 4 - Destination Folder Installation

You must choose where to install WMPI. The default path is on root directory, but you can change it to anywhere you prefer.

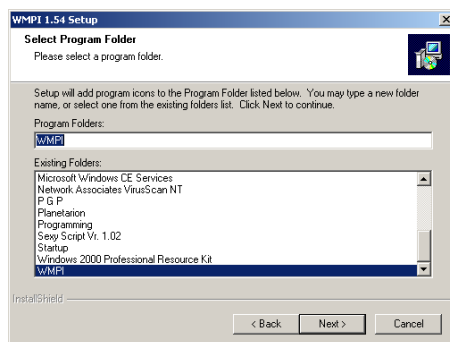


Figure 1.5: Default destination folder installation

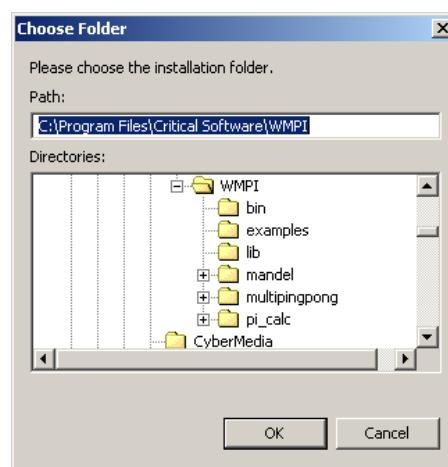


Figure 1.6: Change destination folder installation

1.3.5 Step 5 - Setup Type

Choose the setup type that best suits your needs: typical , or compact (figure 1.7 or custom (figure 1.8).

The *Typical* setup type will install all program features and will require more disk space. We recommend this option for mostly common users.

Custom Type

The *Custom* setup type will install only the features you desire, reducing the amount of disk space used. This option can be complex and requires some previous knowledge about Clustering, MPI and WMPI, so we recommend it for advanced users only.

1. **Execution** This component includes all executables and services needed to make WMPI compiled applications run (figure 1.9).

- (a) Device TCP

Includes all the binaries necessary to use the TCP Device in your machine.

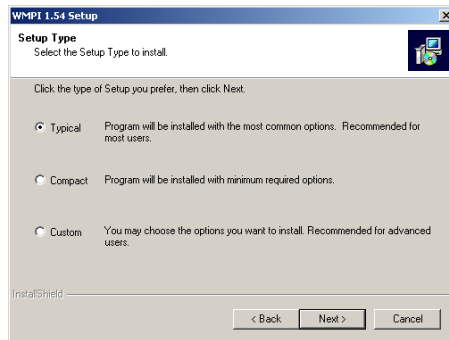


Figure 1.7: Default Setup Type

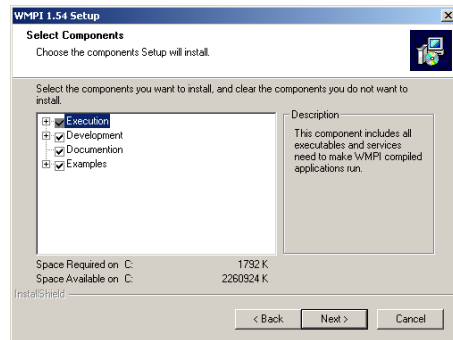


Figure 1.8: Custom Setup Type

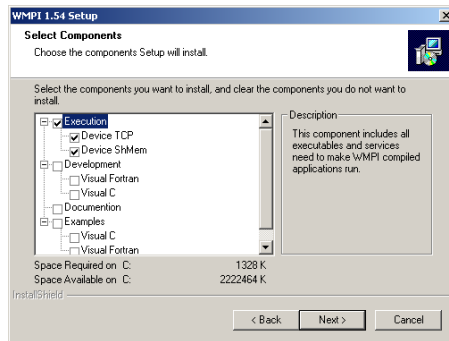


Figure 1.9: Custom Option - Execution

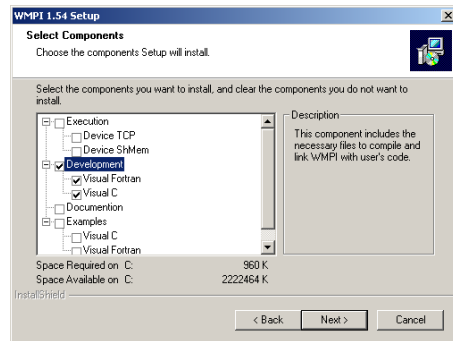


Figure 1.10: Custom Option - Development

(b) Device Shmem

Includes all the binaries necessary to use the Shared Memory Device in your machine.

(c) Core

Core components (WMPi Dll's), required to run MPI programs.

(d) Remote Start

Service needed to start the first process using *MPI_Exec*. TCP/IP driver must be installed on the system.

2. Development

This component includes the necessary files to compile and link WMPi with user's code. (figure 1.10)

(a) Visual Fortran

Includes all the binaries necessary files to compile and link WMPi with user's Compaq Visual Fortran projects.

(b) Visual C

Includes all the binaries necessary files to compile and link WMPi with user's code using Microsoft Visual C++.

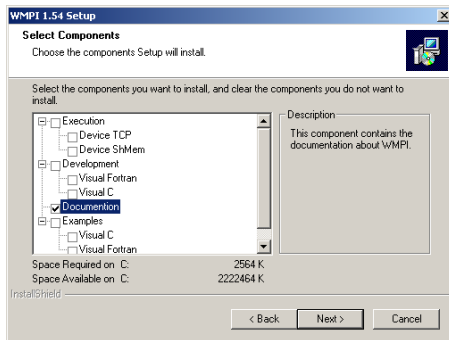


Figure 1.11: Custom Option - Documentation

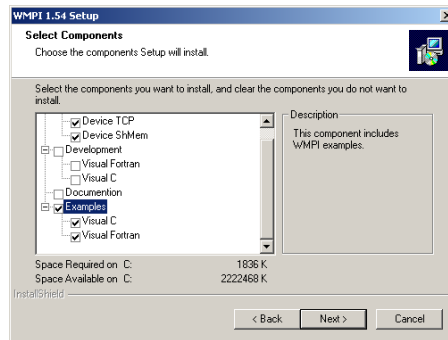


Figure 1.12: Custom Option - Examples

3. Documentation

Product documentation. (figure 1.11)

- (a) WMPI
WMPI specific documentation.
- (b) Functions Reference
MPI Functions reference.

4. Examples

Examples of MPI programs. (figure 1.12)

- (a) Binaries
Binaries to run the programs.
- (b) Source
Source Code of the examples.

1.3.6 Step 6 - Ready To Install

Now, you must be able to complete your WMPI Installation (figure 1.13). All installation options were inserted with success. Never the less, if something is not feeling right or if you want to check it all again, you are still able to *roll back* all installation process.

1.3.7 Step 7 - Installing WMPI

The installation process has started the *real and effective* installation, the whole process may take several minutes. Although, InstallShield Setup Wizard has initialized the WMPI Installation, there is still the possibility to cancel the installation operation anytime you wish. It is ensured that your previous environment will be restored exactly as it was before starting the WMPI installation.

1.3.8 Step 8 - WMPI Installation Complete

Finally, the WMPI Installation Process is complete (figure 1.15). Now, you are able to start using WMPI features.

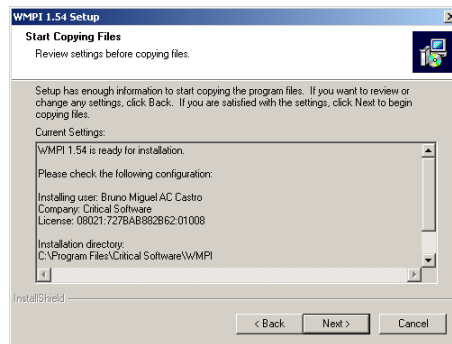


Figure 1.13: Ready To Install

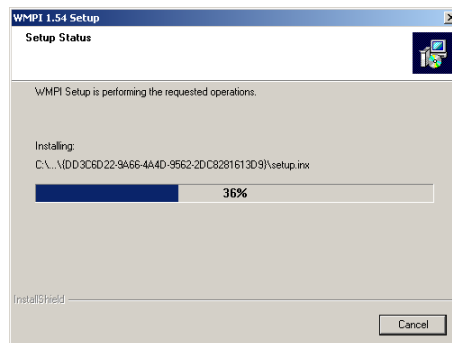


Figure 1.14: Installing WMPI

1.4 Check Your Installation

The installation is complete, now it is time to check the results of it. To do so, you must compare the layout of the file system presented on figure 1.16 with your own file system after the WMPI installation. You should get a similar layout. After, you must run a WMPI Application example to test if WMPI is able to run.

1.4.1 Layout of File System

Since the layout of the WMPI file system is present, it would be useful to make a simple description of each directory.

1. WMPI Utilities → WMPI_BASE\bin
2. Product documentation. → WMPI_BASE\doc
3. Examples of MPI programs → WMPI_BASE\examples
4. Files (libraries) to be included in WMPI applications → WMPI_BASE\include
5. WMPI libraries → WMPI_BASE\lib

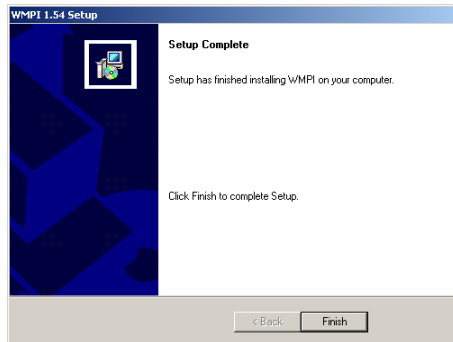


Figure 1.15: WMPI Installation Complete

1.4.2 Run PI Example

This is a very simple and well-known MPI example. It is used to test the basic functions of MPI and to check your WMPI installation.

1. Objective

Calculate the value of PI using numerical integration. The user may choose the accuracy of the calculation using a command line argument, if no value is introduced, the master process will ask for it.

2. Files

Files	Location	Description
pi_calc.c	Examples\PI_Calc\	Example code file
PI_Calc.dsp	Examples\PI_Calc\	VC++ Project file
pi_calc.exe	Examples\PI_Calc\Release\	Release linked executable
pi_calc.pg	Examples\PI_Calc\Release\	Process Group file prototype
wmpi.clusterconf	Examples\PI_Calc\Release\	Cluster Configuration file prototype

Table 1.2: Pi Calculation Files Description

To simplify the matter, the Cluster Configuration and Process Group files are available in the current path. Further ahead, the configuration matter will be presented with higher detail (section ??). Meanwhile, you can use this configuration files to run *Pi Calculation* example and also to check out your installation.

3. How to Run

You can run the PI example from `WMPI_BASE\examples\Pi_Calc\Release\pi_calc.exe`. The executable requires no parameters. The process started by the user asks for the number of intervals that the user wants. The bigger the number, the more accurate the value of PI. Although the accuracy is system limited the variable that holds the value is a double. Notice that two slave processes are created along with the master process.

After executing the calculation a set of time statistics is presented.

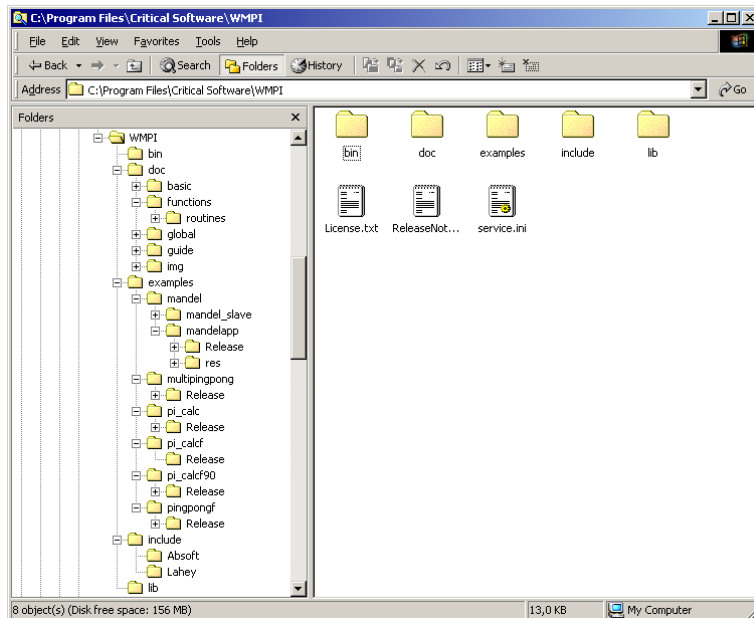


Figure 1.16: WMPI Layout File System

```

C:\WMPI>cd examples\pi_calc\Release
C:\WMPI\examples\pi_calc\Release>pi_calc
Calculation of PI by numerical Integration
Number of intervals: 10000
Master: Sending # of intervals to MPI-Processes
Master: Has collected sum from MPI-Processes

Pi estimation: 3.14159265442313180000
3 tasks used - Execution time: 0.001 sec

Statistics:
Master: startup: 150 msec
Master: time to send # of intervals:0.000 sec
Master: waiting time for sincro after calculation:0.00 sec
Master: time to collect: 0.000 sec
Master: calculation time:0.000 sec
process 1: calculation time: 0.000 sec   waiting time for sincro.: 0.000 sec
process 2: calculation time: 0.000 sec   waiting time for sincro.: 0.000 sec
C:\WMPI\examples\pi_calc\Release>

```

Figure 1.17: PI Calculation Example

Chapter 2

MPI External Links

2.1 Benchmarks

PMB - Pallas MPI Benchmarks MPI1

A set of benchmarks that targets point-to-point message-passing, global data movement and computation routines. We ported and actively use PMB2-MPI1 on WMPI.

- <http://www.pallas.de/pages/pmb.htm>

NPB - NAS Parallel Benchmarks

The NAS Parallel Benchmarks (NPB) are a set of 8 programs designed to help evaluate the performance of parallel supercomputers. The benchmarks, which are derived from computational fluid dynamics (CFD) applications, consist of five kernels and three pseudo-applications.

- <http://www.nas.nasa.gov/Software/NPB/>

2.2 MPI Tutorials

ANL MPI Exercises

Simple data structures, master/slave and other examples (a couple advanced which include data typing) created by Gropp and Lusk.

- <http://www-unix.mcs.anl.gov/mpi/tutorial/mpiexmpl/contents.html>

EPIC MPI

EPCC provides free documents (upon request) on programming with MPI for beginners.

- <http://www.epcc.ed.ac.uk/epic/mpi/>

2.3 MPI Standard

MPI Forum's Documents page

- <http://www.mpi-forum.org/docs/docs.html>

MPI 2.0

- <http://www.mpi-forum.org/docs/mpi-20-html/mpi2-report.html>

MPI 1.1

- <http://www.mpi-forum.org/docs/mpi-11-html/mpi-report.html>

2.4 Tools

AutoMap on the Web

Is a tool that helps one generate the code for creating data-types.

- <http://www.itl.nist.gov/div895/savg/auto/>

PETSc

The Portable, Extensible Toolkit for Scientific Computation is a suite of data structures and routines for the scalable (parallel) solution of scientific application problems modeled by partial differential equations.

- <http://www-fp.mcs.anl.gov/petsc/>