WHY YOU SHOULD READ THIS DOCUMENT
This planning guide provides IT managers with insight into how they can upgrade to Windows Server* 2012 R2 software built on Intel® Xeon® processor E5 v3 family-based servers in response to end of support for the Windows Server 2003 operating system. This guide covers:

- The importance of migrating from Windows Server 2003 software and the risks and costs associated with maintaining the status quo
- How addressing this legacy technology today allows you to capitalize on new opportunities while keeping your business agile and ready for the future
- How upgrading to both Windows Server 2012 R2 software and Intel Xeon processor E5 v3 family-based servers provides a higher-performing solution optimized to take advantage of the strengths of each product
- Microsoft* Azure* software as an option for migration to a cloud platform for the enterprise
- A four-step checklist for upgrading to Windows Server 2012 R2 software running on the Intel Xeon processor E5 v3 family
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The Upgrade Imperative

Many companies today are simply “getting by” with their existing IT infrastructure. If you’re one of those companies, you know that this can mean something as simple as slower performance or as complex as needing a workaround for service delivery. Ultimately, an aging IT infrastructure limits your ability to deliver new and innovative services. Consider this: 32 percent of average data center servers contribute only 4 percent of the total performance, yet they use 65 percent of the total power.¹

Organizations are now moving toward virtualization and modern cloud options, as well as a more secure and compliant data center environment. With end of support for the Windows Server* 2003 operating system rapidly approaching, now is the ideal time to upgrade your data center to take advantage of the latest innovations in hardware and software. Addressing this legacy technology today allows you to capitalize on new business opportunities while keeping your business agile and ready for the future.

Considering the Risks

As of July 2015, support for Windows Server 2003 software will end, leaving customers facing significant risks. Here are a few of the challenges that can have a devastating impact on your business:

- **Compliance issues** – Failure to meet regulatory requirements from HIPAA, Sarbanes-Oxley, and others can bring workflows to a halt. For the payment card industry (PCI), being out of compliance may translate into fines or having vendors refuse to do business with your organization.

- **Security risks** – Without security updates, physical and virtualized instances will be left vulnerable to threats and place sensitive company data at risk. Moreover, losing technical support is a big deal, especially in the event of an outage that requires a system restore.

- **Inefficiencies** – Without access to standard patching, you’ll be forced to maintain systems with costly custom support agreements. Ultimately, it will cost you more to maintain old systems than to upgrade now.

Making the Business Case

If budget or resource constraints are a challenge for upgrading, be sure to communicate the business risks of not upgrading to the right executives. The risks may not be obvious to those outside of IT.

Timing Is Everything

July 14, 2015, is coming up fast. If a server migration takes approximately 200 days and an application migration takes about 300 days, your organization is already behind schedule.

Mainstream support for Windows Server 2003 software ended in July 2010, so this is currently the extended support phase. And while this phase includes ongoing security fixes and patches, all support will be entirely eliminated in July 2015. Organizations that don’t act now will be at risk of significant business impact.

The Upgrade Process, Simplified

For more information, see *A Checklist: Four Steps to Modernization*. Intel and Microsoft have distilled a complex modernization process into four steps:

- **Step 1: Discover and assess** – Identify and categorize your apps and workloads running on the Windows Server* 2003 operating system.

- **Step 2: Target destination** – Choose a migration destination for each app and workload, either in the data center or the cloud.

- **Step 3: Upgrade hardware and software** – Install the latest Intel® architecture running Windows Server 2012 R2 software for the best combined performance.

- **Step 4: Migrate and launch** – Get started moving your apps to the platform of your choice.
Gain Breakthrough Performance with Intel® Xeon® E5 v3 Family Processors and Windows Server* 2012 R2 Software

Now is the time to get your IT environment in order and maximize performance, security, and compliance with the new capabilities in the latest hardware and software. By upgrading to the Intel® Xeon® processor E5 v3 family-based servers running the Windows Server 2012 R2 operating system, you can gain breakthrough performance, flexibility, and speed.

Together, the Intel Xeon processor E5 v3 family and Windows Server 2012 R2 software provide the versatility your business needs to optimize the data center now and prepare for the future. A combined solution delivers up to 3.1 times greater performance overall, with increased energy efficiency and industry-leading performance across a range of high-performance computing (HPC) applications.

Windows Server* 2012 Software and the Intel® Xeon® Processor E5 v3 Family

Windows Server* 2012 R2 software and Intel® Xeon® processor E5 v3 family-based servers deliver significant performance gains, greater energy efficiency, and high-performance computing capabilities.

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1 Intel internal measurements. Supermicro® X8DAI with two Intel Xeon processor X5690, 12 x 4 GB DDR3-1600 RDIMMs, Intel Compiler 12.1.0.255, Windows Server 2003, estimated SPECint_rate_base2006 score: 369; Intel Server System R2208WTTYS with two Intel Xeon processor E5-2699 v3, 16 x 8 GB DDR4-2133 RDIMMs, Intel Compiler 14.0, Windows Server 2012 R2 estimated SPECint_rate_base2006 score: 1170.

2 Intel Server System R2208WTTYS with two Intel Xeon processor E5-2699 v3, 16 x 8 GB DDR4-2133 RDIMMs, Intel Compiler 14.0, Windows Server 2012 R2 estimated SPECint_rate_base2006 score: 1170.

2‡‡ Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests such as SYSmark® and MobileMark® are measured using specific computer systems, components, software, operations, and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products.
Start with a Powerful Hardware Foundation

The latest Intel Xeon processor E5 v3 family is optimized for large-scale data centers and designed to respond quickly to changing business demands with greater automation; responsive, cost-effective performance; and stronger security, including:

- **Up to three times more memory bandwidth** with next-generation memory support from DDR4.\(^2\)\(^4\)
- **Up to 18 cores for increased parallelism**,\(^5\) with 50 percent more cores and cache overall than previous generations.
- **Faster compression** that is optimized for storage, with built-in technology to accelerate and improve intelligent storage systems.
- **Up to four times double floating point operations per second (DP FLOPS) per core** and support for 2x wider vector integer instructions for faster high-performance computing capabilities via Intel Advanced Vector Extensions 2 (Intel AVX2).\(^6\)
- **Accelerated encryption and decryption** that is up to twice as fast as previous generations,\(^7\) via Intel Data Protection Technology (with Advanced Encryption Standard New Instructions [Intel AES-NI\(^8\)]). Performance benefits are designed to speed high-volume encryption and increase efficiencies for data transport and storage workloads.

Build a Cloud-Ready Data Center with Windows Server 2012 R2 Software

Using the latest Intel Xeon processor-based servers as your hardware foundation combined with Windows Server 2012 R2 software delivers everything you need for an enterprise-class data center that is ready for cloud. Windows Server 2012 R2 software is designed with flexibility and agility in mind and includes enhancements for virtualization of compute, storage, and networking to help you manage workloads.

- **Enterprise-class scalability and performance** supports enhanced server virtualization and massively increased parallelism with:
  - Up to 320 logical processors (a 5x improvement over the previous release)\(^9\)
  - 4 TB of physical memory\(^9\)
  - 1,024 active virtual machines for Hyper-V* technology, which can support a 64 TB virtual hard disk format\(^9\)
- **An enhanced power management interface** for improved control over power consumption.
- **Enterprise-grade security with a trusted boot environment.** Unified Extensible Firmware Interface (UEFI) secure boot helps ensure that only a properly signed BIOS and operating system is used during start-up. The trusted boot process includes three components:
  - **Secure boot** helps protect the Windows* environment from malware or other tampering.
  - **Measured boot** provides the antimalware and remote management software with a detailed log of components that is loaded prior to the antimalware driver during start-up.
  - **Trusted boot** is the combination of secure boot and measured boot and provides customers with a high degree of trust that their software is running on a trusted server.

By upgrading to an Intel Xeon processor E5 v3 family processor running the Windows Server 2012 R2 operating system, you can set up your organization for an automated, dynamic, and flexible private cloud environment. Together these industry-leading solutions provide a scalable IT foundation that delivers greater performance and increased energy efficiency across all load levels.

Hardware-Assisted Security Foundation

The Intel\(^*\) Xeon\(^*\) processor E5 v3 family safeguards your data and infrastructure by providing foundational hardware-assisted security. Intel Platform Protection Technology (with OS Guard)\(^9\) strengthens malware protection and guards the operating system from escalation-of-privilege attacks. You’ll also gain added protection from attacks against the hypervisor, BIOS, firmware, and other prelaunch software components. And with faster, high-quality cryptographic keys and certificates, you can deploy a wide range of security applications.

\(^1\)No computer system can provide absolute security. Requires an enabled Intel processor, enabled chipset, firmware, and software, and may require a subscription with a capable service provider (may not be available in all countries). Intel assumes no liability for lost or stolen data and/or systems or any other damages resulting thereof. Consult your service provider for availability and functionality. For more information, visit intel.com/go/anti-theft. Consult your system manufacturer and/or software vendor for more information.

\(^2\)Memory bandwidth may vary based on memory latency, type, speed, voltages, and other factors.

\(^3\)For more information, visit http://www.intel.com/go/avx2.

\(^4\)Memory bandwidth may vary based on memory latency, type, speed, and other factors.


\(^6\)Some features of the Intel AVX2 instructions require assembly language programming.

\(^7\)Performance may vary. For information about additional features, visit http://www.intel.com/content/www/us/en/processors/icon-architecture.html.

\(^8\)For more information about Intel AES-NI, visit http://www.intel.com/go/avx2.

A hybrid cloud approach gives you the flexibility to use a private or public cloud model depending on your workload. You can achieve the ideal balance of agility and control with the ability to expand and optimize the scope of IT service delivery:

- **Elastic capacity** – More easily manage spikes in demand with the ability to move workloads between clouds based on business need.
- **Scalability** – Expand value-added services and deliver apps across a range of users and devices.
- **Total cost of ownership** – Scale only as demand requires, and increase savings from better app utilization.

When you upgrade to Azure* services running on the latest Intel Xeon E5 processor platform, you can work with a complete solution that is optimized for both cloud and the enterprise.

The latest Intel Xeon E5 processors are built on industry standards that facilitate interoperability, cost-effective storage, advanced networking, and hardware-enhanced security, and they:

- **Use integrated telemetry** to optimize total cost of ownership (TCO) across a hybrid infrastructure with fast, agile application and service delivery. Telemetry capabilities enable monitoring and diagnostics for app components over time so that you can make informed decisions on efficiency and capacity planning.
- **Connect multiple resource pools** to identify the best "rent or buy" deployment model.

Also, Azure services are optimized to support a hybrid cloud model with disaster recovery and capacity bursting capabilities. With this software running on the latest Intel Xeon processors, you can quickly deliver the next generation of online services to reduce CapEx costs. You'll also gain added security from intrusion detection, denial-of-service attacks, and threats.

**Hybrid Cloud with Bursting Capabilities**

Cloudbursting is when an application runs in a private cloud or data center and "bursts" to a public cloud when the demand for computing capacity increases. It's ideal for seasonal or cyclical workloads or limited-time apps, as well as development, testing, and simulation scenarios.

**Get More from the Windows* Azure* Pack**

For an optimal hybrid cloud experience, you can install the Windows Azure Pack for Windows Server software within your private cloud. Once installed in the data center, Windows Azure Pack integrates with Microsoft* System Center and Windows Server 2012 R2 software to provide a self-service portal for managing services such as web sites, virtual machines (VMs), and scalable web hosting. It also provides a portal for administrators to manage resource clouds.

**Gain Added Security**

The Azure platform addresses security risks across its hybrid cloud infrastructure with:

- Continuous intrusion detection and prevention systems
- Denial-of-service-attack prevention
- Regular penetration testing
- Forensic tools that help identify and mitigate threats

Added security capabilities include network isolation, encrypted communications, and private connections between on-premises or colocated infrastructure and Azure data centers (via Azure ExpressRoute* software).
A Checklist: Four Steps to Modernization

Use this checklist to start your upgrade to Windows Server 2012 R2 software and the latest Intel Xeon processor E5 platform. While each migration process will be unique, these steps are meant to provide practical guidance and resources to make it easier.

**Step 1: Discover and Assess**

The first step in the upgrade process is gaining an understanding of your current environment. Specifically, you need to:

- Determine which applications and workloads you have running on the Windows Server* 2003 operating system today. Identify software and workloads.

- Categorize your applications and workloads by type, importance, and degree of complexity for your unique situation. Organize by:
  - **Type** – Microsoft* server roles, Microsoft applications
  - **Importance to your business** – Applications that can be retired, marginal, important, and mission-critical
  - **Complexity and risk** – Low, medium, and high

- Identify workloads that can be displaced using standardized service offerings.

- Explore these free, downloadable assessment tools available from Microsoft:
  - **Microsoft Assessment and Planning Toolkit** – Provides a secure, agentless, and network-wide inventory that can be conducted from a single networked computer
  - **Microsoft Azure* Virtual Machine Readiness Assessment** – Inspects your on-premises environment (both physical and virtualized) and provides a checklist and detailed report on the steps to take to move your environment to the cloud

**Step 2: Target Destination**

Choose a migration destination for each application and workload, either in the data center or in the cloud.

- Evaluate options for the best platform for each application and workload. Consider these four migration options:
  - Windows Server 2012 R2
  - Microsoft Azure
  - Microsoft Cloud OS Network partner
  - Microsoft Office 365

- For migration destinations within the data center, start planning your hardware upgrade.

- Explore this cost estimation tool from Microsoft:
  - **Microsoft Azure (IaaS) Cost Estimator Tool** – Helps customers profile their existing on-premises infrastructure and estimate the cost of running it on the Azure platform. This tool is released for the United States.

- Learn more about the Intel® Xeon® processor E5 v3 family-based servers.

- Learn more about Windows Server 2012 R2 software.
Step 3: Upgrade Hardware and Software

Before you migrate, upgrade to Intel Xeon processor E5 v3 family-based servers running Windows Server 2012 R2 software to ensure that you gain the best combined performance for your software and hardware.

- Learn more about the Intel Xeon processor E5 v3 family-based servers.
- Learn more about Windows Server 2012 R2 software.

Step 4: Migrate and Launch

Finally, it’s time to upgrade your software to the Windows Server 2012 R2 operating system and migrate your existing workloads to the platform of your choice. You can use a service provider, collaborate with a partner, or employ a do-it-yourself approach.

- Get started with the Windows Server 2003 migration resources from Microsoft.
- Explore these additional tools available from Microsoft:
  - Windows Server Migration Tools
  - SQL Server* Migration Assistant
  - IIS Web Deploy
Additional Resources

**Intel Resources**

*Planning Guide: Data Center Optimization*
Get practical guidance on how to optimize your data center to improve operational efficiency, deliver innovative services, and embrace new business opportunities.


*Data Center Technology: Refresh for Competitive Advantage*
Upgrade data center technologies and free up IT staff to develop innovative business services.


*Inside the Future: Tomorrow's Data Center*
Get insight on Intel's vision of the optimized, next-generation data center and software-defined infrastructure (SDI) from Intel futurist Steve Brown.


**Microsoft Resources**

*Windows Server 2003 Migration*
Get started with the software upgrade process with these comprehensive tools and resources for the Windows Server 2003 migration.

microsoft.com/en-us/server-cloud/products/windows-server-2003/

*Windows Server 2012 R2*
Find everything you need to know about the Windows Server 2012 R2 operating system, designed to deliver enterprise-class data center and hybrid cloud solutions that are simple to deploy, cost-effective, and user friendly.

microsoft.com/en-us/server-cloud/products/windows-server-2012-r2/

*Windows Azure Pack*
Learn more about how Windows Azure Pack can deliver the technologies you need in the data center for rich, self-service, multitenant services.

Endnotes

2. Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests such as SYSmark® and MobileMark® are measured using specific computer systems, components, software, operations, and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products.
4. Up to 3x memory bandwidth based on STREAM (Triad) benchmark comparing baseline Supermicro® X8DTN+ platform with two Intel Xeon processor X5680, 18 x 8 GB DDR3-800 scoring 26.5 GB/sec to the new Intel Server System R2208WTTYS with two Intel Xeon processor E5-2699 v3, 24 x 16 GB DDR4-2133 @ 1,600 MHz DR-RDIMM scoring 85.2 GB/sec. Source: Intel internal testing.
5. Intel Xeon processor E5-2699 v3 (18C, 45M cache) compared to Intel Xeon processor E5-2697 v2 (12C, 30M cache).
6. The Intel Xeon processor E5 product family supports Intel Advanced Vector Extensions (Intel AVX), which increases maximum vector size from 128 to 256 bits. Compared to the Intel Xeon processor 5600 series, Intel AVX enables up to twice the work to be accomplished per clock cycle during floating point and vector operations.
8. No computer system can provide absolute security. Requires an enabled Intel processor and software optimized for use of the technology. Consult your system manufacturer and/or software vendor for more information.

More from the Intel® IT Center

This planning guide, Modernizing Servers and Software, is brought to you by the Intel® IT Center. The Intel IT Center is designed to provide IT professionals with straightforward, fluff-free information to help them implement strategic projects on their agenda, including virtualization, data center design, big data, cloud, and client and infrastructure security. Visit the Intel IT Center for:

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