The Book of Webmin

Or: How I Learned to Stop Worrying and Love Unix

by Joe Cooper

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Documenting system configuration and ongoing system maintenance using the Webmin [http://www.webmin.com/webmin] web based administration tool.

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Preface

Webmin is a web-based graphical Unix system administration tool written by Jamie Cameron in the Perl programming language that is designed to be lightweight, functional, and easily extensible. Webmin has been translated to over 20 languages and dialects at the time of this writing, and has been embraced by a number of hardware and operating system vendors as their default system administration tool. It is extremely portable, offering support for more than 35 different Unix-like Operating Systems and Linux distributions. And it is very easily extended to support new features and options, due to an open and well documented API.

Webmin also happens to be a fast and easy to use tool for general Unix system administration. This document attempts to introduce to you many of the concepts you will need to maintain a Unix system using Webmin. While no single volume can address every aspect of Unix system administration, a real effort has been made to provide both a solid introduction to many important tasks, and a nearly comprehensive reference to a typical Unix server and its parts. It is my hope that with nothing more than this book, a copy of Webmin, and the documentation that accompanies your server, you will be able to configure the system to provide the most popular services, create a reasonable security policy, and manage your users and normal system maintenence tasks. Advanced topics are often covered, but I hope that it will not be at the expense of preventing you from seeing the forest for the trees.

Conventions Used in This Guide

This book is divided into chapters, with each one being devoted to a particular module or section of Webmin. Often, a short introductory section is included at the start of a chapter, that explains the purpose and design of the module and also the function of the underlying software package that is configured by the module. Also, in most cases, one or more tutorials is provided at the end of a chapter to introduce the user to some common functions of the software and how to perform those functions with the Webmin interface.

Type faces have been chosen to indicate the purpose of a word or value. The following type faces have been used in the described manner. Note that some type faces are used for multiple purposes, but context will generally clarify the intention.

Type faces

Italics
Indicates an emphasized word or concept. Also used to indicate the first use of a term in a given context.

Bold
Used to specify a module name, or an individual option within a module. The full path to a given module will be represented by separating each level in the hierarchy seperated by colons in a bold face. For example, the Squid Access Controls module, located under the Servers tab, can be specified with **Servers:Squid Proxy Server:Access Control**. This form will be used throughout the book.

`Fixed width`
Indicates an option value, or a directive within a text configuration file. This type face is also used for filenames and directory pathnames, as well as example input on the command line. When text console examples are used, they will also be in this font, and set off from the rest of the text on the page.

When an item is of particular interest, or is of importance for security or compatibility reasons, it will be set off from the rest of the text. A small icon will indicate the type of information and why it has been separated from the normal text. Those icons are used as follows.

Note

This is a note, used to indicate some item of interest or a reference to additional documentation on a subject. Notes may be informational, anecdotal, or referential. I.e. they might make a suggestion, tell a story, or refer you to more extensive documentation on the subject.

Caution

This is a warning, used to denote important security information or stability, compatibility, or other information on options that could lead to improper functioning of your server if configured incorrectly. Hopefully, the hammer will remind you that something could get broken if care is not taken.

Tip

This indicates a helpful tip. Usually a short recommendation for how to best use a feature or option to make your system easier to administer.

Who Webmin is For

While it is probably clear by now that the author of this book is a big fan of Webmin, it is worthwhile to discuss who else Webmin is good for, and why. Webmin is unique in the Unix world, in that it provides a one-to-one graphical interface to nearly every service and action needed to maintain a Unix system. It is universally accessible, because it only requires a web browser. It can potentially be accessed from anywhere in the world via a network connection. It is simple, concise, and consistent in its presentation across a wide array of differing services, functions, and operating systems. It is predictable, in that it does not modify files unnecessarily or in incompatible ways. Configuration with Webmin does not preclude configuration via other tools, or via the command line. Equally importantly, Webmin will not damage files if it doesn't understand a particular option or directive in your existing configuration. If Webmin does not understand a portion of your configuration, it will simply ignore it, and leave it untouched in the configuration file. Webmin is also accessible, in the sense that it can be used successfully from nearly any browser. Text mode browsers, small screen displays, and nearly anything else can be accomodated through the appropriate use of themes and numerous configurable display parameters.

Webmin is an excellent tool for both novice and experienced system administrators. As a tool for novices, it can provide a means of getting involved in system administration in a very visual way. All of the options available are presented in a clear and complete fashion. For new users, seeing the possibilities laid out so plainly can be a very effective teaching tool, as well as a helpful safety net to avoid many common pitfalls. It is possible to explore the possibilities of a system, without wading through obscure man pages (you only need wade through the pages in this book, which are perhaps less obscure).

For experienced admins, the advantages are less obvious but no less real. An administrator cannot possibly remember every option to every system function that she must configure and maintain. With Webmin, an administrator no longer needs to remember complex syntax, or the exact directive needed to accomplish some task. Using Webmin may not be as quick or flexible for some tasks and some users as the command line, and it should not be viewed as a complete replacement for study of traditional system administration tools and techniques. But it is an excellent helper for getting your job done without having to experiment with weird configuration file syntax.

I often tell people that Webmin doesn't make being a good system administrator easy, it just makes the problems more visible and the solutions more consistent. That fact will be a focal point of this book. We will cover precisely how the Webmin interface maps to the traditional configuration files that actually control your Unix system. Unix, like any sufficiently powerful and flexible system, is complex, and Webmin doesn't remove that complexity, though it can make the complexity easier to manage by presenting it in the form of a consistent interface.

Who This Book is For

This book is targeted at intermediate Unix users as an introductory text to many complex topics, and as a reference guide for experienced system administrators who must maintain a wide array of services and operating systems. It can also be a valuable companion volume to a beginning Unix text, for beginners who would like to learn the *Webmin Way* alongside more traditional methods and practices. There is no substitute for learning and understanding your operating system. But this book attempts to bring the two worlds together, so that time spent with a book covering traditional methods will map directly onto your Webmin experience, with the hope of making both more valuable and comprehensible.

If you have a desire to learn more about your system and Webmin, no matter your current level of knowledge, this book can be valuable to you. I make no assumptions of the level of experience of the user. I do assume a reader willing to read not just this book, and not just approach the system from the Webmin perspective. The reader who will gain the most from this book will be the one who reads the man page for a software package while working through the chapter on that subject. Links to other sources of information are often provided, as are notes to help you locate where on your system the actual configuration files are located. Finally, every single option in Webmin maps to some configuration file directive, command line option, or system variable value. Each of these directives, options, and values for the modules covered is pointed out and described. If Webmin has turned your system into a black box in your mind, this book seeks to pull the top from the box so you can look inside. There is nothing wrong with allowing Webmin to make your job easier, but ignorance of how it relates to the underlying system can only lead to confusion and problems.

Because Webmin itself predates the writing of this book by a couple of years, Jamie Cameron has a significant head start on this author. I'd love to cover every module in the core Webmin and a few of the better third party modules, but deadlines must be met. The book has to be called *finished* at some point, and I believe I've made a valiant first effort to document the *core* modules. This book covers all of the general system modules and functions, the Webmin configuration modules, and the modules for the Apache web server, the Sendmail mail server, the Postfix mail server, the WU-FTPD ftp server, the BIND domain name server, and the Squid proxy server. I believe these are the most common services being configured with Webmin, and therefore I considered them the most important to document completely and accurately for the first published edition of this book. At any rate, they are the most common source of questions on the Webmin mailing list, and thus those are the modules that are covered here.

Note

Perhaps you've noticed that there are two mail servers in the above list of topics covered, Sendmail and Postfix, while all other services are covered by one module and chapter only. The reason is simple: I prefer Postfix to Sendmail. However, the last time I saw any data regarding the subject of mail server usage Sendmail was moving over 75% of the worlds email, while Postfix was merely a blip on the radar. So, while Postfix is an easier mail server to configure and maintain in most environments, and functionally equivalent to Sendmail in most ways, I felt compelled to address both.

Why a Webmin Book?

Though the question is perhaps of little relevance to some readers, I've come to the conclusion that every technical book ought to be able to convincingly answer the question of why it was written. If an author can't answer that simple question it is quite likely the book should have never come to be, and given the alarming number of fat, empty books in the technical section at my local bookseller I'd guess that too few authors ever attempt to answer it. So, for the next few paragraphs I'm going to answer the question by explaining why a Webmin book, and more specifically a Webmin book written by me, should be on the bookshelves at your local bookseller and on the web for all to read.

I started writing the Webmin book not quite two years ago in late 2000, for entirely selfish reasons, though reasons unrelated to making money on the book in any direct way. Some time before that in 1999 I co-founded a company to build appliance servers based on the Linux operating system and a number of other Open Source software packages. Starting Linux-based technology companies was very much the thing for nerds like me to do at the time, just as two years later it was equally popular for Linux-based technology companies to fold into bankruptcy and oblivion just as enthusiastically as they had started, if with somewhat less fanfare and revolutionary talk. The company, Swell Technology, was founded on a lot of high ideals about how a hardware vendor ought to behave towards customers and towards the Open Source community, plus a little money that I had made in the stock market before the internet bubble burst. After all, no matter how high the ideals or how vibrant the Linux server market potential appears at the time it still takes a little money to start a company. But, unlike a lot of other Linux-based technology startups, Swell Technology still exists three years later, possibly partly because we didn't bother with venture capital or a hyped IPO as was the standard operating procedure for most Linux-based technology companies of the time.

In 1999 when we founded Swell, we focused on one small niche market and developed a web caching appliance product based on the previously mentioned Linux, Squid, and a still young but rapidly developing Webmin. The choice of Webmin was mostly an easy one, because at the time it was either Webmin or text editing of configuration files with `vi` or `emacs`. Luckily, Webmin was already an exceedingly solid piece of work with a quite wide feature set. So I built the product, packaged the product, marketed the product (with some help on all counts), and even sold a few of the product by the middle of 2000. I also wrote a lot of documentation, to the tune of a few hundred pages. First in LinuxDoc, and then in the far more capable and flexible DocBook. However, most of this documentation was mostly written for users of our products. It contained a large amount of information that would be useful to a general reader using Webmin and not just our clients, but that information was interspersed with occasional information that was only useful to a user logged into one of our servers. Thus, no one was reading it except our customers who, at the time, did not make an exceedingly large audience.

Also during this time, I was reading and answering questions on the Webmin mailing lists whenever I knew the answer. As on all technical mailing lists, there are questions that come up every few days or weeks no matter how many times they are answered. On some lists this is particularly annoying because the documentation for a project usually answers those sorts of questions in vivid detail. Perhaps there is a FAQ with the answers, or a nice manpage. Webmin, however, had very little in the way of documentation. At the time, the Webmin FAQ consisted of about five questions and answers and online help only existed for a few modules (I had already written the online help for the Squid module, and still maintain those help files today). So the questioners couldn't simply be referred to the documentation, because there was none that answered their question. So, out of a profound desire to be lazy, I started writing a book. I'm sure there is an apparent contradiction in that statement to many readers, but probably not to anyone who regularly contributes to an Open Source project mailing list. Answering the same question half-heartedly several times is far more tiring than answering it once with the thoroughness it deserves.

So I set out to answer some of those questions with a thoroughness that I hoped would severely reduce the number of repetitive questions on the mailing list, as well as answer some of the questions I found my clients often asked about Webmin on our servers. According to my revision information I posted the first 0.01 draft on October, 6 2000 on a back corner of my personal website. It contained four chapters, none of which was more than ten pages. It covered Apache, Squid and most of the Webmin related configuration options. I had taken off a long weekend from Friday to Monday to write it and another couple days to figure out how to process DocBook SGML. Within three days of mentioning it on the Webmin list my book, if it could be called that in its diminutive early form, was receiving 1,000 hits and a few hundred unique visitors each day. Our company webserver, where my homepage is hosted, had never seen that much traffic in its entire existence. Interesting. Free stuff draws visitors, and free, *useful* stuff draws a *lot* of visitors. This discovery was very exciting for me because, as a devout capitalist and businessman, I like to give stuff away. Or maybe I'm merely a little less than humble and enjoy knowing folks have read my book and find it useful. Either way, I enjoyed the popularity my book was gaining among Webmin users.

A lot of people seemed to like the early versions of the book, and I was enjoying writing it because it gave me a structured way to learn a lot of things that I didn't already know and reinforced things I did. Thus, the book grew whenever I had a weekend to spare and a subject that I wanted to write about. Somewhere along the way, I began to receive requests to buy the book, and as the book grew these requests came more frequently. So in a fit of brilliance unequalled by any of my previous intellectual revelations (which number in the hundreds on a good day), I decided to publish the book myself. I began the process of preparing it for printing via a print-on-demand publisher, and trying to figure out all of the complexities of transferring digital words onto paper cost-effectively and with a high quality resulting product. Luckily, this madness was interrupted by a phone call from Bill Pollock of No Starch Press, a *real* book publisher with a well-earned reputation for quality production, who was inerested in publishing a book about Webmin. He had spoken to Jamie Cameron who referred him to me as a possible choice for doing the writing. After a brief discussion about licensing (since I insisted on being able to offer a free version on my website) we came to an agreement. Several months later by way of magic and editors and printers this book has found its way to your local bookseller with an attractive cover and in a nice binding. Or I suppose I should say I *think* it will find its way to your local bookseller with an attractive cover and nice binding...one can never be sure about the future. It was a brief discussion, because I've been a fan of No Starch since reading *The Book of Javascript* by Thau! with its brilliant cover design and very nice presentation overall. Also, the terms of the boilerplate contract were quite fair and more generous than most similar agreements from other publishers. Adding Bill's immediate agreement to allow me to publish a free version online, it was a quick and painless process. If all publishers were this nice to work with, I would probably become a full-time writer and rid myself of the complexities and uncertainties of running a business in a highly volatile market.

Now that the story of the book and how it came to be is out, I will wrap up by saying I hope you enjoy my first book and find it a valuable addition to your bookshelf. I've attempted, with possibly varying degrees of success, to strike a balance between a comprehensive reference to the options found in Webmin and a valuable learning tool for Unix and Webmin users who may not have extensive system administration experience. More succintly, I hope this book answers your questions.

How to Contact the Author and Errata

I've done my best to make this book a useful and accurate desktop reference guide for administering a Unix system with Webmin. If you have ideas about what would make this a more useful guide in future editions, or if you find an error in the text, please feel free to contact me. Email is the preferred method of contact, at `webmin-book@swelltech.com`. I will maintain a list of errata online at the Book of Webmin Homepage [http://www.swelltech.com/support/webminguide].

How to Contact No Starch Press

XXX

Acknowledgments

This book could not have been completed without the extreme patience and helpfulness of Jamie Cameron, the author of Webmin. Not only did he go to the trouble to create Webmin to start with, but he managed to fix every bug this author could find, and explain every detail I could not figure out on my own during the course of writing the book. He also maintains a breakneck pace of development, which has only accelerated in the time that I've been using Webmin. The Webmin community could not hope for a more benevolent or productive leader.

Thanks also are due to the regulars on the Webmin users and Webmin developers mailing lists. Many patient individuals helped me learn the ropes of Webmin long ago. The fine users of Webmin have continued to provide support and assistance to me throughout the writing of this book by spotting the problems, and complaining loudly. It is surely a better book because of the criticisms of every person who sent emails detailing my failings. It could be said that this book has been continuously edited by the Webmin community from the day of its first publication on the web. Of particular note for sharing their in-depth knowledge of Webmin, Perl, and Linux systems in general, are Ryan W. Maple and Tim Niemueller.

Much thanks are also due to members of the docbook-apps mailing list, where all of my SGML and DocBook questions were answered. The book would not be as nice to look at or read without the guidance of the kind individuals there. In particular, Norman Walsh deserves praise for his modular DocBook stylesheets and the prompt attention to my questions regarding them, and Sebastian Rahtz is due thanks for his JadeTeX and PDFJadeTeX macro package as well as the great work he does in helping to compile the TeXLive CD, all of which were instrumental in producing the HTML, PostScript and PDF variants of the book. There seems to be a small revolution in the world of open tools for publishing, and the folks involved in making all of these technologies possible are due my highest praise and appreciation. I couldn't have prepared a book for publication without their hard work on PDFJadeTeX, Jade and OpenJade, teTeX, and probably others that I don't even realize are involved in the process. My next book will be in XML DocBook, so I'm hopeful they will still be around to help me through the process.

Finally, the screenshots within this text have been made using the Swell Technology Webmin theme. The icons in this theme were created primarily by me, but with early assistance and guidance by Youngjin Hahn (aka Artwiz), a very talented young artist who is perhaps best known for his excellent icon and theme work at Themes.org [http://www.themes.org]. Other design elements, including the theme colors and titles, were created with assistance from Charity Baessell, the webmistress and graphic designer at Swell Technology and of the PenguinFeet project. Thanks also go to Jamie for making Webmin themeable to start with. Not to say the original theme was ugly or anything, but...well, I'm just happy Webmin is themeable.

Note

The latest version of the Swell Technology Webmin theme can be downloaded from the Open Source Projects page [http://www.swelltech.com/projects] at swell-tech.com.

Chapter 1. Getting and Installing Webmin

Getting Webmin is easy, and in fact, it may already be installed on your system. Several Linux distributions now include Webmin as either its primary system administration interface or as an optional package. Also, a large number of Linux hardware vendors use Webmin or a modified version of Webmin as their graphical administration interface. Best of all, because Webmin is Free Software, even if you don't already have Webmin, it is only a download away.

Where to Download Webmin

It is often best to obtain Webmin from your OS vendor if they provide a package for it. In this way, you can be sure it is automatically configured suitably for your particular OS and version. Executable and configuration file locations vary somewhat from OS version to version and from vendor to vendor, so getting Webmin from your vendor insures consistency.

Caution

It is necessary to temper the advice to get Webmin from your vendor with the warning that some vendors lag behind the release schedule of the official Webmin by a month or more. In recent months at least two exploitable conditions have been found in older versions of Webmin. If you are obtaining Webmin from your vendor, it is imperative that you check to be sure it is a recent version, which does not have exploitable bugs. Good vendors will of course update their packages immediately with a secured version, but being cautious is wise when the security of your server is at stake.

If your OS or system vendor does not provide a package of Webmin, then you can go to the Webmin homepage at: http://www.webmin.com/. Here you will find the latest version of Webmin in a tarball package, a Solaris pkg, and an RPM package. The tarball will work on nearly any Unix version that has Perl, while the RPM package is known to work directly on at least Red Hat, Mandrake, SuSE, MSC and Caldera versions of Linux.

Installing Webmin

Installation of Webmin differs slightly depending on which type of package you choose to install. Note that Webmin requires a relatively recent Perl for any of these installation methods to work. Nearly all, if not all, modern Unix and Unix-like OS variants now include Perl as a standard component of the OS, so this should not be an issue.

Installing from a tar.gz

First you must untar and unzip the archive in the directory where you would like Webmin to be installed. The most common location for installation from tarballs is `/usr/local`. Some sites prefer `/opt`. If using GNU tar, you can do this all on one command line, like so:

```
# tar zxvf webmin-0.87.tar.gz
```

Or if you have a less capable version of tar, you must unzip the file first and then untar it:

```
# gunzip webmin-0.87.tar.gz
# tar xvf webmin-0.87.tar
```

Next, change to the directory that was created when you untarred the archive, and execute the `setup.sh` script, as shown below. The script will ask several questions about your system, and your preferences for the installation. Generally, accepting the default values will work. An example installation might look like this:

```
[root@delilah webmin-0.87]# ./setup.sh
********************************************************************
*            Welcome to the Webmin setup script, version 0.87      *
********************************************************************
Webmin is a web-based interface that allows Unix-like operating
systems and common Unix services to be easily administered.

Installing Webmin in /usr/local/webmin-0.87 ...

********************************************************************
Webmin uses separate directories for configuration files and log
files.  Unless you want to run multiple versions of Webmin at the
same time you can just accept the defaults.

Config file directory [/etc/webmin]:  /usr/local/webmin-0.87/etc
Log file directory [/var/webmin]:  /usr/local/webmin-0.87/log

********************************************************************
Webmin is written entirely in Perl. Please enter the full path to
the Perl 5 interpreter on your system.

Full path to perl (default /usr/bin/perl):

Testing Perl ...
Perl seems to be installed ok
```

```
*********************************************************************
For Webmin to work properly, it needs to know which operating system
type and version you are running. Please select your system type by
entering the number next to it from the list below
---------------------------------------------------------------------
  1) Sun Solaris                         2) Caldera OpenLinux eServer
  3) Caldera OpenLinux                   4) Redhat Linux
  5) Slackware Linux                     6) Debian Linux
  7) SuSE Linux                          8) Corel Linux
  9) TurboLinux                         10) Cobalt Linux
 11) Mandrake Linux                     12) Delix DLD Linux
 13) Conectiva Linux                    14) MkLinux
 15) LinuxPPC                           16) XLinux
 17) LinuxPL                            18) Linux From Scratch
 19) Trustix                            20) Cendio LBS Linux
 21) Ute Linux                          22) FreeBSD
 23) OpenBSD                            24) BSDI
 25) HP/UX                              26) SGI Irix
 27) DEC/Compaq OSF/1                   28) IBM AIX
 29) SCO UnixWare                       30) SCO OpenServer
 31) MacOS Server X
---------------------------------------------------------------------
Operating system: 4

Please choose which version of Redhat Linux you are running, by
entering the number next to it from the list below
---------------------------------------------------------------------
  1) Redhat Linux 4.0                      2) Redhat Linux 4.1
  3) Redhat Linux 4.2                      4) Redhat Linux 5.0
  5) Redhat Linux 5.1                      6) Redhat Linux 5.2
  7) Redhat Linux 6.0                      8) Redhat Linux 6.1
  9) Redhat Linux 6.2                     10) Redhat Linux 7.0
 11) Redhat Linux 7.1
---------------------------------------------------------------------
Version: 9

Operating system name:    Redhat Linux
Operating system version: 6.2

*********************************************************************
Webmin uses its own password protected web server to provide access
to the administration programs. The setup script needs to know :
 - What port to run the web server on. There must not be another
   web server already using this port.
 - The login name required to access the web server.
 - The password required to access the web server.
 - The hostname of this system that the web server should use.
 - If the webserver should use SSL (if your system supports it).
 - Whether to start webmin at boot time.

Web server port (default 10000): 10000
Login name (default admin): root
Login password:
Password again:
Web server hostname (default delilah.swell.):
Use SSL (y/n): y
Start Webmin at boot time (y/n): y
********************************************************************
Creating web server config files..
..done

Creating access control file..
..done

Inserting path to perl into scripts..
..done

Creating start and stop scripts..
..done

Copying config files..
..done

Creating uninstall script /usr/local/webmin-0.87/etc/uninstall.sh ..
..done

Changing ownership and permissions ..
..done

Attempting to start Webmin mini web server..
Starting Webmin server in /usr/local/webmin-0.87
..done

********************************************************************
Webmin has been installed and started successfully. Use your web
browser to go to

  https://delilah.swell.:10000/

and login with the name and password you entered previously.

Because Webmin uses SSL for encryption only, the certificate
```

```
it uses is not signed by one of the recognized CAs such as
Verisign. When you first connect to the Webmin server, your
browser will ask you if you want to accept the certificate
presented, as it does not recognize the CA. Say yes.

[root@delilah webmin-0.87]#
```

Here you can see that I've chosen the default in some locations, and deviated from the default in others. The most likely changes you may want to make include changing the default installation directories, and altering the port on which Webmin will listen. Webmin also politely generates an `uninstall.sh` script that allows you to easily remove Webmin from your system.

Installing from an RPM

Installing from an RPM is even easier. You only need to run one command:

```
[root@delilah root]# rpm -Uvh webmin-0.87.rpm
```

This will copy all of the Webmin files to appropriate locations and run the install script with sane default values. For example, on my Red Hat system, the Webmin perl files will be installed in `/usr/libexec/webmin` while the configuration files will end up in `/etc/webmin`. Webmin will then be started on port 10000, and you may log in using `root` as the login name and your system root password as the password. It's unlikely you will need to change any of these items from the command line, since they can all be modified using Webmin, but if you do they are set in the `miniserv.conf` in `/etc/webmin`.

Installing from a pkg

To install on a Solaris machine using the pkg file, the steps are almost as simple as using the RPM. First unzip the file using gzip, and then use `pkgadd` to install the package.

```
root# gunzip webmin-0.87.pkg.gz
root# pkgadd -d webmin-0.87.pkg
```

This will install Webmin into `/usr/opt`, and run the install script with sensible default values.

After Installation

After installation, your Webmin install will behave nearly identically, regardless of operating system vendor or version, location of installation, or method of installation. The only apparent differences between systems will be that some have more or fewer modules because some are specific to one OS. Others will feature slightly different versions of modules to take into account different functioning of the underlying system. For example, the package manager module may behave differently, or be missing from the available options entirely, depending on your OS.

Note

A common problem after installing Webmin, is that some modules do not work, or do not seem to work completely. This can be caused by some of the software being installed in non-standard locations on your system. By default, when Webmin is installed, it creates a configuration for each module based on the standard filesystem structure and configuration file locations for your selected OS. If you have installed software from source tarballs instead of packages, or packages from a different source than your OS vendor, Webmin may not be able to find the files it needs to function correctly. Correcting these problems is usually a simple matter of modifying the configuration for the individual modules to match the actual locations of your configuration files.

Changing Webmin Passwords from the Command Line

Generally, once Webmin is installed all configuration of Webmin can be performed from within Webmin. However, there are a few things that can lead to being unable to log in. A common question is how to log in if you've forgotten the Webmin administrator password. If you have root access to the machine in question (i.e. you haven't also forgotten your system password), you can use the `changepass.pl` tool, that is found in the same directory as all of the other Webmin executable files (this is the directory in which you installed Webmin). To use `changepass.pl`, for example, to change the `root` password, the following command could be used:

```
# ./changepass.pl /etc/webmin root newpassword
```

In the above, the first option should be the directory where your Webmin configuration files are located. The second is the login name of the user whose password you'd like to change. The third is what you'd like the password to be changed to. Note that this script only works if you are logged in as the system root user, and can change any Webmin users password.

Changing the Webmin Port from the Command Line

Another problem after installation may be that a firewall prevents access to the Webmin port from across a WAN link (if, for example, you are remotely maintaining your Webmin server). If this is the case, you will want to consult with the firewall administrator to find out whether port 10000 can be opened, or if not, what port you can use for your

Webmin installation. Changing the port that Webmin runs on after installation is also a pretty simple process. Simply edit the file `miniserv.conf` in the `/etc` directory where your Webmin configuration files were installed (this is likely one of the following: `/etc/webmin`, `/usr/local/webmin/etc`, or `/opt/webmin/etc`). You'll find a `port` directive. Change this to whatever port you need Webmin to listen on, and then restart the Webmin web server.

Restarting Webmin from the Command Line

Restarting the Webmin server is usually required when making changes to the `miniserv.conf` file. Some OS versions provide a standard method to stop, start, and restart services, which Webmin often supports. But all versions of Webmin on all OS versions will have `start` and `stop` scripts, usually located in the configuration file directory of Webmin.

Restarting the Webmin server can be accomplished in a few different ways depending on the OS and version. Under Red Hat Linux and its derivatives, for example, you would use the standard `service` command:

```
[root@delilah /root]# /sbin/service webmin stop
[root@delilah /root]# /sbin/service webmin start
```

If your OS does not have a standardized service control tool like `service`, you may use the standard Webmin stop and start scripts located in the Webmin `etc` directory:

```
[root@delilah /root]# /etc/webmin/stop; /etc/webmin/start
```

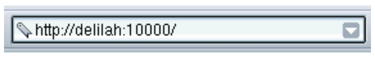
There are many other options contained within the `minserv.conf` file, but only a few are even remotely likely to need to be edited manually. Some other common problems that users run into include restricting access by IP and then running into trouble when their IP is changed by their service provider. Simply mistyping an IP when restricting access by IP can lead to the same trouble. The remedy for this problem is to add your correct IP to the `allow=` directive, and then restart the Webmin server.

Chapter 2. Logging In

Logging in with Netscape or Internet Explorer

Logging into Webmin is easy. Open a web browser, like Netscape or Internet Explorer, on any machine that has network access to the server that you wish to login on. Browse to port 10000 on the IP or hostname of the server, like so:

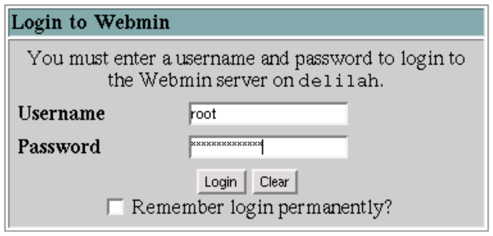
Figure 2.1. Entering the URL



http://delilah:10000/

Webmin will then respond with either an authentication window, or an authentication web form, where you can enter the adminstrator user name (usually "root") and password. After successful authentication, you will be greeted with the Webmin index page. The type of login form you receive (either on a web page or in a popup window) depends on the configuration of the Webmin server. The differences between session authentication and standard HTTP authentication will be discussed later in the book.

Figure 2.2. Session Authentication



Login to Webmin

You must enter a username and password to login to the Webmin server on delilah.

Username: root

Password: **************

Note

Many systems are configured with Webmin running in SSL encrypted mode. On these systems, you will log in using a URL beginning with *https://* rather than *http://*. Also, at least one Linux distribution that includes Webmin, specifically Caldera, installs it on port 1000 rather than 10000. This is theoretically a more secure arrangement, however, be aware that some firewalls will prevent you from accessing your Webmin-enabled server from outside of the local network if Webmin runs on a port below 1024.

Logging in with Lynx

Sometimes, it may be desirable or necessary to administer your system from the command line without the benefit of a GUI. Luckily, one does not have to give up Webmin entirely in these circumstances. Using Lynx, or a similarly capable text-mode web browser, one can login and use most of the Webmin modules much the same as using a graphical browser. Logging in when Webmin is using session authentication is identical to logging in with a graphical browser, but logging in when Webmin is configured to use traditional HTTP authentication is slightly different. Lynx requires that authentication information be included on the command line when starting up:

```
[joe@delilah joe]$ lynx -auth root:passwd http://delilah:10000
```

Caution

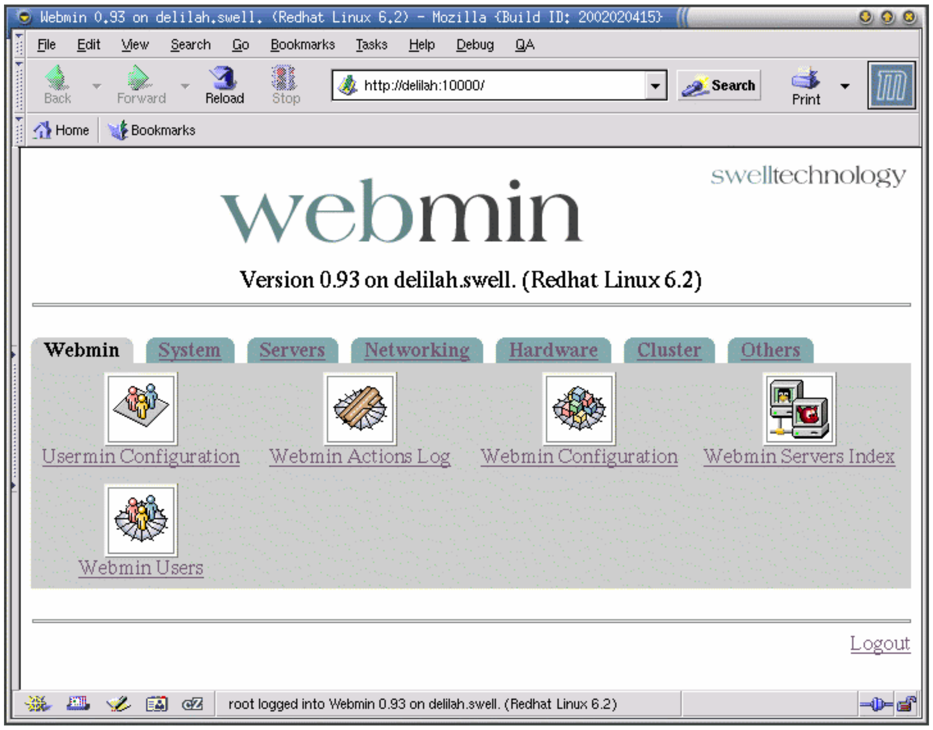
If you plan to administer your system via a text mode browser, you will want to choose an alternate theme rather than the new default MSC.Linux theme. The old default theme, or the Swell Technology theme have a simpler icon and table layout, allowing Lynx and other textmode browsers to display them more effectively. The MSC.Linux theme, while attractive in a GUI browser, uses a complex layout that leads many areas of Webmin to be difficult to read and impossible to use in a text mode browser.

Another limitation of using a command line client is that SSL is not well supported by all versions of Lynx and other text-mode browsers. This means you may need to run your Webmin server without encryption, and thus more extreme measures should be taken to insure the security of your server. Securing a Webmin installation will be discussed in detail in later chapters.

A First Look

Webmin is divided into a number of modules that each allow you to administer a single aspect of your system. Modules exist for most common, and many uncommon, system administration tasks. The standard modules provide a graphical interface for: *Apache, Squid, Bind, NFS, man pages, Sendmail, Postfix, Samba,* and much more. There also exist a wide array of third party modules that provide even more extensive functionality. This book will focus on the standard modules but may expand to encompass other modules in time.

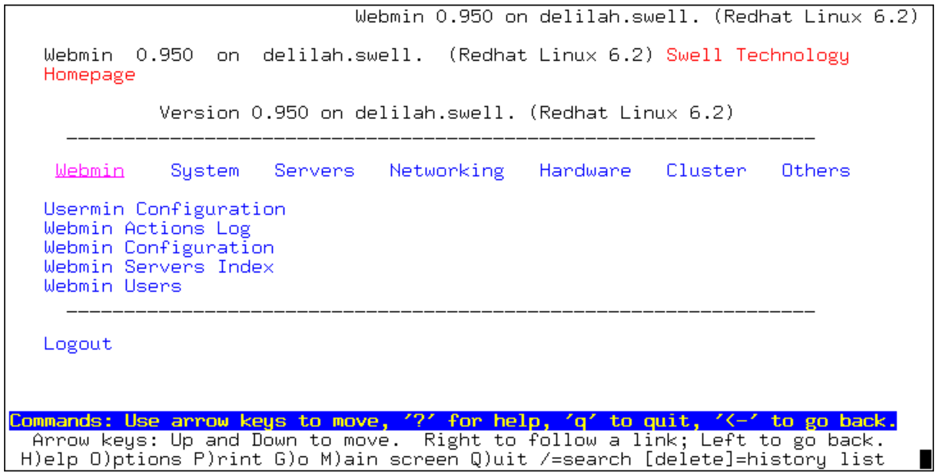
Figure 2.3. A First Look


Webmin 0.93 on delilah.swell. (Redhat Linux 6.2) - Mozilla {Build ID: 2002020415}
File Edit View Search Go Bookmarks Tasks Help Debug QA
Back Forward Reload Stop
http://delilah:10000/
Search
Print
Home Bookmarks
swelltechnology
webmin
Version 0.93 on delilah.swell. (Redhat Linux 6.2)
Webmin System Servers Networking Hardware Cluster Others
Usermin Configuration
Webmin Actions Log
Webmin Configuration
Webmin Servers Index
Webmin Users
Logout
root logged into Webmin 0.93 on delilah.swell. (Redhat Linux 6.2)

Upon first logging in, you'll see a row of tabs and a number of icons. The tabs are labelled **Webmin**, **System**, **Servers**, **Hardware**, **Cluster**, and **Others**. You may also have, depending on your OS and version, one or two additional tabs. The selected tab when first logging in is always **Webmin**. This category is where all of the Webmin related configuration details are located.

The view from Lynx is actually pretty similar if using one of the traditional themes. The MSC.Linux theme makes many links inaccessible when using Lynx, and usage overall quite difficult when in a text mode browser, so be sure to switch to a more conventional theme if you'll be administering your system from the command line. On my server using the Swell Technology theme, Webmin is quite useable entirely from a text console, making Webmin useful even when no browser is available. The MSC.Linux theme can also be rather heavy-weight when administering a server across a WAN link with a graphical browser, as the number and size of images makes browsing the pages rather slow even via a fast connection.

Figure 2.4. A first look from Lynx



```
                              Webmin 0.950 on delilah.swell. (Redhat Linux 6.2)

   Webmin  0.950  on  delilah.swell.  (Redhat Linux 6.2) Swell Technology
   Homepage

             Version 0.950 on delilah.swell. (Redhat Linux 6.2)
     _________________________________________________________________

    Webmin    System   Servers   Networking   Hardware   Cluster   Others

   Usermin Configuration
   Webmin Actions Log
   Webmin Configuration
   Webmin Servers Index
   Webmin Users
     _________________________________________________________________

   Logout



Commands: Use arrow keys to move, '?' for help, 'q' to quit, '<-' to go back.
  Arrow keys: Up and Down to move.  Right to follow a link; Left to go back.
 H)elp O)ptions P)rint G)o M)ain screen Q)uit /=search [delete]=history list
```

Chapter 3. Webmin Category

Webmin provides a number of configurable options, access control features and flexible action logging in order to allow maximum flexibility and security of the Webmin server and the various Webmin system administration modules. These features are accessed through the **Webmin** tab on the index page of Webmin. When in the **Webmin** category, you will see icons for **Usermin Configuration**, **Webmin Actions Log**, **Webmin Configuration**, **Webmin Servers Index**, and **Webmin Users**. Keep in mind that the modules located under the **Webmin** tab are for configuring *Webmin itself*, not the underlying system. So, for example, creating a user in the **Webmin Users** module will not create a system user, only a Webmin user. Likewise, the **Webmin Actions Log** module allows you to search and view the Webmin log, not any system or service log that might exist. We'll get to those kinds of options later. For the moment, we're going to skip over **Usermin Configuration**, as **Usermin** receives full coverage in the next chapter.

Webmin Actions Log

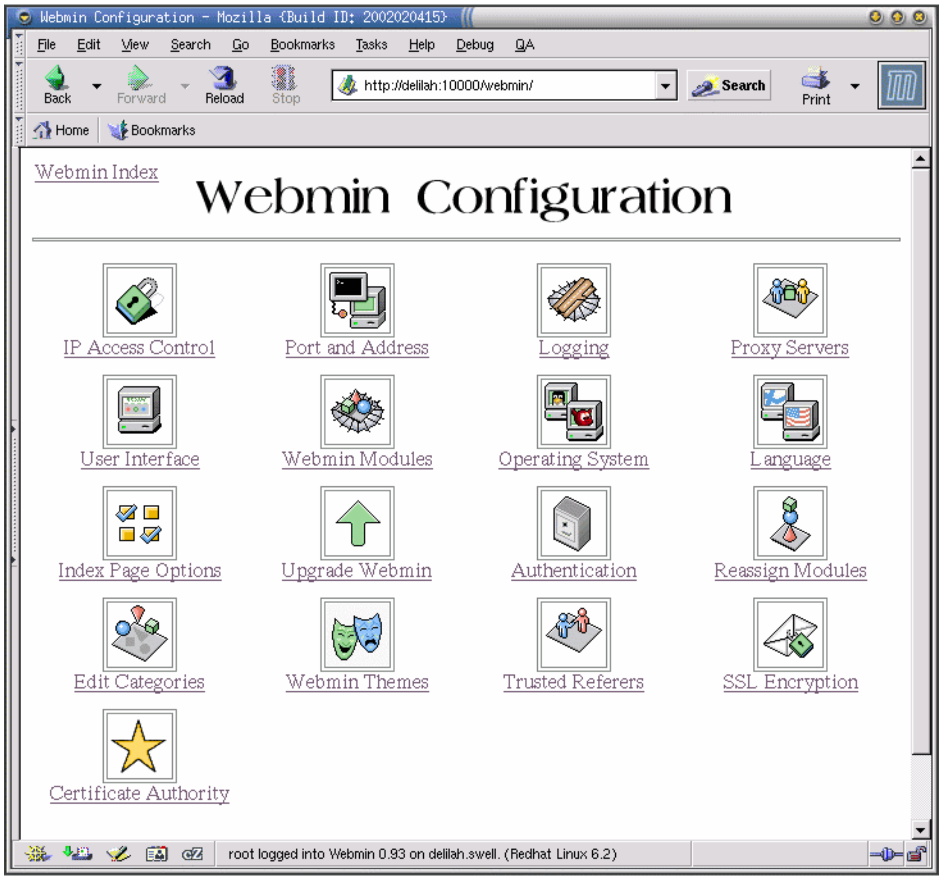
This page provides access to the Webmin log. This log can be configured for each module, and individual users. This module does not configure the logs, but provides a means to search the logs for actions performed by particular logged users, or actions performed in given logged modules. Configuration of Webmin's logging capabilities is covered in the **Webmin Configuration** section.

With this module it is possible to search for actions by specific users, within specific modules, for a given range of dates, or any combination of those qualifications. For example, if you manage a number of junior system administrators and you'd like to find out if one of them has edited an Apache virtual server configuration in the past week, this module makes those kinds of questions easy to answer (assuming logging to that degree is enabled, of course).

Webmin Configuration

The **Webmin Configuration** module allows you to configure most of the important aspects of Webmin itself, as well as install new modules, upgrade existing modules, and upgrade Webmin itself. It also provides a means to change the port and address where the Webmin miniserv.pl web server listens for connections, select different languages, enable or disable SSL encryption, and configure the Webmin built-in logging features.

Figure 3.1. Webmin Configuration



IP Access Control

Webmin has its own web server, called `miniserv.pl`, which provides a simple IP access control feature. This page allows you to configure this option. You may enter IP networks (such as `192.168.1.0`), IP host addresses (such as `192.168.1.79`), and hostnames (such as `joesbox.penguinfeet.org`). It is wise to limit access to the Webmin server to just those addresses that are trusted. While Webmin has no known exploits in versions greater than 0.970, if someone were to obtain your password, this would provide an additional level of protection from unauthorized access. This option configures the `accept` and `deny` directives in the `miniserv.conf` file. The default is to allow any address to access Webmin.

Caution

Be aware that using IP access controls within Webmin is an application level security feature. In other words, if ever an exploitable problem were discovered in the Webmin `miniserv.pl` web server, it would still be accessible from an IP not permitted to use Webmin. So it is still theoretically possible to attack the web server even if the user isn't offered a login page. However, this is a pretty unlikely scenario, requiring a bug in `miniserv.pl` that is exposed even when an authentication page is not provided.

Port and Address

The Webmin server will, by default, listen on every active IP address on the system. But if you have multiple addresses and would prefer Webmin to only listen on one of them, you may use this option. So, for example, if you have one network interface connected directly to your local network and a second network interface connected to the internet, you could improve security by causing Webmin to only listen on the local network. In this case, any requests from the internet at large would be ignored, but it would still be possible to connect from local computers. This can be a very effective first line of defense. After all, if the bad guys can't even talk to the Webmin server, they certainly can't try anything funny to break into it.

The **Listen on Port** option specifies the network port on which Webmin will listen. In a standard Webmin install this will be port 10000, though Caldera installs it on port 1000. Some firewalls may restrict access to ports below 1024, and some may restrict even ports above 1024. If your network has strict proxy restrictions that prevent connecting on port 10000, you may wish to try port 553 or 443 (assuming these ports are not already in use on your Webmin server for normal SSL service). These ports will nearly always be usable through a proxy, even when using an SSL enabled Webmin.

Note

In a proxied environment, your client browser must use a `CONNECT` method to construct a tunnel through the proxy device. Because of the potential for abusing `CONNECT` requests most proxies prevent this method on all but a few ports. The standard port for SSL web connections is 443, and so it is the most likely port to be available for `CONNECT` requests. If your proxy is running Squid, and you have administrator privileges you may wish to add Webmins default port to the allowed SSL ports as documented in the Squid chapter of this book.

As mentioned briefly in the installation chapter, it is possible to alter these configuration settings in the `minis-erv.conf` configuration file in addition to graphical configuration with the Webmin Configuration module. This may be necessary if a firewall prevents you from accessing port 10000, and you only have console or SSH access to the machine. In this case, editing the `port` option will alter the port, and the `bind` directive configures the address on which Webmin listens. Whenever editing the `miniserv.conf` file, Webmin must be restarted for changes to take effect.

Logging

As mentioned earlier, Webmin provides very flexible logging features. With these features, you can very easily monitor what actions those users with adminstrator privileges are performing on the server. It is also possible to log actions based on the module where the actions are performed. The option **Log resolved hostnames** will cause Webmin to provide a hostname rather than just an IP address for the client computer that performed an action. And **Clear logfiles every...hours** causes Webmin to rotate its own logs and keep them from overfilling the disk with old logs. If long-term logs are needed for security auditing purposes, it may be wise to include the Webmin log in your normal system backup rotation.

The decisions regarding what to log, whose actions to log, and how long to store those logs, should be carefully considered for your situation. In some cases, a log is unnecessary, while in others it may be required by company policy or useful in addressing the security needs of your environment. If logging is enabled, care should be taken to insure Webmin will have plenty of disk space in the Webmin log directory, as some options can lead to quite verbose logging (**Log changes made to files by each action**, for example). Remember that Webmin action logging has nothing to do with the logging features of other parts of the system. Syslog is configured separately in the **System:System Logs** module, while application specific logging is usually configured within the application module.

Proxy Servers

Webmin provides several tools that must connect to the internet to operate correctly. These include the **Webmin Update** feature, the **Software Packages** module and others. If your local network uses a proxy to access Web or FTP sites on the internet, you may configure those settings here. If your proxy requires authentication, the username Webmin will use to login can also be configured on this page in the **Username for proxy** and **Password for proxy** fields.

User Interface

The Webmin user interface is configurable in a number of ways. In this module you may configure the colors of your Webmin pages. The colors are expected to be in standard hex triplets, as used in HTML markup on the internet. You may also choose to use the standard fonts of your browser to display page titles, rather than the font provided by the theme you are using. Finally, you may configure where on the page Webmin will display the login name and hostname of the server. This page does not configure Webmin themes, which are configured on their own page, and the changes that can be made here are mild by comparison to the possibilities when using themes. Beware also that these changes may not take effect when using a theme other than the old standard Webmin theme. For example, the new MSC.Linux theme overrides all of these options with its own standard values.

Webmin Modules

As previously mentioned, one of the best things about Webmin is that it is completely modular. Every server daemon, every system feature, every Webmin feature, has its own module that connects to the core Webmin libraries and answers to the Webmin `miniserv.pl` webserver. Because of the elaborate, but still easily comprehensible, modular framework that Webmin provides, it is very easy to write full featured modules that integrate seemlessly into Webmin and your operating system.

Install Module

From this page, you can install new modules, either from a local file, an uploaded file, or a file downloaded from an FTP site or website. Webmin module packages are simply tar archive files, that contain the complete directory structure of the module. These modules end in the suffix `.wbm`.

Note

A great resource for additional Webmin modules is the Third Party Modules for Webmin [http://www.thirdpartymodules.com/webmin] page, run by Richard Teachout. Richard is a long time fan and supporter of Webmin, and a regular contributor to the Webmin dicussion lists. After spending some time on the list, he perceived a need for a comprehensive resource for modules that work with Webmin. At the time of this writing, there are over 180 modules listed at his site, though it should be mentioned that the site also lists the modules included in the standard Webmin distribution. If you've written a Webmin module, you should post it to this site, so others will be able to easily find and benefit from your efforts. It is also a great place to find example code to help you when writing your own modules (in addition to the standard modules, of course!). Beware, however, that as with any group of free software the modules vary wildly in quality. Some are excellent and on par with any of the best standard Webmin modules, while others are in such an early stage of development as to not be useful.

Clone Module

The **Clone Module** feature provides an impressive amount of flexibility for administrators who must provide limited administration access for several instances of the same software on the same machine. If, for example, you have two different Apache configurations running on your system, you could clone the Apache module to allow different users to access the different Apache configurations.

Caution

While this feature does allow interesting and powerful options for multiple users configuring similar services, Webmin should not *yet* be viewed as an ideal tool for administering a virtual hosting server, where many users configure the Apache virtual servers, Sendmail aliases, and DNS entries. There are a number of commercial and Open Source efforts underway to provide such services within the framework of Webmin. At the time of this writing none are production-ready, but with the number of people pursuing the goal, it is likely that such a tool is not far off.

To clone a module, select the module to clone from the dropdown menu, then enter a new name for the module. To avoid the problem of the new module interfering with the original module, you will want to carefully consider the service being administered by the cloned module. Usually, you will need to set up the new clone with a wholly separate installation of the service being configured. So, for example, if you have cloned Squid so that you may run two different Squid processes you *must* configure them to use separate configuration files, cache directories, log files, and process IDs. If this precaution is not taken, one or both of the processes will behave erratically or fail to work at all.

Example: Cloning the Squid Module

To take the example further, let's create a clone of the Squid module, and configure two Squid processes to run on the same server without stepping on each other. First, copy the `squid.conf` configuration file from the command line or the Webmin File Manager to a file named `squid2.conf`.

```
[root@delilah /]# cp /etc/squid/squid.conf /etc/squid/squid2.conf
```

Next create your module clone of the Squid module (referred to as **Squid2** from here on). Browse to the newly created clone module, and edit the module configuration by clicking on the **Module Config** link in the upper left corner of the Squid2 index page. Here you should change the **Full path to squid config file** to point to the newly created configuration file. You will also need to change the **Command to start squid** and **Command to stop squid** to point to another filename as well, let's call it `/etc/rc.d/init.d/squid2`. We'll have to actually create these files before trying to start up our new Squid process.

We will also need to alter the **Full path to PID file** to point to `squid2.pid` rather than `squid.pid` and change the log directory name. I usually use `/var/log/squid2` for a cloned Squid process. This is all that is required within the module configuration for the moment. Click **Save** to save your changes and return to the **Squid2** index page.

Now that we've told Webmin the file to edit, we can actually edit it to configure Squid2 to operate independently of Squid. First we'll need to change Squid2 to operate on a different port or IP than Squid, since no two processes can listen on the same IP:port combination. 8080 is a good secondary cache port to use. This option is configured in **Squid2:Ports and Networking**. Next alter the cache directories to something different than the **Squid** cache directories, since they cannot be shared. The same must be done for the `access.log`, `cache.log`, and `store.log`. As mentioned previously, I usually place my Squid2 logs into `/var/log/squid2`, so this directory must be created with ownership by the same user and group names that Squid runs under (`squid:squid` on Red Hat Linux).

Finally, copy your Squid startup script to a new location, and modify it to call Squid with the new configuration file and check against the new PID file. For example, on my Red Hat system I would copy `/etc/rc.d/init.d/squid` to `/etc/rc.d/init.d/squid2`. You can now configure access controls in Webmin to allow access to separate administrators for each Squid process, or further modify the Squid2 configuration to provide different functionality than the primary Squid process.

Delete Modules

In this section, you may select any modules that you'd like to delete from your Webmin installation. Beware that using this form will delete the selected modules entirely from the system. If you decide later to use a deleted module, you will have to download the module again and reinstall it. It is usually a better idea to simply remove the module from each users access list (possibly even including `root`), rather than deleting the module here. However, if disk space is a concern, you can use this to delete all unneeded modules from your system.

Operating System

Webmin knows how to interact with your system based on configuration files for each module, that are selected based on the operating system configured here. If your system has Webmin pre-installed, you usually will not need to concern yourself with this. But if you upgrade your system, and the new version moves some configuration files to new locations, updating this may be necessary. On this page you may also set the search path for both programs (like system commands), and for libraries (such as for the password encryption library). Again, these options rarely need to be changed unless you have installed system tools and configuration files in odd locations on your system.

Note

In current versions of Webmin, at least up to 1.020, changing the OS does not alter existing module configuration files, and will only apply to newly installed modules. A future version will likely alter this behavior to modify the already installed module configurations only if they have not been altered by the user.

Language

Webmin supports a large number of languages for titles and module text. This page allows you to choose the language of your Webmin. New languages are being added regularly. Users of languages that are not supported are encouraged to write a translation and send it to the author of Webmin. He's always happy to receive new translations, and users are always happy to find that their native language is one that is provided with the distribution.

Index Page Options

This page allows you to configure the layout of the Webmin index pages. You may choose the number of icons to display per row using the **Number of Columns** field. The **Categorize modules?** selects whether modules will be grouped under category tabs based on the type of function they perform. The **Default category** is the category that will be displayed when first logging into Webmin. An alternative header can be used by selecting the **Use alternative header** option, which provides a somewhat different appearence by placing the host information on the upper right side of the display rather than below the Webmin title. Finally, selecting **Go direct to module if user only has one?** will cause a user to see *only* the module they have access to, rather than the Webmin index page when logging in.

Upgrade Webmin

Using this page, you may upgrade your Webmin to the latest version automatically from the Webmin home page, or from a local or uploaded file. This module will use a package management system to perform the update if one is available on your system. If, for example, you have an RPM based system like Caldera, Red Hat, or Mandrake, this feature will upgrade from an RPM package (it even knows how to find the correct package type for your system on the Webmin homepage!).

Authentication

Webmin provides some nice features for preventing brute force password cracking attacks on your server, as well as protection against "forgetful users". If your Webmin server is widely accessible, and provides service to many users, it is probably wise to make use of these features to maximise the security of your system. Security policy in your company may even require usage of some or all of these features.

Password timeouts provide a means to prevent brute force password attacks by limiting the frequency of login attempts by a given user. If enabled, Webmin will block hosts that have a given number of failed login attempts. The time to block the host is configurable in seconds. Webmin will expand the delay on continuing failed login attempts from the same host. Logging of blocked logins can also be enabled.

The next option, **Log blocked hosts, logins and authentication failures to syslog** configures Webmin to log authentication failures and blocked addresses attempting to login to `syslog`. These logs will usually appear in the `secure` or `auth` file in your system log directory.

Session authentication provides a means of logging users out after a specified time of inactivity. This can help prevent unauthorized users from accessing the server by simply using the computer of someone who does have access. This isn’t fullproof, as many browsers now have password management features and authorized users may store their passwords on the local computer, making them accessible to anyone with access to the computer. If security is a concern, you should strongly discourage users from saving login information for the server on their local machine, as well as discouraging leaving open browser sessions when away from their desk or office.

Finally, you may choose to allow logins from users on the same machine where Webmin is running based on the username. This feature should only be used for single user machines, where security is not a major concern. If enabled, anyone with access to the local machine will easily be able to gain root access to your system.

Caution

As any complete system administration tool must, the Webmin web server runs with `root` privileges. Security should always be a first priority for any publically accessible Webmin-enabled system. A weak security policy, or no security policy at all, is an invitation for disaster. A comprehensive security policy will include a good firewall, an intrusion detection system, vigilance with regard to software updates and errata from your OS vendors, and perhaps most importantly education of users and administrators of your network.

Reassign Modules

As mentioned earlier, Webmin categorizes modules based on the function they perform, by default. This page provides a simple means for moving modules to new categories if you find the default categorization is confusing to you. Some third party modules, written before the categorization features were added to Webmin, are miscategorized into the **Others** category by default, so you may wish to manually move them to their more sensible locations using this module.

Edit Categories

Instead of moving modules within existing categories it may be most sensible to create a *new* category for your favorite modules, or for custom modules written just for your organization. This page allows you to create new module categories, as well as rename or relabel old ones.

Webmin Themes

One of the more fun additions to the Webmin feature set is that of themability. Themes in Webmin are very flexible, allowing a theme developer to modify nearly every single aspect of the appearence and layout of the Webmin pages. For example, in the screenshots throughout this guide, you may have noticed that the icons and titles are not the same as the standard Webmin appearence. These screenshots were taken on a Webmin using the *Swell Technology* theme, which is a custom theme designed by the author of this book with some help and pointers from Youngjin Hahn (aka Artwiz of Themes.org fame), and Charity Baessell (the webmistress and designer here at Swell Technology).

Tip

For information on making your own themes for Webmin, you can consult the Creating Themes [http://www.webmin.com/webmin/modules.html#theme] section of the Webmin module developers guide.

Switching amongst installed themes is simply a matter of selecting the preferred theme, and then clicking the **Change** button. Installing a new theme requires you to choose the location of the file (Webmin themes have a suffix of `.wbt`), and then clicking **Install Theme**. Changing themes will require a forced refresh of your browser display in order for all new icons and title images to be displayed because browsers often cache images and pages. To force a refresh in Netscape, Mozilla and related browsers, press and hold the **Shift** key, while clicking the refresh button. Similarly, in Internet Explorer, press and hold the **Ctrl** key while clicking the refresh button.

Trusted Referers

Because Webmin is web based, it is accessed from your browser. Browsers often store authentication information and will automatically resend it on demand from the Webmin server. Because of this, it *could* be possible for remote web sites to trigger dangerous actions on your Webmin server (assuming the web site owner has malicious intentions--it would not happen accidentally!). This page allows you to configure which hosts may refer to actions on your Webmin server.

Anonymous Module Access

In some circumstances it may be useful to have one or more Webmin modules accessible to any user, without requiring authentication. For example, it may be useful to allow users to view some read only statistics about the server, or allow a user to mount or unmount a device using a custom command, or similar. Extreme caution should be taken when using this feature of Webmin, as giving users access to the wrong module can easily lead to an exploitable condition. To be more explicit, very few standard modules are harmless enough to be safely usable with this feature.

SSL Encryption

If your system has the OpenSSL libraries installed, as well as the Net::SSLeay Perl module, you will be able to use SSL encrypted connections to your Webmin server. This increases the security of your server by allowing password and user information to be sent in an encrypted form. If you will be accessing your Webmin server from across the internet, it is strongly suggested that you use SSL encrypted sessions. Now that both the export restrictions on encryption have been relaxed and the RSA patent has expired, it is becoming more common for Linux and Unix versions to always ship with the necessary libraries and Perl module for this to be enabled out of the box. But if you do need some help setting this option up, there is a nice tutorial on the Using SSL With Webmin [http://www.webmin.com/webmin/ssl.html] page.

Certificate Authority

This page allows you to configure the SSL certificate for this server. Using this, you may configure your system to allow logins without a username and password. If configured, clients may request a personal certificate in the **Webmin Users** module, and from then on the browser will authenticate itself via the certificate provided. If your users are located in controlled and secured environments, this feature can make using Webmin simpler.

To create a certificate, simply fill in the authority information (this can be any information you'd like to include, such as the name of the administrator of the Webmin server), and click **Setup certificate authority**.

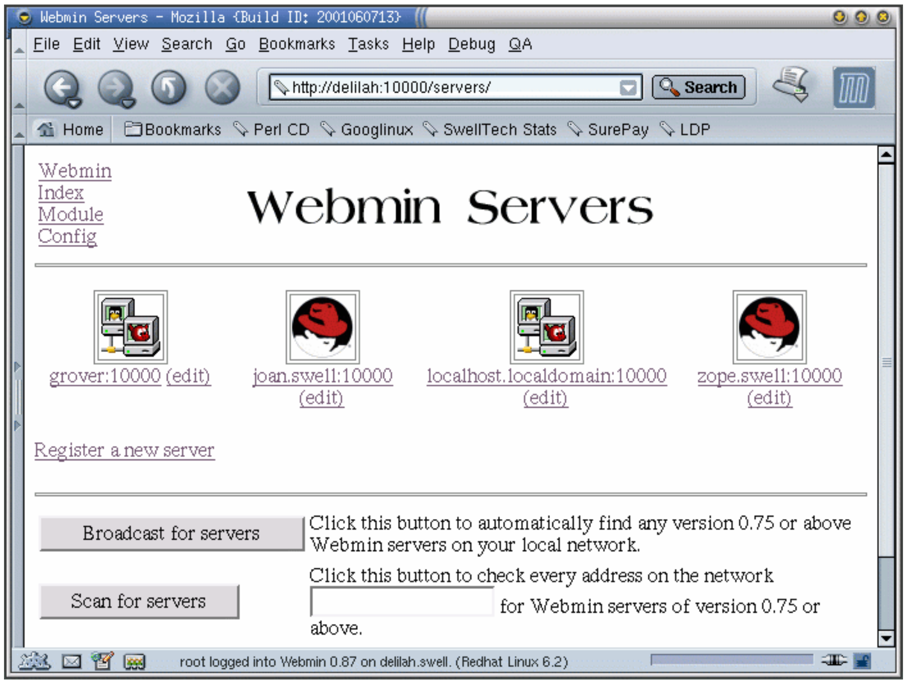
Caution

If using this authentication method, users should be made aware of the potential security issues involved. Anyone who has access to a machine with such a certificate will be able to access the Webmin server with the same privileges as the primary user of the machine. This prevents the use of the login timeouts that are normally possible with Webmin, and so should be used with caution in environments where a logged in machine may be left unattended.

Webmin Servers

This page provides access to every Webmin server on your local network. Clicking any icon will direct your browser to the login page of the server clicked. Clicking **Broadcast for servers** will cause Webmin to send out a broadcast request to port 10000 over your local network. Every Webmin server on your network will reply and identify itself. Webmin will then add those servers to the list of servers. You may also scan specific networks for servers, if you manage Webmin servers remotely. Simply enter the subnet to search and click **Scan for servers**.

Figure 3.2. Webmin Servers


Webmin Servers - Mozilla {Build ID: 2001060713}
File Edit View Search Go Bookmarks Tasks Help Debug QA
http://delilah:10000/servers/
Search
Home
Bookmarks
Perl CD
Googlinux
SwellTech Stats
SurePay
LDP
Webmin Index
Module Config

Webmin Servers

grover:10000 (edit)
joan.swell:10000 (edit)
localhost.localdomain:10000 (edit)
zope.swell:10000 (edit)

Register a new server

Broadcast for servers — Click this button to automatically find any version 0.75 or above Webmin servers on your local network.

Scan for servers — Click this button to check every address on the network [ ] for Webmin servers of version 0.75 or above.

root logged into Webmin 0.87 on delilah.swell. (Redhat Linux 6.2)

Clicking on a server icon will simply direct your browser to the Webmin port on the selected server, allowing you to log in. You may also configure Webmin to connect you to the server through a proxied connection, if you provide a user name and password for the other server. This can be useful when connecting remotely to a frontend Webmin server on the routable internet that also connects to a non-routable private network, allowing an administrator outside of the private network to tunnel through to administer systems inside the private network.

Versions of Webmin beyond 0.85 provide support for some functions to be executable via remote procedure calls, if login information is provided for the remote server. This allows a single Webmin server to directly configure or monitor other Webmin servers. Currently this functionality is limited to the **System and Server Status** module and some of the modules in the **Cluster** category. It is likely that many of the other modules will expand to take advantage of this new functionality in the future.

Webmin Users

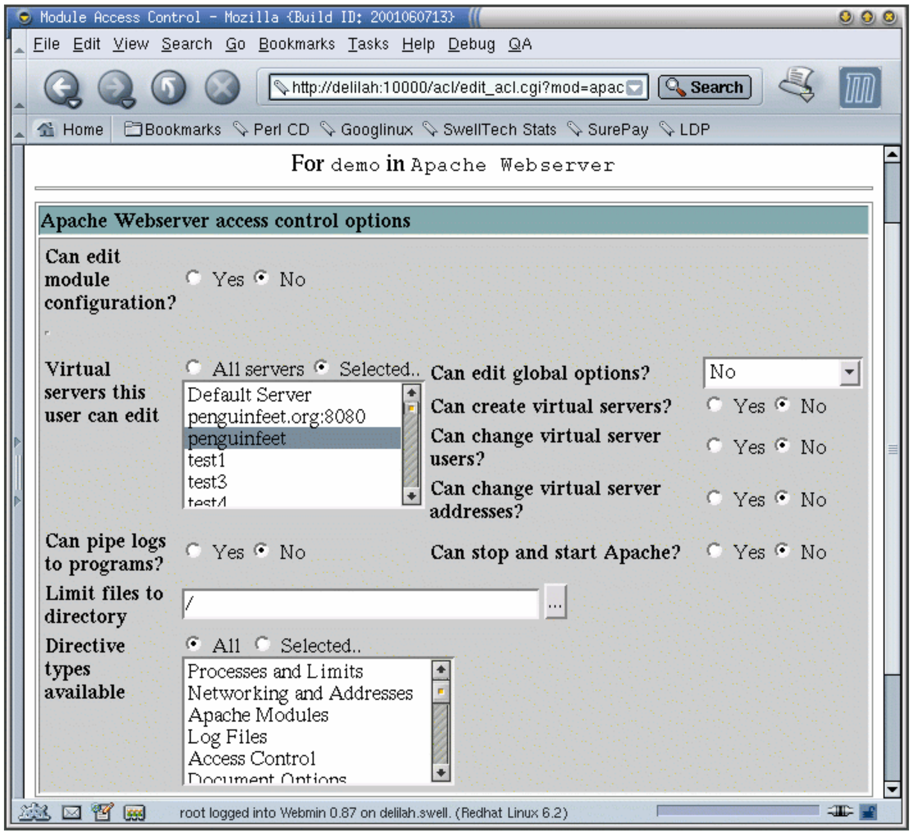
This page allows you to configure any number of users and give each some specified subset of the system to maintain. It would allow you, for example, to create a mail administrator who only had access to the Sendmail module, a DNS administrator who could only modify the DNS records, and a Squid administrator who only had permission to edit the Squid configuration. In this way, delegation of authority is very simply and securely handled.

Editing a Webmin User

To edit a Webmin user and the modules they have access to, click on the name of the user on the **Webmin Users** index page. Each user has a list of accessible modules, and a number of additional options that can be configured. From the **Edit Webmin User** page, it is possible to change the users password, select an SSL certificate for them to use for authentication, alter the language and theme from the default, and specify the IP addresses from which this user can login. Also on this page is a list of all modules that are installed on the machine, each with a checkbox beside it. If checked, the user will have access to the module.

Webmin also allows finer grained control over many modules, and this functionality is becoming more flexible with every release. For example, a user with permission to use the **Apache Module** can be denied the ability to edit some specific aspects of the configuration. In the example below you can see that the user is being granted permission to edit only one of the many available virtual servers. To edit fine grained access controls, browse to the **Webmin Users** index page, and click on the module name link beside the user whose access controls you wish to edit.

Figure 3.3. Editing User Access Controls


Module Access Control - Mozilla {Build ID: 2001060713}
File Edit View Search Go Bookmarks Tasks Help Debug QA
http://delilah:10000/acl/edit_acl.cgi?mod=apac
Search
Home
Bookmarks
Perl CD
Googlinux
SwellTech Stats
SurePay
LDP

For demo in Apache Webserver

Apache Webserver access control options

Can edit module configuration?	Yes [✓ No]		
Virtual servers this user can edit	All servers [✓ Selected..] Default Server penguinfeet.org:8080 penguinfeet test1 test3 test4	Can edit global options? Can create virtual servers? Can change virtual server users? Can change virtual server addresses?	No Yes [✓ No] Yes [✓ No] Yes [✓ No]
Can pipe logs to programs?	Yes [✓ No]	Can stop and start Apache?	Yes [✓ No]
Limit files to directory	/		
Directive types available	[✓ All] Selected.. Processes and Limits Networking and Addresses Apache Modules Log Files Access Control Document Options		

root logged into Webmin 0.87 on delilah.swell. (Redhat Linux 6.2)

Creating Webmin Users

Creating new users is also easy. Click the **Create a new Webmin User** link and choose a username or use one of an existing user on the system. Choose between using the users Unix password, or choose a new one. Select which modules the user will have access to, and click **Save**. Now you can edit the fine grained access controls for the user, or accept the defaults. Adding or deleting modules from the users access list can be performed by clicking on the username from the **Webmin Users** page, and then editing the user in whatever manner is required.

Webmin Groups

Webmin, like Unix, understands the concept of groups. Groups in Webmin are similar to Unix groups in that they ease administration of heavily populated servers but allowing easy creation of any number of users with the same set of permissions and access controls. To create a group click on the **Create a new Webmin group** link, give it a name, and select the modules that members of the new group should have access to. After saving the new group, any user can be assigned to the group and automatically receive the module access of the group, plus whatever modules are specified for the user. Currently users can only be a member of one group, so the Webmin groups feature is somewhat less flexible than that of most modern Unix variants and Linux where users can be members of a primary group in addition to a number of supplemental groups.

Tutorial: Securing Webmin

Because Webmin runs with the privileges of the `root` user, it is vitally important that Webmin be locked down tightly before allowing remote internet access. Historically, Webmin is pretty secure, but there have been exploits discovered in the past, and there will probably be exploits discovered in the future. Any tool which runs as `root` has the potential to be an entry point for a malicious cracker to unlimited access to the machine.

So in order to prevent all of the woes that can result from an exploited machine, we’re going to take a few steps to limit our risk, and minimize the damage that can be done without us noticing. We will briefly discuss password policy, application level network access control, SSL, and firewall configuration. The tutorial will wrap up with a survey of some other techniques and technologies that can be used to help maintain a secure system.

Password Policy

Countless studies and anecdotes from both sides of the security issue (crackers on one side, and those who implement systems to protect against crackers on the other) have told us that cracking weak passwords is nearly always a reliable, if time consuming way to obtain illicit entry into a system. Because many users, and even system administrators use weak, easily guessed passwords, it is quite common for a determined hacker to run an automated password hunt on a target system. Another, perhaps even more frightening, technique crackers use is what is known as Social Engineering.

Social Engineering is a technique as old as malicious cracking itself, which plays on human nature to overcome technical barriers to entry by going the easier path of getting through a humans line of defense. One common technique is for a cracker to pose as tech support staff, and simply ask for the users password so they can "test" something or other on the network. This works disturbingly often, even among technically savvy users. This type of attack can happen via any communications medium, including telephone, IRC, email, etc. and its continued success relies on the human desire to be helpful. This technique is often enhanced through the use of other subtle additions to further lower the guard of the person answering the phone or email. The cracker may mention that there is a problem on the network, of some sort, which taps into another fundamental aspect of human nature: complaining about the state of the network. Everyone complains about the state of the network in an office at one point or another, and when a "tech" calls to say he is going to fix it it further establishes his credibility with the victim. In the users mind, it seems obvious that no outsider would know about the "network problems" he has been experiencing lately, so this caller must be legitimate.

In my time of supporting Unix servers I’ve noticed another aspect of human nature that is sometimes exploited by crackers. When asked to type in their password, some users spell it out quietly under their breath while entering the letters. Experienced typists are far less likely to speak the text they are entering in this way, but it may be a last resort trick used by a Social Engineering cracker to simply ask the user to type in their password a few times (because by the second or third time, the user is either excited enough to be taking part in "solving a network problem" to begin talking or singing along with their text input or be frustrated enough at being kept away from his real work to start muttering along with what he is typing). Users should be cautioned against this habit. This may all sound like a rather silly way to break into a network, when Hollywood movies always show us a lone cracker in a basement filled with computer junk, but it is likely that the most determined, and thus the most dangerous, crackers will use these techniques before attempting more time consuming technical attacks like brute force password searches. These techniques work, if users are not aware of the danger.

This only scratches the surface of how crackers operate. But it does begin to make it clear that good passwords and educated users are a core part of any successful security policy. Insist upon quality passwords, and notify your users of the policy. A good password policy might include the following requirements:

Minimum Length
A good password should be a minimum of 6 or 8 characters. All other things being equal, longer passwords are more secure than shorter passwords, simply because a brute force attack has more possibilities to go through to find a password that works.

No Dictionary Words
It is generally recommended to avoid plain dictionary words, or even dictionary words at all. The reason for this is that brute force attacks usually involve attempting all of the words in a word list, or in a dictionary file. Real words are simply easier to guess and easier to obtain through brute force attacks. Weird spellings, odd capitalizations, and combinations of word fragments can all be used to create less easily guessed passwords without making them much less memorable for the user. After all, if the user has a drawer full of their passwords on sticky notes because they can’t remember them, the cure is worse than the disease.

Include Numbers
Another good possibility is to enforce the inclusion of at least one number in all passwords. This automatically increases the pool of possible passwords by an order of magnitude, even if dictionary words are allowed. Again, this doesn’t make passwords significantly less memorable for the user, but does increase the security of the password. However, use of birthdays, anniversaries, etc. should be discouraged as these are easily guessable, and more prone to Social Engineering attacks.

Scheduled Password Changes
In environments where security is important, it is wise to implement a mandatory password change after some specified period of time. The inconvenience to users of this choice should be carefully balanced against the security needs of the environment. It is less useful if frustrated users alternate between two passwords because they are being forced to change them every two weeks, or even worse if they write them down somewhere in their desk because they don’t want to take the effort to remember a new password every week. Once every 6 months is probably frequent enough for all but the most extreme circumstances.

Failed Login Timeouts
In the event that a cracker attempts a brute force attack on your server, password timeouts can be very effective at making the process extremely time consuming, or even impossible. Going on the assumption that a user usually will not mistype their password more than a few times, many authenticators can timeout and refuse to allow *any* login for that user for a specified period of time after that number of failed logins is reached. With this feature enabled, it becomes a daunting task to use brute force password searches to break into a system that has password timeouts of this sort. It can potentially increase the time it takes by months or years, and the likelihood of detection of the scans considerably since one or more users will begin to complain of being unable to login (since their password is in a state of timeout most of the time).

Education
This is perhaps the most important in light of the prevalance of Social Engineering. Users of the network, both new and old, should receive training about the password policy, why the policy has been implemented, and how to use the tools required to take part in the new policy. This training doesn't have to be a large investment in time, effort, or money. In high tech environments, a simple email reminder with the policy and instructions sent out every month to old users and immediately to new users could be enough. In traditional business, education, or government, environments it may be better to schedule a one hour group lecture the first time in order to explain both the whys and the hows, followed by a question and answer period. It is also vitally important that users understand that *no one* should ever ask for their password, and they should never give out their password to anyone, no matter who they claim to be. It might also be appropriate to make clear that the real system admnistrator doesn't need a password to log in as any user, and thus would never need a users password to test or fix anything.

Caution

Some of these policy choices cannot currently be enforced with Webmin. As of version 0.970, only password timeouts are available. Even so, encouraging users to use secure passwords, and more importantly for you as an administrator, using good password policy, can achieve the same goals without enforcing them. It is likely that Webmin will have all of these features in some form or another in future revisions. Your underlying OS variant probably supports some or all of them, as well, for system passwords. Educating users about these issues becomes more important when policy cannot be enforced via technical measures.

Setting Authentication Policy

As discussed above, a carefully considered password policy can be very helpful in defending against crackers. Webmin provides a simple means to enforce some aspects of password policy for Webmin users in the **Webmin:Webmin Configuration:Authentication** module. Here you may choose to enable password timeouts, and automatically block hosts that appear to be running brute force attacks on the Webmin server.

Also, enabling logging of failed login attempts is an excellent idea, assuming someone will read those logs on occasion. It is possible using tools like `logwatch` to automatically be notified via email of some types of logged data. While `logwatch` is not currently configurable within Webmin, it is well worth your time to read up on this utility, or any similar tool provided by your OS vendor and to make use of it to help ease the burden of administering a system. To enable logging of authentication failures, browse to the **Webmin:Webmin Configuration:Authentication** module, and select **Log blocked hosts, logins and authentication failures to syslog Disable session authentication**. Then you may configure any log analysis tools you use to flag these authentication failures so that a human administrator can watch for signs of cracker activity.

Note

The `logwatch` utility is Open Source software, available from www.logwatch.org [http://www.logwatch.org]. The program is maintained by Kirk Bauer and is included with many Linux distributions. Other OS variants often provide similar functionality

Setting Network Access Controls

As discussed earlier in this chapter, Webmin provides a few mechanisms to provide network level security to your Webmin installation. Utilizing some or all of them can increase security immensely, without adding complexity to the deployment. The primary purpose of these features is to allow Webmin to refuse to even talk to someone on an address that is not allowed to login.

To begin, take a look at your network topology diagram, or write down your local network information, if your network isn't large enough to justify a full diagram. Then write down the network information for every user that must be able to access your Webmin server. This may get complicated rather quickly, if you have dialup or other remote users who need to log in from dynamically assigned IP addresses, but even in such cases it may be possible to reach a viable compromise.

Setting the Listen Address and Port

The first step, is to decide if you can restrict access to one particular network interface on your server. If your Webmin server has a non-routable local address and a routable internet address, you should decide whether anyone will ever need to be able to access the Webmin server from outside of your local network. If not, simply configure Webmin to listen on the local interface. This can be configured using the **Webmin:Webmin Configuration:Port and Address** module by selecting the radio button beside the **Listen on IP Address** option, and entering your internal IP in the entry field.

Before moving on to other items, it may be worthwhile to consider moving Webmin to another port. Webmin being on port 10000 leads to one additional type of possible exploit, that would be difficult for a cracker to take advantage of, but is probably not impossible for a local user. Because port 10000 is a non-privileged port, any user with login permission on the server could start an arbitrary server that listened on that port, if Webmin were not currently running on the port. Once a local user is able to start a server on port 10000, it is trivial to setup a webserver that *looks* like the Webmin login page, but in fact is just a simple CGI script in the users home directory. If the system administrator then attempts to login, his password can be grabbed and stored for the user to pick up later (or worse, mailed out automatically as soon as it has been grabbed). A particularly clever script of this sort could delete itself after its job is done, and even restart Webmin so the administrator will believe they simply entered the wrong password when they attempted to login the first time. One solution to this problem is to simply run Webmin on a port below 1024, as these ports require root permission to bind to, so a malicious user would not be able to run a password grabbing trojan on the same port, and thus would not be able to fool anyone into entering their authentication information.

Note

In some OS variants and versions, it is possible to control which users can bind to any port, whether above or below 1024. This feature is sometimes known as capabilities or ACLs. A proposed, but then withdrawn, specification labelled POSIX.1e provided some of the capabilities that are supported by some Linux versions. With features of this sort it may be possible to make port 10000 behave just like a sub-1024 port, but availability of this kind of feature varies wildly, so it will not be covered here. In the vast majority of environments, it makes sense to run Webmin on port 1000, or if connectivity through very restrictive proxy firewalls is required, port 553.

IP Access Control

The next step is to setup application level IP access control to your Webmin installation. If you have only static, or local addresses that should have access to Webmin, then your job is simple. Just open the **Webmin:Webmin Configuration:IP Access Control** module, and select the **Only allow from listed addresses** radio button, and then enter all of the addresses or hostnames that must have Webmin access.

If, however, you have users who will be accessing Webmin from dialup connections, or some other form of dynamic link, you cannot know in advance what IP address they will need to log in from. In some cases this can be mostly worked around, if you have a friendly ISP who will provide a list of their IP blocks. With the list of all *possible* addresses on which your dialup users may come in on, you can severely limit the percentage of internet users who can access your Webmin installation, simply because a single ISP only represents a tiny number of the total addresses on the internet. This is, for lack of a better term, *Good Enough*. Obviously, large nationwide ISPs are not generally helpful enough to provide this information for you, but if you are lucky enough to have a service-oriented local or regional ISP, you will likely find the technicians to be quite helpful.

If address based access control is not feasible due to needing nationwide dialup access or similar, it isn't the end of the world. Assuming systems are kept up to date, and other security policies followed, it is highly unlikely that your Webmin server will ever expose an exploitable condition to crackers.

Note

Webmin version 1.000 and above provides the option to do a hostname lookup for every user access. The result of this will be that a dynamically assigned IP with a DNS entry with DynDNS, or a similar service, will be able to be checked against the IP Access Control list, just like a fixed address. This is not efficient if you have more than a few domain names entered in the IP Access Control list, due to the high overhead of performing a name lookup for every hostname in the list on every request. But it can be very useful if you have one or two administrators or users who travel or simply don't have a fixed address at their normal location, because they can have a domain name that follows them wherever they go, and this name can be used to allow them access. I use this feature for the swelltech.com webserver, since it is remotely located and I often access it from my dynamically-assigned home ADSL link.

Enabling SSL

Webmin is a web-based application, thus it operates using the standard protocols of the internet and specifically the HTTP or HTTPS protocol. In a default installation from tarball or package, Webmin operates via the standard unencrypted HTTP protocol. In some environments this presents no major security threat, but in most situations this is a quite large hole in the security of a Webmin installation. If you only access Webmin across a local network of only trusted clients, and have a firewall closing your local network to outsiders, then you may feel safe in using Webmin over an unencrypted link. Otherwise, if you ever access your Webmin across the internet or an intranet that may have untrusted clients (for example, a laptop owned by an outside consultant, temporary employees, etc.) encryption should be considered mandatory.

Luckily, setting up Webmin for use with SSL connections is pretty simple, and requires only installation of two other packages: OpenSSL and the Perl Net::SSLeay module. Here we'll briefly discuss installing these tools from source, though it is even easier if your OS vendor provides binary packages. Documenting the actuall installation process will be left for the included documentation of these packages.

Install OpenSSL

OpenSSL is an Open Source implementation of the Secure Sockets Layer protocols (SSL), as well as the Transport Layer Security protocol (TLS). It provides strong encryption library routines that are easy to integrate into other software, and is thus used quite frequently in Open Source projects requiring encryption. Because of this, if you are using any modern Open Source operating system, like Linux or FreeBSD, you probably already have OpenSSL installed on your system or can get a package for your OS that is simpler to install.

OpenSSL is free software, and can be downloaded from the www.openssl.org [http://www.openssl.org] homepage, or one of its many mirrors. Download it to the server running Webmin. If you don't have a graphical browser installed, or are accessing your server remotely you can use `lynx` or `wget` to fetch it from the website. If no text mode HTTP client is available, you can get the file from the ftp.openssl.org [ftp://ftp.openssl.org] FTP site instead. I've never seen any internet capable operating system that does not have at least one text-mode FTP client available. Even Windows includes a simple FTP client for use in the MS-DOS shell! To install simply follow the instructions found in the `INSTALL` document included in the source distribution.

Getting the Net::SSLeay Perl Module

Because Webmin is written in Perl, it needs a Perl interface to the OpenSSL libraries. The standard choice for this is the Net::SSLeay module, which can be downloaded for free from CPAN or one of its mirrors. You may also be able to download a packaged binary version from your OS vendor.

Webmin itself offers a module for managing and installing Perl modules on your system. Using this module, documented later in this book, you may be able to install the Net::SSLeay module using this module. On my test systems (mostly Red Hat Linux of varying versions) I could only successfully install using the Webmin module if I left out the `make test` option, selecting only `make and install`. No additional arguments were required, however.

If a package is not provided by your vendor and installation via Webmin fails for some reason (and there are several reasons why it might), simply visit the Comprehensive Perl Archive Network (CPAN), and search for "SSLeay" to get the latest version. After downloading the tarball, unzip and untar it:

```
[joe@grover /joe]$ tar zxvf Net_SSLeay.pm-1.15.tar.gz
```

Or, if your OS doesn't use GNU tar you may have to unzip and untar in two steps:

```
[joe@grover /joe]$ gunzip Net_SSLeay.pm-1.15.tar.gz
[joe@grover /joe]$ tar xvf Net_SSLeay.pm-1.15.tar
```

Change directory to the newly created Net_SSLeay directory. Run the `Makefile.PL` using Perl, like so:

```
[joe@grover Net_SSLeay.pm-1.15]# perl Makefile.PL
```

Assuming no problems arise, this will generate a standard makefile suitable for your system. If OpenSSL was installed from an RPM, you may need to explicitly specify the `/usr` directory on the command line, though it appears to be unnecessary in new versions the module. But if it complains about being unable to find an OpenSSL installation you can try the following:

```
[joe@grover Net_SSLeay.pm-1.15]# perl Makefile.PL /usr
```

Next, use make to build, test and install the module into the correct location. The command sequence is as follows (don't forget to switch user to `root` before the install phase):

```
[joe@grover Net_SSLeay.pm-1.15]# make
[joe@grover Net_SSLeay.pm-1.15]# make test
[joe@grover Net_SSLeay.pm-1.15]# su
Password:
[root@grover Net_SSLeay.pm-1.15]# make install
```

Finally, test to be sure the module is installed, using the following command line:

```
[root@grover Net_SSLeay.pm-1.15]# perl -e 'use Net::SSLeay; print "Success!\n"'
Success!
```

If the result is the word `Success!`, then the module has been successfully installed. Otherwise, if you see an error regarding Perls inability to find the module, it is not installed correctly.

Turning it on

Now that the correct additional tools are installed, all that is left is to turn on SSL connections in the Webmin configuration. This can be done from within Webmin itself, or if you're particularly paranoid and don't want even want to login once over an unencrypted connection you can edit the configuration file manually.

To enable SSL connections using Webmin, browse to the **Webmin:Webmin Configuration:SSL Encryption** page, and click the radio button labelled **Enable SSL support, if available**. Click save, and you will automatically be redirected to the `https` port and connected via an SSL link.

To enable from the command line, for example from a SSH login or a direct console login, edit the `miniserv.conf` file, usually located in `/etc/webmin` or possibly `/usr/local/webmin-0.980/etc`, where `0.980` is replaced by the version of Webmin you have installed. The option to modify is `ssl=`, which defaults to `0` (off). Changing it to a `1` and restarting the Webmin server will enable SSL connections. You can then login on the HTTPS port as documented earlier.

Firewall Configuration

As in the earlier discussion of IP Access Controls, the goal when constructing a set of firewall rules is to prevent access to sensitive ports by unknown persons. If, for example, you can restrict the external network addresses that can talk to your server on port 10000 (or 1000, depending on the port you choose to run Webmin on) you can very easily make it impossible to exploit your Webmin installation via most types of attack. This is perhaps a bold claim, but it is easily proveable assuming one can trust the firewall to do its job.

Unfortunately, the internet is a world of tradeoffs and constantly changing conditions. Sometimes, you simply cannot lock down your machine using a firewall without locking out all of the people who need to use it. If you remotely manage your server via a dialup connection, the firewall clearly cannot be restricted to allowing only one IP. So compromises are required. As in the IP Access Controls, an ideal world would allow you to restrict access to only one or two external IPs (and some or all of the IPs within your own local network), but most likely you'll have to allow large blocks of IPs to account for dynamically assigned addresses on dialup, DSL and Cable internet connections. As before, if you have a helpful ISP, you'll be able to obtain a list of the network blocks that may be assigned to you.

Firewall configuration is outside the scope of this book, but adding protection for Webmin to an existing firewall is usually trivial. If your network does not yet have a firewall of some sort, it is well worth your time to research the options and implement a reasonable firewall. If you are using a free Unix-like system like FreeBSD, Linux, OpenBSD, NetBSD, etc. you already have access to a very flexible firewall system. All that will be needed is a few hours or days to study the implementation of such firewalls, and a few minutes to construct an appropriate ruleset (just don't forget to protect the Webmin port!). Users of other Unix OS variants may need to purchase a firewall package from your vendor, or a free firewall system may be available for download.

Other Security Techniques and Tools

Security is a many-sided problem, and as such, a number of tools have been developed to help an administrator implement a highly secure system. In the preceding four sections, I've addressed the first line defensive techniques and how they can be applied to Webmin. Those techniques are designed to prevent intrusion in the first place. They do nothing to let you know an intrusion has taken place, nor do they respond proactively to an attack that is underway. Thus it is worth taking a brief tangential look at some intrusion detection tools, and attack response tools.

Intrusion Detection

There are a large number of free and commercial intrusion detection systems available for all of the major Unix variants. An IDS provides an easy method of auditing one or more systems to insure that they have not been exploited. Most such systems create a database of file identifier keys (usually an MD5 hash, or similar strongly encrypted key), which is also encrypted with a passphrase known only to the system administrator. Some systems provide an easy means to store the database on another machine, or it can be written to a floppy or CD for use in a read only mode, so that even if the machine is violated tampering with the file key database is impossible rather than merely extremely difficult.

Perhaps the most popular IDS for free Unix systems is Tripwire, which is available in both an Open Source and proprietary version. It is available in package form from many Linux distribution vendors, and source downloads for all supported operating systems. Tripwire uses a database of MD5 keys, which is generated on a known secure system. Using a simple cronjob, tripwire can then be run periodically to insure no unexpected changes have occurred on the system since the last database generation. Using two passphrases, it is possible for tripwire to prevent unauthorized tampering with the database (for example, a cracker regenerating the database after having modified all of the files needed for future entry).

Note

The Open Source variant of Tripwire can be downloaded from www.tripwire.org [http://www.tripwire.org]. A thorough reading of the documentation is recommended before attempting to use it, because though it is relatively simple to use, the required steps for initial setup and database generation are not at all obvious.

Another simple but effective intrusion detection method for systems that use RPM or any other package manager that keeps a database and can verify file integrity, is to keep a copy of the package database on another system, or stored on read only media. With this database and a known good installation of the package manager, one can verify all of the system files quickly and easily. The drawback of this method is that it cannot detect new files and modification of files that were not installed from packages. If no proper intrusion detection system is available, this can be a life saver in the event of an intrusion on a system that has no complete IDS installed.

Some pitfalls to watch for in the event of an intrusion, is that once a cracker has gained access to your system with root privileges, there is nothing to prevent him from modifying the tripwire or package manager binaries to prevent them from reporting good results even after all of their changes. Such a modification is usually obvious to an experienced admin, because normal file changes should show up in such checks, and over time those changes will probably not be accurately reported by the cracked IDS or package manager. This problem is most easily worked around by installing secondary versions of these tools and running them against a database stored on read only media, like a CD or floppy disk with writing disabled. While a cracker with the knowledge to make these changes is rare, it is likely that such ideas will eventually be included in rootkits making it easy for even the most brain damaged cracker to thorough cover his tracks pretty effectively.

Proactive Attack Response Tools

There are several new tools designed to recognize common types of attack and respond to them quickly enough to diffuse the attack. There is no single name for such systems, and the way in which they work varies depending on their particular focus. Two such tools are PortSentry and Hogwash.

PortSentry is the most mature of these types of tool, and takes a more basic approach to the problem. PortSentry keeps an eye on network connections, and watches for a rapid series of abnormal connections that is usually indicative of a network scan. When such a scan is detected the host from which the attack originates is simply blocked using the normal packet filter on the system. PortSentry is made more attractive by the fact that a Webmin module exists to easily administer and configure a PortSentry installation.

Note

PortSentry, like Tripwire, is available in both commercial and Open Source versions. The Open Source release is available for download from www.psionic.com [http://wwww.psionic.com] .

A newer entry into the field, Hogwash uses a rule based system to detect hundreds of known exploit types, and can drop those packets without disturbing any other kind of traffic from the host. Hogwash is based on the rule engine of the Snort network intrusion detection system, but adds the ability to respond to the intrusion by dropping or disarming the troublemaking packet by rewriting it to a harmless form.

Chapter 4. Usermin: A Webmin for Users

Introduction to Usermin

This chapter is a short detour away from Webmin to cover a closely related tool called Usermin. The two tools have a lot in common, and are often used together to provide a multi-tiered GUI for users and administrators. The commonalities begin with the fact that both were written and are maintained by Jamie Cameron. They share much of the same codebase, and the operation of Usermin closely parallels that of Webmin. The differences begin with the intention of each. Webmin is primarily for system administrators, and it provides unlimited power to the logged in administrator unless permissions are explicitly restricted. Usermin, on the other hand, is primarily for system users, and the powers of a logged in Usermin user are by default limited to only the permissions of a normal user. Specifically, Usermin provides access to a web-based mail client, a Java file manager applet, SSH configuration and client modules, GnuPG encryption and decryption, mail forwarding, changing passwords, cron jobs, and a simplified web-based command shell.

Caution

Usermin prefers to use the PAM authentication mechanism used by most Linux distributions and Solaris. Unfortunately, PAM is not well supported on many Unix variants, or even all Linux versions. For this reason, Usermin will attempt to fall back to directly using the shadow password file if PAM cannot be used for some reason.

Note

PAM is an acronym for Pluggable Authentication Modules. It allows easier integration of a variety of authentication technologies without requiring all authenticating software to be modified to support each authentication type. Modules are available for a vast array of authentication methods, including LDAP, Kerberos, RSA, and Unix `passwd` and `shadow` files. It is widely deployed on most major Linux distributions, Solaris versions 2.6 and above, and is available as packages or in source form for FreeBSD and HP-UX.

Because the Usermin modules are so closely related to the modules in Webmin, it would be pointless to cover them in detail here. What the chapter will cover is the Usermin Configuration module in Webmin, document the modules that do diverge from similar Webmin modules or simply do not exist in Webmin, and provide some discussions about using Webmin and Usermin in real environments with examples to help make the best use of them. Compared to Webmin, Usermin is severely limited, but it is just those limitations that make it ideal for a certain class of problem and so those will be the problems that will be discussed along with how Usermin can help solve them. Before we can use Usermin, it will have to be installed. Unlike Webmin, at the time of this writing no major Linux distribution or Unix vendor is including Usermin in its standard installation or offering it as an optional package. This will certainly change in time, and OS vendors may be installing it by the time you read this. Check with your vendor for packages, or simply download it from the Webmin website.

Usermin Installation

Checking for the Authen-PAM Perl Module

Installing Usermin is just about like installing Webmin, with the one exception that it is recommended to install the Authen-PAM Perl module before installation of Usermin. So first it will be necessary to check for, and possibly install this Perl module. The easiest way to check for a Perl module is to use a command like the following:

```
[root@grover root]# perl -e ’use Authen::PAM; print "success!\n"’
```

The result if this module is available will simply be the word "success!" printed on the next line. If the module is not installed, a number of errors will result instead. If you have success with the module check, proceed to the next section. If not, visit the Comprehensive Perl Archive Network (CPAN for short) at www.cpan.org [http://www.cpan.org]. Use the search function to find the latest version of **Authen-PAM**, download it and follow the instructions in the `README` file that is included. Briefly, all CPAN Perl modules are installed in the same simple way.

First generate a makefile by running the `Makefile.PL` file, as below:

```
[root@grover Authen-PAM-0.13]# perl Makefile.PL
```

If successful, run `make` and `make install`

```
[root@grover Authen-PAM-0.13]# make

[root@grover Authen-PAM-0.13]# make install
```

Next, use the Perl command suggested at the beginning of this section to test for the availability of the module. Then add a PAM service called `usermin` in the appropriate location. Under many Linux distributions, this involves creating a file named `/etc/pam.d/usermin` containing the following:

```
#%PAM-1.0
auth     required        pam_unix.so     shadow nullok
account  required        pam_unix.so
password required        pam_unix.so     shadow nullok use_authtok
```

```
session   required        pam_unix.so
```

Now installation of Usermin should proceed smoothly.

Note

You may be able to download a package of Authen-PAM for your operating system, which is usually preferable from a system maintenence perspective. Also, if you use an RPM based Linux distribution, you may be able to use `cpanflute` to automatically generate a package from the Perl module, if your vendor doesn't provide a package for you. The use of `cpanflute` is well out of the scope of this book, but it is worth looking into if you frequently install Perl modules as it makes generating module RPMs a simple and painless process.

Getting Usermin

Lucky for us, Usermin is free under a BSD style license, just like its more powerful sibling. It can be downloaded for free from the Usermin site or one of its mirrors. For reference the primary Usermin site is www.usermin.com [http://www.usermin.com]. Like Webmin, Usermin is available in a tarball, as well as an RPM for Red Hat, MSC Linux, Caldera, Mandrake and SuSE. Unlike Webmin, there is currently no Solaris pkg package of Usermin. Choose the most appropriate option for your system.

Installing the Package or Tarball

Depending on installation method, you will follow similar steps to that of installing Webmin. For the tarball, copy it to the desired installation location (usually `/usr/local`), unzip it, untar it and run the `setup.sh` script.

```
[root@delilah /root]# cp usermin-0.6.tar.gz /usr/local
[root@delilah /root]# cd /usr/local
[root@delilah local]# gunzip usermin-0.6.tar.gz
[root@delilah local]# tar xf usermin-0.6.tar
[root@delilah local]# cd usermin-0.6
[root@delilah local]# ./setup.sh
```

The install script will ask a series of questions, most of which are usually safely left at their default values. After the installation script finishes running, you will be able to log in to the Usermin server on port 20000.

Installing Usermin from an RPM

Installing from an RPM package is, just like with Webmin, even easier than installation from the tarball. When installing from a package it is still necessary to check to insure you have the PAM Perl module as documented previously, if you will be using it. Then use the following command for an RPM installation:

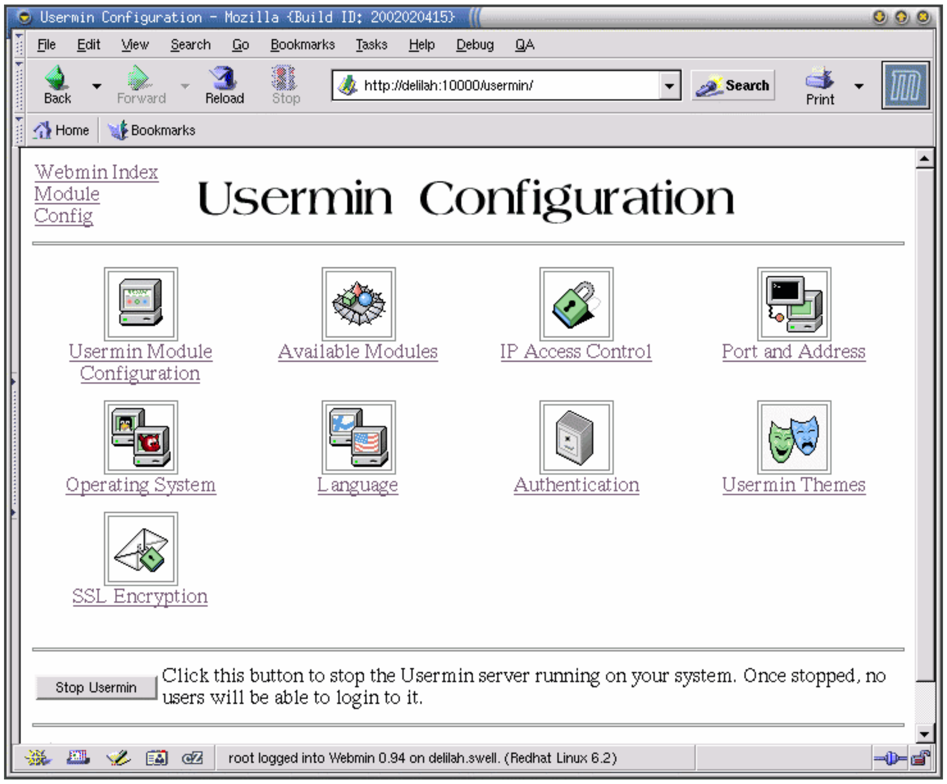
```
[root@delilah /extra]# rpm -Uvh usermin-0.6-1.noarch.rpm
```

The RPM will automatically run the installation script with sensible defaults and start the Usermin server on port 20000.

Usermin Configuration

Configuring Usermin is done, perhaps paradoxically, from within Webmin. Clicking on the **Usermin Configuration** icon under the **Webmin** tab displays a few rows of icons of Usermin options, that is very similar in form and function to those of the **Webmin Configuration** module. There are far fewer configurable options, of course, but because Usermin is based on the same webserver framework as Webmin (`miniserv.pl`, specifically) it provides all of the same access control, and security mechanisms.

Figure 4.1. Usermin Configuration index



Click this button to stop the Usermin server running on your system. Once stopped, no users will be able to login to it.

root logged into Webmin 0.94 on delilah.swell. (Redhat Linux 6.2)

Usermin Module Configuration

On first entering this module, all that is displayed is a dropdown selection menu listing all of the Usermin modules that have configurable options. Selecting a module name, and clicking **Edit config for module** will reload the page and and add the configuration options for the selected module under the dropdown menu.

GnuPG Encryption

GnuPG (Gnu Privacy Guard, or gpg for short) is a complete and Free Software implementation of the encryption standards originally provided by PGP (Pretty Good Privacy, a commercial product). It does not rely on the patent-encumbered IDEA algorithm, so can be used with no restrictions for commercial or non-commercial purposes. GnuPG provides strong encryption and digital signatures of several types for email and files. Using GnuPG strong encryption it is possible to send a private email with confidence that only the recipient can decrypt the message. Additionally, a message may be digitally signed, allowing confirmation of sender identity and verification of the contents of the message (i.e. is this actually the message exactly as composed by the sender or has it been modified in some way during transit).

This module only has one configurable option, the keyserver that will be used for sending and receiving key files. If using GnuPG to confirm signatures, it is necessary to use central keyservers so that identities can be looked up in a centralized database. In this way, a web of trust can be woven between individuals who can confirm the identity of others. There are a large number of public keyservers available all over the world, and they synchronize their data so it is a good idea to choose one near you.

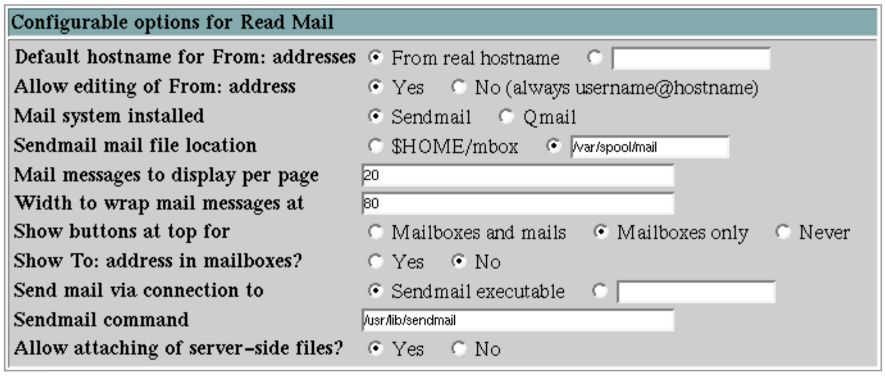
Configurable options for Mail Forwarding

Webmin and Usermin support a number of different mail transfer agents (MTAs), specifically Sendmail, Postfix and Qmail. This option should be set to the mail transfer agent in use on your server. Postfix is not listed as an option, however, as Postfix is entirely Sendmail compatible from a user perspective. Simply select Sendmail if Postfix is the MTA, and all will work as expected.

Configurable options for Read Mail

The Usermin **Read Mail** module offers a complete, if basic, web based mail client for users. It allows the user to send and receive mail, as well as keep a simple address book, and digitally sign or encrypt messages. For this module there are a number of configurable options.

Figure 4.2. Configurable options for Read Mail



Configurable options for Read Mail

Default hostname for From: addresses	[✓ From real hostname] ○
Allow editing of From: address	[✓ Yes] No (always username@hostname)
Mail system installed	[✓ Sendmail] Qmail
Sendmail mail file location	$HOME/mbox [✓ /var/spool/mail]
Mail messages to display per page	20
Width to wrap mail messages at	80
Show buttons at top for	Mailboxes and mails [✓ Mailboxes only] Never
Show To: address in mailboxes?	Yes [✓ No]
Send mail via connection to	[✓ Sendmail executable] ○
Sendmail command	/usr/lib/sendmail
Allow attaching of server-side files?	[✓ Yes] No

Default hostname for From: addresses
This is the hostname that will be included in the mail headers in the `From` field. If you wish all mail from your domain to be addressed from just the domain name (rather than, for example, `mail.domain.com`) you may enter it here.

Entering `domain.com` will cause all mail sent from this machine using the Usermin mail client to appear to be from `domain.com`.

Allow editing of From: address
If `Yes` the user will be able to enter any address they choose in the `From` field. If no, all mail will be marked as originating from the domain you chose in the previous option. It may be appropriate to permit this change, if clients have their own domain names, or would like to be able to primarily use another address and do not won't to keep up with replies to another mailbox.

Mail system installed
Like that of the **Mail Forwarding** configuration above, this selection should match the MTA that is running on your server. Choose Sendmail, if Postfix is the installed MTA.

Sendmail mail file location
Here you select the location of your mail storage directories. This is usually located in `/var/spool/mail`, and another common option is to deliver it to the users home directory into `mbox`. This depends on the configuration of your mail delivery system (which may or may not actually be Sendmail). Postfix may use Sendmail compatible mail delivery options and so requires no special configuration here.

Mail messages to display per page
This option is pretty much self explanatory. You may choose to display more or fewer messages, which can be useful if clients are using small display devices for using the web mail client and too many lines makes browsing messages in the inbox cumbersome.

Width to wrap mail messages at
Again, this is an option that may be of use for users of small displays, such as handheld computing devices. The tradition standard line wrap has been 80 characters, and that is the default.

Show buttons at top for
Selects on which pages the **Delete**, **Mark message as**, and **Forward** buttons will be displayed at the top of the page, if any. By default, these buttons appear at the top and bottom on the mailbox pages, and only at the bottom on the view mail page. If large mails are common, users may find buttons at the top on both a convenience. Users with little screen real estate (palm-sized devices, for example) may find it best to have no top buttons on any page.

Show To: address in mailboxes?
This option selects whether the mailbox page will display the `To:` field. Useful if a mailbox receives messages with different email addresses via mail aliases.

Send mail via connection to
Selects how mail will be sent. It can be sent to any local mail transport agent. By default this is the `sendmail` executable, but several alternatives exist.

Sendmail command
The location of your MTA executable. This is the command that will be called when sending mail.

Allow attaching of server-side files?
This allows users to attach files that are located on the local machine (where Usermin is running). This could potentially be a minor security risk, because the user could then attach any file for which they have read permissions.

Running Processes

The **Running Processes** module in Usermin allows the user to view all of the processes they have running at a given time. There are a couple of configurable options here.

Default process list style
The options correlate to the modes of the `ps` command. Thus, it allows output forms, such as a process tree (where parent/child relationships are clear) as well as simpler process lists.

PS command output style
This option should match the OS on which Usermin is running, as it chooses how to parse the output of the `ps` command. However, if your system uses a custom variant of this command, you may need to modify this to an OS that provides a similar `ps`.

Cron Jobs

The **Cron Jobs** module allows users to create their own schedule tasks to be performed automatically by the system at a scheduled time. The commands are performed with the permissions of the user that configured them.

Crontab Directory
This should be set to the directory where `cron` looks for its `crontab` files.

Command to read a user's cron job
Some `crontab` versions may use slightly different command line options, or you may use a special-purpose wrapper for cron. Here you can select the command and options for reading the user's crontab.

Command to edit a user's cron job
Similar to the above, except configures the command to edit a user's crontab.

Command to accept a user's cron job on stdin
`crontab` can usually also accept input from the standard input, if the `-` pseudo-filename is given on the command line.

Command to delete a user's cron jobs
This option sets the command Usermin will use to delete a users crontab.

Cron supports input to cron jobs

This option configures whether Webmin will provide a text entry box so that the user can provide data to the command being run via standard input. This allows a user to easily run a command that requires some interaction automatically.

Path to Vixie-Cron system crontab file
This should be the path to your system wide crontab. Generally, `/etc/crontab`.

Path to extra cron files directory
Many systems make use of an extra cron directory for program specific cron jobs to execute when cron runs. This is likely `/etc/cron.d`.

run-parts command
The run-parts command is often run in the system `crontab` file, and is used to specify other directories to run at specified times. For example, on a Red Hat Linux system the `crontab` contains:

```
SHELL=/bin/bash
PATH=/sbin:/bin:/usr/sbin:/usr/bin
MAILTO=root
HOME=/

# run-parts
01 * * * * root run-parts /etc/cron.hourly
02 4 * * * root run-parts /etc/cron.daily
22 4 * * 0 root run-parts /etc/cron.weekly
42 4 1 * * root run-parts /etc/cron.monthly
```

The above sets a few defaults in the cron environment, and then executes run-parts at a few specified times. Specifically, the `/etc/cron.hourly` file is excuted at 1 minute after every hour. `run-parts` is simply the program that processes the directory specified and executes all of the commands in it.

Available Modules

Much like the Webmin module selection page, this page allows you to select which modules will be available to users. If, for example, you do not want users to have any direct filesystem access, you could disable the **Command Shell**, **File Manager**, and **SSH/Telnet Login**. The **SSH Configuration** and **Login Script** are then useless, so may be disabled as well.

When to Use Usermin

It has probably become quite clear that Usermin and Webmin are strikingly similar in many ways, and Usermin has very little that Webmin does not. So, why use it? Why not simply give everyone access to Webmin, and simplify life for everyone? There is no way to answer that question fully without analysing the environment in which the system is deployed. Under some circumstances, Usermin would be useless while requiring additional resources to install and run it. But in other circumstances, Usermin can be a valuable addition to an administrators toolkit.

Usermin is at its most useful when the server is being used by a large number of unprivileged users, and administration of those users needs to be simplified. Before Usermin, it was possible to grant users access to Webmin to read their mail, change passwords, and perform a few normal user functions, and that functionality is still there. One *could* use Webmin for the same purposes by constructing elaborate ACLs and groups and being careful to configure those new users with just those permissions. However, this leaves some room for administrator error, which could have dramatic consequences. Usermin, on the other hand leaves no room for error. A Usermin user has the permissions of the user that is logged in and no more. The user can't accidentally receive additional rights, and so a careful selection of available modules is not needed to insure security and ease of use (because, let's face it, many users can become quite confused by too many complicated options).

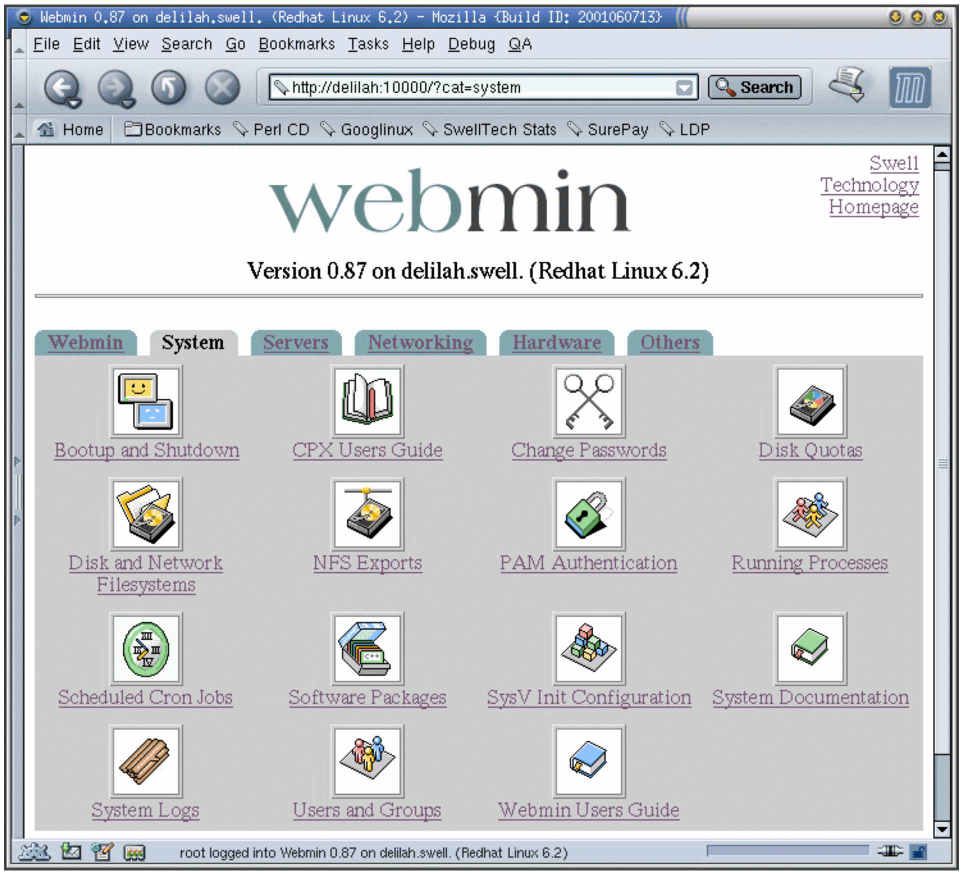
Another good use for Usermin is to provide an easy method for travelling users to read their mail, and retrieve files from their own directories. By providing a web interface to the local machine (and via network fileservers, potentially all users data) telecommuters or travelling employees can do all of these things from any web enabled device in the world. In other words, users can login to the local network from an internet cafe, an internet kiosk at trade shows, or from a wireless web device. Doing so requires no specialized software to be installed on the client side system.

Another interesting use for Usermin would be in a shared hosting environment, allowing users the ability to view their own directory, upload files via a web browser, edit many of the basic features of their shell account, read mail, etc. It would be only slightly more than trivial to implement a few nifty extras like running a web log analysis tool and allowing users to view the results from within Usermin.

Chapter 5. General System Configuration

The second category on the Webmin tab bar is System. Clicking it will allow you to edit such system features as: Bootup and Shutdown behaviour, Disk Quotas, Filesystems, Manual Pages, NFS Exports, Processes, Cron Jobs, System Logs, and more. The figure below shows the options available on a Linux system (specifically a Swell Tsunami web caching appliance running Red Hat Linux).

Figure 5.1. System Category



Bootup and Shutdown

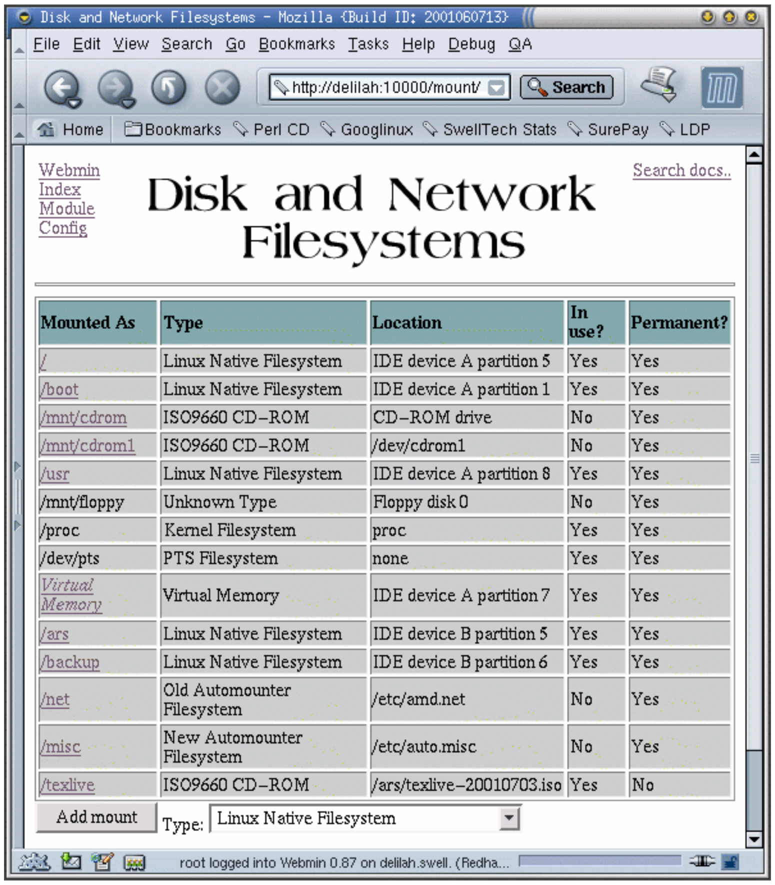
Clicking bootup and shutdown brings you to a page of bootup options. In the case of a Red Hat system, it provides access to all of the initscripts found in `/etc/rc.d/init.d`. Similarly, on a Solaris system the scripts are located in `/etc/init.d`. Clicking on any of the script names will provide the ability to edit, start, stop, and delete the initscript. Usually, each initscript provides functions to start, stop, and restart system services such as Sendmail, named, and Apache, as well as perform basic system initializations such as setting up network devices and routing tables. An easy way to quickly add a new service or command to the system startup routine, if it does not have an initscript, is to add it in `/etc/rc.d/rc.local` or `/etc/rc.local`.

Also on this page are the **Reboot** and **Shutdown** buttons. They do just what you would assume, after a confirmation screen.

Disk and Network Filesystems

This page provides a detailed view of the filesystems listed in `/etc/fstab` and from this page you can edit mount points, create new mount points, umount and mount partitions, and add execute and suid restrictions to specific mount points for security. This module configures the `/etc/fstab` file.

Figure 5.2. Mounted Filesystems


Disk and Network Filesystems - Mozilla {Build ID: 2001060713}
File Edit View Search Go Bookmarks Tasks Help Debug QA
http://delilah:10000/mount/
Search
Home
Bookmarks
Perl CD
Googlinux
SwellTech Stats
SurePay
LDP
Webmin Index
Module Config
Search docs..
root logged into Webmin 0.87 on delilah.swell. (Redha...

Disk and Network Filesystems

Mounted As	Type	Location	In use?	Permanent?
/	Linux Native Filesystem	IDE device A partition 5	Yes	Yes
/boot	Linux Native Filesystem	IDE device A partition 1	Yes	Yes
/mnt/cdrom	ISO9660 CD-ROM	CD-ROM drive	No	Yes
/mnt/cdrom1	ISO9660 CD-ROM	/dev/cdrom1	No	Yes
/usr	Linux Native Filesystem	IDE device A partition 8	Yes	Yes
/mnt/floppy	Unknown Type	Floppy disk 0	No	Yes
/proc	Kernel Filesystem	proc	Yes	Yes
/dev/pts	PTS Filesystem	none	Yes	Yes
Virtual Memory	Virtual Memory	IDE device A partition 7	Yes	Yes
/ars	Linux Native Filesystem	IDE device B partition 5	Yes	Yes
/backup	Linux Native Filesystem	IDE device B partition 6	Yes	Yes
/net	Old Automounter Filesystem	/etc/amd.net	No	Yes
/misc	New Automounter Filesystem	/etc/auto.misc	No	Yes
/texlive	ISO9660 CD-ROM	/ars/texlive-20010703.iso	Yes	No

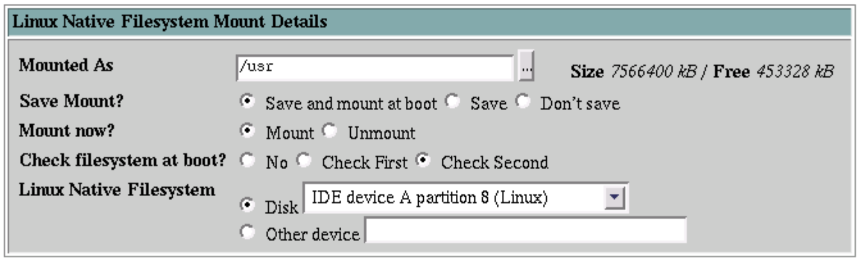
Add mount Type: Linux Native Filesystem

To edit one of the listed filesystems, simply click on it. From there, you'll be able to mount and unmount the filesystem, as well adjust several filesystem options. The available options may vary depending on the operating system and the media. Linux and Solaris have large differences, and so will be documented separately. Irix and FreeBSD are nearly identical to Linux, and so are not given its own section.

Linux Native Filesystem Mount Details

In the upper table on the **Edit Mount** page, Webmin offers access to several general options that are applicable for all filesystems.

Figure 5.3. Linux Native Filesystem Mount Details



Linux Native Filesystem Mount Details

Mounted As	/usr ... **Size** *7566400 kB* / **Free** *453328 kB*
Save Mount?	[✓ Save and mount at boot] Save Don't save
Mount now?	[✓ Mount] Unmount
Check filesystem at boot?	No Check First [✓ Check Second]
Linux Native Filesystem	[✓ Disk] IDE device A partition 8 (Linux)
	Other device

Mounted As
This is the mount point on which the filesystem will be located in your system's directory hierarchy. A mount point is a directory, made like any other directory using the `mkdir` command. When mounting a filesystem, the OS checks this value to decide where the contents of the filesystem should be located in the hierarchy. Some mount points, such as `/usr` and `/`, have a specific meaning for the OS and must not be changed. While several other mount points are so named because of long standing Unix tradition, such as `/home` and `/usr/local`. Nonetheless, most mount points can be named in any way that suits your environment, just be careful when diverging from the historically accepted names.

Save mount?
Provides options for whether to save the current mount point. Generally, when creating a new mount point, or modifying an old one, you will want to save and mount at boot. However, if the media is a removable media, like floppy disk or CD ROM, you will likely choose just to save the mount. Finally, if you are only creating a temporary filesystem, such as for mounting an ISO image as a filesystem, you'll have no need to save the mount point.

Mount now?
Allows you to choose whether to mount or unmount the filesystem now. If `Mount` is selected, Webmin will attempt to mount the filesystem when you click the create or save button. Likewise, selecting `Unmount` will attempt to unmount the filesystem if it is mounted. If the filesystem is in use by any programs, the OS will refuse to unmount the filesystem.

Check filesystem at boot
Selects whether the filesystem will be checked using `fsck` on system boot, and if so, what priority the check should receive. Note that some filesystem types, such as journalled filesystems like ReiserFS and XFS, do not usually need to be checked. Also, read only filsystems, such as those of CD ROMs, should not be checked. Under Linux, the ext3 filesystem will quietly skip the `fsck`, even when the `fstab` entry specifies a priority here, unless the user specifies otherwise manually during a boot after an unclean shutdown. As it is a journalling filesystem, this is reasonable behavior, but may not be immediately obvious from the documentation.

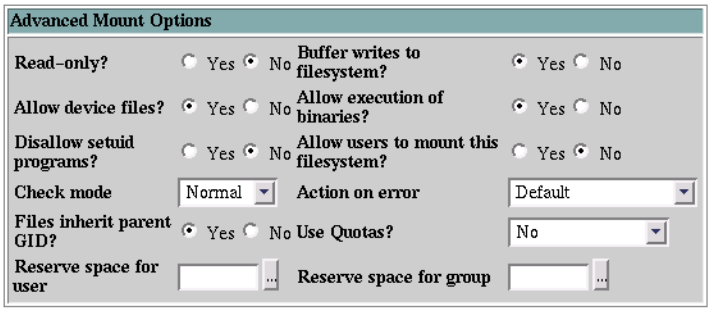
Linux Native Filesystem

Allows you to choose the device that will be associated with the mount point. Some modern Linux distributions use labeled devices for this, while others simply identify the device directly. The dropdown menu provides access to all of the known disk devices. You may also enter a device or ISO filename directly in the text entry field by clicking the `Other devices` radio button.

Linux Advanced Mount Options

The lower table on this page displays the available mount options and indicates which are enabled.

Figure 5.4. Advanced Mount Options



Advanced Mount Options

Read-only?	Yes [✓ No]	Buffer writes to filesystem?	[✓ Yes] No
Allow device files?	[✓ Yes] No	Allow execution of binaries?	[✓ Yes] No
Disallow setuid programs?	Yes [✓ No]	Allow users to mount this filesystem?	Yes [✓ No]
Check mode	Normal	Action on error	Default
Files inherit parent GID?	[✓ Yes] No	Use Quotas?	No
Reserve space for user	...	Reserve space for group	...

Read-only?
Sets the read only flag for the filesystem. If `Yes` the filesystem will not allow writing, even by the root user. CD ROM drives, floppy drives mounted with the write protect tab enabled, and some other media will always have this flag enabled, regardless of the setting in `fstab`. This option correlates to the `ro` mount option.

Buffer writes to filesystem?
Allows you to disable write buffering for this device. By default, disk I/O is buffered in Unix, to improve responsiveness and increase overall disk throughput. In some circumstances, buffering can be detrimental to the reliability of a system. Some database or email server software may be more reliable on a filesystem that has buffering disabled. Ordinarily, this change is unnecessary, as most software that requires this behavior forces a flush to disk after every transaction, thus disabling buffering for only the application that requires it. In most situations, altering this will only slow down the system without providing any tangible benefit. This option enables the `sync` mount option switch.

Allow device files?
This option dictates whether a device file will be specially on this filesystem. Device files are a special type of file that does not map to a portion of the disk, but instead directs I/O to another physical or virtual device, such as a printer, a modem, or a console display. In general, only the root user should be allowed to mount filesystems containing device files. This option enables the `nodev` switch.

Allow execution of binaries?
When this option is enabled, no file contained on the filesystem will be treated as an executable file. It could be useful when mounting a filesystem that contains binary executables for another architecture, for example PPC executables from Yellow Dog Linux on an x86 system running FreeBSD. This option correlates to the `noexec` switch.

Disallow setuid programs?
A program that is `setuid` will be treated by the system as though it were executed by the user to which it has been set to. For example, a program that has been setuid `root` will be executed with the permissions of the root user, thus it can be very dangerous. Since a program that is setuid root could be very dangerous, there must be a means to prevent users from being able to introduce setuid programs into the system from outside sources. This option correlates to the `nosuid` directive.

Allow users to mount this filesystem?
If users need to be able to mount the filesystem, this option can be selected. In general, most filesystems will be mounted at boot time and will thus always be available to users. But in the case of removable media like floppy disks, USB drives, and CDROM disks, the user is likely to need to access their own disks on occasion. This option corresponds to the `user` mount switch.

Check mode
In some older versions of Linux the ext2 filesystem supports a number of mount check options, specifically `none`, `normal`, and `strict`. When set to normal or strict simple integrity checks are performed on the filesystem. These checks are widely regarded as next to useless, and so are considered deprecated. This option will likely disappear in a near future variant of Webmin, and you are very unlikely to work on a system that still supports it in the kernel.

Note

The check mode options will be not be visible in Webmin versions 1.0 and above,
if your system kernel is 2.4 or greater.

Action on error
When mounting the filesystem, errors may occur. This option allows you to choose how the system should behave in response to mount errors. The default is set in the filesystem superblock, and can be configured using the `tune2fs` utility. When set to `Continue` the filesystem will be mounted and the filesystem will be marked as being in an erroneous condition. When set to `Remount read-only`, the system will attempt to remount the filesystem as a read-only filesystem. This can provide some level of safety and help maintain the ability to recover data from the disk if the errors were due to a failing disk. The `Panic` option halts the system with a filesystem mount error. This option corresponds to the `errors` mount option.

Caution

When attempting to recover data from a damaged disk, or a disk with data that has been accidentally deleted, it is vital that no additional data be written to the disk. Because of the design of most Unix filesystems in use today, including Linux ext2 and the BSD systems UFS, a files contents are not usually removed from disk until the space is required by the OS for new storing new data. Thus, if you immediately remount your filesystem read-only, your ability to restore deleted data is greatly improved. A better choice, of course, is to make good use of a reliable backup utility and a regular backup schedule. It is impossible to guarantee recovery of deleted files or files lost due to a failing drive.

Files inherit parent directory GID?
When new files are created on a Unix filesystem, they usually have user and group ownership matching the creator of the file. If a directory must be shared by a number of users, it may be desirable to have the group membership of the files set to a specific GID. When this option is enabled new files will have group membership set to the GID specified by the containing directory. This option corresponds to the `grpid` or `bsdgroups` mount options, and defaults to no.

Use Quotas?
If quotas should be used to manage disk usage for this filesystem, you may select the type of quotas to be applied. This option corresponds to the `grpquota`, `noquota`, `quota` and `usrquota` option switches and defaults to applying no quotas.

Reserve space for user, **Reserve space for group**
Most Unix filesystems implicitly set aside a small amount of space for emergency use by an administrator. This space will remain available even if the normal users of the system have filled the rest of the disk. By default this user will be the root user, however, in ext2 and ext3 filesystems the reserved space may be used by the user or group specified here. This option configures the `resuid` and `resgid` options.

Solaris Filesystem Options

Solaris has a few of its own additional options beyond the traditional UFS options. This section will cover the options that diverge from the Linux options discussed already.

UFS Disk
This option is only moderately different from the similar option on Linux and other systems. Disks are identified by type, SCSI or IDE, system device numbers, and the partition number. RAID devices may be specified by Unit number, and other devices may be specified by pathname.

Solaris Advanced Mount Options

The Solaris UFS implementation provides a few special features differentiating it from the previously documented Linux advanced mount options, specifically, **Repair Delay**, **Update access times?**, **Force direct IO?**, **Allow large**

files?, and **Enabled logging?** are available, while **Allow execution of binaries?**, **Allow device files?**, **Allow users to mount this filesystem?**, **File inherit parent GID?** and the reserved space options that were available in Linux are not.

Allow user interrupt?
This option configures whether a user will be permitted to interrupt a process that is blocked waiting for a disk operation on this filesystem. This option corresponds to `intr` and `nointr`, and defaults to yes (`intr`).

Repair Delay
Because it is possible for the server to reboot on a failed mount attempt, the system needs a protective mechanism to prevent it from going into a repair/reboot cycle, which might do more harm to an already damaged filesystem. This option specifies the minimum amount of time between repair attempts. If the system reboots within this time frame and attempts to repair the disk a second time within the time specified, it will simply halt. This option correlates to the `toosoon` mount directive, and is only available in Solaris versions older then 7. It is unnecessary and ignored on later Solaris revisions.

Update access times?
This option specifies whether the access time, or `atime`, value of a file will be updated when accessed. `Immediately` means that a files access time will be updated immediately every time the file is accessed. `Deferred` means the access time will be updated, but only during the course of other filesystem activity. Finally, `No` means that access time will never be updated on a file. On ordinary filesystems, it is desirable to leave `atime` enabled. Alternatively, when using a filesystem exclusively for an application that does not require access time updates, like an NNTP news spool or a web cache, disabling `atime` updates can provide a small performance boost as the number of disk transactions required is reduced. This option correlates to the `noatime`, and `dfratime` and `nodfratime` switches.

Force direct IO?
This option is functionally the same as the **Buffer writes to filesystem?** described previously. In its simplest terms it disables buffering between processes and the filesystem. For programs that use very large contiguous files without frequent random access, forcing direct I/O can improve overall throughput. This option correlates to the `forcedirectio` and `noforcedirectio`. By default, direct I/O is not enabled, and all disk I/O will be buffered.

Allow large files?
Maximum file size on Solaris, as on most operating systems, has throughout its history gone through changes. In simple terms, this option dictates whether a filesystem will permit files over the size of 2 GB (currently). Because there are a number of programs, operating systems, and other filesystems that cannot support files larger than 2 GB this limit can be imposed to maintain reliable operation between those differing parts. For example, if a filesystem is to be exported via NFS to operating systems that cannot handle large files, it is wise to enforce this limit on the exporting machine as well. This option corresponds to the `largefiles` and `nolargefiles` mount switches.

Enabled logging?

Logging, when enabled, stores filesystem transactions in a log before applying the transaction to the filesystem. In other words, before making an I/O transaction permanent, it must successfully complete. The result of this is that in the event of a unclean shutdown of the system, the filesystem will remain in a consistent state, eliminating the necessity of running `fsck` on the filesystem. This option correlates to the `logging` and `nologging` mount switches.

System Documentation

This page provides access to the extensive help that is available on most Unix systems via man pages, in addition to the Webmin help files, installed package documentation files, Perl module documentation, as well as results from the Google search engine.

System Documentation Search

Using the module is as simple as entering a search term and clicking **Search**. If you choose to **Match any** in your search, the module will return a list of all pages that it can find that match your query. You may specify which types of documentation you'd like to search, including manpages, Webmin help files, documentation for installed packages, Perl module documentation, and The Book of Webmin either locally or remotely. It will also provide a simple gateway to a Google search.

Man pages are divided into numbered sections, in order to clearly distinguish programming documentation from user command documentation, etc. When performing a search of the manpages, you will likely see multiple results matching your search term. In some cases, there will be more than one entry precisely matching the command or term you're looking for, in different manual sections. The sections are roughly divided as described below:

1. User commands that may be run by all users.
2. System calls, or functions provided by the kernel.
3. Library Functions.
4. Devices, or special files in the `/dev` directory.
5. File format descriptions, for such files as `/etc/passwd` and **sendmail's** `/etc/aliases` file.
6. Games.
7. Miscellaneous, macro packages, and conventions. Examples include `bootparam` and `unicode`.
8. System administration tools that only root can execute. Examples include **ifconfig** and **halt**.
9. OS Specific kernel routine documentation. Not always available on all systems.

Also available on some systems are a few lettered sections. They are: **n** -- New documentation, that may be moved in the future to a new location. **o** -- Old documentation, that will likely be phased out. **l** -- Local documentation specific to this particular system.

Searching documentation from another module

This page also provides the configuration for searching from within the other modules. In most Webmin modules, there will be a **Search docs...** link in the upper right corner of the page. When clicked, Webmin will search all of the available documentation that has been selected and present links and short excerpts from the documents. If your system will be disconnected from the internet, you may wish to disable Google searchs. Likewise, if you do not want package documentation or similar types of documentation to be searched you may unselect them here.

Tip

In versions of Webmin beyond 1.0, it is possible to search the contents of this book, if the corresponding module is installed. To obtain the Webmin module for this book, visit the Projects [http://www.swelltech.com/projects] page at Swell Technology for downloads in `.wbm` and `.rpm` packages. It is not included in the base Webmin package, due to its large size.

Process Manager

The **Process Manager** is accessed by clicking the **Running Processes** icon. This page provides a list of all running processes grouped by lineage. Clicking on a **Process ID** will provide more complete information about the process, including the command that was run, the parent process, the CPU usage, run time, size, niceness level, and more.

Niceness level is configurable. Niceness is a measure of how much processor time the process will be allowed compared to other processes on the system, and its values go from -20 (highest priority) to +20 (lowest priority).

Clicking on the **Files and Connections** button provides a list of the files that are being used by the process, as well as a list of open file descriptors and details about each. The open files will often contain a number of shared libraries, configuration files, and possibly user files that have been open by the user of the process if it is a user application. Open network connections will provide information about what network connections exist for this process. In many cases this list will only contain local loopback connections from 127.0.0.1, or this section of the page may not be present if the application has no network connections.

The module also offers several alternative views of the data, including sorting by user, memory usage, and CPU usage. Clicking the **Search** link provides the ability to filter on a given aspect of the process. Finally, the **Run..** link provides a simple method of running a command, with optional arbitrary command line input.

Similar information can be gained from the standard Unix command `ps` on the command line. Niceness level of a process can be set from the command line using the `nice` command. Sending a signal to a process, or terminating a process, is achieved using the `kill` command. The list of files and connections is gathered using the `lsof` command.

Scheduled Commands

The `at` command provides a simple means to execute a specified command at a specified time. Its usage is simple, made even simpler by the Webmin interface. It can be very useful for a number of tasks, such as running one-time CPU intensive tasks at off-hours notifying you of appointments, etc.

To create a new `at` job, simply fill in the details. Specifically, the **Run as user** option dictates the user under which the command will be run. **Run on date** and **Run at time** specifies the date and time at which the command will run. The **Run in directory** option specifies where the `at` command will be run from, as a change directory command will be run before the command is executed. This directory must be accessible by the user under which the command is run. Finally, the **Commands to execute** is where you may enter the commands to be run by `at` at the specified time. Any number of linefeed separated commands may be entered and they will be executed in sequence.

Note

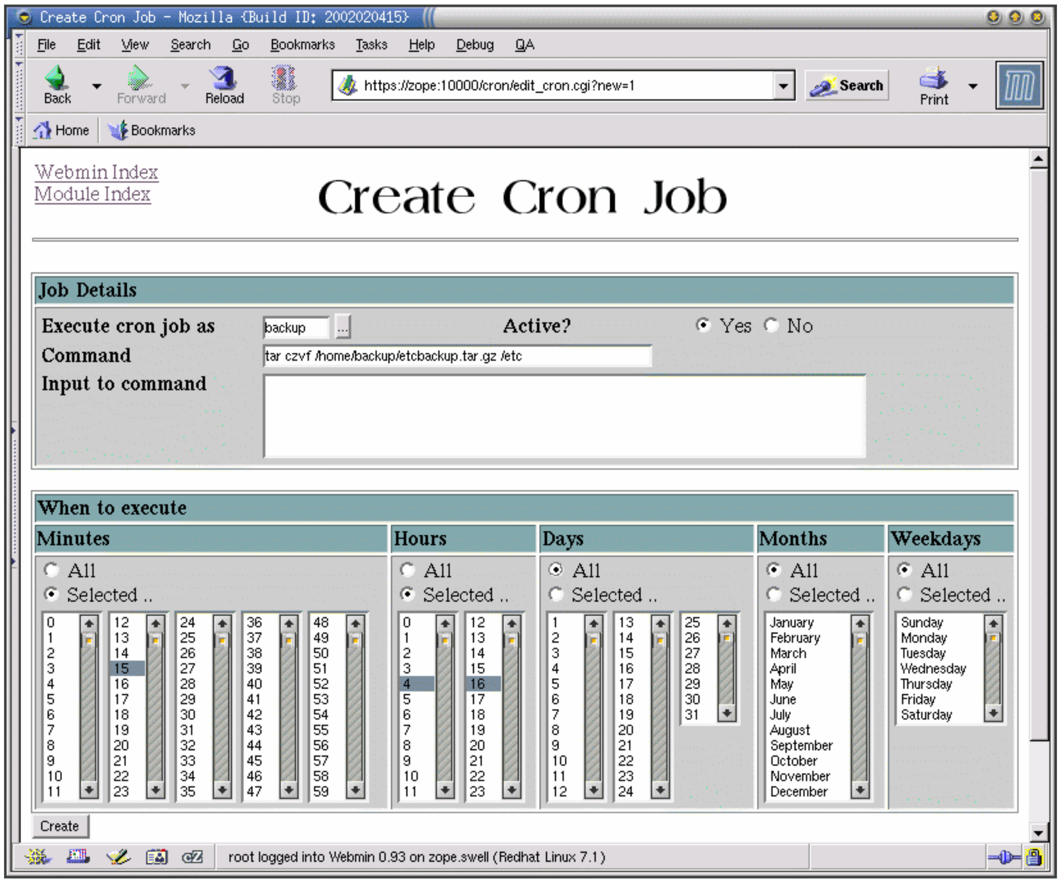
If you have a repetitive task that needs to be executed at a specified time daily, or weekly, or monthly, `at` is not the best tool for the job. There is another command call `cron` that is more appropriate. `cron` is covered in the next section.

Scheduled Cron Jobs

The **Cron Jobs** module is used for editing the crontab on your system. Cron is a daemon that runs constantly on most Unix systems, and allows users and the adminstrator to run specified tasks automatically at selected times. Ordinarily, `crond` is configured from the system-wide `crontab` as well as one or more configuration directories in `/etc/cron.d`, and on Red Hat Linux systems and some other Linux distributions `crond` draws its configuration from `/etc/cron.hourly`, `/etc/cron.daily`, `/etc/cron.weekly`, and `/etc/cron.monthly`. Note that even on Red Hat and similar systems, `/etc/cron.d` and `/etc/crontab` still exists and can be used just as on any other Unix system.

Configuration of `crond` is much simplified by use of the Webmin module. To create a new cron job, click **Create a new cron job**. The **Create Cron Job** page allows you to select the user that the cron job will run as, thereby limiting its permissions to those of the selected user. As in all permissions situations, it is best to choose a user with the least permissions required to actually accomplish the task needed. There are fields for entering the **Command** to be executed, as well as for any **Input to command** you might have. The **Active** option dictates whether the command is enabled or disabled by commenting it out with a hash mark at the beginning of the line.

Figure 5.5. Create Cron Job



Create Cron Job - Mozilla {Build ID: 2002020415}

https://zope:10000/cron/edit_cron.cgi?new=1

Create Cron Job

Job Details

Execute cron job as: backup

Active? [✓ Yes] No

Command: tar czvf /home/backup/etcbackup.tar.gz /etc

Input to command:

When to execute

Minutes	Hours	Days	Months	Weekdays
All [✓ Selected ..]	All [✓ Selected ..]	[✓ All] Selected ..	[✓ All] Selected ..	[✓ All] Selected ..
15	4, 16			

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In the above figure, I've created a cron job that is run as a user named backup (a user I've created just for such tasks). The job is **Active**, so it will run at the specified times. The command that is being run is a simple **tar** commandline to backup my complete `/etc` directory to a tarball in `/home/backup`. While this is not terribly sophisticated backup system, it gets the job done without much complexity. And a simple periodic backup of important files is far better than no backup at all. In this case, it is made slightly more effective by the fact that `/etc` and `/home` are partitions on two different hard disks.

Software Packages

The **Software Packages** module allows an administrator to perform software upgrades and package maintenence via a quite friendly interface. Though the actual implementation can vary quite a lot depending on which software packaging system your operating environment uses, Webmin masks most differences and the overall usage of each is very similar.

Introduction to Package Managers

Most modern Unix systems feature a package manager. The concept of a package manager may be foreign to new users migrating from Windows operating systems, where software is installed by one of a number of installation processes. There is usually no record kept of the locations of installed files, and no easy way to remove all of them if the software is no longer needed. While some installation utilities are more effective and reliable than others, all have difficulties making wise decisions about software dependencies and available library versions. The lack of a unified package manager has led to an entire product category devoted to removing old software installations because of these problems.

A package manager solves this problem, and quite a few other problems that aren't obvious until you've lived with one for a while. With a package managed system, you never have to wonder where a given file originated, or whether a given library or system component is installed. Finding the version of any installed package is quick and easy, and upgrading old packages to new versions can usually be done without fear of overwriting configuration details. So, now that it is clear why package managers are great, it is a good time to talk about how you can use your package manager from Webmin.

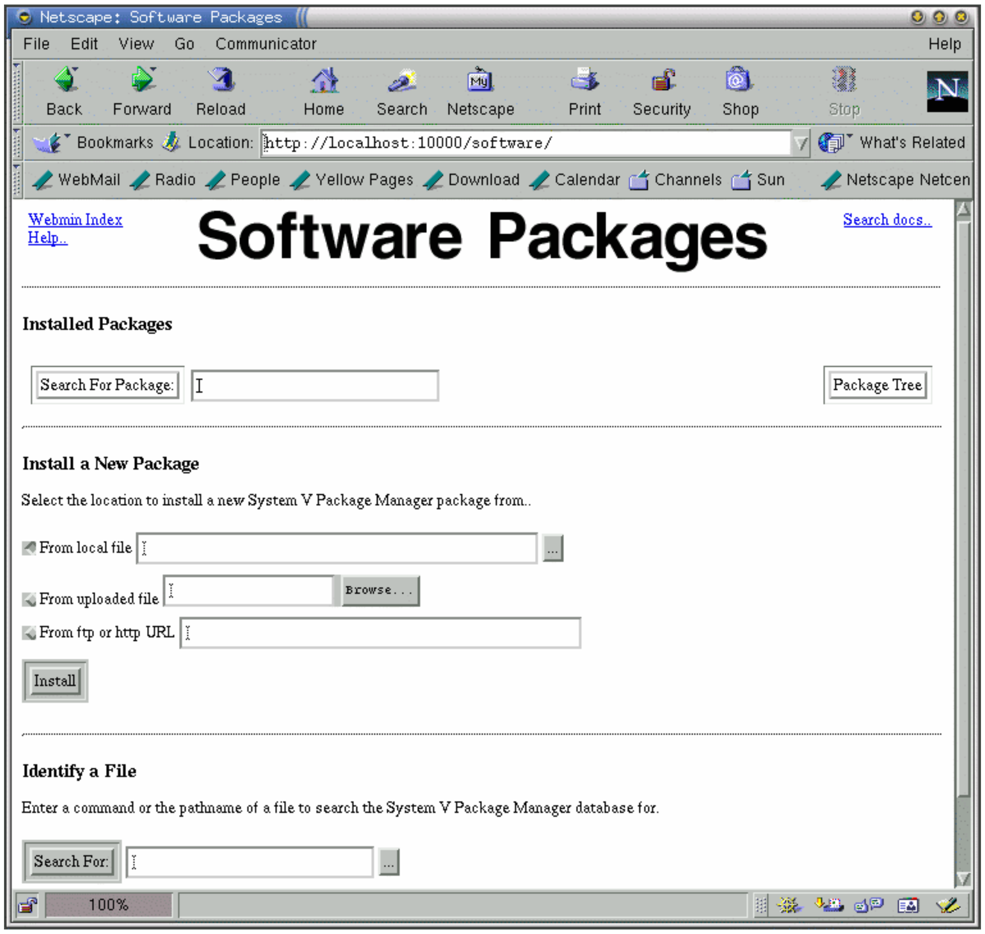
Supported Operating Systems

Webmin provides a mostly consistent frontend to most major OS package managers. The supported operating systems include RPM-based Linux distributions, like Red Hat, SuSE and Mandrake, `deb` based systems like Debian, systems using the pkg style tools like Solaris, Slackware Linux, and SCO Unixware and OpenServer, as well as the HP/UX and IBM AIX package managers. A notable exception to the list of support operating systems is Irix. Though it has a package manager, it is not supported by Webmin.

Using the Package Manager

Webmin presents a simple interface that provides the ability to install packages, search currently installed packages, view the installed packages, and remove packages. Additionally, it is possible to identify the package from which a specified file was installed.

Figure 5.6. Software Package Management on Solaris


Netscape: Software Packages
File Edit View Go Communicator Help
Back Forward Reload Home Search Netscape Print Security Shop Stop
Bookmarks Location: http://localhost:10000/software/ What's Related
WebMail Radio People Yellow Pages Download Calendar Channels Sun Netscape Netcen
Webmin Index
Help..
Search docs..
Search For Package:
Package Tree
From local file
From uploaded file
Browse...
From ftp or http URL
Install
Search For:
100%

Software Packages

Installed Packages

Install a New Package

Select the location to install a new System V Package Manager package from..

Identify a File

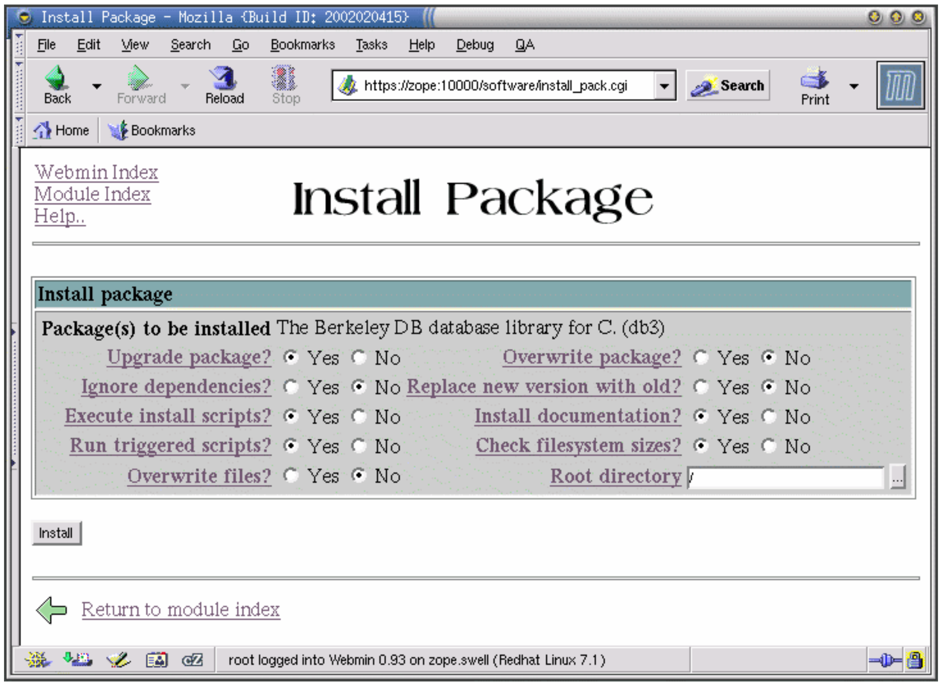
Enter a command or the pathname of a file to search the System V Package Manager database for.

Installed Packages
To search for a package, enter the package name here. A package name is the name of the file that was installed, without the version number or filename extension. For example, on a Red Hat system, the Postfix mail server package is simply called `postfix`. When searching, Webmin will return all packages that have the search term as part of the package name or as part of the package description. This usually makes it easy to find what you're looking for even if you don't know the exact package name.

To view a list of all installed packages, click the **Package Tree** button. When applicable, packages will be divided into their appropriate categories as designated by the packager.

Install a New Package
To install a new package, specify its location, either a local file path, a URL or by uploading it from your local machine using the **Browse...** option. The package will then be identified, title and description displayed, and the installation path may be specified for relocatable packages.

Figure 5.7. Install Package


Install Package - Mozilla {Build ID: 2002020415}
File Edit View Search Go Bookmarks Tasks Help Debug QA
Back Forward Reload Stop
https://zope:10000/software/install_pack.cgi
Search
Print
Home Bookmarks
Webmin Index
Module Index
Help..
Install Package
Install
Return to module index

Install package

Package(s) to be installed The Berkeley DB database library for C. (db3)

Upgrade package?	[✓ Yes] No	Overwrite package?	Yes [✓ No]
Ignore dependencies?	Yes [✓ No]	Replace new version with old?	Yes [✓ No]
Execute install scripts?	[✓ Yes] No	Install documentation?	[✓ Yes] No
Run triggered scripts?	[✓ Yes] No	Check filesystem sizes?	[✓ Yes] No
Overwrite files?	Yes [✓ No]	Root directory	/

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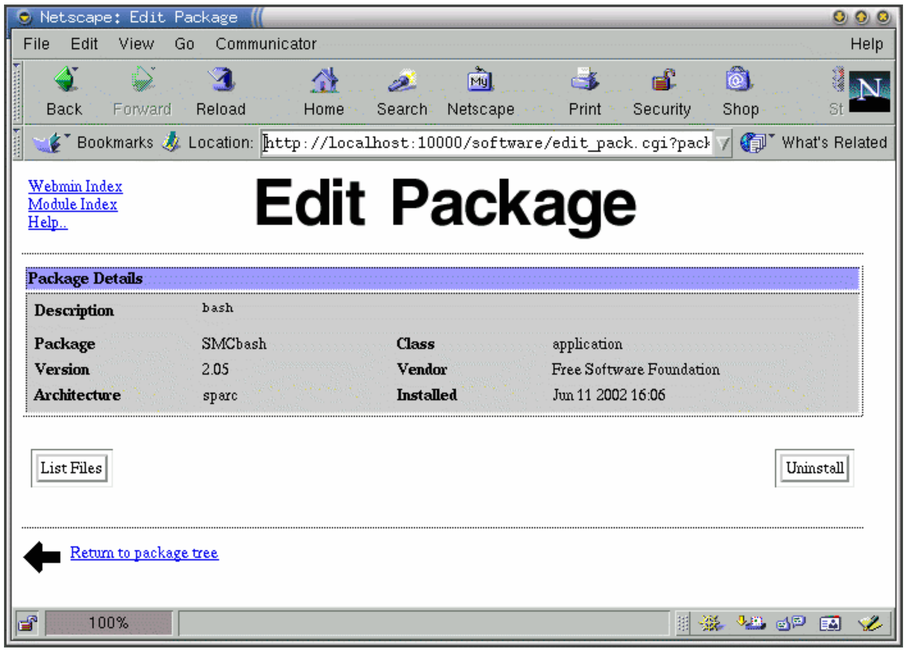
It may also be possible to specify options regarding dependencies, installation scripts, documentation, filesystem size, etc. Generally, the default options will work fine.

Identify a File
Often it is useful to know which package provided a particular file on the filesystem. Simply enter the path to the file you would like to find information about into the text field and click the **Search for:** button.

Edit Package
Clicking on a package name provides access to the **Edit Package** page. This page includes package details such as the description, the category of class of the package, the date of installation, etc. Here you can list the files contained in the package as well as uninstall the package.

Figure 5.8. Edit Package


Netscape: Edit Package
File Edit View Go Communicator Help
Back Forward Reload Home Search Netscape Print Security Shop
Bookmarks Location: http://localhost:10000/software/edit_pack.cgi?pack
What's Related
Webmin Index
Module Index
Help..
List Files
Uninstall
Return to package tree
100%

Edit Package

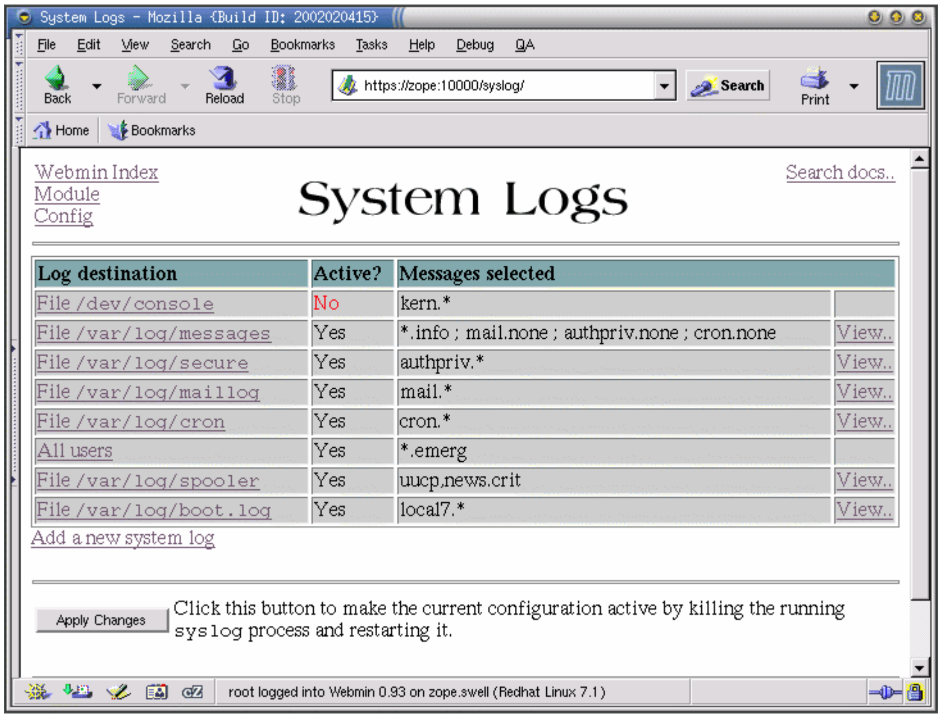
Package Details

Description	bash		
Package	SMCbash	**Class**	application
Version	2.05	**Vendor**	Free Software Foundation
Architecture	sparc	**Installed**	Jun 11 2002 16:06

System Logs

System Logs provides a method for controlling the **syslogd** daemon used on most Unix system to provide standard logging functions. The module opens with a list of all currently existing logs. By clicking on the **Log destination** of a log file, you can edit the logging properties, as shown below. On the editing page there is also a **View log** button, that allows you to view a configurable number of lines from the end of the log file. It also allows a constantly refreshing log view, if selected.

Figure 5.9. System Logs


System Logs - Mozilla {Build ID: 2002020415}
File Edit View Search Go Bookmarks Tasks Help Debug QA
Back Forward Reload Stop
https://zope:10000/syslog/
Search Print
Home Bookmarks
Webmin Index
Module Config
Search docs..
System Logs
Add a new system log
Apply Changes
root logged into Webmin 0.93 on zope.swell (Redhat Linux 7.1)

Log destination	Active?	Messages selected	
File /dev/console	No	kern.*	
File /var/log/messages	Yes	*.info ; mail.none ; authpriv.none ; cron.none	View..
File /var/log/secure	Yes	authpriv.*	View..
File /var/log/maillog	Yes	mail.*	View..
File /var/log/cron	Yes	cron.*	View..
All users	Yes	*.emerg	
File /var/log/spooler	Yes	uucp,news.crit	View..
File /var/log/boot.log	Yes	local7.*	View..

Click this button to make the current configuration active by killing the running syslog process and restarting it.

This module edits the `/etc/syslog.conf` file, and provides a pretty easy way to check up on your logs remotely. And even though the module is designed primarily for **syslogd** logs only, it is flexible enough to allow you to view other types of logs as well. For example, the web caching proxy Squid doesn't use standard syslog facilities, so doesn't fall under the control of `syslogd`. Nonetheless, I like to be able to check up on a running Squid, so I add an entry on all of the boxes I administer to allow me to watch those logs in Webmin. To create a new syslog entry, click the **Add a new system log** link.

Adding a System Log

The **Add System Log** page is divided into sections labelled **Log Destination** and **Message types to log**.

Log Destination

Log to
This option configures the destination of the log file. Syslog can log to a file, a named pipe, a syslog server, or to the console of some or all local users.

File
The log entries will be appended to the filename specified. A complete path should be given. Historically, system logs are stored in `/var/log`. The **Sync after each message?** option will cause the syslog daemon to flush to disk after every entry, thus overriding the disk I/O buffering provided by the operating system. This can be detrimental to performance in circumstances where logging occurs at a very rapid rate, such as the mail log on a very busy mail server. In most circumstances, the integrity of the log is far more important than avoiding the small amount of disk activity system logs generate.

Named pipe
The concept of pipes is fundamental to the Unix Way, or the philosophy of combining small tools to perform large jobs efficiently and flexibly. Most Unix users are familiar with the standard command line pipe which allows the output of one command to be the input of another command. A named pipe expands upon that, and allows output to be sent to a pipe that is located within the normal filesystem under a normal filename. Or, to put it another way, the output of syslog will go to whatever program is accepting input from the named pipe. While named pipes and their usage is beyond the scope of this book, I will point out a few resources to get you started on the subject. Many modern Unix systems, including Linux systems, include a command called `mkfifo` which creates the FIFO special file connected to a named pipe. Reading the manpage, as well as reading about named pipes in your favorite general Unix reference should give you a good overview of the topic.

Syslog server on
The `syslogd` daemon can not only log to local files, pipes and users, it can also direct its output to a remote server running `syslogd`, provided the remote server is configured to permit remote logging from your server. When using remote logging, the address of the server is entered here.

Local users, **All logged-in users**
When one or more, or all users are specified here, the log entries matching the description will be written to all open consoles of the users specified. For example on most systems, all messages of priority `.emerg`, or emergency, are sent to all user consoles. This feature can be used to provide

Logging active?
This is a simple yes or no question, with obvious meaning. However, what may not be obvious is that a disabled log is simply commented out in the `/etc/syslog.conf` file with a hash mark, and so the configuration details remain in the file even though it is no longer an active logging entry.

Message types to log

Here the types of messages to log to the configured log destination can be specified. Any given log entry has two identifiers: its facility, and its priority. The facility specifies the type of program generating the log, such as `mail`, `daemon`, `cron` or locally definable facilities, named `local0` through `local7` on many Linux systems and similarly defined on other Unix variants. The priority is the level of message on a scale of `debug` to `emergency`. The priority level used by any given program for any given message is somewhat arbitrary, as it is chosen by the author(s) of the program. However it is safe to say that `debug` level messages will be incredibly verbose and unnecessary in all but the most complicated troubleshooting situation, while `emergency` is reserved for messages of the utmost importance. Generally, you'll want to configure the priority of logs somewhere in the middle of this, somewhere around `warning` or `err`.

Users and Groups

Unix is, at its very core, a multi-user operating system. It was built from the ground up to provide services to a number of simultaneous users. Because of that, it features a simple, but effective, method for restricting users to only parts of the system they should have access to. The **Users and Groups** module in Webmin attempts to provide a nice frontend for those features of the system. Each Unix has differences in how users and groups are implemented, however, Webmin hides those details quite effectively so that you never have to think about it. The Webmin **Users and Groups** module edits several system files, depending on your OS. Usually, the files are: `/etc/passwd` or `/etc/shadow`, and `/etc/group` or `/etc/gshadow`. Note that the *shadow* versions of the above are far more secure than standard `passwd` files because they are only accessible by the root user. Shadow passwords are standard on most Linux distributions today, and many other systems as well.

Clicking on a user name or group name will take you to an **Edit User** page, allowing you to edit all facets of the account. Note that changing the user or group ID at some point in time after the account is created is risky, as permissions are set by ID, not user/group name. While the module will change these for you on the home directory, there may be user programs or even system programs that rely on the UID to remain the same. Also note that on some systems (Red Hat and probably other Linux distributions) the user and the users primary group are always the same name by default. Red Hats `adduser` will create a group of the same name and ID as the user, and thus Webmin can do the same. You should not change this behaviour, unless you really know what you're doing, as the system relies on this for much of its access control flexibility. Unlike some traditional Unix variants, Linux users can have many secondary groups active at all times, which can be set to any group(s) you need.

Users and Groups Module Configuration

Unlike most module configuration pages, the **Users and Groups** module configuration contains a number of options that significantly impact the usage and usefulness of the module. While most other modules only use the module configuration to specify paths to files, display characteristics, etc. the **Users and Groups** module specifies many defaults that are used when creating new users.

Before and after commands

This section includes fields for specifying commands to be run before and after changes are made. This option allows things like an NIS `make` to be run after adding a user. If more than one command needs to be run, it is trivial to write a simple shell script to execute any commands that need to be run.

Webmin provides access to a number of variables within the local environment in which the command is run. This allows one to construct a command that includes the username, UID, generated password, etc. For example, to email a notice to the system administrator when a new user is created containing the username and password a command like the following could be used:

```
[ "$USERADMIN_ACTION" = "CREATE_USER" ] && echo "Created user $USERADMIN_USER with pass-
word $USERADMIN_PASS" | mail -s "New User" root
```

While shell scripting is beyond the scope of this book, I will point out a few things about how this script works. Using the environment variables set by Webmin when the user is created, the comparison within the test operators (`[` and `]`) checks to see if the command is being executed after a user creation, rather than a change to an existing user. If it is a newly created user, an email will be sent to root containing the contents of the variables for username and password. Below is a list of the variables exported and what they contain:

Environment variables exported when saving a user

USERADMIN_USER
The username of the user being edited. A user must have a username, and it must be unique.

USERADMIN_UID
The user ID of the user being edited. Every user must have a UID. The UID is not required to be unique, but there is rarely any reason for it not to be unique. Permissions are applied to files based on UID rather than username, so changing this will effectively change a users permissions to that of the new UID.

USERADMIN_REAL
The real name of the user. This is not a necessary field in the `passwd` file, and so may be empty.

USERADMIN_SHELL
This variable contains the path and name of the shell for this user.

USERADMIN_HOME
The path to the users home directory.

USERADMIN_GID
This variable will contain the primary GID of the user.

USERADMIN_SECONDARY
This variable will contain a comma-separated list of secondary groups the user belongs to.

USERADMIN_PASS
If the password has been changed, by entering a plain text password into the password field, the new password will be contained in this variable. If the password is unchanged, the variable will be empty.

USERADMIN_ACTION

This variable contains the Webmin action being run that led to a user change. If the user is a new user being created, the variable will contain "CREATE_USER", while if it is an existing user being altered the value will be "MODIFY_USER".

Home directory options

Permissions on new home directories
New directories for users will be created with the permissions specified here. The default is `0755`, which means the owner of the file can read, write and execute files in the directory assuming permission on the file itself, while the group and all other users on the system, can read and execute within the directory. In a web hosting environment, this looseness is often necessary to permit the webserver to have access to a users document root. However, in most business environments, these permissions are unacceptably lax. A better choice would be 0700, or 0711. The former disallows all users, other than UID 0, from being able to list the contents of the directory or read anything within the directory, while the latter permits other users to change directory into the directory, but not necessarily to read or execute files within it. It is useful to permit other users to pass through the current directory to a directory within which is intended to be shared with other users.

Copy files into new home directories from
When creating new Unix users, it is customary to provide a base set of configuration files to setup sensible defaults for the shell, desktop settings, path and other environment variables, and any local configuration details that would make the users life more convenient. For example, on a machine used primarily for development, it is likely that the `CVSROOT` environment variable will be set on login. Or a desktop machine will have icons to make it easier for the user to locate the files they need to use in day to day work. This file is usually called `/etc/skel`, where `skel` is short for *skeleton*, but it can be any directory name.

Automatic home directory base
Webmin can automatically set the home directory path for you, if automatic directory creation is selected. This option allows you to specify the location of the home directory. There is rarely a good reason to stray from the tradition of using `/home` for this purpose.

Automatic home directory style
In most environments, the traditional home directory naming scheme of `/home/username` is perfectly acceptable, but in some large scale networks, the number of users would make managing such a directory cumbersome. So administrators have resorted to breaking down the username distribution in various ways to permit easier home directory maintenence. Webmin supports several such alternate name distributions, specifically: `/home/u/username`, `/home/u/us/username` and, `/home/us/username`.

New user options

Lowest UID for new users, **Lowest GID for new groups**

Most Unix systems use lower numbered user ID and group ID numbers to specify special system users like the `root` user, `syslog` and `nobody`. Because these users usually have special permissions it would be dangerous to accidentally assign a new user to one of the special UID numbers. Many older Unix systems use UID and GID numbers from `0` to `100` for the system user and group IDs. Most modern Linux distributions use `0` through `500` for this purpose. Specifying the appropriate number here makes it impossible to accidentally specify a special UID or GID for a new normal user. Some environments may have other numbering schemes for which this feature can also be helpful.

Create new group for new users?
Many modern Unix systems use a groups system wherein every user has primary group named after themselves. In a system that supports a large number of simultaneous secondary users, this makes it possible to use permissions in very flexible ways. If your system supports this, it is useful to select `Yes` here, and Webmin will automatically create the new group for you. Older-style Unix systems may use a generic `users` group for this purpose. In which case this option should be set to `No`.

Don't use MD5 passwords if missing perl MD5 module?
If MD5 passwords are the default on your system, Webmin can use them for both authentication and when creating new users or changing passwords. If this is set to `Yes`, Webmin will not use MD5 passwords for users if the MD5 perl module is not installed. It will instead use the older, less secure, `crypt` function to encrypt the passwords.

Check for sendmail alias clashes?
When creating a new user, it is possible that there might already be an alias for the new username in the sendmail aliases file. The result of this clash would be that the new user would not receive mail, and it would instead be delivered to whatever user or program the alias pointed to. If this option is selected, Webmin will warn about any clashes that exist.

Only delete files owned by user?
When removing a user, Webmin can remove the users home directory and all of its contents. If this option is enabled, it will remove only those files that are owned by the user. If any files exist in the users home directory that are owned by another user on the system, it will not be removed and the home directory and any subdirectories containing the files not owned by the user will be retained. This option may be useful if the user shares a portion of their home directory for use by others in group projects.

Maximum user and group name length
Here you may specify the longest a user and group name may be. If usernames must be exportable to a system with strict length requirements, you may have to place a limit here. For example, some old Unix systems, and legacy print and file sharing systems had eight or even six character username limites. Most modern systems have much larger hard limits, and so this is rarely necessary.

New user defaults

Default primary group for new users

Normally, Webmin will create a user with a primary group appropriate for your system, and based on the configuration of the earlier option **Create new group for new users?**. But if this is specified, Webmin will set the group specified as the primary group for the user. It may be appropriate to use this feature in some web hosting environments. Usually, though, if your system supports flexible secondary groups you shouldn't need to use this option.

Default secondary groups for new users
You may add any number of secondary groups here, separated by spaces. Modern Unix systems support multiple simultaneous secondary groups, though some older systems have more primitive support for secondary groups.

Note

Secondary groups are a very flexible way to utilize Unix filesystem permissions to provide limited access to parts of the system. For example, if I needed to provide access to a shared `ftp` directory to all users, so that they could drop off files in the directory but couldn't delete or modify each others files, I could create an `ftpusers` group. Then I would set the public FTP directory to be owned by `ftp:ftpusers`, with write access by both the owner and the group and world read access. Finally, any users that needed to be able to drop files into the directory could be added to the `ftpusers` group. They would be able to write and delete their own files but no one elses.

Default shell for new users
Most Unix systems usually have at least two user shells available. The most common are `bash`, Bourne `sh`, `cshell` and `kshell`. While experienced users always have a preference, for most users any reasonably featureful shell will be fine. The system default is probably what your users will expect, so it is the best choice in most cases. On Linux systems `bash` is usually the standard shell, while on Solaris the Bourne `sh` is the default. Since most shells are available on most operating systems, you have much flexibility in your choice if you need it.

Default minimum days for new users, **Default maximum days for new users**
If password timeouts are supported on your system, this option allows you to specify the default minimum and maximum number of days between password changes. As discussed earlier, a policy enforcing password timeouts are an important part of a good security policy. If your OS supports them, it is wise to use them.

Default warning days for new users
The system can warn users when they login via a terminal when an enforced password change is approaching by the number of days specified here.

Default inactive days for new users
If a user is inactive for the specified number of days after the maximum days specified above is reached, the account will be disabled. Only a system administrator will be able to re-enable the account.

Display options

Maximum number of users to display
If there are more users than the number specified here, Webmin will only display a search dialog allowing you to see only the users you need to see.

Sort users and groups by
Webmin will sort the users and groups according to the selection here. The default is not to sort the names, and simply list them in the order they appear in the `passwd` and `group` files.

Number of previous logins to display
When viewing the login history of a user using the **Display logins by** option, this option specifies how many previous logins will be displayed. Unlimited means Webmin will display all logins that exist in the log file. Because logs are rotated at some interval, you will never see logins further back than the last log rotation.

Display users and groups by
Depending on the number of users you have, and how much information you need to see on the front page, you may wish to display them by name only, or display them categorized by primary group. Displaying by name only can allow a much larger number of names to appear on screen at once and may be more convenient than the default in environments with hundreds or thousands of users.

Conceal plain-text password?
If selected, the **Normal password** field in the **Edit User** and **Create User** pages will display `*` marks in place of the characters typed. If set to `No`, the characters typed will be displayed. It may be a security risk to leave this option disabled, if user passwords will be entered or changed in the presence of others.

Get user and group info from
Webmin can usually gather user and group information using standard system calls. In some operating systems this may not work, or may not work as expected. In such cases, Webmin can be configured to draw the information from the appropriate files on the system. This doesn't need to be changed from its defaults by the vast majority of users, as the Webmin default is usually right for your system.

Generate password for new users?
If selected, new users will be assigned a random password when created. This password will be visible in the password entry field on the **Create User** page if **Conceal plain-text password?** is set to `No`.

Show office and phone details?
Webmin can use the comment field in the `/etc/passwd` to store phone numbers and office information. If this option is selected they will be displayed when viewing the user details. Modern implementations of the `finger` command can also display this information.

Display user email from
Webmin can be used to send and receive mail by users who have access to the mail module. This option should be set to your active mail server. If using `postfix`, choose the `sendmail` option, as they use the same mailbox format and locations.

Password restrictions

Minimum password length
When a user changes their password via the Webmin interface, it is possible for Webmin to enforce a minimum password length. It is recommended to enforce at least a minimum password length of six characters if security is at all a concern. Shorter passwords are easier to guess, and are weaker when assaulted with a brute force attack. Operating systems using the older `crypt` encryption mechanism are limited to passwords of eight characters or less, but MD5 based systems usually have no limit or a much larger limit.

Prevent dictionary word passwords?
Because a common method of attack against computer systems is to attempt logins using passwords pulled from a dictionary file, it is often wise to require passwords that do not match words in the system dictionary. This option will cause an error message to be displayed if a user choose a password found in the dictionary.

Perl regexp to check password against
Here you may enter any Perl regular expression you would like passwords to be compared against. For example, if you fear your users will often choose the company name, or the name of a local sports mascot, for their password, you may create a regular expression to match those terms.

Prevent passwords containing username?
Users have a bad habit of choosing really bad passwords. Some even choose their own username as a password. If enabled this option will prevent a user from such a mistake. Unfortunately, in current versions of Webmin, it will not make jokes about the lack of intelligence of the user.

System configuration

Password file
The password file is the location of the list of users, containing information about their home directory, their login shell, and there primary group. Usually, this is `/etc/passwd`. On modern systems this file does not contain user passwords. Passwords usually reside in the shadow file.

Group file
The group file is the location of the file containing the names and membership information of groups on the system. Usually, this is `/etc/group`.

Shadow password file
The shadow password file is the file that contains the actual passwords. It is only readable by users with root permissions, and thus is a more secure location than the `/etc/passwd` file, since the password file must be readable by everyone in order to allow groups and commands like `finger` to work. Usually, this is `/etc/shadow`.

BSD master password file

Much like the shadow password file on Linux and some other Unix variants, the BSD master password file is only readable by root, and is usually the location of passwords on a BSD system rather than the `/etc/passwd` file. This is usually `/etc/master.passwd`.

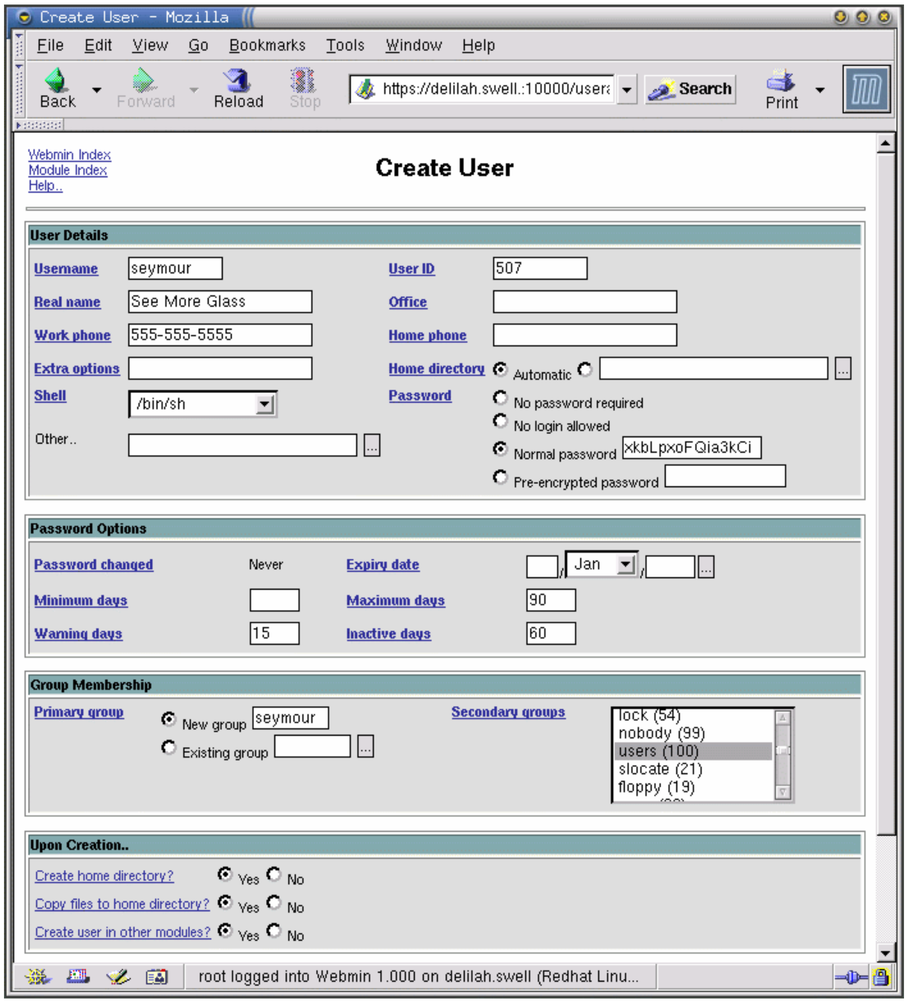
Shadow group file
If group passwords are in use on a system supporting shadow passwords, there will be a group shadow password file in addition to the shadow password file. This is usually named `/etc/gshadow`.

Creating a new User

Creating a user with Webmin is a simple task, and can be further simplified through careful configuration of the module configuration to setup users to suit your environment. Webmin can create a user manually, or it can import a text file list of new users or users to modify in an automated batch mode. This can be used, for example, to migrate an existing user list from a legacy system. Batch mode can also be useful for large organizations with a constantly shifting userbase, such as a University or military installation.

To create a user manually, click the **Create a new user** link. Fill in the appropriate details. If you've chosen your defaults in the module configuration file wisely, you should be able to get away with entering just a few details for each user. In my example case below, I've added a few extras just to make the example more interesting.

Figure 5.10. Creating a new user



Create User

User Details

Username	seymour	User ID	507
Real name	See More Glass	Office	
Work phone	555-555-5555	Home phone	
Extra options		Home directory	[✓ Automatic] ○
Shell	/bin/sh	Password	○ No password required ○ No login allowed [✓ Normal password] xkbLpxoFQia3kCi ○ Pre-encrypted password
Other..			

Password Options

Password changed	Never	Expiry date	/ Jan /
Minimum days		Maximum days	90
Warning days	15	Inactive days	60

Group Membership

Primary group	[✓ New group] seymour ○ Existing group	Secondary groups	lock (54) nobody (99) users (100) slocate (21) floppy (19)

Upon Creation..

Create home directory?	[✓ Yes] No
Copy files to home directory?	[✓ Yes] No
Create user in other modules?	[✓ Yes] No

root logged into Webmin 1.000 on delilah.swell (Redhat Linu...

A username is always necessary, and since our users name is Seymour, I've give him the username `seymour`. I've let Webmin choose the UID for me, which is the next available UID on the system above the minimum that is set in the module configuration. I've also entered Seymour's real name and his work telephone number. The password appearing in the normal password text entry box was selected at random by Webmin. Looks secure enough to me, so we'll leave that one alone. In the password options section I've specified some reasonable timeout information. Finally, I've selected for Seymour to be a member of the `users` group, because I think he will be involved in many group projects requiring him to be able to easily share files with co-workers.

Create User and Edit User options

User Details

Username
This is simply the username under which the user will login. Unix has a long tradition of using all lowercase letters for usernames, but capitalized names will work if you feel a strong urge to go against 30 years of tradition. Usernames may contain all alphanumeric characters, but no spaces or other special characters. Names must be unique and begin with a letter.

User ID
This usually should be automatically chosen by Webmin, and will be the UID of the user created.

Note

Recycling a UID or GID, i.e. reusing a deleted users old ID, can be dangerous, because file ownership is maintained at the OS level by the UID and GID number of the file rather than the name of the user. Thus if you create a new user with an old users UID or GID, and any files remain on the system owned by the previous user, the new user will have access to the files at the same level as the old user. There are reasonably reliable methods of locating such file permission problems using the `find` command, though it is beyond the scope of this book. A better choice is to never delete old users, simply disable their account by turning off logins, and if the user will never need to be re-enabled you may delete their home directory and other files. By doing this you insure that Webmin will never reuse an old ID, unless you force it to.

Office, **Work phone**, **Home Phone**, **Extra options**
The Unix `passwd` file has a comment field which may be used for mostly freeform text entry. Many programs, however, have standardized on a few comma-separated field values for the comment. For example, running the `finger` command on a username that has provided these extra fields will result in these numbers being displayed in addition to the usual information, such as recent logins.

The **Extra options** field may be used on some systems to configure the initial `umask`, `nice` level, and `ulimit` values for the user.

Home directory
Users on a Unix system generally have a directory that belongs to them called their home directory. Within their home directory, a user may read, write, delete, or execute files with no permissions restrictions. Quotas may limit the amount of space available to the user, but the user can otherwise work unrestricted in their home directory. The Unix tradition places home directories in a partition labelled `/home`, with each user having their home directory named after their own username within it. For example, if our system has a user named `slim` it would not be unreasonable to expect

his home directory to be `/home/slim`. As discussed previously, if you let it, Webmin will select the home directory for you based on the policy selected in the module configuration.

Shell

Unix has a very long and diverse history, and has seen the rise of a number of similar tools for any given task. Nowhere is this more evident than in the proliferation of command shells that have been developed. Today, the most popular shells are `bash` or the Bourne Again Shell, `csh` or C shell, and `kshell` or the Korn shell. Many other shells are also in use, including traditional `sh` or the original Bourne shell, `ash`, `zsh`, and many others. The choice of what shell to use is highly personal, though most average users will never know the difference between them. Leaving this at the OS default is probably wise, barring any strong reasons to choose otherwise. New users will learn whatever shell is provided for them, while experienced users will know how to choose an alternate shell for themselves.

Scattered amongst the real user shells are a number of oddly named "shells", which provide the ability to lock out a user, or the ability to create special users to perform certain tasks remotely. Depending on the OS, you may have a `nologin` or `false` shell option which simply closes the connection when the user attempts to login. Other possibilities include `shutdown` which will cause the system to shutdown when the user logs in, assuming the user has appropriate permissions to shut down the system. Similarly, the `sync` user will run the `sync` command to cause all disks to flush unwritten data. This could be used in anticipation of a shutdown, or as a means to insure some important data has been committed to disk. Neither is in common use today, as modern Unix systems automatically sync disks when shutting down.

Password

No password required
This option means that the user need not provide a password to login. You don't want this option for any user that has shell access, as it means anyone that can reach a login prompt or the `su` command can become the user.

No login allowed
If set to this option, the system will never allow a user to login under this username. This is often used for system users, like the `syslog` or `nobody` users.

Normal password
Here you may enter a new password for the user in plain text. If creating a new user, and you have configured Webmin to generate a password automatically, it will be prefilled with the generated password. If the configuration is set to hide plain text passwords, the letters of the password will be replaced with asterisks. Existing passwords will never appear on this page, as the encryption used by the system is a one-way hash. There is no way, short of a brute force attack, to convert the encrypted password to a plain text password.

Pre-encrypted password
If a password exists for this user, either in `crypt` or MD5 hash format, it will appear in this field. If you are importing Unix users from an existing Unix system, you may simply copy the password verbatim into this field. In most cases, the old password will continue to work on the new system. If importing many users, it may be more efficient to use the batch user creation feature instead of adding each user manually.

Note

As the **Password Options** and **Group Membership** options have already been covered in the module configuration section they will not be covered again here.

Upon Save...

Move home directory if changed?
If selected, and you have modified the value of the **Home directory** field, the path of the users home directory will be altered to the new location. If unselected, the contents of the old home directory will remain unaltered. The default is `Yes`.

Note

Webmin attempts to rename the home directory rather than copy its contents. Because of this, the change must occur on the same filesystem, otherwise the change will fail.

Change user ID on files?, **Change group ID on files?**
If you have altered the users **User ID** field and/or **Group ID** field, and these options are enabled, Webmin will change the user or group ownership of the files selected to the new UID or GID. If `Home directory` is selected only files within the users current home directory will have ownership altered, while the `All files` option will change ownership of all files on the system that are currently owned by the user. Changing all files may take a very long time, depending on the size of the filesystems to be searched.

Modify user in other modules?
Because a Unix system may maintain more than one user and password database for various services, Webmin provides a means to synchronize passwords and user creation across multiple files. For example, Samba and Squid may have their own user files and if configured to synchronize, Webmin will make changes to those files automatically when changes are made to system users. If this option is selected, changes made here will be made to all other modules that are configured for user synchronization.

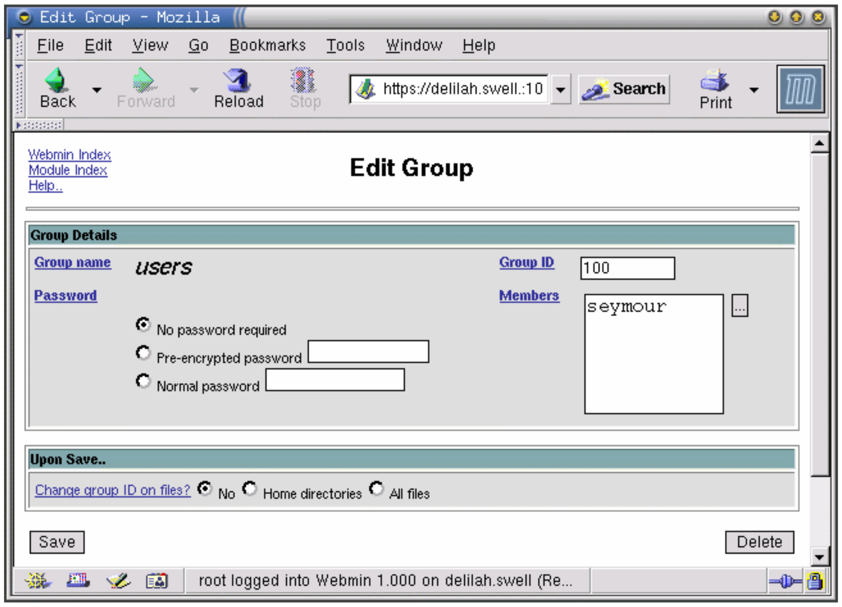
Creating or Editing a Group

Groups are used in Unix to provide means of providing access to common resources to more than one user. For example, if a group of users are working on the same project, the directories and files for that project can be owned by a common group which has read and write access. Modern Unix systems use a two-layered approach to groups, including a single Primary group and some number of Secondary groups, also called supplementary groups. When a user creates a new file, the ownership will probably default to the user and her primary group. The default group membership of newly created users varies quite a bit between OS vendors and versions. Most modern Unix types create a new group whenever a new user is created which shares a name with the user. This becomes the primary group of the user. Since modern systems support a a large number of Secondary groups transparently, this provides a very flexible means of configuring permissions. Many Unix variants that have been around longer than Linux, like Solaris and the BSD-derived systems, may set the Primary group of new users to a `users` group or something similar.

Note

Linux, and most other recent Unix systems, support at least 32 groups per user. However, because the NFS protocol only supports 16 groups, most of them have imposed a soft limit of 16 groups. There are very rarely circumstances that require more than 16 groups, but it is usually possible to use more if the system will not be exporting or using NFS mounted filesystems.

Figure 5.11. Editing a group



Edit Group

Group Details

Group name: users

Group ID: 100

Password: [✓ No password required] Pre-encrypted password Normal password

Members: seymour

Upon Save..

Change group ID on files? [✓ No] Home directories All files

root logged into Webmin 1.000 on delilah.swell (Re...

Group Details

Group name

Like the username, this is a unique alphanumeric identifier. The name must follow the same rules as usernames, so must start with a letter, and contain no non-alphanumeric characters. If editing the group, the name will be shown but cannot be edited.

Group ID
This is the numeric identifier that the system uses to identify this group. It is not necessary for this ID to be unique, but there is very rarely a reason to have multiple groups with the same GID. When creating a new group, Webmin can select a new unused ID for you.

Password
A little known and even less used feature of groups under most Unix variants is that they can have a password just like users. When using this option, a user who normally is not part of a group can login to a group using the `newgrp` command and providing the password. Because of the flexibility now available with the supplemental groups system, this feature is rarely used, but is still widely available.

Members
This field lists all current members of the group, and allows adding any number of new members. The `...` browse button allows you to choose from a selector popup containing all existing users.

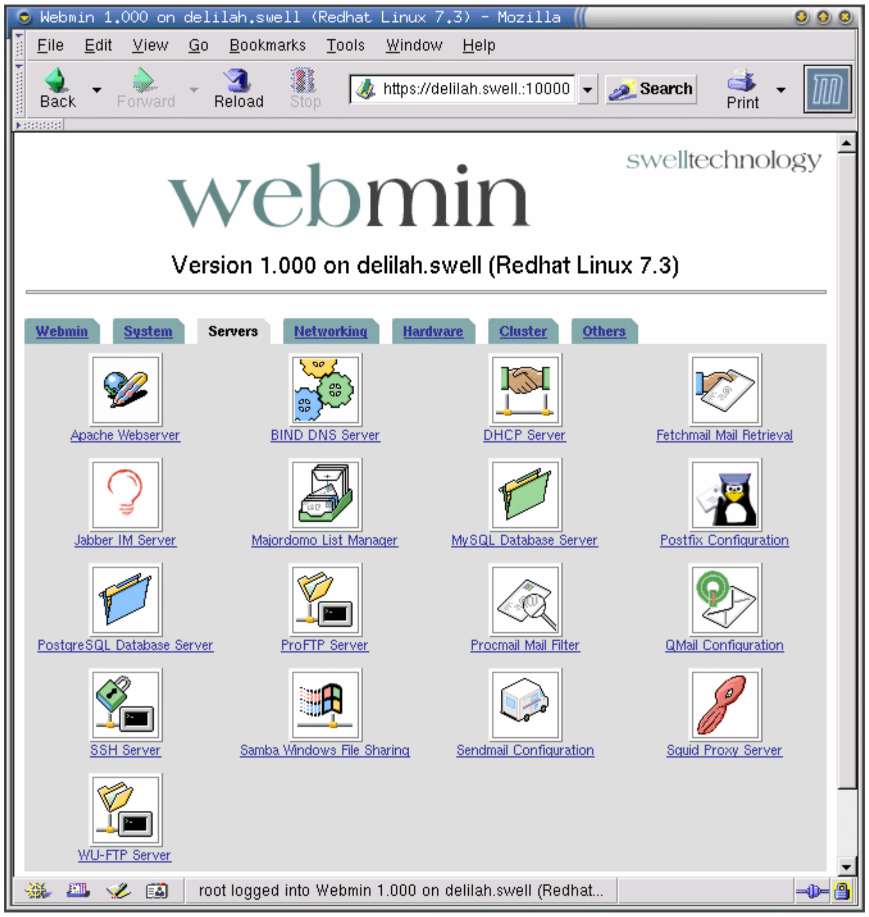
Upon Save...

Change group ID on files?
Much like the similarly named option for users, this provides the option to change the group ownership of files in either home directories or all files on the system. Selecting `Home directories` will cause Webmin to search all user home directories for files owned by this group, and change the group ownership to match the new group ID. Choosing `All files` will search the entire system, which may take a very long time, depending on the size and speed of the mounted disks. This change does not impact the user ownership of files. A file owned by `seymour:users` will still be owned by `seymour` after the change (and still owned by `users` for that matter, just under a different GID).

Chapter 6. Server and Daemon Configuration

Clicking the **Servers** tab on the Webmin category bar brings you to what is probably the most interesting of the Webmin pages. It is here that all of the various complex servers and daemons can be configured. Webmin provides standard modules for a large number of the most popular servers and daemons in use on network systems in the world today, and more are being written all the time.

Figure 6.1. Servers Category


Webmin 1.000 on delilah.swell (Redhat Linux 7.3) - Mozilla
File Edit View Go Bookmarks Tools Window Help
Back Forward Reload Stop
https://delilah.swell.:10000
Search
Print
swelltechnology
webmin
Version 1.000 on delilah.swell (Redhat Linux 7.3)
Webmin System Servers Networking Hardware Cluster Others
Apache Webserver
BIND DNS Server
DHCP Server
Fetchmail Mail Retrieval
Jabber IM Server
Majordomo List Manager
MySQL Database Server
Postfix Configuration
PostgreSQL Database Server
ProFTP Server
Procmail Mail Filter
QMail Configuration
SSH Server
Samba Windows File Sharing
Sendmail Configuration
Squid Proxy Server
WU-FTP Server
root logged into Webmin 1.000 on delilah.swell (Redhat...

Introduction to Servers

Chapter 6. Server and Daemon Configuration

The **Servers** Webmin category is for administration of the server applications that run on a system to provide some service to clients on the network. One example is the Apache web server daemon. Clicking on the Apache icon in this category will allow you to edit the Apache configuration files, which are usually located in `/etc/httpd/conf`. Most modules located in **Servers** will edit some configuration file found in `/etc` or some subdirectory therein. One of the most impressive features of Webmin is the ability to edit files without damaging existing hand-edited configuration details.

The root of much of Webmin's popularity is the ability for an administrator to perform some tasks via the Webmin interface without being forced to do *all* tasks with Webmin. Unlike some graphical frontends for Unix systems, Webmin leaves the edited file intact as much as is possible. Comments are untouched, and ordering of directives is not changed. This results in a system that can be configured via Webmin, and via hand editing of configuration files, with no conflict between the two methods. A side effect of this is that Webmin generally must provide a 1 to 1 interface to configuration files in order to ensure that configuration options are not confused, and to ensure that a savvy administrator gets what is expected from the Webmin output. This means that Webmin is not an "easier" way to administer a Unix system. The administrator still must understand the tools she is administering with Webmin. For example, configuring DNS from Webmin requires an understanding of **named** and its required configuration files. Likewise for **squid**, **httpd**, **sendmail**, etc. It *can* make the learning process somewhat quicker, however, as all of the options are present on the display, which may or may not be the case with configuration files.

Chapter 7. Apache Webserver

The **Apache** module is broken up into several sections to address different aspects of an Apache configuration. On the main page, these sections are grouped into **Global Configuration** and **Virtual Servers** groups. Using virtual servers it is possible to locate several web sites with unique domain names on a single IP address, in order to conserve the rapidly diminishing IPv4 address space. In the context of the **Apache** module, **Global Configuration** refers to configuration information that will apply to *all* virtual hosts that are run from the same **httpd** daemon. It is usually unnecessary to run more than one **httpd** daemon on a single machine but it is possible. It is also possible to manage more than one such daemon with Webmin via the module cloning feature.

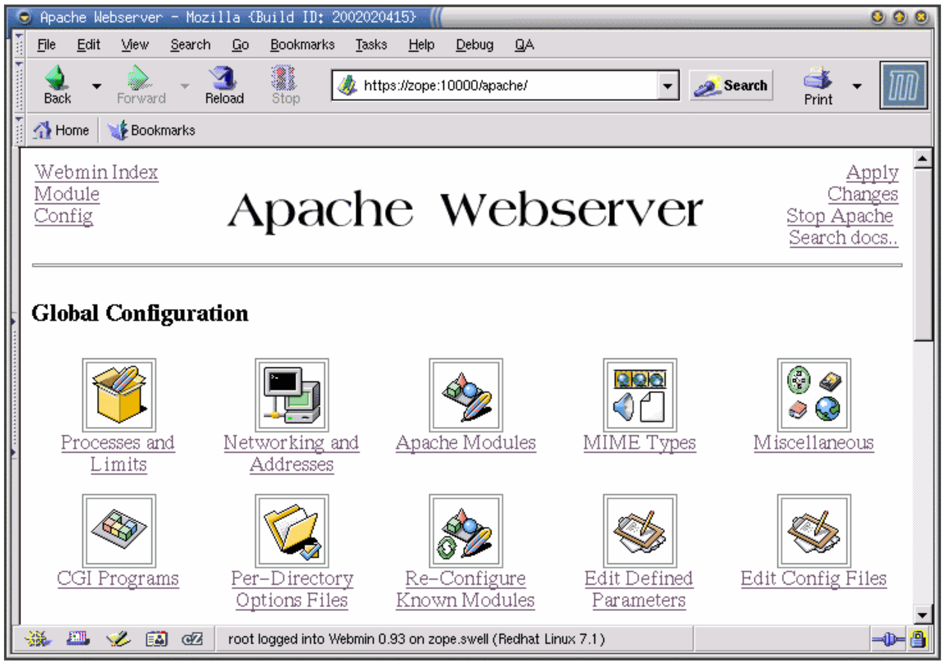
Note

The official *Apache documentation* [http://httpd.apache.org/docs/] is a good source of additional information.

Global Configuration

Global Configuration is found on the top half of the divided **Apache** module page. It provides access to the various options that will be shared across all virtual servers, such as which modules to load, network addresses, MIME types, etc. The options configured here will apply to every virtual server and the default server. To configure an option for one specific virtual server it must be configured in the virtual servers configuration section.

Figure 7.1. Apache Global Configuration



Processes and Limits

This page provides the following options, which set many of the limits for Apache. Generally, the defaults are reasonable, but may need to be altered for high load or low memory situations. The options on this page cover two distinct, but related limits that are configurable in Apache.

The first set of limits are related to the length or number of request-headers that will be accepted by the server. A request-header is a term that refers to all of the information that a client sends to the server to indicate the object it would like to receive. The most important portion of the request-header is usually made up of the HTTP method (such as GET, POST, HEAD, etc.), the URI (the complete path and domain name of the object being referred to), and the HTTP protocol version number.

The second set of limits refers to connection and process specific limits of Apache. Apache usually operates in what is known as a process-per-connection mode, wherein each client connection to the server will be served by a single and independent httpd process. Thus to provide service to 30 simultaneous clients, the system will run 30 Apache processes.

Maximum headers in request
Sets the maximum number of request headers accepted per request. Each time a web client (usually a web browser) makes a connection to a webserver, it includes request headers to indicate information about the encoding capabilities, HTTP version support, cache-control, content negotiation and other information about the client agent. As HTTP standards and non-standard extensions to the HTTP protocol have been developed, the number of request headers usually received has risen slowly, but is rarely more than 20. The `LimitRequestFields` [http://www.apache.org/docs/mod/core.html#limitrequestfields] directive in the Apache configuration file is modified by this option, and usually defaults to 100.

It may be possible to prevent certain types of denial of service attacks by restricting the number of headers accepted, though it is unlikely the be a problem at the default value. It should rarely need to be altered from its default, unless clients receive error messages from the server indicating too many headers were in the request.

Maximum request header size
Defines the maximum header field size that will be permitted. Apache sets aside a buffer for processing of header entries received from the client. This buffer must be large enough to contain a single header entry in its entirety. The `LimitRequestFieldsize` [http://www.apache.org/docs/mod/core.html#limitrequestfieldsize] directive is modified by this option, and it usually defaults to 8190 and this value is also the normal maximum value possible. It is worth noting that the maximum value for this option is system dependent and is compiled into the Apache executable when it is built. Raising this value above the default of 8190 may not be supported on your Apache, and should not be necessary under any normal circumstances.

Maximum request line size
Defines the maximum length of an HTTP request-line. The request-line contains the HTTP method, the complete URI, and the protocol version. The accepted line size needs to be long enough to contain any resource name on the system, and the default is generally recommended. This option edits the `LimitRequestLine` [http://www.apache.org/docs/mod/core.html#limitrequestline] directive in the Apache configuration and defaults to 8190 bytes, which is also usually the compiled-in upper bound for this value.

This option rarely needs to be altered from its default, but may be useful in preventing certain types of Denial of Service attacks by preventing client applications from overloading the server with many extremely large and complex request lines.

Maximum concurrent requests
The maximum number of allowed concurrent requests. Each request to Apache spawns a new daemon, and this defines the upper limit on how many such daemons will be spawned to answer requests. This option correlates to the `MaxClients` [http://www.apache.org/docs/mod/core.html#maxclients] directive. To configure more than 256 you will probably have to edit HARD_SERVER_LIMIT entry in `httpd.h` and recompile your Apache, unless the package that is installed has already been configured for high loads or you did so when building Apache from the source tarball.

Except in extremely high load environments it is rarely beneficial to raise this to very high levels. Because every new process requires resources, in the form of memory and CPU time, it can be counter-productive and cause service to become less responsive rather than more. If all processes are busy, the request will usually be queued up to the limit imposed by the **Listen Queue Length** discussed in the next section of this chapter.

Maximum requests per server process
The maximum number of requests that each child process will answer before being killed and respawned. This is useful for a couple of reasons. First, if there are any accidental memory leaks (anywhere in the process, including its modules), the damage can be minimized by restarting processes regularly. Also, without using this option the system will always keep alive the largest number of processes it has ever needed, even during low load periods when far fewer processes are needed to answer requests. This option correlates to the `MaxRequestsPerChild` [http://www.apache.org/docs/mod/core.html#maxrequestsperchild] directive.

Note

On Keepalive requests, only one request is counted per *connection* from a client. Thus, a number of requests from the same client may be served before the counter is incremented if the client supports Keepalive requests. In this case, this directive acts to limit the number of *connections* per process rather than number of individual requests.

Caution

Though Apache is historically a quite solidly written program, and has rarely exhibited major memory leaks, many of the shared modules in use by Apache may not be quite as commonly used or as well-tested. These modules may lead to memory leakage even if the Apache `httpd` process does not exhibit such leakage.

Maximum spare server processes
This defines the maximum number of unused server processes that will be left running. This option configures the `MaxSpareServers` [http://www.apache.org/docs/mod/core.html#maxspareservers] directive and defaults to 10. There is usually no need to tune this option, except on extremely high load servers.

Minimum spare server processes
The minimum number of child processes that will be left running at all times. For high load servers, this may need to be raised, and for low memory and low load systems it might be best to reduce the number. This option correlates to the `MinSpareServers` [http://www.apache.org/docs/mod/core.html#minspareservers] directive and defaults to 5.

Caution

It is a very common mistake to raise the above two options to extreme levels when performance of an Apache installation seems sluggish. It is very rarely actually the source of the problem, but it seems a popular first reaction among new Apache administrators. Tuning Apache for performance is well documented in a number of locations, and much documentation about tuning for specific OS platforms is also available on the internet. A good place to start is the Apache Performance Notes page [http://httpd.apache.org/docs/misc/perf-tuning.html]. The documentation found there will address nearly all performance issues that most users will ever run into.

Initial server processes
The number of child processes that are spawned when the `httpd` is started. Correlates to the `StartServers` [http://www.apache.org/docs/mod/core.html#startservers] directive and defaults to 5. This usually does not need to be modified, except on high load servers.

Display extended status information
If the status module is enabled on the server, turning this on will keep track of extended status information for each request and present them in a web page or machine readable format. This option edits the `ExtendedStatus` [http://httpd.apache.org/docs/mod/mod_status.html] directive. This option requires the `mod_status` module be loaded.

Note

To access the extended status information from a running Apache server, you can browse to the address `http://www.yourdomain.com/server-status`. Note that access control should generally be configured to tightly restrict access to this URL, as it may contain sensitive data about your webserver environment.

The information provided by `mod_status`, with extended status enabled, includes statistics about the number of child processes and the number of connected clients, the average number of requests per second being served, the average number of bytes per request, and the current CPU percentage being used by each Apache process. A machine readable form of this data may be collected from `http://www.yourdomain.com/server-status?auto`. The latter is ideal for use in scripts to gather statistics from your server automatically.

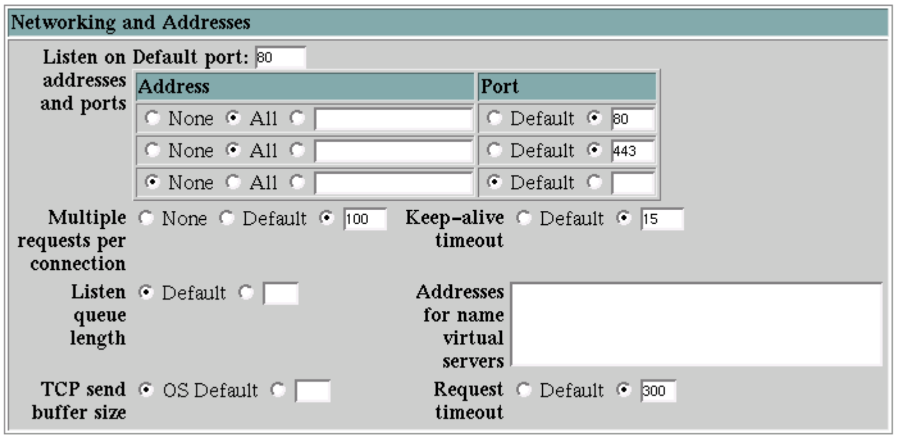
Caution

Because of the persistent nature of this type of data, this module is only functional when Apache is run in standalone mode, and not when run in inetd mode. Because of the large number of problems involved in running Apache under inetd, and problems inherent to inetd, it is simply best to avoid inetd altogether, anyway.

Networking and Addresses

This section is for configuring the network addresses and ports where Apache will listen, and some other access limits, timeouts, and queue options.

Figure 7.2. Networking and Addresses



Networking and Addresses

Listen on addresses and ports — Default port: 80

Address	Port
None [✓ All]	Default [✓ 80]
None [✓ All]	Default [✓ 443]
[✓ None] All	[✓ Default]

Multiple requests per connection: None Default [✓ 100]

Keep-alive timeout: Default [✓ 15]

Listen queue length: [✓ Default]

Addresses for name virtual servers:

TCP send buffer size: [✓ OS Default]

Request timeout: Default [✓ 300]

Listen on addresses and ports
This option defines the addresses and ports where Apache will listen for requests. The default is to listen on port 80 on all addresses, and this is often all that is needed. Port 80 is the standard port for web traffic, and should generally be used for all normal web traffic. It is also possible to configure multiple Apaches to run on the same machine with different global configurations on different ports or addresses. Also, because ports below 1024 are *privileged ports*, regular users running Apache without administrator access will have to run it on a non-standard port. 8080 is a common port for webservers run by unprivileged system users who cannot bind to port 80. A good overview of these options can be found at *Setting which addresses and ports Apache uses* [http://www.apache.org/docs/bind.html]. These options correlate to the `Listen` [http://www.apache.org/docs/mod/core.html#listen] and `Port` [http://www.apache.org/docs/mod/core.html#port] directives.

Multiple requests per connection
When `KeepAlive` [http://www.apache.org/docs/mod/core.html#keepalive] is enabled the server will support persistent connections, which can result in improved performance and a generally better experience for the end user. This option sets the maximum number of requests to be handled per client connection. If set to `0`, the server will impose no limit on the number of requests during a single connection. This option correlates to the `MaxKeepAliveRequests` [http://www.apache.org/docs/mod/core.html#maxkeepaliverequests] directive. The default is usually `100`.

Caution

Resist the temptation to rely on persistent connections to maintain state if you develop websites. An unfortunate effect of persistent connections becoming available on most browser clients, as well as most webservers, is that some web application and commerce site developers have attempted to use a long-lasting persistent connection to maintain the shopping cart, or other state information of the user. This seemingly easy method of keeping up with users is fraught with problems in the real world, and the time spent doing it right using backend storage and cookies or similar session ID information will be well-rewarded in the decrease of support problems you run into. Problems caused by the abuse of persistence include older web proxies that do not support persistence breaking the connection and causing your application to not work for anyone behind such a proxy. Even some network address translation devices and load balancing systems can cause mysterious failures of the site. It is also an inefficient use of resources, potentially leading to many more server processes running than are necessary to service requests.

Keep-alive timeout
The number of seconds Apache will wait for a subsequent request before closing a connection. This option edits the `KeepAliveTimeout` [http://www.apache.org/docs/mod/core.html#keepalivetimeout] directive. The default is `15` seconds. A too large value for this directive may lead to performamce problems, as many clients may hold open idle connections to Apache processes which cannot exit or process requests for other users, thus they take up resources but remain idle.

Listen queue length
The maximum length of the queue of pending connections. Generally no tuning is needed or desired, however on some systems it is desirable to increase this when under a TCP SYN flood attack. As discussed in the **Processes and Limits** section, the listen queue is where requests that cannot be served immediately end up. If this number is exceeded, subsequent requests will be dropped. Correlates to the `ListenBacklog` [http://www.apache.org/docs/mod/core.html#listenbacklog] directive.

Addresses for name virtual servers
This option is used to configure the IP address on which Apache will listen for requests to virtual servers. Virtual servers are name based servers, wherein several different domain names can answer on the same IP address. For example, I run two test servers on my local network. One is named *liberty* while the other is named *constitution*. Both run on the same server, but they answer on different named addresses and provide different root directories. So a visit to each will bring up different web pages. This, of course, works for real domain names as well (www.nostarch.com or www.swelltech.com, for example). Note that your DNS server, or the DNS server that is authoritative for the domain you wish to run virtual servers on, will also have to have entries for each virtual server you run that resolves to the IP of your server. It is also possible to specify a different port for a given name virtual server to listen on, by appending the

port following a colon (i.e. `192.168.1.1:8080` would cause Apache to listen on port 8080 on the given IP. This option affects the `NameVirtualHost` [http://www.apache.org/docs/mod/core.html#namevirtualhost] directive. A tutorial on setting up Apache virtual hosts is provided later in this chapter. Another good source of information on virtual servers in Apache is the *Apache Virtual Host documentation* [http://www.apache.org/docs/vhosts/index.html].

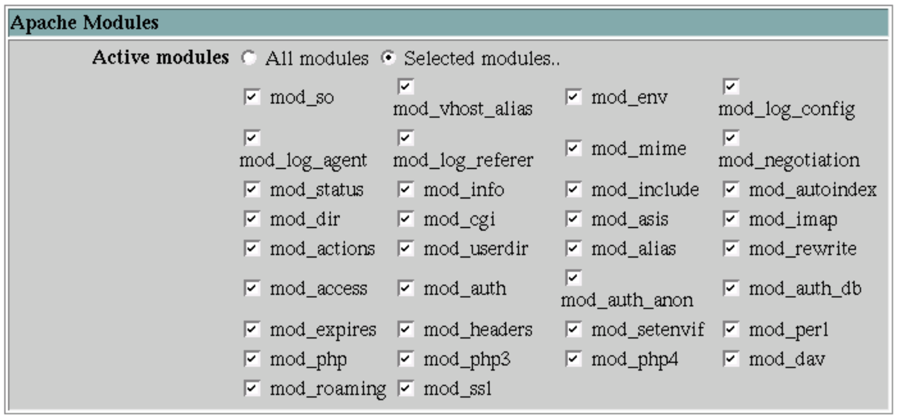
TCP send buffer size
Sets the size of the send buffer for TCP packets. It is usually safe to leave this at the default, which is determined by the default of your operating system. This option edits the `SendBufferSize` [http://www.apache.org/docs/mod/core.html#sendbuffersize] directive.

Request timeout
Defines the maximum number of seconds that Apache will wait for a request after a connection has been established. Correlates to the `TimeOut` [http://www.apache.org/docs/mod/core.html#timeout] directive.

Apache Modules

Apache is designed in a modular fashion, so that the base server can be a small easily debugged application, while nearly unlimited additional functionality can be added easily by loading additional modules. The base process can then be smaller, and only those additional features that are needed can be loaded. This Webmin module allows you to select the available Apache modules that you'd like to be loaded.

Figure 7.3. Apache Modules



Apache Modules

Active modules All modules [✓ Selected modules..]

✓ mod_so	✓ mod_vhost_alias	✓ mod_env	✓ mod_log_config
✓ mod_log_agent	✓ mod_log_referer	✓ mod_mime	✓ mod_negotiation
✓ mod_status	✓ mod_info	✓ mod_include	✓ mod_autoindex
✓ mod_dir	✓ mod_cgi	✓ mod_asis	✓ mod_imap
✓ mod_actions	✓ mod_userdir	✓ mod_alias	✓ mod_rewrite
✓ mod_access	✓ mod_auth	✓ mod_auth_anon	✓ mod_auth_db
✓ mod_expires	✓ mod_headers	✓ mod_setenvif	✓ mod_perl
✓ mod_php	✓ mod_php3	✓ mod_php4	✓ mod_dav
✓ mod_roaming	✓ mod_ssl		

The first module listed in the figure above is `mod_so` [http://www.apache.org/docs/mod/mod_so.html], which is the module that provides shared object loading at run-time. This module is required if you are using run-time module loading and is the only module other than `core.c` that cannot be a dynamically loaded module. It must be compiled into the Apache binary at build time if you will be using dynamically loaded modules. Dynamic Shared Objects are not supported by all operating systems, currently, but they are supported by the majority of modern systems including Unix variants that support loadable `.so` libraries and Windows systems in the form of `DLLs`. There are several other modules in common use listed in the above figure, some of which will be discussed below. A good place to go to find out more about available standard modules and third party modules is *Apache modules* [http://www.apache.org/docs/mod/index-bytype.html] and *Apache Module Registry* [http://modules.apache.org/].

Configured modules are loaded into the Apache process on startup, thus it is possible to add new modules without recompiling the server. The modular nature of Apache is one of it's primary benefits over other webservers. Without modules, Apache would be just another webserver. But because modules are relatively easy to program, the variety available has proliferated, providing functionality for Apache that is unavailable in any other webserver product, commercial or Open Source.

About Apache Modules

Because of the importance modules play in the configuration and management of an Apache webserver, it is worthwhile to step out of Webmin for a short time to discuss some of the lower-level details of Apache and its modules. While the usage of these modules via Webmin is discussed throughout this chapter, an overview of the modules will help put the modular structure of Apache into perspective, and hopefully make clearer the interaction between Webmin and the underlying configuration files.

Note

The official *Apache modules* [http://httpd.apache.org/docs/mod/] documentation page is an informative, and more comprehensive list of modules that are part of the Apache distribution. Only the most commonly used modules and their purposes will be discussed here. A similar page covers the *Apache 2.0 modules* [http://httpd.apache.org/docs-2.0/mod/].

Apache Core

The Apache *Core module* [http://httpd.apache.org/docs/mod/core.html] provides the basic functionality that is required to provide web service as described by RFC 2616. The features in `core` are always available in any Apache installation, regardless of what other modules are available. Most of the basic network, system and HTTP limits and functions are handled by the core module, and many of the configuration directives are available with no additional modules required.

Multi-Processing Modules

Beginning with Apache version 2.0, a new model (or more accurately, a number of new models) for handling connection concurrency has been added to the system. Concurrency in Apache versions prior to 2.0 used a model known as connection-per-process, with some enhancements to that model like pre-forking. New versions provide what are known as Multi-Processing Modules which allows Apache to use the concurrency model that makes the most sense for a give operating system. Most Unix and Unix-like systems use a module called worker which implements a hybrid model utilizing a pool of multi-threaded processes.

When the `worker` module is enabled, Apache runs a single control process that is responsible for launching child processes. The child processes spawn a configurable fixed number of threads each, and these individual threads listen for connections and serve them. Threads are lighter weight, or less resource intensive, than real processes, and thus a machine of a given capacity can provide higher throughput from a worker style Apache than from a traditionl pre-forking Apache. This was a primary motivation in the development of the new Apache 2.0 service modules.

If your Unix variant doesn't support threads, or supports them in an incompatible way, Apache will likely use the `prefork` model instead. Windows machines will likely use the `mpm_winnt` Multi-Processing module, which creates a single control process which spawns a child process, which in turn creates threads to handle requests. Since Webmin only runs on Unix-like operating systems at this time, you will likely have no use for the Windows module.

mod_access

This module provides access control based on client hostname, IP address and other information taken from the client request. This module also provides some of the functionality involved in supporting directory `.htaccess` files to control access to certain parts of the server.

mod_auth

User authentication of several types is supported by Apache. The oldest and most commonly used is supported by this module. It is known alternately as HTTP Basic Authentication or NCSA authentication. This method authenticates users from a plain text file located somewhere on the system. The password file can be generated using the `htpasswd` program that is included with Apache.

Note

To generate a password file using `htpasswd`, simply run the program with the `-c` option, a new filename, and the first username to add to the file:

```
[joe@delilah mydocs]$ htpasswd -c .htpas
```

mod_cgi

The CGI module must be used in order to run scripts or programs on the server to generate content dynamically for users. It is possible to configure at runtime the file types that will be handled by the CGI module. Configuration of the CGI module can be handled separately for virtual hosts, or it may be applied globally to all virtual hosts on the server, or a combination of global defaults with specific differences in some virtual hosts.

mod_expires

The HTTP specification defines a set of rules for clients and intermediary devices (specificially, web caching proxies, like Squid) to follow when deciding whether to serve a cached document, revalidate the object, or fetch a new copy. A primary method for the website maintainer to dictate the result of these decisions for any given object is the `Expires` header. This module provides a flexible, and simple method for configuring server wide, as well as per-directory or by file type.

mod_rewrite

This module provides an extremely flexible (some would say too flexible) means of redirecting user requests to different URLs based on information contained in the request. The basis of this module is a regular expressions based parser and rewriting engine. The URL alterations can depend on a large variety of additional data, including environment variables, client headers, time, external database lookups, and more.

Note

To fully understand URL rewriting, it may be worth your time to study the *URL Rewriting Guide* [http://httpd.apache.org/docs-2.0/misc/rewriteguide.html] written be Ralf Engelschall, the original author of the `mod_rewrite` module.

mod_ssl

Normally, the HTTP protocol is not encrypted, and thus, not secure from prying eyes at any stage along the request path. Ordinarily, this is OK, and man-in-the-middle security problems of this sort are extremely rare (because the vast majority ISP and backbone administrators are honest folks who have no inclination to snoop on your web browsing habits). However, for extremely private matters, such as online banking, investing, or making online purchases, it is important to have a more secure means of communication. The solution is Secure Sockets Layer, also known as simply SSL. The Open Source implementation is called `OpenSSL`, and it is the core of the `mod_ssl` Apache module.

To use SSL connections, you must generate or purchase an SSL certificate from one of several Certificate Authorities. A locally generated certificate can be used for authentication within a company, or for a small number of users whom you already have a trust relationship with. However, if your secure site will be used by a number of users who have no direct relationship with you, a certificate from a trusted certificate authority will be required so the user will know that the site is operated by who it claims to be.

Note

Certificate Authorities, or CAs as they are often called, supported by most modern browsers include VeriSign [http://www.verisign.com/], GeoTrust [http://www.geotrust.com], and Thawte Consulting [http://www.thawte.com] in the US. Options outside of the US include Internet Publishing Services [http://www.ips.es] and BelSign [http://www.belsign.be].

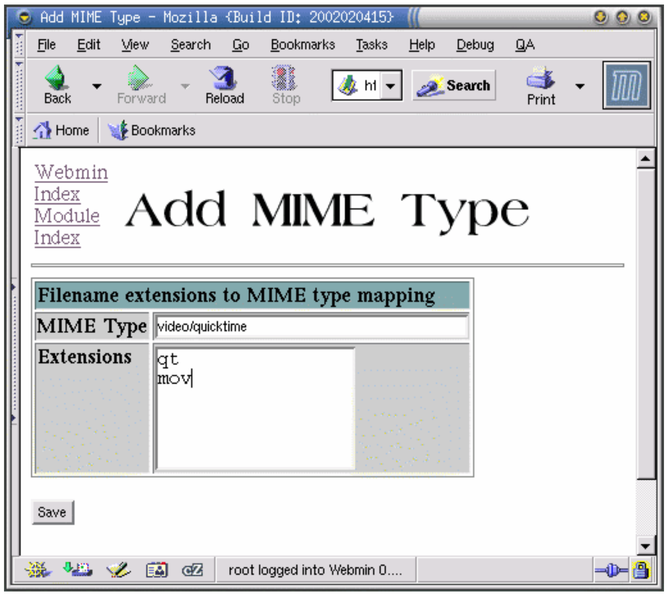
mod_suexec

In many web hosting environments, a single server is shared by a number of users, and it would be inappropriate to allow the files of all users to be viewed by any other user. Because CGI scripts are run, by default, with the permissions of the webserver itself, and the webserver must have access to all content and scripts, it would be possible for a malicious user to use a CGI script to browse the contents of any other users private directories using Apache as an intermediary. In order to combat this problem in virtual hosting environments, the server may be configured to run CGI scripts as a specified user rather than as the more privileged Apache user (usually `nobody`). This module makes this feature possible by performing a `suexec` function on the created process when CGI scripts are run. There is some complexity in this solution, and many security pitfalls to beware of, but it is a required step to providing a secured virtual hosting environment with CGI script capabilities.

MIME Types

MIME Types is the method by which the server, and its clients, know what type of data a given object is. This information is generally more important to the client, as they must know how to interpret the data where the server only needs to send it to the client along with MIME identification information. MIME, or Multipurpose Internet Mail Extensions was originally defined to easily allow sending of data other than text via email. It has now become the standard method for many types of network connection to declare data type. The **MIME Types** module merely provides a list of the currently accepted MIME types, and their optional extensions. At the bottom of the page, the **Add a MIME type** link allows you to add new MIME types easily.

Figure 7.4. Apache MIME Types


Add MIME Type - Mozilla {Build ID: 2002020415}
File Edit View Search Go Bookmarks Tasks Help Debug QA
Back Forward Reload Stop Search Print
Home Bookmarks
Webmin Index Module Index
Save

Add MIME Type

Filename extensions to MIME type mapping	
MIME Type	video/quicktime
Extensions	qt mov

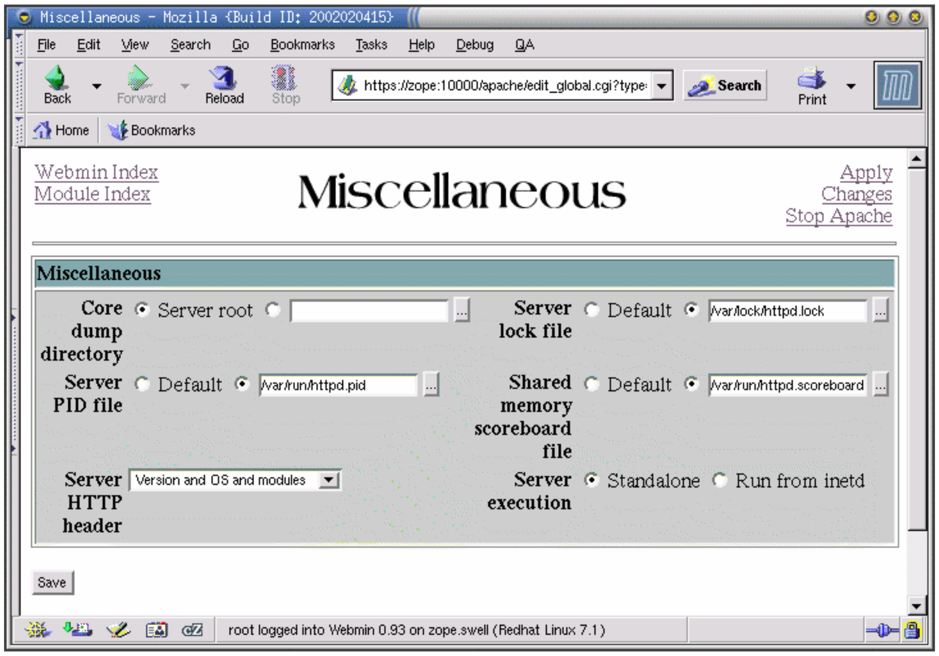
root logged into Webmin 0....

A great resource for more information on MIME types can be found at the *MIME Page* [http://www.oac.uci.edu/indiv/ehood/MIME/MIM maintained by Earl Hood. Links to relevant RFCs as well as a *MIME FAQ* [http://www.faqs.org/faqs/mail/mime-faq/mime0/] can be found there.

Miscellaneous

The **Miscellaneous** options page is just what it sounds like. It's the global options that didn't seem to fit anywhere else. As such, there aren't very many fields on this page, but nonetheless there are a few items of interest.

Figure 7.5. Apache Miscellaneous Page


Miscellaneous - Mozilla {Build ID: 2002020415}
File Edit View Search Go Bookmarks Tasks Help Debug QA
Back Forward Reload Stop
https://zope:10000/apache/edit_global.cgi?type
Search
Print
Home Bookmarks
Webmin Index
Module Index
Apply Changes
Stop Apache
Save

Miscellaneous

Core dump directory	[✓ Server root] ○	Server lock file	○ Default [✓ /var/lock/httpd.lock]
Server PID file	○ Default [✓ /var/run/httpd.pid]	Shared memory scoreboard file	○ Default [✓ /var/run/httpd.scoreboard]
Server HTTP header	Version and OS and modules	Server execution	[✓ Standalone] ○ Run from inetd

root logged into Webmin 0.93 on zope.swell (Redhat Linux 7.1)

Core dump directory - This is the directory where Apache will send its core dump file, in the event of a crash. By default this will be the same directory as the Apache servers root directory. However, the server process will not normally have write access to this directory, so in order to get a core dump on crashes, it is necessary to change it to a directory that is writable by the Apache process. Core dumps are often used for debugging purposes. This option affects the `CoreDumpDirectory` [http://www.apache.org/docs/mod/core.html#coredumpdirectory] directive.

Server lock file - This sets the location for Apache's lock file to the file named. A lock file is the file that is used to notify a new instance of a process that one is already running. This prevents Apache from trying to start again, *using the same configuration*, if it is already running. Note that if you use a different configuration, and a different lock file, it is possible to start multiple instances of Apache. This option corresponds to the `LockFile` [http://www.apache.org/docs/mod/core.html#lockfile] directive.

Server PID file - The PID file for Apache. Edits the `PidFile` [http://www.apache.org/docs/mod/core.html#pidfile] directive.

Shared memory scoreboard file - Some architectures require a file for the children and parent processes can communicate. For performance this can be placed on a RAM disk. This corresponds to the `ScoreBoardFile` [http://www.apache.org/docs/mod/core.html#scoreboardfile] directive.

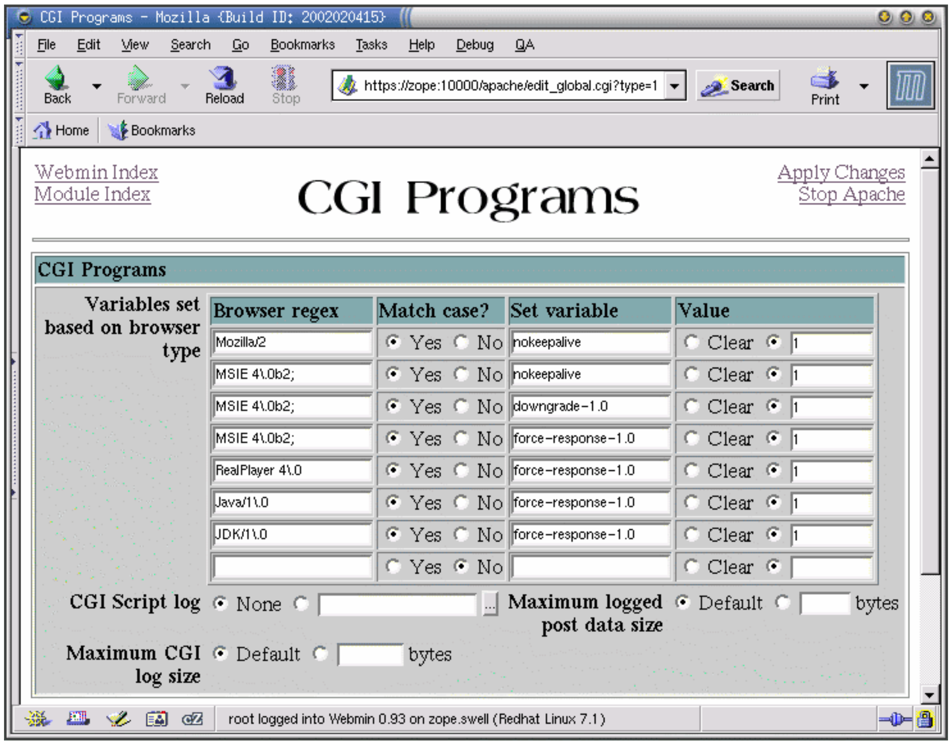
Server HTTP header - This option allows you to set the data that will be contained within the HTTP header. This corresponds to the `ServerTokens` [http://www.apache.org/docs/mod/core.html#servertokens] directive.

Server execution - Defines how the server will be started. **Standalone** indicates that it will run as a standalone daemon, while **Run from inetd** will cause it to run periodically, as called by the **inetd** daemon. It is strongly recommended to avoid the **inetd** option, as it does not always work as expected. This option edits the `ServerType` [http://www.apache.org/docs/mod/core.html#servertype] directive.

CGI Programs

CGI, or Common Gateway Interface, provides a means for a website to have dynamic, program generated, content on a web page. CGI programs can interact with the user through the use of input fields and can provide different data based on the information returned. CGI programs can be written in nearly any language, though it is most common for them to be written in Perl, PHP, Python, Java, C, and bash or other shell scripting languages. The **CGI Programs** module provides an interface to the global CGI options of Apache.

Figure 7.6. Apache CGI Programs


CGI Programs - Mozilla {Build ID: 2002020415}
File Edit View Search Go Bookmarks Tasks Help Debug QA
Back Forward Reload Stop
https://zope:10000/apache/edit_global.cgi?type=1
Search Print
Home Bookmarks
Webmin Index
Module Index
Apply Changes
Stop Apache

CGI Programs

CGI Programs

Variables set based on browser type

Browser regex	Match case?	Set variable	Value
Mozilla/2	[✓ Yes] No	nokeepalive	Clear [✓ 1]
MSIE 4\.0b2;	[✓ Yes] No	nokeepalive	Clear [✓ 1]
MSIE 4\.0b2;	[✓ Yes] No	downgrade-1.0	Clear [✓ 1]
MSIE 4\.0b2;	[✓ Yes] No	force-response-1.0	Clear [✓ 1]
RealPlayer 4\.0	[✓ Yes] No	force-response-1.0	Clear [✓ 1]
Java/1\.0	[✓ Yes] No	force-response-1.0	Clear [✓ 1]
JDK/1\.0	[✓ Yes] No	force-response-1.0	Clear [✓ 1]
	Yes [✓ No]		Clear [✓]

CGI Script log [✓ None] ○ ...

Maximum logged post data size [✓ Default] ○ bytes

Maximum CGI log size [✓ Default] ○ bytes

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CGI Script log - Is the log directory for the CGI script error log file. If none is given, no log is created. Edits the `ScriptLog` [http://www.apache.org/docs/mod/mod_cgi.html#scriptlog] directive.

Maximum logged post data size - Data from a PUT or POST request to a CGI script that is written to the error logfile can be limited in size, because PUT and POST requests can be extremely large. The default is 1024 bytes. This option correlates to the `ScriptLogBuffer` [http://www.apache.org/docs/mod/mod_cgi.html#scriptlogbuffer] directive.

Maximum CGI log post size - Limits the size of the CGI script logfile. When the log file exceeds this size, no more errors will be written to the log file. Corresponds to the `ScriptLogLength` [http://www.apache.org/docs/mod/mod_cgi.html#scriptloglength] directive.

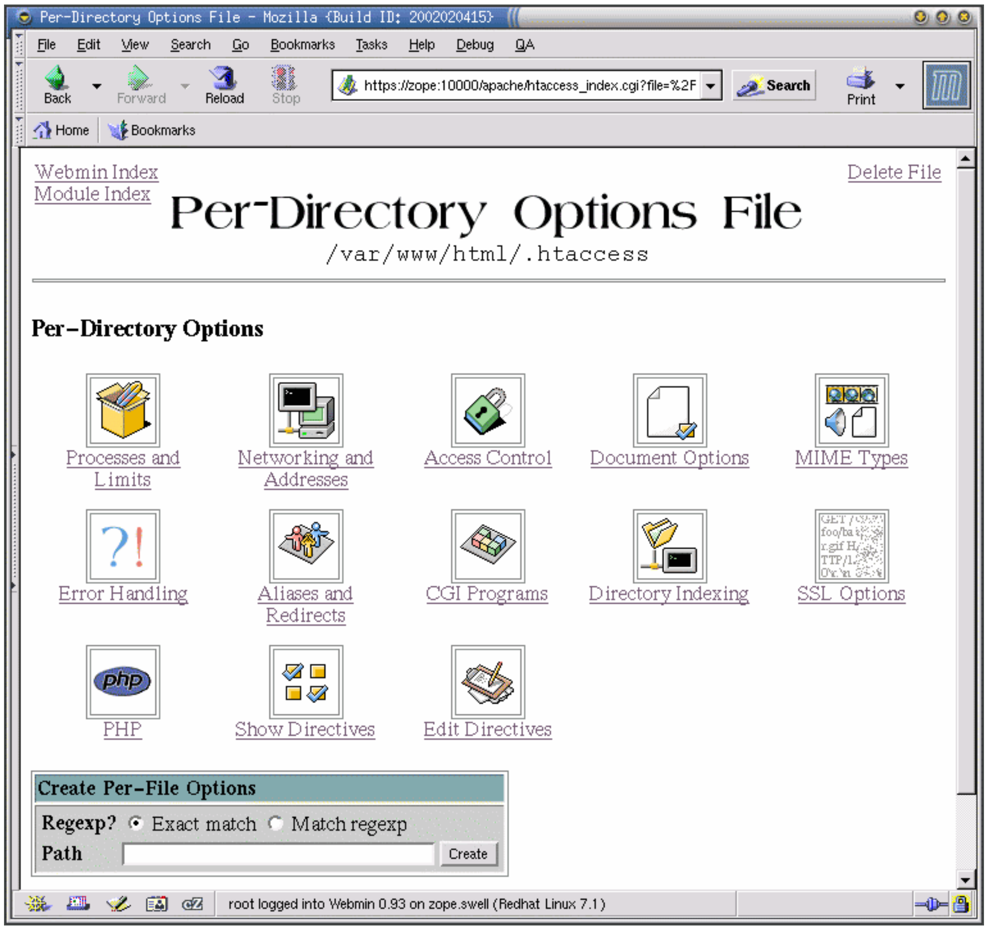
Variables set based on browser type - If the server should set some environment variables differently depending on the client browser type, it is possible to enter that data here. This option edits the `BrowserMatch` [http://www.apache.org/docs/mod/mod_setenvif.html#BrowserMatch] directive. Note that the mod_setenvif and mod_browser modules should be loaded when using these features.

Variable set based on request headers - Allows you to set environment variables based on attributes of the request. This corresponds to the `SetEnvIf` [http://www.apache.org/docs/mod/mod_setenvif.html#SetEnvIf] directive.

Per-Directory Options Files

Apache offers the ability to modify many global settings on a per-directory basis. This module provides access to that feature. To create an options file for a directory, simply enter the path and filename in the field and click **Create Options File**. By convention these files are called `.htaccess`, but that is a configurable option in Apache. This file also allows configuration of per-directory authentication among other access control features.

Figure 7.7. Per-Directory Options File


Per-Directory Options File - Mozilla {Build ID: 2002020415}
File Edit View Search Go Bookmarks Tasks Help Debug QA
Back Forward Reload Stop
https://zope:10000/apache/htaccess_index.cgi?file=%2F
Search Print
Home Bookmarks

Webmin Index
Module Index
Delete File

Per-Directory Options File

/var/www/html/.htaccess

Per-Directory Options

Processes and Limits · Networking and Addresses · Access Control · Document Options · MIME Types · Error Handling · Aliases and Redirects · CGI Programs · Directory Indexing · SSL Options · PHP · Show Directives · Edit Directives

Create Per-File Options

Regexp? [✓ Exact match] Match regexp

Path [ ] Create

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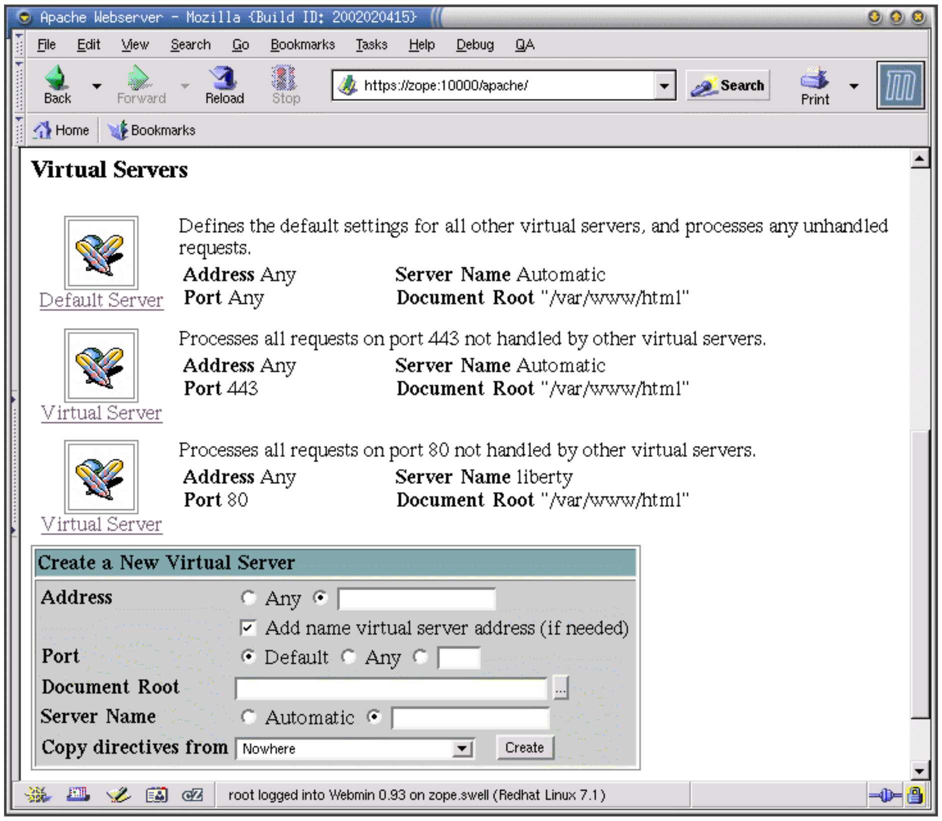
More information on options files can be found in the Apache docs under the `Options` [http://www.apache.org/docs/mod/core.html#opti directive.

Virtual Servers

The lower half of the **Apache** page contains a list of configured virtual servers. Each virtual server entry on this page shows the address and port the virtual server listens on, the server name, and the document root. Clicking on the icon for the virtual server will bring you to a page filled with many new options and many of the same options found in the **Global** section discussed earlier. The options that are repeated from that section generally behave the same, and so are not covered again.

Figure 7.8. Virtual Servers


Apache Webserver - Mozilla {Build ID: 2002020415}
File Edit View Search Go Bookmarks Tasks Help Debug QA
Back Forward Reload Stop
https://zope:10000/apache/
Search
Print
Home Bookmarks

Virtual Servers

Default Server
Defines the default settings for all other virtual servers, and processes any unhandled requests.
Address Any **Server Name** Automatic
Port Any **Document Root** "/var/www/html"

Virtual Server
Processes all requests on port 443 not handled by other virtual servers.
Address Any **Server Name** Automatic
Port 443 **Document Root** "/var/www/html"

Virtual Server
Processes all requests on port 80 not handled by other virtual servers.
Address Any **Server Name** liberty
Port 80 **Document Root** "/var/www/html"

Create a New Virtual Server

Address	Any [✓]
	[✓ Add name virtual server address (if needed)]
Port	[✓ Default] Any
Document Root	
Server Name	Automatic [✓]
Copy directives from	Nowhere

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It's important to remember that each virtual server has its own configuration. While it is possible to set *default* behaviors by editing the **Default** server (the first in the list of Virtual Servers, each virtual server may have configuration directives that override the default behavior. Each may have its own directory structure, server settings, MIME types, logging configuration, and more. Apache provides near infinite options, and most of those can be applied to any individual virtual server, as well as to the server as a whole.

Log Files

Logs provide a window into the operation of your web server, and Apache provides a great set of logging options so you can keep up with what your server is up to. In short, Apache allows you to configure each virtual host as though it were an independent server. This includes the ability to independently log information to a separate file and in a custom format.

Caution

Beware that there are particular security issues associated with logging in Apache. Because any logging helper programs will be started as the user that started Apache (usually `root`), the program *must* be secure. A good resource for further security information is the *Security Tips* [http://httpd.apache.org/docs/misc/security_tips.html] section of the official Apache Documentation.

Error log to
This sets where Apache sends error information for this virtual server. Usually this goes to the syslog daemon, which writes it to the primary web server error log. However, Apache can send this to an alternate logging program, or to a file. This option configures the `ErrorLog` [http://httpd.apache.org/docs/mod/core.html#errorlog] directive, and usually defaults to logging to the syslog daemon, if available.

Browser log file
Here you can define whether Apache will keep logs of the user agents (browsers, most often, though robots and autodownloaders will show up also) that access the web server. This information is usually only of passing interest, except perhaps when you're thinking of implementing some technology that is incompatible with some browsers (like Flash, Shockwave, and a host of lesser known and even less widely accessible data formats). Reviewing these logs will often remind you of what percentage of your clients such technologies may alienate. Agent information not logged by default. This option configures the `AgentLog` [http://httpd.apache.org/docs/mod/mod_log_agent.html#agentlog] directive.

Default log format
This option allows you to configure Apache to write logs in an arbitrarily chosen format. If you want Apache to log in the *Common Log Format* you simply leave this on the default. However, to log in a different manner, you would select the `Format` choice, and fill in the field with either a nickname of a named log format (discussed next) or with a log format string. This option configures the `CustomLog` [http://httpd.apache.org/docs/mod/mod_log_config.html#customlog] directive.

Named log formats
A named log format is a custom log format, as discussed above, that has been defined and given a nickname for use by other log directives. A custom log format is created by entering a series of variables to indicate the data fields that should be present and the order in which they will appear. For example, a custom log type that mimics the *Common Log Format* looks like this:

```
%h %l %u %t \"%r\" %>s %b
```

This option configures the `LogFormat` [http://httpd.apache.org/docs/mod/mod_log_config.html#logformat] directive.

Access log files
Here, you can define additional locations, formats, or programs, for Apache to send logs to. Configuration is much like the **Default** log above, except that you may have any number of access log files. This allows you, for example, to log accesses of images to a separate file, or to log visits to another format for processing and analyses. This option correlates to the `TransferLog` [http://httpd.apache.org/docs/mod/mod_log_config.html#transferlog] directive. Beware that the same security implications that effect all of the other logging directives effect this option as well.

Don't log references from
This option adds the hostnames provided to a list of hosts from whence referral information will not be logged. For example, if I wanted my web server at penguinfeet.org to ignore referrals from my other web page, swelltech.com, I would enter `swelltech.com` here. Then, my statistics wouldn't be skewed by the large number of referrals from my own pages. This option correlates to the `RefererIgnore` [http://httpd.apache.org/docs/mod/mod_log_referer.html#refererignore] directive.

Referer log file
Here you define where referer information is logged to. This can be a file, or a program. This option configures the `RefererLog` [http://httpd.apache.org/docs/mod/mod_log_referer.html#refererlog] directive.

Document Options

Here you have access to many of the virtual server specific options that will effect permissions, locations, and behaviors.

The first field of this page has no label. It is the document root. This is usually set when the virtual server is created, and is created automatically by Webmin. This option correlates to the `DocumentRoot` [http://httpd.apache.org/docs/mod/core.html#documentroot] directive.

User WWW directory - Here, you configure the location where users can publish HTML documents via Apache. The syntax has several forms that perform different types of expansion to create the actual path. First, a relative link, of the form `htmldocs` translates for user `joe` to `~joe/htmldocs`. An absolute link, such as `/usr/htmldocs` will translate to `/usr/htmldocs/joe`. Finally, it is possible to use an `*` to represent the username in the translation. For example, `/home/*/htmldocs`, will translate to `/home/joe/htmldocs`. This option configures the `UserDir` [http://httpd.apache.org/docs/mod/mod_userdir.html#userdir] directive.

The following fields are continued options connected to the above **User WWW directory** option. They control which users' directories will have the translation performed. Selecting `All users accessible` means that for any username entered in the URL, the translation will occur and the users web directory will be browsable. `All users except` allows you to disallow some users, while the rest are translated. This could be used, for example, to disable the website of a user who violated the terms of service. Finally, `Only users` means that only those users explicitly named will have directory translation performed.

Per-directory options file - Here you can specify a filename to be checked for directory access options. Unless prohibited elsewhere in Apache's configuration, options found in a file by this name in any directory will override the default permissions for that directory. For example, if I chose the filename `.acl`, and in one of my directories I created such a file that included instructions to `Generate directory indexes`, then for that directory such indexes would be generated. This would apply even if the default with to not generate indexes. If you are operating a virtual hosting server, this can allow your users to have some freedom in the behaviour of the web server for their individual site, without interfering with or altering the behaviour of other sites on the same server. This can be thought of as one more layer of the onion of configurability that is Apache. This option configures the `AccessFileName` directive and defaults to `.htaccess`.

Directory options - Here, you can choose to use the default options for this directory. This effects the root directory for your virtual server and all subdirectories, except those the contain and `AccessFileName` file as discussed in the **Per-directory options file** section above. This option correlates to the `Options` [http://httpd.apache.org/docs/mod/core.html#options] directive and defaults to all, except for `Generate Multiviews`.

The available directory options are as follows:

Available directory options

Execute CGI programs
Allows execution of CGI scripts located in this directory.

Follow symbolic links
The server will follow symbolic links in this directory. This correlates to the `ExecCGI` directive.

Server-side includes and execs
Server-side includes are permitted. This correlates to the `FollowSymLinks` directive.

Server-side includes
Permits server side includes, but disallows `#exec` command and the use of `#include` for CGI scripts. This correlates to the `IncludesNOEXEC` directive.

Generate directory indexes
When a URL maps to a directory in which there is no index html file (usually `index.html`, but this is a configurable option), then Apache can generate a formatted file list for the directory. This option correlates to the `Indexes` directive.

Generate Multiviews

Content negotiated multiviews are permitted. This allows for multiple languages, character sets, a presentations to be referenced by the same URL. The client browser then negotiates with the server to select the appropriate one for the user. For more, see Content Negotation [http://httpd.apache.org/docs/content-negotiation.html]. This option correlates to the `MultiViews` directive.

Follow symbolic links if owners match
Apache will only follow symbolic links for which the target file or directory ownership matches that of the link. This option correlates to the `SymLinksIfOwnerMatch` directive.

Note that if multiple items apply (inherited from a parent directory), then the ones specific to the selected directory apply, unless **Merge with parent** is selected. For example, if `/home/httpd/penguinfeet` has `All` permissions, but the subdirectory `/home/httpd/penguinfeet/users` has only `ExecCGI`, then that directory would only have the execute CGI option available. Merging with the parent however, gives the subdirectory the same options, except where explicitly turned off.

Generate MD5 digests
This option turns on generation of `Conten-MD5` digest headers. When enabled, Apache will generate a message digest, or fingerprint, for each static page served. When using MD5 digests, the client can be assured with a very high degree of confidence that if the content has been altered during transit from the origin server those alterations will be reflected in alterations in the message digest. The `Content-MD5` standard is described in RFC 1864 [http://www.ietf.org/rfc/rfc1864.txt?number=1864] and RFC 2616 [http://www.ietf.org/rfc/rfc2616.txt?number=2616]. This option configures the `ContentDigest` [http://httpd.apache.org/docs/mod/core.html#contentdigest] directive. Be aware that this option can have performance implications, since the digest is generated for each request, and digests will not be created for any requests that are served by modules.

Virtual server path
Very old browsers and proxies cannot address name based virtual servers, and know only how to request a site by its IP. This leads to the unfortunate effect that those browsers will only be able to reach the default website on a given IP. A workaround for this problem, is to provide a path from the default server to each virtual server. Using this directive, you can define where in the path of the default server this particular virtual server will reside. So, if my virtual server `www.penguinfeet.org` resides on a server at IP 123.45.67.89, and an older browser visits that name, it will end up browsing to the default server on the host--which can provide the user with a list of links to virtual servers hosted on this server. If this were set to `/penguinfeet`, the link would then take the user to `http://www.penguinfeet.org/penguinfeet/` which is the correct page! Not exactly pretty, but the web wasn't always as well thought out as it is today. And who can blame the original designers of the web for not realizing the one day everyone would have their own domain name! The good news is that those old web clients are simply no longer in use in any statistically significant quantity (they don't show up on any of my webserver logs, anyway, your mileage may vary). This option configures the `ServerPath` [http://httpd.apache.org/docs/mod/core.html#serverpath] directive. For more on Virtual Hosts and the potential issues, see also the Apache Virtual Host Documentation [http://httpd.apache.org/docs/vhosts/].

Error message footer

This option allows you to add a footer to all server generated documents (such as error pages, mod_proxy ftp directory listings, mod_info output, etc.). This is usually only needed when your Apache is acting as a proxy, as it is most useful in discovering where are error message originates from in a chain of multiple proxies. This option configures the `ServerSignature` [http://httpd.apache.org/docs/mod/core.html#serversignature] directive and defaults to `Off`.

Default base for imagemaps
This option sets the base directory for image maps. If this is not set, the default is `http://servername/`. This correlates to the `ImapBase` [http://httpd.apache.org/docs/mod/mod_imap.html#imapbase] directive.

Default action for imagemaps
Sets the default used in imagemap files. This will be overridden by a `default` directive within the imagemap file. The default is `nocontent` or `Do nothing` which sends a `204 No content` message to the browser. The browser should continue to display the original page. This option correlates to the `ImapDefault` [http://httpd.apache.org/docs/mod/mod_imap.html#imapdefault] directive.

Action on incorrect use of imagemaps
This option determines what action Apache should take if an imagemap file is called without valid coordinates. This correlates to the `ImapMenu` [http://httpd.apache.org/docs/mod/mod_imap.html#imapmenu] directive. The options are as follows:

Imap Menu Options

none
If ImapMenu is none, no menu is generated, and the default action is performed.

Show formatted menu
A formatted menu is the simplest menu. Comments in the imagemap file are ignored. A level one header is printed, then an hrule, then the links each on a separate line. The menu has a consistent, plain look close to that of a directory listing.

Show semi-formatted menu
In the semiformatted menu, comments are printed where they occur in the imagemap file. Blank lines are turned into HTML breaks. No header or hrule is printed, but otherwise the menu is the same as a formatted menu.

Show unformatted menu
Comments are printed, blank lines are ignored. Nothing is printed that does not appear in the imagemap file. All breaks and headers must be included as comments in the imagemap file. This gives you the most flexibility over the appearance of your menus, but requires you to treat your map files as HTML instead of plaintext.

For more on imagemap files in Apache visit the `mod_imap` Module documentation [http://httpd.apache.org/docs/mod/mod_imap.html#i

Error Handling

In the event of a server error, Apache can be configured to provide custom error messages, or redirect to a local or external URL, or by default output a simple hardcoded error message. Here, you may configure any error types for which you'd like to provide a custom message. So, for example, if you wanted a custom 404 message that directed users to a local site search page (a convenient and polite thing to do), you could do that on this page. To configure the custom error responses feature of Apache, simply enter to error code, and then enter the URL or message to be displayed. See the Custom error responses documentation [http://httpd.apache.org/docs/custom-error.html] for more on this feature.

User and Group

This page configures the user and group under which the Apache server will run. This sets the priviledges the Apache and child processes will have while operating. It is strongly suggested that you set this to a user and group with as little priviledge as possible (while still allowing the server to do its job). This is often configured to `nobody` and `nogroup` on many Unix operating systems, and this is a good choice in most cases. Do *not* set this to `root` unless you know exactly what you're doing, and the security implications of doing so. Note that the Apache parent process, if started as root, will remain as root, while the child processes that actually service requests will run as the user and group set here. If the parent process is started by a non-root user, Apache will not be able to su to another user, and so will run as the user that started the process. This option configures the `User` [http://httpd.apache.org/docs/mod/core.html#user] and `Group` [http://httpd.apache.org/docs/mod/core.html#group] directives.

Aliases and Redirects

Apache provides several forms of alias and redirection. This allows you to present more unified or simpler paths to your users in the URL, as well as serve objects from outside of your servers root directory. It also allows you to redirect users to a new website during a transition period, or direct their browser to the correct link if directory structure has changed.

Document directory aliases - This allows objects to be stored in directories other than the root directory. Be aware the aliases that end in a `/` will require the slash in the requested URL to be translated. This option correlates to the `Alias` [http://httpd.apache.org/docs/mod/mod_alias.html#alias] directive.

Regexp document directory aliases - This option is very similar to the above, except that it allows the use of regular expressions to match paths to be translated. This option correlates to the `AliasMatch` [http://httpd.apache.org/docs/mod/mod_alias.html#aliasmatch] directive. For more on regular expressions, consult the `regex` manpage.

URL redirects - This option redirects an old URL into a new one. The new URL is returned to the client, which will attempt to fetch again with the new address. You can also specify a status message for thie redirect, which can be one of several HTTP status codes, as described below. This option configures the `Redirect` [http://httpd.apache.org/docs/mod/mod_alias.html#redirect] directive.

Redirect status codes

301
Moved permanently.

302
Moved temporarily.

303
See other, meaning the resources has been replaced.

410
The object is no longer available. When this status is used, the redirect **To** URL should be omitted.

Regexp URL redirects - This option behaves exactly like the above, except the **From** field can contain a regular expression to match. This option correlates to the `RedirectMatch` [http://httpd.apache.org/docs/mod/mod_alias.html#redirectmatch] directive.

Permanent URL redirects - This option behaves as the above **URL Redirect** with a status of 301 (moved permanently). Correlates to the `RedirectPermanent` [http://httpd.apache.org/docs/mod/mod_alias.html#redirectperm] directive.

Temporary URL redirects - This option behaves as the above **URL Redirect** with a status of 302 (moved temporarily). Correlates to the `RedirectTemp` [http://httpd.apache.org/docs/mod/mod_alias.html#redirecttemp] directive.

Map local to remote URLs - This option allows a remote server to be mapped onto the space of the local server; the local server does not act as a conventional proxy, but appears to be a mirror of the remote server. For example, if the **Local URL** is `/mirror/otherdomain` and the **Remote URL** is `http://www.otherdomain.com` then users will be able to access `http://www.otherdomain.com` via `http://www.thisdomain.com/mirror/otherdomain`. This option corresponds to the `ProxyPass` [http://httpd.apache.org/docs/mod/mod_proxy.html#proxypass] directive.

Map remote Location: headers to local - This option provides roughly the reverse functionality of the previous option. It adjusts the location header on HTTP redirect responses, which is necessary when Apache is being used as a reverse proxy in order to avoid having the reverse proxy bypassed by a redirect request. This option configures the `ProxyPassReverse` [http://httpd.apache.org/docs/mod/mod_proxy.html#proxypassreverse] directive.

Directory Indexing

An *index* in Apache, is simply a page that is displayed when a client browses to a directory on the server rather than an object or document. For example, if someone browses to my Squid patches directory on my server, which is located at http://www.swelltech.com/pengies/joe/patches/, Apache will serve an index page. If there is no file in the directory that matches Apache's definition of an index page, it will instead generate an index page containing a file list, or it will serve an error page, if index generation is prohibited. This page allows you to configure the behavior of Apache when displaying index pages.

Directory index options -- This option sets the appearence and information contained in Apache-generated indexes. This option configures the `IndexOptions` [http://httpd.apache.org/docs/mod/mod_autoindex.html#indexoptions] directive. The following options are available:

Display fancy directory indexes
This turns on fancy indexing of directories, which means that icons will be provided for files and directories. This configures the `FancyIndexing` subdirective.

Display HTML title as description
If files within the directory contain HTML title information, those titles will be displayed as the filenames for their respective files. This option configures the `ScanHTMLTitles` subdirective.

Icon height
This sets the height of the icons in fancy directory listings. This correlates to the `IconHeight` subdirective.

Icon width
This sets the width of the icons in fancy directory listings. This correlates to the `IconWidth` subdirective.

Allow user sorting of columns
By default, Apache will generate listings that can be sorted by the user by clicking the column headings. If you do not wish for users to be able to sort by last-modified date, or size, then you may disable this, and no sorting links will be provided. This option configures the `SuppressColumnSorting` subdirective.

Show file descriptions
Enable this to display descriptions of the files in the fancy index listings. This option correlates to the `Suppress-Description` subdirective.

Output HTML header tags
If using a header file (also configured on this page) for directory indexes, you may choose to allow Apache to output a standard HTML preamble containing enough to *start* a legal HTML page. If this is disabled, your header will have to contain its own preamble to make it into a legal HTML page. This option configures the `SuppressHTMLPreamble` subdirective.

Show last modified times
By default, Apache will display the last modified time of each file in a generated index. Unselecting this option will cause Apache not to do so. This option configures the `SuppressLastModified` subdirectory.

Show file sizes
This option is much like the previous option, except that it allows you to disable display of the size information about the files listed in a generated index. This option correlates to the `SuppressSize` subdirective.

Include icon in link
This will cause Apache to display icons as part of the link. This option configures the `IconsAreLinks` subdirective.

Filename width
Here you may configure the number of characters Apache will display in the filename of indexes. This option correlates to the `NameWidth=` subdirective. If this is set to `*` Apache will set the length to the length of the longest filename in the directory.

Description width
The number of characters that will be displayed in the description field of generated indexes. This option correlates to the `DescriptionWidth=` subdirective. As above, if this value is set to `*` the description length will be set to that of the longest description in the directory.

Display directories first
You may choose to have Apache sort the listing such that directories are listed first in the index. This option corresponds to the `FoldersFirst` subdirective.

Directory index files -- Here you configure the filenames that Apache will look for when entering a directory, and if one of them exists it will be displayed as the index of the directory rather than an autogenerated file index. This file will be displayed to clients who request any directory on the server by specifying a `/` at the end of the URL. This may be any filename or list of filenames, though those used by convention include `index.html` or `index.htm` on operating systems with filename limitations. It is now not uncommon to use script suffixes on inedex pages, such as `index.pl`, `index.cgi`, or `index.php`. This option correlates to the `DirectoryIndex` [http://httpd.apache.org/docs/mod/mod_dir.html#directoryindex] directive.

Files to ignore in directory index -- If an autogenerated index is being displayed, you may specify files that are not to be listed in the index. This option configures the `IndexIgnore` [http://httpd.apache.org/docs/mod/mod_autoindex.html#indexignore] directive.

Directory index default icon -- Apache will automatically add icons to index listings when the file types of files are recognized. When no icon is known for a file type, you may configure an icon to be displayed here. This option correlates to the `DefaultIcon` [http://httpd.apache.org/docs/mod/mod_autoindex.html#defaulticon] directive.

Directory index header file -- Indexes may have a custom header file attached to them using this option. The file may either be a plain text file, or an HTML file. This option correlates to the `HeaderName` [http://httpd.apache.org/docs/mod/mod_autoindex.html#headername] directive.

Directory index footer file -- Sets the path to the file to append to the end of an index. This option corresponds to the `ReadmeName` [http://httpd.apache.org/docs/mod/mod_autoindex.html#readmename] directive.

Sort directory index by -- This option allows you to select how Apache will sort the entries on the index page. The order may be `Ascending` or `Descending`, and it may sort based on the `Name` of the file, `Date` of last modification, `Size` of the file, or the `Description` of the file. This option correlates to the `IndexOrderDefault` [http://httpd.apache.org/docs/mod/mod_autoindex.html#indexorderdefault] directive and defaults to sorting by filename in ascending order.

Directory index icons -- Here you may select the graphic icons that will be displayed beside filename links in the fancy directory listing index pages. The `Icon` is the relative path to the image file. The `Alt text` is the text to be displayed if the clients browser does not support images. `Match by` is the attribute to match against when deciding which icon will be displayed, and it can be one of `Filename`, `MIME type`, or `Encoding`. The `Filenames, Types, or Encodings` is simply the terms to be matched for this icon type to be displayed. This option configures the `AddIcon` [http://httpd.apache.org/docs/mod/mod_autoindex.html#addicon], `AddIconByEncoding` [http://httpd.apache.org/docs/mod/mod_autoindex.html#addiconbyencoding], and `AddIconByType` [http://httpd.apache.org/docs/mod/mod_autoindex.html#addiconbytype] directives. When matching against the filename of the MIME type, you can use wildcards to matchany of several variations. For example, to match all backup files (as generated by ispell and other software), you could use the file match `*~`. Or, for a MIME type wildcard example, to match all images types, you could use `image/*`. It is generally recommended to match based on the MIME type rather than file extensions, when possible, as it tends to be less prone to missing files of certain types or misidentifying a filetype.

Note

When adding a filename matched icon, there are a couple of special names that allow you to match directories and blank lines (Apache uses blank lines to format the list). These are `^^DIRECTORY^^` and `^^BLANKICON^^`, respectively.

Directory index ALT tags -- Much like the previous option, this option allows you to configure the text to be displayed for files instead of icons. The possible values and wildcard usage are the same as for the previous option. This configures the `AddAlt` [http://httpd.apache.org/docs/mod/mod_autoindex.html#addalt], `AddAltByEncoding` [http://httpd.apache.org/docs/mod/mod_autoindex.html#addaltbyencoding], and `AddAltByType` [http://httpd.apache.org/docs/mod/mod_autoindex.html#addaltbytype] directives.

Directory index descriptions -- Here you may define what descriptions will be displayed for a given filename extension. The length of this will be limited by the `Description width` option discussed above. This option configures the `AddDescription` [http://httpd.apache.org/docs/mod/mod_autoindex.html#adddescription] directive.

Proxying

This page configures the `mod_proxy` module, which allows Apache to act as a full featured HTTP proxy. While Squid is a higher performance and more featureful option in most cases, Apache can also provide some interesting functions and features for proxying and reverse proxying in very simple environments. For additional information on proxying with `mod_proxy` see the `mod_proxy` module documentation [http://httpd.apache.org/docs/mod/mod_proxy.html]. Generally, however, if you need HTTP proxying, or web caching, Squid [http://www.squid-cache.org] is a far better choice, and usually no more complicated to configure.

Act as proxy server?
This option simply turns proxying on or off in Apache. This is not required for passing requests on to another server using the `ProxyPass` directive, which was documented briefly in the **Directory Options** section, and also is configurable on this page. This option correlates to the `ProxyRequests` [http://httpd.apache.org/docs/mod/mod_proxy.html#proxyrequests] directive, and defaults to `off`

Cache directory
This option sets the directory where cached files will be stored. This directory must be writable by the server. If this option is not set, proxying will still function, but not caching will occur. This option correlates to the `CacheRoot` [http://httpd.apache.org/docs/mod/mod_proxy.html#cacheroot] directive and defaults to `none`.

Block requests to domains
Provides a simple means of access control, wherein any domain or domain containing a word listed will be inaccessible through the proxy. The sites listed will be blocked even if the site is accessed via IP address, as Apache will resolve the names on startup and cache the IP information. This option correlates to the `ProxyBlock` [http://httpd.apache.org/docs/mod/mod_proxy.html#proxyblock] directive and defaults to `none`.

Requests to pass to another proxy
This option configures remote proxies that requests will be sent to if the request contains the words or domains in the match field. This option correlates to the `ProxyRemote` [http://httpd.apache.org/docs/mod/mod_proxy.html#proxyremote] directive and defaults to `none`.

Don't pass requests to another proxy for
Here you can configure any number of domains, IP addresses, IP subnets, or hostnames that will not be forwarded to another proxy via the above option. This option correlates to the `NoProxy` [http://httpd.apache.org/docs/mod/mod_proxy.html#noproxy] directive, and defaults to `none`.

Domain for requests with no domain
This option is useful for proxy servers on intranets. It allows you to configure a domain name to be redirected to if a request is encountered without one. This option correlates to the `ProxyDomain` [http://httpd.apache.org/docs/mod/mod_proxy.html#proxydomain] directive and defaults to `none`.

Domains not to cache
If caching is enabled above, here you can select some number of domains that will not be stored on the local proxy. This is useful for local domains, for which no benefit would be gained by locally caching the content thereof. This option configures the `NoCache` [http://httpd.apache.org/docs/mod/mod_proxy.html#nocache] directive and defaults to `none`.

Ports to which CONNECT is allowed

This option dictates which ports Apache will allow the proxy `CONNECT` method on. This method is used to set up a tunnel for `https` connections. This option correlates to the `AllowCONNECT` [http://httpd.apache.org/docs/mod/mod_proxy.html#allowconnect] directive and defaults to ports 443 (https) and 563 (snews). Enabling this option overrides the default, so if you add ports here, you must include at least the https port for secure connections to work corrcetly through your proxy.

Cache default expiry time
If an object is fetched via a protocol that does not support expiry times (such as ftp), or no expiry time is present, the cached data will be stored the specified number of hours. This option configures the `CacheDefaultExpire` [http://httpd.apache.org/docs/mod/mod_proxy.html#cachedefaultexpire] and defaults to 1 hour.

Cache directory name length
Sets the number of characters in proxy cache subdirectory names. This option correlates to the `CacheDirLength` [http://httpd.apache.org/docs/mod/mod_proxy.html#cachedirlength] directive and defaults to `1`.

Cache directory levels
Sets the number of levels in the proxy cache subdirectory hierarchy. This option correlates to the `CacheDirLevels` [http://httpd.apache.org/docs/mod/mod_proxy.html#cachedirlevels] directive and defaults to `3`.

Finish and cache transfer after
If a transfer is cancelled before completion, but after this percentage of the object has been received, Apache will continue to fetch the object in order to cache the complete object. Entering `0` here will cause the default to be used, and `100` will not store an object unless the whole transfer was completed. A number between 60 and 90 is suggested. This option configures the `CacheForceCompletion` [http://httpd.apache.org/docs/mod/mod_proxy.html#cacheforcecompletion] and defaults to `90`.

Cache garbage collection interval
If this is configured, Apache will perform periodic garbage collection, wherein it deletes files if the space used for cached objects is greater than the configured **Cache size**. This option accepts floating point values, so can be configured to perform garbage collection every 30 minutes, for example, by entering `0.5` here. If this is unset, the cache will grow indefinitely. This option configures the `CacheGcInterval` [http://httpd.apache.org/docs/mod/mod_proxy.html#cachegcinterval] and defaults to `none`.

Cached file expiry time factor
If the origin HTTP server does not provide an expiry time for the object, Apache can estimate one by multiplying the time since the last modification by this factor. This option configures the `CacheLastModifiedFactor` [http://httpd.apache.org/docs/mod/mod_proxy.html#cachelastmodifiedfactor] directive, and defaults to `0.1`.

Cached file maximum expiry time
After an object has been stored for this many hours, Apache will check for new content with the origin server, even if the expiry time supplied by the origin server has not yet been reached. This option configures the `CacheMaxExpire` [http://httpd.apache.org/docs/mod/mod_proxy.html#cachemaxexpire] directive and defaults to `24` hours.

Cache size
Assuming garbage collection has been configured, Apache will restrict the size of the cached object storage directories to this number of kilobytes. This option correlates to the `CacheSize` [http://httpd.apache.org/docs/mod/mod_proxy.html#cachesize] directive and defaults to `5` KB.

Server Configuration

This page allows you to reconfigure the basic configuration details of your virtual server. For example, if when you created your virtual server you placed it on port 8080 for testing, but now want to move it over to port 80 for production, you can perform that update here.

Address and **Port**
If your system has multiple interfaces, Apache will answer on any of them by default on port 80. However, you can configure your virtual server to only answer on one address using this option. You can also configure a different port here.

Document Root
This is the root directory, from whence the paths to access objects on your server will begin. This option configures the `DocumentRoot` [http://httpd.apache.org/docs/mod/core.html#documentroot] directive.

Server Name
When using name based virtual servers, this name should match the name under which this server should answer. This is also used when creating redirection URLs. If not specified Apache will try to deduce it from the IP address, which isn't always reliable. This option correlates to the `ServerName` [http://httpd.apache.org/docs/mod/core.html#servername] directive.

Tutorial: A Basic Apache Configuration

Apache is an extremely large and featureful piece of software. Approaching it for the first time can be daunting. Luckily, it is extremely easy to install, configure, and maintain as long as you proceed with care and pay attention to the documentation relevant to your installation and environment. Installation of Apache is not covered here, as it is well-documented on the Apache website, and it is also very likely that your OS vendor provides a suitable package to make installation automatic. What will be covered is the initial hurdle of setting up Apache to serve HTML web pages. The next section will take the configuration one step further to configuring virtual hosting service. Later, a section in the BIND module chapter will cover adding name service for your webserver.

Configuring Apache Paths

Note

If you've installed Apache from a package from your OS vendor or if your vendor does not provide a package and it has been installed in the default location selected by the program, you can probably skip this section and proceed to the next section covering initial module selection. For any supported OS, Webmin has a configuration file that includes sensible default paths for the programs that it administers. These configurations assume an installation in the default location for your operating system. So, for example, on a Red Hat Linux system, Webmin will expect to find the `httpd.conf` file in the `/etc/httpd/conf` dircetory, while on Solaris it is expected to be in `/usr/local/apache/conf`.

Webmin works directly with the Apache configuration files, and so must know where to find them. When you browse to the Apache module of Webmin for the first time you may be greeted with an error stating that the configuration file could not be found. You'll need to locate the configuration files, as well as the Apache binary, and possibly startup and shutdown scripts for your system, and configure Webmin to search the appropriate locations. The most important paths are probably **Apache server root directory** and the **Path to httpd executable**.

Module Selection

Apache is extremely modular, and the vast majority of its available functionality is broken out into small modules that can be loaded at run-time depending on the needs of the specific environment in which it runs. Webmin needs to know about the modules that are available to your Apache so that it can provide configuration options for options that are available and hide options that are not. So, the first time you visit the Webmin Apache module, you'll be presented a list of Apache modules with checkboxes beside them. If you've used a package or a default Apache source installation, you can simply click **Configure**. If you've built your Apache from scratch with customizations, you'll need to choose the modules that you have made available in your installation, and then click **Configure**.

Adding Content

Believe it or not, we're now very nearly ready to serve up content with Apache. Once you've reached the primary Apache module page in Webmin, you'll see a set of icons for the global server options as well as a single virtual server configuration section labelled **Default server**. The default server is the server that will answer a request when no other virtual servers do. Since we have no virtual servers configured on our system yet, the default server will answer all HTTP requests that reach our machine. Take note of the path in the **Document root** field, as this is where we'll be placing our first web page.

On my system the **Document root** for the default server is `/var/www/html`, which was automatically created during the installation process. So I will create a web page called `index.html` and drop it into that directory, making sure the page has permissions that will allow the Apache process to read it. The name `index.html` is significant, and you must use the correct filename for your default page, or else Apache won't serve it without having the file specified after the address in the URL. Other common names for the index page are `index.htm` and `default.htm`.

Starting Apache

Now all that is left is to startup your Apache server. Assuming Webmin has been configured correctly for your installation it can even be started from within Webmin with the click of a button. Simply browse to the Apache module main page, and click the **Start Apache** link in the upper right corner of the page.

To test your new website browse to the IP on which your server resides with your favorite browser. For example, my testing server is located on IP 192.168.1.1, so I would enter `http://192.168.1.1` into my browser URL field. Assuming everything went right, you'll see your new web page.

Tutorial: Name-Based Virtual Hosting With Apache

In the real world, it is rare to only operate one website on a machine. For all but the most demanding websites, it would be a waste of resources to do so, because a single modest computer can serve hundreds or thousands of web requests every minute without much effort. It would also be a waste of the finite IP space on the internet, as there is a fixed number of IP addresses available and the majority of them are already in use. To solve both problems Apache provides a feature known as name-based virtual hosts. With name-based virtual hosts, you may server hundreds or thousands of websites, each with their own domain name, from a single machine running on a single IP!

Note

The terms *virtual host* and *virtual server* are generally interchangeable for our purposes. The terminology is constantly shifting, however, and you may hear the terms used differently in different contexts. In our case, the terms have the same meaning, but the term virtual host may be used to indicate a concept, while the term virtual server will generally be used to indicate a specific configuration detail.

In this short tutorial we will convert our existing default server into a virtual server, and create a new server that can be hosted alongside our first website on a different domain name. With the mention of domain names, you may have realized we won't be able to test our new virtual servers until domain name service has been configured. Luckily, there is a short tutorial for that as well in the BIND chapter to which you can refer when you are ready to try out your new virtual hosts.

Converting a Default Server to a Virtual Server

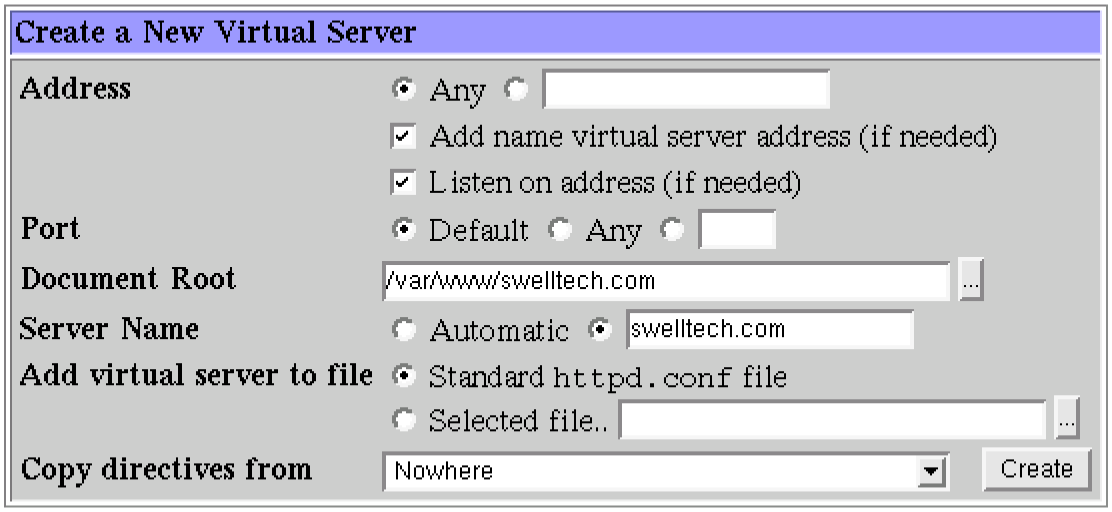
The first step to using virtual servers in a generic, and thus easily scalable and flexible manner, is to convert our already configured default server to a virtual server. Though this isn't strictly necessary to make this change, it is common practice to instead provide an appropriate error page, or a page of links to all of the virtual hosts on the machine using a traditional URL syntax for web clients that are incompatible with name-based hosts (however extremely rare such clients may be). Because the default server will be used in the event no virtual servers match, it could also be left as-is, with all other hosts being configured using the virtual hosts mechanism.

To create a new virtual server, fill in the form at the bottom of the primary Apache module page. You may leave the address and port empty and select the **Any** option for the address, unless your server has many IP addresses and you only want this virtual host to respond on one of them or you want this virtual host to respond on one ore more non-standard ports. For our example setup, we'll just leave them empty.

The **Document Root** can be any directory on your system to which the Apache process has read access, however there are some conventions that you can follow in order to make your server more immediately comprehensible to subsequent administrators. If all of the virtual servers on your system are to be under the control of your company, and you will be administering all of them yourself, it is wise to place all of the document roots into subdirectories of whatever the default server document roots parent directory is. For example, on my system the default document root is `/var/www/html`, so it makes good sense for my virtual server document roots to reside in subdirectories of `/var/www`. The more common convention, however, is used in environments where many users will be maintaining many websites, and none of the users should have access to the other users website directories directly. In this case, the normal practice is to place the document root into the users home directory, in a sub-directory called `htdocs` or `www`.

Finally, fill in the server name, which is the domain name on which you'd like this server to answer. If you don't happen to own a domain that can be used for experimenting, you can simply make one up. We'll be configuring our own local domain name server later on, so there are no rules about how you have to name it. You could call it `google.com`, or `whitehouse.gov`, or just `george`, if you wanted to. However, since it is likely you intend to put the server online for production use at some point in the future, you'll likely just name it whatever domain name it will be at that point. In my case, I'd call it `swelltech.com`.

Figure 7.9. Creating a new virtual host



Create a New Virtual Server

Address	[● Any] ○
	[✓] Add name virtual server address (if needed)
	[✓] Listen on address (if needed)
Port	[● Default] ○ Any ○
Document Root	/var/www/swelltech.com
Server Name	○ Automatic [● swelltech.com]
Add virtual server to file	[● Standard httpd.conf file]
	○ Selected file..
Copy directives from	Nowhere

Click **Create**. Now move your content from your default server document root directory into your new document root. In my case it is `/var/www/swelltech.com`. After applying the changes to your server, your Apache configuration should be finished, though we'll tackle a few more small issues before calling it done.

Note

To test your new virtual server, you can't simply browse to your IP as you did in the previous tutorial. The browser must contain the domain new for the virtual host in the URL. There are a couple of ways to achieve this. The first is to configure a local nameserver to temporarily provide name service for your new domain, the second is to setup your system hosts file to point to the appropriate IP for the domain name. The easiest is obviously to add it to your hosts file. You can do this in Webmin, if your client machine is a Unix machine running Webmin, using the **Networking:Network Configuration:Host addresses** module. On a Windows client machine, you'll need to edit the hosts file manually. It is located in `c:\windows\hosts` on Win98 and Me, `c:\winnt\system32\drivers\etc\hosts` on WinNT, 2000, and XP Pro, and `c:\windows\system32\drivers\etc\hosts` on XP Home. The more interesting, and educational method is to configure BIND to serve your new address, and then configure your client to get name service from the newly configured BIND. This is documented later in the BIND chapter, feel free to skip ahead and work through that tutorial now. I'll wait for you here...

Adding Other Virtual Server Names

Perhaps you noticed when we configured the above virtual server, it was named simply `swelltech.com`. Did you wonder why I didn't call it `www.swelltech.com` instead? The reason is simple: I'd like for users to be able to browse to either address and get the same website. So I named the virtual server `swelltech.com`, and now a new server alias can be added to cause it to answer on both names. To add a new virtual server name to an existing virtual server, click on the icon for the virtual server on the main Apache module page. Then click the **Networking and Addresses** icon. Now fill in all of the other domain names on which you'd like your website to appear. Note that these names must each have their own DNS record for users to be able to use them, just like the original `swelltech.com` name. Every additional hostname in the domain is a new address, so `www.swelltech.com` and `mail.swelltech.com` have to have their own name record in the name server even if they are on the same machine.

Chapter 8. BIND

DNS, or the Domain Name System, is absolutely vital to the functioning of the internet. In fact, though you rarely interact directly with the DNS the internet as we know it could not exist without its constant presence. DNS associates, or *binds*, hostnames and domain names to IP addresses and thus allows you to type http://www.swelltech.com instead of the much less memorable IP 216.40.244.74. Further, it makes it possible for mail servers to easily locate the correct host to send mail to for a given domain, the correct administrative contact when strange things are originating from the domain, and more. But for our purposes, as ordinary system administrators, all we need to really keep in mind is that BIND is our method of providing DNS information for our network. It will provide information to our local users, when their client applications need to access various sites by name. And it will provide information to clients (primarily other DNS servers acting as DNS clients in order to fetch the correct information for their clients) on the internet at large in order to advertise to the world how hostnames on our network can be reached. Think of it as a fancy telephone book, or even better a telephone operator, for networked computers. The client computer has a name, but needs the number in order to reach it across the vast internet. So it contacts the DNS server and asks for the number, and BIND is happy to do its best to return the correct number.

Every host on a TCP/IP network has an IP address. This address must be unique for the network on which the address is routable. So, every host that is accessible via the internet has a unique IP address that may, theoretically, be reached from anywhere else on the internet. Because these addresses are doled out, roughly, according to physical location on the network, and because routers keep up with which other routers have access to which subnets, this simple number is all that is needed for your computer to establish a connection with any other computer on the internet in seconds. Unfortunately the topic of routing on the internet falls quite outside of the scope of this document, as Webmin is not designed to manage routers or the more complex routing features of Linux, FreeBSD, and the other operating systems that are supported.

A brief history of BIND

We have established already that BIND can provide name service for your network, allowing you to enter a hostname rather than an IP when connecting to another computer on the network. However, we did not address how BIND, and DNS in general, works on the internet at large. DNS on the internet is really a multi-tiered system, wherein clients make queries of local nameservers that serve a tiny fraction of the clients found on the internet, usually on a single subnet. These local nameservers then act as clients of somewhat larger name servers, which in turn act as clients for nameservers above even them. At some point in this hierarchy the server will be one of the ROOT, or top level domain, nameservers, which will know what other lower nameserver to query regarding the requested name. Each name server in the chain will likely save the results of the query, or cache the result, so will have no need to go all the way up the chain the next time the same query is made. Shockingly, perhaps, this system works quite well, and has scaled as the internet has grown from a few thousand hosts to hundreds of millions.

Walking through an example query

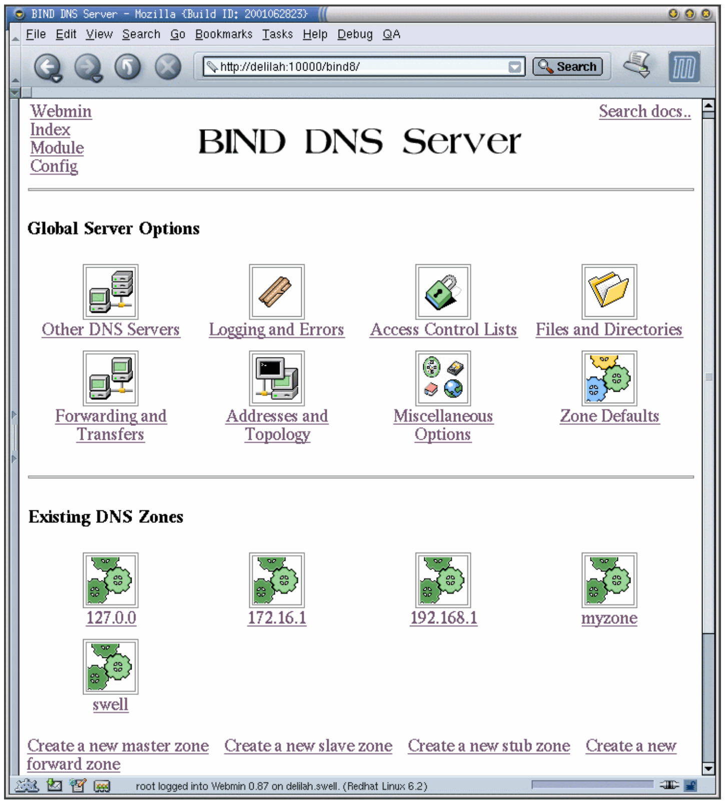
When you open your favorite browser and enter a request for a web page, for example http://www.swelltech.com, quite a lot goes on behind the scenes before the browser can even begin to load data from the server. First, the URL you entered must be parsed and interpreted by the browser. But we don't care about that step. Next, the domain and hostname where the data is located must be found on the internet. The name, `www.swelltech.com`, tells the browser very little about the physical or network location of the data, so it queries a tool that can make some sense out of that information: the DNS server.

The DNS server receives the request and checks its internal cache for the host named `www`, in the second level domain `swelltech`, in the top level domain (aka TLD) `com`. If the DNS server does not have this information cached, it becomes a client and asks its parent nameserver the same question: "What is the IP for the host www.swelltech.com?" Eventually, assuming no lower level nameservers have information about this host, a Top Level Domain nameserver (in this case, the one for the `com` TLD will receive the query. The difference here is that the Top Level Domain nameserver knows the address of the nameserver that is responsible for that domain name, or at least the next level down, `swelltech`. Finally, the nameserver for the `swelltech.com` domain is queried, and the IP for the host `www` is returned. As mentioned earlier this data will then be cached by each nameserver in the query path so that next time, they won't have to work so hard to answer the request.

The BIND Module

The BIND module opens to a screen with two sections. The upper portion of the page, is devoted to global BIND options, such as other DNS servers, logging, access control, and more. The lower portion of the display provides a number of icons, one for each of the zones your BIND is responsible for. This will include all Master, Slave, Forward, and Stub zones.

Figure 8.1. The BIND start page



root logged into Webmin 0.87 on delilah.swell. (Redhat Linux 6.2)

Configuring your BIND server is an area where Webmin can really make things simpler. Even though DNS is a very simple service on the surface, the BIND configuration files are notoriously confusing and it is very easy to make a mistake that will render your nameserver useless. That's not to say you can't misconfigure your name server with Webmin, but it does make it a lot easier to generate a syntactically correct BIND configuration.

Note

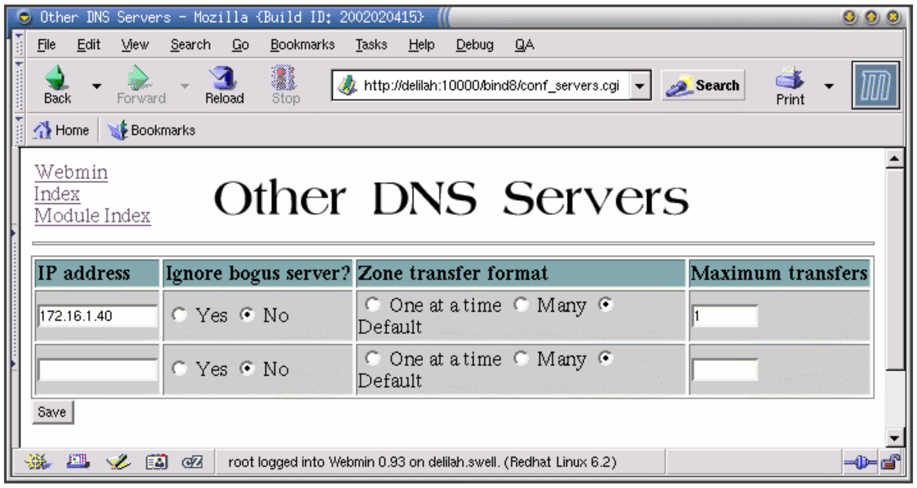
There are three BIND versions in common usage today, specifically version 4, 8 and 9. BIND 8 and 9 are functionally identical in many ways and share a configuration file syntax, so that a working BIND 8 configuration will very likely also be a working BIND 9 configuration. BIND 9 adds a few new features, but is primarily a rewrite of BIND 8 (the reasons for the rewrite are irrelevant for general users). Webmin has two BIND modules, one for 4 and one for 8 and 9. Because version 4 is extremely old, and pretty rarely used outside of OpenBSD and older Unix environments, it will not be covered here. BIND 8 and 9, because they share the same module and configuration syntax, can be covered together. Features available only in BIND 9 will be noted as such.

Global Server Options

Other DNS Servers

The Other DNS Servers page allows you to configure the behavior of DNS servers that BIND will communicate with in one way or another in a zone transfer relationship. This allows you to explicitly configure several aspects of the transfer relationship for each server.

Figure 8.2. Configuring Other Servers


Other DNS Servers - Mozilla {Build ID: 2002020415}
File Edit View Search Go Bookmarks Tasks Help Debug QA
Back Forward Reload Stop
http://delilah:10000/bind8/conf_servers.cgi
Search Print
Home Bookmarks
Webmin Index
Module Index
Save

Other DNS Servers

IP address	Ignore bogus server?	Zone transfer format	Maximum transfers
172.16.1.40	Yes [✓ No]	One at a time Many [✓ Default]	1
	Yes [✓ No]	One at a time Many [✓ Default]	

root logged into Webmin 0.93 on delilah.swell. (Redhat Linux 6.2)

The first field is the **IP address** of the server to configure. If you are receiving zone transfers for several servers and one of them is to be treated differently, here is where to configure it. The next field tells BIND to treat replies from this server as bogus, meaning incorrect. Future results that come from this domain will not be trusted. Next, in the **Zone transfer** format field, you can configure whether BIND will receive zone transfers one at a time, or in a batch of many.

Finally, though it is not yet implemented in BIND (at least not the latest version of BIND 8--BIND 9 may have this feature by now), there is a place holder for a per-server limitation on the number of transfers to initiate concurrently called **Maximum transfers**.

Note

If you have configured any security keys as documented later in the **DNS Keys** section, there will be an additional field containing a checkbox for each of the keys configured. Selecting one will require the server to authenticate itself using the key selected. A copy of the key must exist on both the local server and the remote server, and must be configured in the BIND configuration for each.

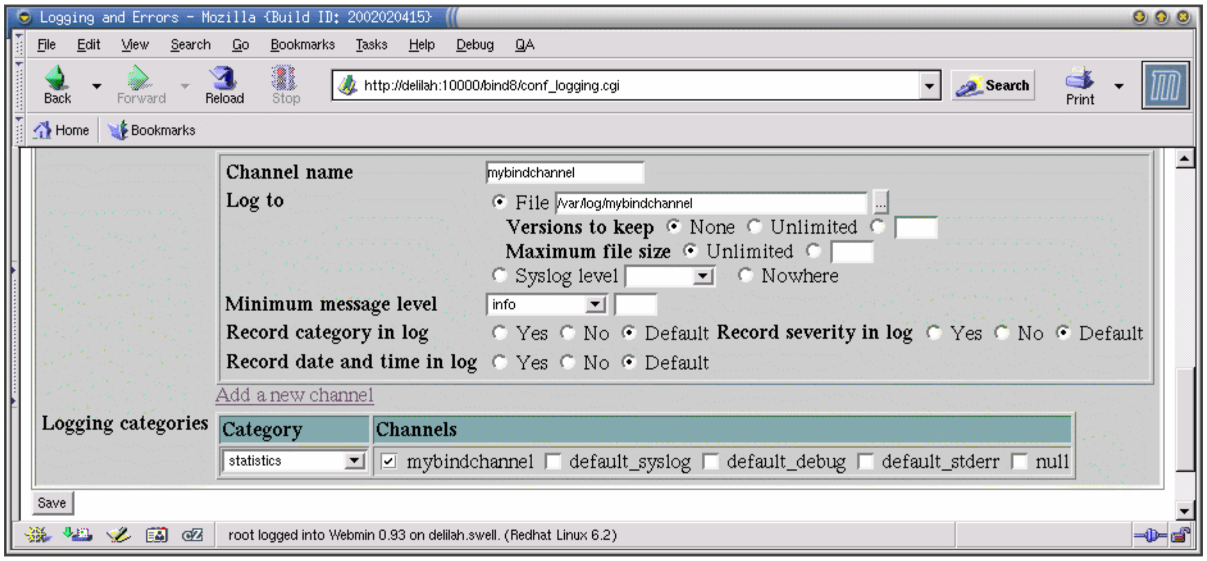
This page configures the `server` directive and related options in your `named.conf` file. By default, no other servers are defined.

Logging and Errors

This page provides a list of existing logging channels that are active for bind. It also allows you to add new logging channels. Generally speaking, the logs provided by BIND by default are enough for most purposes, providing a general overview of operations (starting, stopping, etc.) as well as any errors that occur during operation. However, if you need additional logging or logging of specific information to a separate file, you can configure it here.

Logging in BIND 8 is very flexible but also a little confusing at first glance. To add a new log, you first create a new channel that can be set to log to a file or to a syslog level. You then configure the level of information to log there, as discussed below. Finally, you assign logging categories to that channel. The categories dictate what types of information are logged to this particular channel.

Figure 8.3. Creating a new logging channel


Logging and Errors - Mozilla {Build ID: 2002020415}
File Edit View Search Go Bookmarks Tasks Help Debug QA
Back Forward Reload Stop
http://delilah:10000/bind8/conf_logging.cgi
Search
Print
Home Bookmarks
Save

Channel name	mybindchannel
Log to	[✓ File] /var/log/mybindchannel
Versions to keep	[✓ None] Unlimited
Maximum file size	[✓ Unlimited]
	Syslog level Nowhere
Minimum message level	info
Record category in log	Yes No [✓ Default] Record severity in log Yes No [✓ Default]
Record date and time in log	Yes No [✓ Default]

Add a new channel

Logging categories

Category	Channels
statistics	[✓ mybindchannel] default_syslog default_debug default_stderr null

root logged into Webmin 0.93 on delilah.swell. (Redhat Linux 6.2)

In the example, I've created a logging channel called `test`. I've chosen to send it to a log file located at `/var/log/test` (I know what you're thinking: "Where does he come up with these great names?"). So far it's all pretty self-explanatory, but then we come to **Minimum message level**. Here we can set the logging level for the information we'd like logged. There are five presets and you can also choose a numeric debug level. The five presets are, from order of least important, `info`, `notice`, `warning`, `error`, and `critical`, which are pretty much what they sound like. The `info` level is almost everything the server has to say about the subject, making for quite a chatty little log. On the other hand, the `critical` level is reserved for things that usually mean your nameserver is experiencing one or more serious problems, possibly leading to improper functioning of the server. These first five levels are the same as those used by syslog. The `Debug level` option allows you to set a debug level for debugging messages to be sent to your log. Note that debug messages cannot be sent to syslog, and must be logged to a file. Finally, the `Global level` sets this log to the same level as the global server logging.

Next, I assigned a logging category to the logging channel *test*. In this case I decided to send `security` information to this channel. There are currently 22 supported categories of information that can be logged. They are as follows.

Logging categories

default
If no categories are specified, then default is used. Default contains most messages from the other categories, but a few are left out.

config

Configuration file processing information. BIND writes these messages as it loads the configuration file.

parser
Configuration file parsing information. BIND writes these messages as it parses the configuration file.

queries
Logging of queries.

lame-servers
Notifies you of the detection of a bad delegation.

statistics
Provides periodic reports of general system runtime information.

panic
Logging of problems that will cause the shutdown of the server.

update
Dynamic updates.

ncache
Negative caching.

xfer-in
Zone transfers the server is receiving.

xfer-out
Zone transfers the server is sending.

db
All database operations.

eventlib
Debugging info from the event system. Only one channel may be specified for this category, and it must be a file channel. If you do not define the eventlib category, eventlib will be directed to default. This is generally only useful to developers debugging BIND or its related libraries.

packet
Dumps of packets received and sent. Only one channel may be specified for this category, and it must be a file channel. If you do not define the packet category, it will be directed to the default category at the debug level.

notify
The NOTIFY protocol, which provides asynchronous change notifications.

cname

CNAME errors.

security
Approved and unapproved requests.

os
Problems with the underlying operating system.

insist
Internal consistency check failures.

maintenance
Periodic maintenance events.

load
Zone loading messages.

response-checks
Messages arising from response checking, such as "Malformed response ...", "wrong ans. name ...", "unrelated additional info ...", "invalid RR type ...", and "bad referral ...".

Access Control Lists

This page is for entering any number of named address match lists. The lists defined here are used later in the configuration for a number of purposes, though having an ACL by itself does nothing. To create an ACL, simply enter a name in the ACL Name field, and the addresses, networks, and other ACLs that this ACL will match in the second field. There are a few ACLs that are built in, and do not need to be defined manually, these are `any` which matches all hosts, `none` which matches no hosts, `localhost` which matches the IP address of all interfaces on the system where BIND is running, and `localnets` which matches all hosts on the local networks for which the system has an interface configured.

Files and Directories

Here you configure a few of the file locations for files that your BIND process may need to read from or write to. These usually do not need to be changed, but it may be useful to know what each of them refers to.

Statistics output file
This option allows you to choose a different filename and path for the statistics that BIND generates when signalled. To cause BIND to dump statistics to this file, you can use the **ndc** program with the stats option which will send the correct signal to BIND. This corresponds to the `statistics-file` directive in the options section of `named.conf`, and defaults to `named.stats`.

Database dump file
Configures the location of the file where BIND dumps its database when it receives the correct signal. The signal can be generated by using **ndc dumpdb**. This option correlates to the `dump-file` directive in the options section of `named.conf`, and defaults to `named_dump.db`.

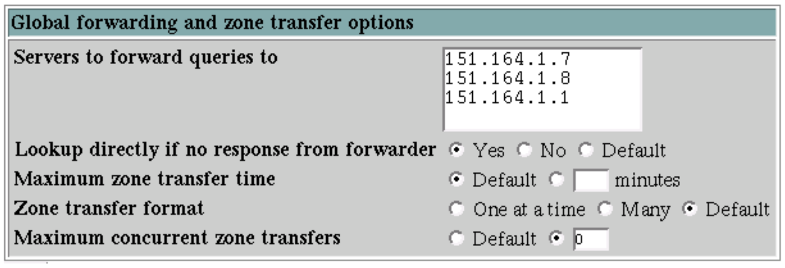
Process ID file
This is the location of BINDs process ID file. This location and file must be writable by the BIND process.

Path to zone transfer program
This sets the path to the named-xfer program that BIND uses for inbound zone transfers. This option configures the `named-xfer` directive of the options section in `named.conf`.

Forwarding and Transfers

This page allows you to configure parent DNS servers. Here, you declare what servers your BIND can query and how to behave towards them.

Figure 8.4. Forwarding and Transfers



Global forwarding and zone transfer options	
Servers to forward queries to	151.164.1.7 151.164.1.8 151.164.1.1
Lookup directly if no response from forwarder	[✓ Yes] No Default
Maximum zone transfer time	[✓ Default] ___ minutes
Zone transfer format	One at a time Many [✓ Default]
Maximum concurrent zone transfers	Default [✓ 0]

Servers to forward queries to
With this field, you enter any name servers that you wish your BIND process to query in the event it does not have a cached result to serve to the client. Usually this will be the nameservers that your ISP or hosting service provides for you, but it may also be other servers on your local network. It's a good idea to have at least two, which will be called the primary and secondary name servers, respectively. This option configures the `forwarders` directive in the options section of `named.conf`.

Lookup directly if no response from forwarder
This option allows you to choose whether BIND should query the TLD servers directly if the forwarders do not reply. You may need to turn this off if you have a non-internet-connected DNS server, or a server isolated by a firewall on your local network that can only communicate with the forwarders. This option configures the `forward` directive.

Maximum zone transfer time

This allows you to put an upper limit on the time allowed for inbound zone transfers. This option correlates to the `max-transfer-time-in` directive, and defaults to 120 minutes. After this time, a transfer will be terminated.

Zone transfer format
Sets the global transfer format (which can be overridden on a per server basis, in the Other Servers section). Here you can choose whether BIND should receive a message for each resource record transferred. The `many` choice tells BIND to accept several per message, which is more efficient. This option correlates to the `transfer-format` directive.

Maximum concurrent zone transfers
Places a limit on the number of concurrent transfers. This corresponds to the `transfers-in` option and defaults to 10. Increasing this may improve performance but at the cost of more system resources being consumed.

Addresses and Topology

Ports and addresses to listen on
BIND can answer on any number of ports and addresses on your server. By default, BIND will answer on port 53 on every active IP address. If you choose to listen on one or more specific IPs and/or ports, then BIND will answer on only those allowed by the match list. It is also possible to negate a port or IP by prepending an !.

Source IP address for queries
If your BIND does not know the answer to a query, it will query other nameservers. Here you can define the local addresses and ports on which to query those nameservers. By default it can use any IP or port that is available on the system.

Nameserver choice topology
When querying other servers, BIND can be configured to choose nameservers that are closer in the topology address list. The order the servers appear in the list indicates their distance from the local nameserver, where the first is closest and the last is furthest. It is also possible to force one or more name servers to be last resorts, by prepending them with !. Those servers prepended by an exclamation point will be placed at the end of the queue, regardless of placement in the topology address list.

Miscellaneous Options

The BIND options with no other obvious locations ended up in this section, so it has a relatively large number of options. Luckily for you, most administrators don't have to worry about these options very often. Unluckily for me, to achieve my goal of fully documenting the BIND module, I have to document these features just as completely as those that are more often used. So, on this page you'll find several configurable memory usage settings, some timing options, and some general behavior choices.

Maximum core dump size

This is the maximum file size of a dump file that BIND will generate in the event of a crash. This option configures the `coresize` option in the `named.conf` file. Your operating system may also impose a limit on core size, which may or may not be smaller than the value configured here.

Maximum data memory usage
This defines the maximum amount of memory that BIND will use for storage of data. This is not the complete memory usage of BIND, as the process itself must have memory, but it can be used to limit BIND somewhat. This option correlates to the `datasize` in `named.conf`.

Maximum open files
Defines the number of files that BIND can have open at any given time. The default is the limit of the OS, however, BIND is not always able to determine this at runtime if the operating system does not accurately report it. In this case, it may be necessary to use the correct value here. This is not a problem under the most popular operating systems where Webmin and BIND are used, such as FreeBSD, Linux, etc. This option configures the `files` directive.

Maximum stack memory usage
Defines the maximum amount of stack space that the BIND process may use. This correlates to the `stacksize` directive.

Interval between cleaning expired records
BIND will periodically remove expired records from the cache. This option configures how often this cleaning occurs. This corresponds to the `cleaning-interval` and defaults to 60 minutes.

Interval between check for new interfaces
BIND will scan the network interface list periodically, and this option configures the interval, in minutes, between scans. The default is 60 minutes. This option configures the `interface-interval` directive.

Interval between logging stats
This setting controls how often BIND writes general server statistics to the logs. By default this occurs every 60 minutes, and if set to 0 statistics logging will be turned off. This option correlates to the `statistics-interval` directive.

Do full recursive lookups for clients?
BIND can respond in one of two ways if it does not have an answer for a client. If this option is set to Yes , the default, then BIND will perform the lookup itself on a parent or root server. If this is turned off, BIND will simply refer the client to another nameserver that can answer the query. This option configures the `recursion` directive.

Allow multiple CNAME aliases for one name?
Older versions of BIND allowed multiple CNAME resource records for a single domain, and many sites used this for load balancing. However, this usage is against standards and is not recommended. Turning this on allows you to use multiple CNAMES, as in older versions of BIND. The default is off, and it correlates to the `multiple-cnames` directive.

Fetch glue records?

If this option is set to Yes, the default, the server will fetch "glue" resource records it does not have when constructing the additional data section of a response. Setting this to No can be used in conjunction with `recursion no` to prevent the server's cache from growing or becoming corrupted. However, doing this increases the work for the client. This option configures the `fetch-glue` directive.

Set authoritative AA bit on responses?
BIND normally caches negative responses (i.e. NXDOMAIN, or "this does not exist"), however, some very old servers and clients may have problems with this and generate errors. It's probably wise to upgrade those old clients and servers rather than turning this off. This option configures the `auth-nxdomain` directive, and defaults to Yes.

Control Interface Options

BIND provides a command line utility called `rndc` (or `ndc` in older versions) that allows an administrator to perform some administrative tasks. The newer `rndc` version allows these tasks to be performed on remote BIND servers as well as a server running locally, as it operates via a network socket. Common uses for this utility include stopping the `named` process, forcing a reload of configuration files, refreshing zone information, and triggering a dump of server stats. Because the `rndc` tool can be used to shutdown the server, as well as other potentially dangerous actions, its use should be limited to a few trusted client addresses.

This page of the BIND module provides access to the `controls` section of the BIND configuration file, and configures the hosts that are allowed to connect to the running BIND server.

Control options

Internet port access
If enabled, the first field must contain the local address on which the `named` server will listen for control requests. The `port` field can either be the port on which you'd like the process to listen, or you can simply fill in an asterisk, "`*`", to specify a randomly selected unprivileged port (unprivileged ports on a Unix system are usually those above 1024). Finally, the `allow` field should contain the addresses of the hosts you would like to be able to administer your server from. Generally, unless you have a reason to do otherwise, security is most easily maintained by preventing access to all outside addresses. In such a case you would choose an address of `127.0.0.1` in the first field, a port of `*` and an allow list containing only `127.0.0.1`. Assuming your local machine is trusted, your server will be relatively secure.

Unix filing system access
As in the previous set of options, this directive specifies which clients will have access to the adminstrative channel of the running `named` process, but in this case, it is for the older style of communication using a Unix FIFO pipe. A pipe in Unix, is a mechanism by which a stream of data can be treated as a file, and vice-versa. Or, in other words, it allows a running process to accept data being written into it as though it were a file and it can output data likewise in a form that can be read like a file.

If using this mechanism for communicating with your `named` process, you can choose a filename for the pipe, the permissions for the pipe, and the owner and group of the pipe. Care should be taken to make the file inaccessible to all but the administrative users of the system.

Note

The Unix pipe mechanism is not available in BIND 9. It has been deprecated in favor of using the network socket interface along with security keys. It is supported in BIND version 8.

DNS Keys

Newer BIND version support secure keys for the purpose of authentication and authorizing access to certain functions. This page allows you to generate keys for use in other sections. Specifically, after generation, a key can be used to secure your **Other Servers** connections.

Installing a key

To create a new key, simply fill in a new **Key ID** which must be an alphanumeric string with no whitespace, for example `mynewkey` or `supersecret` or `HenryThe8th`. The **Algorithm** can usually safely remain at the default of `hmac-md5`. Finally, the **Secret string** must be a base64 encoded string.

Creating a key with dnssec-keygen

To generate a base64 encoded string for use in the **Secret string** field, you can use the `dnssec-keygen` or `dnskeygen` utility that is included in most installations of BIND. You can even use a plain string encoded with the `mmencode` utility, though this will be significantly less secure than using an MD5 key. To create a key using `dnssec-keygen`, the following command line can be used with minor modifications to suit your server:

```
[root@delilah]# dnssec-keygen -a HMAC-MD5 -b 128 -n HOST delilah.swelltech.com
Kdelilah.swelltech.com.+157+06448
```

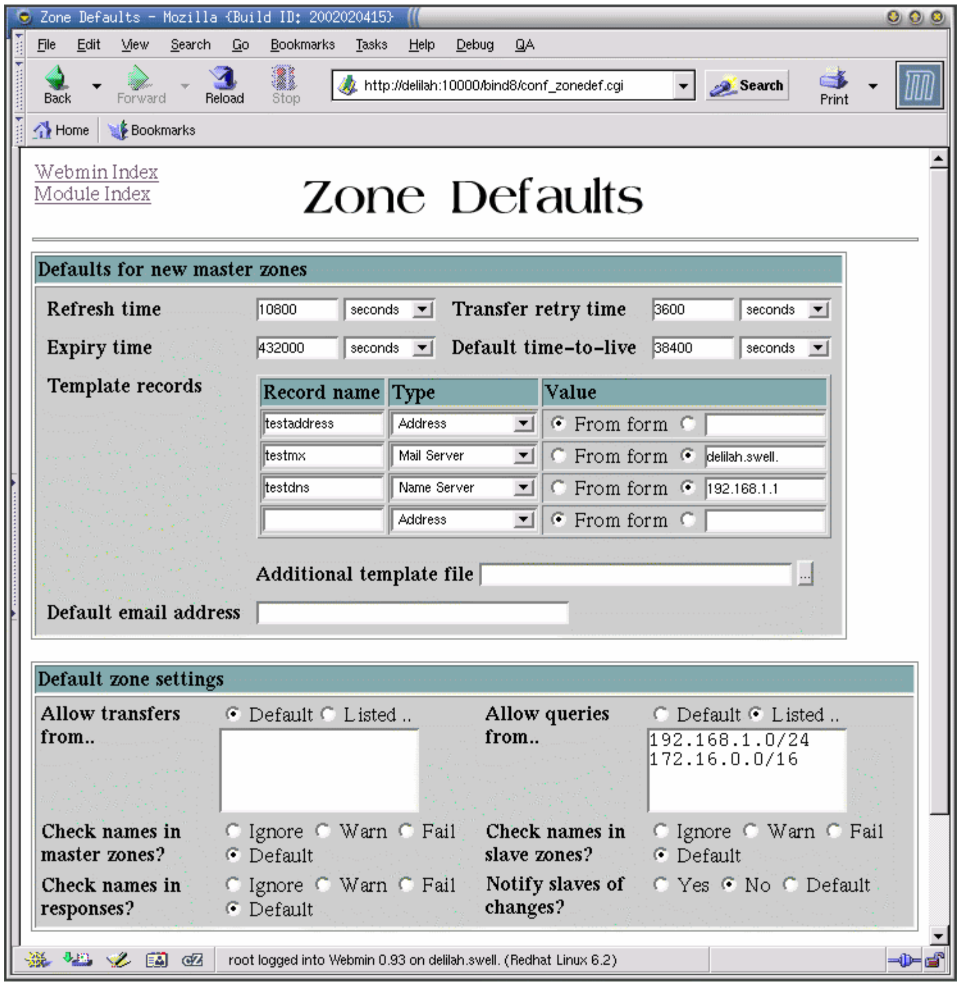
In the above example, the second line is the output from the command, which gives you a hint about the filenames under which your new key is stored. In this case, two files were generated, named `Kdelilah.swelltech.com.+157+06448.key` and `Kdelilah.swelltech.com.+157+06448.private`. Both contain the newly generated key, and so you can view either to copy the key for pasting into the Webmin **Secret string** field. This key will also need to be made available to any servers that will be communicating with this server using security features.

Zone Defaults

Here you can define several default options for new zones on your server, and zones for which you provide backup service. These options can often be overridden in the definition of the individual zone, however most such items are best configured here, and any differences from the norm can be configured in the individual zone. These options are only documented here, though they apply to individual zones as well. Note also, that these do not effect the named.conf file at all. It is merely a set of default values used by Webmin when creating new master zones, kind of like an /etc/skel for zones. Also found on this page are setting for some default zone permissions options, found in the second part of the page.

Defaults for new master zones

Figure 8.5. Zone defaults


Zone Defaults - Mozilla {Build ID: 2002020415}
File Edit View Search Go Bookmarks Tasks Help Debug QA
Back Forward Reload Stop
http://delilah:10000/bind8/conf_zonedef.cgi
Search Print
Home Bookmarks
Webmin Index
Module Index

Zone Defaults

Defaults for new master zones

Refresh time	10800 seconds	Transfer retry time	3600 seconds
Expiry time	432000 seconds	Default time-to-live	38400 seconds

Template records

Record name	Type	Value
testaddress	Address	[✓ From form]
testmx	Mail Server	From form [✓ delilah.swell.]
testdns	Name Server	From form [✓ 192.168.1.1]
	Address	[✓ From form]

Additional template file

Default email address

Default zone settings

Allow transfers from..	[✓ Default] Listed ..	Allow queries from..	Default [✓ Listed ..] 192.168.1.0/24 172.16.0.0/16
Check names in master zones?	Ignore Warn Fail [✓ Default]	Check names in slave zones?	Ignore Warn Fail [✓ Default]
Check names in responses?	Ignore Warn Fail [✓ Default]	Notify slaves of changes?	Yes [✓ No] Default

root logged into Webmin 0.93 on delilah.swell. (Redhat Linux 6.2)

Refresh time
This is interval for which your zones will be cached before being refreshed by slaves. Lowering this will increase the load on your master server but will help insure fresh data reaches clients from your slave DNS servers. This option configures the refresh field in the SOA record in each new zone you create, and defaults to 10800 seconds, or 3 hours. Note that the introduction of the DNS NOTIFY protocol into BIND 8 removes the reliance of slaves on refresh times for prompt updates. To find out more take a look at *RFC 1996* [http://www.ietf.org/rfc/rfc1966.txt?number=1966].

BIND 4 and some other name servers may not have NOTIFY, so if your slaves are not all known to be NOTIFY capable, you should still be aware that your slaves will take the full refresh time to be guaranteed to be fresh.

Transfer retry time
This defines the amount of time between retries if a refresh attempt fails. If you have reduced the refresh time, this value should be reduced accordingly. This option correlates to the retry field in an SOA record and defaults to 3600 seconds or 1 hour.

Expiry time
This sets the expiration age for your zone records, for the use of DNS servers that have a cached your domain information. Beyond this date, if the server with the cached data cannot contact a name server that is authoritative for your domain, it will no longer return a positive result. This option configures the expires field of the SOA record and defaults to 432000 seconds, or five days.

Default time-to-live
This sets the minimum time to live for a zone. Downstream name servers will no longer consider the information they have cached accurate if it is older than this. They will continue to serve the old data if new data cannot be retrieved, until the Expiry time has been reached. This option can be used to very effectively insure that server or address changes can be performed without interruption of client services. For example, if you are aware that your website will be moving to a new server on a new address in a week, you can alter this to something very short, perhaps 30 seconds. By the end of the week, when your change happens, all nameservers that have cached your information will know to check with a nameserver that is authoritative for your domain often. Know one will even notice you changed! This option configures the TTL field in the SOA record, and defaults to 38400 seconds, or 10 hours.

Template records
This section can be a nice time saver if you create a large number of domains with Webmin (for example, if you run an ISP or a web hosting company). Here you can define several template records that can be automatically inserted into some or all of your new zones. For example, if you have a single mail server and two nameservers that are the same for all of the domains you create you can create templates for each of those. When you create a zone file later, you can choose to have the templates included. It is also possible to add a single host, whose IP can be defined at zone creation time. The mail server, name alias, and name server templates must have addresses assigned to them from the beginning, however. There is no default template, and this section does not directly effect any BIND configuration files.

Default zone settings

Allow transfers from..
Here you can define other servers that will, by default, be allowed to receive transfers from this server. This option correlates to the `allow-transfer` directive, and defaults to allowing zone transfers to all hosts.

Allow queries from..

This one allows you to define what hosts or networks will be allowed to query your server. Any host that will use your nameserver should be listed here. However, by default, the server will allow requests from all hosts. This option configures the `allow-query` directive.

Check names in master zones? and **Check names in slave zones?**
These two allow you to choose how strict you nameserver will be with regard to checking names within their expected client context. This means that, for example, a domain name used as a hostname can be checked for compliance with relevant standards regarding domain names and hostnames. These options configure `check-names master` and `check-names slave` and default to `fail` and `warn`, respectively.

Check names in responses?
Similar to the previous two options, but checks the names in responses to queries sent by the nameserver. If this is set to fail, your nameserver will REFUSE a query it receives and invalid name. This option configures the `check-names response` directive and defaults to ignore.

Notify slaves of changes?
This option allows you to configure whether BIND will use the NOTIFY protocol to inform its slaves of updates. In this way, its slaves can query the master to see if a zone transfer is needed. If so, the transfer takes places immediately, and all servers are brought up to date much more quickly then if the slaves awaited their usual refresh age to be reached. This option configures the `notify` directive.

Existing DNS Zones

This section of the BIND main page displays a list of all existing DNS zones. There are four types of of zones (actually there are five, but the `hint` needs little configuration and is usually setup only once), `master`, `slave`, `stub`, and `forward`. And each of these types may then be either a forward zone (meaning it maps names to addresses), or a reverse zone (maps addresses to names). Each of the four types has a specific purpose, depending on your nameservers relationship to the data it presents to clients.

Zone Types

master
The server has the master copy of the zone data, and will provide authoritative answers for it.

slave
A slave zone is a copy of a master zone. Each slave zone will have a list of masters that it may query to receive updates to its copy of the zone. A slave may, optionally, keep a copy of the zone saved on disk to speed startups. A single master server can have any number of slaves in order to distribute load.

stub
A stub zone is much like a slave zone, and behaves similarly, however, it only replicates the NS records of a master zone rather than the whole zone.

forward
A forward zone directs all queries in the zone to other servers. In this way it can act as a caching DNS server for a network, or provide internet DNS services to a network behind a firewall that limits outside DNS queries (obviously the forwarding DNS server must have DNS access to the internet!). Note that this is similar to the global forwarding facility, but allows per-zone selection of forwarders.

Creating a New Zone

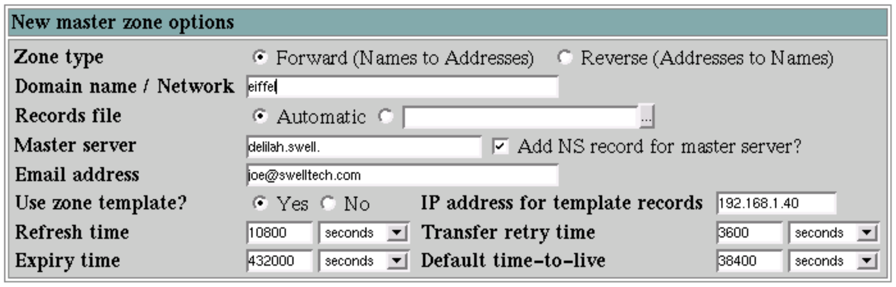
To create a new zone, click on one of the zone creation links in the **Existing DNS Zones** section of the screen. Each zone type will present you with the various fields necessary for Webmin to generate the new zone file for a zone of the selected type. The fields present differ for each zone type, except `slave` and `stub`, so we'll document each in turn.

Creating a Forward Master Zone

A master zone is one which contains the authoritative and complete data for a DNS zone, and thus has the most configurable options. When creating any type of zone, it is necessary to create at least two zone database files, one for forward mappings and one for reverse mappings. This is to provide both name to address translation, as well as address to name translation. Luckily, once you've created a forward and reverse master zone, Webmin can automatically add the correct reverse records for each host you add to your master zone.

The options when creating zones are pretty straightforward, but I'll discuss them briefly, as well as give an example of creating a new master forward and master reverse zone database.

Figure 8.6. Creating a new master zone



New master zone options

Zone type	[✓ Forward (Names to Addresses)] Reverse (Addresses to Names)		
Domain name / Network	eiffel		
Records file	[✓ Automatic]		
Master server	delilah.swell.	[✓ Add NS record for master server?]	
Email address	joe@swelltech.com		
Use zone template?	[✓ Yes] No	IP address for template records	192.168.1.40
Refresh time	10800 seconds	Transfer retry time	3600 seconds
Expiry time	432000 seconds	Default time-to-live	38400 seconds

Zone type
The zone type is either `Forward` or `Reverse`, as discussed earlier. In the example shown, I'm creating a new forward zone.

Domain name/Network

This option will either be the domain name of the zone in the case of a forward zone, or the network in the case of a reverse zone. Here, I'm creating a zone named `myzone`. Note that in my case, my domain is for a local network, and will not be able to be resolved from the internet at large (which requires registration in one of the Top Level Domains, such as .com, .org, or .net). Registration of a domain zone and obtaining IPs and other related tasks are well beyond the scope of this book, but the steps for creating internet domains are precisely the same.

Records file
This option allows you to choose the name and location of the db file while you would like your zone information stored. Webmin will automatically create a correctly named file in the system default location for you if you leave this option set to `Automatic`. Unless you have good reason for breaking convention it is recommended that you leave this as it is.

Master server
Here you select the name of the master server for this domain. Since we are creating a master zone, this should be the host name of the server that will be the master for this file, in my example, I've selected the hostname `delilah.swell.` a host on my local (non-internet) domain `swell`. The sub-option **Add NS record for master server?** when checked, will add a nameserver record in this zone for this nameserver. It's usually good to leave this checked and let Webmin handle one more of the many minor details it will handle if you let it.

Email address
This should be the email address for the maintainer of this domain. In the case of internet resolvable domains, this will be the person contacted in the event of problems with your DNS server(s).

Use zone template?
If you created a zone template in your **Global Server Options:Zone Defaults** you can include that template information here. This can include any number of automatically generated records of several types (host address, mail server, name server, name alias, and host information). If you chose `From form` as a source for one of your host addresses, then you can enter that information in the **IP address for template records** field. Using the template facility in Webmin can prove a very powerful tool for administrators who manage a large number of zones that have the same nameservers and mail servers. Creating a new domain can be done almost automatically, in this way.

Refresh time
This is the same as the option of the same name in **Global Server Options:Zone Defaults**, though it will only apply to this zone. This option will override the global zone default. The same applies to **Transfer retry time**, **Expiry time**, and **Default time-to-live**

Clicking create takes you to the primary page for this new zone. We'll come back to these options after discussing the creation of a reverse master zone, as it makes good sense to create your reverse zone for this domain before adding any records to the zone. In this way, Webmin can keep the two files in sync for you automatically.

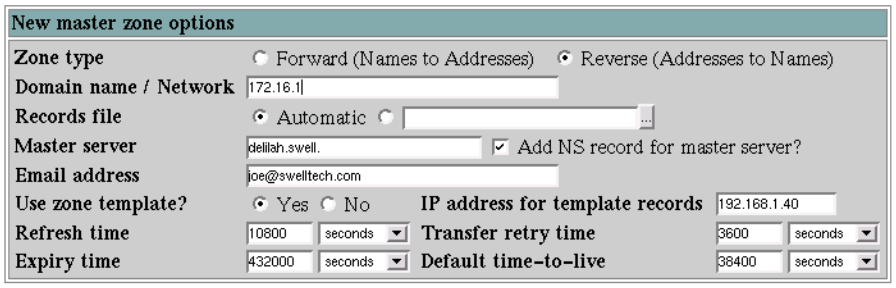
Creating a Reverse Master Zone

After creating a forward master zone, you may then want to return to the main BIND module page and create another master zone. This time, you will choose to create a reverse zone, in order to provide mapping from IP addresses to names.

Note

Reverse address resolution is somewhat different than forward resolution. With forward zones, there can be any number of addresses associated with a single IP, whereas there should only be one reverse record for a given IP. Thus if you are hosting many virtual services on a single IP, they can have their own domain name, but the IP can only map back to one of them in the event of a reverse lookup. Also, unless you own your own network IP block, or are using a private netblock, your nameserver will not necessarily be authoritative for your range of IP addresses. Reverse lookups are not frequently used, and when they are, it is usually only to confirm that an IP does resolve to some legitimate network.

Figure 8.7. Creating a Reverse Master Zone



New master zone options

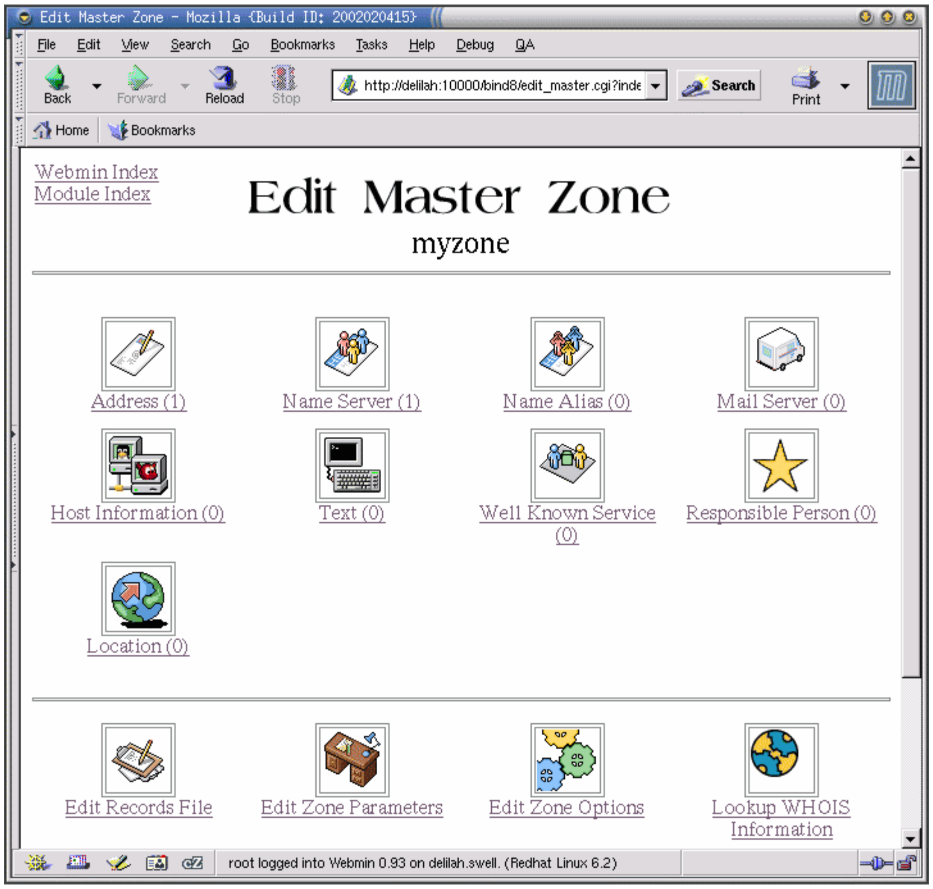
Zone type	Forward (Names to Addresses) [✓ Reverse (Addresses to Names)]		
Domain name / Network	172.16.1		
Records file	[✓ Automatic]		
Master server	delilah.swell.	[✓ Add NS record for master server?]	
Email address	joe@swelltech.com		
Use zone template?	[✓ Yes] No	IP address for template records	192.168.1.40
Refresh time	10800 seconds	Transfer retry time	3600 seconds
Expiry time	432000 seconds	Default time-to-live	38400 seconds

Here, you'll see that creating a reverse master zone is exactly like creating a forward master zone. In this case, I've chosen a zone type of `Reverse`, as this zone will map addresses to names. The only other difference between this and the previous example, is that I've entered the network address, `172.16.1`, instead of the domain name. After creating this, I'm taken to the primary page for the new zone. We will rarely edit the reverse master zone records directly, as it is easier and safer to allow Webmin to do it for us. So let's return to the primary BIND module page, and then edit our new `myzone` master zone.

Adding Records to a Master Zone

Assuming you successfully created a Forward Master Zone, it will now appear in the **Existing DNS Zones** section of your main BIND page. Clicking it takes you to a page that allows adding records of all types, as well as a few general zone options at the bottom of the page. The options at the bottom of the page are the same as those documented in the **Global Zone Options** sections earlier, except they only effect the one zone you are editing, so we will not cover those options here.

Figure 8.8. Edit Master Zone


Edit Master Zone - Mozilla {Build ID: 2002020415}
File Edit View Search Go Bookmarks Tasks Help Debug QA
Back Forward Reload Stop
http://delilah:10000/bind8/edit_master.cgi?inde
Search Print
Home Bookmarks
Webmin Index
Module Index

Edit Master Zone

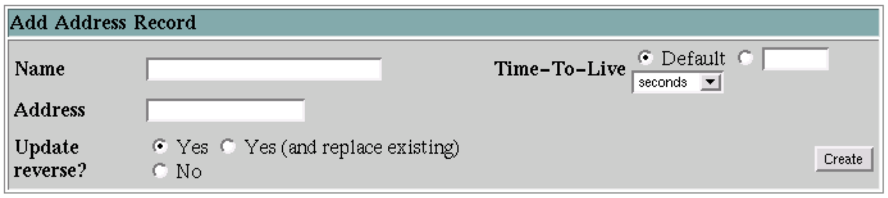
myzone

root logged into Webmin 0.93 on delilah.swell. (Redhat Linux 6.2)

Address

An address record allows you to enter the hostname, the time-to-live, and the address for a host. Every host on your network should have an Address Record. In the example, note that I've entered the fully qualified hostname, and ended with a period. I've also chosen to have Webmin update the reverse master zone with this address, as well. This option creates a A record.

Figure 8.9. Adding an Address Record



Name Server
If you have another name server that is responsible for another subdomain (such as joeszone.myzone.), you can add it here. You can also add other name servers for this domain, including slaves and redundant masters. This option creates a `NS` record.

Name Alias
Name aliases provide a means to name a host more than one name. For example, if you wanted your mail server (real name mail.myzone.) to also be addressable by the name smtp.myzone., you could create an alias for it here, and both names would resolve to the same machine. Also, it allows you to create shortcuts for your users. If for example, you wanted users to be able to simply enter *news* to reach a news server, even though your news server is actually in another domain. This option creates a `CNAME` record.

Mail Server
Every mail server in your domain should have an entry here. On this page, the **Name** field should contain the name of the domain, and the **Mail Server** field should contain the name of the mail server. When creating a mail server record, you are given an extra option that is not present in any of the other records, called **Priority**. The Priority of a mail server is a relative value to indicate which mail server has precedence. The lower the value, the higher its precedence. Every mail record must have a Priority. In the event that the server with the highest precedence is down, mail servers can then deliver mail to the next server on the list. This option creates a `MX` record.

Host Information
This record type allows you to identify the type of host that is referenced by an address record. Here, you enter the name of the host, and the **Hardware** type and **Operating System** type. These types are entirely optional, but if you do enter them, you should be aware of the security implications (identifying your hardware and OS is the first step a cracker takes in identifying ways to crack your system). Also, there are several rules documented in *RFC 1700* [http://www.ietf.org/rfc/rfc1700.txt?number=1700] regarding how one *should* identify hardware and OS. However, these rules are not at all strictly enforced and it is usually quite safe to use this record for internal record keeping purposes (i.e. instead of keeping a notebook or separate database of all of your hosts and what OS and version they run). This option creates a `HINFO` record.

Text Record

Here you can enter any arbitrary text string up to about 2K. You can use this for notes regarding the host, perhaps the location or primary user of the host, as well as for other notes that can be referenced by other records, for example, in a Responsible Person record. This option creates a `TXT` record.

Well Known Service
The Well Known Service record type allows you to configure what types of services a particular host provides. So, for example, you could advertise that the host `myhost.myzone.` can provide `telnet`, `ftp`, and `smtp` services. The services are identified by the same name as is found in the `services` file. This option creates a `WKS` record. More on Well Known Services can be found in section 3.4.2 of *RFC 1035* [http://www.ietf.org/rfc/rfc1035.txt?number=1035]. WKS records are optional, and are not in very common usage, nor is it supported by all domain name servers.

Responsible Person
Here you define the person who is responsible for a given host or domain. The **Name** field is for the hostname or the domain name, ending in a period if an absolute name. You can also enter the email address for the responsible person. The **Text Record** field can contain the name of a previously configured Text record. For example, if I were maintaining a domain and wanted people to be able to locate me in the event of a problem, I could create a text record named `joe` containing my cell phone number. Then for each host and subzone I manage, I could create a Responsible Person record that contains not only my email address, but also refers to the `joe` Text record.

Tip

When entering an email address in the **Responsible Person** section, Webmin will automatically convert it to the dot-separated format required by BIND. You should enter email addresses in their real world form, i.e. `joe@swelltech.com`.

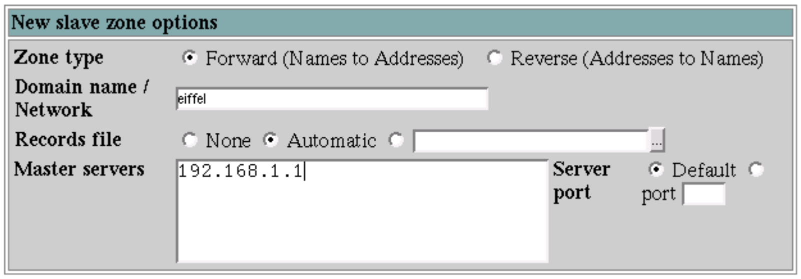
Location
The Location record is a rather new and experimental record type, that allows one to include precise (on a global scale, anyway) information about each host and network in your zone. The location is defined in latitude, longitude, and altitude. The current Webmin version does not distinguish the separate parts of this information, so you must enter it yourself in the correct format. *RFC 1876* [http://www.ietf.org/rfc/rfc1876.txt?number=1876] provides a more complete description of the Location record. One good resource to help you understand and use the LOC record, provided by one of the co-creators of the LOC specification, is *DNS LOC: Geo-enabling the Domain Name System* [http://www.ckdhr.com/dns-loc/]. There you can find links to sites that will provide the coordinates for your location for free. There is also a link to AirNav, which will provide altitude information for public landing sites (airports) in your area. This isn't as precise as a GPS system, but it's better than nothing, and a lot more information than most DNS servers are configured to provide.

Edit Records File
This option merely provides a simple text editor window that contains the complete db file for your zone. This allows you to edit it manually, however, this is not recommended unless you are familiar with the BIND configuration file grammar as it is not checked by Webmin for correctness.

Creating a Slave or Stub Zone

Slave and Stub zones are created in exactly the same way, and are quite similar in some ways though their purposes are very different. Slave zones keep a complete copy in memory, and sometimes also on disk, of a zone that it receives via a zone transfer from a master zone. A slave zone can answer any queries for a zone, and as long as network connectivity remains intact between the master and slave, and the servers are configured correctly, it will stay in sync with the master server. A stub zone also syncs to a master server, however it only keeps NS and SOA record information from the master server. This allows BIND to keep up with delegation information automatically.

Figure 8.10. Creating a Slave Zone


New slave zone options

Zone type	[✓ Forward (Names to Addresses)] Reverse (Addresses to Names)
Domain name / Network	eiffel
Records file	None [✓ Automatic]
Master servers	192.168.1.1
Server port	[✓ Default] port

Creating a slave is extremely simple. The only information required is the domain name or the network (as was used in the master zone earlier), and the addresses of one or more master nameservers. As with Master zones, you configure both a forward and reverse zone type for each zone. This server can then be used by clients just as the master zone is used. In fact, whether it is a slave or master is entirely transparent to the user.

Creating a Forward Zone

A forward zone is simpler still. It's only possible configuration options are whether it is a forward (name to address) or reverse (address to name) zone type, the name or network of the domain, and the master servers to forward requests to. A forward zone is just specific instructions for BIND that it should forward requests for a specific zone to one or more specific name servers. BIND does not perform zone transfers with a forward zone, as it does in the case of slave and stub zones.

Tutorial: Setting up a Caching Nameserver with BIND

A caching nameserver can be beneficial in a number of situations. First, because it brings name service closer to the user, performance of all name-based services will likely be improved. Also, in secured environments with a strict firewall implementation, it can be used to allow local clients to obtain name service without having to pierce the firewall for all users. Only the local caching DNS server must have access to outside name servers. Finally, it provides a simple mechanism for providing a private namespace to local users, by allowing users to obtain all name service from the local caching name server which also acts as a master name server for the local network namespace..

A caching nameserver is perhaps the simplest type of nameserver to configure, and Webmin makes the configuration even easier. Because caching is a core part of how DNS scales, it is an automatic part of any BIND configuration. All that is left for us to do is allow Webmin to create our initial configuration files, and alter a couple of options in the configuration.

Initializing the named.conf

When first opening the Webmin BIND module, you'll be given a few choices about how to generate the initial configuration files. The ideal choice is to allow Webmin to initialize your configuration, and download the root name server list. If you are not currently connected to the network you can choose to use the root name server list file that is included in the Webmin distribution.

Adding Forwarders

After Webmin has completed the download, and initialized your files, click on the **Forwarding and Transfers** icon. Add the primary and secondary name server addresses provided by your ISP to the field labelled **Servers to forward queries to**. Then select `Yes` for the option **Lookup directly if no response from forwarder**. Click **Save**.

Believe it or not, your configuration is finished. Simply click on the **Start BIND** button, and point your client workstations to the IP of your server for their primary name server, and test it out. Check the later section on troubleshooting BIND if problems arise.

Tutorial: Name Resolution for Virtual Hosts

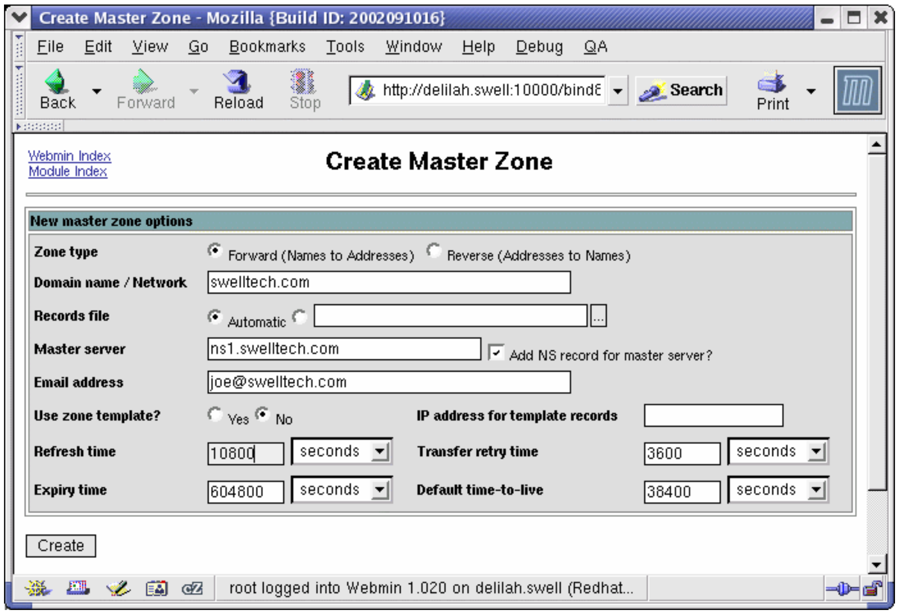
As discussed earlier in the Apache chapter, a name-based virtual host has to have a name mapped to an IP address before you can even access its contents with a browser. BIND, of course, will be our means of providing lookup of those names. Because we're only concerned with web service for this tutorial, we only need to concern ourselves with the creation of a forward zone (a forward zone maps names to addresses).

Create a new master forward zone

Assuming you've already allowed Webmin to initialize your `named` configuration files you're ready to add a master forward zone for your domain. Click on the **Create a new master zone** link on the front page of the BIND module.

The **Zone type** should remain at its default of `Forward`. The **Domain name/Network** field should contain the second level domain name under which your virtual hosts will reside. For example, if I had one or more virtual hosts under the `swelltech.com` domain, that would be the domain name I would enter here. If you have other second level domains, you will create a zone for each. It is easiest to allow Webmin to automatically name the **Records file**, and the **Master server** will probably be correct if your hostname is configured correctly. Enter your email address, or the address you would like to be the administrative contact for this zone, into the **Email address** field. Finally, click **Create**. You will immediately be directed to the new zone for further configuration.

Figure 8.11. An example master zone


Create Master Zone - Mozilla {Build ID: 2002091016}
File Edit View Go Bookmarks Tools Window Help Debug QA
Back Forward Reload Stop
http://delilah.swell:10000/bind8
Search
Print
Webmin Index
Module Index
Create
root logged into Webmin 1.020 on delilah.swell (Redhat...

Create Master Zone

New master zone options

Zone type	[✓ Forward (Names to Addresses)] Reverse (Addresses to Names)		
Domain name / Network	swelltech.com		
Records file	[✓ Automatic]		
Master server	ns1.swelltech.com [✓ Add NS record for master server?]		
Email address	joe@swelltech.com		
Use zone template?	Yes [✓ No]	IP address for template records	
Refresh time	10800 seconds	Transfer retry time	3600 seconds
Expiry time	604800 seconds	Default time-to-live	38400 seconds

Adding Address Records

Now we can begin adding records to our new zone. The first record I would add to my `swelltech.com` domain would be `swelltech.com` itself, and it will be an address record, also known as an A record. Clicking on the **Addresses** icon provides a simple form for adding the new record. Because this first record is for a host named simply `swelltech.com`, we enter nothing in the **Name**. Then we enter the IP address of the server we'd like this name to point to, in my case it is the same address on which my Webmin server is running. All other fields can remain at their defaults. Clicking **Create** adds the record.

Follow the same steps to add another address record for `www.swelltech.com`, presumably on the same IP. All that changes from the above steps is to enter `www` in the **Name** field instead of leaving it blank. If you've worked through the examples in the Apache tutorial on virtual hosting, you'll now have all of the pieces for web service on both domain names.

Adding an Mail Server Record for Mail

Because no domain would be complete without mail service, and mail service for a domain does not have to reside on the same server as web service, we need to have some way to tell mail servers where to direct our mail. Luckily, the designers of DNS have thought of that already and provide the MX, or mail server, record as a means of notifying other mail servers where to send email destined for the domain.

Adding a mail server is usually a two part process. First, a new record is created pointing to the address of the mail server. In the case of small networks, this will likely be a machine that is providing other services, for example the Swell Technology mail server resides on the same machine as our webserver, and our NTP time server. So, in most cases we can use a Name Alias record, also known as a CNAME record, for our mail server name. If you have a dedicated mail server you will use an address record instead.

Adding a Name Alias

Because my mailserver is hosted on the same address as my webserver, I've chosen to use a CNAME record, or name alias, for `mail.swelltech.com`. Creating a name alias record is a lot like creating an address record. Click on the **Name Alias** icon, and fill in the appropriate fields. In this case, I will fill in `mail` for the **Name** and `swelltech.com.` for the **Real Name**. Notice there is a period at the end of my real name. This period is significant, and required to indicate a fully qualified domain name, otherwise the real name pointed to would be `swelltech.com.swelltech.com`, which is probably not what we want. Click **Create** to add the new record.

Note

This step is not strictly necessary if your mail server is hosted on the same machine as other named services. However, traditionally mail servers have had a name record of their own, usually `mail.domain.com` or `smtp.domain.com`. It also makes it easier to plan for later network expansions if you begin your network design with appropriate names for all of the services available on your network. If you wish to avoid adding a CNAME for mail service, you can skip this step, and point your MX record to an existing name.

Creating an MX Record

Now that we have a name for our server, we can add an MX, or mail server, record. This is simply a record that indicates to other mail servers where mail for our domain should be delivered. In my case, I would like mail directed to `swelltech.com` and all names within the domain to be delivered to `mail.swelltech.com`. So when a mail server receives a mail from one of its users directed to `joe@swelltech.com`, it will first find out where that mail ought to be delivered by querying the name server that is authoritative for `swelltech.com` for its MX record.

To create a new mail server record, click on the **Mail Server** icon. Since we are currently concerned with our primary domain, in my case `swelltech.com`, the **Name** field can be left empty. The **Mail Server** field can be filled in with the name of the mail server we created in the previous step, `mail.swelltech.com` in my case. There is an additional field required, called the **Priority**, which is simply a number that dictates the preference of this mail server relative to others that may be configured, where lower numbers have higher priority with zero being the lowest. Traditionally, a priority of `10` is used for the primary mail server, and other servers will be given priorities higher in steps of ten. So a backup mailserver could have a priority of `20`. There is no enforcement of this de facto standard, so you could use priorities of `0` and `43` to represent your primary and backup mail servers, but following traditions is probably more polite to any administrator who might have to follow in your footsteps. Click **Create** to add the mail server record.

Applying Changes and Testing the Results

Now we have the bare minimum configuration required to make good use of our nameserver in the real world, so let's reload our BIND configuration and make sure it is working. First, return to the BIND module front page by clicking on the **Module Index** link in the upper right corner of the page. Then click the **Apply Changes** button at the bottom of the page to signal BIND to reload its configuration files.

To test our work, we can use the `host` program. First, we'll test to be sure our domain is resolvable from our nameserver:

```
[joe@delilah joe]$ host swelltech.com 192.168.1.1
Using domain server:
Name: 192.168.1.1
Address: 192.168.1.1#53
Aliases:

swelltech.com has address 192.168.1.1
```

The `host` command is discussed further in the troubleshooting section of this chapter, but I will point out arguments I've used. Obviously, the first argument to the command is `swelltech.com`, which is the domain I'd like to lookup. While the second argument is `192.168.1.1`, which is the nameserver I'd like to query for the information. This allows us to easily setup a nameserver in isolation, without relying on it for real world name service, so that it can be thoroughly tested and confirmed working. Since the above result is exactly what we expected to see, we can move on to testing the MX and NS records, to be sure they also match our expectations.

```
[joe@delilah joe]$ host -t mx swelltech.com 192.168.1.1
Using domain server:
Name: 192.168.1.1
Address: 192.168.1.1#53
Aliases:

swelltech.com mail is handled by 10 mail.swelltech.com.
```

This time, we've added an additional argument, "`-t mx`", to specify the type of record we'd like to retrieve. With this we can retrieve any record type we would like to test. Our only other currently configured record type is an NS record to indicate the authoritative name server for this domain, so we'll also check it.

```
[joe@delilah joe]$ host -t ns swelltech.com 192.168.1.1
Using domain server:
Name: 192.168.1.1
Address: 192.168.1.1#53
Aliases:

swelltech.com name server ns1.swelltech.com.
```

So far, so good! Just for completeness, let's run one last lookup, to see how a name alias differs from a normal address record.

```
[joe@delilah joe]$ host mail.swelltech.com 192.168.1.1
Using domain server:
Name: 192.168.1.1
Address: 192.168.1.1#53
Aliases:

mail.swelltech.com is an alias for swelltech.com.
swelltech.com has address 192.168.1.1
```

Assuming all went well with your results, you're ready to put your nameserver into service. The rest of this chapter is devoted to troubleshooting methods, and more advanced uses for the `host` and `dig` utilities, and working through the examples might provide some insight into the workings of DNS in a variety of applications and environments.

Troubleshooting BIND

There are a number of tools that are available to assist with testing and troubleshooting problems with your BIND configuration. The simplest tool on most systems is the `host` command, which simply performs an address lookup or a reverse address lookup. More complete information can be gathered using `dig`. On extremely old systems, `nslookup` might still be the only available option for this type of testing, but it is rather confusing and inconsistent in a number of ways and is not recommended.

Using host

The `host` utility provides a very easy to use command line interface for looking up a name or an address. In its simplest usage form it will return the IP address or addresses when given a hostname as its argument. The mail host address or addresses will also be returned if available. If the command line argument is an IP address, a reverse lookup will be performed and the hostname will be returned. `host` also has a few additional options that may be helpful in tracing DNS problems or testing your configuration for correctness. You may query your system default name server, or you can query any nameserver you need to test by appending a server address to the end of the command line.

The simplest usage of `host` is to lookup an address, or a name.

```
[joe@delilah joe]$ host swelltech.com
swelltech.com has address 216.40.244.74
[joe@delilah joe]$ host 216.40.244.74
74.244.40.216.in-addr.arpa domain name pointer swelltech.com.
```

Above, I’ve requested the address for the domain `swelltech.com`, and then the name for the address `216.40.244.74`. I could also ask for the nameservers that are authoritative for a domain by using the `-t ns` command line option..

```
[joe@delilah joe]$ host -t ns google.com
google.com name server ns2.google.com.
google.com name server ns3.google.com.
google.com name server ns4.google.com.
google.com name server ns1.google.com.
```

Finally, the MX record can be retrieved by using the `-t mx` option.

```
[joe@delilah joe]$ host -t mx yahoo.com
yahoo.com mail is handled by 1 mx2.mail.yahoo.com.
yahoo.com mail is handled by 5 mx4.mail.yahoo.com.
yahoo.com mail is handled by 1 mx1.mail.yahoo.com.
```

In the above MX record example, yahoo.com has three mail servers defined. The MX record has an additional field to indicate the priority of the server relative to other servers, in this case `mx1.mail.yahoo.com` and `mx2.mail.yahoo.com` have a priority of `1` so they will be preferred over `mx4.mail.yahoo.com`, which will only be used in the event the other two servers are unavailable.

Note

Not all options of the `host` utility are discussed here. For more detailed coverage of all of the command line options consult the `host` manpage, either via the Webmin manpages interface or from the command line.

The `-v` option enables *verbose* output, which is in a format compatible with BINDs own master file format, so it can be directly imported into a BIND configuration without additional parsing or modification. The `-t` option allows you to specify the query type to make of the nameserver. There are many query types, but common types that may be useful include `cname` which lists the *canonical name* entries for the host if available, and the `ns` type which lists the authoritative nameservers for the host.

One of the more verbose options of `host` is the `-a` option which will list all available fields for the host, including all `A` records, `CNAME` records, `NS` records, etc. Using `host` with this option against your own nameserver is a good way to insure it is providing all of the information you expect.

Using dig

The `dig`, or *domain information groper*, provides the ability to query any domain server for information about the domains it serves. It operates in both an interactive mode and a batch query mode. Using `dig` is much like using `host`, in that in its simplest mode you enter just the command and the name to lookup. However, `dig` is more verbose by default and presents a much wider array or information, though in a somewhat less readable form.

Just like `host`, it is possible to query your default system resolver, or you can query a name server specified on the command line. For example, I could query my local nameserver about the `nostarch.com` domain.

```
[joe@delilah joe]$ dig @192.168.1.1 nostarch.com

; <<>> DiG 9.2.1 <<>> @192.168.1.1 nostarch.com
;; global options:  printcmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 21448
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 2, ADDITIONAL: 2

;; QUESTION SECTION:
;nostarch.com.                  IN      A

;; ANSWER SECTION:
nostarch.com.           8585    IN      A       66.80.60.21

;; AUTHORITY SECTION:
nostarch.com.           8585    IN      NS      ns1.megapath.net.
nostarch.com.           8585    IN      NS      ns2.megapath.net.

;; ADDITIONAL SECTION:
ns1.megapath.net.       123591  IN      A       66.80.130.23
ns2.megapath.net.       123591  IN      A       66.80.131.5

;; Query time: 281 msec
;; SERVER: 192.168.1.1#53(192.168.1.1)
;; WHEN: Sat Oct 26 19:42:45 2002
;; MSG SIZE  rcvd: 126
```

Above, we have a large amount of information, though not all of it is generally useful to us. First is the version of `dig`, and the command line options we specified. The comes some status information, including the `NOERROR` designator that indicates the name was retrieve without error. If the domain did not exist, or could not be queried, there would be an `NXDOMAIN` error or some other error. Next are the flags of the query. In this case, we have one query and one answer which are contained in the `QUESTION` and `ANSWER` sections below it. The next two items inform us of the number of `AUTHORITY` and `ADDITIONAL` sections that follow. In this case, the authority section gives us the primary and secondary nameservers for this domain, `ns1.megapath.com` and `ns2.megapath.com`, and the additional section provides the IP addresses of those nameservers.

The last few lines give the time the query required, the server that was queried and the port on which it was queried, the time and date on which the query was made, and the size of the message received from the nameserver.

Like `host`, `dig` has a mode in which you can query all of the information available about the domain. This can be done by appending the `ANY` argument to the end of the command line. Further, the options `NS`, `MX`, `CNAME`, etc. are also available and do just what you would expect.

Chapter 9. FTP Server

The File Transfer Protocol is a light weight protocol for the transferring of files over a network. It is a client server protocol requiring an FTP server, such as WU-FTPD [http://www.wu-ftpd.org/] and a client such as `ncftp` [http://www.ncftp.com/]. WU-FTPD is the most popular ftp server on the internet, and though it has had its problems (primarily security related) it is a very featureful, and functional ftp daemon. WU-FTPD has been in constant development for over 10 years, and has attracted a lot of users and developers in that time. This chapter covers all of the configuration files involved in running a WU-FTPD installation. However, the security of the server is beyond the scope of this document. It is highly recommended that you make sure your FTP server is running the latest version (2.6.2 is the version as of this writing) as all earlier versions have widely known security exploits.

Users and Classes

Here you configure the various user and group features of the `ftpaccess` file. For more on this file and its structure, see the `ftpaccess` man page [http://www.wu-ftpd.org/man/ftpaccess.html].

User classes
Here you define a class of users, and the networks from whence they are allowed to log in. Note that the default includes a class `all` for users of all types (`real`, `guest`, and `anonymous`) which matches all networks with the `*`. This option configures the `class` directive.

Unix users and UIDs to treat as guests and **Unix groups and GIDs to treat as guests**
Here, you can define users and groups who would ordinarily qualify as `real` users who will be treated as guests, or anonymous users. In other words, a chroot will be done, and the user will not be permitted to use the USER or PASS commands. The users home directory must be properly set up, as an anonymous FTP directory would be. These two options correspond to the `guestuser` and `guestgroup` directives.

Unix users and UIDs not to treat as guests and **Unix groups and GIDs not to treat as guests**
If your server is configured to treat all users as guests, then you can selectively allow a few users to be treated as real users (i.e. with access to the system directories, and without performing a chroot). These options configure the `realuser` and `realgroup` directives.

Unix users to deny (from /etc/ftpusers)
This is simply a list of users to deny access to the server to. This information is drawn from the `/etc/ftpusers` file. Adding to this list will add to the file. Note that if the next two sets of options are used to precisely control access to the FTP server (i.e. by blocking all access except for explicitly permitted users), then the ftpusers file becomes unnecessary.

Unix users and UIDs to deny and **Unix groups and GIDs to deny**
Here you can enter any users or groups you would like to deny access to. These options configure the `deny-uid` and `deny-gid` directives.

Unix users and UIDs not to deny and **Unix groups and GIDs not to deny**
These options can be used to negate the above options, if you chose to disallow all access from all users and groups. In this way, you could allow only explicitly configured users to access the server.

Messages and Banners

WU-FTPD provides a simple mechanism for informing users of important information regarding the server, or files on the server. As in the previous section, this page configures certain aspects of the `ftpaccess`.

Message files
This option configures the messages that will be displayed on login to the server. The default on many systems is to display a message contained in the file `welcome.msg` in the root ftp directory, if it exists, as soon as someone logs in. Also, when entering a directory the server will check for the existence of a file called `.message` in the new directory. If it exists, it will be displayed. Both of these are optional, and the names and actions can be changed at will. This option configures the `message` directive.

README files
Here, you can configure the behavior of the server with regard to README files. This, too, is set up by default on most systems. In this case, any file beginning `README` will be displayed to the user, both on logging into the server, and upon entering a new directory. This option configures the `readme` directive.

Greeting level
Here you can select how much information about your server will be presented to the user. This can include the hostname, the server version, and nothing. This can be a mild security risk, as the first step to cracking a box is to figure out what software and version is running. However, if the system is kept up to date (religiously), and the system is otherwise secured, this should not be an issue. Many paranoid types (and there's no harm in being paranoid in a world where script kiddies are a dime a dozen) will disable all specific software and version information on all of their publicly accessible services. This option configures the `greeting` directive.

Pre-login banner
Here you configure a banner that will be displayed before the user is prompted for a username and password. This option can cause problems with non-compliant FTP client software. This option configures the `banner` directive.

Hostname for messages
This will be the hostname that is printed in the greeting message, and anytime the hostname is inserted into a message for the user. This option configures the `hostname` directive.

Owner's email address
Here you can set the email address of the servers maintainer. This will be presented as the contact email for this server. This option configures the `email` directive.

Limits and Access Control

This page provides access to various resource limits, as well as provides system level access controls. If you wish to limit the system or network resources your server uses, this is the page to start with.

Deny access from
Here you may deny access to the server from any number of IP addresses, and you can provide a filename of a text error message file to send the client in the event they have been denied access based on this rule. This option configures the `deny` directive.

Concurrent user limits
Here you may limit the number of concurrent users from a given user class. To configure this option, you must provide a class for which the rule will apply, and the maximum number of users to allow to log in simultaneously. Next, you can choose times in UUCP `L.sys` format. This format is pretty simple, you choose the days by entering the first two letters with the first capitalized (i.e. `Su` for Sunday, or `Mo` for Monday), or `Any` for all days. Then the time is set in military format (1000 for 10AM, 2300 for 11PM, etc.). So to limit users during business hours, for example, we could enter `MoTuWeThFr0800-1800`. This option configures the `limit` directive.

File and data transfer limits
This option provides access to the transfer limits features of WU-FTPD. It is possible to limit user's downloads based on files or data or both. You may also configure limits for outgoing and incoming transfers, and to which classes the limits should apply. This option configures the `file-limit` and `data-limit` directives.

Deny access to files and **Allow access to files even if denied**
If there are files in your directory tree that you do not wish to be retrievable by one or more classes of users, you may enter it here. The path may be relative to the FTP chroot, or it may be an absolute path (select which using the **Relative to chroot** option). This option correlates to the `noretrieve` directive. The **Allow access to files even if denied** option allows you to unselect files that would ordinarily be made inaccessible by the previous option. This option correlates to the `allow-retrieve` directive.

Anonymous session limit Guest session limit
Anonymous users and guest users can be limited to the specified time. This option correlates to the `limit-time` directive.

Maximum login failures
This option allows you to define the number of failed login attempts to allow before a "too many login failures" message is presented to the user and the FTP connection is closed. This option configures the `loginfails` directive and defaults to 5.

Can switch groups?
If this option is turned on, a user may switch to a new group after login. The user will then have the privileges of the new group. This configures the `private` directive and defaults to `off`.

Networking

Here you configure a few of the networking related options for WU-FTPD.

TCP window sizes
This option configures the window size of TCP packets for the data connection. This may be useful if clients are PPP dialup users, as a smaller TCP window can provide faster transfers. Usually this does not need to be modified. This option correlates to the `tcpwindow` directive.

Addresses for PASV connections
Allows control of the address reported in response to a PASV command. This does not alter the address that the daemon listens on, only the address it reports to clients on a passive connection. This option configures the `passive address` directive.

Ports for PASV connections
Configures the port numbers which may be used for passive data connections. You may select port ranges for specific networks. When a control connection matches the network specified, a randomly selected port from the range provided will be used for the daemon to listen on. This feature allows firewalls that limit open ports to be used, while still provided FTP services. `passive ports` directive.

Logging

Here you configure the logging behavior of WU-FTPD. Logging for this daemon is quite simple, and doesn't present nearly the options of servers like Apache or BIND. Nonetheless, it is possible to gather a large amount of useful information from your FTP daemon.

Log all commands for
Selecting one or more types of users here will provide a log of every single command executed by a user of the given type. This option configures the `log commands` directive.

Log transfers for
As above, you may select one of more types of users to log for. This option when enabled will log every file transfer made by any users of a given type. This option configures the `log transfers` directive.

Log transfers to
This option sets where transfer logs will be stored. If `System log`, transfers will be logged via the syslog daemon to the standard system log (configured by your syslog configuration). If `XFER log`, transfers will be logged to a separate transfer log file. This option configures the `log syslog` directive.

Log security violations for

It is possible to configure your server to log attempts by users of a given type to perform actions which are denied by the server. This option configures the `log security` directive.

Aliases and Paths

This page allows you to configure aliases that the FTP daemon will use when a client issues a `cd` command. If an alias is defined, in the **CD directory aliases** section, the **Alias name** is the directory name that the client can enter, while the **Alias to directory** field defines to what directory the client will switch to. So, for example, if the **Alias name** is `bin` and the **Alias to directory** is `/home/ftp/pub/usr/local/bin`, then when the client enters `cd bin` he will be directed to `/home/ftp/pub/usr/local/bin`.

Next comes the **CD directory search path**. With this option, you can configure any number of directories that can be in the search path. For example, if a client enters `cd bin`, and there is no `bin` directory in the current directory, then the server will check the directories in the search path. If the directory requested exists in one of those directories, the client will be directed there.

Anonymous FTP

WU-FTPD provides a number of capabilities for serving anonymous (i.e. non-authenticated) users. And anonymous user generally has very limited capabilities on the server, and is often unable to upload files, or modify any content on the server. This page provides access to many of the features related to anonymous users on your FTP server.

Anonymous FTP root directories
This option allows you to configure the root directory for anonymous users of a given class. So setting this to `/home/ftp` for the `all` class, will cause the server to chroot to the directory specified for any anonymous user. The initial directory (somewhere above the chrooted directory) will then be the home directory indicated in `/etc/passwd` for the user `ftp`. The server will then Using this option, is becomes possible for local network users to be chrooted to a different directory than users from the internet, for example. This option configures the `anonymous-root` directive.

Guest root directories
This option, much like the previous option, configures the chroot behavior of the server. In this case, however, it configures for guest users who have logged in with a valid username and password. So, it is possible to set the chroot environment to `/home`, causing users to be unable to traverse the directory tree below that point. The initial working directory, unless otherwise specified, will be the users home directory specified in the `/etc/passwd`. This option configures the `guest-root` directive.

Unix groups for anonymous users
Here you may configure the default Unix group whose permissions will apply to anonymous users of a given class. This option configures the `autogroup` directive.

Anonymous FTP password check
The server always performs a username and password authentication check, before permitting access. The convention is to accept a blank username, and the valid email address of the user. Here you can configure how strict the checking of the given email address is, and whether to issue a warning, but still allow the login, or deny access, if the email address is invalid for some reason. This option configures the `passwd-check` directive.

Anonymous FTP passwords to deny
If you wish to be more stringent about disallowing generated passwords, such as those presented by some web browsers, you may enter those addresses here. This will not prevent browser client users from accessing your server, it will merely force them to configure their browser to provide a legitimate email address. This option configures the `deny-email` directive.

Permissions

This page allows you to configure the permissions that users of each type will have for given classes. You may create any number of permissions rules.

Command restrictions
This section creates a number of different types of rules to regulate the various commands that a user may be able to perform on your server. The **Command** options are `chmod`, `delete`, `overwrite`, `rename`, and `umask`, which match the directive names. You may choose a user type, and a class for each rule.

Disallowed upload filenames
Here you may specify regular expressions to match filenames that may not be uploaded by a specified type or list of types and classes. The option also allows you to specify the path to a message file to be displayed if an upload is disallowed by the rule. By default, the message is located in `/etc/pathmsg`, and the server will revert to this if the path you provide is invalid. This option corresponds to the `path-filter` directive.

Miscellaneous Options

Long listing command, **Short listing command**, **Plain listing**
Defines the command to be used for each of the types of file listing that a user may specify. The defaults are usually sane, and should only be modified if necessary. These options correlate to the `lslong`, `lsshort`, and `lsplain` directives.

Shutdown notification file
Here you configure the path to the message that the server will display prior to shutting down. This option correlates to the `shutdown` directive and usually defaults to `/etc/shutmsg`.

Service process nice level

This sets the niceness level for the ftp daemon process. This may be set per class of user, or for all classes. This option correlates to the `nice` directive.

Default umask for uploaded files
This option defines the umask that is applied to uploaded files by users of the given class. This option correlates to the `defumask` directive.

Chapter 10. Postfix

Postfix is an efficient and featureful mail server that was designed by Wietse Venema at the IBM T.J. Watson Research Center. It was intended to be a replacement for the popular Sendmail. While it still represents only a small percentage of mail server installations worldwide, its popularity is growing rapidly, due to its simple configuration, secure implementation, and high performance architecture. Also, because Postfix is designed to behave outwardly like Sendmail, it is a mostly drop-in replacement for the older, larger, and slower mail server. It does lack some of the obscure features of Sendmail, but the features it lacks are rarely used by the vast majority of users, so they are not often missed.

The Postfix project, originally named VMailer (fortunately for everyone, the name was changed before release due to legal entanglements of the VMailer name), is designed as a group of related but separate executable components, providing security through segmentation. Smaller parts are easier to debug, as well. The internet home of Postfix is www.postfix.org [http://www.postfix.org]. Postfix is an ideal mail server choice for new mail administrators, and even experienced Sendmail administrators might find its simplicity appealing. Because it provides a quite compatible Sendmail-ish exterior, and provides programs of the same names (such as `sendmail` for sendind mail, `mailq` for managing the queue, etc.), and can utilize the same type of aliases and forwarding files that Sendmail uses, it is possible to replace Sendmail without reconfiguring existing mail-related tools, or rewriting local scripts. After such a switch, local users may not even notice the difference.

Note

The previous statements should not be viewed as an endorsement of Postfix as being a *better* mail transport agent than Sendmail. The two projects have different emphasis, and have had very different development models. Sendmail has been in use all over the world for over 20 years in one form or another, and thus has an extremely large headstart on Postfix with regard to maturity, available documentation, number of experienced administrators, and support tools. Postfix is only a few years old and has much more limited supporting documentation and tools to enhance it. The decision for which mail transfer agent is appropriate for your network will be dictated by the requirements and the availability of local expertise.

General Options

The **General Options** page configures a number of options regarding the general behavior of Postfix. Specifically, most of the configuration options that impact all users and all messages are configured here. Postfix, keeping with its philosophy of simplicity, usually requires only a few configuration file changes to get a mail server running efficiently and securely.

The **General Options** page is divided into two parts. The upper section is labelled **Most Useful General Options** and the lower section **Other General Options**. In many standard installations, it may be possible to start up a Postfix installation with just configuration of one or more of the three directives in the upper section. Unless otherwise stated, all of the options on this page correspond to directives in the `main.cf` file in the Postfix configuration directory.

Most Useful General Options

What domain to use in outbound mail
Here you may specify the domain or hostname to use to identify the source on outgoing mail. Postfix defaults to using the hostname of the server, but you most likely will want it to identify mail as coming from your domain name instead. If your mail server will be accepting mail for a large number of users under a single domain name, you will most likely configure domain name here, and create a domain-wide alias database to map usernames to their respective local mail servers. This option correlates to the `myorigin` Postfix directive.

What domain to receive mail for
This option accepts a list of domains and addresses to receive mail as its final destination. In other words, when mail reaches the server destined for addresses in this field, it will deliver the mail to a local user, rather than forward it to another mail server. By default, this is all configured addresses on the machine as well as `localhost` within the local domain. You may specify any number of domains or hostnames separated by commas, or you may provide a full path to a file containing similar entries. The variables `$myhostname` and `$mydomain` may be used to represent those concepts to Postfix automatically. The ability of Postfix to use such variables throughout its configuration files makes it easier to maintain a number of Postfix servers with very similar configurations. This option correlates to the `mydestination` directive.

What trouble to report to the postmaster
Postfix provides the ability to select what types of error messages will be mailed to the designated postmaster of the mail server. Assuming you have setup a `postmaster` alias that directs mail to a real person, Postfix will send reports of all of the types of trouble designated here. The available clases are:

`bounce`
When this option is selected, whenever a message is undeliverable, a bounce message (called a single bounce message will be sent to the sender of the message and the local postmaster. For the sake of privacy only the headers will be sent in the message to the postmaster. If the first bounce to the sender is returned as undeliverable, a double bounce message will be sent to the postmaster with the entire contents of the first single bounce message.

`2bounce`
Causes double bounce messages to be sent to the postmaster.

`delay`
If the delivery of a message is delayed, the postmaster will receive a notice, along with the headers of the delayed message.

`policy`

Notifies the postmaster of messages that were rejected due to a unsolicited commercial email policy restriction. The complete transcript of the SMTP session is sent.

`protocol`
Notifies the postmaster of protocol errors, or client requests that contained unimplemented commands. The complete transcript of the SMTP session is included in the message.

`resource`
Informs the postmaster of undelivered mail due to resource problems, such as a queue file write error.

`software`
Notifies the postmaster of mail not delivered due to software failures.

This option correlates to the `notify_classes` directive, and defaults to reporting only problems that usually indicate a misconfiguration or serious problem (specifically `reource` and `software`). In some high load environments, altering this to include bounce notifications could lead to a large number of notices.

Other Global Options

The lower section of this page is devoted to global options which are less likely to need to be altered. In many installations these options will remain at their defaults.

Send outgoing mail via
This option configures whether outgoing mail should be delivered directly to the recipients mail server, or if a parent mail gateway should be used as an intermediary. If the server is behind a firewall, behind a network address translating router/gateway, or similar, it may be necessary to use an intermediary server to achieve reliable service. Many mail servers on the internet will not accept mail from a server that does not have a working DNS entry and a routable IP address, in order to help prevent spam from forged addresses. Also, local network use policy may require the use of an intermediary for logging, virus scanning, or other purposes that require aggregation of outgoing mail traffic onto a central server. This option corresponds to the `relayhost` directive and defaults to sending mail directly.

Address that receives bcc of each message
With this option, an optional email address may be specified that will receive a copy of every message that enters the Postfix system, excluding locally generated bounce messages. This can represent a breach of privacy in many circumstances, and may be illegal in some countries. It is advisable to be especially cautious about utilizing this option. It can be useful in some environments, however, where central archival of email is valuable for legal or technical reasons. This option correlates to the `always_bcc` directive and defaults to none.

Timeout on handling requests
This option determines how long a Postfix daemon will wait on a request to complete before it assumes the daemon has locked up, at which time the daemon will be killed. This option corresponds to the `daemon_timeout` and defaults to 18000 seconds.

Default database type
This option determines the type of database to use in the `postalias` and `postmap` commands. This option corresponds to the `default_database_type` directive and the default depends on the OS and installed system libraries at the time of building Postfix. Ordinarily on Unix systems this will be `hash` or `dbm`.

Default message delivery transport
The term delivery transport refers to the protocol, or language, used to deliver the message from one mail server to another. The transport on modern systems is nearly always `snmp`, and this is the default in Postfix, but there are still a few legacy `uucp` systems in use. This option is merely the default choice, when no transport is explicitly selected for the destination in the optional transport table. This option corresponds to the `default_transport` directive.

Sender address for bounce mail
In the event a message double-bounces, or first bounces from the recipient and then bounces from the sender when the first bounce notice is sent, the message will be sent to this address. All messages to this address will be silently discarded. In this way bounce-loops can be avoided. This option correlates to the `double_bounce_sender` and defaults to `double-bounce`. The name may be any arbitrary name, but must be unique.

Number of subdir levels below the queue dir
This option configures the number of subdirectory levels below the configured queue directories will be used by Postfix for mail storage. Because of the design of the traditional Unix file system, which includes UFS used by all modern BSD systems and the Linux ext2 and ext3 filesystems, performance becomes measurably slower when an extremely large number of files is stored in a single directory. Thus, programs that generate a large number of files often provide the ability to split files out to a number of subdirectories to keep lookups fast. This option correlates to the `hash_queue_depth` directive and defaults to 2, which is suitable for most moderate and even relatively large installations. Because the number of directories in use increases the search time for object seeks, using a too high value here can be harmful to performance.

Name of queue dirs split accross subdirs
Postfix uses a number of queues to organize messages with varying states and destinations. Each of these queues can be configured to use hashed subdirectories or not. If a queue is selected here, it will be stored in a hashed subdirectory. In some cases, a queue mus not be listed here as performance will be severely impacted, specifically the world-writable mail drop directory. The defer logfile directory, on the other hand must be stored in hashed directories or performance will suffer. This option corresponds to the `hash_queue_names` directive and defaults to `incoming,active,deferred,bounce,defer,flush` and it is rarely necessary or beneficial to alter this configuration.

Max number of `Received:` headers
A message that contains more `Received:` headers than this will bounce. An extremely large number of this header may indicate a mail loop or a misconfigured mail server somewhere in the path of this message. This option correlates to the `hopcount_limit` directive and defaults to 50. This value rarely needs to be altered from its default.

Time in hours before sending a warning for no delivery

If a message cannot be delivered immediately, it will be queued for later delivery. If after this number of hours, the message still cannot be delivered, a warning will be sent to the sender notifying them that the server has been unable to send the message for a specified time. This correlates to the `delay_warning_time` directive and defaults to not sending a warning.

Network interfaces for receiving mail
This option configures the network addresses on which Postfic will accept mail deliveries. By default Postfix will accept mail on every active interface. Here, Postfix will accept the variables discussed earlier. This option configures the `inet_interfaces` directive.

Idle time after internal IPC client disconnects
This option sets the time in seconds after which an internal IPC client disconnects. This allows servers to terminate voluntarily. This feature is used by the address resolution and rewriting clients. This option correlates to the `idle_time` directive and defaults to 100s. This option should probably never need to be altered under normal circumstances.

Timeout for I/O on internal comm channels
This option determines the amount of time in seconds the server will wait for I/O on internal communication channels before breaking. If the timeout is exceeded, the server aborts with a fatal error. This directive corresponds to the `ipc_timeout` directive and defaults to 3600 seconds, or 60 minutes.

Mail system name
This option identifies the mail server system in use to connecting users. It will be used in the `smtpd_banner` which is sent in `Received:` headrs, the SMTP greeting banner, and in bounced mail. Some security experts, who promote security through obscurity, suggest anonymizing all server software to prevent potential crackers from being able to identify the software in use on the server. It is probably not the best use of an administrators time or effort in most environments, however, and many other security tactics are more effective, without negatively impacting the ability to track software problems. This option correlates to the `mail_name` directive and defaults to `Postfix`.

Mail owner
This option specifies the owner of the Postfix mail queue, and most of the Postfix daemon processes. This user should be unique on the system, and share no groups with other accounts or own any other files or processes on the system. After binding to the SMTP port (25), postfix can then drop root privileges and become the user specified here for all new daemon processes. Because of this, if the Postfix daemon is ever compromised the exploiter will only have access to mail and a few other files. Obviously it is good to avoid this as well, but it is certainly better than a root exploit which would allow the exploiter to access and alter anything on the system. This option correlates to the `mail_owner` directive and defaults to `postfix`.

Official mail system version
This paremeter configures the version number that will be reported by Postfix in the SMTP greeting banner, among other things. This correlates to the `mail_version` directive and defaults to the version of Postfix that is installed. Once again, security by obscurity promoters may encourage obfuscation of this value.

Time to wait for next service request
A Postfix daemon process will exit after the time specified here, if it does not receive a new request for service during that time. This option corresponds to the `max_idle` directive and defaults to `100s`. This directive does not impact the queue manager daemon process.

Max service requests handled before exiting
This option configures the maximum number of requests that a single Postfix daemon process will answer before exiting. This option configures the `max_use` directive and defaults to `100`.

Internet hostname of this mail system
This option specifies the internet hostname of the mail server. By default this value will be set to the fully qualified hostname of the server, as determined by a call to `gethostname()`. This option sets the `$myhostname` variable which is used in the defaults to many other options. This option correlates to the `myhostname` directive.

Local internet domain name
This option corresponds to the `mydomain` directive and defaults to the contents of the `$myhostname` variable minus the first component. This option defines the `$mydomain` variable and is used in a number of other configuration option defaults.

Local networks
Postfix provides a flexible set of options to help prevent UCE, or other unauthorized uses of the mail server. This option defines what networks will be considered to be local by Postfix. The value is used to determine whether a client is a local client or a remote client. Policies can be more relaxed for local clients. This option configures the `mynetworks` directive and defaults to a list of all networks attached to the server. For example, if the server has an IP of 192.168.1.48, and a netmask of 255.255.255.0, all of the 192.168.1.0 network will be considered local. If you would like stricter control, or the ability to treat other network blocks as local clients, you can specify them here in the form of network/netmask pairs (i.e. `172.16.0.0/16`. Network/netmask pairs may be inserted from a separate file, if preferred, by specifying the absolute path to the file here.

Send postmaster notice on bounce to...
This option configures the username or email address to whom bounce notices will be sent. This option correlates to the `bounce_notice_recipient` and is set to `postmaster` by default.

Send postmaster notice on 2bounce to...
This option configures the username or email address to whom second bounce messages will be sent. This allows an administrator to watch for second bounces warnings more closely than first bounce messages, because first bounces are far more common and less likely to indicate serious problems. The option configures the `2bounce_notice_recipient` directive and defaults to `postmaster`.

Send postmaster notice on delay to...
This option configures where delay warnings will be sent. This option correlates to the `delay_notice_recipient` directive and defaults to `postmaster`.

Send postmaster notice on error to...
Specifies where error warnings will be sent. This option correlates to the `error_notice_recipient` directive and defaults to `postmaster`.

Mail queue directory
This specifies the directory where Postfix will store queued mail. This will also be the root directory for Postfix daemons that run in a chroot environment. The queue is where messages that are awaiting delivery are stored, thus enough space to accomodate your user mail load should be provided in this directory. This option correlates to the `queue_directory` directive and usually defaults to a sensible location for your OS. Many Linux systems will have the mail queue in `/var/spool/mail` or `/var/spool/postfix`.

Lock file dir, relative to queue dir
This option configures the location of the Postfix lock directory. It should be specified relative to the queue directory, and generally will simply be a subdirectory of the queue directory. This option configures the `process_id_directory` directive and defaults to `pid`.

Separator between user names and address extensions
This option specifies the separator character between usernames and address extensions. This option correlates to the `recipient_delimiter` directive and defaults to using no delimiter. This option impacts **Canonical Mapping**, **Relocated Mapping** and **Virtual Domains**.

Postfix support programs and daemons dir
This option specifies the directory where Postfix will look for its various support programs and daemons. The directory should be owned by `root`. This option correlates to the `program_directory` directive and defaults vary depending on installation method and OS variant. On many Linux systems this will be `/usr/libexec/postfix`.

Relocated mapping lookup tables
Postfix can provide a relocation notice in response to messages sent to users who no longer receive mail from this server. If enabled, this option specifies the location of the file containing a table of contact information for users who no longer exist on this system. By default this feature is disabled. This option correlates to the `relocated_maps` directive. If enabled a reasonable choice for this option might be `/etc/postfix/relocated`.

Disable kernel file lock on mailboxes
On Sun workstatsions, kernel file locks can cause problems, because the `mailtool` program holds an exclusive lock whenever its window is open. Users of other OS variants, or Sun systems where no Sun mail software is in use, may ignore this option. This option correlates to the `sun_mailtool_compatibility` directive and defaults to `No`.

Max time to send a trigger to a daemon
This option specifies the maximum amount of time allowed to send a trigger to a Postfix daemon. This limit helps prevent programs from getting hung when the mail system is under extremely heavy load. This option correlates to the `opts_trigger_timeout` directive and defaults to `10s`.

Address Rewriting and Masquerading

Postfix offers a relatively easy to use, and flexible, address rewriting system, allowing it to act as a mail gateway for a large network, or as a gateway between legacy mail systems and the internet at large.

Note

The options on this page are also discussed on the Postfix Configuration - Address Manipulation [http://www.postfix.org/rewrite.html] page at the Postfix homepage. It is worth reading if advanced address rewriting is required in your mail system.

Rewrite "user%domain" to "user@domain"
This option is useful for some legacy systems that used strange address trickery such as, *user%domain@otherdomain*. It is not generally useful in modern environments, but it is not harmful so usually defaults to `Yes`. This option correlates to the `allow_percent_hack` directive.

Rewrite "user" to "user@$mydomain"
This option configures how Postfix will handle an address that has no domain name in the destination. If enabled, it will append the value of `$mydomain` to the address. This option correlates to the `append_at_myorigin` directive and defaults to `Yes`. Because most Postfix components expect addresses to be of the form `user@domain` it is probably never appropriate to disable this feature.

Rewrite "user@host" to "user@host.$mydomain"
This option configures whether simple host addresses will have the value of `$mydomain` appended to them. This option correlates to the `append_dot_mydomain` directive and defaults to `Yes`. Some administrators may find that this explicit rewrite has unexpected consequences, but it is very rarely a problem.

Rewrite "site!user" to "user@site"
Legacy UUCP networks use a different addressing format than modern SMTP systems. This option enables Postfix to convert the old-style address to a modern address for delivery via the standard SMTP protocol. This option configures the `swap_bangpath` directive and defaults to `Yes`.

Send mail with empty recipient to...
The specifies the destination of mail that is undeliverable. Typically, this will be bounce notifications and other error messages. This option correlates to the `empty_address_recipient` directive and defaults to `MAILER-DAEMON`, which by default is simply an alias to `postmaster`.

Address masquerading
Address masquerading is a method whereby hosts behind the gateway mail server may be hidden, and all mail will appear to have originated from the gateway server. If enabled, the host and/or subdomain portion of an address will be stripped off and only the domain specified here will be included in the address. For example, if `$mydomain` is specified here, an outgoing mail from `joe@joesmachine.swelltech.com` would become simply `joe@swelltech.com`, assuming the $mydomain variable contains `swelltech.com`. This option correlates to the `masquerade_domains` directive and it is disabled by default.

Masquerade exceptions
It is possible to skip over the masquerade rules define above for some usernames. The names to be excepted from those rules can be entered here. This option corresponds to the `masquerade_exceptions` directive and by default no exceptions are made.

Mail Aliases

Mail aliases provide a means to redirect mail to local recipients. Specifically, it allows mail destined for a number of different addresses to be delivered to a single mailbox. A common use for this is to direct mail for users like `postmaster` to a real person. This page is divided into two sections. The upper section labelled **Aliases Options** contains the location and format of the alias files that Postfix should use to construct its alias databases and specifies the type of database to use. The lower section provides a list of all configured aliases on the system, and what the alias maps to.

Aliases Options

Alias databases used by the local delivery agent
This option sets the filenames that Postfix will use for local delivery alias translation. The filename will have a suffix appended to it based on the file type. This option correlates to the `alias_maps` directive and the default is system dependent. Some common defaults include `hash:/etc/aliases` or `hash:/etc/postfix/aliases`. The first part of the entry, preceding the colon, is the type of database to use, which will be one of `hash` for systems with a modern Berkeley DB implementation, `dbm` for older style systems that only have `dbm` available, or `nis` for systems that run NIS. The after-colon portion of the entry is the path to the filename from which the database name is derived. The databases will be built from the contents of the flat files by Postfix on startup, or when running the `newaliases` command.

Alias databases built by Postfix
This option, closely related to the above, specifies the alias database file(s) that are built when the `newaliases` or `sendmail -bi` commands are run. These commands generate the alias database from the flat file in the above option, in order to speed alias lookups performed by Postfix. Because there may be thousands of aliases on a large mail server, importing them into a database is necessary to maintain efficiency. This option correlates to the `alias_database` directive. Defaults are system dependent, but will commonly be the same as the above option, with the appropriate database file suffix appended.

Aliases

This section of the page provides a list of all configured aliases. To edit an alias, click on the name of the alias. To create an alias, click on the **Create a new alias** button and fill in the alias `Name`, and `Alias to...` fields. Whenever the aliases files have been modified, it is necessary to recreate the aliases database files as well in order for the changes to take effect. When using Webmin this step is performed automatically, and no additional steps are required.

Note

If adding aliases from the command line, it is possible to regenerate the aliases database using the command **postalias**. The manpage for this command is a useful resource for understanding how aliases databases are handled in Postfix.

Canonical Mapping

Canonical Mapping Tables

Canonical mapping in Postfix is used for modifying mail in the incoming queue, and it alters both the message headers and the message envelope information for local or remote mail. This mapping can be useful to replace login names with *Firstname.Lastname* style addresses, or to clean up odd addresses produced by legacy mail systems.

Address mapping lookup tables
This option specifies the location of the optional canonical address mapping table file. This mapping is applied to both sender and recipient addresses, in both envelopes and headers. This option configures the `canonical_maps` directive and is disabled by default. Much like the aliases files discussed in the last section, canonical mapping files are specified by a database type and a filename. The accepted database types depend on your operating system, and installed components. Usually `hash` and `dbm` are used as the database type. A common choice for this value, then, might be `hash:/etc/postfix/canonical`.

Tables for RECIPIENT addresses
This parameter configures address mapping only on recipient addresses, and not sender addresses. Mapping is performed on both envelopes and headers. These lookups are performed before the above configured **Address mapping lookup tables**. This option correlates to the `recipient_canonical_maps` directive and is disabled by default.

Tables for SENDER addresses
Similar to the previous option, this configures mapping for sender addresses only, and not recipient addresses. Both envelope and header information is modified. This option correlates to the `sender_canonical_maps` directive and by default is disabled.

Editing Canonical Mappings

Once a filename is selected for any of the canonical mapping tables, it may be edited by clicking the appropriate **Edit...** buttons. A new page will open, listing any existing mappings and allowing creation of new mappings. The format of mappings in all files is the same.

Canonical mappings may seem, on the surface, to be similar to aliases or virtual domains. However, they are quite distinct and are useful for other purposes. While aliases merely make a decision about which user will receive an email, and virtual domains only impact the envelope address, the canonical mapping alters both the envelope address and the SMTP header address. This change can be used to make mail appear to come from a different user or domain, or direct mail to a different user or domain by changing the adrress on the message.

For example, if I have a number of local subdomains, but would like all mail to appear to originate from a single domain, it is possible to create a canonical mapping to make the translations. In the **Edit a Map** page, the `Name` will be a subdomain that is to be mapped to the domain, such as `@lab.swelltech.com`. The `Mapts to...` value will simply be the domain I'd like this subdomain converted to, `@swelltech.com`. After saving the mapping and applying changes, all outgoing mail from `lab.swelltech.com` will appear to originate from `swelltech.com`.

Virtual Domains

Virtual domains functionality in Postfix provides a means to redirect messages to different locations by altering the message envelope address. The header address is not altered by a virtual domain mapping. While some functionality of virtual domains overlaps with features available in aliases, virtual domains can be used for local or non-local addresses, while aliases can only be used for local address.

Domain mapping lookup tables
Much like aliases tables and canonical mapping tables discussed in the previous sections, this is simply the path to a file containing the mapping tables for virtual domains. This is usually something along the lines of `hash:/etc/postfix/virtual`, and must be converted to a database format for use in Postfix. Webmin will perform the database generation step for you.

Transport Mapping

The term transport refers to the mechanism used to deliver a piece of email. Specifically, SMTP and UUCP are mail transports that are supported by Postfix. Transport mapping can be used for a number of purposes, including SMTP to UUCP gatewaying, operating Postfix on a firewall with forwarding to an internal mail server, etc.

Transport mapping lookup tables
This option configures the path to a file containing one or more transport mappings. These tables are much like the mapping tables discussed already, and are converted to a database and used by Postfix in the same way. This option correlates to the `transport_maps` directive. This feature is disabled by default. A common value for this option is `/etc/postfix/trasnport`.

To create a new mapping, first define the mapping file. Then click **Add a mapping**. If your goal is to redirect mail to an protected internal host from Postfix running on a firewall, for example, you could enter the outside domain name into the **Name** field, `swelltech.com` and then enter into the **Maps to...** field the address of the internal machine, `smtp:privatehost.swelltech.com`. To further improve upon this, local delivery on this machine could be disabled, and increased controls over where and to whom mail should be accepted. There are more examples of such a configuration in the tutorial section of this chapter.

Relocated Mapping

Using this option it is possible to notify senders if a local user has moved to another address. For example, if a user leaves an organization but still receives occasional mail at her local address, it may be convenient to notify anyone sending mail to the user of the move and new contact information for that user. Usage is just like the previous types of mappings and so won't be documented specifically here, though and example of a relocated mapping will be given to display the types of information that can be provided by this feature.

As an example, let's say I move from my current company to the far more relaxed atmosphere of the Oval Office. To make sure all of my friends and clients can keep in touch with me, I could provide a relocated mapping with a **Name** of `joe@swelltech.com` with a **Maps to...** of `president@whitehouse.gov`. While this won't redirect mail to me at my new home, it will notify the people trying to contact me that I've changed email addresses. Hopefully they will all update their address books and resend their mail to my new address.

Local delivery

Local delivery is what Postfix does when it reaches the end of all of its list of mappings and access controls, and still finds that the message is allowed and destined for a user on the local machine (i.e. a mapping could potentially send the message elsewhere for final delivery, so all mappings as well as various access checks are performed before reaching this stage). This page configures a number of options relating to how Postfix handles the delivery of mail for local users.

Name of the transport for local deliveries
This configures the name of the transport that will be used for delivery to destination that match the $mydestination or $inet_interfaces variables. This can be a simple mailbox drop handled by the Postfix local delivery agent, or any appropiate delivery command. This option correlates to the `local_transport` directive and defaults to the defined transport type named `local`.

Shell to use for delivery to external command
If a command shell is required to communicate properly with your chosen local delivery transport, this option selects the shell that will be used. By default no shell is used, and the transport command will be executed directly. However, if the command contains shell metacharacters or shell built-in commands they will be passed to `/bin/sh` or whatever shell you configure here. A popular choice for this is `smrsh`, or *Sendmail's Restricted Shell*, which is included in recent Sendmail distributions. `smrsh` allows for more precise control over what commands users can execute from their `.forward` files. This option corresponds to the `local_command_shell` and defaults to `/bin/sh`.

Search list for forward

This is a comma-separated list of possible locations for user forward files. Postfix will try each entry in the list until a forward file is found, or until all have been checked and no match is found. The forward file allows users to configure delivery options for themselves, including delivery-time processing by a program like `procmail` as well as forwarding of messages to a different server. A number of variable expansions are performed on the entries. The expansions are currently:

Forward search path variable expansions

`$user`
The username of the recipient.

`$shell`
The shell of the recipient.

`$home`
Recipient's home directory.

`$recipient`
The full recipient address.

`$extensions`
Recipient address extensions. This is a separate part of the email address, separated by the **Separator between user names and address extensions** defined on the **General Options** page.

`$domain`
The recipient's domain name.

`$local`
The entire local part of the recipient address.

`$recipient_delimiter`
The separation delimiter for the recipient.

Valid mail delivery to external commands
This parameter restricts mail delivery to only those commands specified here. The default is to disallow delivery to commands specified in `:include:` files, and allow execution of commands in `alias` and `forward` files. This option correlates to the `allow_mail_to_command` directive.

Valid mail delivery to external files
This option restricts mail delivery to external files. The deafult is to disallow delivery to files specified in `:include:` but to allow delivery to files specified in `aliases` and `forward` files. This option correlates to the `allow_mail_to_files` directive.

Default rights of the local delivery agent
This option configures the privileges that the delivery agent will have for delivery to a file or a command. This option should never be a privileged user or the postfix owner. This option corresponds to the `default_privs` directive and defaults to `nobody`.

Pathname of user mailbox file
When delivering mail locally, Postfix will drop mail in the directory configured here, or in its default maildir. If you wish to use the maildir format for mail storage, this value can be appended with a trailing slash. For example, to store mail in the users home directory in the `Maildir` subdirectory, the value would be `Maildir/`. This option correlates to the `home_mailbox` directive and usually defaults to some location under `/var/spool/mail` or `/var/spool/postfix`.

Destination address for unknown recipients
If a message is received for a recipient that does not exist, the message is normally bounced. However, it is possible to instead have the message delivered to an alternate address. This option corresponds to the `luser_relay` directive. Variable expansions matching those discussed for the **Search list for forward** are also valid for this directive.

Spool directory
This option specifies the directory where Unix-style mailboxes are stored. Defaults vary depending on OS variant and version, but a common choice is `/var/spool/mail`. This option correlates to the `mail_spool_directory` option.

External command to use instead of mailbox delivery
This option defines a command to use for delivery instead of delivering straight to the users mailbox. The command will be run as the recipient of the message with appropriate `HOME`, `SHELL` and `LOGNAME` environment variables set. This option is commonly used to set up system wide usage of `procmail`. Beware that if you use a command to deliver mail to all users, you *must* configure an alias for `root`, as the command will be executed with the permissions of the `$default_user`. This option correlates to the `mailbox_command` directive and is disabled by default.

Optional actual transport to use
This option configures the message transport to use for all local users, whether they are in the Unix passwd database or not. If provided, the value will override all other forms of local delivery, including **Destination address for unknown recipients**. This option corresponds to the `mailbox_transport` directive and is disabled by default. This option may be useful in some environments, for example, to delegate all delivery to an agent like the **cyrus** IMAPD.

Optional transport for unknown recipients
If a user cannot be found in the Unix passwd database, and no alias matches the name, the message will ordinarily be bounced, or handled via the **Destination address for unknown recipients** option. However, if you would like unknown users to be handled by a separate transport method. This option overrides the **Destination address for unknown recipients** option above. This option correlates to the `fallback_transport` directive and is disabled by default.

Max number of parallel deliveries to the same local recipient

This option limits the number of simultaneous deliveries to a single local recipient. If `.forward` files are allowed for users, a user may run a time-consuming command or shell script, leading to overload caused by several such processes being started up at once. This option correlates to the `local_destination_concurrency_limit` directive and the default is `2`. A low value is recommended for this option, unless it is certain that no complex `.forward` files will be in use.

Max number of recipients per local message delivery
This option configures the maximum number of recipients per local message delivery. This option correlates to the `local_destination_recipient_limit` and is set to the value of `Max number of recipients per message delivery` by default.

Prepend a Delivered-To: when...
This parameter determins when Postfix should insert a `Delivered-to:` message header. By default Postfix inserts this header when forwarding mail and when delivering to a file. The defaults are recommended, and it is generally preferable not to disable insertion into forwarded mail. This option corresponds to the `prepend_delivered_header` directive.

General resource control

This page provides access to the various memory and process limits for the Postfix processes. It is rarely necessary to alter the values on this page, except for highly loaded servers or very low resource machines.

Max size of bounced message
This option limits the amount of the original message content in bytes that will be sent in a bounce notification. This option correlates to `bounce_size_limit` and defaults to 50000.

Max time for delivery to external commands
When delivering mail to an external command (rather than via direct mailbox delivery), Postfix will wait this amount of time for the delivery to complete. If this value is to be set to a high limit (3600s or more) the value of **Timeout for I/O on internal comm channels** in **General Options** must also be increased. This option correlates to the `command_time_limit` directive and defaults to `1000s`.

Max number of Postfix child processes
This option limits the number of child processes that Postfix will spawn. On highly load servers the default may be too low, and may need to be raised to as much as `500` or more. More likely, for most environments, 50 is more than adequate and may even be overkill. For example on dialup, or consumer broadband serving one to ten users, a more appropriate limit might be `10`. If in doubt, leave it at its default unless it causes problems. This option correlates to the `default_process_limit` directive and defaults to `50`.

Max number of addresses remembered by the duplicate filter
While expanding aliases and `.forward` files Postfix will remember addresses that are beind delivered to and attempt to prevent duplicate deliveries to the same address. This option limits the number of recipient addresses that will be

remembered. It corresponds to the `duplicate_filter_limit` directive and defaults to `1000`. There is probably no compelling reason to increase this value.

Max attempts to acquire file lock
This option limits the number of attempts Postfix will make when attempting to obtain an exclusive lock on a mailbox or other file requiring exclusive access. It corresponds to the `deliver_lock_attempts` directive and defaults to `20`.

Time in seconds between file lock attempts
Postfix will wait a specified time between attempts to lock a given file, after a failed lock attempt. This option configures the `deliver_lock_delay` directive and defaults to `1s`.

Max attempts to fork a process
If Postfix attempts to fork a new process and fails, due to errors or a lack of available resources, it will try again a specified number of times. This option correlates to the `fork_attempts` directive and defaults to `5`.

Time in seconds between fork attempts
Postfix will try to spawn a new process a specified time after a failed attempt. This option correlates to the `fork_delay` directive and defaults to `1s`.

Max memory used for processing headers
This option limits the amount of memory in bytes that Postfix will use to process message headers. If a message header is too large to fit into the memory specified, the headers that do not fit into memory will be treated as part of the message body. This option correlates to the `header_size_limit` directive and defaults to `102400`.

Max memory used for handling input lines
This option limits the amount of memory in bytes that Postfix will use to handle input lines. And input line is any line read from an `:include:` or `.forward` file. In order to prevent the mail server from using excessive amounts of memory, it will break up these files into chunks of this length. This option correlates to the `line_length_limit` directive and defaults to `2048`.

Max size of a message
This option limits the size in bytes of a message that will be delivered, including the message envelope information. This limit should be set high enough to support any email messages your users will need to be able to send or recieve. This option correlates to the `message_size_limit` directive and defaults to `10240000`.

Max number of messages in the active queue
This option limits the number of messages that can exist in the message queue at any given time. It correlates to the `qmgr_message_active_limit` directive and defaults to `10000`.

Max number of in-memory recipients
This parameter limits the number of in-memory recipient data structures. This memory contains the short-term *dead list*, which indicates a destination was unavailable when last contacted, among other things. This option correlates to the `qmgr_message_recipient_limit` directive and defaults to `1000`.

Min free space in the queue file system
Postfix will refuse mail if the filesystem on which the queue is located has less available space in bytes than the value set in this option. This option correlates to the `queue_minfree` directive and defaults to `0`.

Max time after which stale lock is released
This option configures how old an external lock file may be before it is forcibly removed. This option correlates to the `stale_lock_time` and defaults to `500s`.

Time in seconds between attempts to contact a broken MDT
This option configures the time in seconds between the queue manager attempts to contact an unresponsive mail delivery transport. This option correlates to the `transport_retry_time` and defaults to `60s`.

SMTP server options

This page configures the majority of the options that directly effect the behavior of the SMTP server portion of Postfix, specifically the portions of Postfix that impact how the server behaves towards an SMTP client that connects to the server.

SMTP greeting banner
When a client connects to an SMTP server a *greeting banner* will be sent to the client (note the term *client* in this context is not the end user, but rather the email software program that is being used to make the connection). This option configures the text that will follow the status code in the banner. It is possible to use a number of variable expansions, for example, to display the specific version of the server software, though Postfix does not include the version by default. If configuring this option to be other than the default, you must include `$myhostname` at the start of this line, as it allows Postfix to report and respond to a mailer loop rather than overloading the system with many multiple deliveries. This option correlates to the `smtpd_banner` directive and contains `$myhostname ESMTP $mail_name` by default.

Note

A proposed federal law in the US would make it illegal to send unsolicited commercial email through a mail server if the server included in its SMTP greeting the words `NO UCE`. Since spammers are generally of a criminal mindset anyway, it is unlikely that many of them will respect the new law if it is ever passed. Nonetheless, it is worth mentioning in hopes that sometime soon, all Americans will have legal protection against the stolen resources and time that UCE represents.

Max number of recipients accepted for delivery
This option limits the number of recipients that may be specified in a single message header. It is usually rare for legitimate messages to have an extremely large number of recipients specified in a single message header, but it is

often done in UCE messages. The legimimate exception is messages to a mailing list (possibly sent by mailing list software like `majordomo` or `mailman`. This option correlates to the `smtpd_recipient_limit` and defaults to `1000`.

Disable SMTP VRFY command
Normally, the SMTP VRFY command is used to verify the existence of a particular user. However, it is also illegitimately used by spammers to harvest live email addresses. Thus it is sometimes useful to disable this command. This option correlates to `disable_vrfy_command` and defaults to `No`.

Timeout in seconds for SMTP transactions
This option sets the timeout in seconds for a client to respond to the SMTP servers response with an SMTP request. The connection process involves the client opening a connection to the server, the server replies with a greeting, and then the client makes its request. If the client request does not come within the time specified here, the connection will be closed. This option correlates to the `opts_smtpd_timeout` directive and defaults to `300s`.

Timeout before sending 4xx/5xx error response
When sending an error response to a client, the server will sleep a specified time. The purpose of this feature is to prevent certain buggy clients from hitting the server with repeated requests in rapid succession. This option correlates to the `smtpd_recipient_lim` directive and defaults to `5s`.

Error count for temporarily ignore a client
This option configures the number of errors that a client may generate before Postfix will stop responding to requests for a specified time. Some buggy mail clients may send a large number of requests, while ignoring or responding incorrectly to, the error messages that result. Postfix attempts to minimize the impact of these buggy clients on normal service. This option correlates to the `smtpd_soft_error_limit` and defaults to `10`.

Error count for closing connection
If the number exceeds this limit the connection will be closed. This option correlates to the `smtpd_hard_error_limit` and defaults to `100`.

HELO is required
Enabling this option causes Postfix to require clients to introduce themselves with a `HELO` header at the beginning of an SMTP session. This may prevent some UCE software packages from connecting, though it may also impact other legitimate clients from connecting. This option correlates to the `smtpd_error_sleep_time postfix` and defaults to `No`.

Allow untrusted routing
This option configures whether Postfix will forward messages with *sender-specified routing* from untrusted clients to destinations within the accepted relay domains. This feature closes a sneaky potential loophole in access controls that would normally prevent the server from being an open relay for spammers. If this behavior is allowed, a malicious user could possibly exploit a backup MX mail host into forwarding junk mail to a primary MX server which believes the mail has originated from a local address, and thus delivers it as the spammer intended. This option correlates to the

`allow_untrusted_routing` and is disabled by default. Enabling this option should only be done with extreme caution and care to prevent turning your Postfix installation into an open relay.

Restrict ETRN command upon...
The SMTP `ETRN` command is a rather clumsy means for a client that is not always connected to the internet to retrieve mail from the server. The usage of this command is rather outdated, and rarely used, as POP3 and IMAP are better suited to solve this problem in the general case. This option correlates to the `smtpd_etrn_restrictions` directive and the default is to allow `ETRN` from any host. This option accepts the following directives: `check_etrn_access maptype:mapname`, `permit_naked_ip_address`, `reject_invalid_hostname`, `check_helo_access maptype:mapname`, `reject_maps_rbl`, `reject_unknown_client`, `permit_mynetworks`, `check_client_access`, `permit`, `reject`, `warn_if_reject`, and `reject_unauth_pipelining`.

This option, as well as the following three **Restrictions...** options accept one or all of the following values in the text field. Each is described only once here and the specific entry will include the list of accepted directives for the option. The impact of some of these choices depends on configuration performed elsewhere, and could potentially open security holes if not configured carefully.

`permit_mynetworks`
Permit the message if the relevant address (sender or recipient depending on the restriction) is within the local network.

reject_unknown_client
The request will be refused is the client IP has no PTR record in the DNS. This means that a client with an IP address that cannot be resolved to a hostname cannot send mail to this host.

`check_client_access maptype:mapname`
This option requires the inclusion of an already configured map, as discussed earlier. This will restrict based on the contents of the map, allowing only clients that are allowed by the map. The map may contain networks, parent domains, or client addresses, and Postfix will strip off unnecessary information to match the client to the level of sepcificity needed.

`check_sender_access maptype:mapname`
This will restrict based on the contents of the map, allowing only senders that are allowed by the map. The map may contain networks, parent domains, or `localpart@`.

reject_maps_rbl
An RBL is a relay domain blackhole list. By testing a reverse domain lookup against a nameserver that receives a domain blackhole list transfer, the server can know if the mail was sent through a known open mail relay. There are a number of free and for-fee services providing blackhole data. The largest and longest lasting is the service operated by MAPS [http://www.mail-abuse.org], while two new similar services are operated by the Open Relay Database [http://ordb.org] and by Distributed Sender Boycott List [http://dsbl.org]. All operated on the principle of allowing administrators to choose to refuse mail sent from open mail relays. If this option is listed, the client will be checked against the available RBL domains, and if any match the mail will be refused.

Note

If using any of the free RBL services on the network, consider donating money, time, or resources to the project maintainers. The projects are generally run by volunteer labor, and using network resources that have been paid for by the maintainers.

`reject_invalid_hostname`
If the client hostname is invalid, due to bad syntax, the request will be rejected.

`permit_naked_ip_address`
If the client `HELO` or `EHLO` command contains a naked IP address without the enclosing `[]` brackets as require by the mail RFC, the message will be rejected. Beware that some popular mail clients send a `HELO` greeting that is broken this way.

`reject_unknown_hostname`
Reject the request if the hostname in the client `HELO` command has no A or MX record in the DNS.

`reject_non_fqdn_hostname`
If the client hostname is not in the form of a fully-qualified domain name, as required by the RFC, the message will be rejected.

`check_helo_access maptype:mapname`
The server will search the named access database map for the `HELO` hostname or parent domains. If the result from the database search is `REJECT` or a `4xx` *`text`* or `5xx` *`text`* error code the message will be refused, while a response of `OK` or `RELAY` or an all numerical response the message will be permitted.

`permit`
This simply permits anything. Generally this will be at the end of a set of restrictions in order to allow anything that has not be explicitly prohibited.

`reject`
Rejects everything. This can be used at the end of a chain of restrictions to prohibit anything that has not be explicitly permitted.

`warn_if_reject`
This is a special option that changes the meaning of the following restriction, so that a message that would have been rejected will be logged but still accepted. This can be used for testing new rules on production mail servers without risk of denying mail due to a problem with the rules.

`reject_unauth_pipelining`

If the client sends commands ahead of time without first confirming that the server support SMTP command pipelining, the message will be rejected. This will prevent mail from some poorly written bulk email software that improperly uses pipelining to speed up mass deliveries.

Restrictions on client hostnames/addresses
This restriction applies to the client hostname and/or address. By default, Postfix will allow connections from any host, but you may add additional restrictions using the following: `reject_unknown_client`, `permit_mynetworks`, `check_client_access` *`maptype:mapname`*, `reject_maps_rbl`, `maps_rbl_reject_code`, `permit`, `reject`, `warn_if_reject`, `reject_unauth_pipelining`.

Restrictions on sends in HELO commands
This option specifies additional restrictions on what information can be sent by client in the `HELO` and `EHLO` commands. This option correlates to the `smtpd_helo_restrictions` directive. By default Postfix accepts anything, and the following restrictions may be added: `reject_invalid_hostname`, `permit_naked_ip_address`, `reject_unknown_hostname`, `reject_non_fqdn_hostname`, `check_helo_access` *`maptype:mapname`*, `reject_maps_rbl`, `reject_unknown_client`, `check_client_access` *`maptype:mapname`*, `permit`, `reject`, `warn_if_reject`, `reject_unauth_pipelining`.

Restrictions on sender addresses
This option restricts what can be contained in the `MAIL FROM` command in a message. It may be used to prevent specific email addresses from sending mail, reject clients without a resolvable hostname, etc. This option correlates to the `smtpd_sender_restrictions` directive and may contain any of the following restrictions: `permit_mynetworks:`, `reject_unknown_client`, `reject_maps_rbl`, `reject_invalid_hostname`, `reject_unknown_hostname`, `reject_unknown_sender_domain`, `check_sender_access` *`maptype:mapname`*, `check_client_access` *`maptype:mapname`*, `check_helo_access` *`maptype:mapname`*, `reject_non_fqdn_hostname`, `reject_non_fqdn_sender`, `reject`, `permit`.

Restrictions on recipient addresses
This parameter places restrictions on the recipients that can be contained in the `RCPT TO` command of a sent message. It can be used to dictate where email may be sent. This option correlates to the `smtpd_recipient_restrictions`, and may contain any of the following restrictions: `permit_mynetworks`, `reject_unknown_client`, `reject_maps_rbl`, `reject_invalid_hostname`, `reject_unknown_hostname`, `reject_unknown_sender_domain`, `check_relay_domains`, `permit_auth_destination`, `reject_unauth_pipelining`, `permit_mx_backup`, `reject_unknown_recipient`, `check_recipient_access`, `check_client_access`, `check_helo_access`, `check_sender_access`, `reject_non_fqdn_hostname`, `reject_non_fqdn_sender`, `reject_non_fqdn_recipient`, `reject`, `permit`.

DNS domains for blacklist lookups
This option configures the optional blacklist DNS servers that will be used for all RBL checks that have been specified in all access restrictions. It may contain any number of servers in a whitespace separated list. These services can be used to help prevent spam, as discussed earlier in this section, with the **Restrict ETRN command upon...** parameter. This option configures the `maps_rbl_domains` directive and is empty, by default.

Restrict mail relaying
This option specifies from which hosts, networks, domains, etc. Postfix will relay email for. This option correlates to the `relay_domains` directive, and defaults to `$mydestination`.

SMTP server response on access map violation, **SMTP server response on RBL domains violation**, **SMTP server response on forbidden relaying**, **SMTP server response on unknown client reject**, **SMTP server response on invalid hostname reject**, **SMTP server response on unknown domain reject**, **SMTP server response on unknown hostname reject**
These options configure the error result code that will be sent to the client when any of the specified restrictions are being applied. These errors have sensible default values and generally should not need to be changed. Consult with RFC 822 if you wish to understand more about the SMTP error codes, or have a reason to change any of these values.

SMTP Client Options

The SMTP client options configures how Postfix will behave when dealing with other mail servers as a client, i.e. when sending mail on behalf of a user. This portion of the configuration primarily dictates how the server will respond to certain error conditions..

Action when listed as best MX server
As discussed in the BIND chapter, a mail server peforms a name server query to find the MX, or mail server, record for the destination domain. If this record indicates that the local server *is* the server to which mail should be sent, it can respond in a couple of ways. The default is to bounce the message with an error indicating a mail loop. If the field is selected and `local` is entered, the mail will be directed to the local delivery agent instead of bouncing the mail. This option correlates to the `best_mx_transport` directive.

Hosts/domains to hand off mail to on invalid destination
By default, a mail that cannot be delivered because the destination is invalid will be bounced with an appropriate error message. However, it is possible to configure `postfix` to hand off email to another server instead. This option correlates to the `fallback_relay` directive.

Ignore MX lookup error
If a name server query fails to provide an MX record, the server defaults to deferring the mail and trying again later. If `Yes` is selected instead, an A record query will be done and an attempt will be made to deliver to the resulting address. This option correlates to the `ignore_mx_lookup_error` directive.

Skip 4xx greeting
If a remote server responds to a connection with a 4XX status code, `postfix` will, by default, select the next available mail exchanger specified by the MX records. If set to `No`, mail delivery will be deferred after the first mail delivery attempt and another attempt will be made later. This option correlates to the `smtp_skip_4xx_greeting` directive.

Skip wait for the QUIT command

This option configures whether Postfix will wait for the receiving mail server to respond to the `QUIT` command. This option correlates to the `smtp_skip_quit_response` directive and defaults to no.

Max number of parallel deliveries to the same destination
This option specifies the maximum number of deliveries that Postfix will perform to the same destination simultaneously. This option correlates to the `smtp_destination_concurrency_limit` directive and defaults to the system wide limit for parellel deliveries configured in the **Delivery Rates** page documented in the next section.

Max number of recipients per delivery
Limits the number of recipients per delivery. This option correlates to the `smtp_destination_recipient_limit` directive and defaults to the system wide limit for recipients per delivery.

Timeout for completing TCP connections
Specifies the time in seconds that the Postfix delivery agent will wait before timing out a TCP connection. This option correlates to the `smtp_connect_timeout` directive and defaults to 0, which disables connection timeouts.

Timeout on waiting for the greeting banner
Limits how long Postfix will wait for a greeting banner to be received from the destination server. This option corresponds to the `smtp_helo_timeout` directive and defaults to 300 seconds.

Timeout on waiting for answer to MAIL FROM
Sets the timeout in seconds for sending the `SMTP MAIL FROM` command and for receiving the destination servers response. This option correlates to the `smtp_mail_timeout`, and defaults to 300 seconds.

Timeout on waiting for answer to RCPT TO
Sets the timeout in seconds for sending the `SMTP RCPT TO` command and for receiving the destination servers response. This option correlates to the `smtp_rcpt_timeout` directive and defaults to 300 seconds.

Timeout on waiting for answer to DATA
Sets the timeout in seconds sending the `SMTP DATA` command and for receiving the destination servers response. This option correlates to the `smtp_data_init_timeout` and defaults to 120 seconds.

Timeout on waiting for answer to transmit of message content
Specifies the SMTP client timeout in seconds for sending the contents of the message. If the connection stalls for longer than this timeout, the delivery agent will terminate to transfer. This option corresponds to the `smtp_data_xfer_timeout` directive and defaults to 180 seconds.

Timeout on waiting for answer to ending "."
Specifies the SMTP client timeout in seconds for sending the closing SMTP "." and receiving the destination servers reply. This option correlates to the `smtp_data_done_timeout` directive and defaults to 600 seconds.

Timeout on waiting for answer to QUIT
Sets the timeout in seconds sending the `SMTP QUIT` command and for receiving the destination servers response. This option correlates to the `smtp_quit_timeout` and defaults to 300 seconds

Delivery Rates

This page contains the options for setting the default rate and concurrency limits for all Postfix components. These rates can usually be overridden within their respective configuration sections.

Max number of parallel deliveries to the same destination
This option specifies the maximum number of deliveries that Postfix will perform to the same destination simultaneously. This option correlates to the `default_destination_concurrency_limit` directive and defaults to `10`.

Max number of recipients per message delivery
Limits the number of recipients per delivery. This option correlates to the `default_destination_recipient_limit` directive and defaults to `50`.

Initial concurrency level for delivery to the same destination
Specifies the initial number of simultaneous deliveries to the same destination. This limit applies to all SMTP, local, and pipe mailer deliveries. A concurrency of less than two could lead to a single problem email backing up delivery of other mail to the same destination. This option configures the `initial_destination_concurrency` directive and defaults to `5`.

Max time (days) in queue before message is undeliverable
Defines the number of days a message will remain queued for delivery in the event of delivery problems before the message is sent back to the sender as undeliverable. This option configures the `maximal_queue_lifetime` directive and defaults to 5 days.

Min time (secs) between attempts to deliver a deferred message
In the event of a delivery deferral, Postfix will wait the specified amount of time before reattempting delivery. This value also specifies the time an unreachable destination will remain in the destination status cache. This option correlates to the `minimal_backoff_time` directive and defaults to 1000 seconds.

Max time (secs) between attempts to deliver a deferred message
Specifies the maximum amount of time between delivery attempts in the event of a deferred delivery. This option configures the `maximal_backoff_time` directive and defaults to 4000 seconds.

Time (secs) between scanning the deferred queue
Specifies the time in seconds between queue scens by the queue management task. This option correlates to the `queue_run_delay` and defaults to 1000 seconds.

Transports that should not be delivered
This field specifies which delivery transports, if any, of the transports defined in the **Transport Mapping** section will not have their messages sent automatically. Instead the messages for these transports will be queued, and can be delivered manually using the `sendmail -q` command. This option correlates to the `defer_transports` directive, and contains nothing by default.

Debugging features

Postfix has two levels of logging. The first level is the normal `maillog`, which reports on all normal mail activities such as received and sent mail, server errors, shutdowns and startups. The second level is more verbose, and can be tuned to log activity relating to specific SMTP clients, hostnames, or addresses. This page contains the configuration for the second level of logging.

List of domain/network patterns for which verbose log is enabled
This is a list of patterns or addresses that match the clients, hosts, or addresses whose activity you would like to have more verbose logging for. Values here could be an IP address like `192.168.1.1` or a domain name like `swelltech.com`. This option correlates to the `debug_peer_list` directive and is empty by default.

Verbose logging level when matching the above list
Specifies the level of verbosity of the logging for the activity that matches the above patterns. This option correlates to the `debug_peer_level` directive and defaults to 2. The above field must have at least one value for this debug level to have any impact.

Postfix, Unsolicited Commercial Email and Access Controls

Postfix offers an extremely flexible set of access controls, primarily targetted at preventing unsolicited commercial email from being delivered through the server. In order to construct a suitable set of controls it is necessary to understand the order in which rules are checked, and how they interact. By default Postfix will accept mail for delivery from or to any client on your local network and any domains that are hosted by Postfix. So, by default, Postfix is not an open relay. This is a good beginning, and may be all that is needed in many environments. However, because UCE is such a nuisance for users and network administrators, it may be worthwhile to implement more advanced filtering. This section will address the basics of the Postfix UCE control features.

Access Control List Order

Every message that enters the `smtpd` delivery daemon will be processed by a number of access control lists and checked against a number of rules to insure that the message is one that the administrator actually wants delivered. The goal for most administrators is to prevent unsolicited commercial email from passing through these rules, yet allow every legitimate email to be delivered. This is a lofty goal, and a delicate balance. No perfect solution exists, as long as people are willing to steal the resources of others for their own commercial gain and go to great lengths to overcome the protections in place to prevent such abuse. However, in most environments it is possible to develop a reasonable set of rules that prevents most spam and allows most or all legitimate mail through unharmed.

It is important to understand the order of processing if complex rulesets are to be used, as attempting to use a particular rule too early in the chain can lead to subtle errors, or strange mail client behavior. Because not all clients react exactly correctly to some types of refusals, and not all clients create correctly formed SMTP requests, it is not unlikely that a misplaced rule will lock out some or all of your clients from sending legitimate mail. It could also, just as easily, lead to opening a hole in your spam protections early in the ruleset which would allow illicit mail to pass.

The Postfix UCE controls begin with a couple of simple yes or no checks, called `smtpd_helo_required` and `strict_rfc821_envelopes`, both configured in the **SMTP Server Options** page. The first, if enabled, requires a connecting mail client to introduce itself fully by sending a HELO command. This can stop some poorly designed bulk email programs. The second option requires for the envelope to fit the SMTP specification precisely, thus enforcing complete headers. Though the envelope and HELO can be forged by a bulk mailer, it may stop the more hastily implemented variants (well, how many *good* programmers do you know that write tools to help spammers?). These two options are configured in the

The next stage is the four SMTP restrictions also found on the **SMTP Server Options** page. These further limit from where and to where mail will be delivered. The order of traversal for these four lists of rules is:

1. **Restrictions on client hostnames/addresses** or `smtpd_client_restrictions`
2. **Restrictions on sends in HELO commands** or `smtpd_helo_restrictions`
3. **Restrictions on sender addresses** or `smtpd_sender_restrictions`
4. **Restrictions on recipient addresses** or `smtpd_recipient_restrictions`

Each of these checks can return `REJECT`, `OK`, or `DUNNO`. If `REJECT`, the message will be refused, and no further rules will be checked. If `OK`, no further rules in the given restriction will be checked, and the next restriction list will be checked. If `DUNNO`, the list will continue to process the current restriction until it gets another result (`OK` or `REJECT`) or until the list end is reached, which is an implicit `OK`. If all lists return `OK`, the message will be passed to the regular expressions checks, otherwise it will be rejected.

Next come the regular expression-based `header_checks` and `body_checks`. These options, if enabled, provide a means to test the actual contents of the headers and the body of the email, respectively. Both operate in the same way, though they should be used somewhat differently. Header checks can be used to prevent well-known spamming domains from sending you email, or for stopping some well-known bulk-mailer software. By entering some signature of the offender, like the domain name, or the X-mailer field identifying the software, the mail can be rejected before the body is even sent. Body checks, though the use the same regular expressions and file format as header checks, should be used more sparingly, as the mail must be accepted before it can be checked. Thus bandwidth is wasted on receipt of the mail, and worse, the server will be occupied for a potentially long while with processing the entire contents of every email. In short, use header checks whenever is convenient, and use body checks only when an effective header check cannot be devised. Only `REJECT` or `OK` are permitted for the returned values.

Note

Webmin, as of this writing (version 1.020), does not provide access to the regular expressions based checks, `header_checks` and `body_checks`. It is likely that a near future version will support these features, however.

Tutorial: Setting up a basic Postfix mail server

As with most of the server software documented here, Postfix has an intimidatingly large number of options and features. But, as we've already seen with BIND and Apache, even complex software can be easy and quick to setup if you know just what to do to get started. Postfix is no different. At the end of this short section you'll have a fully functioning mail server, capable of sending and receiving mail on behalf of one or more domains.

In most environments, only three configuration details are needed to begin providing mail service with Postfix. First, browse the the **General Options** page of the module. The top two options, **What domain to use in outbound mail** and **What domains to receive mail for**, need to be configured to suit your environment.

For the first option, you will likely want to select `Use domainname` in order to select the domain name of your server as the source of email sent from it. For example, if my mail server is named `mail.swelltech.com` and I selected this option, mail will appear to originate from `swelltech.com`.

The second option specifies the domains for which you will receive email. The default is probably too restrictive in that it will only permit receipt of mail to `$mydomainname` and `localhost.$mydomain`, or the server itself. While this depends on your environment and needs, it is likely that you will want to at least add the `$mydomain` variable to the list of accepted domains.

The last step to making Postfix fully functional for sending and receiving mail is to insure the **Local networks** parameter is set appropriately. If you only have one network block, this will already be set appropriately, as the default is to accept mail for delivery from all attached networks (i.e. all configured and active network addresses). However, if you have a public and private network interface, you'll likely want to remove to the public interface to prevent other clients of your ISP from being able to relay mail through your server.

Click the **Save and Apply** button to make your changes take effect. It is, of course, a good idea to test your changes to make sure things are working as intended. First, assuming an appropriate DNS MX record has already been configured as discussed in the BIND tutorials, you can send yourself an email at the new domain. Watch the `maillog` in the **System Logs** module for errors and to see if the message is delivered as expected. Next configure your mail client to send through your new mail server, to insure it is working for sending mail, as well. The `maillog` will likely give clues about what is wrong in the event of problems.

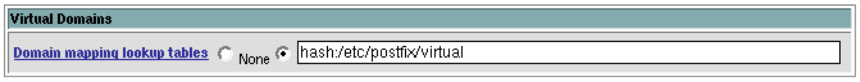
Tutorial: Virtual Hosting email with Postfix

At this point, if you've performed the configuration in the previous tutorial, you'll be able to accept mail for any number of domains. However, this is not the same as providing independent virtual hosting support with Postfix, as you can only have one user of a given name and mail sent to that username at any of the domains for which you accept mail will be delivered to that user. So, if I hosted `swelltech.com`, `penguinfeet.org`, and `swelltechnology.com` on the same server, and mail were sent to user `joe` at each of those domains, all three mails would end up in the same mailbox. Thus we have to introduce another layer to the picture to solve this problem.

Postfix has two commonly used methods for solving this problem. The first is the native Postfix method, using a virtual table to direct mail to the correct destination. The second method is modelled after the way Sendmail handles the problem, and is thus a lot more complex. Because simplicity is better than complexity, we'll cover the native Postfix mechanism exclusively. The Postfix `virtual` manpage covers both methods in moderate detail, so if you have an older Sendmail installation that is being converted to Postfix you may wish to use that method and maintain your current virtual mail configuration.

The first step to setting up virtual domain delivery is to create a virtual map table using the **Virtual Domains** page. Enter the map type (`hash`, `dbm`, etc.) followed by the filename of the flat file to contain the table information. On my Red Hat systems, I always use `/etc/postfix/virtual` for this purpose. This is a pretty common location for this file.

Figure 10.1. The Virtual Domains Table


Virtual Domains
Domain mapping lookup tables ( ) None (•) hash:/etc/postfix/virtual

Save and apply the change, and return to the **Virtual Domains** page. Now, you can click the **New mapping** button. We first have to create a generic map for the new domain. So, for the **Name** field, enter your virtual domain name. In the **Maps to...** field, we can technically enter anything we like, as long as we enter something. The custom seems to be to enter `virtual` in this field, as that is its purpose. Click **Save mapping** to add it to the virtual table.

Next you'll want to add a `postmaster` alias, as all mail servers must have a functioning `postmaster` address to be compliant with the relevant RFC. So, click **New mapping** again. This time enter `postmaster@virtual.domain` into the **Name** field, where *`virtual.domain`* is the name of your domain. Then enter `postmaster` into the **Maps to...** field so that mail to this address will be mapper to the local `postmaster` address for normal delivery.

Finally, we're ready to start adding our virtual domain users to the table. Once again, create a new mapping. Fill in your new virtual domain mail address in the **Name** field. For example, I might fill in `joe@virtual.domain`. In the **Maps to...** section, enter the name of a local user that you would like to receive mail for this address. In my case, I would use `virtual-joe` or perhaps `virtual.domain.joe`. This new local user must exist for mail to be delivered, of course, so you'll need to add the new user to the system as well.

Now, **Save and Apply** your changes, and test it out! The virtual maps can be handled by various database types, or exported to and LDAP database, so there is no reasonable limit to the number of virtual users and domains you can have.

Chapter 11. Sendmail

Sendmail is the de facto standard mail transfer agent, or MTA, in use on the internet today. While there are now several worthy contenders for the title of best or most popular MTA, including Postfix and QMail (both of which have very good Webmin modules, and Postfix is documented in the preceding chapter), more mail probably passes through Sendmail than any other single MTA.

An MTA is the software that provides mail services for a network. A client mail user agent, or MUA sends email, usually via the Simple Mail Transport Protocol, or SMTP, to the MTA. The MTA uses one of several transport protocols, most often via SMTP, to deliver it either directly to the recipient (if the address is served by the same server) or to the mail server for the user. Clients then access the mail on the server using either POP3 or IMAP. So, Sendmail will operate on your server and provide those intermediary services, both sending and receiving mail, for clients and other MTAs on the internet.

Configuring Sendmail

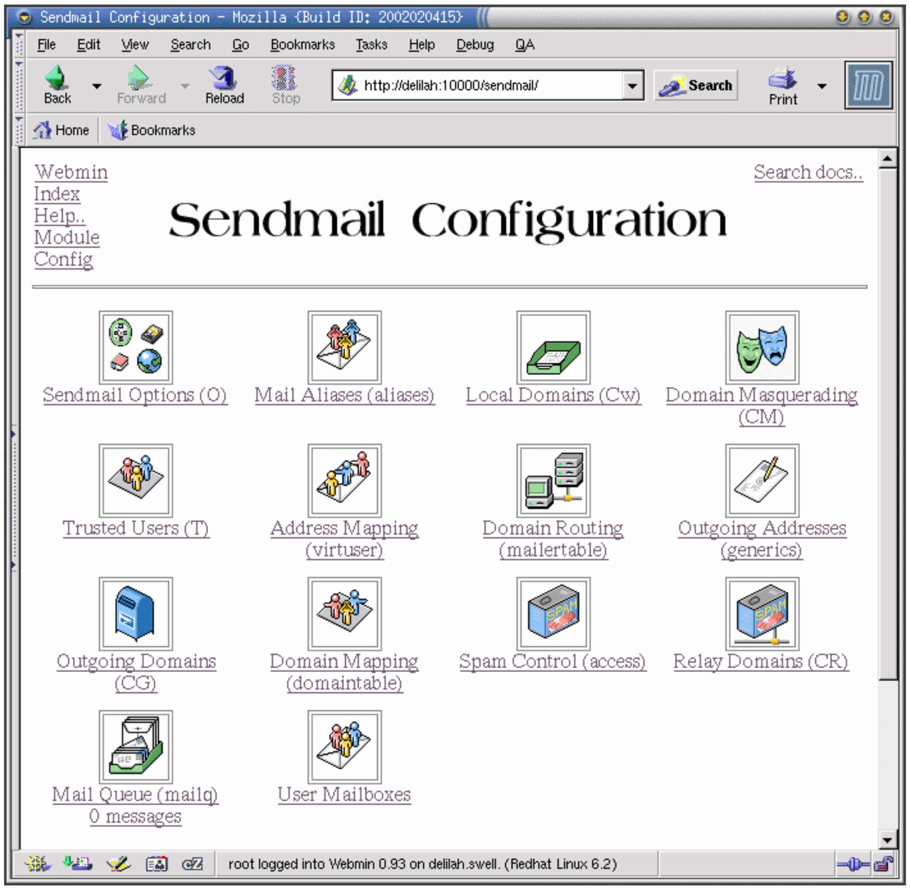
Sendmail has a reputation, not entirely undeserved, for being extremely obtuse and confusing to configure. The famously terse `sendmail.cf` file was designed to be easy and quick for the computer to parse, not for humans to be able to read and edit it. Relatively recently, attempts have been made to remedy this problem, and the solution now provided with Sendmail is an **m4** macro based configuration file, called `sendmail.mc` by default, that allows you to use much more human comprehensible configuration constructs. This configuration file is also supported by Webmin in the **Sendmail M4 Configuration** page.

Sendmail also uses a few other configuration files to dictate certain other behaviors. These include `aliases`, `mailertable`, `access`, and `domaintable`. These files are quite readable by mere mortal humans, usually containing a few (or more than a few in large networks) names, hosts, or domains, and an option or permission that applies to the name, host, or domain. Webmin provides a nice interface for these files as well, so we won't have to deal with them directly either, but it is good to know about them, and what they're for. We'll cover them in more detail as the relevant Webmin sections are discussed.

The Sendmail Module

The Sendmail module in Webmin is thoroughly comprehensive, and provides one to one access to nearly all, if not all, of Sendmails important options and features. Opening the main Sendmail module page provides you with a number of icons representing each type of option in the Sendmail configuration files. From here you can edit the various global options, edit aliases, configure user mail settings, restrict access to your mail server, and even control the mail queue and read mail.

Figure 11.1. Sendmail module


Sendmail Configuration - Mozilla {Build ID: 2002020415}
File Edit View Search Go Bookmarks Tasks Help Debug QA
Back
Forward
Reload
Stop
http://delilah:10000/sendmail/
Search
Print
Home
Bookmarks
Webmin Index
Help..
Module Config
Search docs..
Sendmail Configuration
Sendmail Options (O)
Mail Aliases (aliases)
Local Domains (Cw)
Domain Masquerading (CM)
Trusted Users (T)
Address Mapping (virtuser)
Domain Routing (mailertable)
Outgoing Addresses (generics)
Outgoing Domains (CG)
Domain Mapping (domaintable)
Spam Control (access)
Relay Domains (CR)
Mail Queue (mailq) 0 messages
User Mailboxes
root logged into Webmin 0.93 on delilah.swell. (Redhat Linux 6.2)

Sendmail is configured in a number of files. The first, and most intimidating, is the `sendmail.cf` file. This configures all of the various limits and behaviors of Sendmail. The rest are related to users, hosts, domains, and aliases. They dictate primarily to whom mail is sent, and who and what hosts or networks have permission to send and receive mail from the server. The `sendmail.cf` file is configured on the **Options** page, discussed in the next section, while each of the other option files have their own page which are discussed in the **Other Files** section.

Options

The Sendmail Options page, provides access to most of the relevant `sendmail.cf` directives. These options are usually "set and forget" type options. Unless you have a problem with load, or memory, or untimely failed message delivery, you will have little reason to alter these options after first setting up your Sendmail system.

Send outgoing mail via host
This option sets whether outgoing mail will be sent directly or via another mail server. If it is to go through another mail server, it is entered here. If you are not on a permanently attached network (i.e. with a permanent IP and a domain name), then you should relay through the mail server at your ISP, as many mail servers refuse mail from hosts that cannot be resolved. This option edits the *Smart Host* macro named `S` in `sendmail.cf`. More on this and other common macros can be found in the macros sections of the *Administrative Details* [http://www.sendmail.org/m4/admin.html] documentation page at the Sendmail home page.

Forward unqualified usernames to host
If an email is sent by a local user that is unqualified (i.e. *joe* instead of *joe@swelltech.com*) it will by default attempt to deliver the mail locally (i.e. on the same machine that Sendmail runs on). However, if this is set, mail will be forwarded to the host selected. This is useful if you have a large organization with many Sendmail servers running, but you'd like all local mail to be delivered to a single host. This option edits the `R` macro, which refers to the *Relay* (for unqualified domains) configuration.

Forward mail for local users to host
Email that is received from anywhere that is destined for a user on the local host, will be delivered locally, unless this option is set. This allows all mail to be collected on a single host. This option edits the `R` macro, which refers to the *Relay* (for unqualified domains) configuration.

Delivery mode
This option controls how messages will be scheduled for delivery. If `Background` is selected, Sendmail will deliver messages as soon as possible silently in the background. `Queue only` places mail into a queue to be delivered upon a manual or periodically scheduled flush of the queue. `Interactive` messages are delivered immediately synchronously. `Deferred` is like `Queue only`, except Sendmail will not attempt to resolve hostnames until they queue is flushed (ideal for a sporadic net connections, such as a dialup). This option configures the `DeliveryMode` directive.

Max load average for sending
This option determines at what load average Sendmail will no longer continue to send messages. If this load average is crossed, Sendmail will queue messages for later delivery. This option configures the `QueueLA` directive and defaults to `8`. If your system is becoming overloaded at times with delivering mail, it may be possible to tune this setting to help ease the load.

Max load average for receiving
This option determines at what load average Sendmail will stop accepting incoming messages via SMTP. This forces other mail servers to queue them for later delivery. While most mail servers will be polite and actually save the refused messages for later delivery, if assurance of mail service is important to your users, it is probably best to avoid refusing mail. This option configures the `RefuseLA` option, and defaults to `12`.

Max child processes

Controls how many child processes Sendmail will spawn in order to handle incoming mail. Limiting this allows you to control, somewhat, the memory footprint of Sendmail. This option configures the `MaxDaemonChildren` directive and defaults to `12`.

Max connections / second
Configures the maximum number of new connections per second that Sendmail will accept. With this option, you may limit the CPU and memory usage of Sendmail on your system, or in high load environments allow Sendmail to receive a larger volume of mail. This option configures the `ConnectionRateThrottle` directive and defaults to `3`.

Min time before retrying send
This sets the minimum amount of time mail will wait in the queue after a failed send attempt, before Sendmail attempts to re-send it. Values can be in seconds (i.e. `45s`), minutes (`30m`), hours (`2h`), days (`3d`, or weeks (`1w`). This correlates to the `MinQueueAge` directive and defaults to `30m`.

Maximum queue size
Determines the maximum number of queued jobs Sendmail will process in a single queue run. This correlates to the `MaxQueueRunSize` directive, and defaults to `1000`. This should remain as high as possible to avoid losing jobs that fall late in the queue.

Time before giving up
This is the amount of time that Sendmail will continue to try resending a failed message before giving up and considering it undeliverable. Non-permanent delivery failures can occur for a number of reasons, including network connectivity problems, DNS resolution failure, recipient server is not responding, etc. When this limit is reached, a bounced message will be sent to the sender and the message will be discarded. This option accepts times in the same format as discussed above, for seconds, minutes, hours, days, and weeks. This configures the `Timeout.queuereturn` directive and defaults to `5d`.

Time before sending warning
In the event of a non-permanent delivery failure, as discussed in the previous option, this option configures how long Sendmail will wait before sending a warning to the sender of the message that a problem has occurred. Because these warnings usually resolve themselves shortly (either the network comes back up, DNS resolves again, the recipient server returns to service, etc.) it is often not necessary to trouble the sender with an error message until it begins to appear that a problem might become a permanent failure. This option configures the `Timeout.queuewarn` directive and defaults to `4h`.

Mail queue directory
This sets the location of your mail queue directory where Sendmail stores queued mail. This option correlates to the `QueueDirectory`, and often defaults to `/var/spool/mail`, though on some systems this may differ. There is rarely reason to change this.

Send error messages to

In the event of a problem, such as a delivery failure, error messages will be sent to some user on the system. This is usually `Postmaster`, which on many systems is aliased to `root`. This option correlates to the `PostMasterCopy` directive.

User forward files
This option dictates where Sendmail will search for forwarding information for users. This is a colon separated list (much like the shell PATH environment variable). This option allows you to use variables to include certain values, such as username (`$u`), users home directory (`$z`), and system hostname (`$w`). So, for example, if I wanted to search first for `/var/forward/username` and then in `/home/joe/.forward`, I could enter `/var/forward/$u:$z/.forward`. This option configures the `ForwardPath` directive and usually defaults to `$z/.forward.$w:$z/.forward`.

Min free disk space
If the amount of free disk space is lower than this value, Sendmail will refuse to accept messages from other systems. Allows one to prevent Sendmail from filling the disk on which the queue resides. This option correlates to the `MinFreeBlocks` directive, and often defaults to `100`.

Max message size
This option sets the maximum size of a message that will be accepted by Sendmail. Any message over this size, either received from a local user or a remote mail server, will be bounced. This option configures the `MaxMessageSize` directive and defaults to 1000000.

Log level
This option sets the logging behavior of Sendmail. Logging levels 0-10 are, by convention, used for `useful` information that is probably worth logging on any system. The default logging level is `9` and is a good middle ground, wherein Sendmail usually only logs things that an administrator would want to be aware. Higher log levels between 10 and 64 will provide much more information, while levels over 64 are reserved for extremely verbose debugging output. The normal log levels are documented in the *The System Log* [http://www.sendmail.org/~ca/email/doc8.10/op-sh-2.html#sh-2.1] section of the *Installation and Operation Guide* [http://www.sendmail.org/~ca/email/doc8.10/op.html]. This option configures the `LogLevel` directive.

MIME-encode bounce messages?
This option configures whether Sendmail will encode bounce messages in multi-part MIME format, or as a plain text message. Most mail clients today support MIME encoded messages, but if your client base has problems with this you may turn it off. This correlates to the `SendMimeErrors` directive and defaults to `True`. More on MIME can be found in *RFC 2045* [http://www.ietf.org/rfc/rfc2045.txt?number=2045], and *RFC 1344* [http://www.ietf.org/rfc/rfc1344.txt?number=1344].

File security options
In order to avoid cracking attempts, Sendmail checks most of its support files. If these files are in group writable directories, or some other risky configuration, Sendmail will ordinarily refuse to run. This option allows you to turn off this checking in the ways described by the options available. This option configures the `DontBlameSendmail`

directive and defaults to `Safe`. For obvious reasons, it is strongly suggested that you solve the permissions problem(s) you may have, rather than turning off any of these checks.

Other Support Files

The other side of configuring Sendmail is setting up how it will deliver mail, and who it will allow to use its services. The rest of the Sendmail module is devoted to these options, and you are likely to spend more time on these pages than on the **Options** page. These pages configure all of the other files that Sendmail relies on to tell it how to do its job, including the `aliases`, `access`, `domaintable`, `mailertable`, `relay-domains`, and `virtusertable` files.

Mail Aliases

Sendmail provides a means to direct mail to a given recipient under an *alias*. For example, it is possible to have mail sent to `Postmaster` delivered to `root`. It is also possible to direct mail, to several addresses, into a file, to feed it to a program, or provide an automatic reply. These aliases are stored in a file called `aliases` that is usually located in `/etc`.

Address
This is simply the address that will be the alias. When mail is sent to this address, the action defined in `Alias to` option below will be performed. The alias does not contain the domain name. For example, `joesalias` instead of `joesalias@swelltech.com`.

Enabled
Here you may mark an alias as enabled or disabled. A disabled address will be prepended with a # in the `aliases`, and will appear in *italics* in the list of aliases in the Webmin display.

Alias to
Here you define what Sendmail does when it receives a message for this aliased address. There are several options for this, and they are selected from the drop down list. `Email address` is simply another email address to deliver the mail to. `Addresses in a file` causes the mail to be sent to every address named in the file provided in the text entry field--this allows you to more easily allow users to create their own aliases without giving them access to the `/etc/aliases` file. `Write to file` will cause Sendmail to write every mail sent to the address to a file chosen in the text entry field. `Feed to program` is interesting, in that it allows you to direct mail to any program on your system, thus you could write a script or a program (or find one already written) to provide any number of services based on the email received. Or it could file your mail in a database, or customer service system, or any number of other useful things. Finally, `Autoreply from file` simply sends a mail automatically back to the sender containing whatever is in the file listed in the text field.

The rest of the page is devoted to a listing of existing aliases. As mentioned above, enabled entries are in plain text, while disabled entries are in *italics*. Clicking on an alias allows you to edit, delete, or add destinations to an alias.

Clicking `Manually edit /etc/aliased` provides a simple text editor field wherein you can manually edit or view your aliases file. Be careful, as the format and entries will not be checked by Webmin for correctness. If you make a mistake your Sendmail may complain loudly (in the logs) and stop working.

Local Domains

This page configures the `sendmail.cw` file, and allows you to choose what domains Sendmail will accept local mail delivery for. By default Sendmail only accepts delivery for the local host. In order to accept mail for a whole domain, or a number of domains, they must be listed here. Also, the domains must have a DNS MX record that points to the server where your Sendmail is running. Sendmail can handle mail for any number of domains, however, setting up ’virtual hosting’ with Sendmail is a little tricky. A good document that describes the technique can be found on the *Virtual Hosting With Sendmail* [http://www.sendmail.org/virtual-hosting.html] page. Virtual hosting is also discussed briefly in the tutorial section of this chapter.

Note

For virtual hosting in Sendmail, you will also need to perform some configuration in **Address Mapping**, and possibly in **Outgoing Addresses (generics)**.

Domain Masquerading

The Domain Masquerading page provides access to the domain masquerading features of Sendmail. This allows you to make all outgoing messages appear to be from the same domain. When a domain masquerading rule is in place, Sendmail will replace the `From` address of all outgoing mail to appear to come from the domain to be masqueraded as. Also see the **Local Domains** page for more as well as a helpful link regarding virtual hosting in Sendmail.

Trusted Users

Ordinarily, Sendmail will not allow a user to claim to be a different user. However, if they are listed here, they will be trusted to claim they are another user or from another domain. Care should be taken when using this option, as it is one of the safeguards against spoofed email addresses.

Address Mapping

An `Address mapping` is similar to an `alias`, except they are able to handle domain information, as needed by virtual domains. To create an address mapping, all you must do is enter the address or domain to act upon. And a send to action to perform on each message as it is received by Sendmail. For example, if I host the domain `penguinfeet.org` on my `swelltech.com` server, then I must set up a method for mail sent to `sysadmin@penguinfeet.org` to make it into my mailbox at `joe`. So, I would create a map wherein the **Mail for** address is `sysadmin@penguinfeet.org` and the **Send to** address is `joe`.

Domain Routing

This option provides a special type of gatewaying in which your server accepts mail for a domain or host, but then passes it on to another specific mail server. This can be of use in environments where one or more subdomains have their own mail server, that is behind a firewall and cannot directly deliver or receive mail on its own. Also, this allows Sendmail to provide gateway/proxy/translation services, if the other mail server does not support common transports and protocols. This use is in decline as the vast majority of mail servers (even the few not running Sendmail) now speak the common protocols. These domains should not be listed in **Local Domains** as then the server would accept the mail for local delivery, which is not what is desired in this case. You should still have a DNS MX record that points to the Sendmail server for each of the domains listed here, so that mail will be sent first to this system (where it then will handle it in whatever way is defined.

Mail for
This field allows you to enter a host or domain for which Sendmail will accept mail. It will not deliver the mail locally, but will instead pass it on to another server.

Delivery
Here you select how Sendmail will deliver the mail for the selected domain. The most common method is SMTP, however, Sendmail supports a wide range of delivery methods.

Send to
This should be the mail server where mail for this domain should be forwarded to. Checking the **Ignore MX for SMTP delivery** box will cause Sendmail to ignore MX entries in the DNS server for the domain and send to an explicitly selected server.

Outgoing Addresses (generics)

Here you define mappings that Sendmail will use to modify the `From` addresses of outgoing mail (either from local users, or received from other hosts for delivery to other servers). This can be useful if you host multiple domains on the same mail server and want mail from some users to be addressed as though coming from those other domains. You must also include any domains to be remapped on the **Outgoing Domains** page, before Sendmail will perform any remappings on an address. Also, this mapping will not effect mail delivered to local users unless your `.cf` contains support for `FEATURE('always_add_domain')`.

Note

This option is not enabled by default in most Linux distributions and other operating systems, nor in a default Sendmail installation. You must add the `genericstable` feature to your `sendmail.mc` file and regenerate the `.cf` file. The procedure for regenerating a `.cf` is documented later in this guide.

Mail from
Here you enter a username or full email address for a user to remap.

Change to
Here you enter the address to change the above address into.

Manually edit `/etc/mail/genericstable`
Clicking this provides a simple text entry field, where all genericstable mappings are listed. You may edit them manually here. Take care, however, as manually edited entries are not checked by Webmin for grammatical correctness.

Outgoing Domains

By default Sendmail only performs **Outgoing Addresses** translations on mail from local users (users in the same domain as the Sendmail server). Any outside domains to be remapped, must be entered here.

Domain Mapping

This feature allows you to remap all `To` and `From` addresses for a domain to another domain. This is useful if, for example, your company changes names and you'd like all mail to be changed from `mailuser@oldname.com` to `mailuser@newname.com`. This change will effect all mail that is delivered to, relayed through, or sent out from your server. Use of this should be limited to *your domains*.

Spam Control

On this page, you may configure any number of rules, with the purpose of preventing Spammers from using your system and network resources for their evil purposes. Though this is just the tip of the iceberg for the spam control features provided by recent Sendmail versions, it does provide you with a very good means of preventing spam on your network. The first and primary goal, is to prevent anyone from outside of your network from using your server as a relay for spam. Luckily, in recent versions of Sendmail, the default is to refuse to relay from any host not on your local network. This makes our job a little easier, since all we must do is allow mail relaying from our trusted hosts and domains. Here also, we can add rules to explicitly disallow mail from some known spammers. For example if your users began receiving large batches of unsolicited commercial email (UCE, affectionately known as spam) from the bigdumbspammers.com (not a real domain at the time of this writing) and the administrators of this domain either don't care, or are active participants in the spamming, we could simply block them from sending mail to any of our clients. We would enter the domain name, and select `Reject`, or provide an error message by using the `Error code`.

For more on spam control topics in Sendmail, the *Allowing controlled SMTP relaying in Sendmail* [http://www.sendmail.org/tips/relaying.html] page provides more documentation for several of the new Sendmail features to prevent spam, such as using *The Realtime Blackhole List* [http://mail-abuse.org/rbl/] which provides a blacklist of known spammers and open relays. Also, it may be worthwhile to visit *The Mail Abuse Prevention System* [http://mail-abuse.org/] for more on ways to fight spam.

Relay Domains

Any local domains that you would like to allow relaying to should be listed here. Any incoming mail that is not for a local user, and not for one of these listed domains will be rejected by Sendmail. If your Sendmail is providing mail service for several domains in a virtual hosting fashion, those domains should be listed here also.

Mail Queue

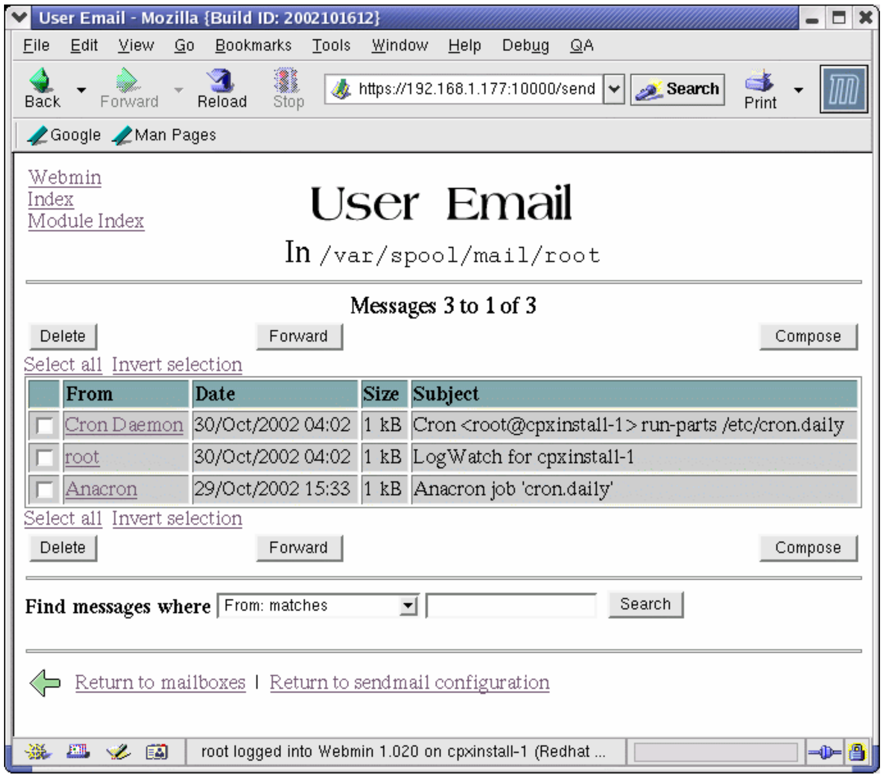
This page provides access to the mail queue. Depending on your configuration, your queue may be a fleeting thing or it may fill until it is flushed periodically or manually. Usually, if you have full-time net access and a full-time DNS server, you will use the `background` mode of delivering mail. In which case, mail will only be in the queue for a few seconds or minutes, before being sent out to the recipient servers. However, in the event of a transient delivery failure (a non-permanent error), the message will remain in the queue until the message is discarded (due to permanent error) or successfully sent. Any message in the queue may be viewed by clicking on the message ID. Also, messages may be deleted from the queue. Finally, it is possible to manually flush the queue, and Sendmail will attempt to deliver all messages in the queue immediately.

User Mailboxes

A great feature of the Webmin Sendmail module is the ability to read mail via a web interface. While not a full featured mail client (even as web based clients go), it is a quick easy way to check messages for accounts that ordinarily do not get checked by a user. For example, on my system, I receive daily backup reports from my backup system, so I check them periodically via the Webmin interface just to look out for problems.

To check mail for `root` simply click on the name. From there you'll be presented with a list of all of that users emails. Clicking on the message will display it. From the **User Email** page it is also possible to delete messages, and to compose a new message.

Figure 11.2. User Email


User Email - Mozilla {Build ID: 2002101612}
File Edit View Go Bookmarks Tools Window Help Debug QA
Back Forward Reload Stop
https://192.168.1.177:10000/send
Search Print
Google Man Pages
Webmin Index
Module Index
Delete Forward Compose
Select all Invert selection
Search
Return to mailboxes | Return to sendmail configuration

User Email

In /var/spool/mail/root

Messages 3 to 1 of 3

	From	Date	Size	Subject
☐	Cron Daemon	30/Oct/2002 04:02	1 kB	Cron <root@cpxinstall-1> run-parts /etc/cron.daily
☐	root	30/Oct/2002 04:02	1 kB	LogWatch for cpxinstall-1
☐	Anacron	29/Oct/2002 15:33	1 kB	Anacron job 'cron.daily'

Find messages where From: matches

root logged into Webmin 1.020 on cpxinstall-1 (Redhat ...

Editing the m4 Configuration File

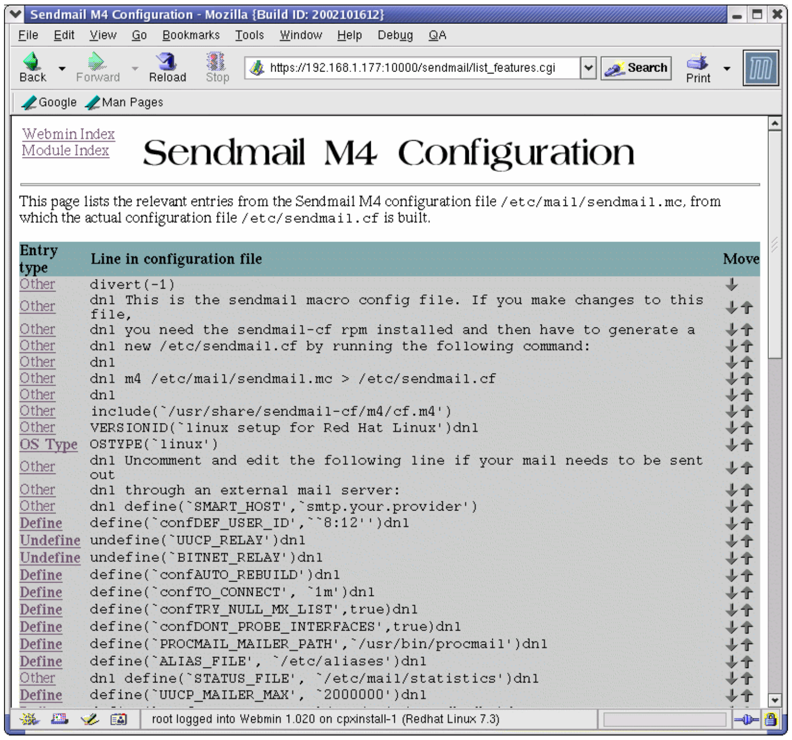
Sendmail on your system probably has a pretty good feature set included in the default `sendmail.cf`. But as has been discussed, some features are often left out, such as `genericstable`. Usually, these features are not needed, but if they are, you must add them to your configuration file. Manually editing the `sendmail.cf` is generally regarded as not being an option for mere mortals like you and I (Eric Allman, the creator of Sendmail *might* be able to do it). However, recent versions of Sendmail provide a novel method of adding features to the `sendmail.cf` which uses a macro file and the **m4** macro processor.

Adding a Feature

Unlike directly editing the `.cf`, adding a feature using the **m4** macro file is actually pretty easy. The method used by many sites is discussed here.

Opening the **M4 Configuration** page, you'll see a file that looks something like this (or almost exactly like this if your system is a Red Hat Linux based system):

Figure 11.3. M4 Configuration File



Sendmail M4 Configuration - Mozilla {Build ID: 2002101612}

https://192.168.1.177:10000/sendmail/list_features.cgi

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Sendmail M4 Configuration

This page lists the relevant entries from the Sendmail M4 configuration file /etc/mail/sendmail.mc, from which the actual configuration file /etc/sendmail.cf is built.

Entry type	Line in configuration file	Move
Other	divert(-1)	↓
Other	dnl This is the sendmail macro config file. If you make changes to this file,	↓↑
Other	dnl you need the sendmail-cf rpm installed and then have to generate a	↓↑
Other	dnl new /etc/sendmail.cf by running the following command:	↓↑
Other	dnl	↓↑
Other	dnl m4 /etc/mail/sendmail.mc > /etc/sendmail.cf	↓↑
Other	dnl	↓↑
Other	include(`/usr/share/sendmail-cf/m4/cf.m4')	↓↑
Other	VERSIONID(`linux setup for Red Hat Linux')dnl	↓↑
OS Type	OSTYPE(`linux')	↓↑
Other	dnl Uncomment and edit the following line if your mail needs to be sent out	↓↑
Other	dnl through an external mail server:	↓↑
Other	dnl define(`SMART_HOST',`smtp.your.provider')	↓↑
Define	define(`confDEF_USER_ID',``8:12'')dnl	↓↑
Undefine	undefine(`UUCP_RELAY')dnl	↓↑
Undefine	undefine(`BITNET_RELAY')dnl	↓↑
Define	define(`confAUTO_REBUILD')dnl	↓↑
Define	define(`confTO_CONNECT', `1m')dnl	↓↑
Define	define(`confTRY_NULL_MX_LIST',true)dnl	↓↑
Define	define(`confDONT_PROBE_INTERFACES',true)dnl	↓↑
Define	define(`PROCMAIL_MAILER_PATH',`/usr/bin/procmail')dnl	↓↑
Define	define(`ALIAS_FILE', `/etc/aliases')dnl	↓↑
Other	dnl define(`STATUS_FILE', `/etc/mail/statistics')dnl	↓↑
Define	define(`UUCP_MAILER_MAX', `2000000')dnl	↓↑

root logged into Webmin 1.020 on cpxinstall-1 (Redhat Linux 7.3)

Each line, with the exception of the `dnl` comment lines and the `divert(-1)` line, are of the form `macro-type(value list)`. In our example, we're going to add a new feature called `genericstable`. So we'll insert a line like this into the `FEATURE` list:

```
FEATURE('genericstable','hash -o /etc/mail/genericstable')
```

To do this, select `Feature` from the dropdown list at the bottom of the page, and click the **Add new entry of type:** button. Then, select `genericstable (Outgoing Addresses)`. Next in the parameters field we specify the type and location of the table file, `hash -o /etc/mail/genericstable`. The single quote marks are not required, as Webmin will insert them for you. For later convenience it is probably wise to use the arrow buttons on the right of the page to raise the new entry to be just below the other `FEATURE` lines in your file. It isn't strictly necessary, but it is nice to have neat configuration files, even if Webmin hides them from you most of the time.

After saving the changed file, we will generate the new `sendmail.cf` (don't forget to backup the old one to another file if you've already set up your Sendmail). To create a new sendmail.cf based on your `.mc` file, click the **Rebuild Sendmail Configuration** button. You'll then be able to open the **Outgoing Domains** page, and create the new `genericstable` file, and edit it normally. A restart of Sendmail will be required to apply the changes you've made..

Tutorial: Setting Up Sendmail

When first installed Sendmail will only need a few small changes in order to begin providing service for sending and receiving mail. The first step is to specify for whom mail will be accepted, which we will specify in the **Local Domains** page, while the second step will be to permit local network users to send, or relay, email through the server, which will be specified in the **Spam Control** page.

Note

This tutorial assumes you have already configured DNS service for your network, including an MX record for your domain. If you haven't already done so, refer back to the BIND chapter, and configure name resolution before attempting the steps in this tutorial.

Configuring Domains to Receive Mail For

By default, Sendmail is not configured to receive mail for any host or network other than the machine on which it is running. So we must first configure Sendmail to permit anyone to send mail for delivery to our domain through out server. Open the **Local Domains** page, and enter the domains for which your server will accept mail. In my case, I would enter `swelltech.com`. Any number of domains can be entered here, as can hostnames, so I could also enter `www.swelltech.com` if ever I expected mail to be delivered to that address.

Click the **Save** button to update the `sendmail.cf` file. This will add new `Cw` lines to include your specified domains.

Permitting Local Users to Relay

The next step to achieving a simple mail server is to permit your local users to send mail through your server. Click on the **Spam Control** icon, and create one or more rules matching your local networks. To create a new rule, first select a **Mail source** of `Network`, and specify the IP of the network you'd like to relay for. For example, on a local network using private IP addresses, one might enter `192.168.1` to specify all of the hosts in the `192.168.1.0/24` network. Then, select `Allow relaying`, and click **Create** to add the new rule to the `access` file.

Finally, return to the primary Sendmail page, and click the **Start Sendmail** button. It is usually useful to keep an eye on the logs when starting a daemon so that problems will be immediately obvious. Sendmail logs to the `maillog` on most systems, which is likely located in `/var/log` directory. You can use the Webmin **System Logs** module to view this log.

Tutorial: Virtual Hosting Email with Sendmail

Virtual hosting is a rather broad term applied to many network services to specify that the server in question provides service to two or more network domains with some degree of separate. Specifically, in the case of a mail server, it means that the mail server will deliver to a unique local user based on the username *and* the domain in the `to` field of the received email. For example, an email to `joe@swelltech.com` would be treated differently from an email sent to `joe@notswelltech.com` and would be delivered to a different mailbox.

As with most Open Source software there are many ways to accomplish our goal, but here we'll cover the simplest method provided by Sendmail. Configuring Sendmail for virtual mail hosting is a three step process. First, DNS must be appropriately configured for each domain being served including an MX record, as documented in the BIND chapter of this book. Second, the new domain is added to the **Local Domains** table. Finally, one or more entries are added to the **Address Mapping** table. As DNS has its own chapter, and adding an entry to the **Local Domains** table was covered in the preceding tutorial, we can skip to the final step.

Adding Address Mapping Entries

Click on the **Address Mapping** icon, and create new mappings as appropriate for your environment. To create a new entry, select `Address` and fill in the address on which mail will be received in the **Mail for** field. This will include the name and domain name of the recipient, so for example, I might enter `joe@virtualhost.com` in this field. Next, select the `Address` option and enter the destination mailbox for this user in the, which needs to be an existing user, into the **Send to** field. For example, I might enter a username of `virtualhost-joe` here.

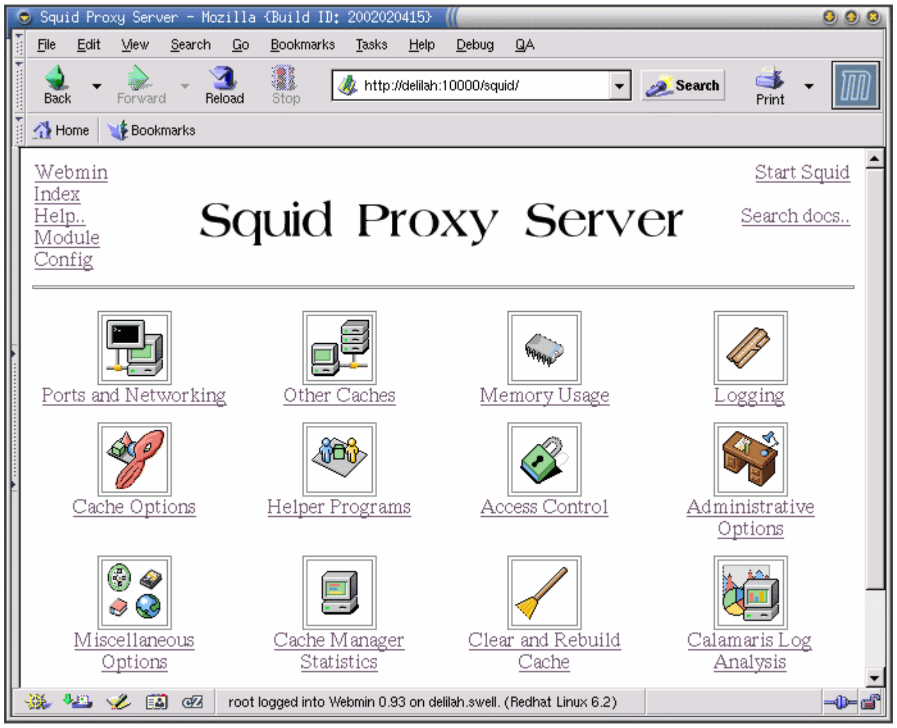
Click the **Create** button, and test your work by sending mail to your newly created virtual user.

Chapter 12. Squid

Squid is a highly featureful and extremely flexible web caching proxy daemon. Most configuration is performed by editing a simple configuration file called `squid.conf` which is usually located in `/usr/local/squid/etc/squid.conf` or, on Red Hat like systems `/etc/squid/squid.conf`. Each behavior is set by a directive followed by one or more options. The Webmin interface provides access to most of the directives available for configuring Squid. Because Squid is a quite complex package, the Webmin interface opens with a series of icons to represent the different types of configuration options. The screenshot below shows the Squid main page.

These options are pretty self explanatory, though a couple of them are worth discussing. The **Cache Manager Statistics** icon, when clicked, will open the Squid **cachemgr.cgi** program to provide direct access to all of Squids various runtime values and statistics. The program provides realtime information about hit ratios, request rates, storage capacity, number of users, system load, and more. The **Calamaris Log Analysis** icon is only present if the **calamaris** `access.log` analyzer is present on your system. Calamaris is a nice perl script that will parse your access log files and provide a nice overview of the type of usage your cache is seeing. Note that by default the **Calamaris** Webmin tool will only parse the last 50,000 lines of your access log. This number can be raised in the **Squid** module configuration, but is not recommended on heavily loaded caches. The parsing of the access logs is a very system intensive task that could interfere with your system's ability to continue answering requests.

Figure 12.1. Squid Proxy Main Page



root logged into Webmin 0.93 on delilah.swell. (Redhat Linux 6.2)

Ports and Networking

The **Ports and Networking** page provides you with the ability to configure most of the network level options of Squid. Squid has a number of options to define what ports Squid operates on, what IP addresses it uses for client traffic and intercache traffic, and multicast options. Usually, on dedicated caching systems these options will not be useful. But in some cases you may need to adjust these to prevent the Squid daemon from interfering with other services on the system, or on your network.

Proxy port
Sets the network port on which Squid operates. This option is usually 3128 by default, and can almost always be left on this address, except when multiple Squids are running on the same system, which is usually ill-advised. This option corresponds to the `http_port` option in `squid.conf`.

ICP port

This is the port on which Squid listens for ICP, or Intercache Communication Protocol, messages. ICP is a protocol used by web caches to communicate and share data. Using ICP it is possible for multiple web caches to share cached entries so that if any one local cache has an object, the distant origin server will not have to be queried for the object. Further, cache hierarchies can be constructed of multiple caches at multiple privately interconnected sites to provide improved hit rates and higher quality web response for all sites. More on this in later sections. This option correlates to the `icp_port` directive.

Incoming TCP address
The address on which Squid opens an HTTP socket that listens for client connections and connections from other caches. By default Squid does not bind to any particular address, and will answer on any address that is active on the system. This option is not usually used, but can provide some additional level of security, if you wish to disallow any outside network users from proxying through your web cache. This option correlates to the `tcp_incoming_address` directive.

Outgoing TCP address
Defines the address on which Squid sends out packets via HTTP to clients and other caches. Again, this option is rarely used. It refers to the `tcp_outgoing_address` directive.

Incoming UDP address
sets the address on which Squid will listen for ICP packets from other web caches. This option allows you to restrict which subnets will be allowed to connect to your cache on a multi-homed, or containing multiple subnets, Squid host. This option correlates to the `udp_incoming_address` directive.

Outgoing UDP address
The address on which Squid will send out ICP packets to other web caches. This option correlates to the `udp_outgoing_address`.

Multicast groups
The multicast groups which Squid will join to receive multicast ICP requests. This option should be used with great care, as it is used to configure your Squid to listen for multicast ICP queries. Clearly if your server is not on the MBone, this option is useless. And even if it is, this may not be an ideal choice. Refer to the *Squid FAQ* [http://www.squid-cache.org/Doc/FAQ/FAQ-13.html] on this subject for a more complete discussion. This option refers to the `mcast_groups` directive.

TCP receive buffer
The size of the buffer used for TCP packets being received. By default Squid uses whatever the default buffer size for your operating system is. This should probably not be changed unless you know what you're doing, and there is little to be gained by changing it in most cases. This correlates to the `tcp_recv_bufsize` directive.

Other Caches

The **Other Caches** page provides an interface to one of Squids most interesting, but also widely misunderstood, features. Squid is the reference implementation of ICP, or Intercache Communication Protocol, a simple but effective means for multiple caches to communicate with each other regarding the content that is available on each. This opens the door for many interesting possibilities when one is designing a caching infrastructure.

Intercache Communication Protocol

It is probably useful to discuss how ICP works and some common usages for ICP within Squid, in order to quickly make it clear what it is good for, and perhaps even more importantly, what it is *not* good for. The most popular uses for ICP are discussed, and more good ideas will probably arise in the future as the internet becomes even more global in scope, and the web caching infrastructure must grow with it.

Parent and Sibling Relationships

The ICP protocol specifies that a web cache can act as either a parent or a sibling. A parent cache is simply an ICP capable cache that will answer both hits and misses for child caches, while a sibling will only answer hits for other siblings. This subtle distinction means simply that a parent cache can proxy for caches that have no direct route to the internet. A sibling cache, on the other hand, cannot be relied upon to answer all requests, and your cache must have another method to retrieve requests that cannot come from the sibling. This usually means that in sibling relationships, your cache will also have a direct connection to the internet or a parent proxy that can retrieve misses from the origin servers. ICP is a somewhat chatty protocol in that an ICP request will be sent to every neighbor cache each time a cache miss occurs. By default, whichever cache replies with an ICP hit first, will be the cache used to request the object.

When to Use ICP

ICP is often used in situations wherein one has multiple internet connections, or several types of path to internet content. Other possibilities include having a cache mesh such as the *IRCache Hierarchy* [http://www.ircache.net/Cache/] in the US or *The National Janet Web Caching Service* [http://wwwcache.ja.net/] in the UK, which can utilize lower cost non-backbone links to connect several remote caches in order to lower costs and raise performance. Finally, it is possible, though usually not recommended, to implement a rudimentary form of load balancing through the use of multiple parents and multiple child web caches. All of these options are discussed in some detail, but this document should not be considered the complete reference to ICP. Other good sources of information include the two RFCs on the subject, *RFC 2186* [http://www.ircache.net/Cache/ICP/rfc2186.txt] which discusses the protocol itself, and *RFC 2187* [http://www.ircache.net/Cache/ICP/rfc2187.txt] which describes the application of ICP.

One common ICP-based solution in use today, is satellite cache pre-population services. In this case, there are at least two caches at a site, one of which is connected to a satellite internet uplink. The satellite connected cache is provided by the service provider, and it is automatically filled with popular content via the satellite link. The other cache uses the satellite connected cache as a sibling, which it queries for every cache miss that it has. If the satellite connected sibling has the content it will be served from the sibling cache, if not the primary cache will fetch the content from the origin server or a parent cache. ICP is a pretty effective, if somewhat bandwidth and processor intensive, means of accomplishing this task. A refinement of this process would be to use Cache-Digests for the satellite connected sibling in order to reduce traffic between the sibling caches. Nonetheless, ICP is a quite good method of implementing this idea.

Another common use is cache meshes. A cache mesh is, in short, a number of web caches at remote sites--possibly distant, but also possibly just in different buildings of the same university or different floors in the same office building--that are allowed to share data using ICP. This type of hierarchy allows a large number of caches to benefit from a larger client population than is directly available to it. All other things being equal, a cache that is not overloaded will perform better (with regard to hit ratio) with a larger number of clients. Simply put, a larger client population leads to a higher quality of cache content, which in turn leads to higher hit ratios and improved bandwidth savings. So, whenever it is possible to increase the client population without overloading the cache, such as in the case of a cache mesh, it may be worth considering. Again this type of hierarchy can be improved upon by the use of Cache Digests, but ICP is usually simpler to implement and is a widely supported standard, even on non-Squid caches.

Finally, ICP is also sometimes used for load balancing multiple caches at the same site. ICP, or even Cache Digests for that matter, are almost *never* the best way to implement load balancing. However, for completeness, I'll discuss it briefly. Using ICP for load balancing can be achieved in a few ways. One common method is to have several local siblings, which can each provide hits to the others' clients, while the client load is evenly divided across the number of caches. Another option is to have a very fast but low capacity web cache in front of two or more lower cost, but higher capacity, parent web caches. The parents will then provide the requests in a roughly equal amount. As mentioned, there are much better options for balancing web caches, the most popular being WCCP (version 1 is fully supported by Squid), and L4 switches.

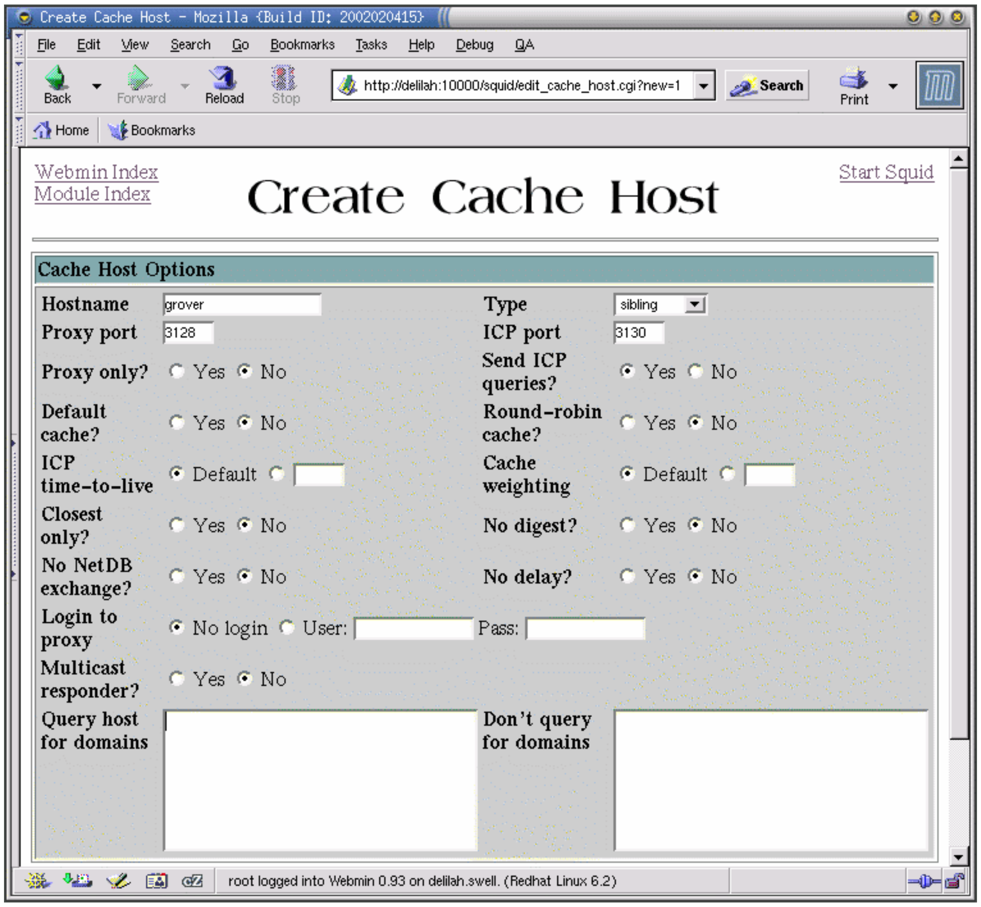
Other Proxy Cache Servers

This section of the **Other Caches** page provides a list of currently configured sibling and parent caches, and also allows one to add more neighbor caches. Clicking on the name of a neighbor cache will allow you to edit it. This section also provides the vital information about the neighbor caches, such as the type (parent, sibling, multicast), the proxy or HTTP port, and the ICP or UDP port of the caches. Note that Proxy port is the port where the neighbor cache normally listens for client traffic, which defaults to 3128.

Edit Cache Host

Clicking on a cache peer name or clicking *Add another cache* on the primary **Other Caches** page brings you to this page, which allows you to edit most of the relevant details about neighbor caches.

Figure 12.2. Edit Cache Host Page


Create Cache Host - Mozilla {Build ID: 2002020415}
File Edit View Search Go Bookmarks Tasks Help Debug QA
Back Forward Reload Stop
http://delilah:10000/squid/edit_cache_host.cgi?new=1
Search Print
Home Bookmarks
Webmin Index
Module Index
Start Squid
root logged into Webmin 0.93 on delilah.swell. (Redhat Linux 6.2)

Create Cache Host

Cache Host Options

Hostname	grover	Type	sibling
Proxy port	3128	ICP port	3130
Proxy only?	Yes [✓ No]	Send ICP queries?	[✓ Yes] No
Default cache?	Yes [✓ No]	Round-robin cache?	Yes [✓ No]
ICP time-to-live	[✓ Default]	Cache weighting	[✓ Default]
Closest only?	Yes [✓ No]	No digest?	Yes [✓ No]
No NetDB exchange?	Yes [✓ No]	No delay?	Yes [✓ No]
Login to proxy	[✓ No login] User: Pass:		
Multicast responder?	Yes [✓ No]		
Query host for domains		Don't query for domains	

Hostname
The name or IP address of the neighbor cache you want your cache to communicate with. Note that this will be one way traffic, ACLs are used to allow ICP requests from other caches. ACLs are covered later. This option plus most of the rest of the options on this page correspond to `cache_peer` lines in `squid.conf`.

Type
The type of relationship you want your cache to have with the neighbor cache. If the cache is upstream, and you have no control over it, you will need to consult with the administrator to find out what kind of relationship you should set up. If it is configured wrong, cache misses will likely result in errors for your users. The options here are `sibling`, `parent`, and `multicast`.

Proxy port
The port on which the neighbor cache is listening for standard HTTP requests. Even though the caches transmit availability data via ICP, actual web objects are still transmitted via HTTP on the port usually used for standard client traffic. If your neighbor cache is a Squid based cache, then it is likely to be listening on the default port of 3128. Other common ports used by cache servers include 8000, 8888, 8080, and even 80 in some circumstances.

ICP port
The port on which the neighbor cache is configured to listen for ICP traffic. If your neighbor cache is a Squid based proxy, this value can be found by checking the `icp_port` directive in the `squid.conf` file on the neighbor cache. Generally, however, the neighbor cache will listen on the default port 3130.

Proxy only?
A simple yes or no question to tell whether objects fetched from the neighbor cache should be cached locally. This can be used when all caches are operating well below their client capacity, but disk space is at a premium or hit ratio is of prime importance.

Send ICP queries?
Tells your cache whether or not to send ICP queries to a neighbor. The default is Yes, and it should probably stay that way. ICP queries is the method by which Squid knows which caches are responding, and which caches are closest or best able to quickly answer a request.

Default cache
This be switched to Yes if this neighbor cache is to be the *last-resort* parent cache to be used in the event that no other neighbor cache is present as determined by ICP queries. Note that this does not prevent it from being used normally while other caches are responding as expected. Also, if this neighbor is the sole parent proxy, and no other route to the internet exists, this should be enabled.

Round-robin cache?
Chooses whether to use round robin scheduling between multiple parent caches in the absence of ICP queries. This should be set on all parents that you would like to schedule in this way.

ICP time-to-live
Defines the multicast TTL for ICP packets. When using multicast ICP, it is usually wise for security and bandwidth reasons to use the minimum tty suitable for your network.

Cache weighting
Sets the weight for a parent cache. When using this option it is possible to set higher numbers for preferred caches. The default value is 1, and if left unset for all parent caches, whichever cache responds positively first to an ICP query will be be sent a request to fetch that object.

Closest only
Allows you to specify that your cache wants only CLOSEST_PARENT_MISS replies from parent caches. This allows your cache to then request the object from the parent cache *closest* to the origin server.

No digest?
Chooses whether this neighbor cache should send cache digests.

No NetDB exchange
When using ICP, it is possible for Squid to keep a database of network information about the neighbor caches, including availability and RTT, or Round Trip Time, information. This usually allows Squid to choose more wisely which caches to make requests to when multiple caches have the requested object.

No delay?
Prevents accesses to this neighbor cache from effecting delay pools. Delay pools, discussed in more detail later, are a means by which Squid can regulate bandwidth usage. If a neighbor cache is on the local network, and bandwidth usage between the caches does not need to be restricted, then this option can be used.

Login to proxy
Select this is you need to send authentication information when challenged by the neighbor cache. On local networks, this type of security is unlikely to be necessary.

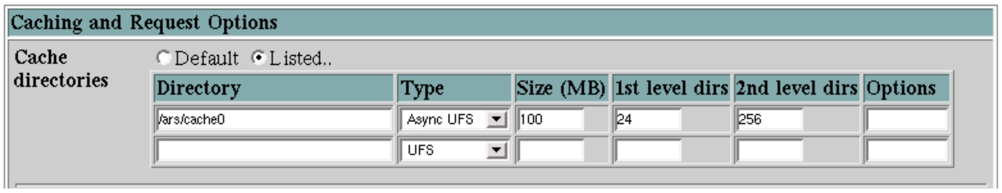
Multicast responder
Allows Squid to know where to accept multicast ICP replies. Because multicast is fed on a single IP to many caches, Squid must have some way of determining which caches to listen to and what options apply to that particular cache. Selecting Yes here configures Squid to listen for multicast replies from the IP of this neighbor cache.

Query host for domains, **Don't query for domains**
These two options are the only options on this page to configure a directive other than `cache_peer` in Squid. In this case it sets the `cache_peer_domain` option. This allows you to configure whether requests for certain domains can be queried via ICP and which should not. It is often used to configure caches not to query other caches for content within the local domain. Another common usage, such as in the national web hierarchies discussed above, is to define which web cache is used for requests destined for different TLDs. So, for example, if one has a low cost satellite link to the US backbone from another country that is preferred for web traffic over the much more expensive land line, one can configure the satellite connected cache as the cache to query for all .com, .edu, .org, net, .us, and .gov, addresses.

Cache Selection Options

This section provides configuration options for general ICP configuration. These options effect all of the other neighbor caches that you define.

Figure 12.3. Some global ICP options



Caching and Request Options

Cache directories: Default [✓ Listed..]

Directory	Type	Size (MB)	1st level dirs	2nd level dirs	Options
/ars/cache0	Async UFS	100	24	256	
	UFS				

Directly fetch URLs containing
Allows you to configure a match list of items to always fetch directly rather than query a neighbor cache. The default here is *cgi-bin ?* and should continue to be included unless you know what you're doing. This helps prevent wasting inter-cache bandwidth on lots of requests that are usually never considered cachable, and so will never return hits from your neighbor caches. This option sets the `hierarchy_stoplist` directive.

ICP query timeout
The time in milliseconds that Squid will wait before timing out ICP requests. The default allows Squid to calculate an optimum value based on average RTT of the neighbor caches. Usually, it is wise to leave this unchanged. However, for reference, the default value in the distant past was 2000, or 2 seconds. This option edits the `icp_query_timeout` directive.

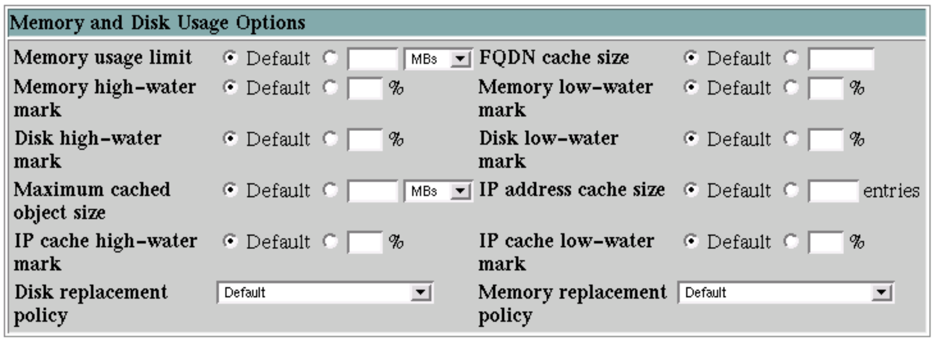
Multicast ICP timeout
Timeout in milliseconds for multicast probes, which are sent out to discover the number of active multicast peers listening on a give multicast address. This configures the `mcast_icp_query_timeout` directive and defaults to 2000 ms, or 2 seconds.

Dead peer timeout
Controls how long Squid waits to declare a peer cache *dead*. If there are no ICP replies received in this amount of time, Squid will declare the peer dead and will not expect to receive any further ICP replies. However, it continues to send ICP queries for the peer and will mark it active again on receipt of a reply. This timeout also affects when Squid expects to receive ICP replies from peers. If more than this number of seconds have passed since the last ICP reply was received, Squid will not expect to receive an ICP reply on the next query. Thus, if your time between requests is greater than this timeout, your cache will send more requests DIRECT rather than through the neighbor caches.

Memory Usage

This page provides access to most of the options available for configuring the way Squid uses memory and disks. Most values on this page can remain unchanged, except in very high load or low resource environments, where tuning can make a measurable difference in how well Squid performs.

Figure 12.4. Memory and Disk Usage



Memory and Disk Usage Options

Memory usage limit	[✓ Default] ○ ___ MBs	FQDN cache size	[✓ Default] ○ ___
Memory high-water mark	[✓ Default] ○ ___ %	Memory low-water mark	[✓ Default] ○ ___ %
Disk high-water mark	[✓ Default] ○ ___ %	Disk low-water mark	[✓ Default] ○ ___ %
Maximum cached object size	[✓ Default] ○ ___ MBs	IP address cache size	[✓ Default] ○ ___ entries
IP cache high-water mark	[✓ Default] ○ ___ %	IP cache low-water mark	[✓ Default] ○ ___ %
Disk replacement policy	Default	Memory replacement policy	Default

Memory usage limit
The limit on how much memory Squid will use for *some parts* of its in core data. Note that this does not restrict or limit Squids total process size. What it does do is set aside a portion of RAM for use in storing in-transit and hot objects, as well as negative cached objects. Generally, the default value of 8 MB is suitable for most situations, though it is safe to lower it to 4 or 2 MB in extremely low load situations. It can also be raised significantly on high memory systems to increase performance by a small margin. Keep in mind that large cache directories increase the memory usage of Squid by a large amount, and even a machine with a lot of memory can run out of memory and go into swap if cache memory and disk size are not appopriately balanced. This option edits the `cache_mem` directive. See the section on cache directories for more complete discussion of balancing memory and storage.

Caution

If Squid is using what you consider to be too much memory, do not look here for a solution. It defaults to a modest 8 MB, and only when you have configured a very small amount of cache storage will this 8 MB be a significant portion of the memory Squid allocates. If you do find yourself running out of memory, you can lower the size of your configured cache directories for a more noticeable decrease in memory used.

FQDN cache size
Size of the in memory cache of fully qualified domain names. This configures the `fqdncache_size` parameter and defaults to 1024, which is usually a safe value. In environments where DNS queries are slow, raising this may help.

Memory high-water mark, **Memory low water mark**
Sets the points at which Squid begins to remove objects from memory. As memory usage climbs past the low water mark, Squid more aggressively tries to free memory. Note this applies to the memory usage limit defined above, *not* the total process size of Squid. If you have a system that is doing double or triple duty and providing more than cache

services it may be wise to set the low mater mark at a low number, like 50%, and the high mark at a high number like 95%. In such a case, Squid will mostly keep its usage at 50%, but if it begins to get overloaded, or a particularly large object comes through the cache, it can briefly go over that point. This option configures the `cache_mem_low` and `cache_mem_high` options, which default to 90% and 95%, respectively.

Disk high-water mark, **Disk low-water mark**
Provide a mechanism for disk usage similar to the memory water marks above. To maximize hit ratio, and provide most efficient use of disk space, leave this at the default values of 90% and 95%. Or to maximize performance and minimize fragmentation on disk, set them to a higher spread, such as 85% and 100%. Note that these settings are not where the amount of disk space to use is configured, they only define the percent of the allotted cache space at which Squid should begin to prune out old data to make room for incoming new objects. These options correlate to the `cache_swap_high` and `cache_swap_low` directives.

Maximum cached object size
The size of the largest object that Squid will attempt to cache. Objects larger than this will never be written to disk for later use. Refers to the `maximum_object_size` directive.

IP address cache size, **IP cache high-water mark**, **IP address low-water mark**
The size of the cache used for IP addresses and the high and low water marks for the cache, respectively. This option configures the `ipcache_size`, `ipcache_high`, and `ipcache_low`, directives, which default to 1024 entries, 95% and 90%.

Logging

Squid provides a number of logs that can be used when debugging problems, and when measuring the effectiveness and identifying users and the sites they visit. Because Squid can be used to "snoop" on users browsing habits, one should carefully consider privacy laws in your region and more importantly be considerate to your users. That being said, logs can be very valuable tools in insuring that your users get the best service possible from your cache.

Access log file
The location of the cache `access.log`. The Squid `access.log` is the file in which Squid writes a small one line entry for every request served by the cache. This option correlates to the `cache_access_log` directive and usually defaults to `/usr/local/squid/log/access.log` or on some RPM based systems `/var/log/squid/access.log`. The format of the standard log file looks like this:

```
973421337.543  11801 192.168.1.1 TCP_MISS/200 1999 GET http://www.google.com/ -
DIRECT/64.208.34.100 text/html
```

In the above line each field represents some piece of information that may be of interest to an administrator. They are as follows:

1. *System time* in standard Unix format. The time in seconds since 1970. There are many tools to convert this to human readable time, including this simple perl script.

   ```
   #! /usr/bin/perl -p
   s/^\d+\.\d+/localtime $&/e;
   ```

2. *Duration* or the elapsed time in milliseconds the transaction required.

3. *Client address* or the IP address of the requesting browser. Some configurations may lead to a masked entry here, so that this field is not specific to one IP, but instead reports a whole network IP.

4. *Result codes* provides two entries separated by a slash. The first position is one of several *result codes* [http://www.squid-cache.org/Doc/FAQ/FAQ-6.html#cache-result-codes], which provide information about how the request was resolved or wasn't resolved if there was a problem. The second field contains the *status code* [http://www.squid-cache.org/Doc/FAQ/FAQ-6.html#http-status-codes], which comes from a subset of the standard HTTP status codes.

5. *Bytes* is the size of the data delivered to the client in bytes. Headers and object data are counted towards this total. Failed requests will deliver and error page, the size of which will also be counted.

6. *Request method* is the HTTP *request method* [http://www.squid-cache.org/Doc/FAQ/FAQ-6.html#request-methods] used to obtain an object. The most common method is, of course, GET, which is the standard method web browsers use to fetch objects.

7. *URL* is the complete Uniform Resource Locator requested by the client.

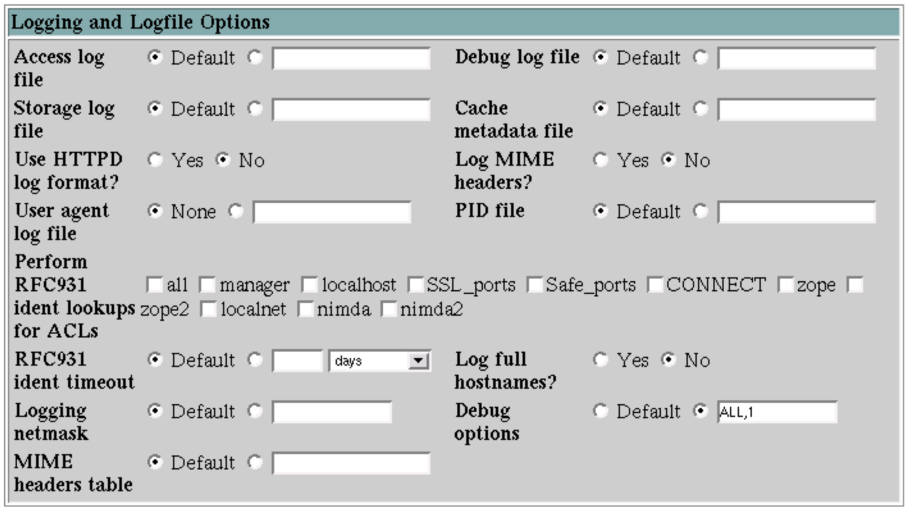
8. *RFC931* is the ident lookup information for the requesting client, if ident lookups are enabled in your Squid. Because of the performance impact, ident lookups are not used by default, in which case this field will always contain "-".

9. *Hierarchy code* consists of three items. The first is simply a prefix of TIMEOUT_ if all ICP requests timeout. The second (first if there is not TIMEOUT_ prepended) is the code that explains how the request was handled. This portion will be one of several *hierarchy codes* [http://www.squid-cache.org/Doc/FAQ/FAQ-6.html#hier-codes]. This result is informative regardless of whether your cache is part of a cache hierarchy, and will explain how the request was served. The final portion of this field contains the name or IP of the host from which the object was retrieved. This could be the origin server, a parent, or any other peer.

10. *Type* is simply the type of object that was requested. This will usually be a recognizable MIME type, but some objects have no type or are listed as ":".

There are two other optional fields for cases when MIME header logging has been turned on for debugging purposes. The full HTTP request and reply headers will be included enclosed in `[` and `]` square brackets.

Figure 12.5. Logging Configuration



Logging and Logfile Options

Access log file	[✓ Default]	Debug log file	[✓ Default]
Storage log file	[✓ Default]	Cache metadata file	[✓ Default]
Use HTTPD log format?	Yes [✓ No]	Log MIME headers?	Yes [✓ No]
User agent log file	[✓ None]	PID file	[✓ Default]
Perform RFC931 ident lookups for ACLs	all manager localhost SSL_ports Safe_ports CONNECT zope zope2 localnet nimda nimda2		
RFC931 ident timeout	[✓ Default] days	Log full hostnames?	Yes [✓ No]
Logging netmask	[✓ Default]	Debug options	Default [✓ ALL,1]
MIME headers table	[✓ Default]		

Debug log file
The location for Squids `cache.log` file. This file contains startup configuration information, as well as assorted error information during Squids operation. This file is a good place to look when a website is found to have problems running through the web cache. Entries here may point towards a potential solution. This option correlates to the `cache_log` directive and usually defaults to either `/usr/local/squid/log/cache.log` or `/var/log/squid/cache.log` on RPM based systems.

Storage log file
Location of the caches store log file. This file contains a transaction log of all objects that are stored in the object store, as well as the time when the get deleted. This file really doesn't have very much use on a production cache, and it primarily recommended for use in debugging. Therefore, it can be turned off by entering *none* in the entry field. The default location is either `/usr/local/squid/log/store.log` or `/var/log/squid/store.log`.

Cache metadata file
Filename used in each store directory to store the web cache metadata, which is a sort of index for the web cache object store. This is not a human readable log, and it is strongly recommended that you leave it in its default location on each store directory, unless you really know what you're doing. This option correlates to the `cache_swap_log` directive.

Use HTTPD log format
Allows you to specify that Squid should write its `access.log` in HTTPD common log file format, such as that used by Apache and many other web servers. This allows you to parse the log and generate reports using a wider array of tools. However, this format does not provide several types of information specific to caches, and is generally less

useful when tracking cache usage and solving problems. Because there are several effective tools for parsing and generating reports from the Squid standard access logs, it is usually preferable to leave this at its default of being off. This option configures the `emulate_httpd_log` directive. The **Calamaris** cache access log analyzer does not work if this option is enabled.

Log MIME headers
Provides a means to log extra information about your requests in the access log. This causes Squid to also write the request and response MIME headers for every request. These will appear in brackets at the end of each `access.log` entry. This option correlates to the `log_mime_hdrs` directive.

Perform RFC931 ident lookups for ACLs
Indicates which of the Access Control Lists that are defined should have ident lookups performed for each request in the access log. Because the performance impact of using this option, it is not on by default. This option configures the `ident_lookup_access` directive.

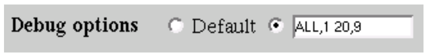
RFC931 ident timeout
The timeout, usually in seconds, for ident lookups. If this is set too high, you may be susceptible to denial or service from having too many outstanding ident requests. The default for this is 10 seconds, and it applies to the `ident_timeout` directive.

Log full hostnames
Configures whether Squid will attempt to resolve the hostname, so the the fully qualified domain name can be logged. This can, in some cases, increase latency of requests. This option correlates to the `log_fqdn` directive.

Logging netmask
Defines what portion of the requesting client IP is logged in the `access.log`. For privacy reasons it is often preferred to only log the network or subnet IP of the client. For example, a netmask of 255.255.255.0 will log the first three octets of the IP, and fill the last octet with a zero. This option configures the `client_netmask` directive.

Debug options
Provides a means to configure all of Squids various debug sections. Squids debugging code has been divided into a number of sections, so that if there is a problem in one part of Squid debug logging can be made more verbose for just that section. For example, to increase debugging for just the Storage Manager in Squid to its highest level of 9 while leaving the rest at the default of 1, the entry would look like this:

Figure 12.6. Setting Squid Debug Levels



Debug options Default [✓ ALL,1 20,9]

There is a *complete list of debug sections* [http://www.swelltech.com/support/docs/squid/debug-sections.txt] at the Swell Technology website and in the Squid source distribution in the `doc` directory. More information can be found in the *Squid FAQ* [http://www.squid-cache.org/Doc/FAQ/FAQ-11.html#ss11.20].

MIME headers table
The pathname to Squids MIME table. This usually should remain at the default value. This option configures the `mime_table` directive, and defaults to `/usr/local/squid/etc/mime.conf` or `/etc/squid/mime.conf`.

Cache Options

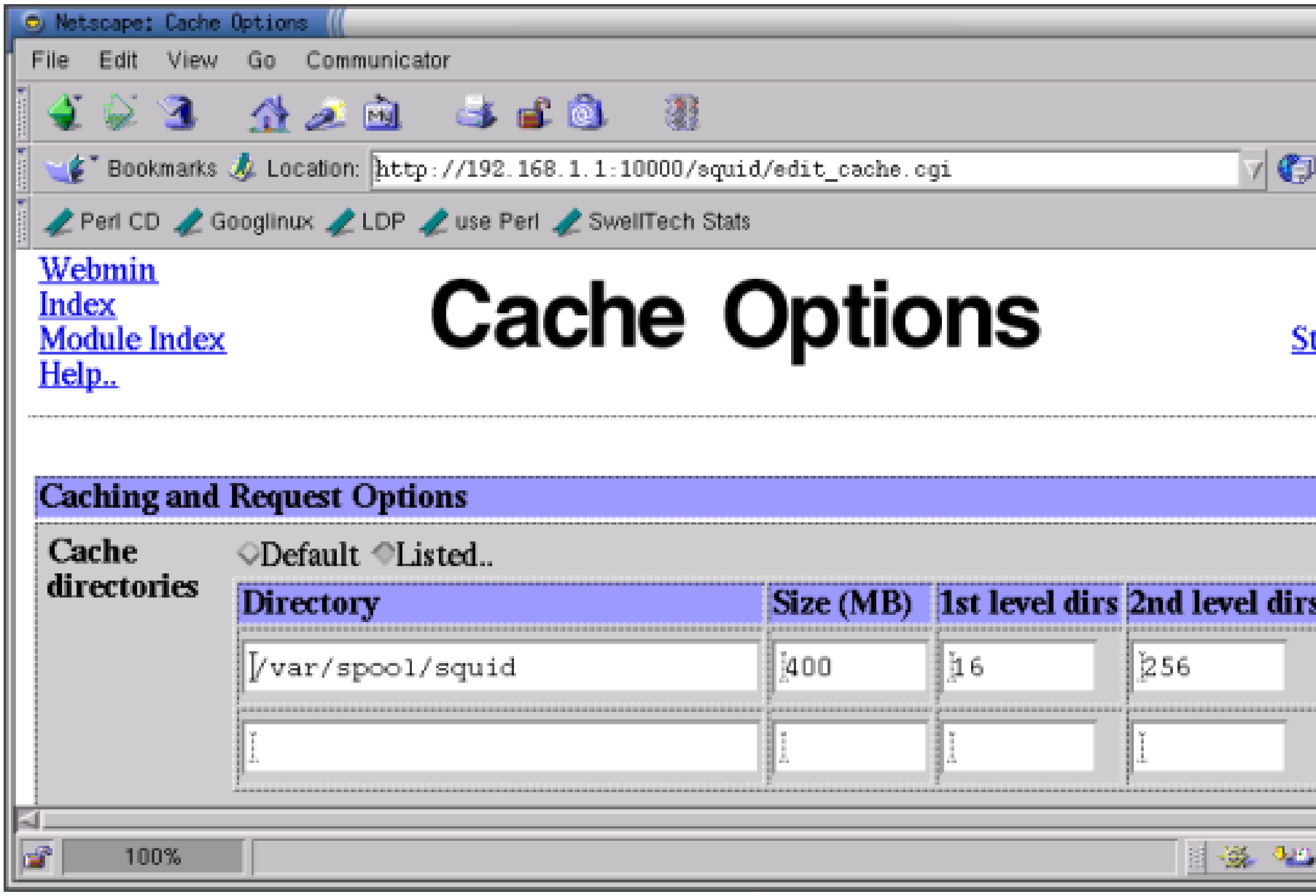
The **Cache Options** page provides access to some important parts of the Squid configuration file. This is where the cache directories are configured as well as several timeouts and object size options.

Cache directories

The **Cache directories** option sets the cache directories and the amount of space Squid is allowed to use on the device. The first example displays an example `cache_dir` line in the `squid.conf` file, while the figure below shows the **Cache Options** screen in Webmin where the same options can be configured.

```
cache_dir ufs /cache0 1500 8 256
```

Figure 12.7. Configuring Squids Cache Directories


Netscape: Cache Options
File Edit View Go Communicator
Bookmarks Location:
Perl CD Googlinux LDP use Perl SwellTech Stats
Webmin
Index
Module Index
Help..
100%

http://192.168.1.1:10000/squid/edit_cache.cgi

Cache Options

Caching and Request Options

Cache directories ◇Default ◇Listed..

Directory	Size (MB)	1st level dirs	2nd level dirs
/var/spool/squid	400	16	256

The directive is **`cache_dir`** while the options are the type of filesystem, the path to the cache directory, the size allotted to Squid, the number of top level directories, and finally the number of second level directories. In the example, I've chosen the filesystem type **`ufs`**, which is a name for all standard Unix filesystems. This type includes the standard Linux ext2 filesystem as well. Other possibilities for this option include **`aufs`** and **`diskd`**.

Note

The filesystem type is a new feature of Squid 2.3 and above. Versions below 2.3 do not need this option, and will not accept any option in its place. 2.2 only supports UFS and Async UFS filesystems, which are chosen at compile time. The GUI example in the figure is for Squid version 2.2.STABLE5. Newer versions will contain the additional field.

The next field is simply the space, in megabytes, of the disk that you want to allow Squid to use. Finally, the directory fields define the upper and lower level directories for Squid to use. Calculating the L1 number precisely is tricky, but not difficult if you use this formula:

```
x=Size of cache dir in KB (i.e. 6GB=~6,000,000KB)
y=Average object size (just use 13KB)
z=Number of directories per first level directory

(((x / y) / 256) / 256) * 2 = # of directories
```

As an example, if my cache used 6GB of each of two 13GB drives:

```
 6,000,000 / 13 = 461538.5 / 256 = 1802.9 / 256 = 7 * 2 = 14
```

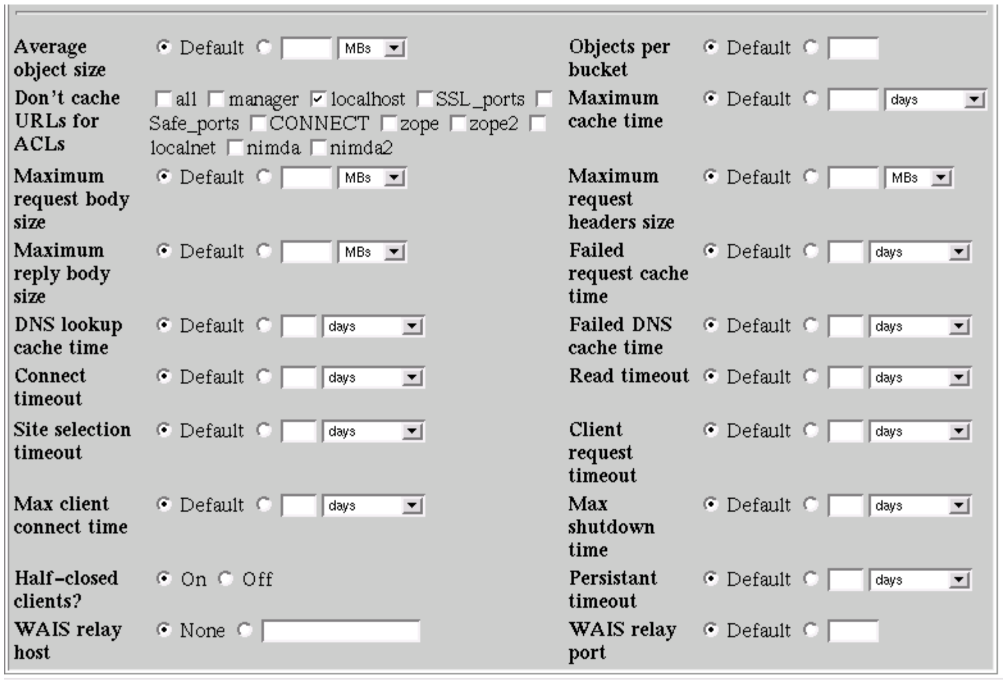
So my cache_dir line would look like this:

```
 cache_dir ufs 6000 14 256
```

Other Cache Options

The rest of the **Cache Options** page is a bit of a hodge podge of mostly simpler options. Generally most configuration will take place on this page, as it addresses many of the tunable items in Squid that can make a difference in performance.

Figure 12.8. Other Cache Options



Average object size	[✓ Default] ○ MBs	Objects per bucket	[✓ Default] ○
Don't cache URLs for ACLs	☐ all ☐ manager ☑ localhost ☐ SSL_ports ☐ Safe_ports ☐ CONNECT ☐ zope ☐ zope2 ☐ localnet ☐ nimda ☐ nimda2	Maximum cache time	[✓ Default] ○ days
Maximum request body size	[✓ Default] ○ MBs	Maximum request headers size	[✓ Default] ○ MBs
Maximum reply body size	[✓ Default] ○ MBs	Failed request cache time	[✓ Default] ○ days
DNS lookup cache time	[✓ Default] ○ days	Failed DNS cache time	[✓ Default] ○ days
Connect timeout	[✓ Default] ○ days	Read timeout	[✓ Default] ○ days
Site selection timeout	[✓ Default] ○ days	Client request timeout	[✓ Default] ○ days
Max client connect time	[✓ Default] ○ days	Max shutdown time	[✓ Default] ○ days
Half-closed clients?	[✓ On] ○ Off	Persistant timeout	[✓ Default] ○ days
WAIS relay host	[✓ None] ○	WAIS relay port	[✓ Default] ○

Average object size
The average size of objects expected in your cache. This item is generally safe at its default value of 13KB. In older versions of Squid (prior to 2.3) this option effected the number of filemap bits set aside by Squid at runtime. In newer Squids filemap bits are configured dynamically, as needed, and so configuration of this option is unnecessary and arguably pointless. This option will go away in some future version of Squid. Until then, it correlates to the `store_avg_object_size` directive.

Objects per bucket
The number of objects in each store hash table. Again, not worth bothering to change it, as its default value is probably a good safe value, and changing it provides little or nothing in the way of performance of efficiency improvements. Corresponds to the `store_objects_per_bucket`

Don't cache URLs for ACLs
Allows you to easily pick which ACL matches will not be cached. Requests that match the selected ACLs will always be answered from the origin server. This option correlates to the `always_direct` directive.

Maximum cache time

The maximum time an object will be allowed to remain in the cache. This time limit is rarely reached, because objects have so many occasions to be purged via the normal replacement of the cache object store. However, if object freshness is of prime importance, then it may be worthwhile to lower this from its default of 1 year to something much shorter, such as 1 week, though it is probably counter-productive to do so for most users. This option configures the `reference_age` parameter.

Maximum request size
The maximum size of request that will be accepted by Squid from the client. The default is 100 KB, however, in environments where the POST method may be used to send larger files to webservers, or webmail is used for sending attachments, it will probably be necessary to raise this limit to something more reasonable. 8 or 16 MB is probably a good size that will permit most uploads without any problems. Note that this bears no relation to the size of object that is being retrieved, it only effects the size of the HTTP request being sent from the client. This option corresponds to the `request_size` directive.

Note

Squid versions from 2.5 onward have removed the default size limit, and requests can be unlimited in size. Thus if you rely on the default limit being in place, you will need to modify your configuration when upgrading.

Failed request cache time
The amount of time that a request error condition is cached. For example, some types of *connection refused* and *404 Not Found* errors are negatively cached.

DNS lookup cache time
The length of time that DNS lookups are cached. Squid provides functionality as a basic caching nameserver, in order to further accelerate web service through the proxy. This value defaults to 6 hours and correlates to the `positive_dns_ttl` directive. If rapid updates of cache DNS data is required, such as to keep up with dynamic DNS systems or to avoid load balance problems with local network sites in a website acceleration environment, it may be wise to reduce this value significantly. Insuring you have reliable and suitably fast DNS service on the local network is mandatory, however, if you do reduce this value by a large amount.

Failed DNS cache time
The time period for which failed DNS requests are cached. This option corresponds to the `negative_dns_ttl` directive, and defaults to 5 minutes. This option rarely needs tuning.

Connect timeout
An option to force Squid to close connections after a specified time. Some systems (notably older Linux versions) can not be relied upon to time out connect requests. For this reason, this option specifies the timeout for how long Squid should wait for the connection to complete. This value defaults to 120 seconds (2 minutes) and correlates to the `connect_timeout` directive.

Read timeout

The timeout for server-side connections. Each successful read() request the timeout is reset to this amount. If no data is read within this period of time, the request is aborted and logged with ERR_READ_TIMEOUT. This option corresponds to `read_timeout` and defaults to 15 minutes.

Site selection timeout
The timeout for URN to multiple URLs selection. URN is a protocol designed for location-independent name resolution, specified in *RFC 2169* [http://www.ietf.org/rfc/rfc2169.txt]. This option configures the `siteselect_timeout` directive and defaults to 4 seconds. There is probably no need to change this.

Client request timeout
The timeout for HTTP requests from clients. By default the value is 5 minutes, and correlates to the `request_timeout` directive.

Max client connect time
The time limit Squid sets for a client to remain connected to the cache process. This is merely a safeguard against clients that disappear without properly shutting down. It is designed to prevent a large number of sockets from being tied up in a CLOSE_WAIT state. The default for this option is 1440 minutes, or 1 day. This correlates to the `client_lifetime`.

Max shutdown time
The time Squid allows for existing connections to continue after it has received a shutdown signal. It will stop accepting new connections immediately, but connections already in progress will continue to be served for this amount of time. This option corresponds to the `shutdown_lifetime` configuration directive and defaults to 30 seconds, which is a good safe value. If rapid down->up time is more important than being polite to current clients, it can be lowered.

Half-closed clients
Defines Squids behavior towards some types of clients that close the sending side of a connection while leaving the receiving side open. Turning this option off will cause Squid to immediately close connections when a read(2) returns "no more data to read". It's usually safe to leave this at the default value of yes. It corresponds to the `half_close_clients` directive.

Persistent timeout
The timeout value for persistent connections. Squid will close persistent connections if they are idle for this amount of time. Persistent connections will be disable entirely if this option is set to a value less than 10 seconds. The default is 120 seconds, and likely doesn't need to be changed. This option configures the `pconn_timeout` directive.

WAIS relay host, **WAIS relay port**
The WAIS host and port to relay WAIS requests to. WAIS, or Wide Area Information System, is a system to catalog and search large amounts of data via a WAIS or WWW browser. WAIS is a mostly deprecated protocol, but some sites probably do still exist, though this author has been unable to locate any to satiate his curiosity about the subject. These options correspond to the `wais_relay_host` and `wais_relay_port` directives, and defaults to `localhost` and `8000`.

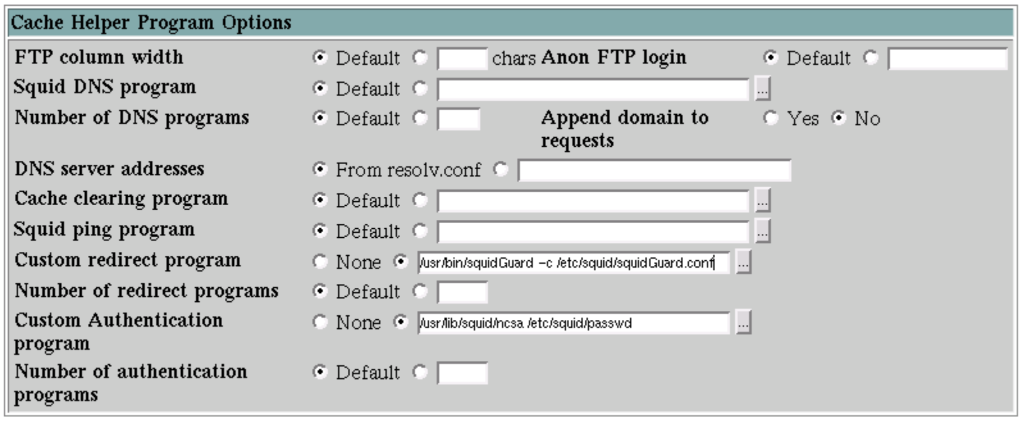
Helper Programs

Squid uses helper programs to provide extra functionality, or provide greater performance. Squid provides a standard API for several types of program to provide extra services that do not fit well into the Squid core. Helper programs could be viewed as a simple means of modular design, allowing third parties to write modules to improve the features of Squid. That being said, some of Squids standard functionality is also provided as helper programs. The standard helper programs include dnsserver, pinger, and several authentication modules. Third party modules include redirectors, ad blockers, and additional authentication modules.

Note

Squid versions from 2.3 onward do not use the dnsserver helper program by default, replacing it with an internal non-blocking DNS resolver. This new internal DNS resolver is more memory and processor efficient, so is preferred. But in some circumstances, the older helper program is the better choice. If your Squid must be able to resolve based on any source other than a DNS server, such as via a hosts file or NIS, then you must use the external dnsserver helper.

Figure 12.9. Cache Helper Program



Cache Helper Program Options

FTP column width	[✓ Default] ○ chars	Anon FTP login	[✓ Default] ○
Squid DNS program	[✓ Default] ○		
Number of DNS programs	[✓ Default] ○	Append domain to requests	○ Yes [✓ No]
DNS server addresses	[✓ From resolv.conf] ○		
Cache clearing program	[✓ Default] ○		
Squid ping program	[✓ Default] ○		
Custom redirect program	○ None [✓ /usr/bin/squidGuard -c /etc/squid/squidGuard.conf]		
Number of redirect programs	[✓ Default] ○		
Custom Authentication program	○ None [✓ /usr/lib/squid/ncsa /etc/squid/passwd]		
Number of authentication programs	[✓ Default] ○		

FTP column width
The column width for auto-generated web pages of FTP sites queried through Squid when Squid is in forward proxy mode. Squid provides limited FTP proxy features to allow browsers (even older, non-FTP aware browsers) to communicate with FTP servers. This option gives some control over how Squid formats the resulting file lists. This option correlates to the `ftp_list_width` and defaults to 32.

Note

Squid only provides FTP proxy and caching services when acting as a traditional proxy, not when acting transparently. Squid does not currently provide FTP caching or proxying for standard FTP clients. The clients must be HTTP clients, for which Squid can provide gateway services.

Anon FTP login
The email address Squid uses to login to remote FTP servers anonymously. This can simply be a username followed by an @ symbol, which your domain name can be automatically attached to. Or it can be a full email address. This should be something reasonable for your domain, such as `wwwuser@mydomain.com`, or in the domainless case first mentioned, `Squid@`, which happens to be the default for this option. This corresponds to the `ftp_user` directive.

Squid DNS program
The helper program to use for DNS resolution. Because Squid requires a non-blocking resolver for its queries, an external program called **dnsserver** is included in the standard distribution. In Squid versions prior to 2.3, this program is the only standard choice for resolution, and the path to the file can be entered here. In Squid versions later than 2.3, there is a new default option, which is an internal non-blocking resolver that is more memory and CPU efficient. This option rarely needs to be changed from its default value. This option configures `cache_dns_program` directive.

Number of DNS programs
The number of external DNS resolver processes that will be started in order to serve requests. The default value of five is enough for many networks, however, if your Squid serves a large number of users, this value may need to be increased to avoid errors. However, increasing the number of processes also increases the load on system resources and may actually hinder performance if set too high. More than 10 is probably overkill. Correlates to the `dns_children` directive.

Append domain to requests
When enabled, causes the **dnsserver** to add the local domain name to single component hostnames. It is normally disabled to prevent caches in a hierarchy from interpreting single component hostnames locally. This option configures the `dns_defnames` directive.

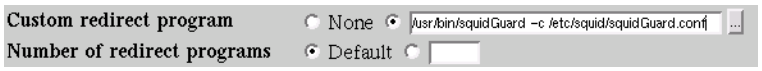
DNS server addresses
Normally defaults to `From resolv.conf`, which simply means that Squids parent DNS servers will be drawn from the `/etc/resolv.conf` file found on the system Squid runs on. It is possible to select other DNS servers if needed, for example to choose a more local caching DNS server, or a remote internet connected server. This option corresponds to the `dns_nameservers` directive.

Cache clearing program
The name of the helper program that deletes, or unlinks, old files in the cache to make room for newer objects. In all current versions of Squid, this helper is known as **unlinkd** and should probably not be changed from this unless you know what you're doing. This option configures the `unlinkd_program` directive.

Squid ping program
An external program that provides Squid with icmp RTT information so that it can more effectively choose between multiple remote parent caches for request fulfillment. There are special cases when this option is required, and your Squid must have been compiled with the `--enable-icmp` configure option in order for it to work. This option should only be used on caches that have multiple parent caches on different networks that it must choose between. The default program to use for this task is called **pinger**. This option configures the `pinger_program` directive.

Custom redirect program, **Number of redirect programs**
Provides access to the redirector interface in Squid, so a redirector can be selected and the number of redirector processes needed configured. A redirector is, in short, just what it sounds like: a program that, when given a URL that matches some circumstances, redirects Squid to another URL. To be a little less brief and perhaps more complete, a redirector provides a method to export a request to an external program, and then to import that programs response and act as though the client sent the resulting request. This allows for interesting functionality with Squid and an external redirector. To configure a redirector, enter the path to the redirector and the redirector filename as shown. You should also enter any options to be passed to the redirector in the same field, as in the example shown. Though the whole command line isn't visible, in this case, the line uses the `-c` of SquidGuard to indicate the location of its configuration file.

Figure 12.10. Configuring a Redirector



Custom redirect program: None [✓ /usr/bin/squidGuard -c /etc/squid/squidGuard.conf]
Number of redirect programs: [✓ Default]

One common usage is to block objectionable content using a tool like *SquidGuard* [http://www.squidguard.org]. Another popular use is to block advertising banners using the simple, but effective *Ad Zapper* [http://www.zip.com.au/~cs/adzap/index.html]. The Ad Zapper not only allows one to block ads, it can also remove those pesky flashing "New" images and moving line images used in place of standard horizontal rules. Several other general purpose redirectors exist that provide URL remapping for many different purposes. Two popular and well supported general redirectors are *Squirm* [http://www.senet.com.au/squirm/] and *JesRed* [http://ivs.cs.uni-magdeburg.de/~elkner/webtools/jesred/]. Finally, it is possible to write a custom redirector to provide any kind of functionality needed from your Squid. While it is not possible to use the redirector interface to alter a web page's content it is possible to perform inline editing of some or all URLs to force many different types of results. The two redirect options configure the `redirect_program` and `redirect_children` directives.

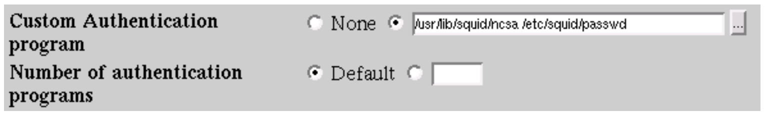
Note

Redirector's usually require additional configuration of their own, and often have their own configuration file. Swell Technology has sponsored development of a module for configuring the SquidGuard redirector. A Squirm module is also planned.

Custom Authentication program, **Number of authentication programs**

Provides an interface to the external authentication interface within Squid. There are a large number of authentication modules for use with Squid, allowing users to be authenticated in a number of ways. The simplest authentication type is known as **ncsa_auth**, which uses a standard htpasswd style password file to check for login name and password. More advanced options include a new NTLM module that allows authentication against a Windows NT domain controller, and LDAP authentication that allows use of Lightweight Directory Access Protocol servers. Most authentication modules work the same way, and quite similarly to a redirector as discussed above. In the figure below, I've chosen the standard `ncsa_auth` authenticator, and provided the location of the passwd file it should use for authenticating users. I've also increased the number of authenticator child processes from the default of 5 to 10, in order to handle quite heavy loads. These options edit the `authenticate_program` and `authenticate_children` directives, respectively.

Figure 12.11. Authentication Configuration

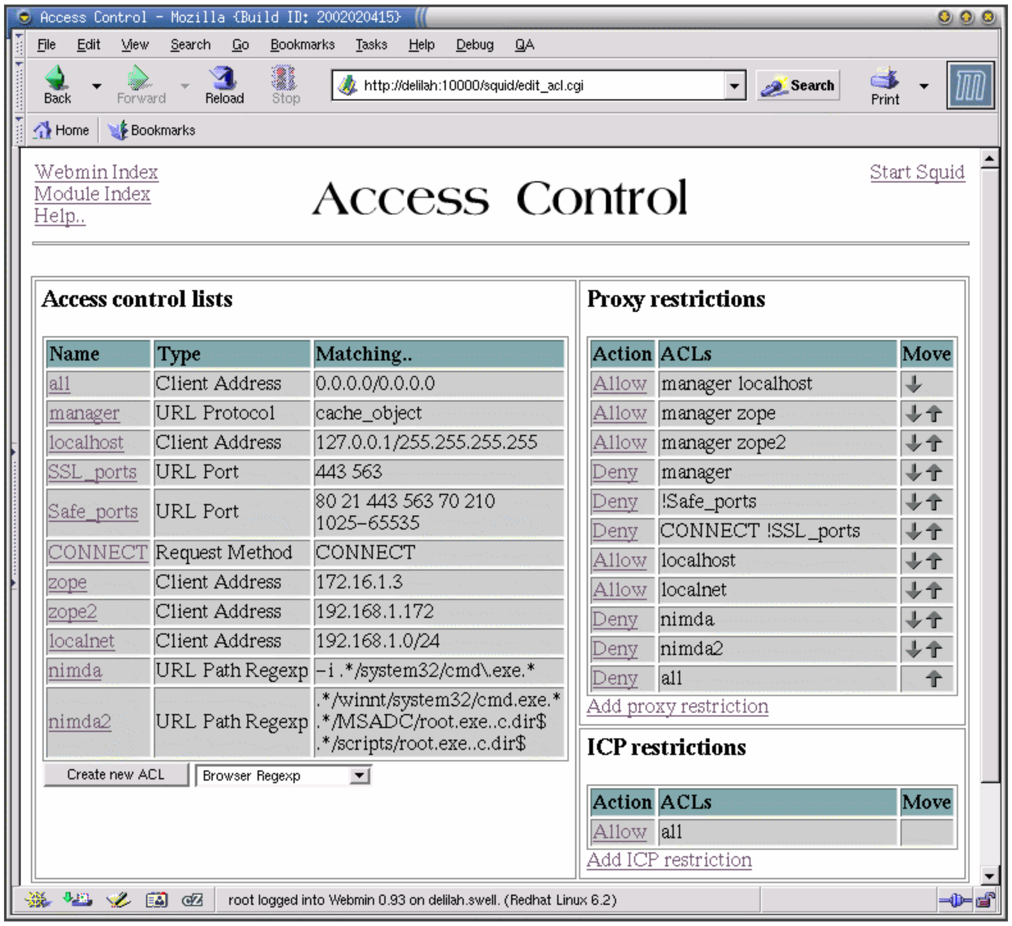


Custom Authentication program	None [✓ /usr/lib/squid/ncsa /etc/squid/passwd]
Number of authentication programs	[✓ Default]

Access Control

The Access Control functionality of Squid is perhaps its most complex set of features, but also among its most powerful. In fact, many use Squid primarily for these features. Because of its complexity we will address it in steps, breaking down the process of creating and implementing an access control list. Access control lists in Squid has two meanings within the configuration file and within the Webmin interface. First, it signifies the whole *concept* of access control lists and all of the logic that can be applied to those lists. Second, it applies to the lists themselves, which are simply lists of some type of data to be matched against when some type of access rule is in place. For example, forcing a particular site or set of sites to not be cached requires a list of sites to not cache, and then a separate rule to define what to do with that list (in this case, don't cache them). There is also a third type of option for configuring ICP access control. These three types of definition are separated in the Webmin panel into three sections. The first is labeled **Access control lists**, which lists existing ACLs and provides a simple interface for generating and editing lists of match criteria. The second is labelled **Proxy restrictions** and lists the current restrictions in place and the ACLs they effect. Finally, the **ICP restrictions** section lists the existing access rules regarding ICP messages from other web caches.

Figure 12.12. Access Control Lists



http://delilah:10000/squid/edit_acl.cgi

Access Control

Access control lists

Name	Type	Matching..
all	Client Address	0.0.0.0/0.0.0.0
manager	URL Protocol	cache_object
localhost	Client Address	127.0.0.1/255.255.255.255
SSL_ports	URL Port	443 563
Safe_ports	URL Port	80 21 443 563 70 210 1025-65535
CONNECT	Request Method	CONNECT
zope	Client Address	172.16.1.3
zope2	Client Address	192.168.1.172
localnet	Client Address	192.168.1.0/24
nimda	URL Path Regexp	-i .*/system32/cmd\.exe.*
nimda2	URL Path Regexp	.*/winnt/system32/cmd.exe.* .*/MSADC/root.exe..c.dir$.*/scripts/root.exe..c.dir$

Proxy restrictions

Action	ACLs	Move
Allow	manager localhost	↓
Allow	manager zope	↓↑
Allow	manager zope2	↓↑
Deny	manager	↓↑
Deny	!Safe_ports	↓↑
Deny	CONNECT !SSL_ports	↓↑
Allow	localhost	↓↑
Allow	localnet	↓↑
Deny	nimda	↓↑
Deny	nimda2	↓↑
Deny	all	↑

ICP restrictions

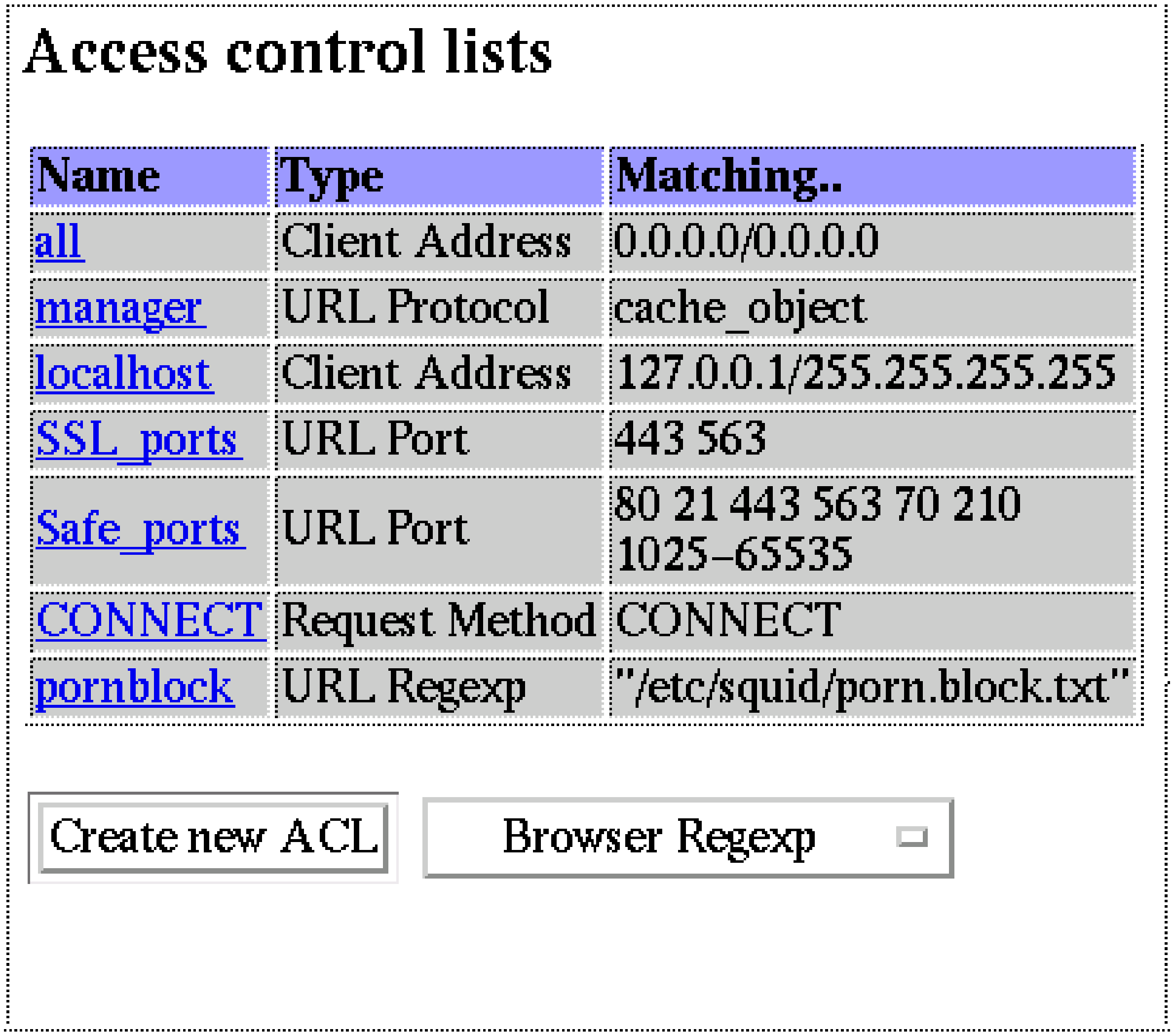
Action	ACLs	Move
Allow	all	

root logged into Webmin 0.93 on delilah.swell. (Redhat Linux 6.2)

Access Control Lists

This section provides a list of existing ACLs and provides a means to create new ones. The first field in the table represents the name of the ACL, which is simply an assigned name, that can be just about anything the user chooses. The second field is the type of the ACL, which can be one of a number of choices, that indicates to Squid what part of a request should be matched against for this ACL. The possible types include the requesting clients address, the web server address or hostname, a regular expression matching the URL, and many more. The final field is the actual string to match. Depending on what the ACL type is, this may be an IP address, a series of IP addresses, a URL, a hostname, etc.

Figure 12.13. ACL section

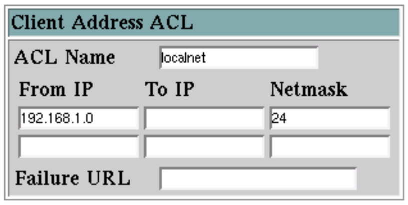


Access control lists

Name	Type	Matching..
all	Client Address	0.0.0.0/0.0.0.0
manager	URL Protocol	cache_object
localhost	Client Address	127.0.0.1/255.255.255.255
SSL_ports	URL Port	443 563
Safe_ports	URL Port	80 21 443 563 70 210 1025-65535
CONNECT	Request Method	CONNECT
pornblock	URL Regexp	"/etc/squid/porn.block.txt"

To edit an existing ACL, simply click on the highlighted name. You will then be presented with a screen containing all relevant information about the ACL. Depending on the type of the ACL, you will be shown different data entry fields. The operation of each type is very similar, so for this example, we'll step through editing of the `localhost` ACL. Clicking the `localhost` button presents the page below.

Figure 12.14. Edit an ACL

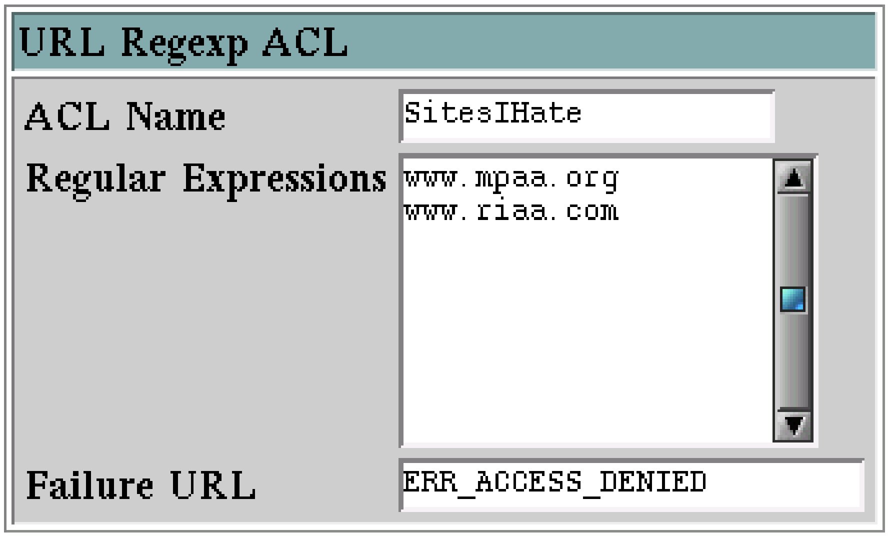


Client Address ACL

ACL Name	localnet	
From IP	To IP	Netmask
192.168.1.0		24
Failure URL		

The title of the table is **Client Address ACL** which means that the ACL of the `Client Address` type, and tells Squid to compare the incoming IP address with the IP address in the ACL. It is possible to select an IP based on the originating IP or the destination IP. The netmask can also be used to indicate whether the ACL matches a whole network of addresses, or only a single IP. It is possible to include a number of IPs, or ranges of IPs in these fields. Finally, the **Failure URL** is the address to send clients to if they have been denied access due to matching this particular ACL. Note that the ACL by itself does nothing, there must also be a proxy restriction or ICP restriction rule that uses the ACL for Squid to use the ACL.

Figure 12.15. Creating an ACL



URL Regexp ACL

ACL Name: SitesIHate

Regular Expressions:

```
www.mpaa.org
www.riaa.com
```

Failure URL: ERR_ACCESS_DENIED

Creating a new ACL is equally simple. From the ACL page, in the **Access control lists** section, select the type of ACL you'd like to create.Then click **Create new ACL**. From there, as shown, you can enter any number of ACLs for the list. In my case, I've created a list called `SitesIHate`, which contains the web sites of the Recording Industry Association of America and the Motion Picture Association of America. From there, I can add a proxy restriction to deny all accesses through my proxy to those two web sites.

Available ACL Types

Browser Regexp
A regular expression that matches the clients browser type based on the user agent header. This allows for ACL's to operate based on the browser type in use, for example, using this ACL type, one could create an ACL for Netscape users and another for Internet Explorer users. This could then be used to redirect Netscape users to a Navigator enhanced page, and IE users to an Explorer enhanced page. Probably not the wisest use of an administrators time, but does indicate the unmatched flexibility of Squid. This ACL type correlates to the `browser` ACL type.

Client IP Address
The IP address of the requesting client, or the clients IP address. This option refers to the `src` ACL in the Squid configuration file. An IP address and netmask are expected. Address ranges are also accepted.

Client Hostname
Matches against the client domain name. This option correlates to the `srcdomain` ACL, and can be either a single domain name, or a list or domain names, or the path to a file that contains a list of domain names. If a path to a file, it must be surrounded parentheses. This ACL type can increase the latency, and decrease throughput significantly on a loaded cache, as it must perform an address-to-name lookup for each request, so it is usually preferable to use the Client IP Address type.

Client Hostname Regexp
Matches against the client domain name. This option correlates to the `srcdom_regex` ACL, and can be either a single domain name, or a list of domain names, or a path to a file that contains a list of domain names. If a path to a file, it must be surrounded parentheses

Date and Time
This type is just what it sounds like, providing a means to create ACLs that are active during certain times of the day or certain days of the week. This feature is often used to block some types of content or some sections of the internet during business or class hours. Many companies block pornography, entertainment, sports, and other clearly non-work related sites during business hours, but then unblock them after hours. This might improve workplace efficiency in some situations (or it might just offend the employees). This ACL type allows you to enter days of the week and a time range, or select all hours of the selected days. This ACL type is the same as the `time` ACL type directive.

Dest AS Number
The Destination Autonomous System Number is the AS number of the server being queried. The autonomous system number ACL types are generally only used in Cache Peer, or ICP, access restrictions. Autonomous system numbers are used in organizations that have multiple internet links and routers operating under a single administrative authority using the same gateway protocol. Routing decisions are then based on knowledge of the AS in addition to other possible data. If you are unfamiliar with the term autonomous system, it is usually safe to say you don't need to use ACLs based on AS. Even if you are familiar with the term, and have a local AS, you still probably have little use for the AS Number ACL types, unless you have cache peers in other autonomous systems and need to regulate access based on that information. This type correlates to the `dest_as` ACL type.

Source AS Number
The Source Autonomous System Number is another AS related ACL type, and matches on the AS number of the source of the request. Equates to the `src_as` ACL type directive.

Ethernet Address
The ethernet or MAC address of the requesting client. This option only works for clients on the same local subnet, and only for certain platforms. Linux, Solaris, and some BSD variants are the supported operating systems for this type of ACL. This ACL can provide a somewhat secure method of access control, because MAC addresses are usually harder to spoof than IP addresses, and you can guarantee that your clients are on the local network (otherwise no ARP resolution can take place).

External Auth
This ACL type calls an external authenticator process to decide whether the request will be allowed. Many authenticator helper programs are available for Squid, including PAM, NCSA, Unix passwd, SMB, NTLM (only in Squid 2.4), etc. Note that authentication *cannot* work on a transparent proxy or HTTP accelerator. The HTTP protocol does not provide for two authentication stages (one local and one on remote websites). So in order to use an authenticator, your proxy must operate as a traditional proxy, where a client will respond appropriately to a proxy authentication request as well as external webserver authentication requests. This correlates to the `proxy_auth` directive.

External Auth Regex
As above, this ACL calls an external authenticator process, but allows regex pattern or case insensitive matches. This option correlates to the `proxy_auth_regex` directive.

Proxy IP Address
The local IP address on which the client connection exists. This allows ACLs to be constructed that only match one physical network, if multiple interfaces are present on the proxy, among other things. This option configures the `myip` directive.

RFC931 User
The username as given by an ident daemon running on the client machine. This requires that ident be running on any client machines to be authenticated in this way. Ident should not be considered secure except on private networks where security doesn't matter much. You can find free ident servers for the following operating systems: Win NT [http://info.ost.eltele.no/freeware/identd/], Win95/Win98 [http://identd.sourceforge.net/], and Unix [http://www2.lysator.liu.se/~pen/pidentd/]. Most Unix systems, including Linux and BSD distributions, include an ident server.

Request Method
This ACL type matches on the HTTP method in the request headers. This includes the methods GET, PUT, etc. This corresponds to the `method` ACL type directive.

URL Path Regex

This ACL matches on the URL path minus any protocol, port, and hostname information. It does not include, for example, the "http://www.swelltech.com" portion of a request, leaving only the actual path to the object. This option correlates to the `urlpath_regex` directive.

URL Port
This ACL matches on the destination port for the request, and configures the `port` ACL directive.

URL Protocol
This ACL matches on the protocol of the request, such as ftp, HTTP, ICP, etc.

URL Regexp
Matches using a regular expression on the complete URL. This ACL can be used to provide access control based on parts of the URL or a case insensitive match of the URL, and much more. The regular expressions used in Squid are provided by the GNU Regex library which is documented Regular expressions are discussed briefly in a nice article by Guido Socher [http://www.linuxfocus.org/English/July1998/article53.html] at LinuxFocus. Most Unix systems will also have a man page or info page for **regex**. This option is equivalent to the `url_regex` ACL type directive.

Web Server Address
This ACL matches based on the destination web server's IP address. Squid a single IP, a network IP with netmask, as well as a range of addresses in the form "192.168.1.1-192.168.1.25". This option correlates to the `dst` ACL type directive.

Web Server Hostname
This ACL matches on the hostname of the destination web server.

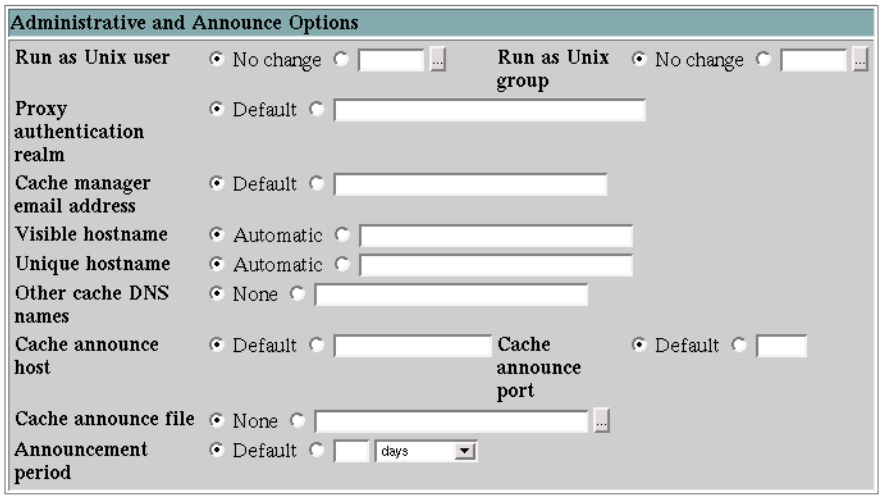
Web Server Regexp
Matches using a regular expression on the hostname of the destination webserver.

More information on Access Control Lists in Squid can be found in [*Chapter 10* [http://www.squid-cache.org/Doc/FAQ/FAQ-10.html]] of the Squid FAQ. Authentication information can be found in [*Chapter 23* [http://www.squid-cache.org/Doc/FAQ/FAQ-23.html]] of the Squid FAQ.

Administrative Options

Administrative Options provides access to several of the behind the scenes options of Squid. This page allows you to configure a diverse set of options, including the user ID and group ID of the Squid process, cache hierarchy announce settings, and the authentication realm.

Figure 12.16. Administrative Options



Administrative and Announce Options

Run as Unix user	[✓ No change]	Run as Unix group	[✓ No change]
Proxy authentication realm	[✓ Default]		
Cache manager email address	[✓ Default]		
Visible hostname	[✓ Automatic]		
Unique hostname	[✓ Automatic]		
Other cache DNS names	[✓ None]		
Cache announce host	[✓ Default]	Cache announce port	[✓ Default]
Cache announce file	[✓ None]		
Announcement period	[✓ Default] days		

Run as Unix user and group
The username and group ID Squid will operate as. Squid is designed to start as `root` but very soon after drop to the user/group specified here. This allows you to restrict, for security reasons, the permissions that Squid will have when operating. Though Squid has proven itself to be quite secure through several years of use on thousands of sites, it is never a bad thing to take extra precautions to avoid problems. By default, Squid will operate as either `nobody` user and the `nogroup` group, or in the case of some Squids installed from RPM as `squid` user and group. These options correlate to the `cache_effective_user` and `cache_effective_group` directives.

Proxy authentication realm
Tthe realm that will be reported to clients when performing authentication. This option usually defaults to *Squid proxy-caching web server*, and correlates to the `proxy_auth_realm` directive. This name will likely appear in the browser pop-up window when the client is asked for authentication information.

Cache manager email address
The email address of the administrator of this cache. This option corresponds to the `cache_mgr` directive and defaults to either *webmaster* or *root* on RPM based systems. This address will be added to any error pages that are displayed to clients.

Visible hostname
The hostname that Squid will advertise itself on. This effects the hostname that Squid uses when serving error messages. This option may need to be configured in cache clusters if you receive IP-Forwarding errors. This option configures the `visible_hostname`.

Unique hostname
Configures the `unique_hostname` directive, and sets a unique hostname for Squid to report in cache clusters in order to allow detection of forwarding loops. Use this if you have multiple machines in a cluster with the same Visible Hostname.

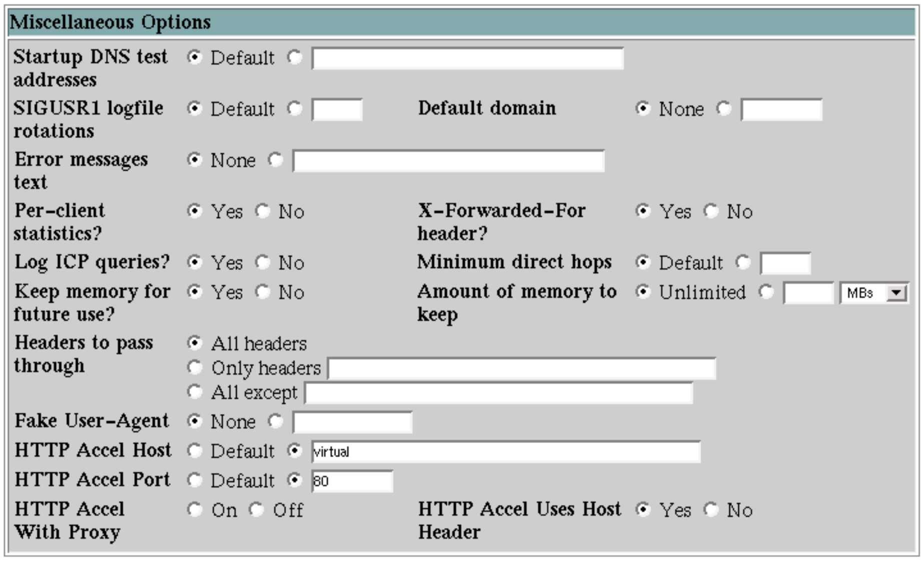
Cache announce host, port and file
The host address and port that Squid will use to announce its availability to participate in a cache hierarchy. The cache announce file is simply a file containing a message to be sent with announcements. These options correspond to the `announce_host`, `announce_port`, and `announce_file` directives.

Announcement period
Configures the `announce_period` directive, and refers to the frequency at which Squid will send announcement messages to the announce host.

Miscellaneous Options

Miscellaneous Options is just what it sounds like. A hodgepodge of options that don't seem to fit anywhere else. Here you'll find several memory related options, options regarding headers and user agent settings, and the powerful HTTP accelerator options.

Figure 12.17. Miscellaneous Options



Miscellaneous Options

Startup DNS test addresses	[✓ Default]		
SIGUSR1 logfile rotations	[✓ Default]	Default domain	[✓ None]
Error messages text	[✓ None]		
Per-client statistics?	[✓ Yes] No	X-Forwarded-For header?	[✓ Yes] No
Log ICP queries?	[✓ Yes] No	Minimum direct hops	[✓ Default]
Keep memory for future use?	[✓ Yes] No	Amount of memory to keep	[✓ Unlimited] MBs
Headers to pass through	[✓ All headers] Only headers All except		
Fake User-Agent	[✓ None]		
HTTP Accel Host	Default [✓ virtual]		
HTTP Accel Port	Default [✓ 80]		
HTTP Accel With Proxy	On Off	HTTP Accel Uses Host Header	[✓ Yes] No

Startup DNS test addresses
This should point to a number of hosts that Squid can use to test if DNS service is working properly on your network. If DNS isn't working properly, Squid will not be able to service requests, so it will refuse to start, with a brief message regarding why in the cache.log. It is recommended that you select two or more hostnames on the internet and one or two hostnames on your intranet, assuming you have one and Squid is expected to service it. By default, the `dns_testnames` directive checks a few well known and popular sites: `netscape.com`, `internic.net`, `nlanr.net`, and `microsoft.com`.

SIGUSR1 logfile rotations
The number of old rotated log files Squid will keep. On Red Hat systems, this option defaults to zero, as logs are rotated via the system standard *logrotate* program. On other systems, this defaults to 10, which means Squid will keep 10 old log files before overwriting the oldest. This option corresponds to the `logfile_rotate` directive.

Default domain
The domain that Squid will append to requests that are not possibly fully qualified domain names (more precisely, those that have no dots in them). This option correlates to the `append_domain` directive.

Error messages text
Provides a means to automatically add some extra information to Squids error pages. You can add HTML or plain text comments or links here, which will be added to the error messages displayed to clients. This option correlates to the `err_html_text` directive.

Per-client statistics?
Allows you to choose whether Squid will keep statistics regarding each individual client. This option configures the `client_db` directive and defaults to *on*.

X-Forwarded-For header?
This option allows you to choose whether Squid will report the hostname of the system that originally made the request to the origin server. For example, if this option is disabled every request through your cache will be reported as originating from the cache. Usually, this should remain enabled. This correlates to the `forwarded_for` directive and defaults to *on*.

Log ICP queries?
Dictates whether Squid will log ICP requests. Disabling this can be a good idea if ICP loads are very high. This option correlates to the `log_icp_queries` directive and defaults to *on*.

Minimum direct hops
When using ICMP pinging features of Squid to determine distance to peers and origin servers, this configures when Squid should prefer going direct over a peer. This option requires your Squid to have been compiled with the `--enable-icmp`, and you must be in a peering relationship with other Squid caches, also with the appropriate build option compiled in. This option correlates to the `minimum_direct_hops` directive.

Keep memory for future use?

This option turns on `memory_pools` and allows Squid to keep memory that it has allocated (but no longer needs), so that it will not need to reallocate memory in the future. This can improve performance by a small margin, but may need to be turned off if memory is at a premium on your system. This option defaults to *on* and should generally be left on, unless you know what you're doing.

Amount of memory to keep
The amount of memory Squid will keep allocated, assuming the **Keep memory for future use** option is turned on. This option configures the `memory_pools_limit` directive, and defaults to unlimited. Any non-zero value will instruct Squid not to keep more than that amount allocated, and if Squid requires more memory than that to fulfill a request, it will use your system's malloc library. Squid does not pre-allocate memory, so it is safe to set this reasonably high. If your Squid runs on a dedicated host, it is probably wisest to leave it to its default of *unlimited*. If it must share the system with other server processes (like Apache or Sendmail) then it might be appropriate to limit it somewhat.

Headers to pass through
Configures the anonymizing features of Squid. This option allows you to dictate what kinds of request headers are allowed to pass through Squid. For example, to prevent origin servers from being able to detect the type of browser your clients are using you would choose to allow all except `User-Agent`. This option has mostly obscure uses and usually doesn't need to be changed from its default of allowing all headers to pass through. There is a relevant *Squid FAQ section* [http://www.squid-cache.org/Doc/FAQ/FAQ-4.html#ss4.18] that describes in more detail what can be accomplished with this option. This option corresponds to the `anonymize_headers` directive and defaults to allow *All headers*.

Caution

Indiscriminate use of the anonymizing features of Squid can cause websites to behave incorrectly. Because modern websites often rely on the contents of cookies or other headers, to know the right JavaScript and HTML code to serve for everything to look and act correctly, many sites could be confused into serving the wrong content, or refusing to serve any content to the user.

Fake User-Agent
Acts as an addition to the above option, in that it allows you to configure Squid to report a faked User-Agent header. For example, using this option you could have your Squid report that every client being served is named *Mozilla/42.2 (Atari 2600; 8-bit)*. That would be lying, but perhaps the person looking over the logs at origin servers will find it amusing. If you are using the anonymize headers features to hide your clients User-Agent headers, it is probably wise to include a fake User-Agent header because some servers will not be happy with requests without one. Further, this *will* cause problems with some web pages for your users, as the User-Agent header is sometimes used to decide which of a number of pages to send based on the features available within a particular browser. The server will usually end up choosing the least interesting page for your clients (i.e. text only, or no Javascript/Java/etc.).

HTTP Accel Host and Port
The options you will use to configure Squid to act as an accelerator, or as a transparent proxy. When using your Squid as an accelerator, you must configure these two options to point to the IP and port of the web server you are

accelerating. If you are using Squid to accelerate a number of virtual hosts, you must choose `virtual` as the Accel Host. Note that this opens potential security problems, in that your Squid will then be open to users outside of your network as a proxy. This can be avoided via proper firewall rules on your router or on the Squid system itself. Finally, if you are operating your Squid transparently, you would also configure the Accel Host to be `virtual` and the Accel Port to be `80`. Outgoing port 80 traffic will then need to be redirected to your Squid process in order for it to work. This is discussed in much greater detail in the and sections. These options configure the `httpd_accel_host` and `httpd_accel_port` directives.

HTTP Accel with Proxy
Allows you to operate your cache as both an accelerator and a caching proxy. This option tells Squid to accept both traditional proxy connections as well as requests intended for an origin web server. This option correlates to the `httpd_accel_with_proxy`.

HTTP Accel Uses Host Header
Configures Squid to use the host header information as described in the HTTP 1.1 specification. This option must be turned on for transparent operation, in order for virtual servers to be cached properly. This option correlates to the `httpd_uses_host_header` directive.

Tutorial: A Basic Squid Proxy Configuration

Squid is almost entirely preconfigured for traditional proxying as soon as it is installed from source distribution or from a binary package. It can be up and running in just a few minutes, if your needs are simple. This tutorial covers the first changes you'll need to make to get your caching proxy up and running quickly.

Note

This tutorial assumes you have already installed Squid, and have configured Webmin to know where to find all of the appropriate Squid files. If you've installed from a vendor supplier package, Webmin will probably already know where to find everything.

Opening access to local clients

The only change that *must* be made before using your Squid installation is to open access for your local users. By default Squid denies access to all users from any source. This is to prevent your proxy from being used for illicit purposes by users outside of your local network (and you'd be amazed at how many nasty things someone can do with an open proxy).

Click on the **Access Control** icon to edit the access control lists and access rules for your proxy. First, create a new ACL by selecting selecting `Client Address` from the dropdown list, and then clicking **Create new ACL**. This will open a new page where you can define your ACL. First, enter a name, like `localnet`, in the **Name** field. Next, specify your network either in terms of a network range, or by specifying a network and netmask. If you have only 10 addresses for example that you would like to be permitted to use your proxy you could enter, for example, a **From IP** of `192.168.1.20` and a **To IP** of `192.168.1.30`. Or if you have a whole network to which you would like to allow proxy access, you could enter a **From IP** of `192.168.1.0` and a **Netmask** of `255.255.255.0`. Click **Save**.

Next, we need to add a proxy restriction to permit the clients matched by the `localnet` ACL to use the proxy. So click the **Add proxy restriction** link. On the proxy selection page, choose the `Allow` option for the **Action**, and select `localnet` in the **Match ACLs** selection box. Click **Save**.

Then use the arrow icons to the right of the list of proxy restrictions to move the rule you've just created above the **Deny all** rule.

Initializing the Cache Directory

You may have noticed, on the front page of the Webmin Squid module, there is notice that the configured cache directory has not been initialized. Before starting Squid, we'll want to make sure it gets initialized. Webmin, of course, will do this for us. Just click the **Initialize Cache** button. If you plan to alter your cache directories to something other than the default. you'll likely want to do so in the **Cache Options** page before initializing the directories. Details are covered earlier in this chapter.

Starting Squid and Testing

To start Squid, click on the **Start Squid** link in the upper right corner of the main module page. It is worthwhile to then check the information provided by Squid during its startup in the `cache.log`. You can use the Webmin file manager, or you can add this log to the **System Logs** module for viewing there (read the section covering that module for information on adding non-syslog log files to make them viewable). Squid is usually quite forthcoming about problems that might prevent it from starting or operating correctly.

To test your new Squid, configure a browser on your local network to use the Squid server as its proxy. Doing this is browser dependent. In Netscape and Mozilla, the proxy options are located under the **Advanced:Proxy Settings** preferences category, while in Internet Explorer, they are located under **Internet Options:Connections**. Squid can act as a proxy for `HTTP`, `HTTPS`, `FTP`, `Gopher`, and `WAIS` protocols. `Socks` is not supported by Squid, though there are a few good Open Source `Socks` proxies available.

Now, just browse for a bit to be sure your caching proxy is working. Take a look in the `access.log` for information about whether a request was served with a cache hit or a cache miss. If Calamaris is installed on your system, Webmin will generate an access report on demand whenever you click the **Calamaris** icon on the Squid module main page.

Tutorial: Interception Proxying

Ordinarily, when using Squid on a network to cache web traffic, browsers must be configured to use the Squid system as a *proxy*. This type of configuration is known as traditional proxying. In many environments, this is simply not an acceptable method of implementation. Therefore Squid provides a method to operate as an interception proxy, or *transparently*, which means users do not even need to be aware that a proxy is in place. Web traffic is redirected from port 80 to the port where Squid resides, and Squid acts like a standard web server for the browser.

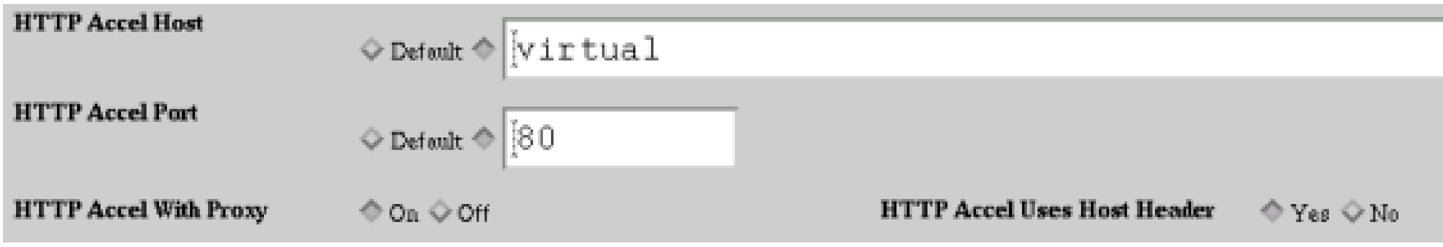
Using Squid transparently is a two part process, requiring first that Squid be configured properly to accept non-proxy requests, and second that web traffic gets redirected to the Squid port. The first part of configuration is performed in the Squid module, while the second part can be performed in the **Linux Firewall** module. That is, assuming you are using Linux, otherwise you should consult the *Squid FAQ Transparent Caching/Proxying* [http://www.squid-cache.org/Doc/FAQ/FAQ-17.html] entry.

Configuring Squid for Transparency

In order for Squid to operate as a transparent proxy, it must be configured to accept normal web requests rather than (or in addition to) proxy requests. Here, we'll discuss this part of the process, explaining both the console configuration and the Webmin configuration. Console configuration is explained, and Webmin configuration is shown in the figure below.

As root, open the `squid.conf` file in your favorite text editor. This file will be located in one of a few different locations depending on your operating system and the method of installation. Usually it is found in either `/usr/local/squid/etc`, when installed from source, or `/etc/squid`, on Red Hat style systems. First we'll take note of the `http_port` option. This tells us what port Squid will listen on. By default, this is port 3128, but you may change it if you need to for some reason. Next you should configure the following options, as shown:

Figure 12.18. Transparent Configuration of Squid



HTTP Accel Host ◇ Default [✓ ◇] virtual

HTTP Accel Port ◇ Default [✓ ◇] 80

HTTP Accel With Proxy [✓ ◇ On] ◇ Off

HTTP Accel Uses Host Header [✓ ◇ Yes] ◇ No

```
httpd_accel_host virtual
httpd_accel_port 80
httpd_accel_with_proxy  on
httpd_accel_uses_host_header on
```

These options, as described in the Miscellaneous Options section of this document, configures Squid as follows. `httpd_accel_host virtual` causes Squid to act as an accelerator for any number of web servers, meaning that Squid will use the request header information to figure out what server the user wants to access, and that Squid will behave as a web server when dealing with the client. `httpd_accel_port 80` configures Squid to send out requests to origin servers on port 80, even though it may be receiving requests on another port, 3128 for example. `httpd_accel_with_proxy on` allows you to continue using Squid as a traditional proxy as well as a transparent proxy. This isn't always necessary, but it does make testing a lot easier when you are trying to get transparency working, which is discussed a bit more later in the troubleshooting section. Finally, `httpd_accel_uses_host_header on` tells Squid that it should figure out what server to fetch content from based on the host name found in the header. This option must be configured this way for transparency.

Linux Firewall Configuration For Transparent Proxying

The `iptables` portion of our transparent configuration is equally simple. The goal is to *hijack* all outgoing network traffic that is on the www port (that's port 80, to be numerical about it). `iptables`, in its incredible power and flexibility allows you to do this with a single command line or a single rule. Again, the configuration is shown and discussed for both the Webmin interface and the console configuration.

Note

The **Linux Firewall** module is new in Webmin version 1.00. All previous revisions lack this module, so to follow these steps, you'll need to have a recent Webmin revision.

When first entering the **Linux Firewall** module, the `Packet filtering` rules will be displayed. For our purposes we need to edit the `Network address translation` rules. So, select it from the dropdown list beside the **Showing IPtable** button, and click the button to display the NAT rules.

Now, add a new rule to the **PREROUTING** chain by clicking the **Add rule** button to the right of the **PREROUTING** section of the page.

Fill in the following fields. The **Action to take** should be `Redirect`, and the **Target ports for redirect** set to `3128`. Next you'll need to specify what clients should be redirected to the Squid port. If you know all port 80 traffic on a single interface should be redirected, it is simplest to specify an **Incoming interface**, but you could instead specify a **Source address or network**. Next, set the **Network protocol** to `Equals TCP`. Finally, set the **Destination TCP or UDP port** to `80`. Click **Create** to add the new rule to the configuration. Once on the main page again, click the **Apply Configuration** button to make the new rule take effect. Finally, set the firewall to be activated at boot so that redirection will continue to be in effect on reboots.

```
# iptables -t nat -I PREROUTING 1 -i eth0 -p tcp --dport 80 -j REDIRECT --to-port 3128
```

While a detailed description of the **iptables** tool is beyond the scope of this section, it should briefly be explained what is happening in this configuration. First, we are inserting a rule into the first `PREROUTING` chain of the NAT routing path, with the `-t nat -I PREROUTING 1` portion of the command. Next we're defining whose requests will be acted upon, in this case iptables will work on all packets originating from the network attached to device `eth0`. This is defined by the `-i eth0` portion of the rule. Then comes the choice of protocol to act upon, here we've chosen TCP with the `-p tcp` section. Then, the last match rule specifies the destination port we would like for our redirect to act upon with the `--dport 80` section. Finally, iptables is told *what to do* with packets that match the prior defined criteria, specifically, we will `REDIRECT` the packets `--to-port 3128`.

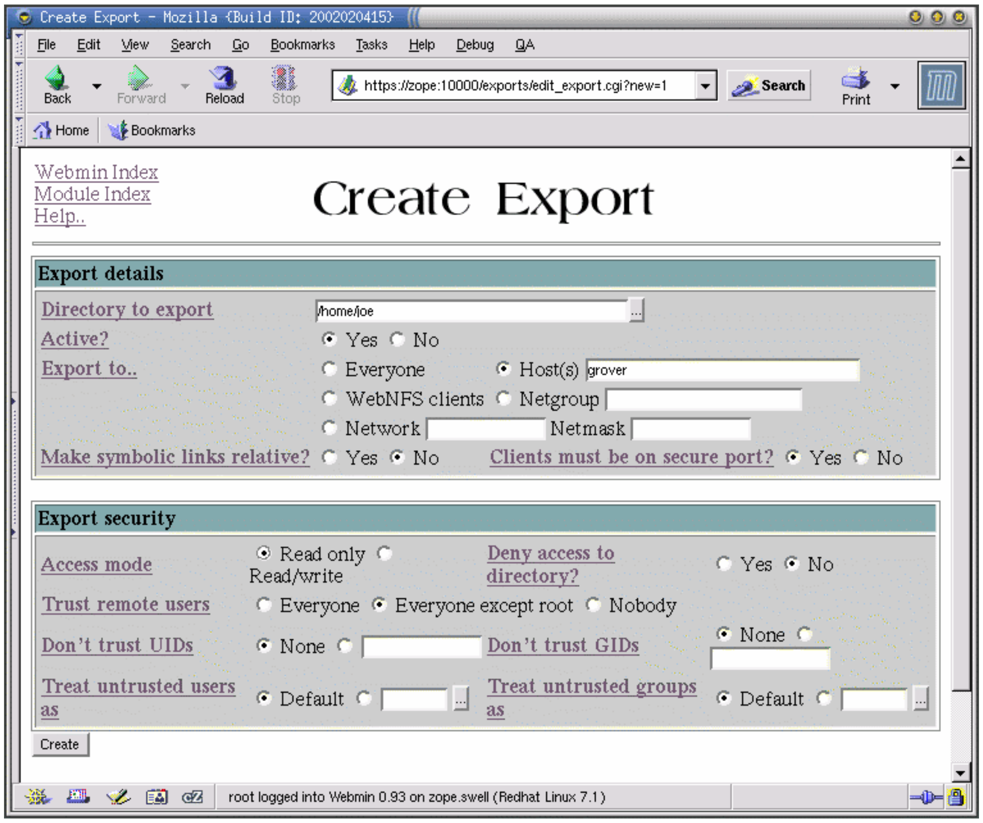
Chapter 13. Networking Configuration

The fourth category tab in Webmin is for **Networking** related configuration. Specifically, this is where you'll find the modules to configure `inetd` or `xinetd`, `iptables`, NFS exports, NIS client and server, and network interfaces. The **Networking** category was introduced in Webmin version 1.0, so if for some reason you are using an earlier Webmin revision (upgrade, already, it's free!), these modules will be found under other category tabs.

NFS Exports

The **NFS Exports** module lists all exported directories. Clicking **Add a new export** will bring you to the **Create Export** page, shown below.

Figure 13.1. Create NFS Export


Create Export - Mozilla {Build ID: 2002020415}
File Edit View Search Go Bookmarks Tasks Help Debug QA
Back Forward Reload Stop
https://zope:10000/exports/edit_export.cgi?new=1
Search
Print
Home Bookmarks
Webmin Index
Module Index
Help..
Create
root logged into Webmin 0.93 on zope.swell (Redhat Linux 7.1)

Create Export

Export details

Directory to export	/home/joe
Active?	[✓ Yes] No
Export to..	Everyone [✓ Host(s) grover] WebNFS clients Netgroup Network Netmask
Make symbolic links relative?	Yes [✓ No]
Clients must be on secure port?	[✓ Yes] No

Export security

Access mode	[✓ Read only] Read/write
Deny access to directory?	Yes [✓ No]
Trust remote users	Everyone [✓ Everyone except root] Nobody
Don't trust UIDs	[✓ None]
Don't trust GIDs	[✓ None]
Treat untrusted users as	[✓ Default]
Treat untrusted groups as	[✓ Default]

In the above figure, you can see that the module allows you to select a directory to export, and choose a number of options for that directory and to whom the directory should be exported.

Export details

Directory to export
This is simply the full path to the directory you would like to export.

Active?
An export may be disabled when it is not needed by selecting no. Otherwise the export will always be active and available as long as the NFS server is running.

In the next few fields it is possible to select access controls to dictate which machines or users on the network will be permitted to mount the exported directory.

Everyone
Specifies that anyone may mount the directory. This is similar to an anonymous FTP server.

Caution

Use extreme caution when exporting a directory to everyone. If your local network is not protected by a very good firewall, it will be possible for outsiders to mount your exported directory. It may also be possible for outsiders to stage a denial of service attack against your server, as NFS is not reknowned for its reliability in the face of determined attackers. It is always a good idea to restrict NFS exports to just those machines that need access, and additionally to implement a firewall to block anyone outside of your local network from even attempting to connect to your NFS server.

Host(s)
Allows you to specify a hostname or IP that may mount the directory. Wildcards are accepted in this field as well, so that names of the form `*.company.com` can be entered to match all hosts in the `company.com` domain.

WebNFS clients
WebNFS is a relatively new protocol developed by Sun, also the creators of NFS, and is designed for file sharing across the internet. It allows users to browse exported directories using a familiar web browser as the interface. It has largely been ignored by the mass-market in favor of WebDAV, but it may have its uses in some environments. If you will be supporting WebNFS clients with this export, select this option. Not all operating system variants support this option, or if support is provided it may not be complete or stable.

Netgroup

If your local network uses NIS services, you may use netgroups to specify access to exports. Any existing group name may be specified here.

Network
To export to all hosts on a given network, enter the network number and netmask. This may be a full network class, or it may be a smaller subnet.

Make symbolic links relative?
On NFS mounted directories, symbolic links can pose a problem, due to the change in where a directory might be mounted on the client machine. For example, a directory located on `/home/nfsusers` on the NFS server may be mounted on the client on `/home`. If a symbolic link on the server points to `/home/nfsusers/joe/work`, the link will be broken on the client machine if the link is not converted to a relative link. If made relative, the link will become `joe/work` and will work fine on the client machine. This option corresponds to the `link_relative` switch.

Clients must be on secure port?
The effect of turning this option on is that NFS will insist upon a connection on ports below 1024. This does improve security in some circumstances, but may interfere with Windows clients mounting the exported directory. In reality, security of most current NFS variants in use is relatively weak, providing only mediocre authentication methods and no data encryption.

Note

In Unix systems, a normal user is not permitted to bind to a port below 1024. This means that only the root user on a multi-user system can start services that run on ports below 1024. The security implication of this is that when you connect to a Unix server on a port below 1024 (such as making an NFS connection when this option is enabled) you may have some assurance that the NFS server is one being operated by the administrator of the server. If the NFS server has normal users, and NFS connections are not forced to be made on low ports, it might be possible for a malicious user to operate an illicit NFS server whose only purpose is to obtain access to parts of the network he should not have access to. As discussed earlier, Webmin is often run on port 1000 or some other sub-1024 port in order to avoid this risk for the Webmin server.

Export security

In the *Export Security* section you can specify several other security options, including the ability to treat some UID's and/or GID's as untrusted users. This section also provides fields for declaring what user and group name will be used for the untrusted users permissions.

Access mode

The exported directory may be mounted for reading and writing, or just for reading. This option correlates to the `ro` and `rw` switches in the `exports` file.

Deny access to directory?
Normally, when a directory is exported all of its subdirectories will be exported with the same access rules. This is usually exactly what is desired, as in the case of exporting home directories to users via NFS. Obviously, the users will need to access everything in their own home directory, including subdirectories thereof. This option explicitly denies access to a directory, when the connecting client matches the export rules in this export. This can be useful to explicitly disallow access to a subdirectory of a directory that is exported in another rule. This option corresponds to the `noaccess` directive.

Trust remote users
NFS provides a simple trust model, wherein some users will be trusted, all users will be trusted, or no users will be trusted. To be more explicit, when another computer on the network connects to your NFS server, the UID of the user attempting to access the exported directory is included in the negotiation process. Depending on the configuration of this option, the user may be able to use files with the same permissions as if he were working on the local machine, assuming other configuration details don't prevent it. If either `Everyone` or `Everyone except root` are selected, all normal users will be able to use the files on the NFS export as though they are working on the local machine. The root user will have this same ability only if the `Everyone` option is selected. In the case of exporting user home directories, it makes sense to enable the `Everyone except root` option. The `Nobody` option means that the connecting user will always be treated as the untrusted user. This option sets the `no_root_squash` and `all_squash` directives. The default is `Everyone except root` which correlates to the implicit `root_squash` directive.

The untrusted user is a user that is used specifically for NFS, but it is very similar in function to an anonymous user on an FTP server. This can be useful for many situations where some or all client machines are not directly under the control of the administrator of the NFS server. A common use for such exports is system boot images and anonymous access to file or document repositories.

Don't trust UIDs, **Don't trust GIDs**
If there are specific User IDs or Group IDs that should be treated as the untrusted user, they may be specified here. The IDs may be specified as a range, such as `0-500`, or as a comma-seperated list or a combination of both. Most Unix variants reserve some subset of UIDs and GIDs for system specific users and groups, like `nobody` and `lp`. It may be useful to distrust a user claiming to be one of these system users or groups. This option correlates to the `squash_uids` and the `squash_gids` directives, respectively.

Treat untrusted users as, **Treat untrusted groups as**
This option specifies the user ID and group ID to which an untrusted user or group is mapped to. If unspecified, the untrusted UID or GID will be set to the default of the NFS server. This varies somewhat between NFS versions, but it is safe to assume the default is a user or group with very limited permissions, and is usually an appropriate choice for the system on which it is running.

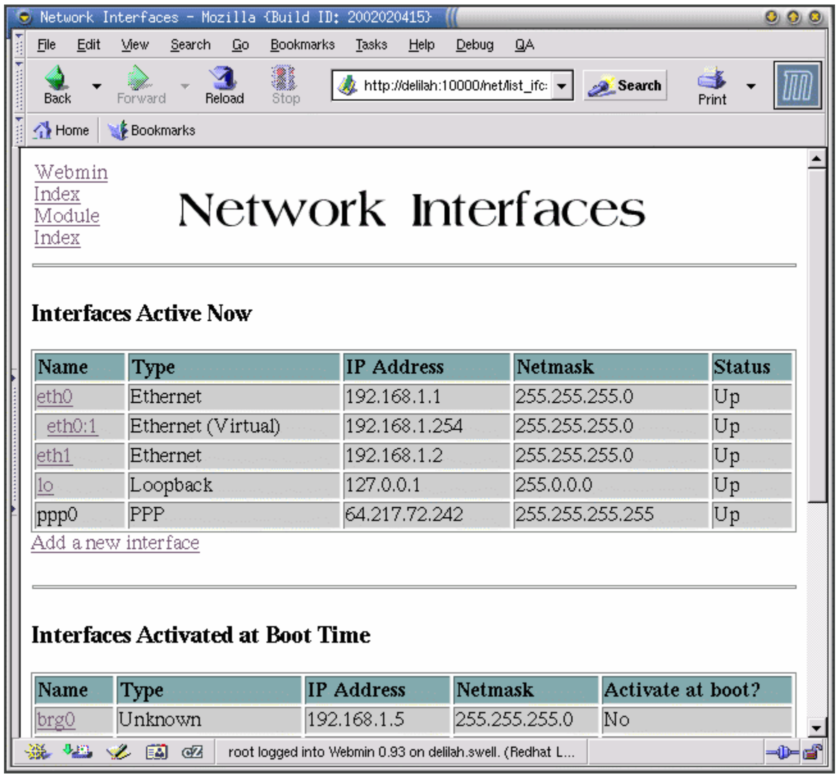
Network Configuration

The **Network Configuration** module provides a nice clean interface to most of the important network configuration details on your system. It is possible to set IP's, create IP aliases, define routing and gateway information, configure DNS clients, and edit the `/etc/hosts` file.

Network Interfaces

Clicking on the **Network Interfaces** icon will open a page much like the one in the screenshot below, and will allow you to configure the currently active interfaces as well as interfaces that are brought up at boot time (usually these will be the same).

Figure 13.2. Network Interfaces


Network Interfaces - Mozilla {Build ID: 2002020415}
File Edit View Search Go Bookmarks Tasks Help Debug QA
Back Forward Reload Stop
http://delilah:10000/net/list_ifc
Search
Print
Home Bookmarks
Webmin Index
Module Index

Network Interfaces

Interfaces Active Now

Name	Type	IP Address	Netmask	Status
eth0	Ethernet	192.168.1.1	255.255.255.0	Up
eth0:1	Ethernet (Virtual)	192.168.1.254	255.255.255.0	Up
eth1	Ethernet	192.168.1.2	255.255.255.0	Up
lo	Loopback	127.0.0.1	255.0.0.0	Up
ppp0	PPP	64.217.72.242	255.255.255.255	Up

Add a new interface

Interfaces Activated at Boot Time

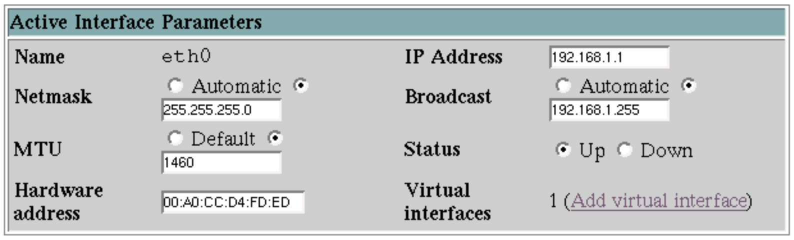
Name	Type	IP Address	Netmask	Activate at boot?
brg0	Unknown	192.168.1.5	255.255.255.0	No

root logged into Webmin 0.93 on delilah.swell. (Redhat L...

The **Interfaces Active Now** section is a list of interfaces that are currently *up*. The same data could be gathered by running **ifconfig -a** from the command line. The section below that, **Interfaces Activated at Boot Time** is the list of interfaces that are configured permanently on the system. These can optionally be brought up on boot.

To edit an interface, either **Active** or **Boot**, simply click the name of the interface. You will be presented with a page like the figure below:

Figure 13.3. Editing a Bootup Interface



Active Interface Parameters

Name	eth0	IP Address	192.168.1.1
Netmask	Automatic [✓ 255.255.255.0]	Broadcast	Automatic [✓ 192.168.1.255]
MTU	Default [✓ 1460]	Status	[✓ Up] Down
Hardware address	00:A0:CC:D4:FD:ED	Virtual interfaces	1 (Add virtual interface)

Here it is possible to specify the **IP Address** for the system, or to choose DHCP or BOOTP to autoconfigure the IP. Also editable from this page are **Netmask** and **Broadcast** settings.

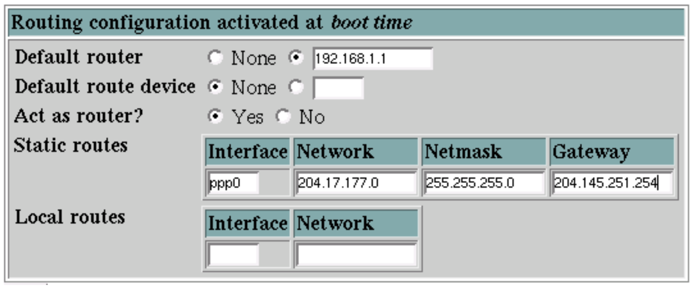
Adding a new interface is equally simple. From the main page, click the **Create new interface** under either **Interface Active Now**, for a temporary interface, or **Interfaces Activated at Boot Time** for a permanent interface. Then on the configuration page, choose a name for the interface. Manually enter the IP, or choose DHCP or BOOTP for automatic IP configuration. If manually entering the IP, also enter the **Netmask** and **Broadcast** settings, or select **Automatic** for these settings, if preferred and available (automatic is only available when creating an **Active** interface.

Note when editing a just created **Boot** interface it is possible to activate it immediately by clicking **Save and Apply** rather than simply **Save**.

Routing and Gateways

Routing is an encompassing term that basically refers to the paths that your system should take to reach certain hosts and networks. In the simplest configuration, you will only have one route, known as the Default Router or Gateway. This simply means the all packets that are bound for a network that *is not local* will be sent to the address defined by the default route setting.

Figure 13.4. Routing and Gateways



Routing configuration activated at *boot time*

Default router	None [✓ 192.168.1.1]
Default route device	[✓ None]
Act as router?	[✓ Yes] No

Static routes

Interface	Network	Netmask	Gateway
ppp0	204.17.177.0	255.255.255.0	204.145.251.254

Local routes

Interface	Network

In the above figure the **Default router** is blank, because for the example machine, the route is set automatically by DHCP. It could contain an IP or a hostname, if a router did need to be defined. **Default route device** simply defines which device, on systems with more than one device, will be considered the *default* device. This device name could be any active device on your system, such as `eth0`. The **Act as router** option turns on packet forwarding on some Linux systems. On Red Hat Linux systems this is done in `/etc/sysconfig/network` or `/etc/sysctl.conf` on versions from 6.2 onward.

Static routes provide a means for some traffic to choose another route to some known host or network, rather than going through the default route. This is commonly used for accessing local networks on different subnets through a single multi-homed, or having more than one network interface, host. For example, if my system were on the 192.168.1.0/24 local subnet, and I had a second subnet on 172.16.1.0/24. I could provide a static route with the **interface** value of `eth0` and a **Network** of 172.16.1.0, a **Netmask** of `255.255.255.0`, and finally, a **Gateway** of `192.168.1.23`, assuming the host at 192.168.1.23 also had an active interface on the 172.16.1.0 network.

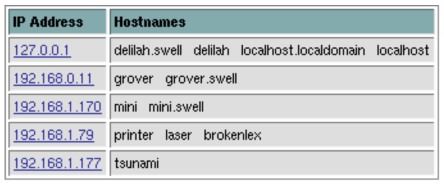
DNS Client

The **DNS Client** module allows you to configure your systems resolver settings. Usually, all you need to do is add your nameservers IP's to this list. In the case shown in the figure below, there is a local caching nameserver running on IP 127.0.0.1, as well as two remote nameservers as backups. **Resolution order** allows you to select the order in which the system will try to resolved hostnames. In the example in the figure, DNS will be checked first, followed by the `/etc/hosts` file. Other available resolution options are NIS and NIS+. Finally, the **Search domains** field usually contains the domain name where your computer is located, and possibly others. Search domains will be searched first if a fully qualified domain name is not entered. For example, if I tried to **ping** a host named *gigi* on the machine shown in the example, the name *gigi.swell.* would be looked up first, and then if there was no such system in DNS or `/etc/hosts` it would try to resolve just the name *gigi*.

Host Addresses

The `/etc/hosts` file is another common resolution method on Unix systems. It is a very simple way to deal with a small number of host addresses. However, because host files are not easily shared amongst multiple computers, its usage is limited. Nonetheless, Webmin does provide a nice means of editing your hosts file, so I'm going to document it.

Figure 13.5. Host Addresses



IP Address	Hostnames
127.0.0.1	delilah.swell delilah localhost.localdomain localhost
192.168.0.11	grover grover.swell
192.168.1.170	mini mini.swell
192.168.1.79	printer laser brokenlex
192.168.1.177	tsunami

In the above figure there are a number of IP addresses and the hostnames they are associated with. Clicking on any of the IP's will allow you to edit the entry. Creating a new entry is done by clicking **Add a new host address**. If you only have a very small network, a hosts file one each machine may be all you need, otherwise, use DNS for most resolution tasks.

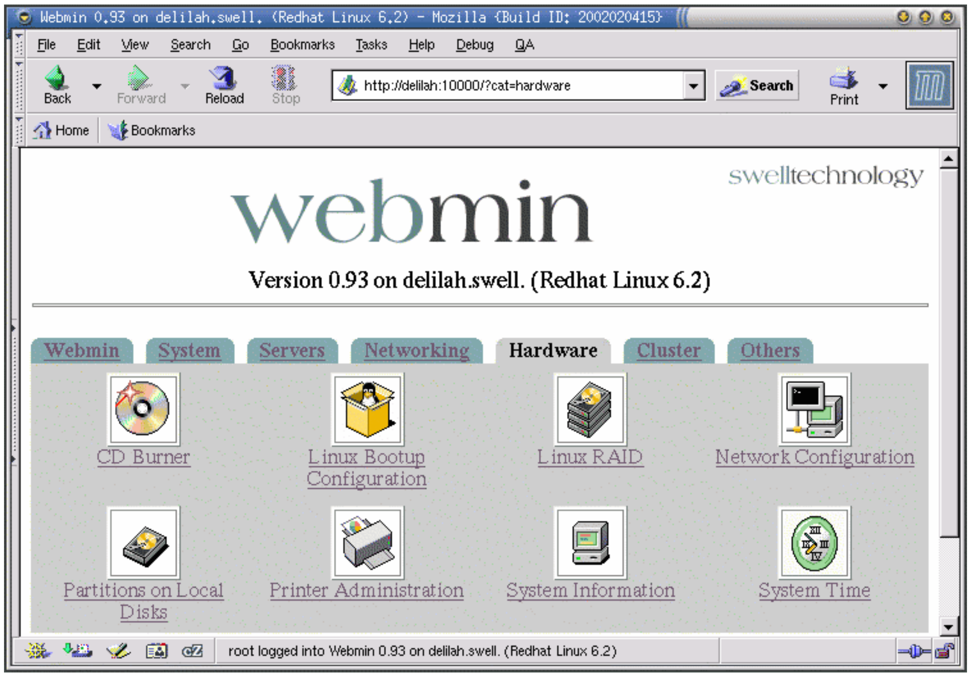
Tip

When testing Apache virtual hosts that are not yet ready for production use, it can be useful to configure the address and hostname here, so that you can browse your test server on the hostname where it will eventually live. Of course, you can do the same thing by running a local DNS server, but the `hosts` file is a faster way to achieve the same task.

Chapter 14. Hardware Configuration

The **Hardware** configuration tab, presents several options for hardware level settings. This includes disk partitions, boot loader, printer administration, system time and date, and more. The exact options available vary greatly depending on platform.

Figure 14.1. Hardware Configuration


Webmin 0.93 on delilah.swell. (Redhat Linux 6.2) - Mozilla {Build ID: 2002020415}
File
Edit
View
Search
Go
Bookmarks
Tasks
Help
Debug
QA
Back
Forward
Reload
Stop
http://delilah:10000/?cat=hardware
Search
Print
Home
Bookmarks
swelltechnology
webmin
Version 0.93 on delilah.swell. (Redhat Linux 6.2)
Webmin
System
Servers
Networking
Hardware
Cluster
Others
CD Burner
Linux Bootup Configuration
Linux RAID
Network Configuration
Partitions on Local Disks
Printer Administration
System Information
System Time
root logged into Webmin 0.93 on delilah.swell. (Redhat Linux 6.2)

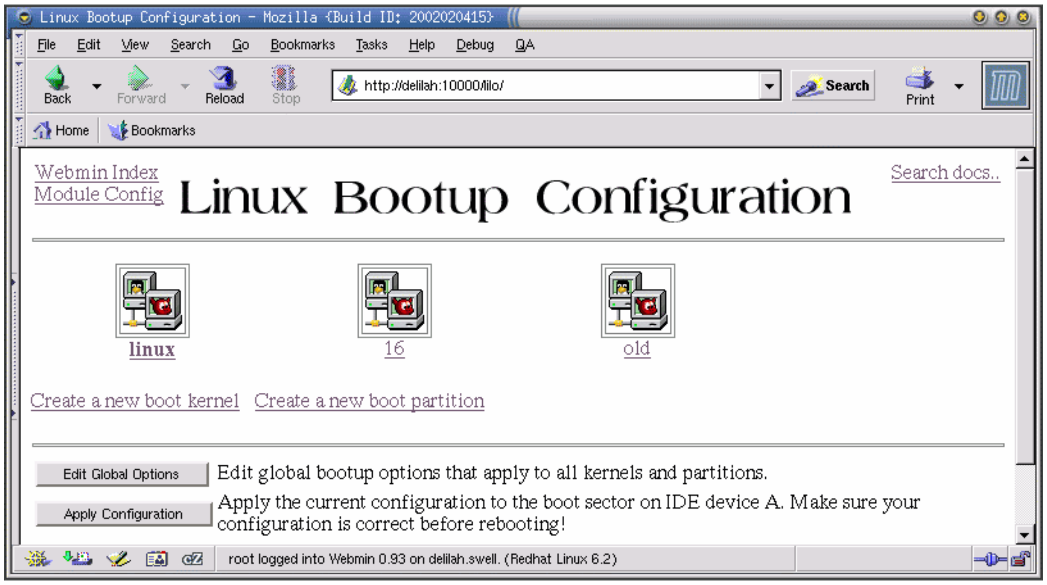
Linux Boot Configuration

If you are running Linux, Webmin provides module for editing the `/etc/lilo.conf` file that the *LInux LOader*, or LILO for short, uses. LILO is the boot manager most commonly used with Linux. It works by writing a small boot sector to the MBR on your boot disk. This boot sector contains the code needed to first present a prompt:

```
LILO:
```

And then to boot the kernel or operating system that the user requests. LILO can boot multiple systems and multiple versions of the Linux kernel. When you open the **Linux Bootup Configuration** page, you should see at least one boot kernel or boot partition. Boot kernels are for Linux kernels, while boot partitions are for other operating systems.

Figure 14.2. Linux Bootup Configuration


Linux Bootup Configuration - Mozilla {Build ID: 2002020415}
File Edit View Search Go Bookmarks Tasks Help Debug QA
Back Forward Reload Stop
http://delilah:10000/lilo/
Search
Print
Home Bookmarks
Webmin Index
Module Config
Search docs..
linux
16
old
Edit Global Options
Apply Configuration

Linux Bootup Configuration

Create a new boot kernel Create a new boot partition

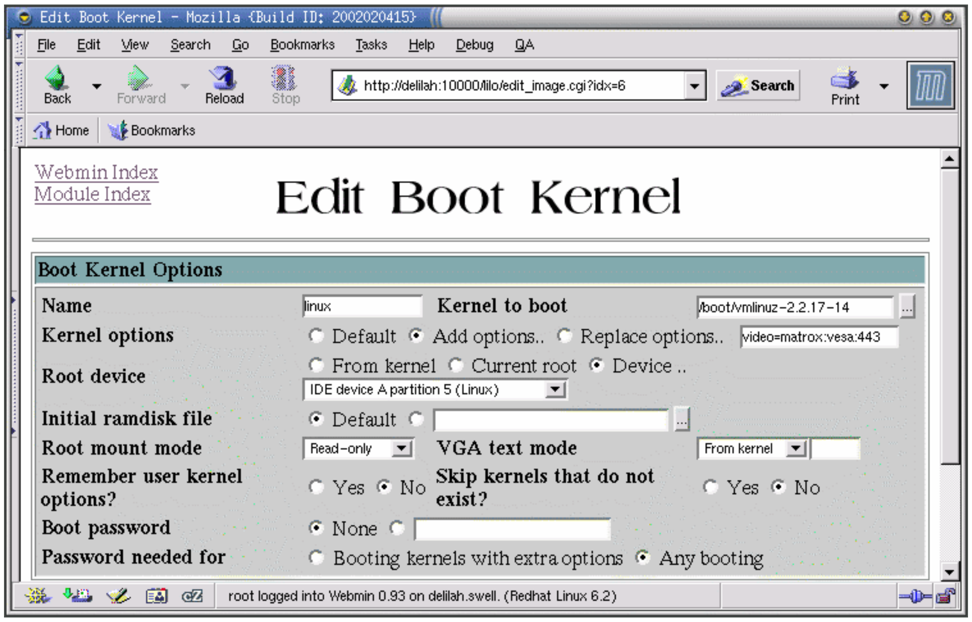
Edit global bootup options that apply to all kernels and partitions.

Apply the current configuration to the boot sector on IDE device A. Make sure your configuration is correct before rebooting!

root logged into Webmin 0.93 on delilah.swell. (Redhat Linux 6.2)

Clicking on one of the boot kernel or boot partition icons will allow you to edit that boot kernel of partition.

Figure 14.3. Editing Boot Kernel


Edit Boot Kernel - Mozilla {Build ID: 2002020415}
File Edit View Search Go Bookmarks Tasks Help Debug QA
Back Forward Reload Stop
http://delilah:10000/lilo/edit_image.cgi?idx=6
Search
Print
Home Bookmarks
Webmin Index
Module Index

Edit Boot Kernel

Boot Kernel Options

Name	linux	Kernel to boot	/boot/vmlinuz-2.2.17-14
Kernel options	Default [✓ Add options..] Replace options.. video=matrox:vesa:443		
Root device	From kernel Current root [✓ Device ..] IDE device A partition 5 (Linux)		
Initial ramdisk file	[✓ Default]		
Root mount mode	Read-only	VGA text mode	From kernel
Remember user kernel options?	Yes [✓ No]	Skip kernels that do not exist?	Yes [✓ No]
Boot password	[✓ None]		
Password needed for	Booting kernels with extra options [✓ Any booting]		

root logged into Webmin 0.93 on delilah.swell. (Redhat Linux 6.2)

Here the **name** is an identifier for the kernel and it translates to **label** in the `/etc/lilo.conf` file. The **Kernel to boot** is the path to the Linux kernel boot image to load.

Kernel options -- This field can be used to enter any arguments you need to pass to your kernel on boot. It is often used for specifying the amount of memory in a machine when Linux doesn't recognize it all. For example, to specify 127MB of RAM, one could select **Add options..** and add the line mem=127MB in the text field. This will be translated in the `/etc/lilo.conf` file to:

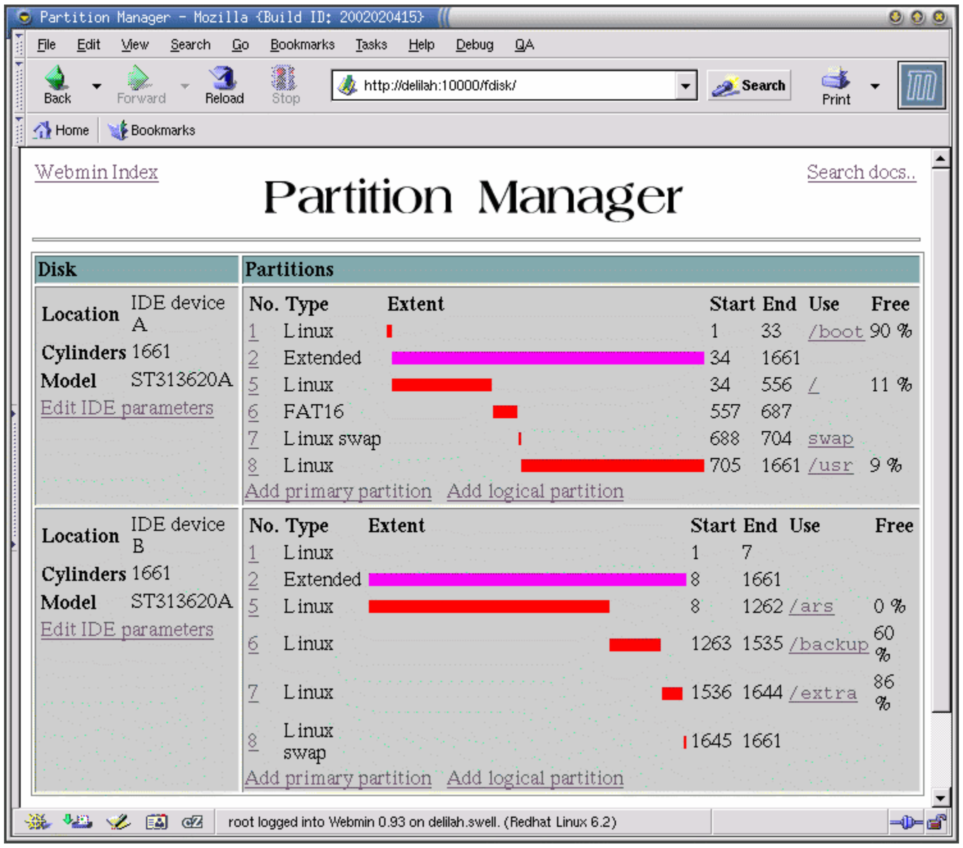
```
boot=/dev/hda
map=/boot/map
install=/boot/boot.b
prompt
timeout=50
default=linux

image=/boot/vmlinuz-2.2.16-11.0
        label=linux
        read-only
        root=/dev/hda5
        append="mem=127MB"
```

It is always necessary to click **Apply Changes** from the mainpage in order to write a new boot sector to the boot device. This button simply runs **`/sbin/lilo`**.

Partition Manager

The partition manager provides a graphical interface to both the **`fdisk`** partition editing command and the `/etc/fstab` file on your system. **`fdisk`** is commonly used to create and remove partitions on a disk, while the `/etc/fstab` file is where the mounting information for the system is configured.

Figure 14.4. Partition Manager



Webmin Index

Partition Manager

Search docs..

Disk	
Location	IDE device A
Cylinders	1661
Model	ST313620A
Edit IDE parameters	

No.	Type	Extent	Start	End	Use	Free
1	Linux		1	33	/boot	90 %
2	Extended		34	1661		
5	Linux		34	556	/	11 %
6	FAT16		557	687		
7	Linux swap		688	704	swap	
8	Linux		705	1661	/usr	9 %

Add primary partition   Add logical partition

Disk	
Location	IDE device B
Cylinders	1661
Model	ST313620A
Edit IDE parameters	

No.	Type	Extent	Start	End	Use	Free
1	Linux		1	7		
2	Extended		8	1661		
5	Linux		8	1262	/ars	0 %
6	Linux		1263	1535	/backup	60 %
7	Linux		1536	1644	/extra	86 %
8	Linux swap		1645	1661		

Add primary partition   Add logical partition

root logged into Webmin 0.93 on delilah.swell. (Redhat Linux 6.2)

The partition manager page provides a list of currently accessible disks, and the partitions on it. In the first column there is the type and location of the disk, the number of cylinders reported by the BIOS (this isn't necessarily the actual number of physical cylinders, it depends on the type of CHS structure is reported by the BIOS), and model number reported by the drive. The other, larger, row contains the drive partition structure. The red bars represent primary or secondary partitions. If you have secondary partitions, the Extended partition that contains them will fill the whole portion of the drive occupied by all of the secondary partitions.

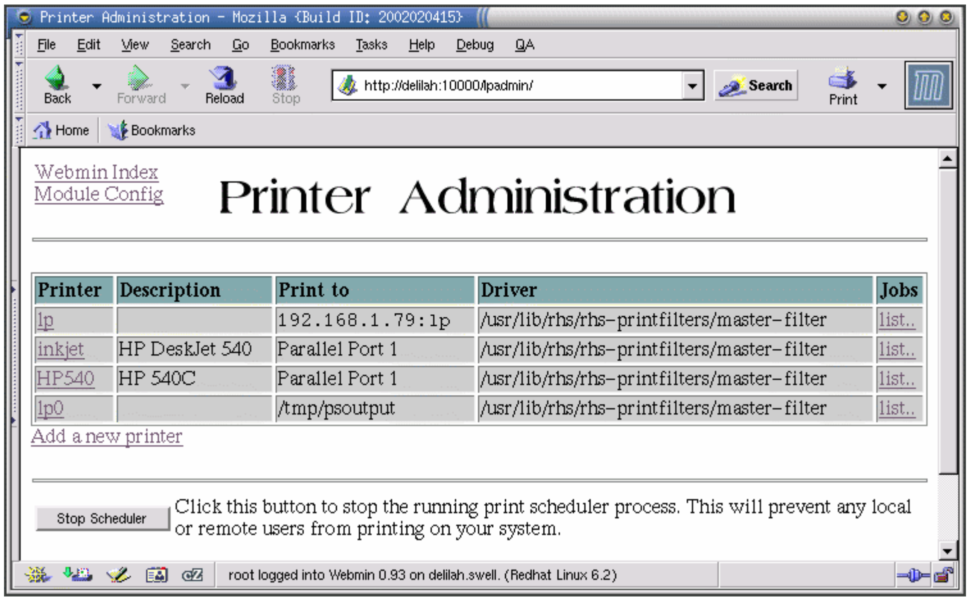
To edit the parameters of a partition, click the number of the partition to edit. Note that mounted partitions cannot be edited. To edit the mount information for a partition click the mount point listed under **Use**. Clicking this will take you out of the **Partition Manager** and into the **Disk and Network Filesystems** module.

To create a new partition on a disk with space available, click either **Add primary partition** or **Add logical partition**. Choose the type of partition to create (usually Linux or Linux swap) and then the size of the partition in the **Extent** field. This is the range of cylinders to use for this partition, so take care to correctly identify the cylinders, and to not overwrite any existing partitions. Finally, click **Create**.

Printer Administration

The **Printer Administration** module may behave somewhat differently under different operating systems, as printer driver details and configuration often varies between systems, and even between Linux distributions. Nonetheless, Webmin minimizes the differences between systems, and these directions work more or less unchanged.

Figure 14.5. Printer Administration


Printer Administration - Mozilla {Build ID: 2002020415}
File Edit View Search Go Bookmarks Tasks Help Debug QA
Back
Forward
Reload
Stop
http://delilah:10000/lpadmin/
Search
Print
Home
Bookmarks
Webmin Index
Module Config
Printer Administration

Printer	Description	Print to	Driver	Jobs
lp		192.168.1.79:lp	/usr/lib/rhs/rhs-printfilters/master-filter	list..
inkjet	HP DeskJet 540	Parallel Port 1	/usr/lib/rhs/rhs-printfilters/master-filter	list..
HP540	HP 540C	Parallel Port 1	/usr/lib/rhs/rhs-printfilters/master-filter	list..
lp0		/tmp/psoutput	/usr/lib/rhs/rhs-printfilters/master-filter	list..

Add a new printer

Stop Scheduler Click this button to stop the running print scheduler process. This will prevent any local or remote users from printing on your system.

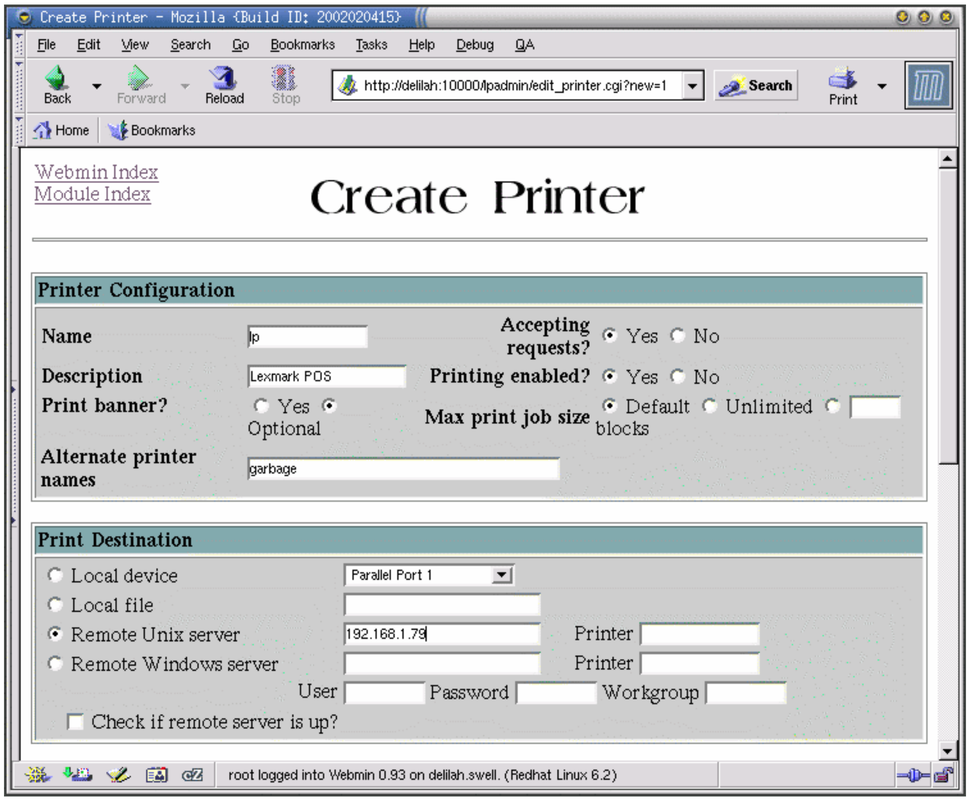
root logged into Webmin 0.93 on delilah.swell. (Redhat Linux 6.2)

When entering the **Printer Administration** page, you will see a list of currently configured printers, a link to **Add a new printer** and a button to **Stop Scheduler** or **Start Scheduler** depending on the current status of the print scheduler.

Clicking the **Add a new printer** link opens a page where you can configure a new printer. The **Name** field is an arbitrary name for the printer. Conventionally, `lp` or `lp0` are often used for the first printer, but you can name it anything. The **Description** can be a longer description of the printer. **Accepting requests** simply sets whether the printer should be available, and **Printing enabled** defines whether it is enabled for printing (the queue can still receive requests with this turned off if the previous option is still on). **Max printe job size** is the maximum size request that will be accepted. This shouldn't be too small, as many postcript files are quite large.

The next section is **Print Destination**, where you define the device type (Local, file, remote Unix, or remote Windows). Many standalone network printers support standard Unix LP functionality in addition to Windows printer sharing. If your printer is local, choose the port to use, and if it is a remote printer, enter the IP or Hostname for the host where the print queue is located. If using a Windows shared printer, enter the **User**, **Password**, and **Workgroup** for the printer share.

Figure 14.6. Adding a New Printer



http://delilah:10000/lpadmin/edit_printer.cgi?new=1

Create Printer

Printer Configuration

Name	lp	**Accepting requests?**	[✓ Yes] No
Description	Lexmark POS	**Printing enabled?**	[✓ Yes] No
Print banner?	Yes [✓ Optional]	**Max print job size**	[✓ Default] Unlimited ○ blocks
Alternate printer names	garbage		

Print Destination

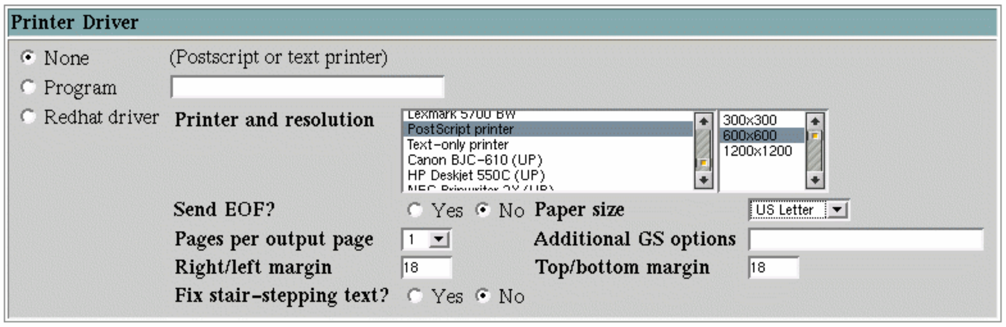
Local device	Parallel Port 1		
Local file			
[✓ Remote Unix server]	192.168.1.79	Printer	
Remote Windows server		Printer	
User	Password	Workgroup	

☐ Check if remote server is up?

root logged into Webmin 0.93 on delilah.swell. (Redhat Linux 6.2)

Finally, the third section of the page is for configuring the driver for your printer. If your printer is a simple text printer, or a Postscript printer, the top selection is probably right for you. The second option is for a program to handle printer control. This could be a custom print driver for your printer, or one of a couple of competing commercial and non-commercial printer packages. Finally, if your system provides them, there will be a list of available drivers. This section, on Red Hat systems, is a frontend to the GhostScript printer drivers that come standard with Red Hat. It's quite likely that your system will have its own set of drivers, or a front end, much like that of Red Hat.

Figure 14.7. Adding a New Printer (cont'd)



Printer Driver

[✓ None] (Postscript or text printer)

Program

Redhat driver — Printer and resolution: Lexmark 5700 BW, [✓ PostScript printer], Text-only printer, Canon BJC-610 (UP), HP Deskjet 550C (UP), NEC Pinwriter 2X (UP); 300x300, [✓ 600x600], 1200x1200

Send EOF? Yes [✓ No] — Paper size: US Letter

Pages per output page: 1 — Additional GS options:

Right/left margin: 18 — Top/bottom margin: 18

Fix stair-stepping text? Yes [✓ No]

The **Send EOF** option is for some printers that require an explicit EOF to be sent after every page before they will print. If your printer acts as though it is preparing to print, but never does (for example, if the busy light flashes), try turning this option on. **Paper size** is just what it seems: the size of the paper you print from this printer. Keep in mind that this doesn't limit programs to only print on this paper size. It merely configures the standard system printing tools to print on whatever paper size is selected by default.

Pages per output page is the number of pages that will be printed per paper page. This allows you to conserve paper by printing multiple pages on a single page of paper. This option will arrange the text in rows and columns. These rows and columns can be further configured, as well as numerous other options (too many to begin to discuss here), in the next field, **Additional GS options**. You may wish to consult the **`man`** pages for GhostScript, as well as those for **`lp`**, **`lpd`**, and **`lpr`**, to find out more about the printer capabilties of your system. You can, of course, view these man pages in the Webmin **Manual Pages** module. Another good source of information regarding printing includes the *Printing HOWTO* [http://www.linuxdoc.org/HOWTO/Printing-HOWTO/index.html] at the *Linux Documentation Project* [http://www.linuxdoc.org].

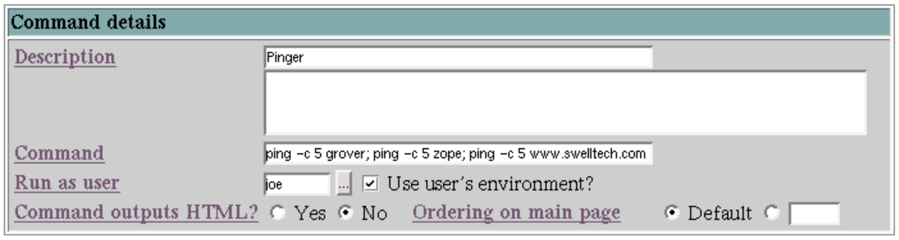
Chapter 15. Others Category

Clicking the **Others** category tab will take you to a page of tools that don't really fit anywhere else. This includes a small module that allows you to run any system command from a button, a Java file manager much like Windows Explorer or the Gnome File Manager tool, and a Java based telnet client.

Custom Commands

The **Custom Commands** module provides a simple interface to every single command on your server at the press of a button. Sounds pretty impressive. Unfortunately, you actually have to create those command buttons before you can use them. The simplest way to document it is to create an example custom command and show it work.

Figure 15.1. Create a New Custom Command

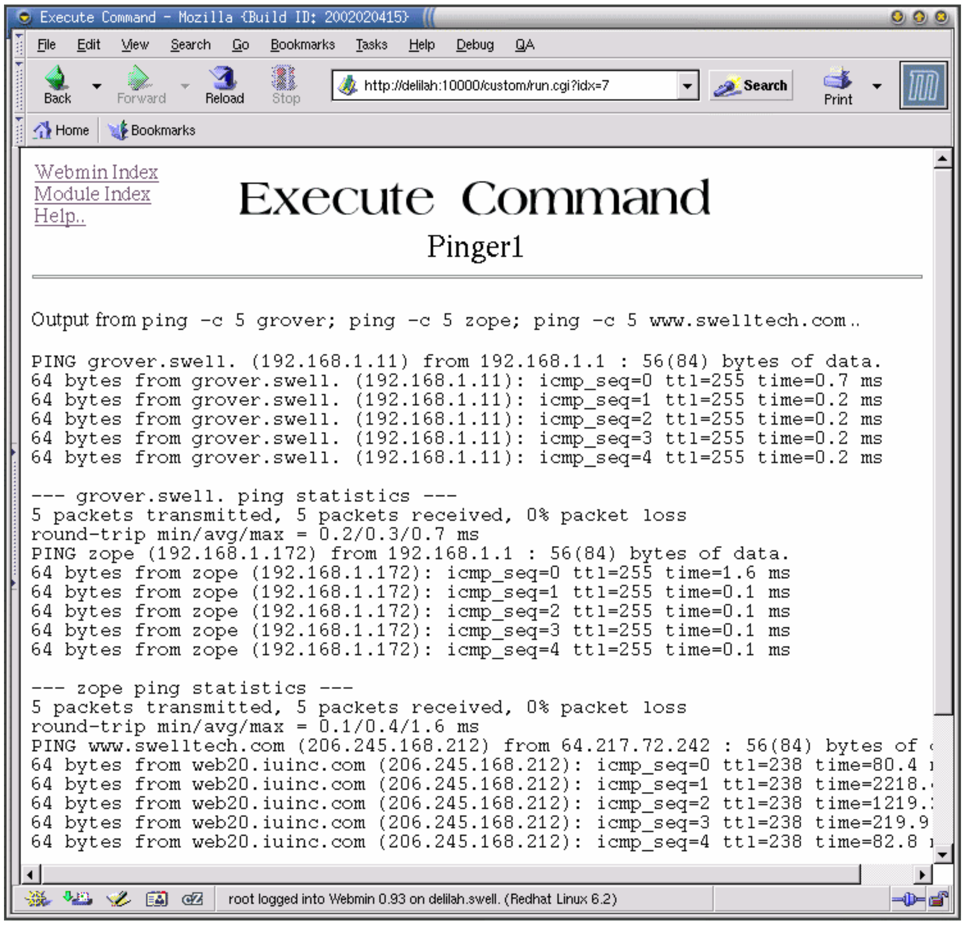


Command details

Description	Pinger
Command	ping -c 5 grover; ping -c 5 zope; ping -c 5 www.swelltech.com
Run as user	joe ✓ Use user's environment?
Command outputs HTML?	Yes [✓ No]
Ordering on main page	[✓ Default]

As you can see in the figure above, I've created a command called *Pinger* which runs ping three times in succession for each of three computers on my network. The `-c 5` sets **ping** to ping the host 5 times and then exit. The output of this command looks like the figure below.

Figure 15.2. Output From Pinger Custom Command

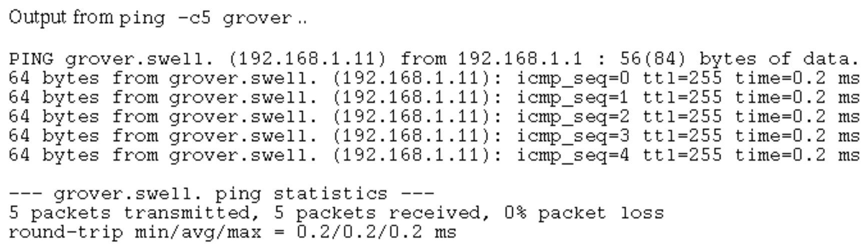

Execute Command - Mozilla {Build ID: 2002020415}
File Edit View Search Go Bookmarks Tasks Help Debug QA
Back Forward Reload Stop
http://delilah:10000/custom/run.cgi?idx=7
Search Print
Home Bookmarks
Webmin Index
Module Index
Help..
Execute Command
Pinger1
root logged into Webmin 0.93 on delilah.swell. (Redhat Linux 6.2)

Output from `ping -c 5 grover; ping -c 5 zope; ping -c 5 www.swelltech.com` ..

```
PING grover.swell. (192.168.1.11) from 192.168.1.1 : 56(84) bytes of data.
64 bytes from grover.swell. (192.168.1.11): icmp_seq=0 ttl=255 time=0.7 ms
64 bytes from grover.swell. (192.168.1.11): icmp_seq=1 ttl=255 time=0.2 ms
64 bytes from grover.swell. (192.168.1.11): icmp_seq=2 ttl=255 time=0.2 ms
64 bytes from grover.swell. (192.168.1.11): icmp_seq=3 ttl=255 time=0.2 ms
64 bytes from grover.swell. (192.168.1.11): icmp_seq=4 ttl=255 time=0.2 ms

--- grover.swell. ping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
round-trip min/avg/max = 0.2/0.3/0.7 ms
PING zope (192.168.1.172) from 192.168.1.1 : 56(84) bytes of data.
64 bytes from zope (192.168.1.172): icmp_seq=0 ttl=255 time=1.6 ms
64 bytes from zope (192.168.1.172): icmp_seq=1 ttl=255 time=0.1 ms
64 bytes from zope (192.168.1.172): icmp_seq=2 ttl=255 time=0.1 ms
64 bytes from zope (192.168.1.172): icmp_seq=3 ttl=255 time=0.1 ms
64 bytes from zope (192.168.1.172): icmp_seq=4 ttl=255 time=0.1 ms

--- zope ping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
round-trip min/avg/max = 0.1/0.4/1.6 ms
PING www.swelltech.com (206.245.168.212) from 64.217.72.242 : 56(84) bytes of
64 bytes from web20.iuinc.com (206.245.168.212): icmp_seq=0 ttl=238 time=80.4
64 bytes from web20.iuinc.com (206.245.168.212): icmp_seq=1 ttl=238 time=2218.
64 bytes from web20.iuinc.com (206.245.168.212): icmp_seq=2 ttl=238 time=1219.
64 bytes from web20.iuinc.com (206.245.168.212): icmp_seq=3 ttl=238 time=219.9
64 bytes from web20.iuinc.com (206.245.168.212): icmp_seq=4 ttl=238 time=82.8
```

It is also possible to accept options for your commands by choosing a type of input and naming it in the **Command Parameters** section of the **Create Command** page. So to make the above example more flexible, lets change it so that any host may be pinged by the user of the command.

Figure 15.3. Output From Ping Host Custom Command



```
Output from ping -c5 grover ..

PING grover.swell. (192.168.1.11) from 192.168.1.1 : 56(84) bytes of data.
64 bytes from grover.swell. (192.168.1.11): icmp_seq=0 ttl=255 time=0.2 ms
64 bytes from grover.swell. (192.168.1.11): icmp_seq=1 ttl=255 time=0.2 ms
64 bytes from grover.swell. (192.168.1.11): icmp_seq=2 ttl=255 time=0.2 ms
64 bytes from grover.swell. (192.168.1.11): icmp_seq=3 ttl=255 time=0.2 ms
64 bytes from grover.swell. (192.168.1.11): icmp_seq=4 ttl=255 time=0.2 ms

--- grover.swell. ping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
round-trip min/avg/max = 0.2/0.2/0.2 ms
```

In the above example, I've added a variable `$host` to the command. I've still chosen to force `-c 5` to be included in the command, though it could also be made into a variable option. Now, the user can choose to enter any hostname they wish to ping in the text entry field provided. The way this feature works is that a variable name is assigned to each entry field you create in the **Command Parameters** section. You can then insert those variables contents into the command that is executed.

Note

Beware that there have been security issues with allowing user entered data on custom commands in the past. All known exploits have been fixed, but it is still probably a wise idea to carefully consider security implications before giving a normally untrusted user access to commands that allow arbitrary text entry.