



Technical Research Study



How Can IT Teams Best Deliver Value?

Prowess Consulting recommends three steps for transforming IT operations to increase revenue and profitability while reducing risk.

More Is Expected From IT Leaders Today

IT has changed. Today's IT leaders are no longer just order takers who build technology to match specifications. They are expected to be thought leaders that support organizational strategies for increasing revenue and profitability while reducing risk. For every new project an IT organization launches, the IT team must be able to answer the question, "How is business value being delivered?"

It can be challenging to achieve this level of business impact. Staff might be limited, and capital expenditure (CapEx) budgets might be constrained. Ongoing tech-refresh cycles can consume valuable time. And advanced security threats must be continually monitored to manage business risk. These demands are compounded by the recent focus on reducing the use of power and other natural resources to meet sustainability goals.



Figure 1 | Today's IT leaders are expected to be thought leaders

Delivering Value

Prowess Consulting explored how IT teams can best deliver value given the challenges they face. Based on our research, we devised three recommendations for IT teams seeking to deliver value to improve business results. These are:

- Build a forward-looking infrastructure
- Select a business-oriented operating system (OS)
- Simplify software licensing

This paper dives into detail on these three recommendations. We use Dell™ PowerEdge™ servers to show how organizations can create a forward-looking infrastructure. Windows Server 2022 is used to demonstrate features needed in a business-oriented OS. Finally, we illustrate the benefits of simplifying software licensing using the example of licensing through Dell Technologies.

Build a Forward-Looking Infrastructure

Pwerc Consulting's first recommendation for IT teams looking to deliver value is to build a forward-looking infrastructure. The infrastructure must align with organizational priorities like growth, differentiation, and profitability. This calls for a modern edge-to-cloud infrastructure that allows business teams to use data regardless of its location.



Figure 2 | A modern edge-to-cloud infrastructure allows businesses to use data regardless of its location

Data-driven workloads like artificial intelligence (AI) and advanced analytics can open the door to new revenue streams and cost efficiencies. For example, consumer retailers can apply AI to offer differential pricing (such as volume discounts). Healthcare organizations can use AI to assist in diagnosing illness, while media and telecom organizations can make use of AI to analyze video content and gain insight into consumer behavior.

Success with AI and advanced analytics requires the right skillsets and the right technology. And this could mean refreshing hardware and software. Sufficient computing capacity is required to deploy scalable algorithms and manage high-performance networks. As data volumes grow, storage capacity must scale. Network infrastructure is important for deep learning (DL) algorithms that depend on communication.

Additionally, servers need to reinforce security by accelerating policies like Zero Trust adoption, the concept that all users are authenticated and continuously validated for the right credentials to access applications and data. And IT teams must build out an infrastructure with efficient performance to meet sustainability goals.

Finally, to maximize IT productivity, it is ideal to have robust automated tools to manage this infrastructure. Automated tools can also improve system performance, increase uptime, and enhance the end user experience.

Additional details of a forward-looking infrastructure are described in the following sections, including edge computing, support for data-intensive use cases, enhanced hardware security, automation, and increased power-efficiency. PowerEdge servers are used to illustrate these concepts.

Unlock Value at the Edge

Organizations need to create an infrastructure that supports edge computing. Processing data at the edge can decrease latency, increase security, and reduce costs. Selected data can be transferred to the cloud for further processing or storage. Sample use cases include:

- Autonomous vehicle manufacturers use edge computing to process information from car sensors.
- Manufacturers collect, analyze, and act on data at all stages of the production cycle.
- Retailers personalize customer experiences using data insights.

Dell Technologies has extended the reach of its PowerEdge servers to the edge, making them a good choice for a forward-looking infrastructure that requires edge-to-cloud capabilities.

Support Data-Intensive Use Cases

As data volumes increase, higher performance infrastructure is required. Data-intensive use cases include:

- Training and re-training AI/machine learning (ML) models
- Deriving actionable decisions from visual data analytics
- Delivering high-visualization quality updates to remote workers over virtual desktop infrastructure (VDI)

While CPUs can meet these needs, solutions might also benefit from graphics processing units (GPUs) to drive concurrent and massive parallel workstreams. As a result, servers might include accelerators or GPUs that are built to run simple tasks in parallel and quickly, alongside CPUs. This helps ensure data-throughput requirements are met.

PowerEdge server options are available with CPUs, accelerators, and GPUs to help organizations harness applications like AI with maximum performance. PowerEdge servers deliver:

- Up to 10x faster AI model generation than non-GPU servers¹
- Up to 4.5 faster GPU performance than servers with the prior-generation NVIDIA® GPU²
- Up to 50 percent more cores than servers with the previous-generation AMD EPYC™ CPU³

In addition to GPUs and accelerators, PowerEdge server performance derives from high-bandwidth PCIe® 5.0 interfaces, support for next-generation DDR5 DRAM, and new technology such as Compute Express Link™ (CXL™). The following sections explore these technologies in more detail.

High-Performance CPUs

IT teams can purchase PowerEdge servers with a choice of high-performance CPUs. These include:

- **4th Generation AMD EPYC processors.** 4th Generation AMD EPYC 9004 Series processors include up to 96 “Zen 4” microarchitecture-based cores and support 12 DDR5 DRAM channels, the PCIe 5.0 interface, and memory expansion with CXL 1.1.
- **4th Gen Intel® Xeon® Scalable processors.** 4th Gen Intel Xeon Scalable processors include up to 60 cores and support the PCIe 5.0 interface, DDR5 DRAM, and memory expansion with CXL 1.1 support.

PCIe® 5.0 High-Speed Interface

PCIe 5.0, the next generation of PCIe, is a widely used, high-speed interface to connect components such as NVMe Express® (NVMe®) drives, select networking cards, and GPUs. PCIe 5.0 transfers data at 32 gigatransfers per second (GT/s), which is double the speed of PCIe 4.0, at 16 GT/s.

High-Speed DDR5 DRAM

DDR5 DRAM runs at 48,000 megatransfers per second (MT/s), a 50 percent increase in bandwidth over DDR4, with a max speed of 32,000 MT/s. DDR5 splits the memory module into two independent 32-bit addressable subchannels to increase efficiency and lower the latencies of data access for the memory controller.

CXL™ Support

Both 4th Generation AMD EPYC and 4th Gen Intel Xeon processors support CXL 1.1. CXL can enable improved performance, lower latency, and expanded memory. It works by bringing on-device memory into the same pool with system DRAM.⁴

Prioritize Automation

Automation tools for managing infrastructure can enhance employee productivity, increase agility, and reduce security attack surfaces by eliminating manual errors. Key characteristics of server-management tools include the ability to:

- Manage servers in virtual, physical, local, or remote environments
- Monitor the real-time health and status of server infrastructure
- Display real-time telemetry data and alerts

PowerEdge servers are a good fit for organizations prioritizing automation. PowerEdge servers offer several layers of management. These include:

- The Integrated Dell™ Remote Access Controller 9 (iDRAC9) tool, which provides agent-free local and remote server administration. This tool can monitor more than 180 PowerEdge server metrics.
- Dell™ OpenManage™ Enterprise, which is used with the iDRAC9 tool to manage servers in a one-to-many configuration. OpenManage Enterprise can manage up to 8,000 devices and makes it easy to deploy, configure, update, and monitor servers. This tool preserves customer investments by integrating with third-party tools such as Windows Admin Center, VMware vCenter®, and ServiceNow®.
- Dell™ CloudIQ, a cloud-based, OpenManage plug-in that uses proactive monitoring and predictive analytics to report anomalies.



Figure 3 | Automation tools enhance employee productivity

Enhance Hardware Security

Ransomware and other cyberattacks are the enemy of today's data-driven organization. Bad actors can breach hardware when organizations use default passwords across multiple devices, leave outdated firmware in place, or neglect to encrypt sensitive data. Bad actors also attack the supply chain by selling counterfeit parts that can be infiltrated through the backdoor.

PowerEdge servers reinforce security by accelerating Zero Trust adoption, which means all users are authenticated and continuously validated to maintain access to applications and data. PowerEdge servers can:

- Offer supply chain assurance through the Dell™ Secured Component Verification (SCV) tool. This tool enables IT teams to verify that the PowerEdge servers received match what was manufactured in the factory. The Dell SCV tool helps identify counterfeit parts or cases where malware has been deployed.
- Offer root of trust and provide end-to-end verified boot resilience. This includes protecting data with a National Security Agency (NSA)-recognized Unified Extensible Firmware Interface (UEFI) secure boot, which checks the cryptographic signatures of UEFI drivers and other code using custom keys prior to startup.
- Secure data across the server lifecycle with strong encryption and new confidential compute technologies. Confidential computing is an approach that uses secure enclave technology to enable the creation of a trusted execution environment (TEE) based on security features within CPUs.

Improve Sustainability with Power-Efficiency

Global computing infrastructure is forecast to use between 3 and 7 percent of global electricity production by 2030.⁶ This puts the focus on increasing server power-efficiency to decrease electricity use.

The Dell OpenManage Enterprise Power Manager can be used to track and reduce the power usage of PowerEdge servers. It also reports on carbon emissions.



Figure 4 | Manufacturers are moving to a circulatory model prioritizing sustainability

Select a Business-Oriented OS

Prowess Consulting's second recommendation for IT teams looking to deliver value is to select a business-oriented OS. A business-oriented OS is one that excels at deploying high-value business applications—especially in virtualized environments. We recommend selecting an OS that offers advanced multi-layer security, hybrid capabilities with the cloud, and support for features such as containers. These three key features are detailed in the following sections.

Advanced multi-layer security allows organizations to be cyber-resilient and to succeed with data-driven initiatives like AI. Ransomware and other cyberattacks pose threats that can derail modernization projects. And attacks are increasingly destructive, driving the cost per attack into the millions. Cyberattacks occur every 11 seconds, with the average cost of a data breach being \$4.35 million.^{6,7}

Hybrid cloud capabilities allow IT teams to move workloads between private and public cloud infrastructures, which enables greater flexibility. For example, an organization with a hybrid cloud infrastructure can keep sensitive data on premises while running applications in a public cloud so that remote workers with the right credentials can access data from anywhere. A hybrid cloud also allows an organization to cost-effectively manage spikes in demand by easily scaling capacity. Finally, hybrid cloud architectures can improve business continuity. If an on-premises server goes down, processing can be moved to the cloud to minimize downtime.

Modern technologies such as containers are important for new IT initiatives. Containers allow applications to be built once and run anywhere—whether at the edge, on premises, or in the cloud. Containerized development environments can be provisioned in minutes. Also, during the training phase of an AI model, containers provide the flexibility to create distributed training environments across multiple host servers, which allows for better use of infrastructure resources.

To illustrate the benefits of a business-oriented OS, we used Windows Server 2022.

Ensure Advanced Multi-layer Security

On-premises solutions give companies confidence that their data is safe. However, if an on-premises server is misconfigured, it leaves an organization vulnerable to security threats.

To increase server security, Microsoft introduced the concept of a “Secured-core server” with Windows Server 2022. Secured-core servers take a defense-in-depth or multi-layer approach to security, starting with the silicon.



Figure 5 | IT admins use Windows Admin Center to configure Secured-core settings

The Secured-core functionality of Windows Server 2022 deployed on a PowerEdge server uses a firmware-based Trusted Platform Module (TPM), available in either a 4th Generation AMD EPYC processor or a 4th Gen Intel Xeon Scalable processor. The TPM is the basis of a hardware root of trust, and it is used to store encryption keys, certificates, and other digital signatures, checksums, and hashes.

During the boot process, Windows Server 2022 measures and verifies using Dynamic Root of Trust for Measurement (DRTM) technology. DRTM launches the system into a trusted state by taking control of the CPU and forcing it down a well-known and measured code path. The OS isolates driver access to memory with direct memory access (DMA) protection. Finally, Windows Server 2022 can be configured to use Hypervisor-Protected Code Integrity (HVCI) to ensure that only executables signed by known and approved authorities are run.

Take Advantage of Hybrid Capabilities

A hybrid cloud model gives organizations the flexibility to move workloads between on-premises implementations and the cloud as computing needs or costs change. Microsoft enables multiple hybrid management capabilities for Windows Server 2022 through Windows Admin Center, Microsoft Azure Arc, and Microsoft Azure Automanage machine best practices.

Windows Admin Center, an app for managing Windows servers, clusters, hyper-converged infrastructure (HCI), and more, and can be used in the Azure portal to manage the Windows Server OS inside an Azure virtual machine (VM). IT admins can also use it to manage OS functions. They can work with files in VMs without using Remote Desktop or PowerShell.

Azure Arc-enabled servers enable IT admins to manage Windows Server 2022 servers hosted outside of Azure, on corporate networks, or with another cloud provider. The experience is designed to be consistent with how IT admins manage native Azure VMs.

Azure Automanage machine best practices simplifies daily server management by handling the initial setup and configuration of Azure services such as Azure Monitor, Azure Backup, Microsoft Defender, and Windows Update Manager.

Prioritize Application Flexibility

It's important to ensure that applications can be deployed in different computing environments—whether on the edge, on premises, or in the cloud. Windows Server 2022 running on PowerEdge servers achieves this by supporting an improved Windows container experience with Kubernetes.⁸ Microsoft has reduced the Windows container image size by up to 40 percent, which leads to a 30 percent faster startup time and better performance.⁸

Simplify Software Licensing

Prowess Consulting's third recommendation for IT teams is to simplify software licensing. Organizations have the potential to save significant time and expense when they use a single source for both server hardware and software. Software can come preinstalled or preconfigured. This approach can help drive better bottom-line results.

For example, IT teams can order PowerEdge servers from Dell Technologies with virtualization software preinstalled and Windows Server 2022 preconfigured with the right BIOS plug-ins. Windows Server 2022 can ship with the server. IT teams can deploy the OS as soon as servers arrive and they install the OS.

In addition to saving deployment time, Windows Server 2022 purchased through Dell Technologies OEM licensing can save organizations up to 28 percent in licensing costs, as compared to purchasing directly from Microsoft.⁹ The Windows Server 2022 license includes Dell ProSupport™ benefits, which gives organizations a single source of support for both server hardware and software.⁹

Deliver Better Business Results

IT managers are expected to support strategies for increasing revenue and profitability while reducing risk. They are also expected to deliver business value on every project. Today, this means supporting new technologies like AI, which can improve the accuracy of forecasts and enable real-time decisions resulting in increased revenue.

PowerEdge servers with the Windows Server 2022 OS provide the performance needed for these new AI and advanced analytics initiatives. This pairing also enhances security, which can reduce business risk. Finally, simplifying software licensing by purchasing both hardware and software from a single source like Dell Technologies saves time and money, which can lead to increased profitability.

Learn more about delivering better business results with Dell Technologies OEM licensing. Visit www.dell.com/en-us/dt/solutions/microsoft-oem/index.htm



Modernize with Windows Server 2022. The cloud-ready operating system that boosts on-premises investments with hybrid capabilities.

¹ Forrester Consulting. "Dell PowerEdge Servers with NVIDIA GPUs Boost Productivity And Accelerates Timelines For AI Workloads." Commissioned by Dell Technologies and NVIDIA. August 2022.

www.delltechnologies.com/asset/en-us/products/servers/industry-market/forrester-spotlight-boost-ai-workload-performance-servers-gpu.pdf

² Ashraf Eassa, Bo Yang Hsueh, Brian Pharris, Zhihan Jiang, and Ashwin Nanjappa. "Full-Stack Innovation Fuels Highest MLPerf Inference 2.1 Results for NVIDIA." NVIDIA Technical Blog. September 2022.

<https://developer.nvidia.com/blog/full-stack-innovation-fuels-highest-mlperf-inference-2-1-results-for-nvidia/>

³ Storage Review. "4th Gen AMD EPYC Review (AMD Genoa)." November 2022. www.storagereview.com/review/4th-gen-amd-epyc-review-amd-geoa

⁴ Tom's Hardware. "AMD Working to Bring CXL Memory Tech to Future Consumer CPUs." October 2022.

www.tomshardware.com/news/amd-working-to-bring-cxl-technology-to-consumer-cpus

⁵ TechTarget. "Making Data Centers More Sustainable." September 2022. www.datasciencecentral.com/making-data-centers-more-sustainable/

⁶ Cybercrime Magazine. "Global Ransomware Damage Costs Predicted to Reach \$20 Billion (USD) By 2021." October 2019.

<https://cybersecurityventures.com/global-ransomware-damage-costs-predicted-to-reach-20-billion-usd-by-2021>

⁷ Security Magazine. "\$4.35 million — The average cost of a data breach." October 2022.

www.securitymagazine.com/articles/98486-435-million-the-average-cost-of-a-data-breach

⁸ Microsoft. "What's new in Windows Server 2022." December 2022.

<https://learn.microsoft.com/en-us/windows-server/get-started/whats-new-in-windows-server-2022>

⁹ Prowess Consulting. "Prowess Testing Demonstrates the Value of Deploying Dell EMC™ PowerEdge™ R750 Servers with Windows Server 2022 Preinstalled."

Commissioned by Dell Technologies. 2022. www.prowesscorp.com/wp-content/uploads/2022/10/210046-TCO-on-15-with-Windows-Server-2022-Exec-Summary.pdf



The analysis in this document was done by Prowess Consulting and commissioned by Dell Technologies.

Results have been simulated and are provided for informational purposes only.

Any difference in system hardware or software design or configuration may affect actual performance.

Prowess and the Prowess logo are trademarks of Prowess Consulting, LLC.

Copyright © 2023 Prowess Consulting, LLC. All rights reserved.

Other trademarks are the property of their respective owners.

0423/220192