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# **FreeBSD VPS v3**

## **Technical Overview**

**Third Edition**  
**July 2008**

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# Introduction

**Important:** The information about all FreeBSD Virtual Private Server, version three (*FreeBSD VPS v3*) plans, including Starter, Basic, Pro, and Pro Plus, is presented in a way to enable you to determine which plan best suits the needs of your administrators, customers, clients, and vendors. In general, the content of the FreeBSD VPS v3 documentation library, will apply to the usage and administration of the features of your account. However, in particular, there will be some features of your account which may differ.

This document provides a technical overview of FreeBSD VPS v3. It describes how your account provides a private, protected, and fully isolated area. Although this document does not provide the detailed, technical instructions of a user's guide, it does provide descriptive technical information regarding operating system-level virtualization and the features of your account. This technical overview also includes descriptions of how resources are managed on your account and how FairShare Technology provides your account with a distinct advantage over other solutions. All of this information is placed in the context of the caveats required of any technical document concerning any Internet or network technology.

## Acknowledgments

In addition to internally developed technologies, FreeBSD VPS v3 utilizes open-source technologies and applications which have grown out of development, testing, and revision conducted by open-source communities around the globe. Those communities include (but are not limited to) the following:

- The FreeBSD Project (<http://www.freebsd.org/>)
- FreeBSD Foundation (<http://www.freebsd.foundation.org/>)
- Apache Software Foundation (<http://www.apache.org/>)
- Free Software Foundation (<http://www.fsf.org/>)
- GNU Project (<http://www.gnu.org/>)

## Overview of the Documentation Library

**Note:** This technical overview is available to you on a restricted basis. You may share its contents with your customers, clients, vendors, and trusted technology partners. However, it is not part of the customer documentation library published to the general public. It is published to restricted, authenticated Web resources such as the Web Hosting Backroom or the Reseller Portal.

The FreeBSD VPS v3 documentation library is included, at no cost, as a feature of your account. The following print-ready, Web documents are available in multiple formats for your unrestricted use:

- *FreeBSD VPS v3 Getting Started Guide*
- *FreeBSD VPS v3 Release Notes*
- *FreeBSD VPS v3 User's Guide*

There are also Website resources such as new feature supplements, migration guides, Frequently-Asked Questions (FAQ), and Web articles.

## Purpose of this Document

The purpose of this technical overview is to provide descriptive, introductory information. It describes, rather than instructs, about the features of your server account. Refer to the FreeBSD VPS v3 documentation library, to find out how to set up, use, and administer your server account and the core services it provides.

## Navigating this Document

This document includes the following sections:

- “Overview of FreeBSD VPS v3” on page three.
- “How FreeBSD VPS v3 Provides Privacy and Protection” on page four.
- “Alternatives to Operating System-Level Virtualization” on page seven.
- “Resource Management and FairShare Technology” on page 9.
- “Default Applications for FreeBSD VPS v3” on page 10.
- “Vinstall Utilities Library” on page 13.
- “FreeBSD VPS v3 Resource Allocation” on page 15.
- “How to Best Utilize Your Plan” on page 17.
- “Caveats” on page 20.

# Overview of FreeBSD VPS v3

This section provides you with a quick introduction of and context for FreeBSD, the online manual pages, and how you might utilize the features of FreeBSD VPS v3.

## FreeBSD is a UNIX Operating System

FreeBSD UNIX is derived from the Berkeley Software Distribution (BSD) of UNIX. The operating system is distributed under the terms of the FreeBSD Foundation. Your FreeBSD VPS v3 account utilizes FreeBSD version 6.0.

## FreeBSD UNIX and FreeBSD VPS v3

FreeBSD UNIX is based on open standards and is derived from the community-supported, open source FreeBSD Project. To locate more information about Berkeley Software Distribution (BSD), FreeBSD, and the FreeBSD Project, refer to the project Website (<http://www.freebsd.org/>). The operating system provides support for numerous open-source communication, database, and software applications.

As you perform configuration, administration and trouble-shooting tasks, you will be able to apply your previous knowledge of open-source software applications to FreeBSD VPS v3. Your account provides services in a way that assures the account functions as a stand-alone server, independent from any other account. The account supports specific processes, applications, users, and files. By utilizing root access you can grant access to any port. The account supports multiple users and user based applications. With access to all of your account's logs, administration per service is easy to do. Data backups, server security and software updates are updated through server software updates which often require no intervention on your part.

Your account is a hosting environment which provides you with an approximation of your own virtual machine. Keep in mind that although your account shares remote hardware with other accounts, your account does not share software. Each account has its own complete directory structure and set of dedicated applications such as Web server and mail server. Your account can be remotely rebooted without affecting any other accounts served by the physical hardware and runs with server monitoring software applications. Configure your account to support multiple users with shell, Web, File Transfer Protocol (*FTP*) and/or email privileges. The FreeBSD operating system provides a compatible base for operating system-level server virtualization, a template-based file system (or *skel*) package, and copy-on-write (*COW*) file system optimization.

## The Online Manual Pages

Your account also supports your access to the online manual pages (or *man pages*) which provide information about the full command set supported by your account. Man pages also provide information about system calls, library calls, special files, as well as file formats and conventions.

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# How FreeBSD VPS v3 Provides Privacy and Protection

FreeBSD VPS v3 provides a private and protected area that operates as an independent server. FreeBSD VPS v3 behaves as if it is, in fact, a stand-alone physical server offering excellent security, performance, and flexibility.

Operating system-level server virtualization creates isolated, secure virtual environments on a single physical server. Server virtualization enables better server utilization and ensures applications do not conflict. Each account performs and executes as a stand-alone server. You can simulate a reboot of your FreeBSD VPS v3 account independently and configure account root access, users, memory, processes, files, applications, system libraries and configuration files.

Your FreeBSD VPS v3 behaves as a stand-alone FreeBSD server. It has standard startup scripts, and software from multiple providers can operate in the account without modification. Change any configuration file and install additional software. The file system, the processes, Interprocess Communication (IPC) mechanisms, and configuration are always fully isolated from any other account. Processes which belong to your account are scheduled for execution on all available processing power.

Your FreeBSD VPS v3 includes its own IP address. The network traffic of your account is isolated from all other accounts. Traffic snooping is not possible.

Resource management controls the amount of resources available to your account. This enables the Quality of Service (or *QoS*) to meet the service level agreements associated with your account. The operating system-level server virtualization also provides performance and resource isolation which protects your account from abuse by other accounts on the same physical machine.

The isolated environment of the FreeBSD VPS v3 is established by creating a server sandbox. Each FreeBSD VPS v3 has its own complete directory structure, a virtual file system, its own set of independent applications (Web server, mail server, etc.); security that limits one FreeBSD VPS v3 from interfering with, or even seeing, another FreeBSD VPS v3; and advanced resource management, which controls how system resources are shared among FreeBSD VPS v3 accounts.

- **Functional Isolation** -- Each FreeBSD VPS v3 (and the applications that run on it) are configured independently. Customers have full administrative control, including the ability to install, customize, and run almost any custom or off-the-shelf application. Additionally, customers have complete control of their FreeBSD VPS v3 configuration and settings.
- **Fault Isolation** -- Similar to separate physical servers, a fault in one application running within a FreeBSD VPS v3 account does not affect any applications running on other VPS v3 accounts on the same physical server.
- **Performance Isolation** -- FairShare technology manages how each FreeBSD VPS v3 uses system resources like the central processing unit (CPU), memory, and network connection, which protects each FreeBSD VPS v3 from the misbehavior of others on the same server.

## Operating System-Level Virtualization Features

The software architecture of operating system-level virtualization is different from traditional virtual machine architecture because it always runs the same operating system (OS) kernel as the host system. It does this while continuing to enable multiple FreeBSD distributions in individual FreeBSD VPS v3 accounts.

This single-kernel implementation technology enables you to run FreeBSD VPS v3 accounts with near-zero overhead. FreeBSD VPS v3 accounts offer an order of magnitude higher efficiency and manageability than traditional virtualization technologies.

Each physical server utilized by FreeBSD VPS v3 is divided into small computational partitions. Each partition operates as a real, physical server. For Unix-like systems, FreeBSD VPS v3 technology is similar to an advanced extension of the standard `chroot` mechanism.

## ***Operating System-Level Virtualization***

From the point of view of applications as well as FreeBSD VPS v3 users, each FreeBSD VPS v3 is an independent system. This independence is provided by a virtualization layer in the kernel of the Host OS which is an operating system installed on the Hardware Node (HN), a computer where the Operating system-level virtualization is installed for hosting FreeBSD VPS v3 accounts.

**Note:** Only a small portion of the CPU resources is spent on virtualization (approximately one or two percent). The main features of the virtualization layer implemented in operating system-level virtualization are the following:

- Any FreeBSD VPS v3 looks and behaves like a regular FreeBSD system. It has standard startup scripts; software from multiple providers can run inside a FreeBSD VPS v3 without operating system-level virtualization-specific modifications or adjustment.
- A user can change any configuration file and install additional software.
- FreeBSD VPS v3 accounts are completely isolated from each other (file system, processes, Inter Process Communication (IPC)).
- Processes belonging to a FreeBSD VPS v3 are scheduled for execution on all available CPUs. Consequently, FreeBSD VPS v3 accounts are not bound to only one CPU and can use all available CPU power.

## ***Network Virtualization***

The network virtualization layer isolates FreeBSD VPS v3 accounts from each other and from the physical network:

- By default, each FreeBSD VPS v3 has its own IP address.
- At all times, network traffic for one FreeBSD VPS v3 is isolated from the other FreeBSD VPS v3 accounts. In other words, FreeBSD VPS v3 accounts are protected from each other in the way that makes traffic snooping impossible.

## ***Resource Management***

Resource management is important for FreeBSD VPS v3. Utilization of the resources available on your account is considerably higher than that of typical computer system. FreeBSD VPS v3 resource management controls the amount of resources available to each FreeBSD VPS v3 account. The controlled resources include such parameters as CPU power, disk space, and a set of memory-related parameters. Resource management enables your account server to efficiently provide the following functions:

- Share available resources among individual accounts.
- Maintain a server's part in network Quality of Service (QoS).
- Isolate performance and resource isolation.
- Protect the server from Denial of Service (DoS) attacks.
- Collect usage information for system monitoring.

## Skel Package

The provisioning system pre-configures each FreeBSD VPS v3 account with the following core services residing on the virtual private server account:

- Web - Hypertext Transfer Protocol (HTTP) and HTTPS.
- Email -- Simple Mail Transfer Protocol (SMTP), Post Office Protocol (POP), and Internet Message Access Protocol (IMAP).
- File Transfer Protocol (FTP)
- Shell access tools -- Telnet, Secure Shell (SSH), cron

These core services are managed by support staff, but can be configured by the customer to run according to their specific needs. Our support staff will provide basic instructional support for configuring and using the core services, as well as maintaining the system functionality of these services free of charge. We reserve the right to adjust FreeBSD VPS v3 resources as required to preserve an optimal operating environment for all FreeBSD VPS v3 customers.

By default your new FreeBSD VPS v3 account is pre-configured as a Web and email server. Your account begins as a copy-on-write (COW) image of a technician-tested, basic FreeBSD installation. However, you can configure your FreeBSD VPS v3 account to provide additional services.

## Copy-on-Write

FreeBSD VPS v3 fully utilizes the advantages of a Copy-on-Write (COW) file system. As you update and customize the server, FreeBSD VPS v3 continues to use central files maintained by our developers through file system overhead with skel. The COW file system ensures that your server has relatively unrestrained access to system resources such as Random Access Memory (RAM). Over time, files which are unique to your own server and configuration can change to suit own your needs.

The COW file system is especially important for virtual memory operating systems; when a process creates a copy of itself, the pages in memory that might be modified by either the process or its copy are then marked copy-on-write. When one process modifies the memory, the operating system's kernel intercepts the operation and copies the memory. It does this so that changes in the memory associated with one process are not visible to any other processes.

The ability to sparsely use memory is an important advantage of the COW file system. This advantage is because the usage of physical memory only increases as data are stored in physical memory. And this enables efficient hash tables to be implemented. The hash tables use only a little more physical memory than necessary to store the objects they contain.

## Ports Collection

Your FreeBSD VPS v3 account supports the FreeBSD Ports and Packages Collection, an open packaging system for FreeBSD. Each FreeBSD VPS v3 contains the Ports Collection already pre-installed and ready for use. Almost all of the over 16,000 ports and packages available through the Collection can be installed on FreeBSD VPS v3 using typical Ports Collection installation methods.

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# Alternatives to Operating System-Level Virtualization

FreeBSD VPS v3 technology virtualizes servers on an operating system layer, including the kernel. The technology partitions a single physical server into multiple small computational partitions. From the point of view of its owner, each partition operates as though it is a physical server. This technology provides an advanced extension of the standard `chroot` mechanism.

The operating system-level architecture has low overhead that helps to maximize efficient use of server resources. Due to a single-kernel approach, this type of virtualization introduces only a negligible level of overhead and enables many more virtual private servers to run on a single physical server than the alternatives. Approaches such as VMware workstation virtual machine emulation, Xen machine para-virtualization, and/or User Mode Linux (UML) cannot achieve equal of density levels. This is due to the overhead required by multiple kernels. Operating system-level virtualization does not enable you to run different operating systems or kernels. But, it does enable different libraries and distributions of an operating system.

Using operating system-level virtualization may increase the response time of a Web server does increase as the numbers of virtual environments. However, response times are acceptable (under two seconds). In comparison, emulation and para-virtualization implementations can typically host fewer virtual environments per server.

As there is a single kernel which maintains all the partitions, isolation and resource management become critical. Without proper isolation security can be compromised, and without proper resource management an application from one partition can abuse resources and thus cause a denial of service (DoS) for other partitions. The following are examples of finite resources which must be controlled and limited on a per-partition basis:

- CPU time
- Disk space
- Network access
- RAM
- Shared memory
- Number of processes

FreeBSD VPS v3 technology provides a set of nine finite resources which are controlled and limited on a per-partition basis.

## Overview of Alternatives

Following are alternatives to the FreeBSD VPS v3 technology. Each approaches, but does not match, the level of virtualization and robustness offered by FreeBSD VPS v3:

- **Chroot** – A UNIX command-line program to be used for process management. The program enables you to run and tightly control different instances of the FreeBSD environment on a single system. These instances operate simultaneously and without an intervention such as rebooting. Although the utility offers file system isolation, it does not offer any of the other features of other alternatives. For more, refer to the man pages included with the FreeBSD (or other Gnu-Unix) operating system.
- **Linux VServer** – Open-source software distributed by the Linux-VServer Project ([http://linux-vserver.org/Welcome\\_to\\_Linux-VServer.org](http://linux-vserver.org/Welcome_to_Linux-VServer.org)) under the terms of the Gnu Public License (GPL). The software provides kernel-level virtualization for GNU/Linux systems by enabling multiple virtual units running on the same kernel.

- **FreeBSD Jail** – A utility provided by the FreeBSD operating system (<http://www.freebsd.org/>). The utility manipulates operating system `chroot` capabilities to provide discrete, secure partitions. For more, refer to the operating system man pages or, for details regarding the utility refer to Chapter Four of the *FreeBSD Architecture Handbook* ([http://www.freebsd.org/doc/en\\_US.ISO8859-1/books/arch-handbook/jail.html](http://www.freebsd.org/doc/en_US.ISO8859-1/books/arch-handbook/jail.html)).
- **Containers** (or *Zones*) –The Solaris Enterprise System (<http://www.sun.com/software/solaris/>) provides support for isolated, virtual environments within one physical server. These environments are referred to as *zones* or *containers*. For more, refer to the *Zones and Containers FAQ* located on the Open Solaris Website (<http://www.opensolaris.org/os/community/zones/faq/>).

## Comprehensive Features Offered by FreeBSD VPS v3

The alternatives offer some, but not all, of the features of FreeBSD VPS v3. Only the FreeBSD VPS v3 implementation of operating system-level virtualization offers all of the following features:

- File System Isolation
- Disk Quotas
- Memory Limit
- CPU Quotas
- Network
- Isolation
- Partition check pointing
- Live migration

# Resource Management and FairShare Technology

The phrase *FairShare* refers to an innovative technology which promotes fair use of shared system resources such as CPU, memory, and network resources. The technology enables customer Websites and applications to perform consistently. It does this by preventing any single FreeBSD VPS v3 from abusing shared resources. Each FreeBSD VPS v3 is provisioned with an allocation of its own disk space and processes. FreeBSD VPS v3 controls usage of a number of resources including CPU, memory, and network.

Resource allocations and FairShare technology are used to accomplish two specific goals:

- Prevent abuse by any single FreeBSD VPS v3
- Differentiate the capacity of FreeBSD VPS v3 plans

A core principle of FairShare technology is to enable each FreeBSD VPS v3 to access appropriate levels of resources while preventing any single FreeBSD VPS v3 from abusing those resources by using more than its fair share. Usage thresholds are put into place to prevent abuse. Available resources and the demand on those resources then regulate the performance of each FreeBSD FreeBSD VPS v3 account.

There are several FreeBSD VPS v3 plans, as follows:

- Starter (a new plan)
- Basic
- Pro (formerly *1000*)
- Pro Plus (formerly *2000*)

During a low-activity period on the server, a FreeBSD VPS v3 could use as much CPU as it demands. However, at the point there is competition for that CPU resource, usage thresholds are applied and the FreeBSD VPS v3 plan type dictates access to available resources. Each FreeBSD VPS v3 is allocated its fair share, but the FairShare resource threshold of the Basic plan is less than that of the Pro plan. And the FairShare of the Pro plan is less than that of the Pro Plus plan.

Resource allocation and the implementation of FairShare technology provide an important competitive advantage of the FreeBSD VPS v3 platform. The information significant to customers is that which will guide appropriate usage of each FreeBSD VPS v3 plan and possibly indicate when an upgrade to a larger FreeBSD VPS v3 plan is necessary. The information included in “FreeBSD VPS v3 Resource Allocation” on page 15 may assist customers in making such decisions.

The main goal of resource management in operating system-level virtualization is to provide Service Level Management or Quality of Service (QoS) for FreeBSD VPS v3 accounts. Resource management settings prevent serious impacts resulting from the resource over-usage (accidental or malicious) of any other FreeBSD VPS v3 accounts. Using resource management parameters for QoS management also enables data center administrators to enforce fairness of resource usage among FreeBSD VPS v3 accounts and service quality for FreeBSD VPS v3 accounts.

# Default Applications for FreeBSD VPS v3

The following table describes the applications which are installed by default in the configuration of your FreeBSD VPS v3 account. In addition, the table provides an overview of the location and usage of the application.

**Table 1: Default FreeBSD VPS v3 Applications**

Application	Location	Usage
Apache modules	<ul style="list-style-type: none"> <li>• Main: /www/modules</li> </ul>	<p>Apache modules are code segments that are written to comply with the Apache API specification and can be loaded into the Apache Web Server. Apache modules can be loaded in one the following ways:</p> <ul style="list-style-type: none"> <li>• The modules are statically loaded in the compiled <code>httpd</code> daemon.</li> <li>• The modules are dynamically loaded in the Web server configuration file.</li> </ul>
Auto responder support	<ul style="list-style-type: none"> <li>• /usr/local/bin/autoreply</li> </ul>	<p>Your account supports auto responder (or <i>autoreply</i>) as a means of distribution for information about your organization. It provides an email alias which executes a program that automatically replies to any email sent to the specified address. This can be configured from the command line.</p>
FreeBSD	<ul style="list-style-type: none"> <li>• Documentation: /usr/share/doc/en</li> <li>• Ports Collection: /ports</li> </ul>	<p>FreeBSD VPS v3 utilizes the FreeBSD operating system version 6.0.</p> <p>The Ports and Packages Collection provides a command line-driven package management system. The Collection commands enable you to install, uninstall, verify, query, and update software features on your account.</p>
FTP server	<ul style="list-style-type: none"> <li>• Configuration: /etc/proftpd.conf</li> <li>• Main: /usr/local/sbin/proftpd /usr/local/sbin/in.proftpd</li> </ul>	<p>proFTPD provides anonymous configuration and support for the Transport Layer Security (TLS) protocols such as anonymous File Transfer Protocol (FTP) and FTP server processes. Your account supports unlimited FTP users.</p>
GCC	<ul style="list-style-type: none"> <li>• Main: /usr/bin/gcc</li> <li>• Main Library: /usr/lib/libgcc.a</li> <li>• Documents: online man pages</li> </ul>	<p>GNU Compiler Collection (GCC) provides program language compilers.</p>

Application	Location	Usage
IMAP	<ul style="list-style-type: none"> <li>• Main: /usr/local/libexec/imapd</li> <li>• Configuration: /etc/inetd.conf</li> </ul>	Your account uses UW IMAP as the Internet Message Access Protocol (IMAP) server software. IMAP is supported under <code>inetd</code> and enables the ability to limit the rate of connections and other <code>inetd</code> configurations. If you modify your <code>inetd</code> configuration, verify your configuration continues to work with the new configuration. Your account does not limit the number of IMAP email users.
OpenSSH	<ul style="list-style-type: none"> <li>• Documentation: online man pages</li> <li>• Configuration: /etc/ssh</li> <li>• Main Files: /usr/bin/ssh /usr/bin/scp /usr/bin/ssh-agent</li> <li>• Other Common SSH Utilities: /usr/bin/ssh-keygen</li> </ul>	OpenSSH provides connectivity tools that encrypt all traffic (including passwords) to eliminate eavesdropping, connection hijacking, and other attacks. OpenSSH also supports secure tunneling capabilities and several authentication methods, and supports commonly used versions of the Secure Shell (SSH) protocol.
Perl and mod_perl	<ul style="list-style-type: none"> <li>• Mod_perl: /www/modules/mod_perl.so</li> <li>• Main perl executable: /usr/local/bin/perl</li> <li>• Main perl directory: /usr/local/lib/perl5</li> </ul>	Perl provides a cross-platform programming language.
POP3 Server	<ul style="list-style-type: none"> <li>• N/A</li> </ul>	Your account supports Post Office Protocol version three (POP3) through the UW IMAP package for the purpose of handling email. POP3 is supported under <code>inetd</code> and enables the ability to limit the rate of connections and other <code>inetd</code> configurations. If you modify your <code>inetd</code> configuration, verify your configuration continues to work with the new configuration. Your account does not limit POP email users.
Ruby	<ul style="list-style-type: none"> <li>• Main Executable: /usr/local/bin/ruby</li> <li>• Main Libraries: /usr/local/lib/ruby</li> <li>• Main Documents: /usr/share/doc/en/books/porters-handbook/using-ruby.html online man pages</li> </ul>	Ruby provides interpreted scripting language for object-oriented programming.

Application	Location	Usage
Sendmail (SMTP) Server	<ul style="list-style-type: none"> <li>• Main Executable: /usr/sbin/sendmail</li> <li>• Main Configuration directory: /etc/mail</li> <li>• Documents: /usr/share/doc/en/books/handbook/sendmail.html online man pages</li> </ul>	SMTP – Sendmail with unlimited aliases.
OpenSSL	<ul style="list-style-type: none"> <li>• Main Executable: /usr/bin/openssl</li> <li>• Main Configuration: /etc/ssl</li> </ul>	Privacy and encryption provided by support for the Secure Sockets Layer (SSL) protocol 2.0. Your account defaults to utilize a shared SSL certificate.
SASL authentication (Unauthorized relay protection)	<ul style="list-style-type: none"> <li>• Main Executable: /usr/local/sbin/saslauthd</li> <li>• Main Documents: online man pages</li> </ul>	Your account supports Simple Authentication and Security Layer, utilizing the Kerberos authentication protocol to protect against unauthorized relay.
Web Server	<ul style="list-style-type: none"> <li>• Main Directory: /www</li> <li>• Main Executable: /usr/bin/httpd</li> <li>• Main Configuration File: /www/conf/httpd.conf</li> <li>• Restart Apache Script: /usr/local/sbin/restart_apache</li> <li>• Default Document Root: /www/htdocs</li> <li>• Documents: online man pages</li> </ul>	Apache HTTP (or <i>Web</i> ) Server and Web Server Modules provided by the Apache Hypertext Transfer Protocol (HTTP) Server version 2.x.

# Vinstall Utilities Library

FreeBSD VPS v3 accounts include a library of custom installation scripts (or *vinstall utilities*). These vinstall utilities greatly simplify the installation of programs and utilities by performing, in most cases, almost the entire configuration for you. Determining dependencies, default locations, and sometimes even upgrading and downgrading are executed for you by the vinstall utility. As of June 3, 2008, all FreeBSD VPS v3 plans include a library of vinstall utilities which include installations or configuration for the following:

**Note:** Because of memory requirements, Java applications are available for the Pro Plus plan only. For more, see “Java Applications” on page 20.

- ant
- Apache (1.3.x and 2.x.x)
- ClamAV
- CPX: Control Panel
- Dada Mail
- Dovecot
- Enhanced Webmail
- eRuby
- Expect
- (GPG) FormMail
- FrontPage server extensions
- iManager (2)
- Java Development Kit (JDK)
- Java Run-time Environment (JRE)
- Mailman
- Majorcool
- Majordomo
- Metamail
- Miva Empresa (virtual and non-virtual machine)
- Mod\_perl
- Mod\_python
- Mod\_ruby
- MySQL (4.x, 5.x)
- MySQL Check
- Namazu
- Open WebMail
- Perl (5.x)
- PGP5 FormMail
- PGP FormMail
- PHP: Hypertext Processor 5.x.x (default) and 4.x.x
- PhpMyAdmin

- PhpPgAdmin
- PostgreSQL (8.x)
- Procmail
- Procmail LDA
- PukiWiki
- Python (2.3, 2.4., 2.5)
- Rails
- System Quota Checker
- Samba (2.x, 3.x)
- Sendmail (RBL, Certificate)
- SpamAssassin
- SquirrelMail
- Swish-e
- Tcl
- Timezone
- Tomcat
- TWIG
- Urchin
- Urchin5
- Webmin
- WordPress
- Wpoison
- Zend Optimizer
- Zope

# FreeBSD VPS v3 Resource Allocation

**Note:** If you compare FreeBSD VPS v3 resource allocations to those of Linux VPS, you may notice what appears to be a difference in the memory limits between the two platforms. Please note that the two operating systems (FreeBSD and RHEL) use memory differently, the values are measured differently, and the FairShare technology used to shape memory usage is different on the two platforms. Additionally, the Web host has tuned the two operating systems to provide equivalent performance with our applications on each platform. In other words, even though actual values are different, the performance will be equivalent for equivalent plan types (Starter, Basic, Pro, and Pro Plus) and configuration on each platform.

As mentioned previously, there are several FreeBSD VPS v3 plans, as in the following list:

- Starter
- Basic
- Pro
- Pro Plus

The plans utilize FairShare Technology as well as operating system-level virtualization to allocate server resources. There are six important aspects of the resource allocation described in this document, as follows:

- **Disk Space** – Determines the maximum number of gigabytes (GB) of data you can store on your FreeBSD VPS v3 account.
- **Total Processes** – Determines the maximum number of tasks (both active and inactive) on your FreeBSD VPS v3 account.
- **Total Open Files** – Determines a maximum number of files which the FreeBSD VPS v3 can open at a time.
- **CPU Priority** – Determines a maximum amount of time, relative to other plan types, the FreeBSD VPS v3 account can access the server hardware Central Processing Unit (CPU).
- **Memory** – Determines the number of megabytes (MB) of memory allocation that your account provides. **Use this number for capacity planning purposes.**
- **Maximum Memory** – Determines a maximum number of megabytes (MB) or gigabytes (GB) of random-access memory (RAM) that your account can utilize.
- **Virtual Memory** – Determines a maximum number of megabytes (MB) or gigabytes (GB) of memory (RAM plus swap space) available to your account.

Resource parameters may be different in certain international datacenters. Please contact your account manager or visit your local support site for the resource allocations used in your datacenter.

The following table describes the resource allocations for each FreeBSD VPS v3 plan:

**Table 2: FreeBSD VPS v3 Resource Allocations**

Resource Allocations	Starter	Basic	Pro	Pro Plus
<b>Disk Space</b>	10 GB	20 GB	40 GB	60 GB
<b>Total Processes</b>	70	100	150	300
<b>Total Open Files</b>	2,000	4,000	8,000	16,000
<b>CPU Priority</b>	1	2 (or twice the priority of Starter)	4 (or quadruple the priority of Starter)	8 (or eight times the priority of Starter)
<b>Memory</b>	256 MB	384 MB	512 MB	768 MB
<b>Maximum Memory *</b>	512 MB	768 MB	1 GB	1.5 GB
<b>Virtual Memory</b> <i>(Supplementary Information)</i>	<i>(1 GB)</i>	<i>(1.5 GB)</i>	<i>(2 GB)</i>	<i>(3 GB)</i>

\* For FreeBSD VPS v3, Maximum Memory works as the Soft Limit. Exceeding *Maximum Memory* limit will cause performance degradation.

## How to Best Utilize Your Plan

Once you have a sense of the resource allocations for your plan, you can begin to assess the needs you have and how to best-utilize your plan.

The Web host has over a decade of experience as a provider. Over that time, approximately 500,000 business customers have chosen the Web host to provide solutions that actually solve real industry and technology problems. Based on this experience, we recommend the following guidelines for each of FreeBSD VPS v3 plans. The information in Table 3 is based on observations and analysis of how current customers actually utilize their plans. As such, it is not the kind of data that comes out of a laboratory setting or test environment. These are not limits or maximums. They are based on averages, not exceptions. In fact, your configuration and usage may lead to far better or more robust results than the information in this document suggests.

There are several best uses to consider, as follows:

- **Monthly Cumulative Bandwidth** – The amount of data passed through the server network connection during a month.
- **Stream Rate** – The amount of data, measured in kilobytes or megabytes per second (*KB/sec* or *MB/sec*), passed through the server network connection.
- **Number of Websites** – The number of Websites (also referred to as *sub-hosts* and/or *virtual hosts*) supported by your server account.
- **Number of Website hits** (per day) – The number of instances when your Website content is viewed by visitors. Typically, *hits* are not the same as downloads, dynamic, or other types of requests which require processing.
- **Number of Users** (including email accounts) – The number of user accounts supported by your account.
- **Total Emails Sent and Received** (per day) – The number of emails processed (sent and received) by your server account during a day.
- **Mailing List Size** – The total, cumulative size (or *volume*) of mailing list recipients your server processes each day.

**Table 3: Usage Guidelines for FreeBSD VPS v3 Plans**

Usage Guidelines	Starter	Basic	Pro	Pro Plus
<b>Monthly Cumulative Bandwidth</b>	80 GB	120 GB	180 GB	200 GB
<b>Stream Rate (per second)</b>	128 KB/sec	256 KB/sec	512 KB/sec	1 MB/sec
<b>Number of Websites</b>	5	10	20	40
<b>Number of Website hits (per day)</b>	15,000	30,000	60,000	120,000
<b>Number of Users (including email accounts)</b>	10	15	30	60
<b>Total Emails Sent and Received (per day)</b>	5,000	10,000	20,000	40,000
<b>Mailing List Size</b>	5,000	10,000	20,000	40,000

Uses for FreeBSD VPS v3 plans vary widely from customer to customer, of course. Some of the basic functions, such as posting Web pages and communicating by email, are installed in the default configuration of your server. There are add-on features, such as e-commerce, which are offered for an additional fee. And there are applications and suites which you can install by means of vinstall utilities designed by our engineers to anticipate the scripts, packages, modules, and other resources the application or suite will require. Beyond that, you can install, run, and develop many other applications and suites by means of the Red Hat Package Manager (RPM). No matter what your plans are, it is important that you refer to this document in order to plan ahead for the needs of your organization.

Following are some of the anticipated uses for FreeBSD VPS v3 plans:

- **Websites** – Websites (also *website* or *Websites*) are collections of text, images, videos and/or other content that your server hosts for the purpose of publicizing your organization. Alternatively, Websites can facilitate tasks and communication within your organization. The default, installed configuration of your server includes the Web server software you need to get you started.
- **Email** – Emails are electronically delivered messages which your server processes so that individuals in your organization can communicate with others, either within in your organization, or to anyone with a valid email address. Images, videos and/or other content may be embedded in the messages or sent as attachments to the emails. The default, installed configuration of your server includes the email services you need to get started.
- **E-Commerce** – Most plans can facilitate Web-based sales transactions (or *e-commerce*) with the speed, efficiency, and reliability your customers have come to expect. E-Commerce enables your customers to respond to the compelling information. E-commerce is available as an add-on, fee-based option for your server.
- **Databases** – You can organize, retrieve, and report information stored in the databases operated by your server. You can add a database application packages to your server by using available vinstall utilities.
- **Dynamic Applications** – The Pro and Pro Plus plans are able to process, deliver, and utilize dynamic applications (also referred to as modules and/r packages). Typically, this means that you can give life to the content your customers see and, possibly, anticipate their needs. You can install many dynamic applications by means of vinstall utilities supported by your server.
- **Multimedia Development Suites** – The Pro Plus plan can provide a robust, scalable development environment for creating (not just processing) multimedia applications. You can install many of the open-source components by means of vinstall utilities supported by your server.
- **Enterprise Development Suites** – The Pro Plus plan can provide a robust, scalable development environment for customizing applications specific to your enterprise. You can install many of the open-source components means of vinstall utilities supported by your server.
- **Java Applications and Java Development Kit (JDK)** – The Pro Plus plan can provide a robust, scalable development and, more importantly, a processing environment for JDK and Java applications. You can install many of the open-source components by means of vinstall install utilities supported by your server. See “Java Applications” on page 20.

Table 4 summarizes the suggested uses for FreeBSD VPS v3 plans:

**Table 4: Suggested Uses for FreeBSD VPS v3 Plans**

Uses	Starter	Basic	Pro	Pro Plus
Websites	✓	✓	✓	✓
Email	✓	✓	✓	✓
E-Commerce		✓ (lightweight only)	✓	✓
Databases		✓ (lightweight only)	✓	✓
Dynamic Applications			✓	✓
Multimedia Development Suites				✓
Enterprise Development Suites				✓
Java and JDK				✓

## Caveats

All of the information in this document is based on the years of experience our product developers and system administrators can offer. Following are some of the caveats they want you to know as you interpret the best-utilization information included in this document.

## Java Applications

**Note:** Java applications may be used on the Pro Plus plan only. This is because many Java applications consume significant CPU and memory resources and some may not be appropriate for use in the FreeBSD VPS v3 environment. Java applications on FreeBSD VPS v3 should be monitored and possibly restricted for use only on Websites with a low expected workload. In addition, some larger Java applications may not be suitable for use on FreeBSD VPS v3 even with low workloads. You must conduct sufficient performance testing of your Java application on a FreeBSD VPS v3 before relying on it for critical business needs. You must build contingency plans in case your Java application does not perform as expected; possible solutions may include:

- Extensive optimization of the Java application
- Moving the Java application to a dedicated server such as the Managed Private Server (MPS).
- Implementing an alternative solution to using Java. (For example, moving from Java to an optimized C program.)

There are a wide range of Java-based applications. Some are designed to handle multiple services and others focus on a smaller range of services. As an example, Zimbra (<http://www.zimbra.com/>) is open-source server and client software used to process email, group calendaring, and contacts. In addition, the software supports Web document management and authoring. The software offers a wide range of services, some of which duplicate applications included with the default configuration of the Pro Plus plan. The software offers these services by drawing on Java and its own, duplicate installation of Tomcat. These factors make the software better suited to a more powerful, dedicated server offering such as MPS.

Alternatively, JSP Wiki (<http://www.jspwiki.org/>) uses standard Java 2 Platform, Enterprise Edition (J2EE) components such as Java, servlets, and JSP. The software enables collaborative authoring for Websites (also called a *wiki*). The software enables visitors to collectively comment upon, add to, or remove from Web page content. The open-source software focuses on providing a singular, unique service. It does this by utilizing the Java components which are available for installation on the Pro Plus plan. JSP Wiki does not duplicate services which are also supported by FreeBSD VPS v3, such as email.

JSP Wiki is an example of a Java-based application which is well-suited to the Pro Plus plan when put under low to moderate workloads. Results will vary by application, but a JSP Wiki installation running on the Pro Plus plan could potentially handle up to tens of thousands of wiki page views per day. Should hundreds of thousands of wiki page views per day be required, upgrading to a dedicated server such as a Managed Private Server (MPS) is recommended.

## Interdependence

Some aspects of your plan's performance are interdependent. Resources are not dedicated to specific applications or tasks; you have a finite number of resources (as described in Table 2) for all of your tasks. The usage guidelines described in this document should be applied with this in mind. For example, if you have a busy Website, your ability to process high volumes of email will be impaired. Or, as another example, there are not additional resources

specifically allocated for processing emails sent and received, performance depends on the total mailing list size (or *volume*). If, on an average day, mailing list activity is high, and you also expect a high volume emails sent and received, then you must take measures to schedule those activities or you might consider upgrading to a plan with sufficient resources for processing all of the emails sent and received, as well as for mailing list usage.

## Sandboxes and Performance

Each FreeBSD VPS v3 operates in a sandboxed environment that protects, but does not always prevent, performance from being impacted by another FreeBSD VPS v3 accounts. All customers share some common server resources including CPU, memory, network, and disk space. Resource availability is not guaranteed.

## For Informational Purposes Only

This information is provided for informational purposes only and must be recognized as providing information about best-utilization (as opposed to performance guarantees or service-level agreements). Operating system-level virtualization technology combined with sound server administration practices enable resources to adjust as required in order to preserve an optimal operating environment for all FreeBSD VPS v3 customers.

## Fluctuations and Adjustments

Actual resource availability may fluctuate both above and below the values in this document. Ultimately, the demand on available resources will determine the performance of each FreeBSD VPS v3 plan. While this information may be helpful in gauging appropriate usage, it should not be the sole determinate in capacity planning. The Web host reserves the right to adjust FreeBSD VPS v3 resources as required. These adjustments preserve optimal operating environment for all FreeBSD VPS v3 accounts.