



Red Hat and Xen virtualisation

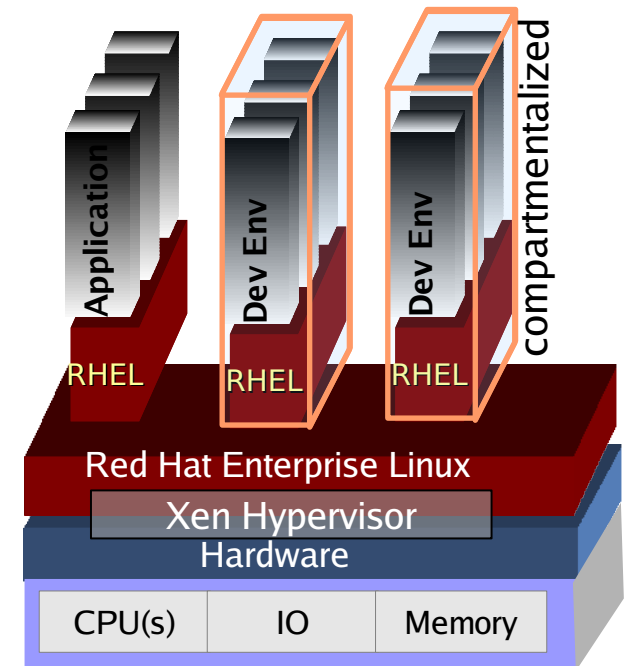
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What is Virtualization?

- Multiplex one machine into different “*Virtual Machines*” VMs; allows running different isolated guest Operating Systems with different applications on same physical hardware.
- Allows a “*Guest*” OS to run under control of a supervising master program that is called:

“*Hypervisor*” or

“*Virtual Machine Monitor (VMM)*”.
- Hypervisor / VMM Functionality:
 - Virtualizes System Resources
 - Provides Scheduling of host/guests
 - Intra-guest communication



Benefits of virtualization

Reduced cost

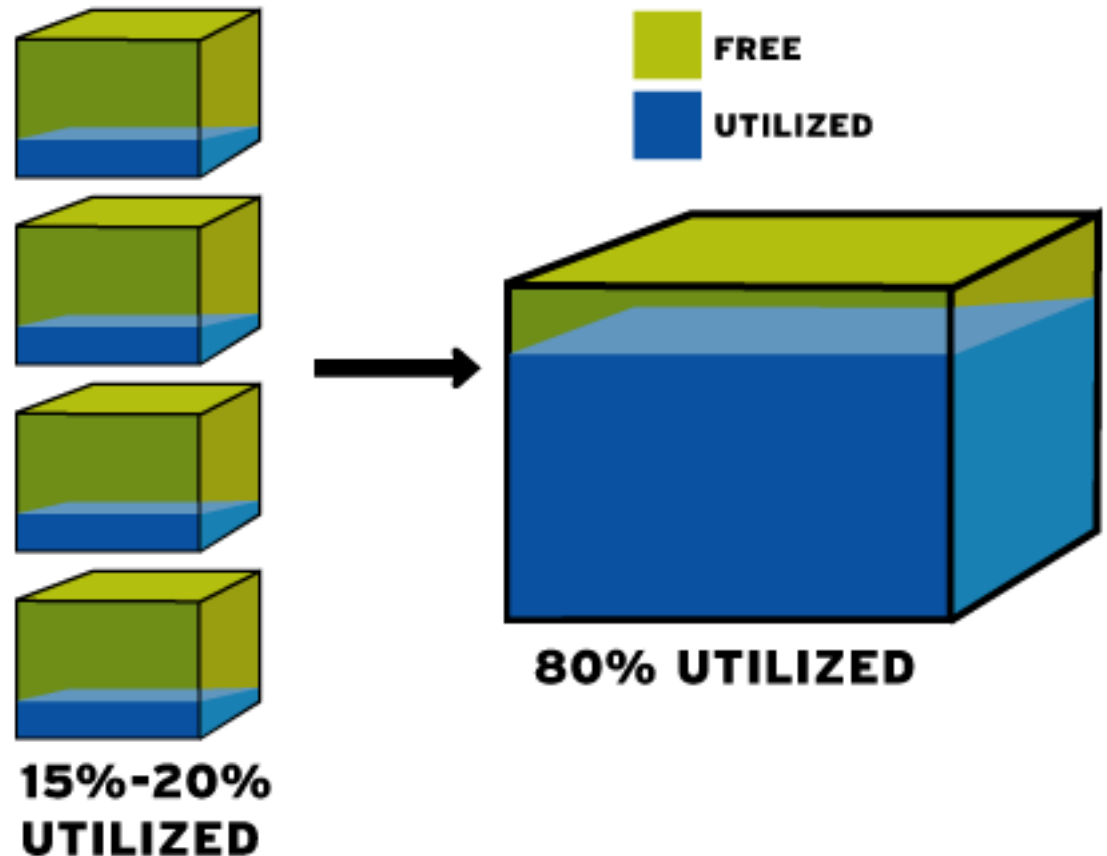
Dramatic lowering of TCO

Security

Separate operating systems on one big machine = separate root users

Agility

Deploy new “machines” in minutes, no tools needed.



New, hot technology?

- Less than 40 years old
- IBM,
- IBM,
- IBM,
- 1990's: VMware
- ...and many more

Virtualization models

Three types of virtualization

1. Full-Virtualization (FV): Transparent virtualization

- VMware
- Xen w/Hardware Support (Intel VT, AMD Pacifica)

2. Single Kernel Image (SKI)

- Light weight virtualization where a shared host operating system spawns multiple user spaces.
- Each virtual operating system must be identical.
- Solaris Zones
- SWsoft Virtuozzo

3. Para-Virtualization (PV)

- IBM VM
- Xen

Para... what?

- Full virtualisation emulates an entire platform
 - Guests are not aware of the virtualised environment
 - Normal operating systems in the guests

- Paravirtualization avoids most of the overhead of full virtualization
- Runs a slightly modified guest OS kernel
 - Uses hypervisor services, to avoid hardware simulation
 - In Xen, services running in domain 0
 - Time, device access, memory management
 - User programs are unmodified from what runs on native Linux.
 - Calls no unvirtualizable instructions, so no rewriting or emulation is required.

- Xen can do full virtualization, with hardware support such as Intel VT

Server virtualisation with Xen

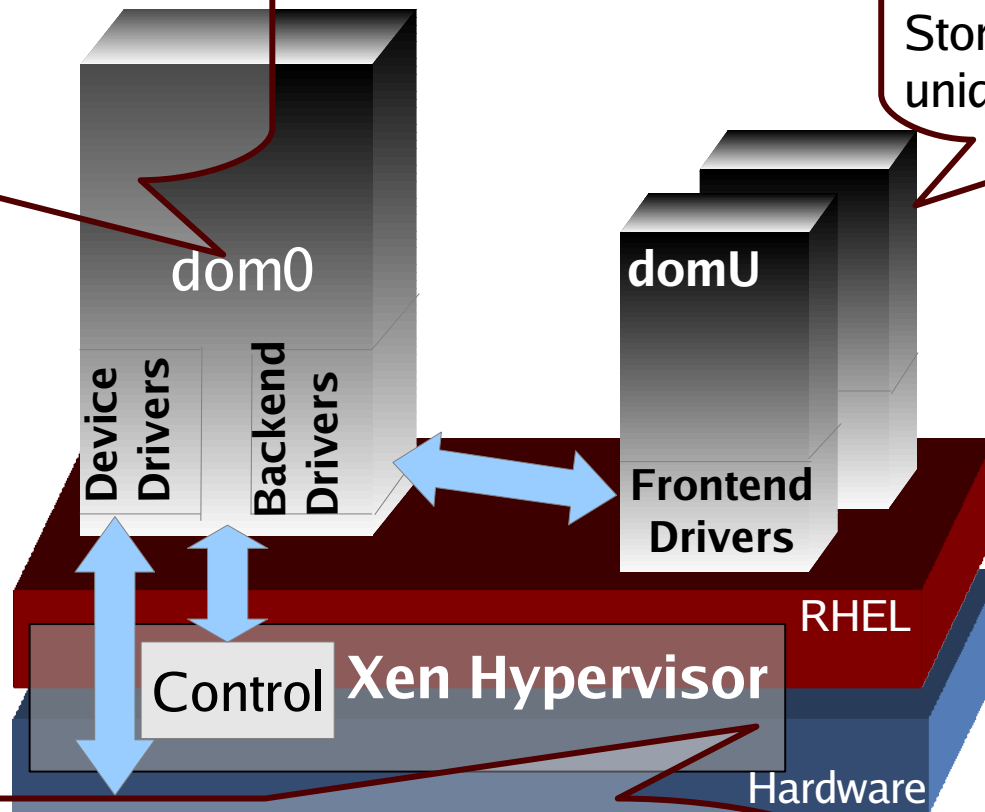
What is Xen, and how does it compare to other virtualization software?

- Hypervisor platform for x86, x86-64, IA64 and PPC64
- Very low overhead
- Open Source (GPL)
- Originally developed by the University of Cambridge
- Full virtualization on
 - x86 and x86-64 with VT or Pacifica hardware assisted virtualization
 - PPC64 with HV enabled
- Paravirtualized on x86, x86-64 and IA64

redhat **Xen Architecture**

Domain 0 – Privileged Domain, the host. Provides hardware support (backend drivers) interfaces for guests control and management tools

Unprivileged Domain: The guest or the Virtual Machine. CPU, Memory, Storage appears to be unique to the guest.



Xen Hypervisor provides IRQ routing, Scheduling, memory management, and inter-domains communications. The Hypervisor with the Dom0 Device Drivers provide transparent sharing of resources. It also enforces strict resource limitations (example: RAM).



Virtualization with Red Hat

*Red Hat integrates **everything** necessary for complete virtualization.*

1. Server/operating system virtualization

- Xen 3.x (integrated into kernel and OS platform)

2. Storage virtualization: Global data

- Red Hat Global File System/CLVM
- Several guests can share the same file system, even for /

3. System management, resource management, provisioning

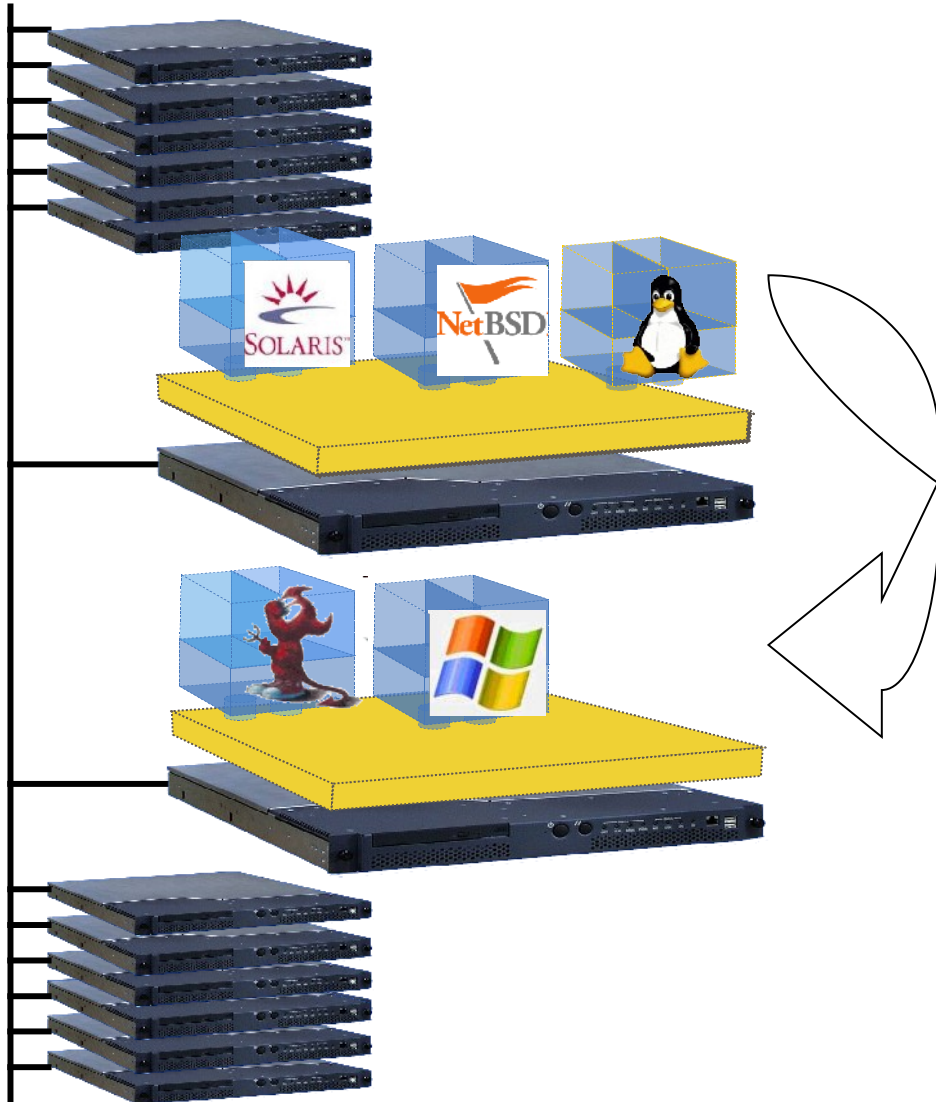
- Virtual Machine Manager (GUI)
- Libvirt (API for heterogenous environments)
- Red Hat Network

4. Application environment consistency with non-virtualized environments

- Only kernel code (drivers) can see the difference

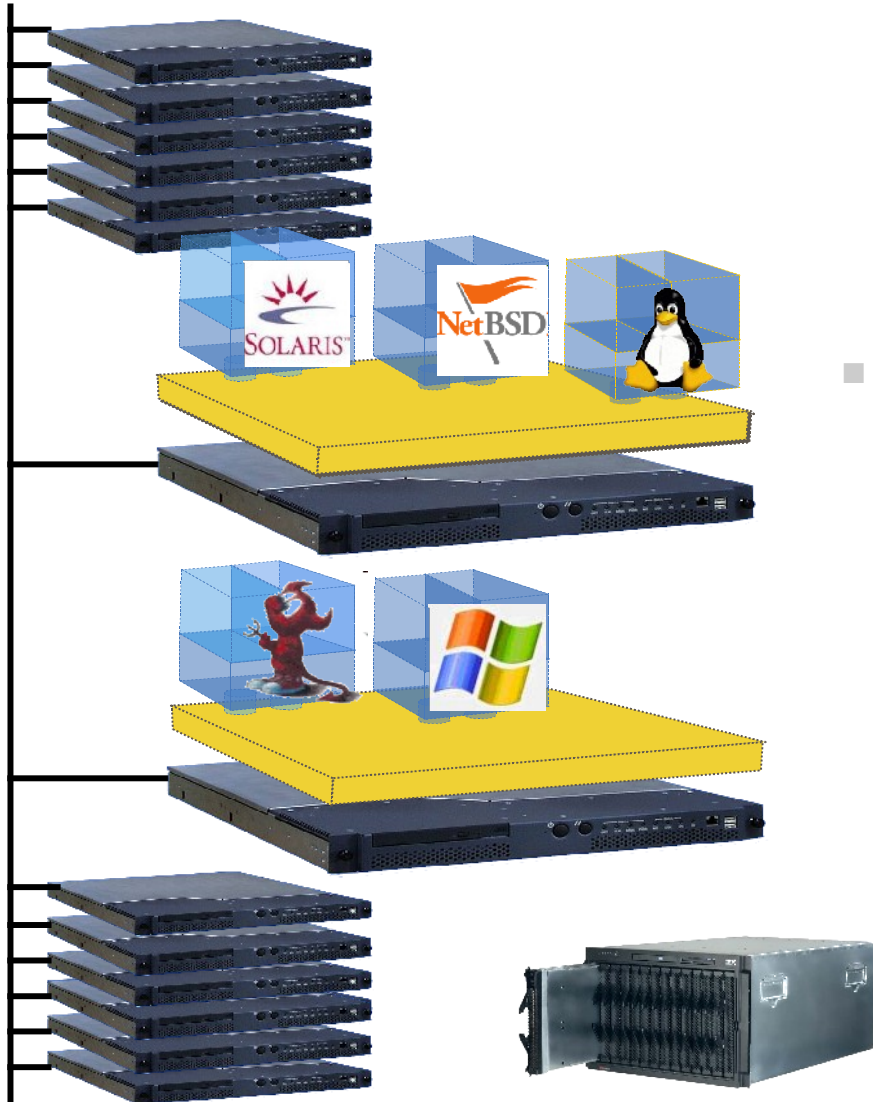
Live migration

-What is it good for?



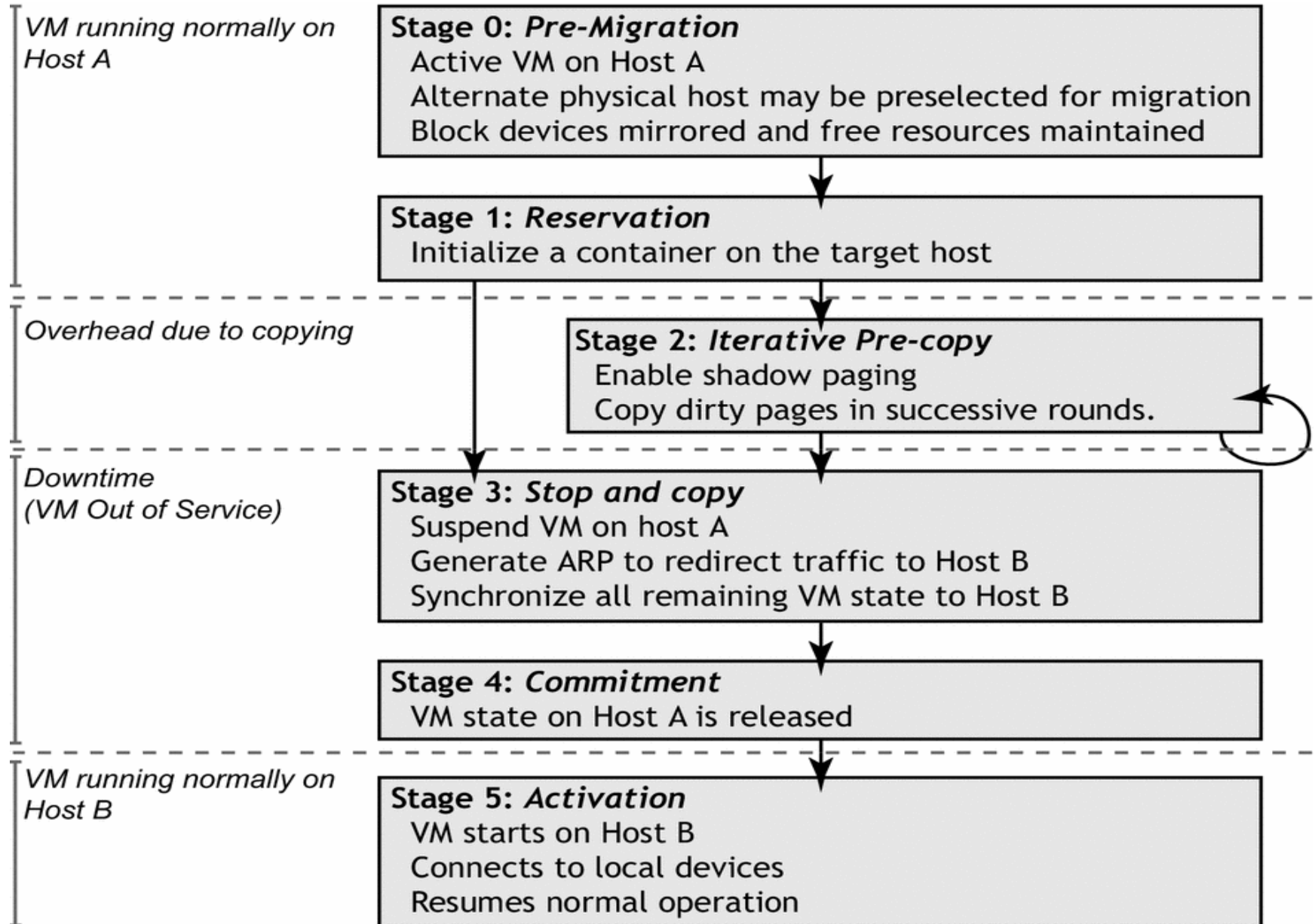
- VM relocation enables:
 - High-availability
 - Machine maintenance
 - Load balancing
 - Statistical multiplexing gain

Live migration: Assumptions

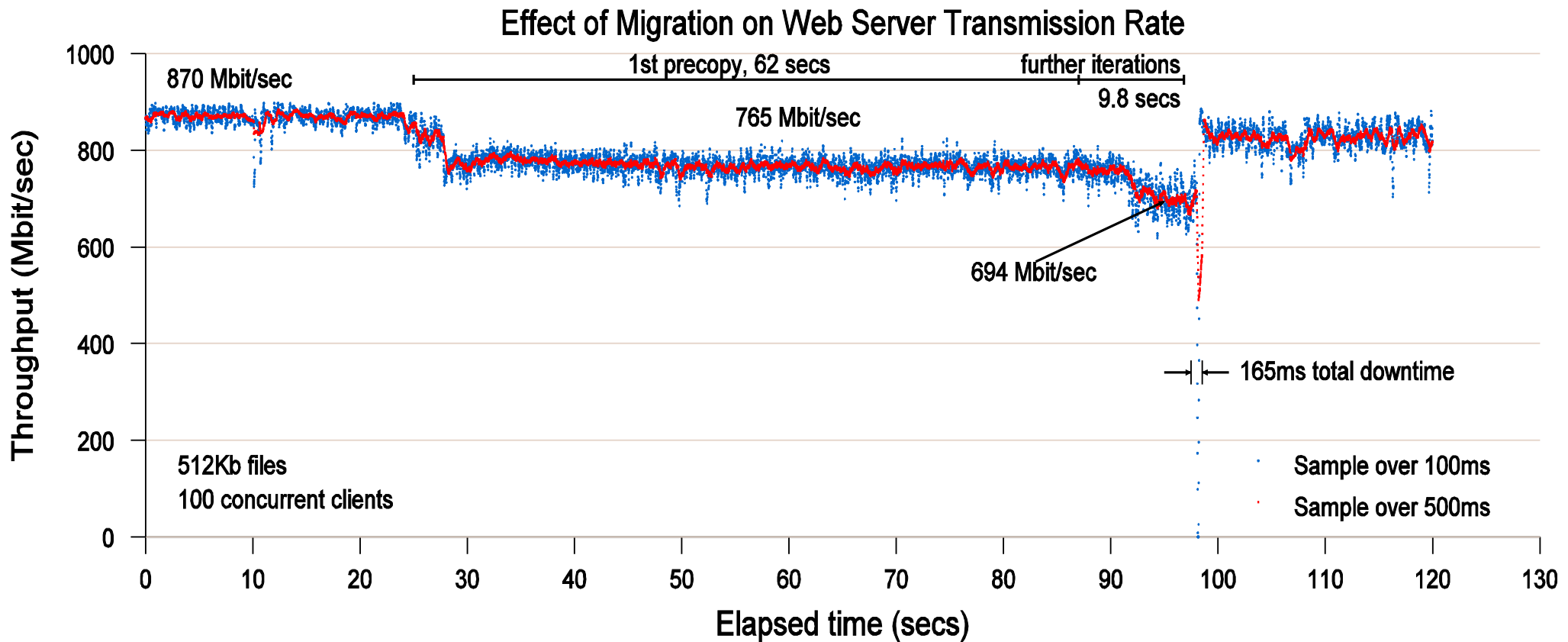


- Networked storage
 - NAS: NFS, CIFS
 - SAN: Fibre Channel
 - iSCSI, network block dev
 - drdb network RAID
- Good connectivity
 - common L2 network
 - L3 re-routeing

Live migration Life Cycle

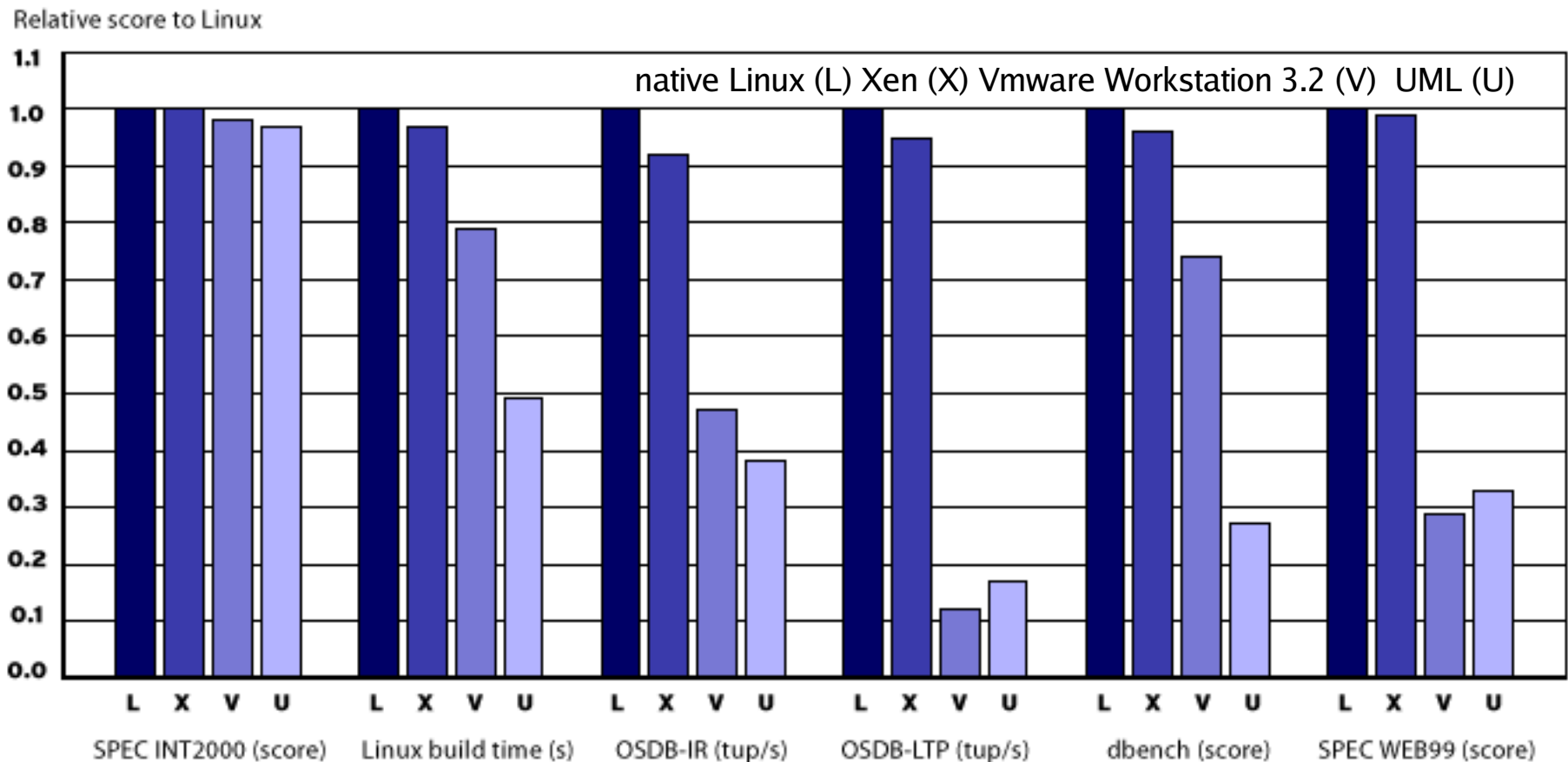


Web Server Relocation



Xen performance

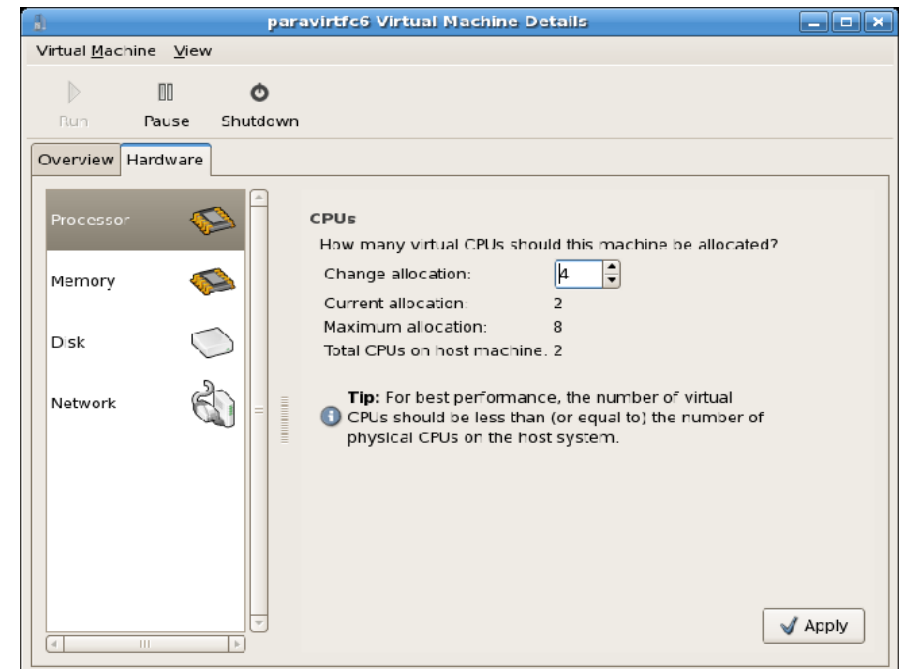
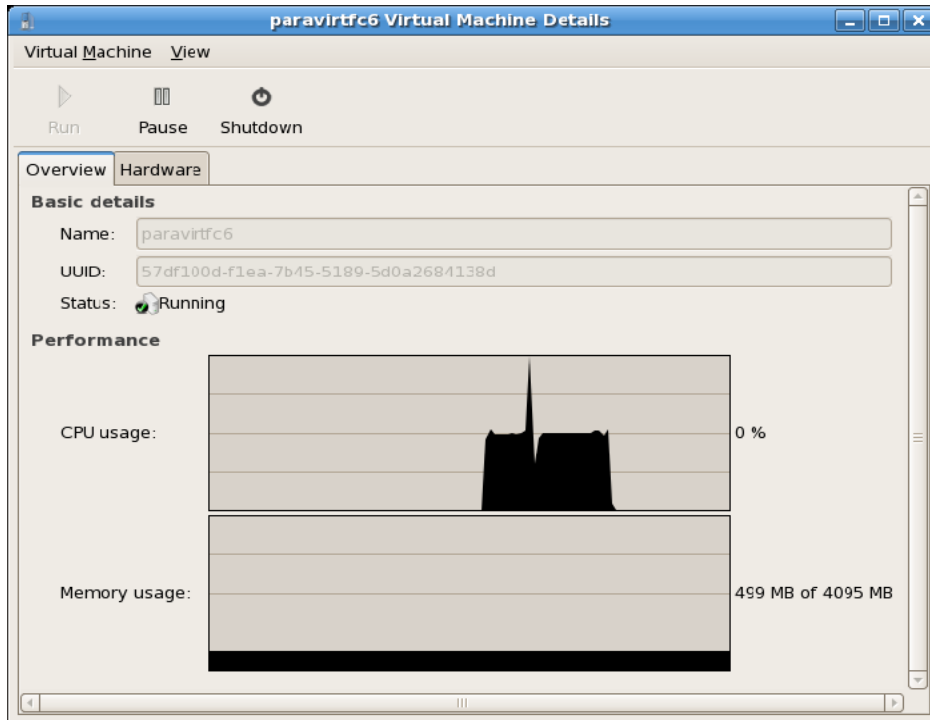
- Outperforms other virtualization technologies.
- Provides very close to native performance for paravirtualized environments.



Where do I start?

- Get Fedora Core 6 now!
 - <http://fedoraproject.org/>
 - ...or Bittorrent
- Read the instructions on <http://www.fedoraproject.org/wiki//Tools/Xen>
 - Install Base -> Xen group
 - Install Xen kernel
 - Configure network, etc
 - Run virt-manager

Gnome Virtualisation Manager



Summary

- Xen is a paravirtualizing hypervisor system.
- Xen supports Full Virtualization with appropriate CPUs.
- Common use cases: consolidation, security, management, testing.
- Xen will be supported in RHEL 5 (late this winter)
- Xen is in Fedora Core 5/6 NOW.

