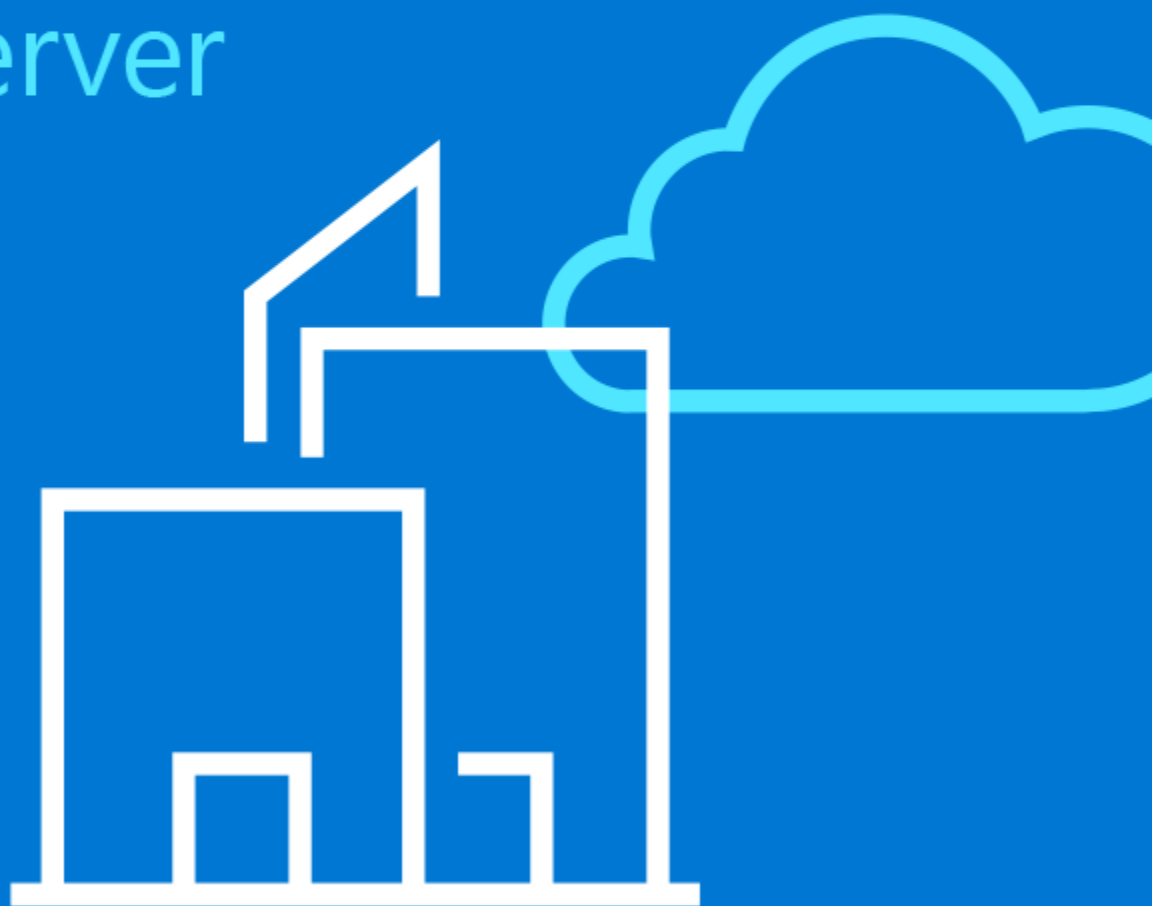




# Migration Guide

## for Windows Server



For more than 20 years, Windows Server has been the operating system of choice for enterprise workloads—but the cloud is increasingly an alternative destination for on-premises deployments of key workloads. The rapid growth of cloud-based services means you've got more options—and more questions—about best approaches for your business-critical services and applications.

This guide helps you understand how to analyze existing IT resources, assess what you have, and identify the benefits of moving specific services and applications to the cloud or keeping workloads on-premises and upgrading to the latest version of Windows Server. We'll help you answer these (and other) important questions:

- How can I know which workloads will work best in the cloud?
- How can I move my custom line-of-business applications?
- What's the best way for me to upgrade my older servers and applications on-premises?
- How can I reduce risk and increase speed when I migrate to cloud or upgrade on-premises?
- What are my options for workloads that I don't want to move to the cloud?

# A simpler approach to migration

Migration is a way of life in any datacenter. Upgrading to the latest platform or moving workloads to the cloud enables you to benefit from new features and functionality. By breaking down the migration process into three steps—Assess, Migrate, and Optimize—you can solve the most pressing migration challenges and deliver the reliability, performance, and security your business stakeholders expect.

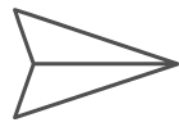
Following this process will help you plan for these activities:

- Designing a hybrid on-premises + cloud model that meets your business needs.
- Providing network connectivity and authentication between on-premises and cloud workloads.
- Reconfiguring workloads as you move them to the cloud to meet applicable compliance and governance standards.
- Understanding which workloads to migrate and in what order.
- Determining which migration approaches work best for each workload you need to move.



## Assess

Inventory workloads in your environment and determine migration path.



## Migrate

Upgrade to Windows Server 2016 or migrate to Azure with guidance, resources, and tools.



## Optimize

Use Azure hybrid services to manage cost and resources, and strengthen security and compliance across your on-premises and Azure workloads.

## Seizing opportunities using today's technology

Cloud adoption is on the rise, as more organizations seek to transform their operations with cloud innovations. Cloud services offer tempting potential for cost savings, increased agility, and technology upgrades, assuming you can set and execute based on priorities.

As part of the Assess process explained in this guide, you might find that some high-value workloads are well suited for cloud migration and worth the additional effort. Many organizations, however, choose to start with some lower-value workloads to deliver quick wins and build skills and confidence.

In other cases, organizations will decide to keep some or all workloads on-premises and upgrade the operating system.

You can plan and carry out your migration with maximum efficiency by taking advantage of the wide range of training, technology, and tools from Microsoft. This guide introduces you to the Microsoft resources that can help you understand the people, process, and technology issues that underlie application migration.

## The phases: Assess, Migrate, Optimize

---

### Assess

Take a systematic look at your environment to determine what you have, where it is, what it does, and whether it's a good candidate for moving to the cloud or upgrading on-premises. If you move to the cloud, you might use tools like [Azure Migrate](#) and [Microsoft Data Migration Assistant](#).

The output of the Assess phase is typically a list of the items you've discovered, ranked according to business impact and value, with business-critical resources at the top and lower-value legacy workloads at the bottom. Tiering your findings enables you to prioritize the systems to migrate or upgrade. Start by understanding the applications you need to migrate, the underlying architectural dependencies and business requirements, and the post-migration benefits that stakeholders expect.

---

### Migrate

For cloud migration, you can use proven tools such as [Azure Site Recovery](#) to seamlessly rehost virtual machines and [Azure Database Migration Service](#) to move databases to Azure. Depending on your approach, you might also refactor apps with container services, rebuild, or rearchitect. For your data, you can migrate to an [Azure SQL Database Managed Instance](#) or modernize with [Azure CosmosDB](#).

If you plan to upgrade on-premises, explore the latest version of Windows Server, with capabilities that can help you get cloud- and DevOps ready, along with straightforward tools and guidance on migrating your applications and workloads to Azure.

---

### Optimize

Once the Migrate phase is complete, you will want a smooth transition to the day-to-day realities of operating workloads in their new homes and—if moving workloads to Azure—managing subscriptions versus servers. In this phase, you want to ensure the new environment meets security and governance requirements.

You can take advantage of incremental learning as your team grows in knowledge and skill working in Azure. Using services such as [Azure Security Center](#), you can strengthen security and ensure compliance across your hybrid environment. [Cost Management for Azure](#) and [Azure Advisor](#) can help you better manage your cloud resources. Finally, as Microsoft introduces new Azure tools and capabilities, your cloud operations can benefit by improving speed, agility, security, and capability.

To help manage on-premises servers, use [Microsoft System Center Configuration Manager](#).

---

## Migration tips

### Tip #1

Take advantage of the investment you've made in Active Directory by using Azure Active Directory to seamlessly unite your on-premises, cloud, and hybrid applications and services.

### Tip #2

Get DevOps benefits and portability by moving web apps to Azure with minimal code changes, using container features in Windows Server 2016.

### Tip #3

Remember that *you* control the pace and scope of your migration. Many organizations find that hybrid deployments, in which some workloads remain on-premises, meet their needs best. Azure has a rich set of coexistence tools to help you find the precise mix of cloud and on-premises services that work best for your organization.

### Tip #4

Keep in mind that you can upgrade workloads on-premises and get improved flexibility, security, and robustness. Upgrading now prepares you for hybrid cloud operations when you're ready.

## The Assess phase

The Assess phase sets the stage for a successful migration by helping you understand the totality of your datacenter environment and reduce the risk of business disruption using a structured process. A successful first migration can give you the confidence to tackle more complex and important workloads.

Microsoft helps you identify and minimize migration risks by providing a comprehensive family of tools and resources to help you prioritize which workloads to migrate first. Deployment guides and technical whitepapers, based on hundreds of real-life migrations, help you step through the process. Review the [Getting Started](#) and the [Resources](#) sections in this document.

Some of the questions you'll want to ask include:

- Which applications can migrate to Azure and which should remain on-premises?
- How do you handle the services used by each application? Can they be split across on-premises and the cloud?
- Are there dependencies between applications that will influence which ones move, or will impose constraints?
- What is the expected impact on the network?
- Will the migration require changes to how to authenticate and authorize user access?
- What databases do the applications depend on and where should they be located?
- How will a migration to Azure impact budgeting and costs?
- What are the options to stay compliant as Windows Server 2008 and 2008 R2 workloads near end of support?

By organizing your inventory into four basic categories of workloads and apps, you help set the course for your migration.

- **Custom applications**, or line-of-business (LOB) applications, developed in house.
- **Microsoft applications**, including Microsoft Exchange and SharePoint, or workloads running on Remote Desktop Services.
- **Microsoft partner applications** such as SAP and Adobe, or other off-the-shelf partner applications.
- **Servers that run key workloads**, including network services like Domain Name System (DNS), file and print servers, and other Windows Server components.

### Assessment tips

Inventory your apps and workloads, then carefully evaluate the difficulty and risk of migrating each one. This evaluation helps you prioritize and plan based on issues and opportunities.

#### Inventory by type

Sort applications into basic categories:

- Custom applications
- Microsoft server applications (Exchange, Skype, SharePoint)
- Microsoft partner applications
- Windows Server workloads (such as DNS and file/print)

#### Calculate application risk

Two factors drive migration risk: business impact and complexity.

- Score business impact by assessing how important the workload is to your business operations.
- Score complexity by evaluating how complex the application is and how well your team understands it.

A critical workload will score a higher risk even if it's simple, whereas a more complex but less critical workload might end up with a lower risk score—and thus might be a better candidate for early migration.

## Seize the opportunity to transform with Azure?

With your initial inventory of IT assets and systems in hand, you may want to consider which of your workloads and apps are appropriate for cloud migration. Using the cloud enables you to minimize time and resources spent managing virtual machines and focus on innovation and business growth. The potential benefits are many:

- **New experiences for users.** Once your app is on Azure, you can take advantage of innovative cloud services that use artificial intelligence and machine learning to help you change the way you interact with customers. These might include including image-processing algorithms, voice verification, audio-to-text conversion, natural language processing, and other [Azure Cognitive Services](#).
- **Reduced maintenance overhead.** You can reduce IT overhead and maintenance costs by moving line-of-business applications built on older versions of Windows Server and SQL Server to the latest versions—significantly reducing the work required to operate, secure, and maintain these applications.
- **Increased speed through agile software development.** As more organizations build apps to differentiate themselves, they also explore new ways to deliver quality software faster. To remove traditional bottlenecks and move closer to DevOps collaboration, organizations can rehost [.NET applications](#) using Windows containers and add cloud-based dev/test/production environments. Every size organization can benefit from scalable and continuous delivery, testing, integration, and deployment.
- **Global scale.** For applications and workloads that are spread out geographically, moving to a cloud like Azure offers global distribution with defined SLAs on performance. The more locations you must deal with today, the greater the potential benefit from Azure’s global reach and high availability features. (These factors will also require more complex migration planning.)
- **Improved security.** Help protect your company’s reputation while simultaneously maximizing availability and data integrity with Azure’s robust suite of security monitoring tools and controls. Powerful network security, access and authorization controls, and auditing features add control and peace of mind.
- **Compliance.** Consider the data sovereignty or local compliance requirements for your workloads and the security practices of any prospective cloud provider. Is your company subject to the European Union (EU) General Data Protection Regulation (GDPR)? GDPR, which gives EU residents greater control over their personal data, requires organizations to maintain appropriate security of personal data and give EU residents access to export, edit, and delete sensitive data from your systems. Many organizations will want to start reviewing or modifying procedures—including data processing security. The good news for organizations open to cloud migration is that Azure is a GDPR compliant cloud, benefiting from annual security investments of more than \$1 billion. Moving workloads to Azure or the latest Windows Server helps you focus on managing the application actions and policies required to remain compliant.

## Build your knowledge

### Get hands-on

Microsoft offers free [12-month trial subscriptions](#) to Azure, so you can build a trial environment and experiment with Azure to deepen your team’s knowledge and capabilities in parallel with your inventory activities.

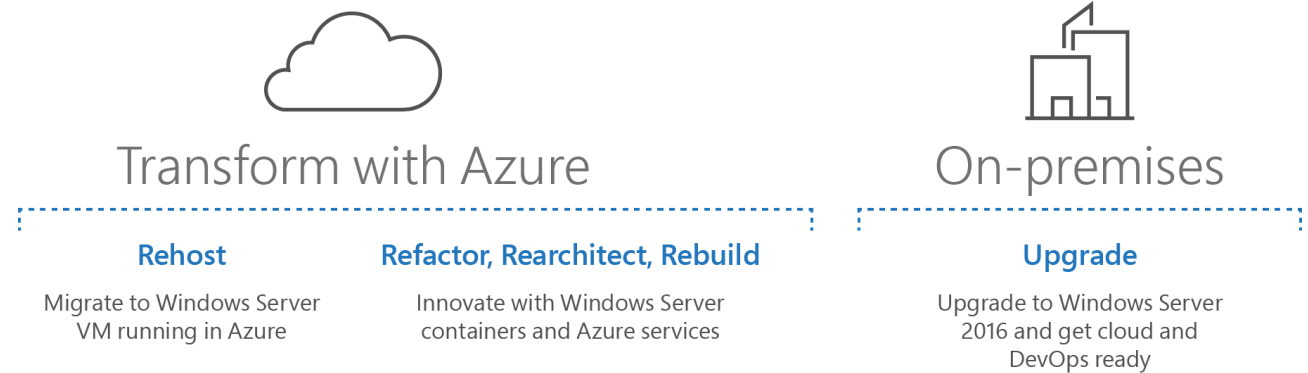
You can also [evaluate Windows Server 2016](#), the operating system that helps you get cloud- and DevOps ready while you support current workloads.

### See the future of management

It’s built for the future, but you can benefit today when you [download Windows Admin Center](#) (WAC), a locally deployed, browser-based app for managing servers, clusters, hyper-converged infrastructure, and Windows 10 PCs. WAC comes at no additional cost beyond Windows and is ready to use in production. Install in under 5 minutes and manage servers in your environment immediately, no target configuration required. It complements existing management tools like System Center and Azure Operations Management Suite with granular management capabilities.

## Choosing a migration approach

Based on workload type, criticality, risk assessment, and other factors, you will choose the next steps for each workload and app. Here are four solid options, each of which will be explored in detail later in this guide.



- **Rehost the workload on Azure**, using Azure virtual machines. This approach works well for self-contained workloads running on Windows Server. Use Azure Site Recovery or other commercial tools to migrate the machine images from physical or virtual machines to Azure Virtual Machines and use Azure networking services to tie them back to your datacenters.
- **Refactor the applications**. Do this with minimal coding by placing apps in containers and moving the containers to Azure. You will likely find this process the quickest and safest route to move many legacy LOB applications.
- **Rearchitect or Rebuild applications** to take full advantage of advanced managed services in Azure. This approach requires more time and a larger investment than rehosting or refactoring, but it can deliver improved agility, performance, and resilience at a lower total cost of ownership.
- **Upgrade on-premises**. You might need to keep apps and workloads on premises, but still need to improve security, reliability, and flexibility. Upgrading these applications to the latest version of Windows Server delivers these benefits whether you adopt a DevOps model or stick with conventional operations. Whatever operating model you use, upgrading to the latest version of Windows Server helps you reduce maintenance costs while simultaneously allowing you to improve your operational processes.

## The Migrate phase: Azure and on-premises

With the Assess phases completed, you're ready to start migrating assets to the cloud or to a newer operating system on-premises. Microsoft provides a wealth of guidance and tools to help you understand, plan, and carry out your migration. Each of the four categories of workloads and apps described earlier require different skills and tools to migrate.

### Migrating custom line-of-business applications to Azure

For many organizations, the line-of-business (LOB) applications they have developed for internal use are the most critical part of the IT infrastructure. These applications may be conceptually simple or complex; they may be large or small; and they may have been developed by large teams or a small group trying to solve a business problem. Many LOB applications are old, poorly understood, and lightly maintained, especially if the original developers have moved on to other roles or retired. Often these legacy LOB applications are the most critical of the most critical, since keeping them running as code and support systems age gets increasingly difficult. The good news is that Microsoft tools and technologies can help you modernize, protect, and improve these applications.

Consider setting up an Azure sandbox environment to test what happens when you migrate a non-production instance of your application—this gives you a safe, controlled environment. Using tools such as Azure Migrate, you can capture a copy of the on-premises workload and put it in the sandbox to better understand how it will function. Containerization is also an excellent way to test a non-production instance of your application—put it into a container and then move the container to Azure.

Web applications can benefit greatly from migration and extension to the cloud. Many LOB applications follow a multi-tier model. It might seem difficult to move all tiers of a critical application to the cloud, but you can realize significant benefits by moving only some of the tiers.

- For example, rehosting the front-end portion of a multi-tier application in Azure enables you to take full advantage of the Azure scale, security, load balancing, and geographic resiliency features, often with no code changes required.
- Azure Site Recovery tools can speed the process of replicating application data, and powerful container services in Azure give you a quick path to move entire applications with minimal changes.
- To drive value quickly, find quick wins by first rehosting application components and services in Azure, if possible, then you can refactor, rearchitect, or rebuild other components. For example, a multi-tier LOB application that uses a database may be configured to use an [Azure SQL Database Managed Instance](#) while you keep the front-end and business logic tiers untouched—or you could recreate a front-end tier using Azure Functions for serverless computing. The ability to mix and match Azure services with on-premises components offers a great deal of flexibility and enables you to quickly capture value from the cloud without needing to re-engineer your most important applications at once.

### Measure twice, cut once

A careful approach will help protect your business operations from disruption. To help make sure your LOB migration goes smoothly, consider the following factors:

- **Dependencies.** Carefully analyze dependencies, including authentication, between LOB applications and other services. These dependencies may be as simple as an SSL connection or as complex as a set of remote APIs that applications use to communicate. Include a plan for authentication.
- **Databases.** Some applications include external databases. You can use Azure Database Migration Service to migrate databases to Azure SQL Database to support any migrated applications you have rehosted in Azure Virtual Machines.
- **Multi-tier.** Azure services can help you migrate tiers to smooth the migration. (See more at left.)
- **Application criticality.** This ranking, which was part of the Assess phase, helps you determine if the app should be refactored, rearchitected, or rebuilt.



## Migrating Microsoft server applications to Azure

Most businesses depend on Microsoft technologies to power email, file sharing, collaboration, and database services. Many of these enterprises increasingly find that they want the additional functionality, flexibility, and security offered by moving the fundamental capabilities provided by applications like Microsoft Exchange, SharePoint, and Skype for Business into the cloud. That's why Microsoft and its partners offer tools and knowledge to support cloud migration. For example, Exchange Online offers full hybrid connectivity to allow on-premises and Office 365 users to seamlessly work together, along with tools to move mailboxes and public folders to the cloud without interrupting your users' work.

Besides like-for-like replacement (such as moving from Exchange on-premises to Exchange Online), moving to Office 365 gives users new capabilities, such as the

Intelligent Communications services provided by Microsoft Teams or the task and time management tools included with Microsoft To-Do and Microsoft Planner. Adopting these additional features helps boost user productivity and maximize the value you get from your Office 365 subscriptions.

One important aspect of migrating Exchange, SharePoint, or SQL Server data to the cloud is that you can typically perform these migrations in parallel with the work you're doing on other applications, and with desktop upgrades or migrations. This combination allows you to build a powerful strategy that refreshes your most critical applications, the services your users need, and their desktop environments all at the same time.

---

## Migrating applications from Microsoft partners to Azure

As Windows Server grew into the preferred enterprise application platform, Microsoft partners built applications that now serve as the core of many modern business operations. Partners such as Adobe, Citrix, and SAP deliver solutions that reach hundreds of millions of Windows users daily—and your business may depend on these applications.

Traditionally, IT teams migrate partner applications by installing the latest version of the application on the latest supported Windows Server version, then using vendor-specific tools to migrate to the new version. With Azure, you gain new migration alternatives that can speed and secure your migration for select third-party applications.

First, many key Microsoft partners are moving their solutions natively to Azure. [SAP HANA](#), [Adobe](#), Citrix, and other partners offer Azure-based solutions that combine

the power of the Azure cloud with the functionalities unique to these applications. The [Azure Marketplace](#) offers hundreds of Azure-native solutions covering a broad range of business and technology applications.


Second, many on-premises applications can safely be migrated to Azure using the same techniques you would use for LOB applications: migrating the server instance from an on-premises physical or virtual machine into an Azure Virtual Machine and taking advantage of Azure networking and security features to tie it to your remaining on-premises resources. This may be a valuable option if your application vendor hasn't yet produced a native Azure version. As more developers take advantage of the power and flexibility of Azure services, a growing number of ISV applications will become Azure-native.


## Migrating server roles to Azure

One of the key factors driving Azure migration is the need for businesses to improve security and reliability. Windows Server 2016 offers wide-ranging backwards compatibility combined with full lifecycle support for all Windows Server role workloads in common use.

- **Active Directory.** You can convert existing Windows Server 2008 Active Directory domain controllers to Windows Server 2016 instances running on Azure Virtual Machines, which gives you all the security and reliability improvements in Windows Server 2016 without requiring you to buy or deploy new hardware.
- **DNS.** You can replace your existing on-premises DNS servers with Azure DNS. Modernizing your existing workloads gives you the benefit of all the service and feature improvements of Azure deployments and reduces operating overhead by reducing the number of servers and applications you have to manage.

**File and print services.** Migrate data from file shares to OneDrive for Business, SharePoint Online, or Teams. [Windows Server Storage Migration Service](#) helps you migrate servers and their data without reconfiguring applications or users. Because Azure Files securely exposes your file storage areas through the industry-standard SMB protocol, you can use any file copy or migration tool you like to move your content—giving you rich options for moving your data on your own schedule. The Azure Migrate tool can help you identify which specific roles you have in place; using this guide along with its results will help you figure out which server roles should be modernized and which should be moved to the cloud.

  
**Transform with Azure**

  
**On-premises**

	<b>REHOST</b> Migrate to Azure VM running Windows Server 2016, 2012, or 2008	<b>REFACTOR, REARCHITECT, REBUILD</b> Containerize apps with Windows Server 2016 or rewrite using Azure PaaS	<b>UPGRADE</b> Upgrade servers to get cloud and DevOps ready
<b>CUSTOM LOB APPS</b>			
<b>Web app</b>	Azure VMs with Windows Server Windows Server Containers	Container services in Azure Azure Service Fabric Azure App Service Azure Functions	Windows Server 2016 LTSC
<b>Database</b>	Azure SQL Database Managed Instance Azure Database for MySQL/PostgreSQL Cosmos DB	Azure SQL Database Managed Instance Azure Database for MySQL/PostgreSQL Cosmos DB	SQL Server 2016-2017
<b>MICROSOFT APPS</b>			
<b>Office workloads</b>	Explore Office 365 for SharePoint, Exchange, Skype for Business		
<b>Remote Desktop Server</b>	Move RDS role to Azure Windows Server VM	Citrix-hosted VDI solution (Azure Marketplace)	Windows Server 2016 LTSC
<b>ISV APPS</b>			
<b>ISV App</b>	Azure-hosted app (Azure Marketplace)	SaaS packaged apps (Azure Marketplace)	Latest version of Windows Server that app supports
<b>SERVER ROLES</b>			
<b>AD, DNS and DHCP</b>	Deploy Active Directory and DNS servers in Azure Windows Server VMs	Azure Active Directory and Azure Domain Services (ADS) Azure DNS	Windows Server 2016 LTSC
<b>File server</b>	Azure Files Services and Azure File Sync with Windows Server Storage Migration Service		Windows Server 2016 LTSC

## Upgrading to latest version of Windows Server

As part of the Assess phase, you might discover workloads running on older operating system that you want to keep on-premises. Perhaps it's time to upgrade? Older operating systems were designed for a different era—before cybercrime became a household word and before cloud-based innovation changed the app development game. You can benefit from the latest version of Windows Server, which helps you get cloud- and DevOps-ready while you support current workloads. Ongoing hybrid coexistence gives you a powerful strategy to help you achieve the right mix of upgraded on-premises applications, rehosted workloads in the cloud, and--eventually--rebuilt applications native to the cloud.

### Choosing an upgrade method

Your upgrade process will vary depending on your existing operating system and the approach you take. The days of risky, complex in-place version upgrades are gone; you can upgrade your critical workloads without fear using any of the fully-supported upgrade methods described below:

- **A clean installation** tends to be low-risk if you want to move to the latest version of Windows Server on the same hardware. [You will install the newer operating system](#) directly over the old one, which is deleted. First, review [system requirements for Windows Server 2016](#) and back up your data, and later, plan to reinstall your applications and server roles.
- **Server role migration** is the recommended upgrade process: first you'll move from your existing operating system to the latest version of Windows Server on new hardware or virtual machines, then move roles and services to the new computers. The exact process you follow will vary depending on the server roles you have installed. Microsoft provides comprehensive documentation to help you move roles or features, and their data, from a source computer running Windows Server to a destination computer running a newer version of Windows Server. To get started, check the [server role upgrade and migration matrix](#).
- **Cluster OS Rolling Upgrade** enables you to avoid downtime if you are moving off Windows Server 2012 R2. It enables an administrator to [upgrade the operating system of the cluster nodes](#) from Windows Server 2012 R2 to Windows Server 2016 without stopping the Hyper-V or the Scale-Out File Server workloads.

If you're using Windows Server 2008 or Windows Server 2008 R2, you'll need to plan to use the server role migration method or upgrade from Windows Server 2008 to Windows Server 2012 R2 and then upgrade again to Windows Server 2016, as direct updates are not supported.

## New! Bring Windows Server 2008 to Azure

Extended support for Windows Server 2008 R2 and Windows Server 2008 ends on January 14, 2020. Learn your options for [upgrade paths](#), each with different benefits tailored to meet users' needs. For example, you can [move Windows Server 2008 or 2008 R2 VMs](#) to Azure.

### Get DevOps-ready

It starts with Windows Server 2016:

- **Security:** Breach resistance helps you thwart attacks on your system and detect suspicious activity.
- **App innovation:** Take advantage of container technology and microservices. Containers simplify deployment and testing by bundling a service and its dependencies into a single unit. Microservices are small, modular, and independently deployable services that maximize development flexibility.
- **Software-defined efficiencies:** Enable affordable, high-performance storage and Azure-inspired networking capabilities.
- **Hybrid environment support** [with Azure Hybrid Benefit](#).

## Understanding upgrade impact

Each release of Windows Server offers improved security, stability, and functionality. As the enterprise landscape changes, Windows also evolves to meet new threats and new demands for integration. Perhaps the biggest change is in protocol support. To protect your data and networks, Microsoft changed the set of protocols enabled by default and the set of services installed and run by default. Both changes help reduce the attack surface of your network and protect against well-known threats. For example, Microsoft has deprecated the use of SMB version 1 and TLS 1.0 as basic protocols, replacing them with newer and more robust versions. Additionally, there are a number of [other service changes](#) that will impact your IT organization. Before you perform a mass upgrade, examine your existing server configurations and applications to make sure you understand which protocols and services each depends on and how resilient they are to changes.

## Automating Windows upgrades at scale

New tools simplify your ability to update dozens, hundreds, or even thousands of legacy servers and desktops to a modern release of Windows. Microsoft offers a fine-tuned, field-proven set of automated tools to help make such upgrades easier and less disruptive. These tools collectively comprise the [Microsoft Deployment Toolkit](#) (MDT), and automate the deployment process by first configuring the unattended Setup files for Windows and then packaging the necessary files into a consolidated image file that you can then deploy to reference and target computers. Use System Center Configuration Manager to [deploy these images](#) in one of three modes: lite-touch, zero-touch, or user-driven installation.

You can customize the images you deploy with MDT to apply different Windows Server versions and configurations as appropriate in your environment. You can use a single standardized worldwide image or deploy custom images by location, server role, hardware generation, or other criteria. MDT helps you automate large-scale deployment of Windows Server upgrades *and* desktop updates.

Then you can move any workloads you've chosen to migrate to Azure using the tools we've discussed earlier in this guide.

## The modern Windows admin experience

Windows Server 2016 makes life easier for administrators by providing robust management tools that provide powerful automation and integration capabilities, plus an easy-to-use, discoverable GUI. The [Windows Server Admin Center](#) (formerly code-named "Honolulu") gives administrators a single browser-based tool to manage all aspects of local and remote server management within the enterprise network. With Windows Admin Center, you can monitor, configure, and manage physical and virtual Windows Server 2012 and later servers, clusters, and Storage Spaces Direct resources. If you've already deployed Azure Active Directory, you can use it to authenticate access to Windows Admin Center, and you can even use the Admin Center to [protect your virtual machines with Azure Site Recovery](#). Administrators can also benefit from hundreds of new PowerShell cmdlets that allow customized automation for every part of Windows, including user provisioning and management, virtual machine management and configuration, and security configuration.

## The Optimize phase

If the Migrate phase is like climbing a mountain, the Optimize phase is when you start to benefit from the fresh air and stunning scenery. Here, benefits of your move to Azure or the latest operating system start to accrue: cost savings from increased operational efficiencies and reduced capital expenditures, improved functionality, better security, and more flexibility.

Now is a good time to consolidate what you learned during your cloud migration or on-premises upgrade. Most organizations wisely take an incremental approach to migration, starting with a few small or simple workloads to help them understand and master the technology and business issues, then progressing to larger and more complex workloads. Each workload presents an opportunity to reflect on learning and improve your Assess phase for the next migration.

If you have hit the cloud running, you can explore changes in Azure technologies and platforms. Working at “cloud speed” requires both you and Microsoft to continually refine and improve your processes and technologies; Microsoft regularly introduces new features and technologies in Azure. As these new releases hit the market, you can incorporate them into your existing deployments and into your planning for future migrations, maximizing your ability to benefit from platform improvements as they are released.

### Security across on-premises and cloud

Cloud security differs from on-premises security in critical ways. For example, the cloud provider is responsible for physical security and software patching of the environment that hosts your applications. When you migrate applications to Azure, you can continue to use your security information and event management (SIEM) software, combining cloud and on-premises security information into your existing system of monitoring and control. At the same time, you benefit directly and immediately from the huge investment Microsoft has made in Azure physical and logical security. Azure has many security capabilities that are probably new to your environment, such as [Azure Advanced Threat Protection](#) for network security and [Azure Key Vault](#) for secure storage of application credentials and data. During the Optimize phase, you can evaluate these technologies and see how to integrate them with your on-premises, cloud, and hybrid applications, and networks to improve the overall security of your business operations.

### Governance

Most businesses have specific governance and compliance requirements—even tasks as common as collecting and remitting sales tax or VAT payments are controlled by complex frameworks of regulation, law, and process. Specific industries may have specific regulatory regimes, such as the Payment Card Industry Data Security Standard (PCI DSS) and the European Union General Data Protection Regulation (GDPR). Azure and Office 365 offer a wealth of tools for tracking and improving regulatory compliance. The [Azure Trust Center](#) showcases the dozens of regulatory certifications and attestations that Microsoft has earned for its services; these certifications help give you confidence that the cloud solutions you deploy on Azure will accelerate progress towards full compliance with the applicable regulations for your operations. Upgrading on-premises to Windows Server 2016 yields similar benefits. Enhanced protections can help you can meet high-priority compliance requirements and security objectives such as PCI DSS 3.2, ISO 27001, and FedRamp more efficiently.

### Other optimization services

Many organizations operate without a clear sense of how much their datacenter really costs. Cloud services, on the other hand, can offer unparalleled visibility. Azure services can help you right-size resources and manage cost. [Cost Management for Azure from Cloudyn](#) and [Azure Advisor](#) can help you better manage your cloud resources and spending. Security services such as [Azure Security Center](#) help you strengthen security and ensure compliance across your hybrid environment, including on-premises servers. Monitor workloads with Azure Monitor and its powerful real-time reporting capabilities. Combine these cloud tools with [Windows Admin Center](#) and [Microsoft System Center Configuration Manager](#) and you can also manage your on-premises resources. As Microsoft introduces new Azure capabilities, your cloud and on-premises operations will benefit.

## Getting started

How you get started depends on where your organization is in the cloud evolution. Are you focused on improving on-premises operations and adding cloud-services judiciously? Are you just beginning to investigate cloud opportunities? Or, are you already moving datacenter workloads to the cloud or developing cloud-native applications?

Find all core Azure information—training, documentation, pricing, partners, code samples, and more—at [azure.com](https://azure.com). Free documentation and training is available for everyone from cloud beginners to Azure experts. You can also speed up the entire process by engaging with Microsoft partners who have tools and expertise that help guarantee success.

- Try free [Azure hands-on labs](#) to acquire the cloud skills you need at your own pace.
- [Create a free Azure account](#). Get started with a \$200 credit, keep going with free access to services for 12 months.
- Visit the [Azure Migration Center](#).
- Review the free ebook, [Enterprise Cloud Strategy Guide](#) to help you take your application portfolio to the cloud.
- Find out everything you need to know about modernizing [.NET architecture](#).
- Learn more about the benefits of migrating to the [latest version of Windows Server](#) and evaluate it.

### One more reason to get started

Azure Hybrid  
Benefit

Up to

**49%**

Savings vs. PAYG

Azure Hybrid  
Benefit  
+ Azure RI

Up to

**80%**

3-year discount  
vs. PAYG

Save on Azure virtual machines. Use your on-premises Windows Server licenses with Software Assurance [to save up to 49 percent in Azure](#). For each license Microsoft will cover the cost of the operating system (on up to two virtual machines!). You can add more savings—up to 80 percent off the on-demand price of running Windows Server apps in Azure Virtual Machines—when you combine the Azure Hybrid Benefit with the Azure Reserved VM Instance offering.

## Resources

All apps	
Discover and Assess	<a href="http://docs.microsoft.com/azure/migrate/tutorial-assessment-vmware">http://docs.microsoft.com/azure/migrate/tutorial-assessment-vmware</a>
How to migrate VMs using Azure Site Recovery	<a href="https://youtu.be/74O5Hmc2bCY">https://youtu.be/74O5Hmc2bCY</a>
How to manage workloads with Azure Security Center	<a href="https://youtu.be/KLWmG-q8W5k">https://youtu.be/KLWmG-q8W5k</a>
How to synchronize files using Azure File Sync	<a href="https://youtu.be/H-05asnk5jA">https://youtu.be/H-05asnk5jA</a>
Windows Admin Center	<a href="https://youtu.be/PcQj6ZklmK0">https://youtu.be/PcQj6ZklmK0</a>
App modernization with Windows containers	<a href="https://www.youtube.com/watch?v=LgKGLT-OL1E">https://www.youtube.com/watch?v=LgKGLT-OL1E</a>
Windows Server on Azure page	<a href="http://www.azure.com/windowsserver">http://www.azure.com/windowsserver</a>
Custom apps	
Windows Server on Azure Guide for IT Pros	<a href="http://download.microsoft.com/download/5/E/9/5E93D3BB-4C63-438D-8F2F-730611126712/Ultimate_Guide_to_Windows_Server_on_Azure_EN_US.pdf">http://download.microsoft.com/download/5/E/9/5E93D3BB-4C63-438D-8F2F-730611126712/Ultimate_Guide_to_Windows_Server_on_Azure_EN_US.pdf</a>
Azure Windows VMs	<a href="http://docs.microsoft.com/azure/virtual-machines/windows">http://docs.microsoft.com/azure/virtual-machines/windows</a>
Windows VMs reference architectures	<a href="http://docs.microsoft.com/azure/architecture/reference-architectures/virtual-machines-windows/index">http://docs.microsoft.com/azure/architecture/reference-architectures/virtual-machines-windows/index</a>
Windows Server containers for .NET apps	<a href="https://aka.ms/liftandshiftwithcontainersebook">https://aka.ms/liftandshiftwithcontainersebook</a>
Azure SQL Database	<a href="http://docs.microsoft.com/azure/sql-database/">http://docs.microsoft.com/azure/sql-database/</a>
Upgrade to SQL Server 2017	<a href="http://docs.microsoft.com/sql/sql-server/sql-server-technical-documentation">http://docs.microsoft.com/sql/sql-server/sql-server-technical-documentation</a>
Upgrade to Windows Server 2016	<a href="http://info.microsoft.com/TheUltimateGuideToWindowsServer2016.html">http://info.microsoft.com/TheUltimateGuideToWindowsServer2016.html</a>
Microsoft apps	
SharePoint Online	<a href="http://products.office.com/SharePoint/sharepoint-online-collaboration-software">http://products.office.com/SharePoint/sharepoint-online-collaboration-software</a>
Exchange Online	<a href="http://products.office.com/exchange/exchange-online">http://products.office.com/exchange/exchange-online</a>
Remote Desktop Services	<a href="http://docs.microsoft.com/windows-server/remote/remote-desktop-services/rds-in-azure">http://docs.microsoft.com/windows-server/remote/remote-desktop-services/rds-in-azure</a>
Server roles	
Active Directory	<a href="http://docs.microsoft.com/azure/active-directory/virtual-networks-windows-server-active-directory-virtual-machines">http://docs.microsoft.com/azure/active-directory/virtual-networks-windows-server-active-directory-virtual-machines</a>
Domain Controllers	<a href="http://docs.microsoft.com/windows-server/identity/ad-ds/deploy/upgrade-domain-controllers">http://docs.microsoft.com/windows-server/identity/ad-ds/deploy/upgrade-domain-controllers</a>
Domain Services	<a href="http://docs.microsoft.com/azure/active-directory-domain-services/">http://docs.microsoft.com/azure/active-directory-domain-services/</a>