



OpenVZ on CentOS



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Overview

- **Background**
- **Virtualization types on x86**
- **Introduction to OpenVZ**
- **OpenVZ Installation / Configuration**
- **VE Load Demonstration**



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Virtualization Overview



Virtualization

- **Why virtualization**
- **Technology**
- **Performance**
- **Usability**



Virtualization Types

Different types of virtualization

- **Emulation**
- **Paravirtualization**
- **Native Virtualization**
- **OS Level Virtualization**



Emulation

- **Emulates the systems hardware**
- **100% Emulators can emulate other CPUs**
- **Emulators use JIT to speed up**
- **Examples:**

VMWare, Qemu, Bochs



Emulation

ADVANTAGES

- Can emulate different CPUs
- Unmodified OS as guest

DISADVANTAGES

- Slow(er)
- Limited virtual servers per system



Paravirtualization

- **Uses a Hypervisor / Virtual machine monitor**
- **Guests need to be modified**
- **Major performance increase**
- **Examples:**
Xen, UML



Paravirtualization

ADVANTAGES

- **Runs very fast**
- **Less resource overhead than emulation**

DISADVANTAGES

- **Modified Guest kernel / drivers**
- **(Limited Guests)**



Native Virtualization

- **Intel VT, AMD-V**
- **Guests no longer need to be modified**
- **A bit slower than Paravirtualization**
- **Examples:**
Xen, KVM



OS Level Virtualization

- **Also known as containers**
- **Share the same kernel**
- **Lower overhead**
- **Best possible performance regarding resource management**
- **Examples:**

Solaris Zones, Linux-VServer and OpenVZ



OS Level Virtualization

ADVANTAGES

- Highest density of running guest
- Native speed

DISADVANTAGES

- Runs 1 kernel for all VE/VPS
- Less suitable for testing purposes



Comparison

Emulation

- Emulates HW, Test platform, Slowest

Para/native virtualization

- Higher performance, Limited # servers

OS Level

- High density, Native speed, Resource management, Single kernel



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OpenVZ



OpenVZ



- **Runs a modified Linux Kernel**
- **Works with Virtual Environments (VE)**
- **Provides utilities for VE / resource management**



OpenVZ - VE

- **Virtual Environment provides an isolated execution environment**
- **Looks and feels like a separate physical server**
- **Has its own processes (init), filesystem, users, network interfaces, routing tables, firewall rules**



OpenVZ - Kernel

Modified Linux kernel with the following additional features:

- **Enables virtualization and isolation of VE**
- **Resource management (subsystem limits)**
 - Two level disk quota
 - “Fair” CPU scheduler
 - User Beancounters
- **Checkpointing (freezing)**



OpenVZ - Installation

- **Kernel installation via YUM / RPM**
- **VZ Tools installation**
- **Template installation**
- **Quick install guide:**
http://wiki.openvz.org/Quick_installation



OpenVZ - Templates

- **Building Block for VEs**
- **Template metadata**
 - List of packages included
 - Location of package repositories
 - Distribution specific scripts
- **Template Cache**
 - Precreated template usually from the template metadata
 - Delivers faster provisioning of new VE



Use Cases

- **Server consolidation**
- **Development and testing**
- **Educational**
- **Hosting**



Use Cases

- **Numproc, numtcpsock**
- **numproc**
- **Educational**
- **Hosting**