



## Best Practices for Virtualised SharePoint

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# Agenda

- Why Virtualise?
- Hardware
- Licensing
- Storage
- Virtualisation Technologies
- SharePoint Roles
- Backup
- Development and Testing Environments
- Management Tools



# Introduction

- Virtualisation is huge
  - 95.7% virtualise SharePoint development environments
  - 50% virtualise their production environment
- Performance is competitive
  - 7.2% less throughput on 8GB virtual vs 32GB physical Web Front Ends
  - 4.4% slower page response times

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# Why Virtualise?

- Consolidate hardware
- Reduce power consumption
- Reduce cooling costs
- Reduce environmental impact
- Increase server utilisation
- Improve development and testing environment lifecycle
- Increase development environment flexibility with snapshots

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# Hardware

- Use the System Centre Capacity Planner
- Assessment Planning (MAP) Toolkit for Hyper-V
- Virtual Machine hosts should be 64 bit
  - Memory and CPU benefits; Guests benefit from being x64 too
- RAM is the biggest factor for guest performance
- Use SAN attached storage
- Use latest operating system on guests
- Understand 'support' and ensure software is certified via Windows Server Virtualisation Validation Program (SVVP)

<http://www.windowsservercatalog.com/svvp.aspx?svvppage=svvpwizard.htm>

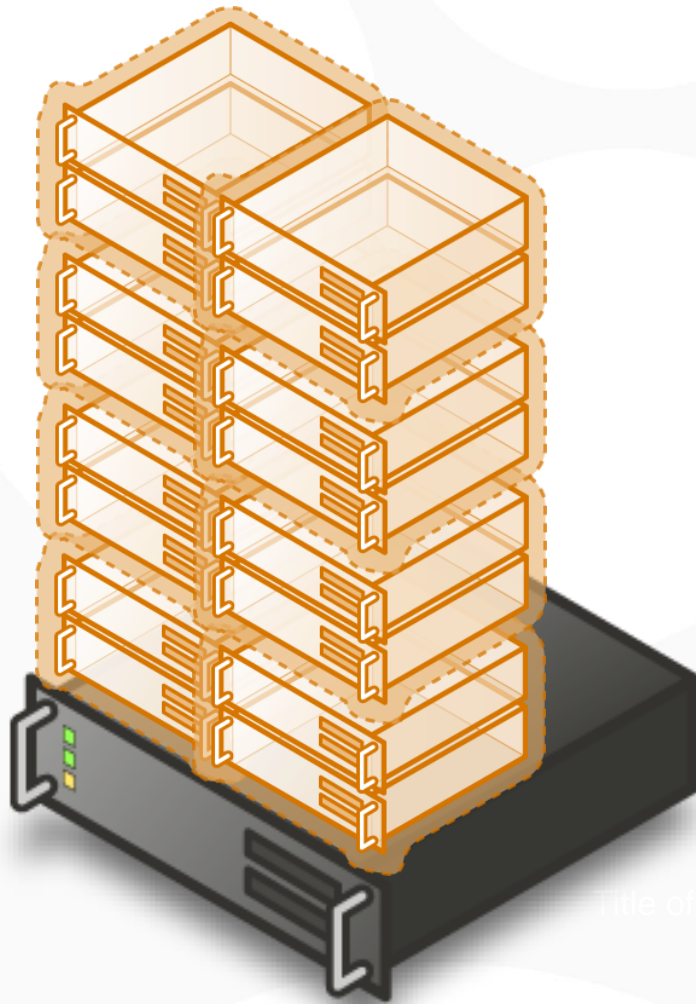


# Licensing

- Hyper V Server (host free only)
- Windows Standard Server (host + 1 VMs)
- Windows Enterprise Server (host + 4 VMs)
- Windows Datacenter Server (unlimited)
- Windows Server Virtualisation Calculator
  - <http://www.microsoft.com/Windowsserver2008/en/us/hyperv-calculators.aspx>

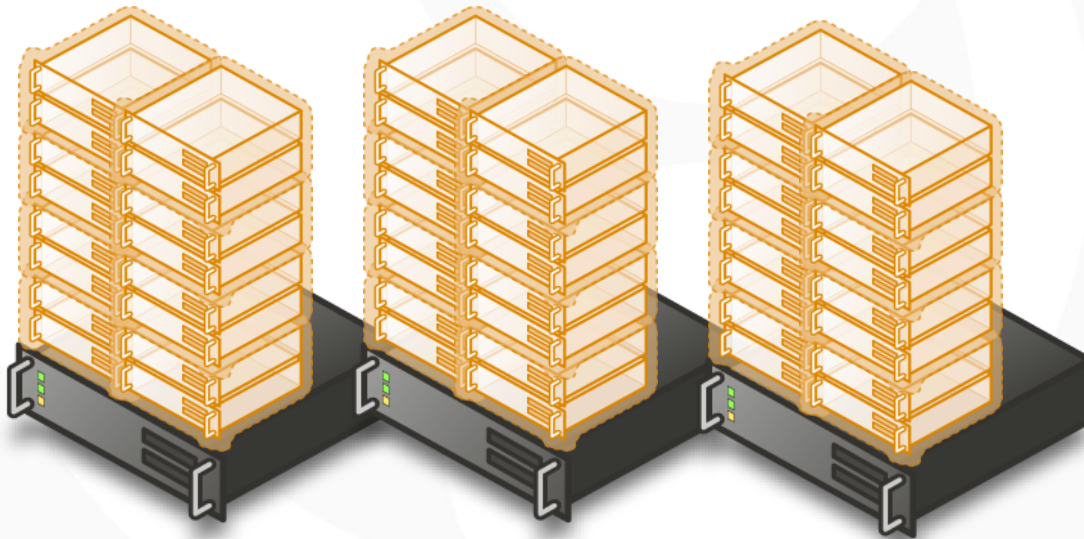
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# Virtualisation Licensing



- By assigning a copy of WS 2008 Enterprise:
  - 4 free **running** Instances
  - Cumulative...
- The same process with WS 2008 Datacenter:
  - Unlimited running instances
- Virtualisation Agnostic

# Virtualisation Licensing Scenario



- 3 Node WS2008 Hyper-V Cluster (with Shared Storage)
- Min Consolidation of 16:1
- Physical Boxes with 2 CPUs (Quad/6 Core)
- High Availability/Migration built in.
- **Future scale-up growth at no cost**

## Each Physical Node - Enterprise (Retail Pricing):

4\* Enterprise License = 16 free running instances  
= 4\*\$2334 = \$9336 per physical node

## Each Physical Node - Datacentre (Retail Pricing):

2\* Datacentre License (per CPU) = unlimited free  
= 2\*\$2381 = \$4762 per physical node

USD pricing

[http://www.microsoft.com/windowsserver2003/howtobuy/licensing/calc\\_2.htm](http://www.microsoft.com/windowsserver2003/howtobuy/licensing/calc_2.htm)

**Overall Solution:**  
Enterprise = \$28008  
Datacentre = \$14286



# Planning

- Partitioning
  - Which will be on SAN, pass through disk?
- Farm Topology
  - Split roles across multiple hosts?
- Disaster Recovery
  - What happens if a host fails?
- High Availability
  - Use virtual infrastructure as fail over for physical?

# Storage

- Virtual hard disks are large
  - Deduplication
  - Linked clones
  - Virtual Templates
- RAID SAN storage for performance
- Or dedicated pass through disks for isolation
  - Specify performance requirements for disks
- Archive testing environments
  - Don't just delete them!

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# Virtualisation Technologies

- A lot of variety out there
- Bare Metal Hypervisor
  - Windows Server 2008 Hyper-V
  - VMWare ESX Server
- Hosted Hypervisors
  - Virtual Server 2005 R2
  - VMWare Server
  - Virtual PC

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# Hyper-V Server 2008



# Hyper-V Server 2008 R2

```
C:\Windows\system32\cmd.exe

=====
Hyper-V Configuration
=====

1) Domain/Workgroup:           Workgroup:  WORKGROUP
2) Computer Name:             MATTHUS7
3) Network Settings
4) Add Local Administrator

5) Windows Update Settings:   Manual
6) Download and Install Updates
7) Remote Desktop:           Enabled (more secure clients only)
8) Failover Clustering Role   Enabled
9) Configure Remote Management

10) Regional and Language Options
11) Date and Time
12) Do not display this menu at login

13) Log Off User
14) Restart Server
15) Shut Down Server
16) Exit to Command Line

Enter number to select an option: _
```

# Windows Server 2008 R2 – Hyper-V

- Live Migration
- Cluster Shared Volumes with I/O Fault Tolerance
- 64 Logical Processor (Core) Support
- Core Parking
- Processor Compatibility Mode
- Hot Add/Remove Storage
- Second Level Address Translation
  - Leveraging new Virtualisation technology built into next generation of Intel (EPT) / AMD (NPT) chips
- Boot from VHD
- Networking Improvements
  - Jumbo Frames & TCP Offload
- Virtualised I/O



# SharePoint Roles

- Good Virtualisation Candidates:
  - Web server role
  - Query role
  - Other application roles
- With some planning:
  - Index role
  - Database role

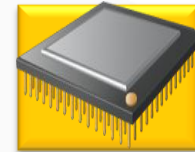
MOSS Performance and capacity requirements for Hyper-V

<http://technet.microsoft.com/en-us/library/dd277865.aspx>



# Web Front End

- Responsible for rendering of content with low amount of disk activity
- Multiple web role servers are common for redundancy and scalability
- Best Practices
  - Be sure to keep all components, applications, and patch levels the same
  - Network Load Balancing (NLB)
    - Hardware -> Offload NLB to dedicated resources
    - Software -> CPU and Network usage on WFE
  - For minimum availability split your load balanced virtual web servers over two physical hosts



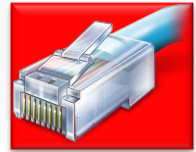
CPU



RAM



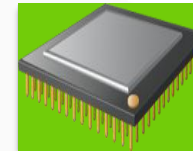
DISK



NETWORK

# Query Server

- Process search queries
- Requires propagated copy of the index
  - 10%- 30% of total size of documents indexed
- Best Practice
  - Large Indexes – Prefer dedicated physical LUN on SAN over dynamic expanding virtual hard disk
  - Don't put your query and index servers on the same underlying physical disk
- Combine or split Web/Query role?
  - It depends on your environment.
  - Web and Query performance requirements



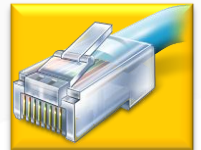
CPU



RAM



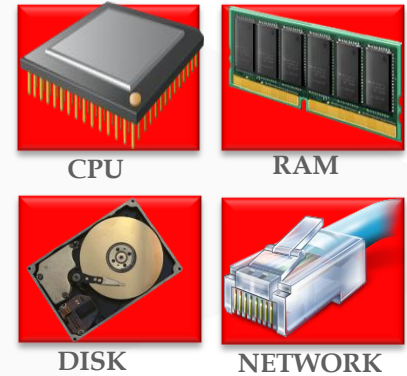
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NETWORK

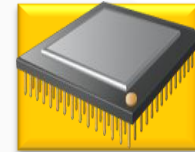
# Indexer

- Memory, CPU, Disk I/O and network intensive
- Best Practices
  - Give most amount of RAM out of front ends
  - Potentially keep as physical machine
  - Use Index server to be dedicated crawl server. Avoids hop.
  - Prefer physical LUN on SAN to virtual hard disk



# Other Roles

- Excel Services, document conversions services are good candidates for virtualisation
- Additional servers can simply be added into the farm
- No additional hardware investment required



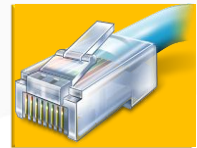
CPU



RAM



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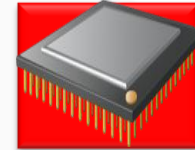
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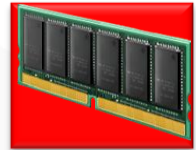


# Database Server

- SQL Server 2005/ 2008 virtualisation fully supported
- Memory, CPU, Disk I/O and network intensive
- Assess first using Microsoft Assessment and Planning Toolkit ([www.microsoft.com/map](http://www.microsoft.com/map)).
- SQL Alias flexibility
- Argument for Physical:
  - SQL Server is already a consolidation layer
  - Disk I/O activity
  - Performance, performance, performance!
  - Longer response times impacts ALL downstream roles in a SharePoint farm



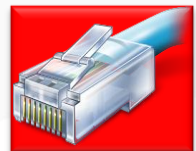
CPU



RAM



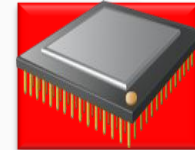
DISK



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# Database Server

- If you decide to virtualise database layer:
  - Assign as much RAM and CPU as possible
  - Offload the Disk I/O from the virtual machines
    - Prefer pass through disks over virtual disks
  - **SQL Clustering : Either virtualise the entire database layer or keep all physical.** Do not virtualise the passive node. Not recommended.



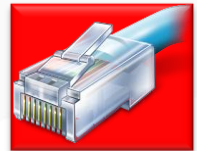
CPU



RAM



DISK



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# Backup

- Virtual Machine Hard Disk Backup
- Databases
  - Content Databases are highest priority
  - Use SQL Maintenance Plans
- Backup Search Index and Database together
  - Use built in tools (STSADM or Central Admin)
- Snapshots/Undo Disks
  - Only on your development environments



# Development Environments

- Developer Workstations
  - Virtual PC/VMWare Workstation
  - Plenty of RAM
- Use Sysprep to create re-usable VMs
  - SQL does not like machine renames
- SharePoint Farm Configuration Scripts
  - Grab them from Ben Curry - Mindsharp
- Snapshots/Undo Disks



# Testing Environments

- Mirror production topology
  - To give a valid test of deployment/solution
- Can be archived after development has finished
  - But should be kept up to date
- Disaster Recovery testing with P2V/V2V
  - Can be used to simulate failure
- Restore backups in test environment to recover individual items

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# Management Tools

- System Centre Virtual Machine Manager (VMM)
  - Multi-Vendor Virtualisation Platform Support
  - Performance and Resource Optimisation (PRO)
  - Self Service, Delegation, P2V
- VMWare vCenter
  - Virtual Machine templates
  - Provisioning
  - Monitoring of multiple hosts
  - Physical to Virtual conversions



**Virtual Machines**

Host Groups

- Overview
- All Hosts
  - ptsoffline

**Hosts**

**All Hosts** Virtual Machines (22)

Search [None]

Name	Status	Job Status	Host	Owner	CPU Av...
Contoso - Vista SP1	Running		ptsoffline	FABRIKAM\Domai...	3 %
Contoso - XP SP3	Running		ptsoffline	FABRIKAM\Domai...	0 %
Contoso - ADRMS-DB	Stopped		ptsoffline	FABRIKAM\Domai...	0 %
Contoso - ADRMS-SRV	Stopped		ptsoffline	FABRIKAM\Domai...	0 %
Contoso - DC	Stopped		ptsoffline	FABRIKAM\Domai...	0 %
Contoso - Node 1	Stopped		ptsoffline	FABRIKAM\Domai...	0 %
Contoso - Node 2	Stopped		ptsoffline	FABRIKAM\Domai...	0 %
Contoso - Node 3	Stopped		ptsoffline	FABRIKAM\Domai...	0 %
Contoso - SC	Stopped		ptsoffline	FABRIKAM\Domai...	0 %
Contoso - SCCMR2	Stopped		ptsoffline	Unknown	0 %
Contoso - SCDPM	Stopped		ptsoffline	Unknown	0 %
Contoso - SoftGrid	Stopped		ptsoffline	FABRIKAM\Domai...	0 %
Contoso - TS	Stopped		ptsoffline	FABRIKAM\Domai...	0 %
Demo Showcase - SRV01	Stopped		ptsoffline	Unknown	0 %

**Virtual Machines**

**Actions**

Virtual Machine Manager

- New virtual machine
- Convert physical server
- Convert virtual machine
- Add library server
- Add host
- Add VMware VirtualCenter server
- Help

All Hosts

- New host group
- Properties

Virtual Machine

- Start
- Stop
- Pause
- Save state
- Discard saved state
- Shut down
- Connect to virtual machine
- Migrate
- New checkpoint
- Manage checkpoints
- Disable undo disks
- Repair
- Install virtual guest services
- New template
- Clone

**Filters** Clear

- Status
- Owner
- Operating system
- Added date
- Tag

Hosts

Virtual Machines

Library

Jobs

Administration

**VM Details**

Contoso - XP SP3

Status: Running

Running time: 00:18:11

Memory: 256.00 MB

Processor: (1) 1.00 GHz Pentium III Xeon

Storage: 29.30 GB

Latest job: 100 % complete  
[\(Refresh VM Properties - System Job\)](#)

CPU usage:

**Actions ->**

Summary Networking and Storage Latest Job

- Server Farms
  - Rack 1
    - esx01
    - esx02
    - Messaging Servers
      - Exchange 2000 Server
      - Exchange 5.5 Server
    - Media Servers
      - Windows Media Server
    - Infrastructure
      - DHCP Server
      - Windows 2000 Active Directory
    - Database Servers
      - Oracle 9i RH Linux
      - SQL 2000 Server
    - App Servers
      - Win2003 App Server (SMP)
      - Win2003 App Server (UP)
  - Rack 2
    - esx03
    - Web Servers
      - Apache
        - RH-Apache01
        - RH-Apache02
      - IIS
        - Win2000-IIS01
        - Win2000-IIS02
    - Clients
      - Control Center Server
      - Exchange Client
      - SQL Server Client
      - Windows Media Client

esx02 Up since: 1:42 PM 10/6/2003

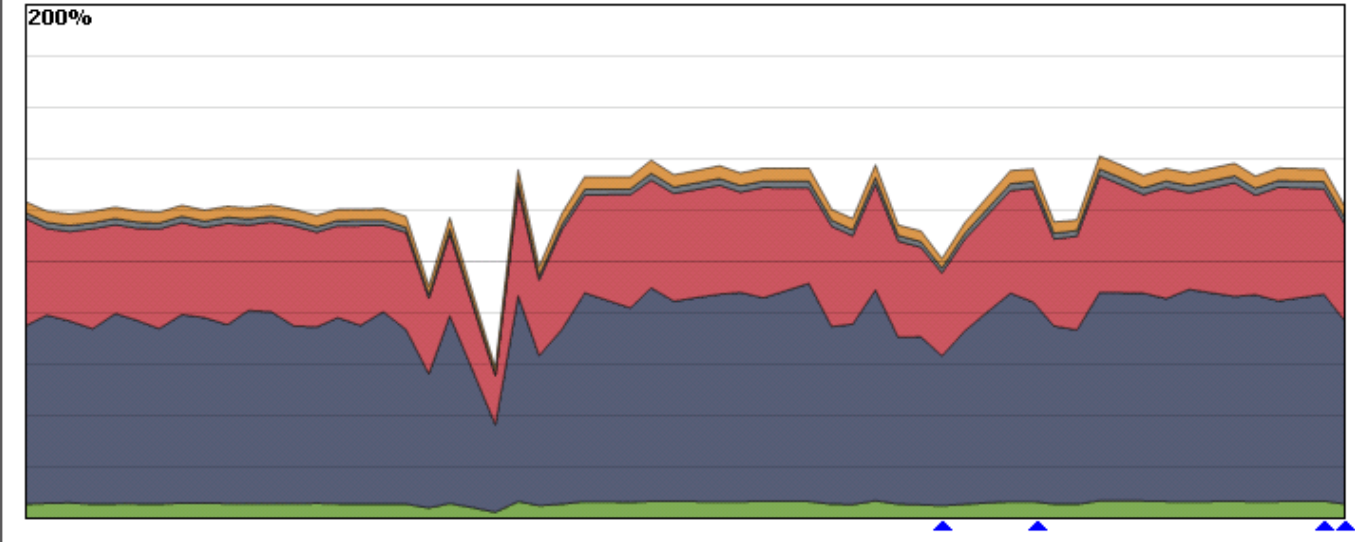
VMware ESX Server 2.0.1 build-5943

Summary Virtual Machines Performance Events Alarms

View chart for:

- CPU
- Memory
- Disk I/O
- Network I/O

CPU Usage by Virtual Machine Range: Past Hour Customize Chart...



Legend		<a href="#">Hide legend</a>
Win2003 App Server (SMP)	70%	
Win2003 App Server (UP)	37%	
Windows Media Server	4%	
Windows 2000 Active Directory	3%	
{Other}	6%	

Last updated: 9:07:51 PM

Connected to localhost (VMware Control Center e.x.p build-5916) as WIN03-CC\administrator

# Recommendations

- Configure same hardware capacity as physical
- Don't take snapshots
- Avoid over-committing virtual CPUs.
- Virtual Networking performance benefits all of the servers in a farm on single physical box
- Memory incl Host
- Use Internet Protocol Version 4 (IPv4) as the network protocol for virtual machines.
- Choose the right storage implementation.

# Conclusion

- Virtualisation adoption is only going to increase
- Make sure you know how to get the most of it
- Use the free planning tools
- Get more information
  - Blogs, Forums, Search, Twitter
  
- Questions?

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# Thanks!

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