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How To Setup OpenVZ under RHEL / CentOS Linux

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This entry is part 1 of 5 in the series RHEL / CentOS OpenVZ Virtualization [1]

Ineed to run more than instance of Linux operating system and different Linux distributions under CentOS. How do I use OpenVZ virtualization to optimize the usage of my Dell servers, and create test Linux VPS running Debian, Ubuntu, and CentOS Linux? How do I deploy OpenVZ under CentOS / RHEL Linux? [6]

OpenVZ virtualization uses the concept of containers to run Linux only instances on the same hadware. OpenVZ is an operating system-level virtualization technology. It allows a physical server to run multiple isolated different Linux distributions operating system instances, known as containers or Virtual Private Servers (VPSs), or Virtual Environments (VEs). It's similar to FreeBSD Jails [7] and Solaris Zones.

OpenVZ doesn't have the overhead of a true hypervisor (e.g. XEN or VMware), so it is very fast and an efficient to run Linux only VPS. All virtual servers will use same Linux kernel version. [8]

OpenVZ Virtualization and Isolation

It offers strong isolation. This is perfect for running named, mysqld, apache and other services in each container. Each VPS is a separate entity, and behaves just like a physical server. Each VPS has:

1. System files (such as /bin, /sbin, /lib etc);
2. Own root users, as well as other users and groups;
3. Process tree;
4. Network (private or public IP;
5. Shared memory, semaphores, messages.

Our Sample Setup (HostNode)

```
Server: Dual Core CPU with Software RAID1 and 2GB RAM
eth0: Public IP 123.1.2.3
venet0: venet used by OpenVZ to talk with rest of the LAN or Internet.
Hostname: hostnode01.nixcraft.in.
vps.nixcraft.net: 123.1.2.5 - can run any supported Linux distribution.
```

Host node

The controlling system of container (VPS) environment. The host system has access to all the hardware resources available, and can control processes both outside of and inside a VPS environment. One of the important differences of the host system from a VPS is that the limitations which apply to superuser processes inside a VPS are not enforced for processes of the host system. Above server is host node.

CT0 or VE0

Another name for host node. In other words, CT0 or VE0 means the server itself. From CT0 / VE0, you can use vzctl and other tools to manage containers.

VPS or VE (Virtual Environment) or Virtual Machine

A process, user or other software, whose access to resources is restricted by OpenVZ software. VPS is nothing but an isolated program execution environment, which looks and feels like a separate physical server. Each VPS has file system, root user, other users, file system, firewall settings, routing tables and much more. You can setup multiple VPSs within a single physical server. Different VPSs can run different Linux distributions such as Gentoo, Debian, CentoS, Fedora Linux etc., but all VPSs operate under the same Linux kernel.

CTID

Each VPS has a unique number called CTID (a ConTainer's IDentifer). CTID is defined by server admin and it is used to create, start, stop, restart, delete VPS and other administrative jobs related to your VEs.

VPS Disk Quota

You can restrict VPS disk usage using standard Linux quota tools. For e.g. set vps.nixcraft.net disk usage to 10Gb only. You can also setup quota using number of inodes [9].

Fair CPU Scheduler

Each VPS gets the time slice from the kernel by taking into account the VPS's CPU priority and limit settings which can be set by server administrator on host node. This can not be modified by VPS users include vps root user. The standard Linux scheduler decides which process in the VPS to give the time slice to, using standard process priorities.

Beancounters - UBC Parameter Units

Each VPS follows set of user beancounters. It is nothing but set of limits and guarantees for each VPS. Beancounters make sure that no single VPS can abuse any resource which is limited for the whole host node and thus cause harm to other VPSs. The resources accounted and controlled are mainly memory and various in-kernel objects such as IPC shared memory segments, network buffers etc.

Beancounter value	Usage
lockedpages	The memory not allowed to be swapped out (locked with the mlock() system call), in pages.
shmpages	The total size of shared memory (including IPC, shared anonymous mappings and tmpfs objects) allocated by the processes of a particular VPS, in pages.
privvmpages	The size of private (or potentially private) memory allocated by an application. The memory that is always shared among different applications is not included in this resource parameter.
numfile	The number of files opened by all VPS processes.
numflock	The number of file locks created by all VPS processes.
numpty	The number of pseudo-terminals, such as an ssh session, the screen or xterm applications, etc.
numsiginfo	The number of siginfo structures (essentially, this parameter limits the size of the signal delivery queue).
dcachesize	The total size of dentry and inode structures locked in the memory.
physpages	The total size of RAM used by the VPS processes. This is an accounting-only parameter currently. It shows the usage of RAM by the VPS. For the memory pages used by several different VPSs (mappings of shared libraries, for example), only the corresponding fraction of a page is charged to each VPS. The sum of the physpages usage for all VPSs corresponds to the total number of pages used in the system by all the accounted users.
numiptent	The number of IP packet filtering entries.

See this article which explains all UBC parameter unit [10].

VPS Templates

VPS templates are nothing but images which are used to create a new VPS. A template is a set of packages, and a template cache is an archive (tarball) of a chrooted
environment with those packages installed. Each Linux distribution comes as template.

Default Locations

1. **/vz** - Main directory for OpenVZ.
2. **/vz/private** - Each VPS is stored here i.e. container's private directories
3. **/vz/template/cache** - You must download and store each Linux distribution template here.

4. **/etc/vz/** - OpenVZ configuration directory.
5. **/etc/vz/vz.conf** - Main OpenVZ configuration file.
6. **/etc/vz/conf** - Softlinked directory for each VPS configuration.
7. **Network port** - No network ports are opened by OpenVZ kernel.

Virtualization With OpenVZ

Now, you are aware of basic terminology used by OpenVZ, it is time to get your hands dirty with OpenVZ. You can run OpenVZ on both CentOS / Red Hat and Debian Linux based server systems.

Download complete series in PDF format [11]. (286K)

Series Navigation

CentOS Linux Install OpenVZ Virtualization Software» [2]

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[2] CentOS Linux Install OpenVZ Virtualization Software: **http://www.cyberciti.biz/faq/rhel-redhat-centos-setup-openvz-virtualization/**
[3] How To Create OpenVZ Virtual Machines (VPS): **http://www.cyberciti.biz/faq/centos-rhel-redhat-create-openvz-virtual-machines-vps/**
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