

# Feature Comparison Summary

## Windows Server 2016, Windows Server 2012 R2, and Windows Server 2008 R2

### Windows Server 2016 – The cloud-ready operating system

Windows Server 2016 is the cloud-ready operating system that delivers new layers of security and Azure-inspired innovation for the applications and infrastructure that power your business.

- Increase security and reduce business risk with multiple layers of protection built into the operating system.
- Evolve your datacenter to save money and gain flexibility with software-defined datacenter technologies inspired by Microsoft Azure.
- Innovate faster with an application platform optimized for the applications you run today as well as the cloud-native apps of tomorrow.

Most organizations today are running a mixture of traditional and cloud-based workloads. Windows Server 2016 is a great operating system for hybrid environments. Evolve your on-premises datacenter to be more secure and efficient. Plus, benefit from cloud-consistency built into Windows Server 2016 to move workloads from on-premises to Azure, in virtual machines or containers.

Get started today and use Windows Server licenses with Software Assurance to save up to 40 percent when you move workloads to the cloud with the [Azure Hybrid Use Benefit](#).

### How to use this comparison guide

Use this guide to compare specific features of Windows Server versions to understand the differences between the version you are running today and the latest version available from Microsoft.

Security is a top priority for IT teams. New threats have made it harder than ever for IT to secure data and applications. Windows Server 2016 gives you new capabilities to help prevent attacks and detect suspicious activity, with features to control privileged access, help protect virtual machines, and harden the platform against emerging threats.

| Scenario                                                                                                                                         | Feature Description                                                                                                                                                                                              | Windows Server 2008 R2 | Windows Server 2012 R2 | Windows Server 2016 |
|--------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|------------------------|---------------------|
| Security                                                                                                                                         | <b>Shielded Virtual Machines:</b> Uses BitLocker to encrypt disk and state of virtual machines.                                                                                                                  | ○                      | ○                      | ●                   |
|                                                                                                                                                  | <b>Host Guardian Service:</b> Helps ensure Hyper-V hosts running Shielded Virtual Machines are allowed and healthy hosts.                                                                                        | ○                      | ○                      | ●                   |
|                                                                                                                                                  | <b>Just Enough Administration (JEA):</b> Limits administrative privileges to the bare-minimum required set of actions (limited in space).                                                                        | ●                      | ●                      | ●                   |
|                                                                                                                                                  | <b>Just-in-Time Administration (JIT):</b> Provides privileged access through a workflow that is audited and limited in time.                                                                                     | ◐                      | ●                      | ●                   |
|                                                                                                                                                  | <b>Credential Guard:</b> Uses virtualization-based security to help secure credential information.                                                                                                               | ○                      | ○                      | ●                   |
|                                                                                                                                                  | <b>Remote Credential Guard:</b> Works in conjunction with Credential Guard for Remote Desktop Protocol (RDP) sessions to deliver Single Sign-On (SSO), eliminating the need to pass credentials to the RDP host. | ○                      | ○                      | ●                   |
|                                                                                                                                                  | <b>Device Guard:</b> Helps ensure only authorized executables run on the machine.                                                                                                                                | ○                      | ○                      | ●                   |
|                                                                                                                                                  | <b>AppLocker:</b> Provides policy-based access control management for applications.                                                                                                                              | ◐                      | ●                      | ●                   |
|                                                                                                                                                  | <b>Windows Defender:</b> Automatically helps protect machines from malware while allowing legitimate applications to run.                                                                                        | ◐                      | ◐                      | ●                   |
|                                                                                                                                                  | <b>Control Flow Guard:</b> Helps protect against classes of memory corruption attacks.                                                                                                                           | ○                      | ○                      | ●                   |
|                                                                                                                                                  | <b>Generation 2 virtual machines:</b> Allows VMs to use hardware-based security to leverage Secure Boot, BitLocker, etc.                                                                                         | ○                      | ◐                      | ●                   |
|                                                                                                                                                  | <b>Enhanced auditing for threat detection:</b> Provides better log information.                                                                                                                                  | ○                      | ◐                      | ●                   |
|                                                                                                                                                  | <b>Dynamic Access Control:</b> Enables administrators to apply access-control permissions and restrictions based on well-defined rules.                                                                          | ○                      | ●                      | ●                   |
|                                                                                                                                                  | <b>Windows Firewall with Advanced Security:</b> Allows granular firewall configuration.                                                                                                                          | ○                      | ●                      | ●                   |
|                                                                                                                                                  | <b>BitLocker:</b> Uses a hardware or virtual Trusted Platform Module (TPM) chip to provide disk encryption for data and system volumes.                                                                          | ◐                      | ●                      | ●                   |
| <b>Small-footprint Hyper-V host (Server Core/Nano Server):</b> Minimizes attack surface with a Hyper-V host running minimum required components. | ◐                                                                                                                                                                                                                | ◐                      | ●                      |                     |

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Datacenter operations seem to earn more scrutiny than budget these days. New applications stretch the operational fabric and create infrastructure backlogs that can slow business. IT organizations are expected to do more with less, but an aging infrastructure with little automation becomes a hindrance to moving forward. As organizations look beyond server virtualization for more efficiency, they can use Windows Server 2016 capabilities to meet operational and security challenges, freeing up IT resources to plan and innovate on future solutions that drive business success.

| Scenario                 | Feature Description                                                                                                                                                                                                                                                                        | Windows Server 2008 R2 | Windows Server 2012 R2 | Windows Server 2016 |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|------------------------|---------------------|
| Software-defined compute | <b>Cluster OS Rolling Upgrade:</b> Enables you to upgrade your server clusters from Windows Server 2012 R2 to Windows Server 2016 while continuing to provide service to your users.                                                                                                       | ○                      | ○                      | ●                   |
|                          | <b>Linux and FreeBSD Workloads:</b> Enables most of the Windows Server software-defined datacenter features for Linux and FreeBSD guests running on Hyper-V for increased functionality, performance, and manageability.                                                                   | ◐                      | ◐                      | ●                   |
|                          | <b>Hot add and remove for disk, memory and network:</b> Add or remove a network adapter and adjust the amount of memory assigned while the VM is running, without any interruption. The memory adjustment capability works even when you have Dynamic Memory turned on for a Hyper-V host. | ○                      | ◐                      | ●                   |
|                          | <b>Mixed OS Mode cluster:</b> Provides ability for Windows Server 2012 R2 cluster nodes to operate with Windows Server 2016 nodes.                                                                                                                                                         | ○                      | ◐                      | ●                   |
| Software-defined storage | <b>Storage Spaces Direct:</b> Enables industry standard servers with local storage to build highly available and scalable software defined storage.                                                                                                                                        | ○                      | ○                      | ●                   |
|                          | <b>Storage Replica:</b> Provides storage agnostic, block-level, synchronous replication between servers for disaster recovery, and allows stretching of a failover cluster for high availability.                                                                                          | ○                      | ○                      | ●                   |
|                          | <b>Site-Aware Failover Clusters:</b> Enables nodes in stretched clusters to be grouped based on physical location, enhancing key cluster-lifecycle operations, such as failover behavior, placement policies, heartbeating between nodes, and quorum behavior.                             | ○                      | ○                      | ●                   |
|                          | <b>Storage Quality of Service (QoS):</b> Uses policies to define and monitor storage I/O minimums and maximums for virtual machines to enable consistent performance across VMs.                                                                                                           | ○                      | ◐                      | ●                   |
|                          | <b>Data deduplication:</b> Provides volume savings of up to 90% by storing duplicate files on a volume once using logical pointers.                                                                                                                                                        | ○                      | ◐                      | ●                   |
|                          | <b>Virtual machine storage resiliency:</b> Provides intelligent means to retain virtual-machine session states to minimize the impact of minor storage disruptions.                                                                                                                        | ○                      | ○                      | ●                   |
|                          | <b>Azure Consistent Storage:</b> Delivers three critical Azure-consistent storage services for Azure Stack customers: blob, table and account management.                                                                                                                                  | ○                      | ◐                      | ●                   |
|                          | <b>Azure Witness for cluster:</b> Enables Azure blob storage as a witness in a quorum for a stretched cluster.                                                                                                                                                                             | ○                      | ○                      | ●                   |

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| Scenario                            | Feature Description                                                                                                                                                                                                                                                                           | Windows Server 2008 R2 | Windows Server 2012 R2 | Windows Server 2016 |
|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|------------------------|---------------------|
| Software-defined storage, continued | <b>Storage health monitoring:</b> Provides continuous monitoring, reporting, and maintenance to support Storage Spaces Direct.                                                                                                                                                                | ○                      | ○                      | ●                   |
| Software-defined networking         | <b>Network Controller:</b> Provides a centralized, programmable point of automation to manage, configure, monitor, and troubleshoot virtualized network infrastructure in your datacenter.                                                                                                    | ○                      | ○                      | ●                   |
|                                     | <b>Virtual networking:</b> Helps create network overlays on top of a shared multi-tenant physical fabric.                                                                                                                                                                                     | ○                      | ●                      | ●                   |
|                                     | <b>Software Load Balancer (SLB):</b> A cloud-optimized Layer 3 and Layer 4 load balancer that provides both North-South and East-West load balancing.                                                                                                                                         | ○                      | ○                      | ●                   |
|                                     | <b>Distributed firewall and microsegmentation:</b> Dynamically segment networks based on evolving security or application needs using a stateful firewall and network security groups.                                                                                                        | ○                      | ◐                      | ●                   |
|                                     | <b>Hybrid SDN gateways:</b> Multi-tenanted, highly available gateways that connect customer virtual networks to Azure, other Windows Server-powered clouds, high speed WANs, and local non-virtualized resources.                                                                             | ○                      | ●                      | ●                   |
|                                     | <b>Converged RDMA:</b> Converge RDMA storage traffic and tenant Ethernet traffic on the same underlying NIC team for significant cost savings, while getting the desired throughput and quality of service.                                                                                   | ○                      | ○                      | ●                   |
|                                     | <b>IP Address Management (IPAM) and DNS:</b> IPAM now supports comprehensive DNS and DHCP management with role-based access control across multiple AD forests. DNS provides for traffic management, load balancing, and split-brain deployments and prevention of DNS amplification attacks. | ○                      | ◐                      | ●                   |
|                                     | <b>PowerShell 5.1:</b> Provides enhanced scripting capabilities for configuration, management and deployment of software-defined datacenter components.                                                                                                                                       | ●                      | ●                      | ●                   |
| Other Capabilities                  | <b>MultiPoint Services Role:</b> New role in Windows Server 2016 that enables low cost-per-seat by allowing multiple users to run their own sessions while connected to one machine.                                                                                                          | ○                      | ○                      | ●                   |
|                                     | <b>RDS RemoteFX vGPU:</b> Provides a rich desktop remoting experience (up to 4k) by allowing multiple VMs to share the same physical GPU for graphics acceleration.                                                                                                                           | ○                      | ◐                      | ●                   |
|                                     | <b>High-availability RDS Connection Broker:</b> Helps create a fault-tolerance connection broker for Remote Desktop scenarios.                                                                                                                                                                | ○                      | ◐                      | ●                   |
|                                     | <b>RDS VM architecture for cloud:</b> Windows Server 2016 can leverage Azure services for more cost effective solutions. (Application Proxy, AD Domain Services).                                                                                                                             | ○                      | ○                      | ●                   |
|                                     | <b>Nano Server installation option:</b> New remote-administered option for private clouds and datacenters.                                                                                                                                                                                    | ○                      | ○                      | ●                   |

Support developers in the race to create cloud-ready, business-changing apps and services, whether on-premises or in any cloud, using technologies such as containers and the lightweight Nano Server installation option. Windows Server 2016 can help you modernize your apps and innovate faster.

| Scenario                         | Feature Description                                                                                                                                                                                             | Windows Server 2008/R2 | Windows Server 2012/R2 | Windows Server 2016 |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|------------------------|---------------------|
| Cloud-Ready Application Platform | <b>Windows Server containers:</b> Creates an isolated application environment (kernel, system drivers, etc.), in which you can run an application without fear of changes due to applications or configuration. | ○                      | ○                      | ●                   |
|                                  | <b>Hyper-V containers:</b> Provides a highly isolated environment in which to operate, where the host operating system cannot be affected in any way by any other running container.                            | ○                      | ○                      | ●                   |
|                                  | <b>Nano Server installation option:</b> New, lightweight option for Windows Server 2016, optimized for cloud infrastructure and perfect for running microservices and applications in containers.               | ○                      | ○                      | ●                   |
|                                  | <b>PowerShell 5.1:</b> Provides enhanced scripting capabilities for configuration, management and deployment of software-defined datacenter components.                                                         | ●                      | ●                      | ●                   |
|                                  | <b>PowerShell Desired State Configuration (DSC):</b> Provides a set of PowerShell language extensions and cmdlets to declaratively specify how you want your software environment to be configured.             | ●                      | ●                      | ●                   |
|                                  | <b>Azure Service Fabric for Windows Server:</b> Enables you to create a multi-machine Azure Service Fabric cluster in your own datacenter or in other public clouds.                                            | ●                      | ●                      | ●                   |
|                                  | <b>Visual Studio Code:</b> Supports development operations such as debugging, task running and version control to provide just the tools a developer needs for a quick code-build-debug cycle.                  | ●                      | ●                      | ●                   |
|                                  | <b>.NET Core:</b> Helps create modern web apps, microservices, libraries and console applications that run on Windows, Mac, and Linux.                                                                          | ●                      | ●                      | ●                   |

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