

Making Windows Work in the Data Center

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Introduction

- **Many organizations are migrating services running in their data centers to Windows from Unix and Linux.**
- **Windows is a viable option for reliable and cost effective computational systems in the data center. Analyst research and case studies of major corporations that implemented Windows in the data center show that Windows Server can provide better price/performance ratios and lower TCO than comparable Linux and UNIX systems.**
- **This presentation will address the major factors to consider when determining if Windows is right for your data center and your organization.**

Agenda

- **Scalability and performance**
- **Reliability and availability**
- **Security**
- **Costs**
- **Windows vs. Open Source**
- **Windows interoperability**
- **Interoperability with UNIX and Linux**
- **Best practices**

Scalability and Performance

- **Scaling up or out? Depends on the application.**
- **How does Windows scale?**

Version	Max CPUs	Max RAM	Clustering/ load balancing/logical partitions
Windows Server 2003 Standard	4	4GB	No
Windows Server 2003 Standard x64	4	32GB	No
Windows Server 2003 Enterprise	8	32GB	8-node clusters
Windows Server 2003 Enterprise x64	8	1TB	8-node clusters
Windows Server 2003 Datacenter	32	64GB	8-node clusters, load balancing
Windows Server 2003 Datacenter x64	128	1TB	8-node clusters, load balancing, 64-CPU partitions

Scalability and Performance

- **Whether you scale up or out, start by picking the right hardware for the job. Here are the basic requirements to analyze:**
 - I/O and CPU intensity of app
 - Max. CPU scalability of the application
 - Acceptable rate of utilization
 - Spare capacity plans
 - Required level of availability
 - Application quality- homegrown apps typically not as stable as COTS
 - Peak vs. off-peak server demand
 - Number of front-end and back-end application connections
 - Number of infrastructure connections (monitoring, backup, etc.)

Scalability and Performance

- **Keys to right-sizing servers:**
 - **Correctly determining I/O- and CPU- intensity**
 - **Establishing partitioning strategy based on utilization levels:**
 - **Co-locating multiple system instances on a single system (monitoring, reporting, etc.) with adequate spare capacity.**
 - **Isolating system instances with high utilization requirements on servers with room for future scaling (adding CPUs)**

Scalability and Performance

- **CPU scaling isn't a 1:1 ratio; law of diminishing returns applies**
- **Scalability of workload is dependent on CPU-intensity and sharing requirements of the workload**
- **CPU intensive apps include ERP, statistical modeling; CAD; compilers; network/ routing optimizers**
- **Characteristics of CPU intensive apps:**
 - Minimal data sharing between processors
 - Few data locks
 - No legacy system data delivery requirements
- **Determine CPU intensity**

Scalability and Performance

- **How I/O intensive is the workload?**
 - I/O intense workloads not only do not benefit from added CPUs, too many CPUs can degrade performance.
- **I/O intense workloads include file and print servers, LDAP servers, authentication providers, firewalls, Citrix servers.**
- **Characteristics of I/O intensive workloads:**
 - High levels of disk I/O
 - High levels of data locking
 - Large numbers of ad-hoc queries

Scalability and Performance

- VeriTest found that more work was completed in less average elapsed time in Windows Server 2003 than in Red Hat Enterprise Linux AS 3.0

Windows Server 2003	Red Hat Enterprise Linux AS 3.0
280 completed tasks and events	248 completed tasks and events
elapsed time 18:44:14	elapsed time 27:48:05

On average, what percentage of server downtime is attributed to the operating system?

1. 40%
2. 30%
3. 20%

On average, what percentage of server downtime is attributed to the operating system?

The correct answer is C) 20%. Downtime breakdown (no pun intended) is as follows:

20%- hardware

25%- operator error

15%- environment and network issues

20%- operating system

20%- application and database

Source: CIOView TCOnow!

Reliability and Availability

- **CIO View estimate of Windows downtime is 3.04 outages per year, with 30 minutes of downtime per outage, or 93.2 minutes per year, not including hardware or other factors.. Compare this to UNIX, with .81 outages/ year with 37.5 minutes/outage, or 30.37 minutes per year.**
- **VeriTest studies show that Windows Server 2003 had a lower average end-user service loss time compared to Red Hat Enterprise Linux AS 3.0 environment.**
 - **Windows 4:20:19, Red Hat: 4:59:44**
- **MTBF rate differs widely in Windows: Different servers, different applications, admin skill set, and environmental issues.**

Reliability and Availability

- **Practical experience shows that organizations with lower admin and engineering skill sets should stick with running multiple servers at lower utilization. Lack of skilled staff combined with complexities of running clustered servers (in any OS) can actually reduce availability, rather than increase it.**
- **It is common to find hardware has been configured for very high availability while applications and operating systems have not been tuned for the same level of availability.**
- **Windows lower acquisition costs make it easier on the wallet to reduce the impact of an outage.**

Reliability and Availability

Relative Total Allocated Downtime Costs for equivalent environments

Solaris: \$125,762 Windows: \$121,887 Delta: - \$3,875

	Item	Sun	Windows	Delta
1	Base hardware availability	\$13,097	\$23,934	\$10,838
2	Operating system availability	\$10,905	\$32,715	\$21,810
3	Application and database availability	\$38,945	\$22,399	- \$16,546
4	Operator availability	\$39,260	\$26,774	- \$12,485
5	Network and environmental availability	\$23,556	\$16,065	- \$7,491
6	RAID hard disk improvement	\$0.00	\$0.00	\$0.00
7	Redundant component improvement	\$212,456	\$59,593	\$152,863
8	Downsizable/deallocated component Improvement	\$53,054	\$1,884	\$51,170

Source: CIO View TCOnow!

Which Operating System had the fewest vulnerabilities 2003-2005?

1. Linux
2. Solaris
3. Windows Server 2003

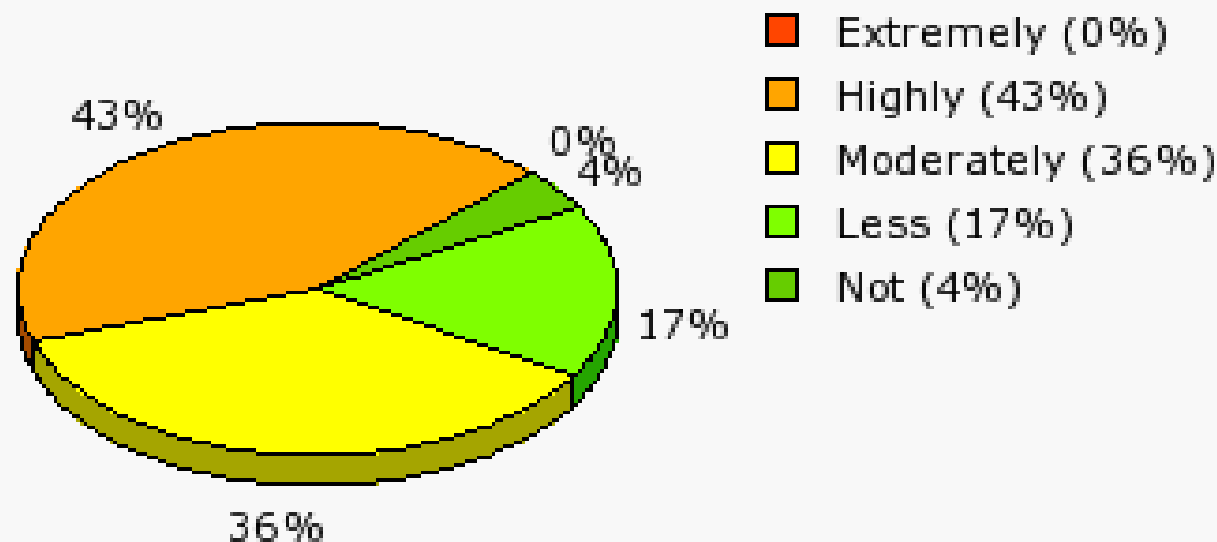
Which Operating System had the fewest vulnerabilities 2003-2005?

Answer: Windows Server 2003

Source: Secunia.com

Security

Microsoft Windows Server 2003 Enterprise Edition Criticality (Based on 47 advisories from 2003-2005)

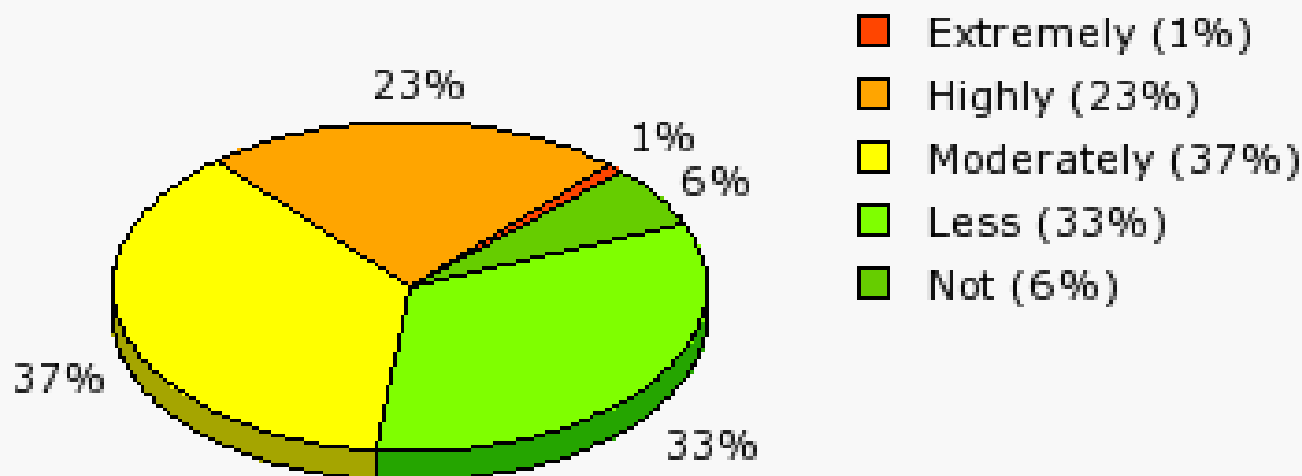


This graph was generated by Secunia.

Based on Secunia Advisories freely available at <http://secunia.com/>

Security

RedHat Enterprise Linux ES 3 Criticality (Based on 160 advisories from 2003-2005)



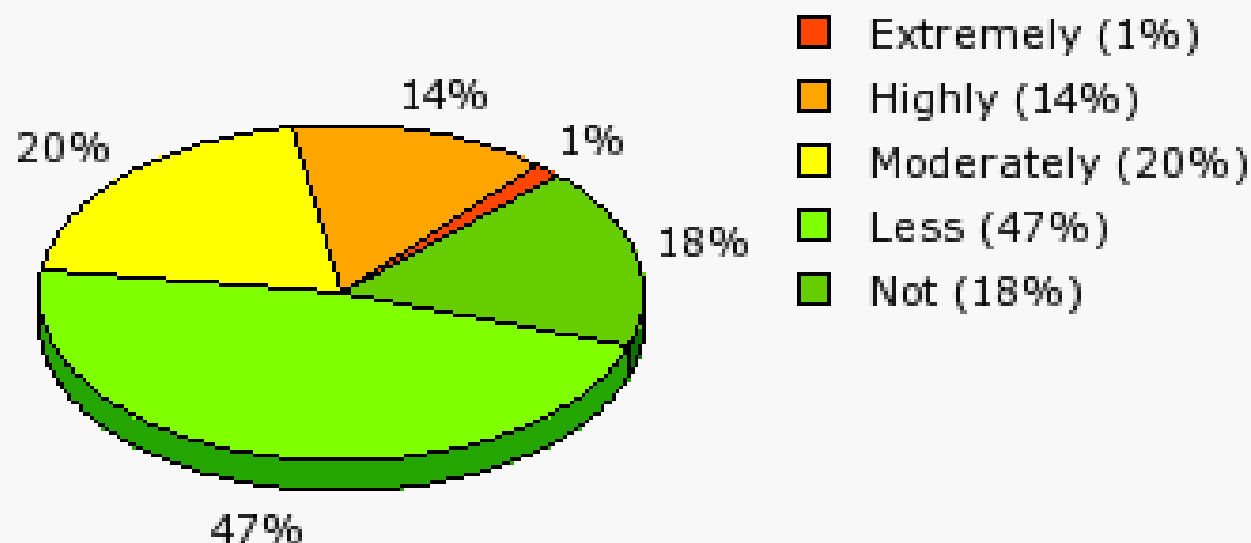
This graph was generated by Secunia.

Based on Secunia Advisories freely available at <http://secunia.com/>

Security

Sun Solaris 9

Criticality (Based on 79 advisories from 2003-2005)



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Based on Secunia Advisories freely available at <http://secunia.com/>

What do analysts say is the largest part of server TCO?

1. Hardware
2. Software licenses
3. Staffing
4. Downtime

What is the largest part of server TCO?

Answer: Staffing

Costs

- **Aberdeen Group shows Windows has a 46% cost advantage over UNIX.**
- **IDC shows lower Windows TCO than Linux in four of five key server workloads, with savings of 11%-22% over five years.**
 - Network infrastructure
 - Print servers
 - File servers
 - Security applications
- **Single biggest cost saving is in IT staff. Hardware and software costs rarely account for more than 28% of TCO over 3 years. Percentages fall further over four-five years.**

Costs

- **Forrester Research shows that companies are unclear on the actual cost of running Linux.**
 - **Only five of 14 companies surveyed kept detailed metrics to track Linux related costs. Those five companies showed Linux cost them 5%- 20% more than their current Windows implementations.**
 - **Yankee Group and Forrester studies also show that planning and Linux upgrades and migrations take longer and are more complex than those for Windows. One reason is a lack of internal knowledge of Linux.**

Windows vs. Open Source

- **Open Source is not free**
 - Every major Linux vendor charges for technical support, warranties, and license indemnification. These costs must be factored into the TCO and ROI.
- **Hardware and support cost trade-offs**
 - Linux will run on less-expensive hardware, but Linux admin staff costs range from 10%- 30% more than Windows admin staff.
 - Fewer qualified Linux personnel in the job market increase direct hire support costs.
 - Outsourced Linux admin support rates equal those of UNIX admin support.
- **Linux training costs average 15% more than Windows**

Windows vs. Open Source

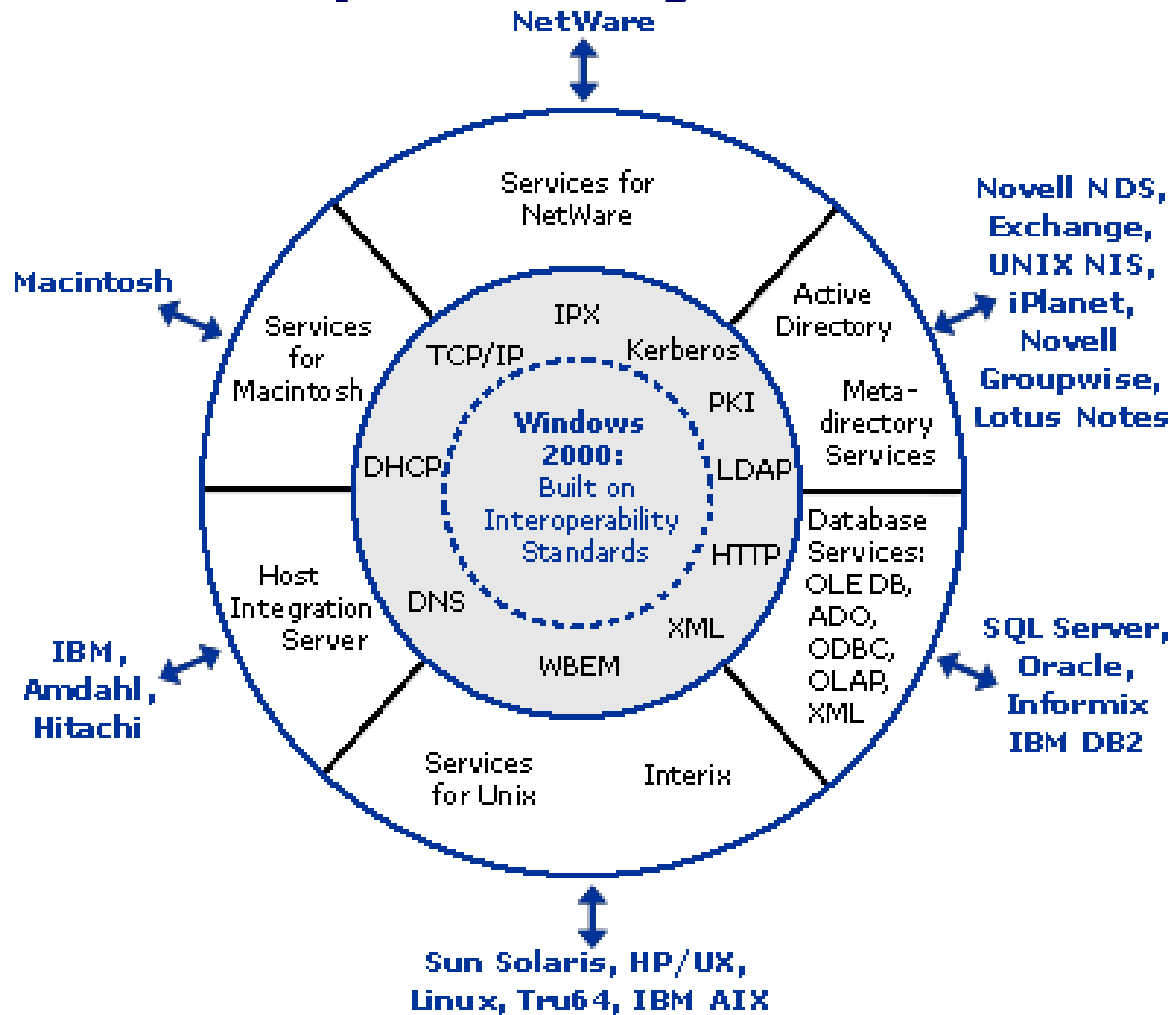
● Indemnification

- Increased financial and business risks related to intellectual property indemnification
- Indemnification caps on Windows vs. Linux.
 - Microsoft: Uncapped protection for legal costs associated with an intellectual property claim alleging infringement by a Microsoft product.
 - Novell: Cap of lesser amount \$1.5 million or 125% of costs of licenses, updates and upgrades. Requires minimum annual purchase amount, premium support contract, and maintaining upgrade protection.
 - HP: Uncapped protection, but requires Linux to run on HP hardware and purchase of HP Linux technical support.
 - RedHat: Software warranty, not indemnity. RedHat's warranty provides replacement code in the event any code is found to infringe on SCO's IP.

Windows Interoperability

- **Interoperability is sometimes confused with open source**
 - Interoperability is about how different systems work together; open source is a licensing and/ or software development methodology.
- **Windows works in heterogeneous environments.**
 - Built-in support for industry standards
 - TCP/IP, IPX, Kerberos, PKI, LDAP, HTTP, XML, DNS, DHCP
 - Windows' adherence to protocol standards and tools allows partial migrations or new implementations of Windows in heterogeneous environment.

Windows Interoperability



Interoperability with UNIX and Linux

● Services for Unix

- **Windows Services for Unix** allows nearly seamless integration between Windows, UNIX, and Linux environments. Provides utilities and services to leverage existing UNIX and Linux assets and expertise while consolidating Windows, UNIX, and Linux admin and management tasks.
- **SFU** won Open Source Product Excellence Award for Best System Integration Software at 2003 Linux World.
- **Services for Unix 3.5** runs on Windows 2000 (Professional and Server versions), Windows XP Professional, and all Windows Server 2003 versions. Explicitly tested for interoperability with:
 - Solaris 7 and 8
 - HP-UX 11i
 - AIX 5L 5.2
 - Red Hat Linux 8.0.

Interoperability with UNIX and Linux

- ***Interix Subsystem.*** Computers running SFU actually run Windows and UNIX simultaneously.
- ***Interix Software Development Kit.*** The Interix SDK provides tools to port UNIX applications to run on Windows in the Interix subsystem.
- ***User Name Mapping.*** Provides a way to map Windows and UNIX user accounts to each other.
- ***Client for NFS:*** Enables Windows users to map a drive to an NFS share.
- ***Server for NFS:*** Allows an administrator to share Windows directories as NFS exported file systems.
- ***Server for PCNFS.*** Authenticates username and password before NFS file access is granted .
- ***Password Synchronization.*** Keeps users' Windows and Unix passwords in synch.

Interoperability with UNIX and Linux

- **LDAP-based Active Directory for authentication.**
- **Extensible; can communicate with other LDAP-based UNIX directories.**
- **Many UNIX ERP and middleware vendors (TIBCO, for example) provide LDAP plug ins for the Active Directory.**
- **Third-party tools (such as Computer Associates' SiteMinder and IdentityMinder) can be deployed (on UNIX or Windows platforms) to tie together multiple directories for transparent sign-on to multiple applications in the enterprise.**

Best Practices

- **Consider a corporate standard hardware make and model platform for all Windows servers.**
- **Hot and cold spares and lots of spare parts may be cheaper than a 4-hour-or-less on-site service contract.**
- **Windows system power consumption is roughly half that of Sun. In a data center with UPS and generators nearing capacity this can make a difference in the timing of upgrading the facility.**
- **Tune the OS and DB to be as available as the HW.**

Best Practices

- **Establish and enforce policies and standards for security updates in the data center. Always do regression testing.**
- **Keep development teams in sync with corporate infrastructure. If apps will run on Windows, ensure infrastructure in the dev and test environments matches the corporate platform. No point in implementing Windows if the dev team is writing apps that are authenticated against UNIX or Linux based versions of what's in the datacenter.**
- **Use Microsoft tools such as Microsoft Solutions Framework (MSF) and Microsoft Operations Framework (MOF). Microsoft has done the planning for a UNIX migration; why not use this as a starting point for you environment?**

Questions