MED 0115
Optimizing Citrix Presentation Server with VMware ESX Server
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Agenda

- Citrix and VMware
- Citrix Presentation Server
- VMware VI 3.0 and CPS 4.0
- Conclusion
Citrix Systems Overview

- Leader in Application Delivery solutions
- NASDAQ 100 and S&P 500 company (CTXS)
- $909 million in 2005 revenue (25% growth)
  - ~50% revenue from outside of No. America
- Microsoft “ISV of the Year” winner (2003, 2005)
- 3,400+ employees in 35 countries
- 6,200 partners in over 100 countries
- 180,000 customers
  - 94% customer loyalty
  - 75% of all Internet users
Citrix and VMware®

- Citrix:
  - Uses ESX in development test environment in UK and testing lab in Ft. Lauderdale
  - Supports Citrix Access Suite deployed on VMware products
    - Knowledge Base article: CTX997956
- VMware announced Virtual Desktop Infrastructure (VDI) Alliance on 4/24/06
  - Citrix is a member of the alliance
- VMware is supporter of Citrix Dynamic Desktop Infrastructure announced 10/22
- VMware is a Solution-level member of the Citrix Global Alliance Program
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Brief Product Overview

- Citrix Presentation Server
  - The #1 application virtualization solution for providing any user with secure access to client/server applications from anywhere using any device or connection
Presentation Server Farm Architecture

Citrix ICA Clients

Citrix Presentation Servers

XML Brokers

Data Collector Servers

Web Interface Servers

Data Store

Citrix Presentation Servers

License Server
Traditional CPS Deployment

- Scale Out Server Deployment
- Challenges...
  - Physical server management
  - Logical server management
  - Per server software licensing costs
  - Billing/cost allocation practices
Candidates for Virtualization

- **Citrix Servers:**
  - Web Interface Servers
  - Data Collector Servers
  - License Servers
  - Data Store Servers
  - Presentation Servers
Single Server Scalability (SSS)

- What Citrix advises for a native environment
  - How many users can a server running Presentation Server support?
    - Power of the server, the environment in which the server is installed, applications running on the server, way users employ those applications
  - The answer to this question can be found by:
    - Creating a test environment that mimics the production
    - Replicating user actions performed on the servers
    - Measuring to see when and where the bottleneck occurs
Impacts to Server Scalability

- Configuring the Server
  - Business applications
    - Applications to be tested
  - Anti-virus software
  - Remote deployment software
  - Agents (SNMP, SMS, Tivoli)

- Configuring the Client
  - Client printers
  - Client drives
  - Multimedia / Audio
  - Session color depth and resolution
  - Security Settings
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Before Virtualizing Servers

- Understand why you are looking for a virtualization solution
  - Improving hardware server utilization
  - Improving management of server environment

- Virtualization is not a performance panacea, and results will vary widely across environments

- Virtualization Does:
  - Make growth easier to manage and afford.
  - Facilitate rapid system deployment, security through virtual machine isolation and mirroring,
  - Provide powerful system administration tools, and cost reduction from hardware consolidation to Citrix.
A Bit Of A Puzzle

- Things we know:
  - Customers – and Citrix – are successfully deploying the combination of CPS and ESX
  - Customer performance varies, as CPS scalability varies by use case
- Things we don’t know yet:
  - Recommendations on sizing newer 64-bit environments
- Things we know we don’t know:
  - What is the magic formula for sizing servers
Hosted Versus Bare-Metal

- ESX is a better fit to host Presentation Servers
  - ESX Server has better management tools and more third party application support, a must for any production environment
  - ESX Server’s direct hardware access allows for better performance
  - Better scalability (less overhead)
  - Better memory sharing and memory allocation for virtual machines

Source: Ron Oglesby, RapidApp, Used with Permission
ESX Performance

- The overhead of a virtual machine depends heavily on the applications running in the Citrix client.
  - To determine the performance of virtual machines, test them in the environment in which they are deployed.
  - The performance of a single virtual machine can be lower than that of a single physical machine, due to virtual machine overhead.
  - ESX Server is likely to better utilize resources and the corresponding number of sustainable user connections only on four-way and above server class machines.
  - When you configure your servers to maximize the number of user connections per physical server, in most cases it is best to create multiple, uniprocessor virtual machines.
  - Distribute the user count that would have been expected from a two-way machine across two uniprocessor virtual machines.
    - Run N uniprocessor Citrix VMs (N = #CPUs) no matter how many CPUs.
### Decision Matrix for CPS + ESX

- **Hardware**
  - Single, Dual or Quad Socket System
    - For ancillary servers, single socket system may suffice
    - Farm considerations also apply
      - Data Store: CPU power affects some actions
      - Data Collector: Memory and CPU usage sensitive to farm size
  - For actual presentation servers, dual or quad socket systems recommended
    - With expected increase in processing cores, the right answer will be an ever-more complex choice – most likely based on your actual workload

- **Software**
  - Kernel Memory and Registry Size Limits
    - If these were hit long before a dual processor server was used up, virtual machines provide a solid solution
  - For 32-bit environments, a case can be made for ESX + CPS
    - 4xCPU servers are obvious target for virtualization because of memory address limitations in 32-bit Windows Server 2003
Standard Citrix Advice:
- For 32-bit environments, dual-processor servers give the best performance.
- Diminishing returns beyond two CPUs:
  - System generally runs out of kernel memory.
  - Non-linear scalability.

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<tr>
<td>Single</td>
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<tr>
<td>Dual</td>
<td>112%</td>
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<tr>
<td>Quad</td>
<td>18%</td>
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Virtualize for Scalability

- Citrix specific Performance improvements in VI 3.0
  - Automatic sizing of page table caches
    (workload=terminalServices option no longer needed)
  - Improved latencies on MMU operations (page faults, context switches)

- Performance Tests run by VMware labs
  - Showcase the performance improvements in VI 3.0
  - Demonstrate user scalability using multiple virtual machines
  - Used Citrix Server Test Kit
  - Standard Microsoft Word only user as defined by the kit

- In real world, the number of users supported will depend on the applications used and the activity levels of users.
Test Configuration

Client:
- 2.2 GHz 2-way
- 4GB RAM

Network switch

Server:
- 2.2 GHz dual-core 4-way
- 32 GB RAM
- 4x 150GB 15K RPM SCSI disks
- 1 Gbps NIC

Guest:
- CPU: 1 virtual CPU
- RAM: 3.5GB
- Citrix software: Citrix Presentation Server Version 4
Test Methodology

- Number of Users that can be supported at 80% CPU utilization
- Success Criteria:
  - the Output logs from all the users include start and end iteration record
  - Meets CPU utilization goal
- Workload definition:
  - Users log on in a regulated manner
  - Open a word document and type for 11-15 minutes and then pause for a short time
  - Run 80 iterations
  - The test was stopped after a steady-state period of 30 minutes had elapsed after the last user had logged in.
Scalability: VMware ESX Server 2.5 vs. 3.0
Scalability with Multiple Virtual Machines

![Graph showing scalability with multiple virtual machines.

- **Number of VMs**:
  - 1
  - 2
  - 4
  - 6
  - 8

- **Number of Users**:
  - 10
  - 20
  - 30
  - 40
  - 50
  - 60
  - 70
  - 80

- **ESX Server CPU Utilization (%)**:
  - 0%
  - 10%
  - 20%
  - 30%
  - 40%
  - 50%
  - 60%
  - 70%
  - 80%
  - 90%

Legend:
- **Number running**
- **CPU utilization (total)**
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Other Things You Need to Know

- Process “tuning” or prioritization apps can help, but at the cost of app response time.
  - Look at user experience from end-point
- Set workload to terminal services (ESX versions older than VI 3.0)
  - Allocates more memory to the virtualization components and keeps more memory reserved for the virtual machine
- Disable COM port and Visual Effects
- Processor Affinity can help sometimes
  - When using affinity you must carefully balance and monitor workloads in order to avoid overcommitting some processors while other processors remain underutilized.

Source: Ron Oglesby, RapidApp, Used with Permission
Citrix + VMware Benefits

- Citrix:
  - Control of the application management and delivery infrastructure

- VMware:
  - Control of the server infrastructure
    - Streamline server provisioning and management
    - Decrease hardware costs – potentially reducing the number of servers
    - Increased Server utilization
Additional Sessions

- MED0096 - Citrix and VMware: A Range of Customer Solutions, Paul Hahn, Citrix
- TAC9728 - Citrix and VMware: How these technologies work together, Thomas Huber, VMware
- MED9518 - Virtual Desktop Infrastructure: How to use VMware ESX Server to Consolidate Desktops, Russel Wilkinson, VMware
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