Server Virtualization

CS526: Advanced Internet and Web Systems
Project Presentation

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Introduction

Objectives:

- Test three of the more popular server virtualization methods available on Linux: KVM, VMware Server, Xen
- Evaluate performance
  - CPU
  - File I/O
  - Network I/O
  - Web server: static and dynamic
- Evaluate installation, use, and stability

Introduction: KVM

Kernel Virtual Machine built into Linux kernel

Standard in kernel since 2.6.20

Works with QEMU front end

Runs on CPUs with hardware support for virtualization

- Intel VT (Vanderpool)
- AMD-V (Pacifica)

Easy to install and use, but still experimental

Introduction: VMWare Server

Proprietary, but free (no cost), registration required

Proprietary code doesn't keep up with open source kernel/browser
Will not run on 2.6.29 kernel and plugin crashes on latest Firefox

Easy management through browser interface

Uses hardware virtualization on CPU if available
Stable, easy to install and uninstall

Introduction: Xen

Open source from University of Cambridge, Citrix since 2007

Popular for VPS hosting (Slicehost, Linode, etc.)

- Xen Hypervisor
- Dom0 System
- DomU Systems

Runs on Linux, NetBSD Kernels in Dom0

Uses hardware virtualization on CPU if available
Otherwise, DomU systems must be ported to Xen architecture

Steeper learning curve, uses xm command for management:
xm list, xm create, xm destroy, etc.

Performance Evaluation

Host system:

- AMD64 3.0GHz quad core
- 8 GB RAM
- 100 Mb/s network

Guest systems:

- 1 core, 3.0GHz
- 512 MB RAM
- 5 GB disk
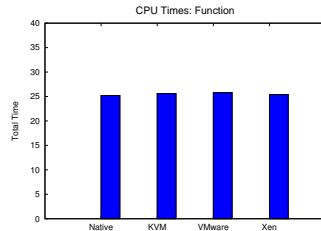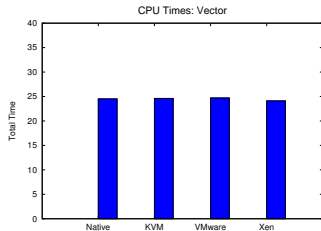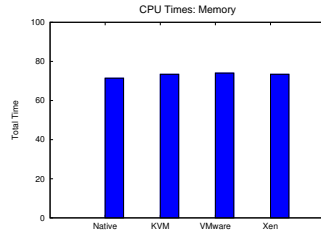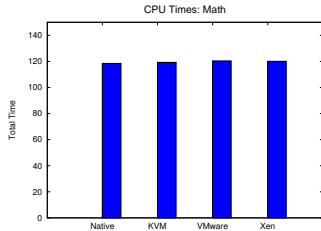- Full network speed, bridged

Performance Evaluation

Tests:

- Raw CPU
    - 32-bit int, 64-bit int, float, double operations
    - math, memory, arrays, function calls
- Disk Read/Write
- Network
- Web server testing with ab
    - small static file
    - large static file
    - small dynamic (cgi environment)
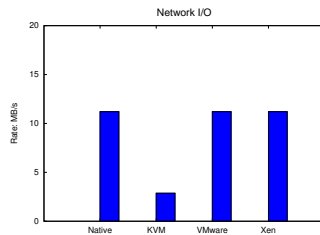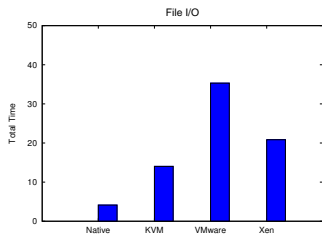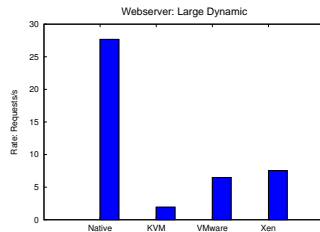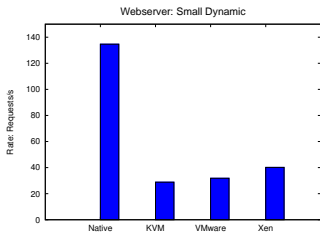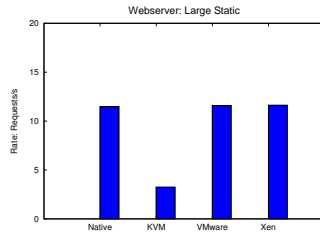   - large dynamic (cgi maze generator)
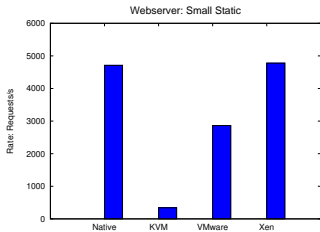
CPU Performance
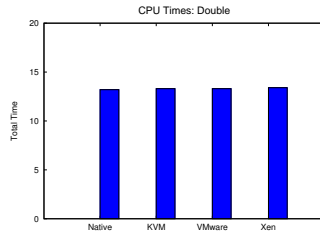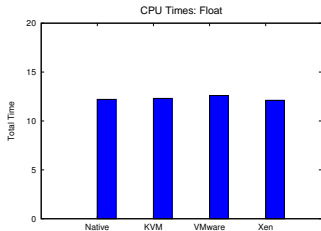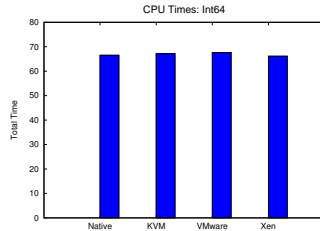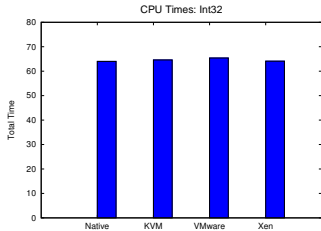
CPU Performance

File and Network Performance

Webserver Performance

Conclusions

All three have high level CPU performance

All three have worse than native disk performance

KVM is not ready yet

VMware Server is easy to install and use, but proprietary

Xen is harder to install and learn, but has best performance

Best Usage (my opinion):

- VMware — quick server setup and experimentation
- Xen — Stable, long-term server usage