

# ATOL: Virtualization

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Advanced Topics of Linux Administration

# Introduction to Virtualization

- ▶ 1960's: IBM mainframes - single user system
- ▶ Virtualization (running single-user OS several times)
- ▶ Introducing virtual memory
- ▶ Main benefit is time sharing (typically in universities, research centres)
- ▶ 1998: VMWare (Berkeley/Stanford); IPO (NYSE:VMW) in 2007
- ▶ 2003: Xen (XenSource/Uni. of Cambridge); bought by Citrix in 2007
- ▶ 2005: KVM (Qumranet); bought by Red Hat in 2008

- ▶ Advantages
  - ▶ Security
  - ▶ Better utilization of computers (power, CPU, rack space)
  - ▶ Higher availability of services
  - ▶ Low-cost solution
- ▶ Disadvantages
  - ▶ Performance issues
  - ▶ Virtualization on Linux is new technology
  - ▶ Very difficult to solve issues

- ▶ No modification are needed in guest OS
- ▶ Total abstraction of underlying physical system
- ▶ HW support: Intel VT (CPU flag vmx), AMD SVM (svm)

- ▶ Requires user modification of guest OS (eg. linux-image-xen)
- ▶ Provides near native performance (<5% at best)

# Management of Virtual Machines

- ▶ libvirt, virsh
- ▶ Large deployment
  - ▶ VMWare Virtual Center
  - ▶ Red Hat Virtualization Manager (RHEV-M)
- ▶ Clouds
  - ▶ Infrastructure as a Service (IAAS) - Amazon WS, Microsoft Azure
  - ▶ Platform as a Service (PAAS) - Google App Engine, (Sales)Force.com
  - ▶ Software as a Service (SAAS) - Google Apps

- ▶ Virtual CPUs (vcpu)
- ▶ Virtual disks (/dev/xvda)
- ▶ Virtual network interfaces (VNIC), identification by MAC addresses
- ▶ Identification of guests using
  - ▶ domain name (domain-name) - user given
  - ▶ identity (domain-id) - unique, non-persistent
  - ▶ UUID - persistent, assigned at first installation

- ▶ Goals:
  - ▶ Create a virtual machine on your computer using kickstart
  - ▶ Setup network connection through your 'real' machine
  - ▶ Using a LVM snapshots create a new virtual machine from existing one



# Lab: Prepare a paper

- ▶ Themes:
  - ▶ Compare VMWare, Xen, KVM, ...
- ▶ Format:
  - ▶ Short presentation (15–20 minutes; 5-7 slides)
  - ▶ Paper containing comparison (500 words)