Sun GlassFish Web Stack Installation and Configuration Guide

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Part No: 821–0324
2009

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Introduction

Sun GlassFish Web Stack is a complete open source web application platform consisting of Apache, lighttpd, MySQL, PHP, Tomcat, GlassFish, Ruby, and Python. It comes with the support for Memory Caching framework (memcached), Dynamic Trace debugging (DTrace), Xdebug, and advanced PHP security framework (Suhosin).

Sun GlassFish Web Stack is available for Solaris, OpenSolaris, and Red Hat Enterprise Linux.

Sun GlassFish Web Stack Components

The table lists the primary components bundled with Sun GlassFish Web Stack.

Component Name	Package Name	Applicable Platform	Component Type
Apache Server 2.2.11	sun-apache22	Solaris/OpenSolaris/Linux	HTTP Server
lighttpd 1.4.21	sun-lighttpd14	Solaris/OpenSolaris/Linux	HTTP Server

Component Name	Package Name	Applicable Platform	Component Type
Squid 2.7.STABLE6	sun-squid	Solaris/OpenSolaris/Linux	Proxy Server
MySQL 5.1.30	sun-mysql51	Solaris/OpenSolaris/Linux	Database Server
MySQL 5.0.67	sun-mysql5	Solaris/OpenSolaris/Linux	Database Server
PHP 5.2.9	sun-php52	Solaris/OpenSolaris/Linux	Language
Ruby 1.8.7	sun-ruby18	Solaris/OpenSolaris	Language
Python 2.6.1	sun-python26	Solaris	Language
memcached 1.2.5	sun-memcached	Solaris/OpenSolaris/Linux	Caching System
Apache Tomcat 6.0.18	sun-tomcat6	Solaris/OpenSolaris/Linux	Application Server
Sun GlassFish Web Stack Enterprise Manager 1.5	sun-wsadmin	Solaris/Linux	Administration Tool
Sun GlassFish Enterprise Server 2.1	sges	Solaris/OpenSolaris/Linux	Application Server

Sun GlassFish Web Stack Distributions

Sun GlassFish Web Stack is distributed in two different versions.

- **Native Package Version**: This is the non-relocatable version of the Sun GlassFish Web Stack distribution. It can only be installed in the system directories as specified in the Sun GlassFish Web Stack Directory Layout section. This guide deals with the Native Package Version by default.
- **Unbundled IPS/pkg(5) distribution:** This distribution is based on the Image Packaging System (IPS). This distribution can be installed in the directory of your choice.

The Unbundled IPS/pkg(5) distribution provides the following significant benefits:

- **Non Root Installation** : Supports installation of Sun GlassFish Web Stack without root or administrative privileges.
- **Relocatable Installation** : Allows for the installation of multiple copies of the Sun GlassFish Web Stack on the same system.
- **Simplified Add-On Framework** : Simplified component install, update and uninstall mechanism.

Installing Sun GlassFish Web Stack

This section discusses the installation of Sun GlassFish Web Stack on Solaris, OpenSolaris, and Linux platforms.

User Permissions

This section explains about the user permissions required for Sun GlassFish Web Stack installation.

Native Package Version

System administration or root privileges are required for performing the Native Package installation.

Unbundled IPS/pkg(5) distribution

Sun GlassFish Web Stack Unbundled IPS/pkg(5) distribution can be installed with or without the administrative or root privileges. When installing as the root user, file and directory ownership as well as run-time identity will match a native package install (e.g., webservd for Apache or Lighttpd). If the required daemon user id doesn't already exist, installation will fail and the user will be prompted to create it manually. When installing as non-root user, all the files and directories will be owned by the user running the installation, and that will be used as the run-time identity as well.

Sun GlassFish Web Stack Operating System Dependencies

Platform specific dependencies exist on Solaris and Red Hat Enterprise Linux platforms. Install the dependent packages first. The following table summarize the dependencies for various Sun GlassFish Web Stack components.

Note – This is not a complete dependency list. Only important packages are listed here.

Note – Unbundled IPS/pkg(5) distribution of Sun GlassFish Web Stack installer has no way of checking the Operating System dependencies. You must cross check with the following dependency table and install all the required dependent packages prior to installing the respective Sun GlassFish Web Stack Components.

Sun GlassFish Web Stack Component	Solaris Dependencies	Red Hat Enterprise Linux Dependencies
Sun GlassFish Web Stack Installer	SUNWPython	python
Apache HTTP Server	SUNWlexpt, SUNWpr, SUNWtls, SUNWlibsasl, SUNWcry, SUNWpostgr-82-libs	expat, openldap, openssl, perl, postgresql-libs, sqlite
lighttpd	-	openldap, openssl, pcre
Squid Proxy Server	SUNWgss, SUNWkrbu, SUNWlibsasl, SUNWopenssl-libraries, SUNWpr, SUNWtls, SUNWperl584core	openssl, openldap
MySQL	SUNWperl584core, SUNWopenssl-libraries	openssl
PHP	SUNWpostgr-82-libs, SUNWopenssl-libraries	curl, gmp, libidn, libXpm, pcre, postgresql-libs
memcached	None	libevent
Apache Tomcat Server	SUNWj5rt, SUNWj5dev	JDK 5.0 or higher
Sun GlassFish Web Enterprise Manager	SUNWopenssl-libraries	sysstat, openssl

Note – On the Red Hat Enterprise Linux x86_64 version, Sun GlassFish Web Stack also depends upon the 32 bit versions of the listed packages.

Installing Sun GlassFish Web Stack on Solaris and Linux Platforms

Perform the following steps to install Sun GlassFish Web Stack

1. Download the Sun GlassFish Web Stack package from the Sun GlassFish Web Stack download page, http://www.sun.com/systems/solutions/amp/getit.jsp. The download page provides packages for RedHat Enterprise Linux (x86 and x86_64) and Solaris (x86, x86_64, and Sparc). Download the package which is relevant to your platform.

2. Extract the tar.gz file containing the Sun GlassFish Web Stack installer. This command will expand the Web Stack installation files into the current directory; you may wish to perform this step within a temporary directory.

```
gunzip -c xxx.tar.gz | tar xf -
```

3. Run the installation script to begin the installation. The list of available installer commands are shown in the following table.

Installer Command	Description	Platform
`./install -h`	Displays the available options with the installer.	Solaris/Linux
`./install -v`	Prints the debug information during the installation.	Solaris/Linux
`./install -X`	Adds the platform specific options to the install command.	Solaris/Linux
`./install -u`	Upgrades the Sun GlassFish Web Stack from earlier versions.	Solaris/Linux
`./install amp`	Installs the complete AMP stack, which includes Apache HTTP Server, PHP, and MySQL.	Solaris/Linux
`./install apache`	Installs Apache HTTP Server with additional modules, including mod_fcgid, mod_jk, mod_perl, and mod_security2	Solaris/Linux
`./install lighttpd`	Installs the lighttpd Web server.	Solaris/Linux
`./install memcached`	Installs the memcached memory caching system.	Solaris/Linux
`./install mysql`	Installs the MySQL database server.	Solaris/Linux
`./install php`	Installs the PHP language support and additional extensions, including apc, memcache, and mysql.	Solaris/Linux
`./install python`	Installs the Python language support.	Solaris
`./install ruby`	Installs the Ruby language support.	Solaris
`./install squid`	Installs the Squid Proxy Server.	Solaris/Linux

Installer Command	Description	Platform
`./install tomcat`	Installs the Apache Tomcat Application Server.	Solaris/Linux
`./install admin`	Installs the Sun GlassFish Web Stack Enterprise Manager.	Solaris/Linux

Installing Sun GlassFish Enterprise Server

Sun GlassFish Enterprise Server is shipped with its own installer and can be installed using the GlassFish Enterprise Server intallation waizard. You can install the GlassFish Enterprise Server by executing the installer in the GUI mode:

- `./sges-2_1-solaris-sparc.bin` on Solaris SPARC platform.
- `./sges-2_1-solaris-i586.bin` on Solaris x86 platform.
- `./sges-2_1-linux.bin` on Linux platform.

For more detailed information, see Sun GlassFish Enterprise Server 2.1 Installation Guide.

Installing Sun GlassFish Web Stack on OpenSolaris Platform

For information on installing Sun GlassFish Web Stack on OpenSolaris platform, see Web Stack Getting Started Guide for OpenSolaris

Installing Sun GlassFish Web Stack Unbundled IPS/pkg(5) distribution

The Sun GlassFish Web Stack unbundled IPS/pkg(5) distribution is delivered in the form of a minimized distribution. A small, base set of the Web Stack components are pre-installed. The remaining components are available in a networked based repository. To install additional components or update installed components the Web Stack distribution contains a command line interface (pkg) as well as a graphical user interface (updatetool) to assist with the installation.

Setting up the Unbundled IPS/pkg(5) distribution for Sun GlassFish Web Stack

Perform the following steps to set up the Unbundled IPS/pkg(5) distribution for Sun GlassFish Web Stack:

1. Download the Sun GlassFish Web Stack Unbundled IPS/pkg(5) distribution package from the Sun GlassFish Web Stack download page, http://www.sun.com/systems/solutions/amp/getit.jsp. Download page provides packages for RedHat Enterprise Linux (x86 and x86_64) and Solaris (x86, x86_64, and Sparc). Download the package which is relevant to your platform.
2. Extract the tar.gz file containing the Sun GlassFish Web Stack Unbundled IPS/pkg(5) distribution into any desired location.

   ```
   gunzip -c webstack-image-* | tar xf -
   ```

3. Change into the webstack-1.5 directory (you may rename this directory if you prefer). The same directory will become the installation directory for all the Sun GlassFish Web Stack components. You can move or rename this directory as per your choice. This directory contains the following important binaries that you will use to manage Sun GlassFish Web Stack components.
   a. `./bin/pkg` : Command Line Interface (CLI) for the Unbundled IPS/pkg(5) distribution.
   b. `./bin/updatetool` : Graphical User Interface (GUI) for the Unbundled IPS/pkg(5) distribution.
   c. `./bin/updatetool` : Graphical User Interface (GUI) for the Unbundled IPS/pkg(5) distribution.
   d. `./bin/setup-webstack` : Post Installation Utility for the Unbundled IPS/pkg(5) distribution. You must run it after installing packages via CLI.

Note – To install and update packages using the Unbundled IPS/pkg(5) distribution, you need a working internet connection.

Using Unbundled IPS/pkg(5) distribution CLI

You can use the ./bin/pkg command to install Sun GlassFish Web Stack packages from command line. Some of the important commands are shown in the following table.

Installer Command	Description
`./bin/pkg --help`	Brings up the pkg command help.
`./bin/pkg list -a`	Lists all the available packages and their current status.
`./bin/pkg install PACKAGE_NAME>`	Installs the given Sun GlassFish Web Stack package.

Note – You need to execute `./bin/setup-webstack` after running the command `./bin/pkg install`.

You can check the Sun GlassFish Web Stack Components section or the command `list -a` for a list of valid package names.

For more information on the `pkg` command, see the pkg(5) man page and the Update Center Wiki.

Using Unbundled IPS/pkg(5) distribution GUI

Sun GlassFish Web Stack Unbundled IPS/pkg(5) distribution ships with GUI tool called the Update Tool. Update Tool can be invoked by using the following command:

```
./bin/updatetool
```

You can use the update tool to perform the following tasks:

- Install new add-on packages
- Manage package updates
- View information about the installed packages

To install packages click on the 'Available Add-ons' item available on the sidebar. Select the packages you wish to install and click on the green 'Install' arrow.

To update packages click on the 'Available Updates' item available on the sidebar. Select the packages you wish to update and click on the 'Update' arrow.

For more information on the updatetool, refer to the online help. Online help can be accessed by Clicking 'Help > Contents' on the Main Menubar.

Upgrading to Sun GlassFish Web Stack 1.5

Sun GlassFish Web Stack 1.5 contains a number of important bugfixes, security updates and updated components. See the Sun GlassFish Web Stack 1.5 Release Notes for more information.

You can use the install command with -u switch to perform an automatic upgrade of all the installed packages of the Sun GlassFish Web Stack.

```
./install -u
```

Note – Upgrades done using the system package management tool are not supported and may lead to software corruption.

Note – You can not mix version 1.4 and version 1.5 packages together. You must upgrade all the installed components.

Managing Sun GlassFish Web Stack Services

Sun GlassFish Web Stack installs a number of services on the system. The following table lists the Sun GlassFish Web Stack services and their start command.

Service Name	In Solaris	In Linux	In Unbundled IPS/pkg(5)
httpd	svcadm enable sun-apache22	/sbin/service sun-apache22 start	OPT_ROOT/bin/sun-apache22 start
lighttpd	svcadm enable sun-lighttpd14	/sbin/service sun-lighttpd14 start	OPT_ROOT/bin/sun-lighttpd14 start
mysqld	svcadm enable sun-mysql51	/sbin/service start sun-mysql51 start	OPT_ROOT/bin/sun-mysql51 start
memcached	svcadm enable sun-memcached	/sbin/service sun-memcached start	OPT_ROOT/bin/sun-memcached start
squid	svcadm enable sun-squid	/sbin/service sun-squid start	OPT_ROOT/bin/sun-squid start
tomcat	svcadm enable sun-tomcat6	/sbin/service sun-tomcat6 start	OPT_ROOT/bin/sun-tomcat6 start

Automatically Starting Services in Linux

In Linux starting or stopping a service merely causes a service to start or stop for a particular system session only in which the command was run. In order to start a service automatically in Linux, it must be put in system's default runlevel.

For example, to put Apache Web Server in runlevel 3 and 5, following command can be used:

```
# chkconfig --level 35 sun-apache22 on
```

Sun GlassFish Web Stack Directory Layout

This section discusses the directory layout of Sun GlassFish Web Stack components. Sun GlassFish Web Stack files are installed in three different directories:

- **OPTT_ROOT**: Application installation directory.
- **ETCROOT**: Application configuration directory.
- **VAR_ROOT**: Application data directory.

The directory paths vary by platform. The following table following table lists the directory location for Solaris, Linux, and OpenSolaris platforms.

Platform	OPT_ROOT	ETC_ROOT	VAR_ROOT
Solaris	/opt/webstack	/etc/opt/webstack	/var/opt/webstack
Linux	/opt/sun/webstack	/etc/opt/sun/webstack	/var/opt/sun/webstack
OpenSolaris	/usr	/etc	/var
Unbundled IPS/pkg(5)	.	/etc	/var

Apache HTTP Server Files

The following list describes the directory layout for Apache HTTP Server and additional plug-in modules:

Directory / File	Description
ETC_ROOT/apache2/2.2/httpd.conf	This is the main Apache HTTP Server configuration file.
ETC_ROOT/apache2/2.2/conf.d/modules-32.load	Contains additional server configuration files. By default, server will load all the .conf files placed under this directory. It also has a configuration file modules-32.load which contain `LoadModule` directive for loading the 32 bundled Apache HTTP server modules. This file needs to be edited to disable modules which are loaded by default.

Directory / File	Description
ETC_ROOT/apache2/2.2/conf.d/modules-64.load	Contains additional server configuration files. By default, server will load all the .conf files placed under this directory. It also has 2 additional.load configuration file modules-64.load which contain `LoadModule` directive for loading the 64-bit bundled Apache HTTP server modules. This file needs to be edited to disable modules which are loaded by default.
ETC_ROOT/apache2/2.2/envvars	Contains the environment settings that the server uses at startup.
ETC_ROOT/apache2/2.2/samples-conf.d	Contains sample `.conf` files. These are not included in the main configuration file. To use the sample file, copy the file to `conf.d` directory and modify as necessary.
OPT_ROOT/apache2/2.2/bin	Contains the 32-bit httpd(Prefork MPM) and httpd.worker(Worker MPM) executables as well as other utility programs.
OPT_ROOT/apache2/2.2/bin/64	Contains the 64-bit `httpd` (Prefork MPM) and `httpd.worker` (Worker MPM) executables as well as other utility programs.
OPT_ROOT/apache2/2.2/manual	Contains the Apache HTTP Server manual in HTML format.
OPT_ROOT/apache2/2.2/include	Contains the Apache HTTP Server header files, which are needed for building building additional plug-in modules with apxs(8).
OPT_ROOT/apache2/2.2/libexec	Contains 32-bit loadable modules (DSOs) supplied with the server.
OPT_ROOT/apache2/2.2/libexec/64	Contains 64-bit loadable modules (DSOs) supplied with the server.
OPT_ROOT/apache2/2.2/man	Contains man pages for the server, utility programs, and `mod_perl` (if installed). Add this directory to your MANPATH to read the man pages.
OPT_ROOT/apache2/2.2/lib	Contains the 32-bit Apache HTTP Server core libraries including APR and APR-Util.
OPT_ROOT/apache2/2.2/lib/64	Contains the 64-bit Apache HTTP Server core libraries including APR and APR-Util.
OPT_ROOT/apache2/2.2/lib/perl	Contains the 32-bit modules and library files used by the `mod_perl` extension (if installed) to Apache HTTP Server.

Directory / File	Description
VAR_ROOT/apache2/2.2/cgi-bin	Default location for the CGI scripts. This can be changed by altering the `httpd.conf` file and restarting the server.
VAR_ROOT/apache2/2.2/htdocs	Default document root. This can be changed by altering the `httpd.conf` file and restarting the server.
VAR_ROOT/apache2/2.2/icons	Icons used by the server. Users can modify these icons for fancy indexing. ETC_ROOT/samples-conf.d/autoindex.conf includes sample examples.
VAR_ROOT/apache2/2.2/libexec	Place holder for 32-bit user apache modules. Any 32-bit modules which are added using apxs(8) are copied into this directory.
VAR_ROOT/apache2/2.2/libexec/64	Place holder for 64-bit user Apache HTTP Server modules. Any 64-bit modules which are added using apxs(8) are copied into this directory.
VAR_ROOT/apache2/2.2/logs	Contains server log files. The formats, names, and locations of the files in this directory can be altered by various configuration directives in the `httpd.conf` file.
VAR_ROOT/apache2/2.2/proxy	Directory used to cache pages if the caching feature of `mod_disk_cache`.

Modules `mod_fcgid`, `mod_jk`,`mod_security`, and `mod_dtrace` are pre-installed with Apache HTTP Server. For more information about these modules, see http://fastcgi.coremail.cn/doc.htm, http://tomcat.apache.org/connectors-doc/generic_howto/quick.html, http://www.modsecurity.org/documentation/index.html, and http://prefetch.net/projects/apachemodtrace/moddtrace.c

MySQL Database Files

The following list describes the directory layout for the MySQL Database Server.

Directory / File	Description
OPT_ROOT/mysql/5.1/bin	Contains binaries and scripts.
OPT_ROOT/mysql/5.1/lib	Contains libraries for the client API.
OPT_ROOT/mysql/5.1/include	Contains header files for the client API.

Directory / File	Description
OPT_ROOT/mysql/5.1/man/man1	Manual pages for client programs.
OPT_ROOT/mysql/5.1/man/man8	Manual pages for server programs.
OPT_ROOT/mysql/5.1/share	Shared data: locale, time zone.
OPT_ROOT/mysql/5.1/docs	Contains HTML documentation.
OPT_ROOT/mysql/5.1/mysql-test	Contains MySQL test programs.
OPT_ROOT/mysql/5.1/sql-bench	SQL benchmark test.
OPT_ROOT/mysql/5.1/share/mysql	Contains internationalization (I18N) files, sample configuration files, and utility scripts.
VAR_ROOT/mysql/5.1/data	Default database data directory.
ETC_ROOT/mysql/5.1	Contains the MySQL configuration file.
OPT_ROOT/mysql/5.1/bin/mysql	Client executable.
OPT_ROOT/mysql/5.1/bin/mysqld	Server executable.

PHP Files

The following list describes the directory layout for PHP:

Directory / File	Description
OPT_ROOT/php/5.2/bin	Contains PHP executables.
OPT_ROOT/php/5.2/lib	Contains PHP library files.
OPT_ROOT/php/5.2/modules	Contains PHP modules for PHP extensions.
OPT_ROOT/apache2/2.2/libexec	Contains the PHP module for Apache 2 (32-bit) prefork MPM and the module name ismod_php5.so.
OPT_ROOT/php/5.2	Contains the default configuration file (php.ini).
ETC_ROOT/php/5.2/conf.d	Contains extension specific INI files for each PHP extension . Here, you can enable or disable various extensions that are integrated with the package.

Note – The PHP extensions like `APC`, `DTrace`, `XDebug`, `suhosin`, and `tcpwrap` are disabled by default. To enable these extensions, you need to uncomment the respective line (`extensions=<module-name>.so`) in the `conf.d` file.

Ruby Files

The following list describes the directory layout for Ruby:

Directory / File	Description
VAR_ROOT/ruby/1.8/gem_home	Contains Ruby gems repository.
OPT_ROOT/ruby/1.8/bin	Contains Ruby executable as well as other utility programs, and Ruby gems programs. These programs are linked from `/usr/bin`.

Squid Proxy Server Files

The following list describes the directory layout for Squid Proxy Server:

Directory / File	Description
OPT_ROOT/squid/bin	Contains executable for the Squid Proxy Server client and to run the cache.
OPT_ROOT/squid/libexec	Contains libraries.
ETC_ROOT/squid/squid.conf	The main configuration file. Modify this file for Squid Proxy Server to work.

Sun GlassFish Web Stack Default Network Ports

Sun GlassFish Web Stack utilizes several network ports by default for regular component operation. The following table lists the ports by component.

Component	Default Port Number (Native)	Default Port Number (Unbundled IPS/pkg(5)) for non root install only	Configuration File
Apache HTTP Server	80	10080	ETC_ROOT/apache2/2.2/httpd.conf
lighttpd Web Server	80	10080	ETC_ROOT/lighttpd/1.4/lighttpd.conf
MySQL Database Server	3306	3306	ETC_ROOT/mysql/5.1/my.cnf
Squid Proxy Server	3128	3128	ETC_ROOT/squid/squid.conf
Apache Tomcat	8080	8080	VAR_ROOT/tomcat/6.0/conf/server.xml

Component	Default Port Number (Native)	Default Port Number (Unbundled IPS/pkg(5)) for non root install only	Configuration File
memcached	11211	11211	-
Sun GlassFish Web Stack Enterprise Manager	8484	8484	ETC_ROOT/admin/server.conf
collectd	25826	25826	ETC_ROOT/admin/collectd/collect
Sun GlassFish Enterprise Server	4848 (for administration) 8080 (for the HTTP listener) 8181 (for the HTTPS listener)	4848 (for administration) 8080 (for the HTTP listener) 8181 (for the HTTPS listener)	GLASSFISH_ROOT/setup.xml

Extending Sun GlassFish Web Stack

Sun GlassFish Web Stack can be easily extended by using various third party extensions. This enables you to add new features to the existing software. To compile Sun GlassFish Web Stack extensions you need to have mandatory development packages installed on your system.

Compiler Requirements:

- Solaris 10: Sun Studio 12 or later.
- Red Hat Enterprise Linux: RedHat Supported GCC release from the distribution repository.

Installing PHP extensions

PHP extensions are available in two forms, PECL (PHP Extension Community Library) and PEAR (PHP Extension and Application Repository). PECL extensions are shipped as C source code. PECL extensions are compiled C language extensions linked to the PHP core. As C programs , PECL extensions run more efficiently than PEAR packages. PECL includes modules for XML-parsing, access to additional databases, mail-parsing, embedding Perl or Python in PHP scripts.

A PEAR package is distributed as a gzipped tar file. Each archive consists of source code written in PHP, usually in an object-oriented style. Many PEAR packages can readily be used by developers as ordinary third party code via simple include statements in PHP.

Installing PECL extensions

The PECL extensions need to be compiled to shared object files (.so) before they can be used with PHP.

Some extensions require additional software to successfully build and install. Installation of the extension will fail if the additional software is not found in PATH, and error messages will vary

depending on the required software and the extension being installed. Additional software commonly required includes GNU Autoconf and re2c - http://re2c.org/.

After installing Sun Studio, run the following command to download, compile and install the PECL extension:

```
# OPT_ROOT/bin/pecl install <extension_name>
```

If you are not sure of the extension name, use the following command to get a list of all the available extensions:

```
$ OPT_ROOT/bin/pecl list-all
```

Installing PEAR extensions

Run the following command to download and install the PEAR extension:

```
# OPT_ROOT/bin/pear install <extension_name>
```

Installing Python extensions

Python extensions are supported through Easy Install. Easy Install is a python module (easy_install) bundled with setuptools that lets you automatically download, build, install, and manage Python packages. easyy_install is capable of downloading and installing python extensions from PyPI (Python Package Index) repository.

Installing setuptools (easy_install)

Use the following commands to download and install setuptools. You need have Sun Studio installed in your system to compile setuptools package. Also, verify that Sun GlassFish Web Stack location is present in the system PATH variable. This will avoid any conflict with the existing installation of python.

1. Download and extract the python setuptools source package from http://pypi.python.org/pypi/setuptools#downloads. Download the tar.gz file (setuptools-0.6c9.tar.gz).
2. Run the following command to compile and install the setuptools package.

```
# python setup.py install
```

Using easy_install

easyinstall is very easy to use. Just use the following command to download and install the python extension.

```
# python easy_install.py <package name>
```

You can browse through the PyPI repository by visting http://pypi.python.org/pypi .

Installing Ruby extensions (RubyGems)

Ruby extensions are supported by RubyGems. RubyGems is a package manager for the Ruby programming language that provides a standard format for distributing Ruby programs and libraries (in a self-contained format called a "gem"), a tool designed to easily manage the installation of gems, and a server for distributing them.

Use the following command to install the ruby extension (gem). Make sure that you have Sun GlassFish Web Stack in PATH variable.

```
# gem install <gem name>
```

If you are not sure of gem name, use the following command to get a list of all the available gems:

```
# gem list -r -d
```

For instance, when installing the mysql gem, the paths to the MySQL 5.1 client libraries and header files must be provided, as follows:

```
# gem install mysql --with-mysql-include=/usr/mysql/5.1/include
--with-mysql-lib=/usr/mysql/5.1/lib
```

Note – To use gem, make sure you have direct access to the Internet. If your system is behind a firewall or if it uses a proxy server, set the HTTP_PROXY variable.

The directory referenced by `GEM_HOME` should be writable. So make sure you execute the following command:

```
$ chmod -R a+w <GEM_HOME_PATH>
```

Note – Do not perform the previously mentioned tasks, if GEM_HOME refers to $HOME/.gem

---

Installing Apache Extensions

Additional features for Apache are available in the form of plug-in modules from third parties. These may take the form of a single source file which is built and installed by the user by running apxs, or a more complex build which takes the path to apxs as a configure argument.

Modules are built for 32-bit or 64-bit Apache individually. (A 64-bit build of Apache is not provided for Red Hat Enterprise Linux.)

The compiler used by apxs must match the compiler used to build Apache. On OpenSolaris, and Solaris 10, the cc command found in PATH must be Sun Studio; if gcc is installed, you may have to manipulate PATH to point to Sun Studio first. On Red Hat Enterprise Linux, gcc will be used.

Here is an example module build in which both 32-bit and 64-bit versions of the module are created:

```
$ pfexec /usr/apache2/2.2/bin/apxs -ci mod_example.c
$ pfexec /usr/apache2/2.2/bin/64/apxs -ci mod_example.c
```

This will create mod_example.so in directories /var/apache2/2.2/libexec/mod_example.so and /var/apache2/2.2/libexec/64/mod_example.so.

The recommended way to load and configure the module is by creating a file in /etc/apache2/2.2/conf.d with the following contents:

```
<IfDefine 64bit>
LoadModule example_module /var/apache2/2.2/libexec/64/mod_example.so
</IfDefine>
<IfDefine !64bit>
LoadModule example_module /var/apache2/2.2/libexec/mod_example.so
</IfDefine>
#module configuration directives
```

Modules which are built using a configure script typically provide a `--with-apxs` or `--with-apxs2` option. Specify the path to either the 32-bit or 64-bit apxs, depending on which mode is required.

Advanced Configuration

Sun GlassFish Web Stack can take advantage of Solaris OS specific features like Solaris Zones, and DTrace. For more information, see:

- Using Memcached with Solaris Zones .
- DTrace and Sun GlassFish Web Stack .