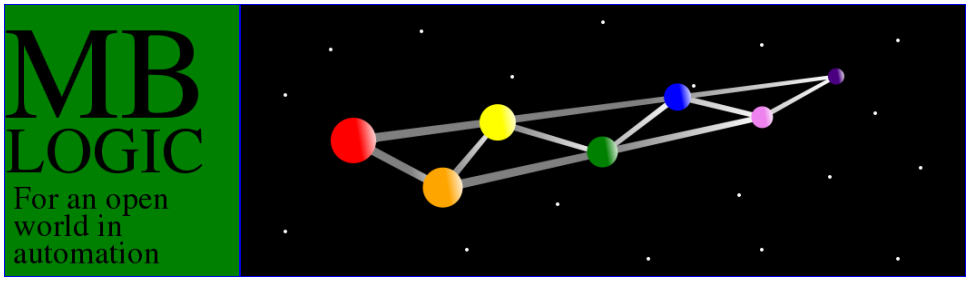
MBLogic - Installation (16-Apr-2011)



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General

This document provides help with initial installation. Full documentation is available after installation via the on-line help feature. See below for information on how to access on line help.

Downloading the Software

MBLogic can be downloaded from the following location: http://sourceforge.net/projects/mblogic/

For more details, visit the website at the following location: http://mblogic.sourceforge.net/

If you need help on how to download the files, you will find more information there on the main web page.

Installing the Base Application

Overview:

The application is distributed as a source archive file. For most platforms (including Linux), this is a "tar.gz" file. For MS-Windows, this is a "zip" file. The MS-Windows version has the special new-line character combination (CR-LF) required by that platform, but is otherwise identical to the standard version.

Installation:

- 1. Select or create a directory into which to extract the application files.
- 2. Extract the archive file into the desired location.
- 3. Several sub-directories will be created as part of the extraction process.
- 4. The application itself will now be installed. However, you cannot run it until you install the third party support software (see the help instructions on how to perform that step).

You should see the following items present in the application directory.

Application Directory Contents:

There will be a directory called "mblogic". It will contain a number of files with ".py" extensions. These are part of the application program itself. These files will be automatically compiled to ".pyc" files when the application first starts. There will also be several sub-directories with additional code files, as well as html web pages for the help system and the status monitoring system. There is nothing in these directories that you will need to change.

HMI Directory Contents:

There will be a directory called "hmipages". It will contain a number of files with ".xhtml", ".js", ".css", and ".png" extensions. These files constitute a sample HMI client (web page) that comes with the system. You will replace some of these files with your own versions later if you create your own HMI application.

Sample Soft Logic Program:

There will be several files which are provided as a sample soft logic application. This sample application works with the sample HMI client (web page). These files are:

- "plcprog.txt". This is a sample soft logic program.
- "mbserver.config". This is provided as a sample server communication configuration file. You will need this file to use the sample HMI demo. You will also need it to access the on-line help functions and system status functions until you replace it with your own configuration.
- "mbclient.config". This is provided as a sample client configuration file. You will need this file to use the sample HMI demo.
- "mblogic.config". This is provided as a sample soft logic IO configuration file. You will need this file to run the sample soft logic program and to use the HMI demo.
- "mbhmi.config". This is provided as a sample HMI server configuration file. You will need this file to use the HMI demo.

Shell Script to Start the System:

There will also be a shell script which is used to start the system. For the Linux version, this is called "mblogic.sh". For the MS-Windows version, this is called "mblogic.bat". This file simply calls the main program file in the "mblogic" directory.

Installing Third Party Support Software

Overview:

The system is built on a number of third party packages which must be installed separately before the system will function. These third party packages are:

- Python - Run time language support for the Python programming language.
- Twisted - Networking library.
- pywin32 - Additional Python library (required for MS Windows only).

Several additional packages are required for MS Windows (these are not required for Linux).

- pywin32 - Additional Python library (required for MS Windows only).
- setuptools - Additional library required to install "egg" format libraries (required for additional libraries).
- zope.interface - An additional library required for Twisted (for Twisted versions 10.0.0 or later).

All required third party support packages are free and can be obtained from normal secure internet sites (see below).

The system has been tested with Python version 2.6. Other versions may work but have not been tested, so version 2.6 is recommended. The version of Twisted installed must be compatible with the version of

Python used. If you are using Linux, the version compatibility will be taken care of automatically. If you are using MS Windows, the Twisted web site will indicate which version of Twisted you need for which version of Python.

Debian Stable is a supported platform, and the system has been tested with Python 2.6 on that platform.

Obtaining and Installing Third Party Software:

The required third party software can be obtained from the following locations.

For Linux:

For Linux, all required packages can normally be obtained from your distro's package repository. Use your package manager (e.g. Synaptic) to download the packages. Some packages (e.g. Python) may already be installed as part of the standard OS distribution.

Install the following in the order listed:

1. Python - Version 2.6. (This is often already installed by default).
2. Twisted. The Debian package name is "python-twisted". You will need python-twisted, python-twisted-core, python-twisted-web (not web2), and any dependencies (your package manager should be able to figure the dependencies out by itself).

For MS Windows:

Installing software on MS Windows is traditionally more difficult that with Linux, as MS Windows has no package management or repository system. This means that each package must be downloaded and installed separately. However, this is relatively straight forward if you follow the steps below.

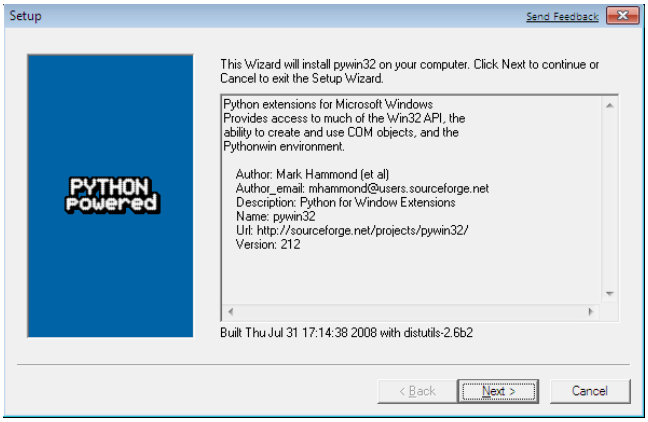
The packages can be obtained from the following locations (don't install them just yet though):

- Python - http://Python.org
- pywin32 - http://sourceforge.net/projects/pywin32/
- Twisted - http://twistedmatrix.com/trac/
- SetupTools - http://pypi.python.org/pypi/setuptools
- Zope Interface - http://pypi.python.org/pypi/zope.interface

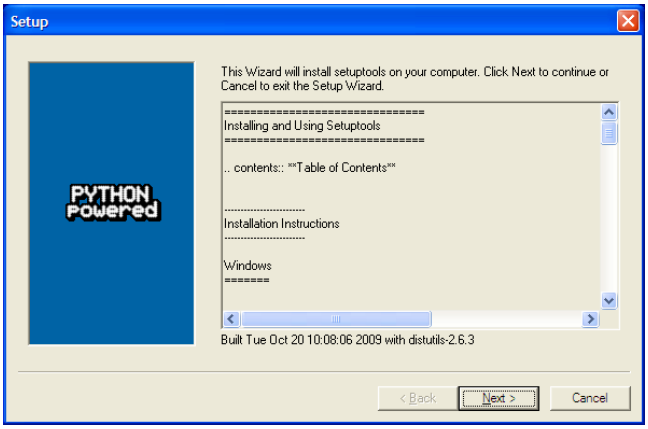
Once you have obtained all the software, install it in the following order:

-
    1. Python. Make a note of where you installed this, as the other packages will need to find it. (Note, the actual install screen will look slightly different from the one shown below. This screen shot was taken after the install was run once already). Run the installer and follow the instructions in the install menus.

- 2. pywin32. Run the installer and follow the instructions in the install menus.

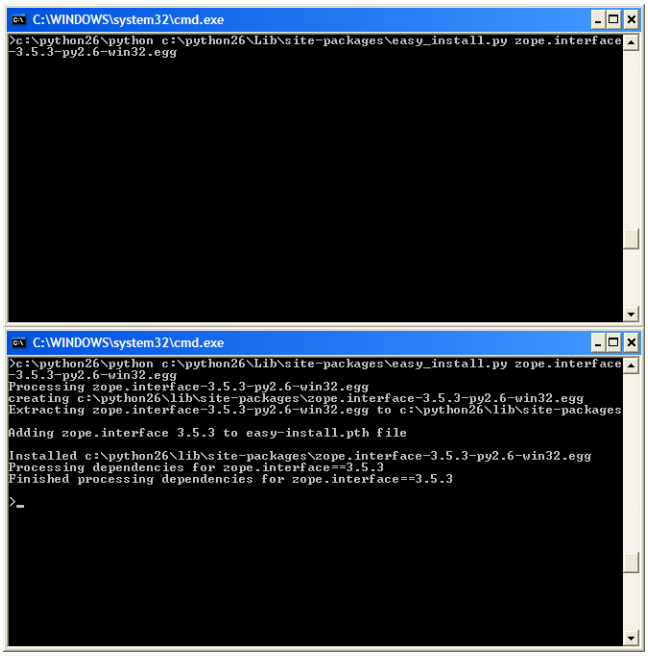


- 3. SetupTools. Run the installer and follow the instructions in the install menus. This is required only for installing Zope Interface. If Zope Interface is already installed (or you do not require it because you are installing an older version of Twisted), you can skip this step.

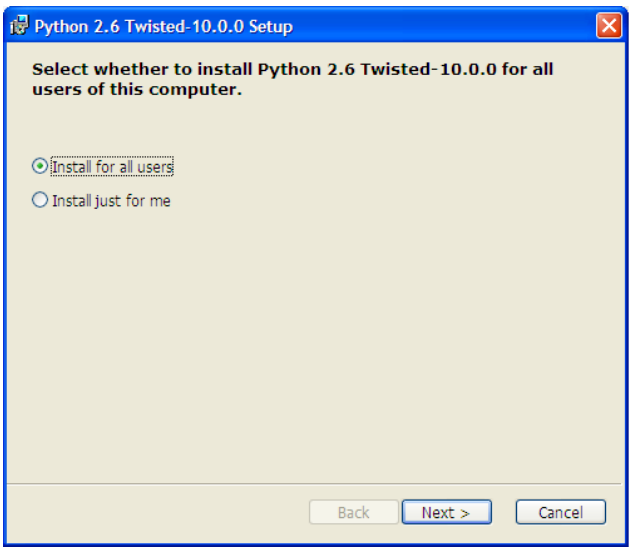


- 4. Zope Interface. This is required for versions of Twisted from 10.0.0 or later. Earlier versions of Twisted package Zope Interface in the Twisted package and do not require Zope Interface to be installed separately. Zope Interface must be installed using the command line. Move the Zope Interface "egg" package to a working directory and open a command line window in the

resulting directory. Type "c:\python26\python c:\python26\Lib\site-packages\easy_install.py zope.interface-3.5.3-py2.6-win32.egg" (without the quotes). If you are using a different version of the Zope Interface, the file name "zope.interface-3.5.3-py2.6-win32.egg" may be slightly different. If you have installed Python in a different location, or if you have installed a different version, you will have to alter the "c:\python26" part of the command accordingly. (e.g. "c:\python25\python etc." if you are using Python 2.5). You should see something like the following as a result. You may see some "deprecation warnings", depending on what version you install. These are not serious and are simply warning of new features or features that will be changed in an upcoming version.



- 5. Twisted. Run the installer and follow the instructions in the install menus.



MS Windows DLL Files:

Some copies of MS-Windows may have one or more "dll" files missing which prevent the program from operating correctly. This can happen when dll files are unintentionally removed when uninstalling software or making other changes. One dll in particular to check is "mfc71.dll". This is a standard MS Windows library which is used by many programs. This should be in the "c:\windows\system32" directory. If it is missing, you will need to reinstall it. A search on Google will turn up many solutions for this problem (this is a common problem). This file is not necessary for Linux.

Installing on Mac OS/X:

There is no documentation for installing on Mac OS/X. However, newer versions of OS/X may come with Python and Twisted already installed.

Testing Third Party Software:

To test if the third party software installation is working, you can do the following (you can skip this step if you wish).

For Linux:

For Linux, open a command line terminal and type "python". You should see the Python interpreter start up with something like the following:

```
Python 2.6.2 (release26-maint, Apr 19 2009, 01:58:18)
[GCC 4.3.3] on linux2
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

To test if twisted is installed, type the following into the Python interpreter:

```
import twisted
```

If it is already installed, the Python command problem will appear after a brief delay. If it is not already installed, you should get an error which looks something like the following:

```
Traceback (most recent call last):
  File "", line 1, in
ImportError: No module named twisted
>>>
```

To exit Python, press "control-D" (press the control and "d" keys simultaneously). To close the terminal, press "control-D" again.

For MS Windows:

For MS-Windows, following the instructions given above for Linux, with the following exceptions.

When starting Python, you will need to include the full path name to the Python interpreter. For example: "C:\Python26\python"

Test if twisted is installed correctly by using the following commands:

```
import twisted.internet
```

This checks the pywin32 installation as well as twisted.

To exit Python, press "control-Z" (press the control and "z" keys simultaneously).

Installing Generic Clients

Generic clients are optional modules which may be installed to provide additional features such as protocols, database logging, etc. Some generic clients may have additional dependencies which must be installed before they can be used. See the documentation for the generic client in question for details on installation.

Starting the Application

When all software has been installed, you can start the application.

Starting from Linux:

Do *one* of the following:

- If you are using Gnome, double click on the "mblogic.sh" file.
- *Or* from the command line, type "./mblogic.sh".

Starting from MS Windows:

Do *one* of the following:

- If you are using the MS-Windows GUI, double click on the "mblogic.bat" file.
- *Or* from the command line, type "mblogic.bat".

The batch file ("mblogic.bat") assumes that you have installed Python version 2.6, and that you have installed it in the default location ("C:\Python26"). If you have a different version of Python installed, or have installed Python in a different location, you will have to edit the batch file accordingly. To edit the batch file, open it with a text editor (e.g. MS Notepad), and change the "C:\Python26\python mblogic\mbmain.py" to match the version and location of your Python installation.

Start-up Messages:

You should see something like the following appear:

```
Starting MBLogic.
Starting system status web server...
Starting ModbusTCP server...
Starting REST web service...
Starting help system web server...
Starting HMI web service...
Starting ModbusTCP clients...
Started to connect outgoing client PumpPressure
Started to connect outgoing client FanCommand
Started to connect outgoing client Robot1
Started to connect outgoing client Beacon
Started to connect outgoing client SlidePosition
Started to connect outgoing client Conveyors
Started to connect outgoing client FanSpeed
Started to connect outgoing client Horn
Soft logic system started.

        Server Loopback Server running at 9:39:30, Mon 05 of Jan, 2009 ...
```

```
Incoming client connected to Modbus TCP server from 127.0.0.1.
Incoming client connected to Modbus TCP server from 127.0.0.1.
Incoming client connected to Modbus TCP server from 127.0.0.1.
Incoming client connected to Modbus TCP server from 127.0.0.1.
Incoming client connected to Modbus TCP server from 127.0.0.1.
Incoming client connected to Modbus TCP server from 127.0.0.1.
Incoming client connected to Modbus TCP server from 127.0.0.1.
Incoming client connected to Modbus TCP server from 127.0.0.1.
Connected outgoing client FanCommand.
Connected outgoing client FanSpeed.
Connected outgoing client Horn.
Connected outgoing client Robot1.
Connected outgoing client PumpPressure.
Connected outgoing client Beacon.
Connected outgoing client SlidePosition.
Connected outgoing client Conveyors.
```

Some of the above lines may appear in a different order depending on when the connections are made. The above assumes you are using the example configuration file included with the release. If you are not using the example configuration, you will see a different series of messages relating to which servers and clients are starting up and connecting.

Port usage is determined by the configuration file.

Testing the Application

This section describes how to test the application after you have installed it.

Web Browsers and Compatibility

The system monitoring pages and HMI demo use advanced features such as vector graphics based on SVG. Most modern web browsers have these capabilities built in, including Firefox, Opera, Apple Safari, Google Chrome, etc. Some browsers based on older technology (e.g. any version of MS Internet Explorer, old versions of Netscape Navigator, etc.) do not have this ability. They may load but not display some or all pages.

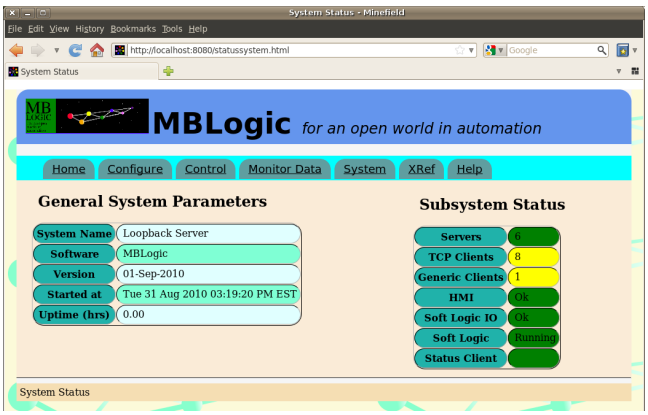
The status monitoring pages and the demo HMI page were developed and tested using Firefox, and that browser is recommended as a good choice. However, any browser based on modern standards (e.g. Firefox, Chrome, Opera, Safari, etc.) should work. Be sure that you have Javascript enabled, as it is needed to run the communications between the web page and the server.

Checking the Web Interface:

Check the system status web page by starting your web browser and entering the following URL (this assumes you are using the sample configuration in mbserver.config):

```
http://localhost:8080/MBStatusSystem.html
```

You should see a web page titled "System Status" similar to the one shown below.



On the right side of the page should be a section titled "Subsystem Status". There should be a table with headings "Servers", "Clients", "Soft Logic", "Soft Logic IO", and "HMI". Each will be accompanied by a text status message and a coloured background status indication.

System Help:

If you can view the status system web page (see above), you will now be able to access the system on-line help. Click on the "Help" link in the menu near the top of the stats web page.

Checking the User Help Server:

Check the user help system by starting your web browser and entering the following URL (this assumes you are using the sample configuration in mbserver.config):

```
http://localhost:8081/index.html
```

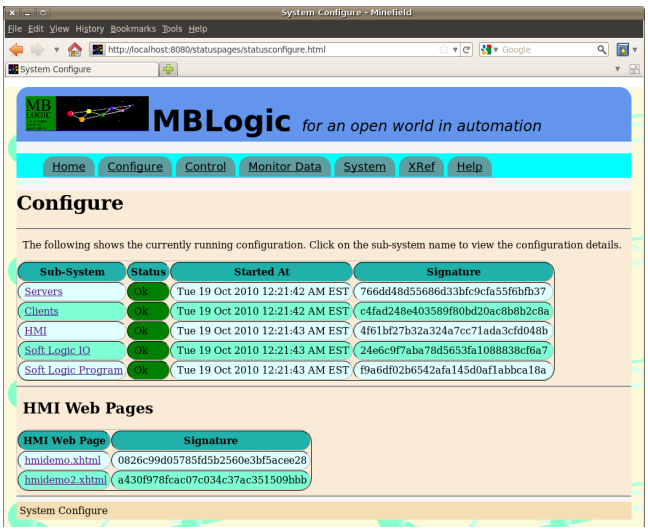
You should see a web page titled "User Help". The default page is a place holder which can be replaced with other content.

Running the HMI Demo:

Check the HMI system by starting your web browser and entering the following URL (this assumes you are using the sample configuration in mbserver.config):

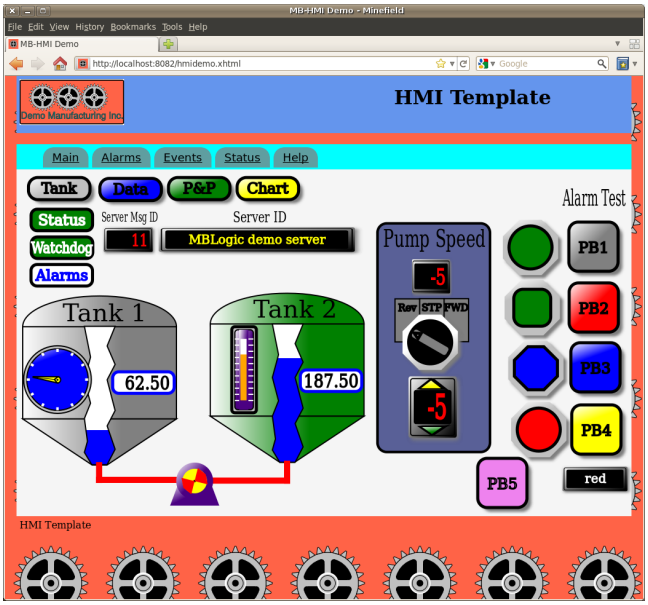
```
http://localhost:8082/hmidemo.xhtml
```

Alternatively, the web based system status lists the hmi web pages on the "configure" web page. Click on a link in the "HMI Web Pages" list to view an HMI sample.



You should see a web page titled "MB-HMI Demo". You should see a number of graphical elements including push buttons, pilot lights, tanks, and gauges.

Just above the middle of the screen on the left you should see a numeric display box titled "Server Mesg ID:" the number appearing within the box should be incrementing at a rate of approximately once per second. To the left of this should be a box titled "Comm Status". The background of this box should be green. If you see these items, the system is running correctly.

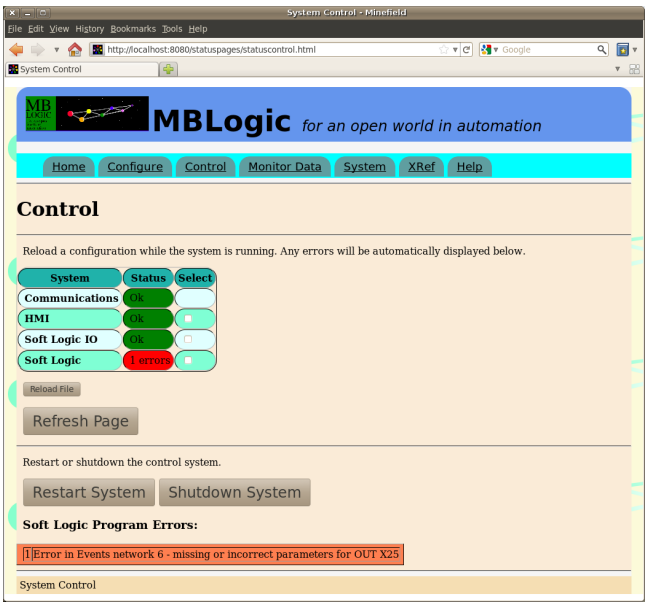


Shut Down Methods

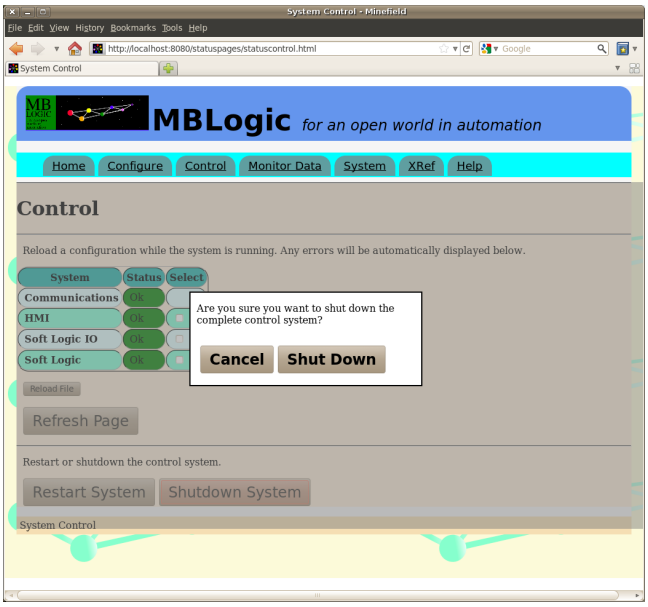
You may shut down the system two different ways. One method is via the systus system interface. The other method is via a keyboard code directly into the terminal window. If your web browser does not fully support the capabilities needed to use the web interface, you will need to use the keyboard command.

Using the Menu Interface

To shut down the system via the system status web interface, select the "control" option from the menu. You should see a web page which looks something like the following.



Click on the "Shut Down System" button which is located near the bottom of the page. You should see the page change and a confirmation dialogue appear. Click the "Shut Down" button to confirm the shut down. A shut down message will appear, and then automatically clear.



The web page will remain visible because the web browser runs independently of the system itself. However, once the system is shut down you will not be able to update the page or load new web pages because the server is no longer running.

Directly Through the Keyboard

To shut down the application using a keyboard command, press "control-C" (press the "control" and "C" keys simultaneously) in the terminal window where the application is running. This will send a signal to the system asking it to shut down.

Shut Down Messages

When you have issued a shutdown command, You should see something like the following appear:

```
Operator terminated system at Sat Jan 10 20:45:42 2009
```

Following that you will see a series of lines reporting that the client connections have been lost. This is just the Modbus/TCP server reporting the client connections closing down (which is expected).

Using Port 502:

Standard Ethernet protocols use what are called "ports". These are numbers which are part of the Ethernet packets which are used to route them to the correct application program. Both ends of the connection (client and server) have to use an agreed upon port number in order to communicate with each other. The server must "bind to the port number" (request the number from the operating system) before it can listen on that port for requests. Clients on the other hand do not have to bind to a port and are free to send requests to any port.

Standard Modbus Port:

The standard port number for Modbus/TCP is 502. It is possible to use a different port, provided both client and server can be set to use a different port number. In some cases, this isn't possible, and in most cases other cases it is most convenient to just use the standard port number.

With most operating systems, ports numbers less than 1024 are reserved for standard system services such as e-mail servers, web servers, etc. and are not available to ordinary applications. This poses a problem with Modbus/TCP. Either the Modbus/TCP server needs to gain (temporarily at least) elevated priviledges, or else the incoming messages on port 502 need to be re-routed to a different port. The second choice is often the simplest, and poses the fewest security risks.

However, it is important to note that if you don't need to use the Modbus server, or if you do need it but can run it on an alternate port number, then you don't need to redirect the port. If the remote client is capable of using an alternate port, that is usually the best solution.

Redirecting Port 502 on Linux:

Linux has a built-in facility called "iptables" which can be used to block, re-route and redirect communications. Redirecting traffic arriving on port 502 to a different can easily be done by using iptables. For example, to redirect incoming traffic on port 502 to port 8502:

```
iptables -t nat -I PREROUTING -p tcp --dport 502 -j REDIRECT --to-port 8502
```

Depending upon how security is set up on your distro, you may need to either log in as "root", or (preferably) use "sudo". For example:

```
sudo iptables -t nat -I PREROUTING -p tcp --dport 502 -j REDIRECT --to-port 8502
```

To save this change permanently so that it is automatically loaded when the computer boots up (assuming you use sudo and have nano installed):

```
iptables -t nat -I PREROUTING -p tcp --dport 502 -j REDIRECT --to-port 8502

sudo sh -c "iptables-save > /etc/iptables.rules"

sudo nano /etc/network/interfaces
```

The above example ends with starting the nano editor (you can use a different editor if you wish) to edit the "interfaces" file. This file stores the Ethernet configuration. Add the following line to the end of the section for the Ethernet port which will be used for Modbus/TCP (typically "eth0"):

```
pre-up iptables-restore < /etc/iptables.rules
```

Save the configuation file and exit nano. Now Ethernet packets coming from outside the computer to port 502 will be redirected to port 8502. However, packets originating inside the same computer (e.g. 'localhost') will not be redirected. Anything originating on the same computer will need to be sent to port 8502.

Port 502 on Microsoft Windows:

Microsoft Windows does not offer any built-in security for system ports, so port 502 can be used directly without redirection. However, if you are using any server (on any port), you may need to adjust the firewall (if one is installed) to allow incoming connections.

Support and Development Contacts

User Support:

For application questions or reporing bugs, use the MBLogic forums at:

Project site: http://sourceforge.net/projects/mblogic/

Forums Link: http://sourceforge.net/projects/mblogic/forums/forum/824973

The support forums are checked frequently and are the fastest and most reliable way of obtaining help or getting answers to questions.

Developer Contacts:

If you are a developer and wish to contribute, or you just want to see the version currently under development, the development version is hosted at Launchpad.

https://launchpad.net/mblogic

If you wish to contribute to development, or you have an application where you need to maintain commercial confidentiality, you can contact the developers directly via the following e-mail addresses:

For general contacts: m.os.griffin@gmail.com

For generic clients (particularly Modbus/RTU and HART), you can also contact: pomaresj@gmail.com

Do *NOT* use these addresses for general help or support. These addresses are monitored but response time will be slower than the support forums on Sourceforge.

Commercial Applications:

MBLogic is licensed under the GPL. The GPL gives you the right to redistribute MBLogic and use it in commercial applications provided you do so under the license terms. A copy of the GPL is included with the MBLogic release package.