### **VIRTUALIZATION**

OpenVZ

# Checkpoints

Introduction to virtualization

Openvz running

Container creation

#### What is Virtualization?

- Method of dividing computer resources
- Multiple isolated environments
- Types
  - Emulation
  - Paravirtualization
  - OS level virtualization

## Operating System level virtualization

- Multiple isolated execution environments within a single OS kernel
- Doesn't allow to run different kernels from different OSs at the same time
- Best possible performance
- Examples: OpenVZ, Linux-VServer

#### Virtual Environment / Container

- Look and feel of separate physical server
- VE has its own
  - Process tree with init
  - File system
  - Network interfaces with IP addresses, Firewall rules, Routing tables

#### Virtual Environment

- Multiple VEs co-exist within a single physical server.
- Different VEs can run different Linux distros
- But, all VEs operate under same kernel

## OpenVZ kernel

- Modified Linux based kernel which comes with following functionalities
  - Virtualization and Isolation
    - Enables many VEs within a single kernel
  - Resource management
    - Manages CPU, RAM, Disk space per VE basis
  - Checkpointing
    - Freezing a VE, Saving its state to disk with ability to unfreeze that state later

### OpenVZ vs VMware/virtualbox

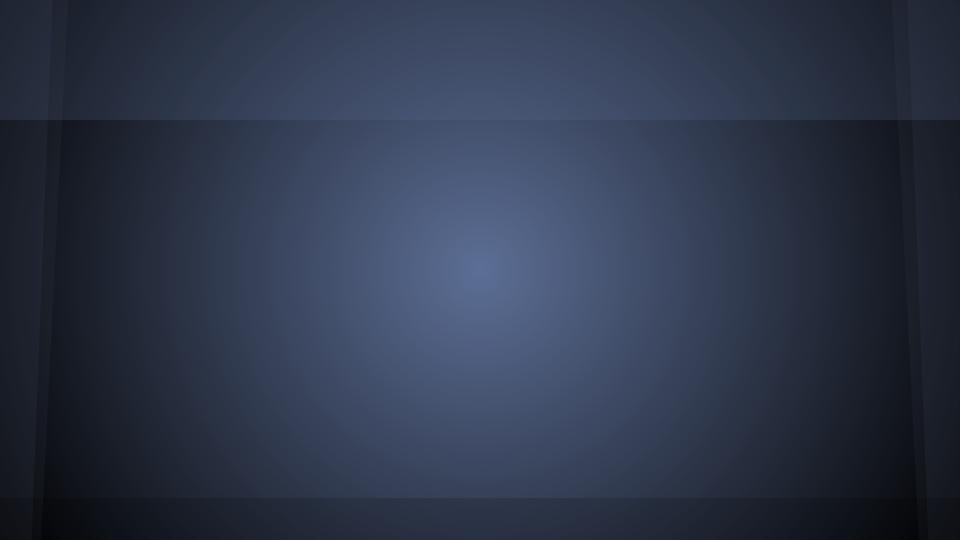
Virtualbox - Hardware assisted

OpenVZ - OS level virtualization

# Demo on OpenVZ

- Vzctl
  - o create
  - start
  - o set
  - restart
  - status
  - o enter
  - o stop
- Vzlist ...

# thanks



#### Virtualization and Isolation

- Each VE has its own set of resources provided by OS kernel
  - Files
    - System libraries, applications, virtualized / proc
      & /sys, virtualized lock ,.etc
  - users and groups
  - o process tree
  - network
    - Allows VE to have its own IP addresses

#### Virtualization and Isolation

- Devices
  - a VE can be granted to access real device like network interfaces, serial ports
- IPC objects
  - shared memory
  - semaphores
  - messages

### Resource Management

- Finite set of resources within a single kernel are shared among multiple VEs
- OpenVZ resource management subsystem consists of three components
  - Two-level disk quota
  - Fair CPU scheduler
  - o UBC