**Why You Should Read This Document**

This guide provides step-by-step guidance to help midsize businesses update and modernize their IT infrastructures, including:

- An overview of reasons for midsize businesses to refresh and upgrade their IT infrastructures on a regular basis
- The benefits of upgrading, particularly to Intel® Xeon® processor-based servers
- Four steps in planning to update your infrastructure: explore, model, plan, and execute
- Insight into issues and technologies of particular interest to midsize businesses
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Modernized IT Infrastructure—a Competitive Advantage

Technology needs for midsize companies vary—from a single office server with minimal storage to many housed in a data center with terabytes of information. IT support may be provided by external consultants and vendors, an individual person, or a team. Wherever your business falls on the IT spectrum, your success relies in large part on your technology. You face many of the same challenges as large enterprises. You rely on information technology to help you manage your organization and maintain a competitive edge. Your customers have high expectations for service, pricing, and quality. In highly regulated industries, you face standard compliance requirements. One big difference: You generally have fewer resources available to help you keep the business running and take on new areas of growth.

In today's global marketplace, midsize businesses often compete with larger, better-funded organizations. Your approach to technology must be strategic and innovative to be successful. Whether it’s a simple server or a data center, your IT infrastructure—servers, network, storage, and software—must be aligned to meet your business needs. Plus, your infrastructure must be flexible, because business doesn’t stay still. As your needs evolve, your infrastructure must be able to support new “modern” initiatives and ongoing growth.

You can ensure that your infrastructure meets your current and near-future business needs by reviewing infrastructure on a regular cycle. Intel recommends a review and refresh cycle that modernizes your technology every two to four years, as you evolve new business requirements, retire hardware and software that can no longer cope cost-effectively, and integrate new solutions that better meet your needs. The good news? Advances in technology have packed more power into today’s latest servers and other equipment, so you can gain more capabilities while lowering your overall IT costs.

With a refresh cycle in place, you can regularly update your IT infrastructure, enabling you to take advantage of innovations that provide exceptional performance, security, efficiency, and other benefits that help your business innovate and compete. By periodically updating your IT infrastructure, you keep pace with the latest capabilities that meet your current needs as well as enable you to prepare for the future. Updated IT infrastructure allows you to capitalize on technology advancements as a competitive advantage. Next-generation business abilities rely on having modern IT in place.

The Purpose of This Guide

This guide can help you understand why it’s important to evaluate and update your IT infrastructure every two to four years and how you can take steps to plan and implement your next refresh cycle.
This is an exciting time in IT, with innovations and new delivery models that can help your business grow and compete. The latest infrastructure technology can help you pursue:

- **Operational excellence.** New hardware and software capabilities minimize operating expenses, maximize efficiency, and help ensure security and compliance.

- **Innovative service delivery.** Cloud computing provides new ways to deliver services on demand to your workforce, customers, and partners. Take advantage of private, public, or hybrid cloud solutions to achieve the best total cost of ownership (TCO) for your applications.

- **New business opportunities.** The latest infrastructure and cloud computing also enable your business to embrace opportunities such as big data, Bring Your Own Device (BYOD) programs, and social and collaborative computing.

In difficult economic times, many businesses have to cut back, limiting expenditures to necessities and putting new initiatives on hold. While that saves money in the short term, over time an aging infrastructure will prevent you from capitalizing on the exciting benefits and opportunities made possible by new technologies.

As economic conditions improve, it’s time to look at your infrastructure and determine how to best invest for the future of your business. Use this opportunity to address the following problems typically associated with older infrastructure:

- Higher costs
- Increased inefficiencies
- Complexity
- Security gaps

The latest infrastructure technology addresses these problems by delivering better performance, reducing energy consumption, lowering operating and maintenance costs, and providing advanced security measures to ensure compliance and defend against the latest security threats. In addition, higher-performing technology builds flexibility and agility into your IT services so that you can capitalize on new business opportunities. With an updated infrastructure, you are able to convert your IT organization from a cost center to a strategic asset that will help drive your business success.
Addressing Cost, Efficiency, and Complexity

Older infrastructure is less efficient than the latest technology and more difficult to manage. A Gartner* report describes a data center scenario in which the servers greater than 4 years old use a disproportionately high amount of energy in comparison to their contribution to overall performance.\(^1\)

Aging infrastructure can consume more of your time and budget because older technology is likely to be larger, complex, and hard to manage. Gartner also describes another data center scenario, in which nearly three-quarters of a business’s total IT expenses are needed to support operations and maintenance of rigid, aging infrastructure; application and information complexity; and inflexible business processes. As IT infrastructure grows and ages, these costs continue to rise, limiting funds to support business innovation. Plus, your business is negatively affected from lost time, effort, and opportunity.\(^1\)

Security becomes a growing concern with older infrastructures. Cyberattacks are increasing in frequency and sophistication, the proliferation of mobile device usage in the workforce can present additional vulnerabilities, and the regulatory environment continues to be challenging. Aging equipment was not designed to defend against these emerging concerns, which leaves businesses at increasing risk.

All these issues—rising costs, declining performance, and increasing security risks—help to explain why many businesses view IT as a “cost center.” After all, businesses are pouring more and more into IT resources, and what they’re getting in return is a sprawling, aging infrastructure that is increasingly insecure and provides declining performance.

Aging Servers Example:
Lower Performance, Higher Energy Consumption

In a typical scenario, 32 percent (or approximately one-third) of the servers in a small group or data center are greater than 4 years old. Those aging servers contribute only 4 percent of the total performance capabilities in the data center while consuming 65 percent of overall energy. (Source: IT Metrics: Align IT Investment Levels with Strategy Using Run, Grow, Transform and Beyond. Gartner [March 23, 2012]).
Advanced Security Solutions from Intel and McAfee

Intel and McAfee have a number of security solutions available to give you greater peace of mind. Intel® Xeon® processor-based servers build cutting-edge security into the processor, including:

- Intel Platform Protection Technology (with Trusted Execution Technology [TXT]): TXT helps address evolving security threats across physical and virtual infrastructures. It can play a role in meeting regulations and data protection standards, and is designed to harden platforms against firmware- and software-based attacks.

- Intel Data Protection Technology (with Advanced Encryption Standard New Instructions [AES-NI]): Encryption is recommended as the key way to secure business-critical data. However, encryption is a compute-intensive process and can slow down performance. This delay often discourages people from regularly encrypting their data and files. AES-NI specifically accelerates data encryption and decryption, removing this performance overhead and delay.

McAfee offers the following solutions for midsize businesses:

- McAfee* Security-as-a-Service (SaaS): McAfee SaaS delivers complete endpoint, e-mail, web, and network protection through the cloud to protect your systems against malware and other threats.

- McAfee DeepSAFE* technology: Most antivirus software is limited to problems within the operating system. McAfee DeepSAFE technology goes deeper, using hardware features in Intel processors to gain a direct view of system memory and processor activity, and proactively detect and prevent advanced persistent threats (APTs) and malware.

† 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 any other damages resulting therefrom. 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.

‡ 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.

Capitalize on New Business Opportunities

The evolution of technology makes it possible for more midsize businesses to benefit from and take advantage of the latest innovations—for example, cloud computing. As the world emerges from the recent downturn, those who upgrade their IT infrastructures now can gain a significant competitive advantage by embracing new technology innovations.

For example, midsize businesses can utilize cloud computing to reduce costs, access solutions such as analytics that might be too expensive to implement in-house, or quickly implement marketing applications of limited time duration. Unified communication, collaboration, and mobility solutions can help employees work together more effectively. These solutions need up-to-date, high-performing infrastructure to operate cost-effectively and help your business grow, enhance customer experiences, increase workforce productivity, and reduce costs.
IT as an Investment

Updated, modernized IT infrastructure keeps your business running and prepared to take advantage of new opportunities. Refreshing servers can expand capabilities and performance while also reducing costs and increasing efficiencies. Here are two examples of how a refresh strategy can help you increase efficiency and performance.

Imagine that Company XYZ is a midsize business currently running the Windows Server* 2003 operating system on 17 servers that are more than 4 years old. The operating system is no longer supported, which means security is outdated and the business is at risk. In this situation, server performance can be expected to steadily decline.

- **Performance upgrade.** In one scenario, Company XYZ replaces the 17 aging servers with 17 new servers powered by the Intel® Xeon® processor E5 v2 product family running Windows Server 2012, the latest operating system. The company would lower its power bill by about 2 percent per year, while achieving performance improvements of up to 17 times. Company XYZ also gains new IT capabilities that enhance data and infrastructure security, virtualization, networking, and storage.

  - **Efficiency upgrade.** In another scenario, Company XYZ replaces its 17 aging servers with just one new server with upgrades to the Windows Server 2012 operating system and Microsoft SQL Server* 2012 data management software. The business continues to run at the same performance level as before, but can potentially reduce its annual energy costs by up to 90 percent, paying back the cost of the new server within 3 months.

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### Two Refresh Scenarios: Performance and Efficiency

Two examples of how upgrading to the latest server based on the Intel® Xeon® processor is a cost-effective way to increase capabilities and efficiency. See Appendix for additional configuration details.

<table>
<thead>
<tr>
<th>2007</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>![17 quad-core Intel® Xeon® processor 5300 series-based servers](Running Windows Server* 2003 R2 operating system and Microsoft® SQL Server* 2005 software)</td>
<td>![1:1 performance refresh](Up to 17x the performance(^4,7), 17 twelve-core Intel Xeon processor E5-2600 V2 product family-based servers)</td>
</tr>
</tbody>
</table>

OR...

<table>
<thead>
<tr>
<th>2007</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>![17 twelve-core Intel Xeon processor E5-2600 V2 product family-based servers](Running Windows Server* 2003 R2 operating system and Microsoft® SQL Server* 2005 software)</td>
<td>![17:1 efficiency refresh](Up to 96% reduced annual energy costs(^4,6), As fast as 3 month return on investment(^4,5))</td>
</tr>
</tbody>
</table>

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.
Each business evaluates for itself the timing of and the degree to which it chooses to invest in updating its technology infrastructure. However, the bottom line is: With new infrastructure technology (hardware and software) in place, the business is able to lower its costs and greatly increase performance and capabilities to support growth.

In either of the scenarios above, the upgrade to the Intel Xeon processor E5 v2 family:

- Streamlines management, freeing your IT team to spend more time on business-critical initiatives
- Lowers operational and maintenance costs, which potentially frees budget to be spent elsewhere
- Improves performance,\(^2,3\) which can fuel improvements in productivity, customer service, product innovation, and time to market, as well as provide other benefits that move your business into high gear

### Intel® Xeon® Processor-Based Servers for Midsize Businesses

Servers based on Intel® Xeon® processors can help you use technology more effectively for your business. Whether you want best-in-class support for cloud computing or faster performance for your data-intensive applications, there is an Intel Xeon processor-based server available to meet your needs.

| Intel® Xeon® processor E3 v3 family | An economical choice that provides entry-server-class performance, reliability, and advanced security features. |
| Intel Xeon processor E5 v2 family | An ideal combination of price-to-performance, energy efficiency, and ease of deployment for most midsize businesses. |
| Intel Xeon processor E7 family | Optimized for running mission-critical operations, such as back-end and in-memory databases and for high-performance computing. |
When considering changes to your IT infrastructure, there are three goals you can focus on: operational excellence, innovative delivery of services, and the ability to act on new business opportunities. While it’s up to you how far you want to go to pursue each goal, your first step is to achieve operational excellence.

Achieving operational excellence builds a solid foundation for growth and enables you to begin working toward innovative service delivery and new business opportunities. The remainder of this guide describes a four-step methodology for upgrading hardware and software to achieve operational excellence. The results will be better IT performance, lower operating expenses, greater overall efficiency, improved security and compliance—and a significant advantage over competitors.

To get the performance, efficiency, and cost-effectiveness that works for your business, use this four-step approach to upgrading your IT infrastructure.

- **Step 1: Explore** – Identify your business requirements.
- **Step 2: Model** – Find the solutions that meet your needs.
- **Step 3: Plan** – Determine the technology you need.
- **Step 4: Execute** – Implement your upgraded infrastructure solution.

Each of the four steps involves a number of substeps that will help you work through the methodology and design the infrastructure that works best for your business.
Step 1: Explore—Identify Your Business Requirements

What is your current IT situation, and what are your business needs? The goal of this step is to conduct an open-minded exploration of your existing infrastructure capabilities and measure them against current and short-term business needs. Use this checklist to identify organizational risks, inefficiencies, and opportunities that guide the next three steps.

☐ Determine business requirements.
Your business requirements drive your IT decisions—not the other way around. List expected business requirements over the next two to four years. For example:

- Do you expect to increase or decrease IT staff?
- Is your business likely to expand into a new region?
- Do you anticipate needing more storage or faster access to your data?
- Will you support remote workers or partners with mobile technology?
- Do you have plans to implement a BYOD program, and how much do you expect it to grow?
- Will you need greater network bandwidth to support more traffic?
- Are you currently able to support security and compliance demands? Do you anticipate requirements changing?

☐ Identify utilization and growth in servers, network, and storage.
Inventory your server, network, and storage resources. For servers, note the total number you operate, as well as the following information:

- Name, model, manufacturer, and type (virtual or physical)
- Processor type and number of cores
- Operating system, and security and warranty status
- Amount of memory and storage, in gigabytes (GB) (in physical servers; local or on the network)
- Location (onsite, remote office, colocation facility, or cloud)
- Applications running on the server (version and number of users)

Also include:
- Average utilization
- Network utilization trends
- Storage utilization trends

☐ Identify software (custom or commercial off-the-shelf).
List custom and off-the-shelf software in use, including database, sales, marketing, accounting, customer relationship management (CRM), and other business solutions.

☐ Group infrastructure by key attributes (age, function, etc.).
Now that you know what equipment comprises your infrastructure, use the information to organize the equipment into like groupings. This helps you get a high-level view of the age and functions of your hardware. For instance, you can place servers that are out of warranty or more than 4 years old in one group, or place equipment that supports mission-critical operations into a specific group.
☐ **Diagram infrastructure architecture.**
Your IT team may already have a diagram of your existing IT infrastructure. If so, update the existing diagram; otherwise you’ll have to start from scratch. It’s worth the effort, however, and will be useful for streamlining your upgrade process.

☐ **Determine costs and cost trends.**
What are the ongoing costs of maintaining and managing your current IT infrastructure? Look at trends over the past year or more. For example, you may find that energy and maintenance costs are rising as your infrastructure ages. Make sure you include costs associated with:

- Software licensing
- Maintenance and support services
- Energy consumption
- Staff training
- Colocation costs (if any)

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**Advantages of Open Standards**

Using open standards to build your updated infrastructure makes good sense. For example, compared to RISC/UNIX* implementations, deploying an open-standards Intel® Xeon® processor-based architecture with a Linux* operating system can give you more flexibility, more options, and lower costs. Open standards can help you avoid vendor lock-in and build the infrastructure you need based on requirements—and extend it in the future.

A good place to start your modernization is to upgrade your web servers, firewalls, file and print servers, and backup services to open-standards hardware. Because servers based on Intel architecture are built using open standards, migrating your applications is typically a straightforward process with limited risk. For help getting started, visit intel.com/servermigration.
Step 2: Model—Find Solutions That Meet Your Needs

With a solid understanding of your business requirements and an accurate picture of your current IT situation, you are ready to look for solutions that can meet your needs.

In this step, you make critical decisions about which hardware components and software to retain and which to upgrade. You also start working with vendors to discover what options can best help support your business requirements.

☐ Compare business requirements to vendor offerings.

During the development of your business requirements, gaps between what you need to meet your business requirements and your current IT environment point to areas for improvement in your infrastructure, such as more storage or a faster network. Check with other IT colleagues and research potential solutions to create a list of vendors to approach.

To narrow your list, look for solutions that offer the most critical capabilities. In addition, different vendors may offer package deals, installation and support services, and other advantages, so it pays to conduct a thorough comparison.

☐ Identify application interoperability issues across the solution stack.

In an IT infrastructure, any single change can have a cascading effect on other parts of the environment. That’s why you need to have a detailed discussion about potential interoperability issues with vendors, an external consultant, or your own IT team.

For example, upgrading your operating system may require you to upgrade your database as well. Upgrading to the Windows Server 2012 operating system may result in the need for a more powerful server.

☐ Determine where applications will be hosted (virtual, physical, or cloud).

Finding a “home” for each of your applications is an important step. Applications may be hosted on physical servers, on virtual servers, or in the cloud. Server virtualization enables you to consolidate to a smaller number of more powerful servers. The cloud offers additional cost savings and flexibility advantages.

Simplify Delivery of Your Cloud Services

The cloud is a proven delivery model from which a growing number of organizations from small to midsize and larger have realized impressive agility and efficiency benefits. Highly virtualized, secure, and scalable cloud infrastructure offers unique advantages, providing the capabilities to build an on-premises private cloud and later expand to a hybrid cloud model by adding public cloud services. A well-planned cloud approach will enable you to deliver new and compelling services for your core business workloads.

Intel can help simplify your path to delivering cloud services by providing the technology foundation and the ecosystem resources and expertise to make agility and efficiency part of the foundation of your business strategy.

Our cross-industry initiative, Intel® Cloud Builders, provides detailed reference architectures for building private clouds, and our Intel Cloud Finder tool helps you more easily and quickly evaluate and identify cloud service providers that can best augment your own cloud capabilities.

Find more at intel.com/cloudbuilders and intelcloudfinder.com.
☐ Evaluate which applications should be upgraded.
As a corollary to the above step, determine which applications need to be upgraded and how that will affect where they can and should be hosted. You will most likely want to upgrade applications that are out of warranty (unless you decide to pay for an extended warranty). Plus, you need to understand which hardware will best support the new applications you plan to purchase.

☐ Define hardware components to retain, upgrade, and acquire.
Your business and application requirements should drive your hardware requirements. Because newer applications often don’t always run, or run well, on older servers, you may need to upgrade your hardware. This affords you the opportunity to consider the performance, security, energy efficiency, scalability, and other benefits of upgrading to newer servers.

More on the Intel® Xeon® Processor E5 v2 Family
The Intel® Xeon® processor E5 v2 family powers versatile, cost-effective servers that work hard keeping your business running while supporting strategic initiatives such as cloud computing, scientific and technical computing, and big data analytics. These processors offer an ideal combination of price, performance, energy efficiency, and ease of deployment to meet your current and future needs.

☐ Assess staff training requirements.
Depending on the extent of the changes you are making and the technology know-how of your employees, staff training may be an important element of your data center upgrade plan. Discuss with your vendor the best way to approach training. Make sure you identify who can provide it, as well as the timing and cost.
Step 3: Plan—Determine the Technology You Need

In this step, you develop a project plan that takes into account your site, storage, application, and other infrastructure requirements, and describes the sequence of events and the timing.

Details matter here. For instance, consider the best period for planned downtime. Also count on the unexpected, and develop contingency plans in case unforeseen events delay, interrupt, or otherwise interfere with your carefully thought-out steps.

☐ **Determine site requirements for hosting hardware.**
   Whether you’re bringing in new hardware or consolidating and removing old servers, make sure you understand what you need at the physical site. Make sure you consider:
   - Electrical outlet connections
   - Power requirements
   - Cooling requirements

☐ **Assign applications and development environments to hardware.**
   Match new and old applications with the right hardware. If an aging server can’t support the necessary applications, it can be reassigned for development and testing purposes.

☐ **Define network architecture requirements.**
   Detail your network architecture requirements, including (as appropriate):
   - Creation of a virtual private network (VPN)
   - Assignment to either a router or a server
   - An upgrade to a 1 GB or even a 10 GB network
   - Use of existing cables or an upgrade to Cat 6 for higher speed
   - Wire lengths and locations

☐ **Calculate storage requirements.**
   As with networking, consider every part of your storage solution, including:
   - Assignment of servers or use of separate hardware for storage
   - Hardware for backup storage
   - Data growth on storage devices
   - Upgrades to solid-state drives (SSDs)
About Intel® Solid-State Drives

An important storage option to consider is an upgrade from traditional hard drives to Intel® Solid-State Drives (Intel SSDs). The many advantages include:

- **Lower failure rates.** Intel SSDs experience up to 85 percent lower failure rates than traditional hard drives.†
- **Faster performance.** Intel SSDs perform up to 140 percent faster than the hard disk drives in most PCs.‡
- **Advanced security.** Intel SSDs feature built-in encryption.
- **Greater reliability.** As with all SSDs, Intel SSDs have no moving parts, making them more durable, whether they’re dropped or experience an earthquake, and generally longer lasting than traditional hard drives.

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.


‡ Source: Intel. System configuration: Intel Core™ i7-3960X (15 MB L3 Cache, 3.3 GHz) on Intel Desktop Board DX79SI, AMD® Radeon* HD 6990 and driver 8.881.0.0, BIOS SIX7910J.0193.2011.0809.1137, Intel INF 9.1.2.1007, Memory 16 GB (4 X 4 GB), Triple-channel Samsung® DDR3-1600, Windows* 7 MSAHCI storage driver, Windows 7 Ultimate 64-bit Build 7600 with SP1; SSD—2.5” Intel SSD 520 Series SSDSC2CW240A3, SATA Revision 3.0 Solid-State Drive, 240 GB, FW 400i; HDD—3.5” Seagate® Barracuda* ST31000528AS, SATA Revision 2.0 Hard Disk Drive, 1 TB, 7,200 RPM, 32 MB cache.
Step 4: Execute—Implement Your Upgraded Infrastructure Solution

In this step, your hard work and planning pay off. Execution includes configuring, testing, and training, as well as the final deployment of your upgraded infrastructure. Finally, this step also includes planning for your next upgrade cycle.

Before you start, make sure that you clearly communicate the plan and process to everyone who will be affected by it. And when it's complete, note that last step, which is to get ready for the next upgrade cycle—because your business will not stop evolving and changing, and your IT infrastructure should grow with you.

☐ Configure new hardware.
   Your IT team or a vendor should be able to take care of configuring your new servers. If you purchased a packaged solution, the configuration is already complete.

☐ Install the new operating system and applications.
   Be sure the users who will be affected by the changeover are fully prepared for any downtime.

☐ Test functionality with select users.
   The testing process can be as long or as short as you think is necessary to ensure that the software is working properly.

☐ Establish backup and disaster recovery functionality.
   Very important: Make sure you are prepared for natural disasters (and other unlikely events that could damage your infrastructure and put your data at risk) with backup and disaster recovery solutions.

☐ Conduct user acceptance testing.
   Again, the testing process can be as long or short as you deem necessary. Be sure to listen closely to feedback, and make adjustments as necessary.

☐ Train staff.
   Schedule staff for the training appropriate to their use of applications and systems.

☐ Release to users.
   Take a deep breath and release your newly modernized IT infrastructure.

☐ Plan for a new upgrade cycle.
   The next upgrade cycle will be far easier now that you've gone through the four-step methodology for the first time. On an ongoing basis, keep track as you update equipment, licenses, and warranties during the next few years, which will help to inform the next major upgrade in two to four years.
Intel Resources for Learning More

Web Sites

Intel® Xeon® Processor E5 Product Family
intel.com/xeonE5

Server Refresh

Intel® Server Refresh, the Smart Investment for SMBs: Case Study
This video describes how Brookwood School in Thomasville, Georgia, used virtualization to consolidate four outdated servers into a single server product: Intel Modular Server with Intel Xeon processors. The upgraded hardware provided performance, efficiency, reliability, and energy savings, so the school got more out of its IT systems. (3:45 minutes)
intel.com/content/www/us/en/modular-server/modular-server-brookwood-school-brief-video.html

Intel® Xeon® Processor-Based Server Refresh Savings Estimator
Enter data about your existing IT environment and evaluate how to optimize your server environment by replacing aging servers with the latest generation of Intel Xeon processor-based servers, Intel Ethernet products, and Intel Solid-State Drives. You can run a simple analysis with just a few inputs, customize to your specific environment, model up to five different existing and new profiles, select the cost and savings variables you want to include or exclude, and generate detailed reports.
intelSalestraining.com/serverroi/

Intel® Xeon® Processor E5-2600 v2 Product Family

Data Center Server Meets IT Demands
Short animation about how the versatile Intel Xeon processor E5-2600 product family meets IT challenges like scalability and responsiveness with less latency, more I/O performance, and greater efficiency. (1:43 minutes)
intel.com/content/www/us/en/processors/xeon/xeon-e5-overview-animation.html

Intel® Xeon® Processor E5-2600 v2 Product Family: Product Brief
A four-page product brief describing how IT can drive higher value into their businesses with the Intel Xeon processor E5-2600 v2 product family to reduce costs and deliver new services.
in tel.com/content/www/us/en/processors/xeon/xeon-e5-brief.html

Real-World Guide: Data Center Infrastructure Built on the Intel® Xeon® Processor E5 v2 Family
A guide explaining how to build high-performance, flexible, and scalable data center infrastructure on the Intel Xeon processor E5 v2 product family to support new and innovative services such as virtualization, cloud computing, and big data analytics.
### Appendix

#### Refresh Scenario Configurations

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2013</th>
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</thead>
<tbody>
<tr>
<td>Number of servers</td>
<td>17 servers</td>
<td>1 server</td>
</tr>
<tr>
<td>Processor</td>
<td>Intel® Xeon® processor X5365</td>
<td>Intel Xeon processor E5-2697 v2</td>
</tr>
<tr>
<td></td>
<td>(4 C, 3.0 GHz, 150 W)</td>
<td>(12 C, 2.7 GHz, 130 W)</td>
</tr>
<tr>
<td>Sockets</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Memory</td>
<td>8 x 2 GB FB-DIMM 667 MHz ECC</td>
<td>16 x 8 GB DDR3-1600 REG ECC</td>
</tr>
<tr>
<td>Disk</td>
<td>SAS</td>
<td>Intel DC S3700 800 GB</td>
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<tr>
<td>Operating system distribution</td>
<td>Windows Server* 2003 R2 operating system</td>
<td>Windows Server 2012 operating system</td>
</tr>
<tr>
<td>Active/idle power (W)</td>
<td>385/250 (estimated)²,³</td>
<td>380/92 (estimated)²,³</td>
</tr>
<tr>
<td>Database performance (online transaction processing [OLTP] transactions/time)</td>
<td>145²,³</td>
<td>2,472²,³</td>
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<tr>
<td>General application performance (SPECint*_rate_base2006 score)</td>
<td>99.1</td>
<td>671</td>
</tr>
</tbody>
</table>

#### Other assumptions:

**Investment of $13,440:**
- Intel estimated two-socket new-server price: $12,558 (based on Intel Xeon processor E5-2697 v2).
- New Windows Server 2012 Standard Edition operating system: $882 per server, $0 additional support cost per server per year.

**For efficiency scenario (17:1) annual cost savings of $71,918 (from 17 servers "existing" to one server "new"):**
- Operating system support: $8,500 (based on Windows Server 2003 operating system at $500 support cost per server per year; Windows Server 2012 operating system at $0 additional support cost per server per year).
- Database support: $50,186 (Microsoft SQL Server 2005 software assurance on 2S Intel Xeon processor 5300 series-based server: $3,586 per server per year; Microsoft SQL Server 2012 software assurance on Intel Xeon processor E5-2600 v2 server: $10,776 per server per year).
- Energy (power and cooling): $8,432. Utility rate = $0.10 per kilowatt-hour (kWh), utilized 24-7 (16 hours active, 8 hours idle), PUE 2.0 (Intel estimate). 2S Intel Xeon processor 5300 series-based servers: $8,432 per year; 2S Intel Xeon processor E5-2697 v2-based server: $354 per year (96 percent savings).
- Server and network maintenance: $4,800. $300 per year (server and networking, Intel estimate).

"As low as three-month return on investment" claim based on the investment cost of $13,440 (server and operating system acquisition cost) divided by the total annual savings for operating system support, database support, power, cooling, and server and network maintenance of $71,918 multiplied by 12 months.
Endnotes

Results have been simulated and are provided! for informational purposes only. Results were derived using simulations run on an architecture simulator or model. Any difference in system hardware or software design or configuration may affect actual performance.

Relative performance is calculated by assigning a baseline value of 1.0 to one benchmark result, and then dividing the actual benchmark result for the baseline platform into each of the specific benchmark results of each of the other platforms, and assigning them a relative performance number that correlates with the performance improvements reported.

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3. Results have been estimated based on internal Intel analysis and are provided for informational purposes only. Any difference in system hardware or software design or configuration may affect actual performance.


5. ROI estimated using publicly available Intel Xeon Server Refresh Savings Estimator at intelsalestraining.com/Xeonestimator/demo.htm. For 3-month ROI: based on the investment cost of $13,440 (server and operating system acquisition cost) divided by the total annual savings for operating system support, database support, power, cooling, and server and network maintenance of $71,918 multiplied by 1.2 months.

6. Energy savings estimated using publicly available Intel Xeon Server Refresh Savings Estimator at intelsalestraining.com/Xeonestimator/demo.htm. For energy savings (power and cooling): $8,432. Utility rate = $0.10 per kilowatt-hour (kWh) utilized 24-7 (16 hours active, 8 hours idle), PUE 2.0 (Intel estimate). 2S Intel Xeon processor 5300 series-based servers: $8,432 per year; 2S Intel Xeon processor E5-2697 v2-based server: $354 per year (96 percent savings).

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