Virtualization 101

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Why Virtualize?

- Computer power exceeds ability to use it
- Better utilization of resources
- Separation or sandboxing of applications
- Run multiple different OS on same hardware
- Rapid deployment without purchase of new hardware
- Ease of relocation from one machine to another
- Ability to cluster applications easily
- Simplified management
- Require less hardware to perform same tasks
- Compatibility - underlying hardware doesn't matter

Problems with Virtualizing

- All eggs in one basket
- Loose some performance - not good for high performance applications
- Licensing considerations
- Virtual Machine sprawl - too easy to create new servers
- Performance issues with one VM can affect others
- Adds complexity
- Support issues - vendors often don't allow it
- Often viewed as a "free ride" even though it does cost

Types of Virtualization

- Server virtualization
  - Provides platform to run OS
  - VMware ESX, Virtual Box, Parallels
- Hardware assisted
  - Xen, MS Virtual PC, Virtual Box
- Paravirtualization
  - Modified OS needed
  - Sun's Logical Domains, Win4Lin, IBM LPAR etc
- Container virtualization
  - Virtualized on OS level
  - FreeBSD jails, Solaris Zones, Linux VServer

Hypervisor

- AKA Virtual Machine Monitor (VMM)
- Provides a layer to run virtual machines
- Type 1: Bare metal
  - Runs on hardware directly, then guest OS above that
  - ESX, Citrix XenServer, KVM, Hyper-V etc
- Type 2: Hosted
  - Runs on an existing OS
  - VMware Server, MS Virtual PC, Sun Virtual Box etc

Virtual Appliance

- Prebuilt and configured virtual machine
- Usually hosts a single application
- Black box delivery of applications
- Often has a web interface to the application to reduce complexity

Live Migration

- Ability to move a virtual machine from one server to another with no downtime
- VMware ESX VMotion, Hyper-V Live Migration (not really live), OpenVZ checkpointing, Xen and KVM live migration
- Requires shared storage
- Often takes a snapshot of the VM and replays the changes in new location
- Allows maintenance of underlying hardware without outage
- Often requires a management server

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