

Domain 3: Introduction to Cloud

Infrastructure: Describe Azure management and governance

Describe cost management in Azure

1. Introduction

<https://learn.microsoft.com/en-us/training/modules/describe-cost-management-azure/1-introduction>

Introduction

Completed

In this module, you'll be introduced to factors that impact costs in Azure and tools to help you both predict potential costs and monitor and control costs. You'll also review cost optimization choices for different workload patterns.

Learning objectives

After completing this module, you'll be able to:

- Describe factors that can affect costs in Azure.
- Describe the Azure Pricing calculator.
- Describe the Microsoft Cost Management Tool.
- Describe the purpose of tags.
- Describe cost optimization options, including Reservations, savings plans, and Spot pricing.

2. Describe factors that can affect costs in Azure

<https://learn.microsoft.com/en-us/training/modules/describe-cost-management-azure/2-describe-factors-affect-costs-azure>

Describe factors that can affect costs in Azure

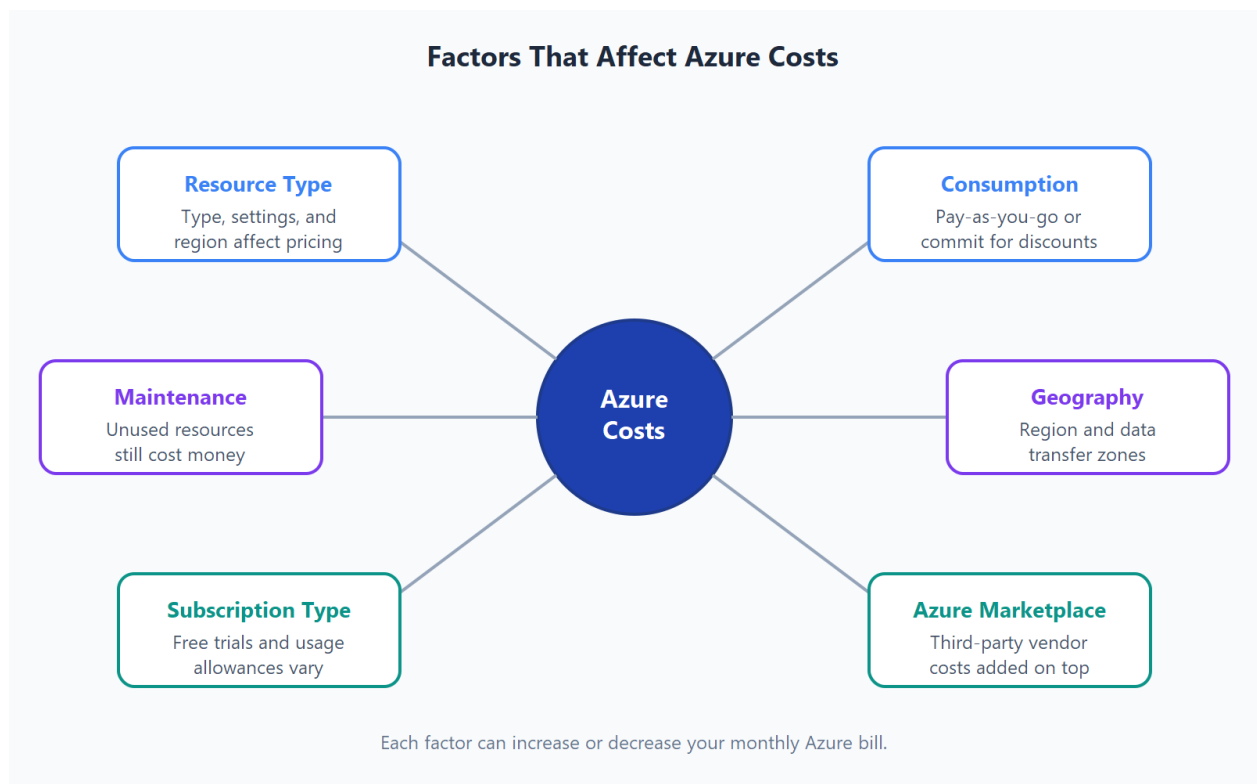
Completed

The following video provides an introduction to things that can impact your costs in Azure.

With Azure, you pay for IT resources as you use them instead of purchasing and maintaining your own infrastructure. Whether it's compute, storage, or networking, you rent what you need and release it when you're done. This consumption-based approach means your costs scale with your actual usage.

Many factors affect how much you pay. Some of the factors that affect cost are:

- Resource type
- Consumption
- Maintenance
- Geography
- Subscription type
- Azure Marketplace



Resource type

A number of factors influence the cost of Azure resources. The type of resources, the settings for the resource, and the Azure region will all have an impact on how much a resource costs. When you provision an Azure resource, Azure tracks how much of each resource you use and charges you based on that usage.

Examples

With a storage account, you choose options that affect the price, such as the type of data stored (for example, blob storage for files and images), how fast you need to access it, how many backup copies to keep, and which region to use. Creating the same storage account in different regions may show different costs and changing any of the settings may also impact the price.

With a virtual machine (VM), you may have to consider licensing for the operating system or other software, the processor and number of cores for the VM, the attached storage, and the network interface. Just like with storage, provisioning the same virtual machine in different regions may result in different costs.

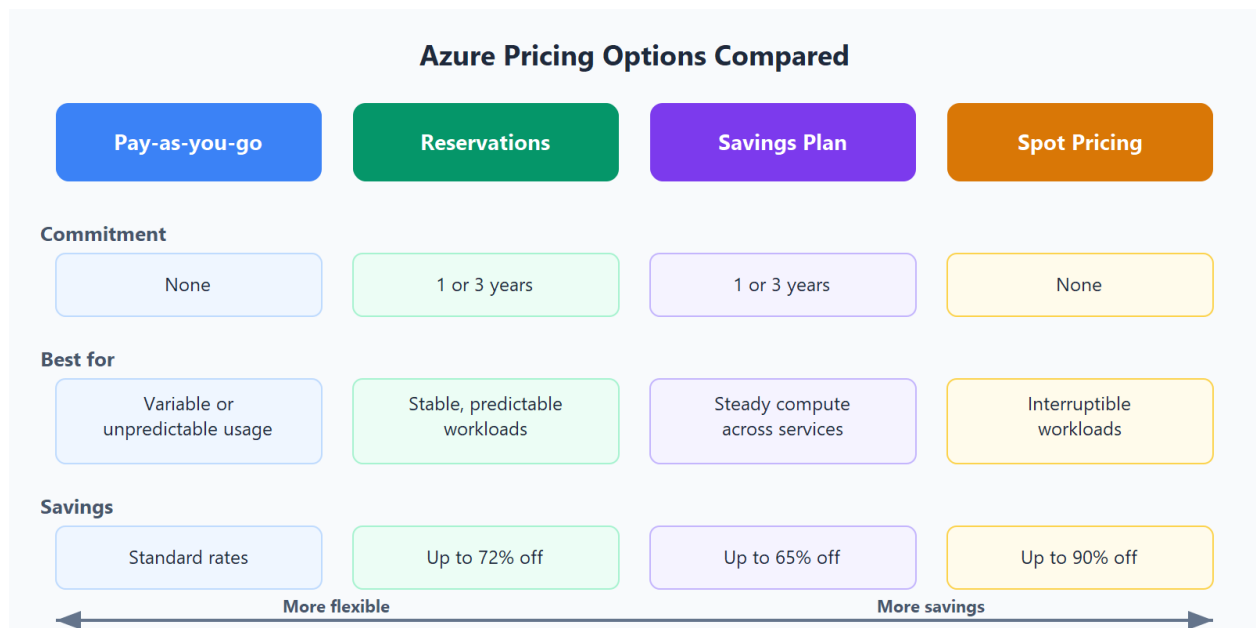
Consumption

Pay-as-you-go has been a consistent theme throughout, and that's the cloud payment model where you pay for the resources that you use during a billing cycle. If you use more compute this cycle, you pay more. If you use less in the current cycle, you pay less. It's a straightforward pricing mechanism that allows for maximum flexibility.

Azure also offers discount options for predictable workloads. With Reservations, you can commit to specific resources for one- or three-year terms to reduce cost. Reservations can apply to services such as virtual machines, databases, and storage.

If you want flexibility in which compute resources you use, Azure savings plan for compute is another option. Instead of committing to a specific VM type, you commit to an hourly spend amount on eligible compute services for one or three years, and Azure automatically applies the best available price as usage occurs.

If you have workloads that can handle interruptions, such as a batch data processing job, Azure Spot Virtual Machines can help reduce cost further. Spot pricing uses unused Azure capacity at lower prices, but those workloads can be evicted when Azure needs the capacity back.



Maintenance

The flexibility of the cloud makes it possible to rapidly adjust resources based on demand. Using resource groups can help keep all of your resources organized. To control costs, it's important to maintain your cloud environment. For example, every time you provision a VM, additional resources such as storage and networking are also provisioned. If you deprovision the VM, those additional resources may not deprovision at the same time, either intentionally or unintentionally. By keeping an eye on your resources and making sure you're not keeping around resources that are no longer needed, you can help control cloud costs.

Geography

When you provision most resources in Azure, you need to define a region where the resource deploys. Azure infrastructure is distributed globally, which enables you to deploy your services centrally or closest to your customers, or something in between. With this global deployment comes global pricing differences. The cost of power, labor, taxes, and fees vary depending on the location. Due to these variations, Azure resources can differ in costs to deploy depending on the region.

Network traffic is also impacted based on geography. For example, it's less expensive to move information within Europe than to move information from Europe to Asia or South America.

Network traffic

Billing zones are a factor in determining the cost of some Azure services. Billing zones are different from availability zones; a billing zone is a geographical grouping of Azure regions used specifically for data-transfer pricing.

Bandwidth refers to data moving in and out of Azure datacenters. Some inbound data transfers (data going into Azure datacenters) are free. For outbound data transfers (data leaving Azure datacenters),

data transfer pricing is based on zones.

A zone is a geographical grouping of Azure regions for billing purposes. The [bandwidth pricing page](#) has additional information on pricing for data ingress, egress, and transfer.

Subscription type

Some Azure subscription types also include usage allowances, which affect costs.

For example, an Azure free trial subscription provides access to a number of Azure products that are free for 12 months. It also includes credit to spend within your first 30 days of sign-up. You'll get access to more than 25 products that are always free (based on resource and region availability).

Azure Marketplace

Azure Marketplace lets you purchase Azure-based solutions and services from third-party vendors. This could include a preconfigured web server, a virtual machine with specialized software already installed, or a managed backup solution. When you purchase products through Azure Marketplace, you may pay for not only the Azure services that you're using, but also the services or expertise of the third-party vendor. Billing structures are set by the vendor.

All solutions available in Azure Marketplace are certified and compliant with Azure policies and standards. The certification policies may vary based on the service or solution type and Azure service involved. [Commercial marketplace certification policies](#) has additional information on Azure Marketplace certifications.

3. Explore the pricing calculator

<https://learn.microsoft.com/en-us/training/modules/describe-cost-management-azure/3-compare-pricing-total-cost-of-ownership-calculators>

Explore the pricing calculator

Completed

The pricing calculator helps you estimate potential Azure expenses. You can access it online and build out a configuration. The Total Cost of Ownership (TCO) calculator has been retired.

Pricing calculator

The pricing calculator is designed to give you an estimated cost for provisioning resources in Azure. You can get an estimate for individual resources, build out a solution, or use an example scenario to see an estimate of the Azure spend.

Note

The Pricing calculator is for information purposes only. The prices are only an estimate. Nothing is provisioned when you add resources to the pricing calculator, and you won't be charged for any services you select.

With the pricing calculator, you can estimate the cost of any provisioned resources, including compute, storage, and associated network costs. You can also account for different storage options like storage type, access tier, and redundancy.

Practical example

If you're planning a new web application, you can model one App Service plan, a managed database, and required storage options in the pricing calculator. You can then compare monthly estimates across regions, service tiers, and redundancy options before deployment.

Teams often use this estimate as a baseline for budget approval, then revisit it when architecture decisions change so planned spend stays aligned with implementation.

The screenshot displays the Azure Pricing Calculator interface. At the top, there are tabs for 'Products', 'Example scenarios', 'Saved estimates', and 'FAQs'. Below the tabs is a blue bar with the text 'Select a product to include it in your estimate.' Underneath this is a search bar labeled 'Search products'. To the left of the main content area is a vertical sidebar with a list of categories: Popular, Compute, Networking, Storage, Web, Mobile, Containers, Databases, Analytics, and AI + machine learning. The main content area displays a grid of service cards. Each card includes an icon, the service name, and a brief description. The services shown are: Azure Advisor (Your personalized Azure best practices recommendation engine), Azure Backup (Simplify data protection with built-in backup management at scale), Azure Cost Management and Billing (Manage your cloud spending with confidence), Azure Policy (Implement corporate governance and standards at scale), Azure Monitor (Full observability into your applications, infrastructure, and network), Azure Site Recovery (Keep your business running with built-in disaster recovery service), Automation (Simplify cloud management with process automation), Traffic Manager (Route incoming traffic for high performance and availability), and Network Watcher (Network performance monitoring and diagnostics solution).

4. Describe the Microsoft Cost Management tool

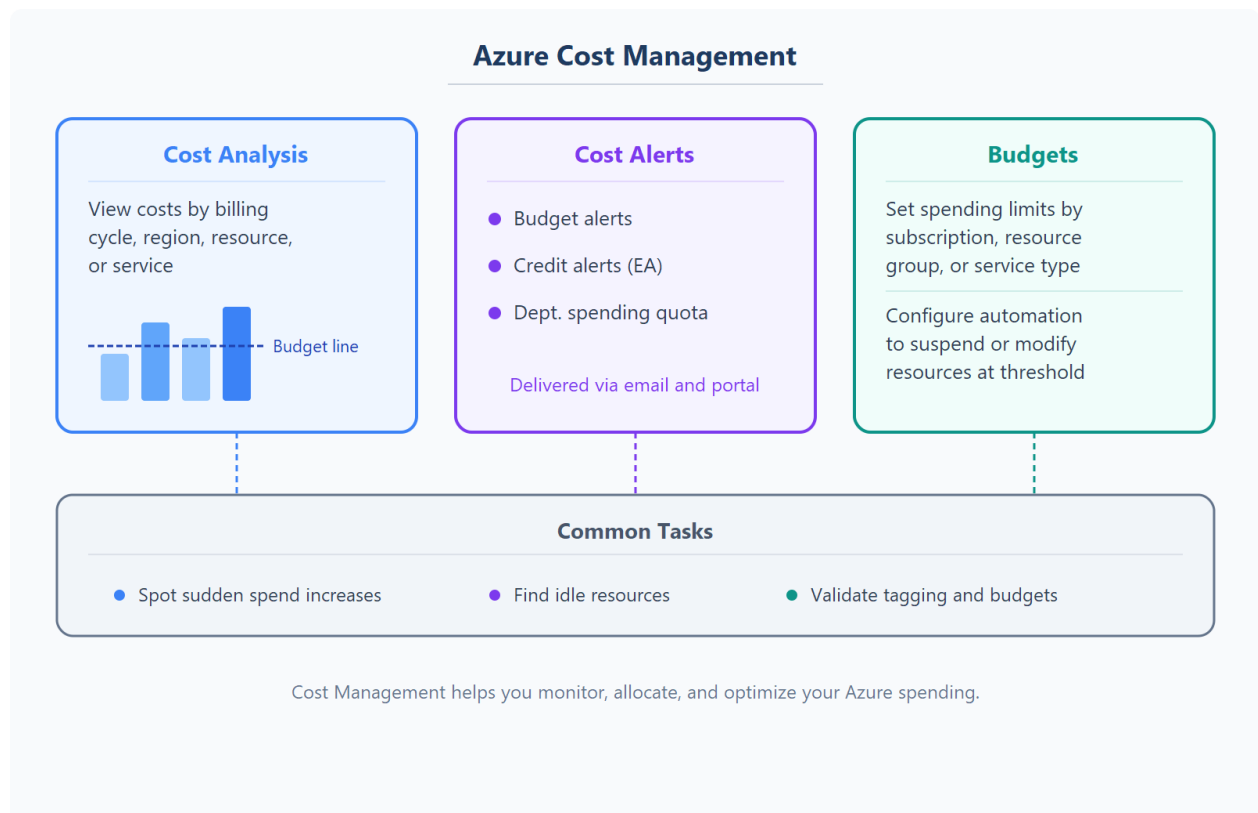
Describe the Microsoft Cost Management tool

Completed

Microsoft Azure is a global cloud provider, meaning you can provision resources anywhere in the world. You can provision resources rapidly to meet a sudden demand, to test out a new feature, or accidentally. If you accidentally provision new resources, you may not be aware of them until it's time for your invoice. Cost Management is a service that helps avoid those situations.

What is Cost Management?

Cost Management provides the ability to quickly check Azure resource costs, create alerts based on resource spend, and create budgets that can be used to automate management of resources.



Cost analysis is a feature within Cost Management that provides a quick visual for your Azure costs. Using cost analysis, you can quickly view the total cost in a variety of different ways, including by billing cycle, region, resource, and so on.

You use cost analysis to explore and analyze your cloud costs. You can view aggregated costs by subscription, resource group, or service to understand where costs accrue and identify spending trends. You can also see accumulated costs over time to estimate monthly, quarterly, or yearly cost trends against a budget.

Common tasks with Cost Management include spotting a sudden spend increase after a deployment, identifying idle resources in nonproduction subscriptions, and validating whether tagging and budgets are working as expected.

Cost alerts

Cost alerts provide a single location to quickly check on all of the different alert types that may show up in the Cost Management service. The three types of alerts that may show up are:

- Budget alerts
- Credit alerts
- Department spending quota alerts.

Budget alerts

Budget alerts notify you when spending reaches or exceeds a threshold you define. You can create budgets in the Azure portal or through the Azure Consumption API.

In the Azure portal, budgets are defined by cost. If you use the Azure Consumption API, you can also define budgets by consumption usage. Budget alerts are generated automatically whenever the budget alert conditions are met. You can view all cost alerts in the Azure portal. Whenever an alert is generated, it appears in cost alerts, and an alert email is also sent to the people in the alert recipients list of the budget.

For example, you might set an alert at 80% of a monthly dev/test budget so your team can investigate and right-size resources before costs exceed target.

Credit alerts

Credit alerts notify you when your Azure credit monetary commitments are consumed. Monetary commitments are for organizations with Enterprise Agreements (EAs). Credit alerts are generated automatically at 90% and at 100% of your Azure credit balance. Whenever an alert is generated, it's reflected in cost alerts, and in the email sent to the account owners.

Department spending quota alerts

Department spending quota alerts are specific to Enterprise Agreement customers. They notify you when department spending reaches a fixed threshold of the quota. Spending quotas are configured in the EA portal. Whenever a threshold is met, it generates an email to department owners, and appears in cost alerts. For example, 50 percent or 75 percent of the quota.

Budgets

A budget is where you set a spending limit for Azure. You can set budgets based on a subscription, resource group, service type, or other criteria. When you set a budget, you will also set a budget alert. When the budget hits the budget alert level, it will trigger a budget alert that shows up in the cost alerts area. If configured, budget alerts will also send an email notification that a budget alert threshold has been triggered.

You can also configure budgets to trigger automation that suspends or modifies resources when a spending threshold is reached. For instance, you can automate shutdown of nonproduction resources when a budget threshold is reached.

5. Describe the purpose of tags

<https://learn.microsoft.com/en-us/training/modules/describe-cost-management-azure/7-describe-purpose-of-tags>

Describe the purpose of tags

Completed

As your cloud usage grows, it's increasingly important to stay organized. A good tagging strategy helps you understand your cloud usage and helps you manage costs.

One way to organize related resources is to place them in their own subscriptions. You can also use resource groups to manage related resources. Resource tags are another way to organize resources. Tags provide extra information, or metadata, about your resources. This metadata is useful for:

Resource Tag Use Cases

Resource Management

Locate and act on resources by workload, environment, or owner

Cost Management

Group resources to report costs, allocate cost centers, and budget

Operations Management

Group by availability to formulate service-level agreements (SLAs)

Security

Classify data by security level, such as public or confidential

Governance

Identify resources that align with compliance requirements (ISO 27001)

Workload Automation

Visualize resources in complex deployments and automate tasks

Recommended starter tags: Environment, Owner, CostCenter, Workload

- **Resource management** Tags enable you to locate and act on resources that are associated with specific workloads, environments, teams, and owners.
- **Cost management and optimization** Tags enable you to group resources so that you can report on costs, allocate internal cost centers, track budgets, and forecast estimated cost.
- **Operations management** Tags enable you to group resources according to how critical their availability is to your operations. This grouping helps you formulate service-level agreements (SLAs). An SLA is an uptime or performance guarantee between you and your users.
- **Security** Tags enable you to classify data by its security level, such as public or confidential.
- **Governance and regulatory compliance** Tags enable you to identify resources that align with governance or regulatory compliance requirements, such as ISO 27001. Tags can also be part of your standards enforcement efforts. For example, you might require that all resources be tagged with an owner or department name.
- **Workload optimization and automation** Tags can help you visualize all of the resources that participate in complex deployments. For example, you might tag a resource with its associated workload or application name and use software such as Azure DevOps to perform automated tasks on those resources.

A practical starter tag set for many teams is `Environment`, `Owner`, `CostCenter`, and `Workload`. This set supports common day-to-day tasks such as filtering costs, finding service owners, and scoping automation.

How do I manage resource tags?

You can add, modify, or delete resource tags through the Azure portal, PowerShell, the Azure CLI, Azure Resource Manager templates, or the REST API.

You can use Azure Policy to enforce tagging rules and conventions. For example, you can require that certain tags be added to new resources as they're provisioned. You can also define rules that reapply tags that have been removed. Resources don't inherit tags from subscriptions and resource groups, meaning that you can apply tags at one level and not have those tags automatically show up at a different level, allowing you to create custom tagging schemas that change depending on the level (resource, resource group, subscription, and so on).

An example tagging structure

A resource tag consists of a name and a value. You can assign one or more tags to each Azure resource.

Name	Value
AppName	The name of the application that the resource is part of.
CostCenter	The internal cost center code.
Owner	The name of the technical or service owner who's responsible for the resource.
Environment	An environment name, such as "Prod," "Dev," or "Test."
Impact	How important the resource is to operations, such as "Mission-critical," "High-impact," or "Low-impact."

Keep in mind that you don't need to enforce that a specific tag is present on all of your resources. For example, you might decide that only mission-critical resources have the Impact tag. All non-tagged resources would then not be considered as mission-critical.

6. Describe cost optimization options in Azure

<https://learn.microsoft.com/en-us/training/modules/describe-cost-management-azure/7a-describe-cost-optimization-options>

Describe cost optimization options in Azure

Completed

After estimating and monitoring costs, the next step is choosing the right pricing option for each workload profile.

Reservations

Reservations are best for stable, predictable workloads. You commit to specific resource capacity for a one-year or three-year term, and Azure applies discounted pricing to matching usage.

Azure savings plan for compute

Azure savings plan for compute is another commitment-based option for compute services. Instead of committing to a specific VM family or instance type, you commit to an hourly spend amount for one or three years, and savings are applied to eligible compute usage.

Spot pricing

Spot Virtual Machines use unused Azure capacity at reduced prices. Spot is most appropriate for interruptible workloads because Azure can reclaim that capacity when needed.

Decision guide

Use this quick decision pattern:

- Choose Reservations for predictable, long-running workloads with stable resource needs.
- Choose Azure savings plan for compute when usage is steady but you need more flexibility across compute services.
- Choose Spot pricing for fault-tolerant or interruptible workloads where lowest cost is the top priority.

For example, a production SQL workload that runs 24/7 might align with Reservations, while a mixed web/API workload that shifts among compute services might fit an Azure savings plan for compute. Batch rendering or test jobs that can restart are common Spot pricing candidates.

Review these choices regularly as usage patterns change. A workload that starts as interruptible might become business-critical later and need to move from Spot to a more predictable pricing model.

Likewise, if a workload becomes more stable over time, shifting from on-demand usage to a commitment model can improve long-term cost efficiency.

7. Module assessment

<https://learn.microsoft.com/en-us/training/modules/describe-cost-management-azure/8-knowledge-check>

Module assessment

Completed

8. Summary

<https://learn.microsoft.com/en-us/training/modules/describe-cost-management-azure/9-summary>

Summary

Completed

In this module, you learned about factors that impact costs in Azure and tools to help you both predict potential costs and monitor and control costs. You also reviewed cost optimization options for different workload profiles.

Learning objectives

You should now be able to:

- Describe factors that can affect costs in Azure.
- Describe the Azure Pricing calculator.
- Describe the Microsoft Cost Management Tool.
- Describe the purpose of tags.
- Describe cost optimization options, including Reservations, savings plans, and Spot pricing.

Additional resources

The following resources provide more information on topics in this module or related to this module.

- [Control Azure spending and manage bills with Microsoft Cost Management + Billing](#) is a learning path designed to give you a deeper understanding of cost management tools and strategies in Azure.

Explore with Copilot

Tip

Try one of these prompts in Copilot Chat:

- "Estimate monthly cost for a sample workload, identify the top cost drivers, and show which assumptions matter most in the pricing calculator."

- "Create a monthly FinOps routine using Cost Management, tags, budgets, and alerts to control spend and reduce waste."
- "Given three workload patterns, choose between reservations, savings plans, and Spot pricing and justify each recommendation."

Describe features and tools in Azure for governance and compliance

1. Introduction

<https://learn.microsoft.com/en-us/training/modules/describe-features-tools-azure-for-governance-compliance/1-introduction>

Introduction

Completed

In this module, you'll be introduced to some of the features and tools you can use to help with governance of your Azure environment. You'll also learn about tools you can use to help keep resources in compliance with internal or regulatory requirements.

Learning objectives

After completing this module, you'll be able to:

- Describe the purpose of Microsoft Purview.
- Describe the purpose of Azure Policy.
- Describe the purpose of resource locks.
- Describe the purpose of the Service Trust portal.

2. Describe the purpose of Microsoft Purview

<https://learn.microsoft.com/en-us/training/modules/describe-features-tools-azure-for-governance-compliance/2-describe-purpose-microsoft-purview>

Describe the purpose of Microsoft Purview

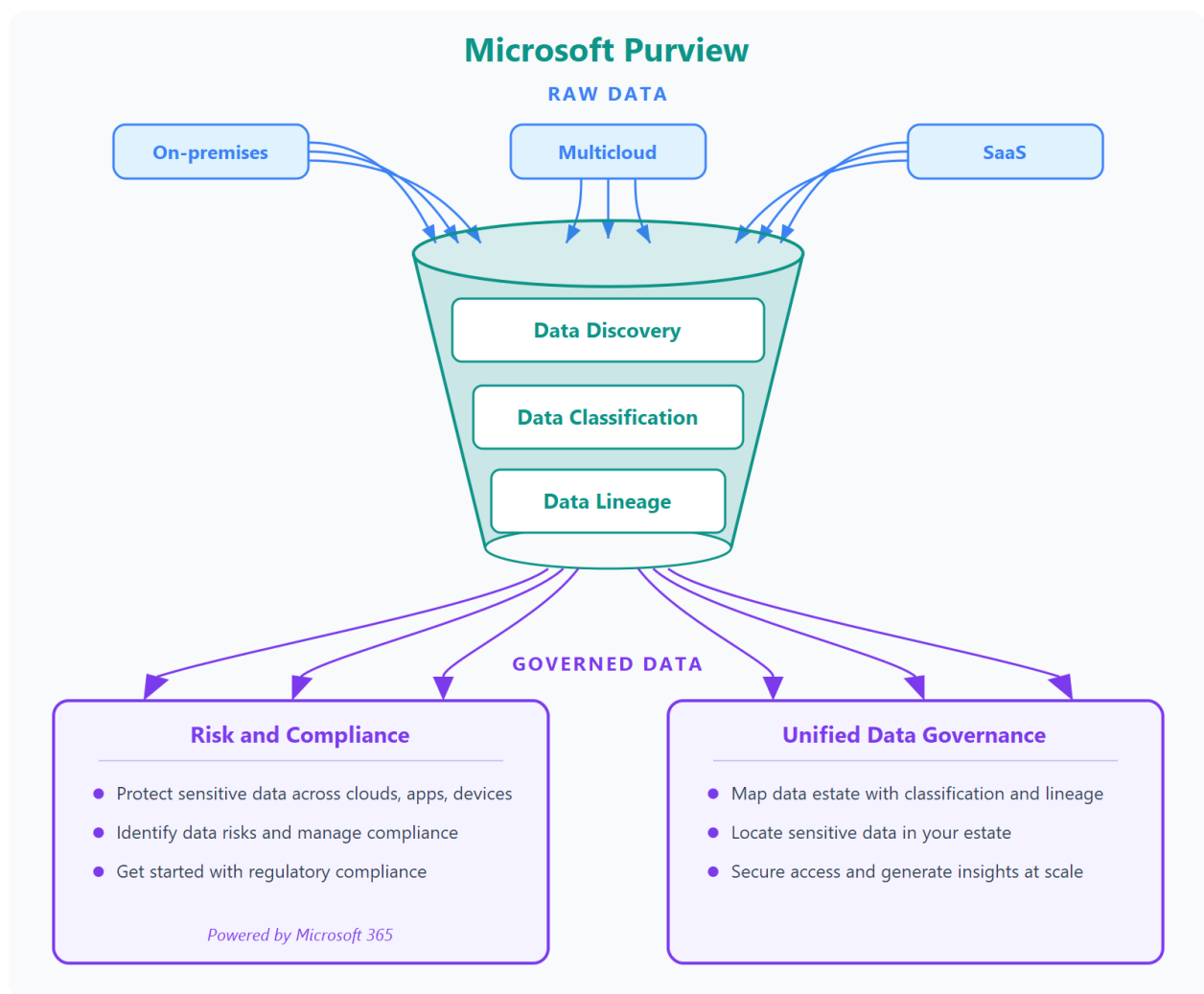
Completed

Microsoft Purview is a family of data governance, risk, and compliance solutions that helps you get a single, unified view into your data. Microsoft Purview brings insights about your on-premises, multicloud, and software-as-a-service data together.

With Microsoft Purview, you can stay up-to-date on your data landscape thanks to:

- Automated data discovery
- Sensitive data classification
- End-to-end data lineage

Two main solution areas comprise Microsoft Purview: **risk and compliance** and **unified data governance**.



Microsoft Purview risk and compliance solutions

Microsoft 365 features as a core component of the Microsoft Purview risk and compliance solutions. Microsoft Teams, OneDrive, and Exchange are just some of the Microsoft 365 services that Microsoft

Purview uses to help manage and monitor your data. Microsoft Purview, by managing and monitoring your data, helps your team:

- Protect sensitive data across clouds, apps, and devices.
- Identify data risks and manage regulatory compliance requirements.
- Get started with regulatory compliance.

Unified data governance

Microsoft Purview has robust, unified data governance solutions that help manage your on-premises, multicloud, and software as a service data. Microsoft Purview's robust data governance capabilities enable you to manage your data stored in Azure, SQL and Hive databases, locally, and even in other clouds like Amazon S3.

Microsoft Purview's unified data governance helps your team:

- Create an up-to-date map of your entire data estate that includes data classification and end-to-end lineage.
- Identify where sensitive data is stored in your estate.
- Create a secure environment for data consumers to find valuable data.
- Generate insights about how your data is stored and used.
- Manage access to the data in your estate securely and at scale.

3. Describe the purpose of Azure Policy

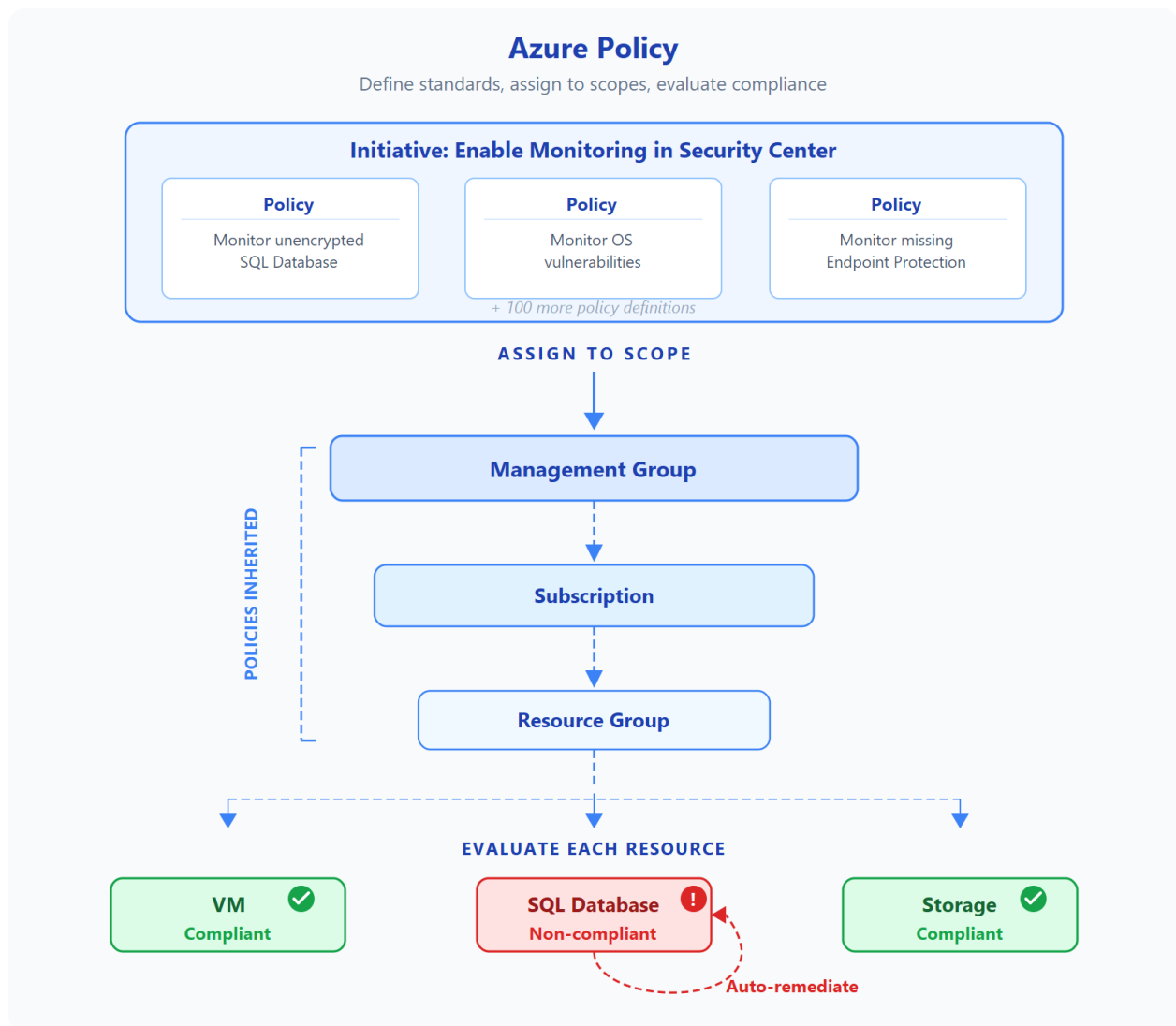
<https://learn.microsoft.com/en-us/training/modules/describe-features-tools-azure-for-governance-compliance/3-describe-purpose-azure-policy>

Describe the purpose of Azure Policy

Completed

How do you ensure that your resources stay compliant? Can you be alerted if a resource's configuration has changed?

Azure Policy is a service in Azure that enables you to create, assign, and manage policies that control or audit your resources. These policies enforce different rules across your resource configurations so that those configurations stay compliant with your standards.



How does Azure Policy define policies?

Azure Policy enables you to define both individual policies and groups of related policies, known as initiatives. Azure Policy evaluates your resources and highlights resources that aren't compliant with the policies you've created. Azure Policy can also prevent noncompliant resources from being created.

Azure Policies can be set at each level, enabling you to set policies on a specific resource, resource group, subscription, and so on. Additionally, Azure Policies are inherited, so if you set a policy at a high level, it will automatically be applied to all of the groupings that fall within the parent. For example, if you set an Azure Policy on a resource group, all resources created within that resource group will automatically receive the same policy.

Azure Policy comes with built-in policy and initiative definitions for Storage, Networking, Compute, Security Center, and Monitoring. For example, if you define a policy that allows only a certain size for the virtual machines (VMs) to be used in your environment, that policy is invoked when you create a new VM and whenever you resize existing VMs. Azure Policy also evaluates and monitors all current VMs in your environment, including VMs that were created before the policy was created.

In some cases, Azure Policy can automatically remediate noncompliant resources and configurations. For example, you can require an `AppName` tag and have Azure Policy add it when missing. You still retain full control of your environment because resources can be marked as exceptions.

Azure Policy also integrates with Azure DevOps by applying any continuous integration and delivery pipeline policies that pertain to the pre-deployment and post-deployment phases of your applications.

Policy guardrails for AI-assisted changes

If teams use Copilot recommendations or agent-like automation, Azure Policy still enforces your standards. You can require allowed locations, required tags, approved resource SKUs, and security baseline controls regardless of how a change was proposed.

This helps teams move faster with AI assistance while keeping changes compliant with organizational and regulatory requirements.

What are Azure Policy initiatives?

An Azure Policy initiative is a way of grouping related policies together. The initiative definition contains all of the policy definitions to help track your compliance state for a larger goal.

For example, Azure Policy includes an initiative named Enable Monitoring in Azure Security Center. Its goal is to monitor all available security recommendations for all Azure resource types in Azure Security Center.

Under this initiative, the following policy definitions are included:

- **Monitor unencrypted SQL Database in Security Center** This policy monitors for unencrypted SQL databases and servers.
- **Monitor OS vulnerabilities in Security Center** This policy monitors servers that don't satisfy the configured OS vulnerability baseline.
- **Monitor missing Endpoint Protection in Security Center** This policy monitors for servers that don't have an installed endpoint protection agent.

In fact, the Enable Monitoring in Azure Security Center initiative contains over 100 separate policy definitions.

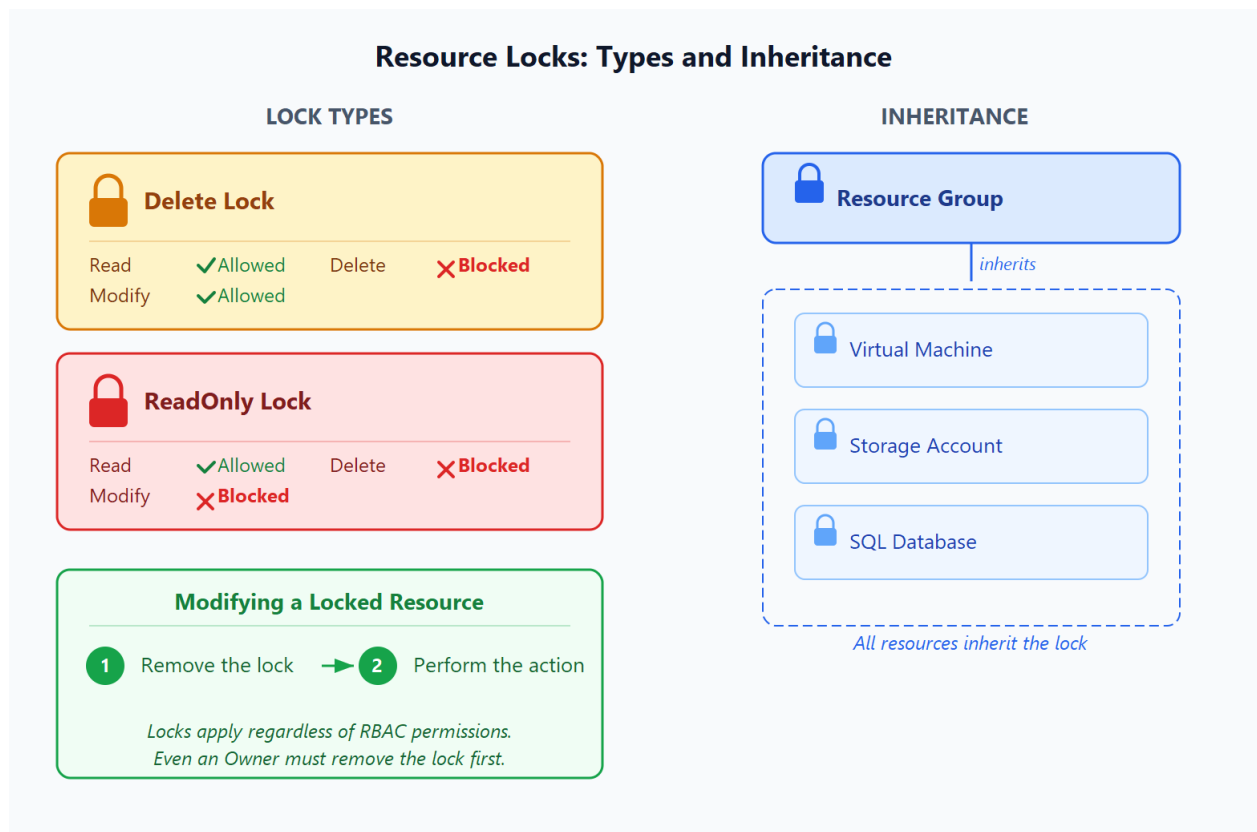
4. Describe the purpose of resource locks

Describe the purpose of resource locks

Completed

A resource lock prevents resources from being accidentally deleted or changed.

Even with Azure role-based access control (Azure RBAC) policies in place, there's still a risk that people with the right level of access could delete critical cloud resources. Resource locks prevent resources from being deleted or updated, depending on the type of lock. Resource locks can be applied to individual resources, resource groups, or even an entire subscription. Resource locks are inherited, meaning that if you place a resource lock on a resource group, all of the resources within the resource group will also have the resource lock applied.



Types of resource locks

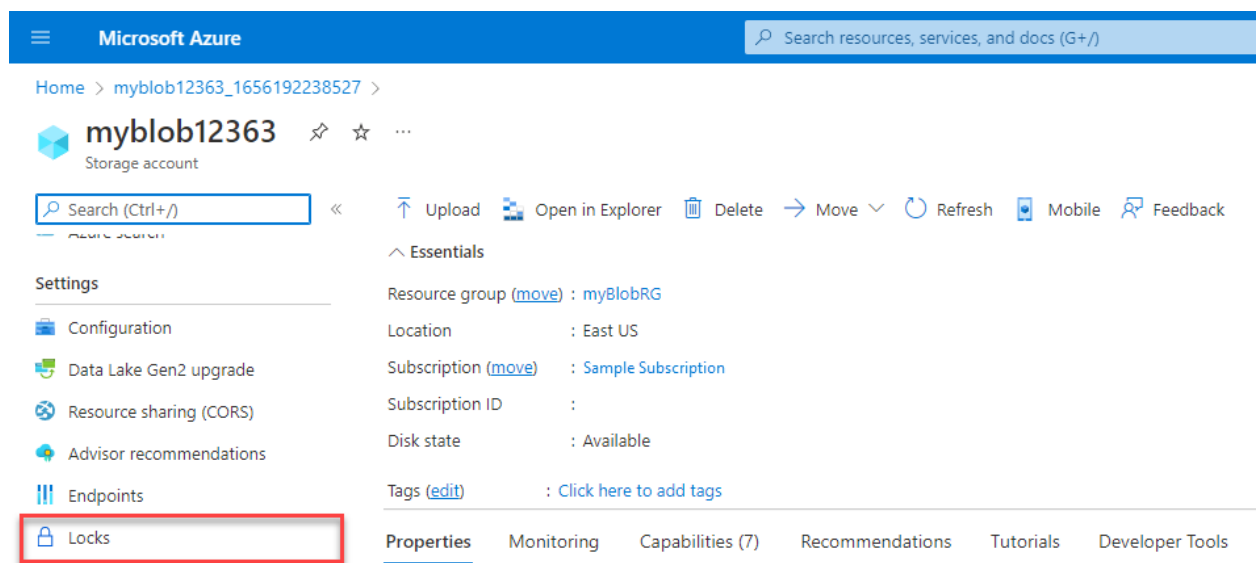
There are two types of resource locks, one that prevents users from deleting and one that prevents users from changing or deleting a resource.

- Delete means authorized users can still read and modify a resource, but they can't delete the resource.
- ReadOnly means authorized users can read a resource, but they can't delete or update the resource. Applying this lock is similar to restricting all authorized users to the permissions granted by the Reader role.

How do I manage resource locks?

You can manage resource locks from the Azure portal, PowerShell, the Azure CLI, or from an Azure Resource Manager template.

To view, add, or delete locks in the Azure portal, go to the Locks section of any resource's Settings pane in the Azure portal.



How do I delete or change a locked resource?

Although locking helps prevent accidental changes, you can still make changes by following a two-step process.

To modify a locked resource, you must first remove the lock. After you remove the lock, you can apply any action you have permissions to perform. Resource locks apply regardless of RBAC permissions. Even if you're an owner of the resource, you must still remove the lock before you can perform the blocked activity.

5. Describe the purpose of the Service Trust portal

Describe the purpose of the Service Trust portal

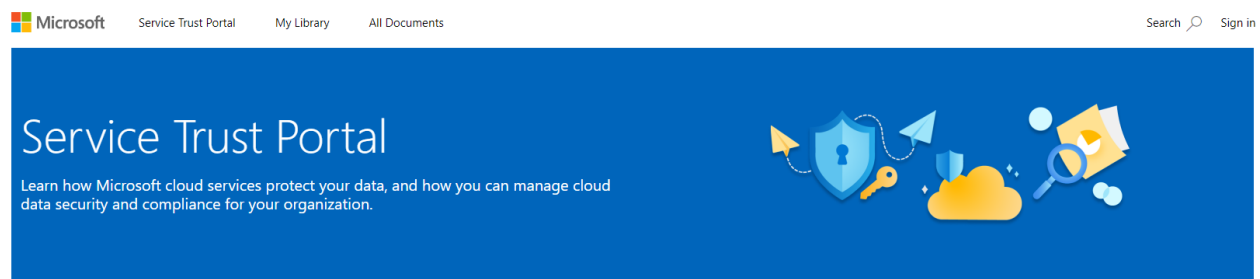
Completed

The Microsoft Service Trust Portal is a portal that provides access to various content, tools, and other resources about Microsoft security, privacy, and compliance practices.

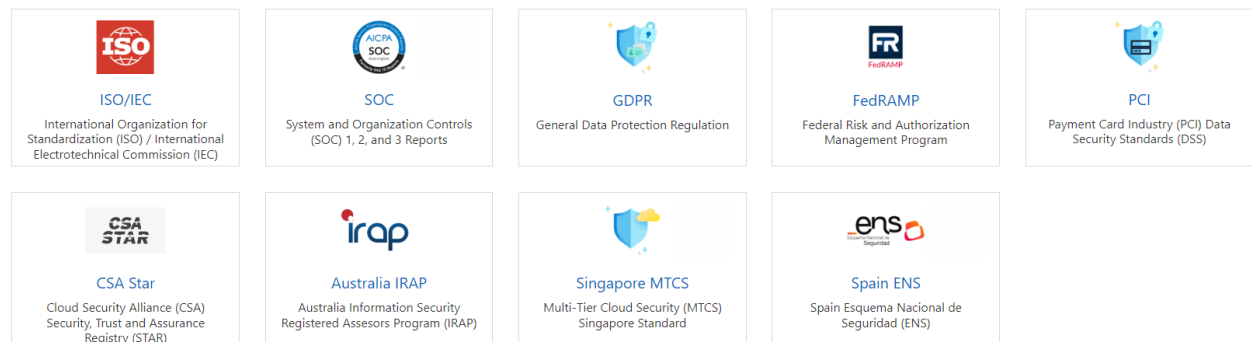
The Service Trust Portal contains details about Microsoft's implementation of controls and processes that protect our cloud services and customer data. To access some of the resources on the Service Trust Portal, you must sign in as an authenticated user with your Microsoft cloud services account (Microsoft Entra work or school account). You'll need to review and accept the Microsoft non-disclosure agreement for compliance materials.

Accessing the Service Trust Portal

You can access the Service Trust Portal at <https://servicetrust.microsoft.com/>.



Certifications, Regulations and Standards



The Service Trust Portal features and content are accessible from the main menu. The categories on the main menu are:

- **Service Trust Portal** provides a quick access hyperlink to return to the Service Trust Portal home page.
- **My Library** lets you save (or pin) documents to quickly access them on your My Library page. You can also set up to receive notifications when documents in your My Library are updated.
- **All Documents** is a single landing place for documents on the service trust portal. From **All Documents**, you can pin documents to have them show up in your **My Library**.

Note

Service Trust Portal reports and documents are available to download for at least 12 months after publishing or until a new version of document becomes available.

6. Module assessment

<https://learn.microsoft.com/en-us/training/modules/describe-features-tools-azure-for-governance-compliance/7-knowledge-check>

Module assessment

Completed

7. Summary

<https://learn.microsoft.com/en-us/training/modules/describe-features-tools-azure-for-governance-compliance/8-summary>

Summary

Completed

In this module, you learned about some of the features and tools you can use to help with governance of your Azure environment. You also learned about tools you can use to help keep resources in compliance with internal or regulatory requirements.

When teams use Copilot or agent-assisted workflows, these governance controls still apply. RBAC, Azure Policy, resource locks, and auditing help ensure AI-assisted changes remain within approved

boundaries.

Learning objectives

You should now be able to:

- Describe the purpose of Microsoft Purview.
- Describe the purpose of Azure Policy.
- Describe the purpose of resource locks.
- Describe the purpose of the Service Trust portal.
- Explain governance guardrails for AI-assisted administrative workflows.

Additional resources

The following resources provide more information on topics in this module or related to this module.

- [Intro to Azure Policy](#) is a Microsoft Learn module that introduces you further to Azure Policy.

Explore with Copilot

Tip

Try one of these prompts in Copilot Chat:

- "Create a governance blueprint showing how Microsoft Purview, Azure Policy, resource locks, and the Service Trust portal work together."
- "Design an agent-assisted Azure Policy workflow for a subscription where an agent drafts three controls and humans approve exceptions and remediation actions."
- "Build an audit evidence checklist that uses Service Trust portal artifacts and policy compliance data for recurring reviews."

Describe features and tools for managing and deploying Azure resources

1. Introduction

<https://learn.microsoft.com/en-us/training/modules/describe-features-tools-manage-deploy-azure-resources/1-introduction>

Introduction

Completed

This module introduces you to features and tools for managing and deploying Azure resources. You learn about the Azure portal (a graphic interface for managing Azure resources), the command line, and scripting tools that help deploy or configure resources. You also learn about Azure services that help you manage your on-premises and multicloud environments from within Azure.

Learning objectives

After completing this module, you'll be able to:

- Describe the Azure portal.
- Describe Azure Cloud Shell, including Azure CLI and Azure PowerShell.
- Describe the purpose of Azure Arc.
- Describe Azure Resource Manager (ARM), ARM templates, and Bicep.

2. Describe tools for interacting with Azure

<https://learn.microsoft.com/en-us/training/modules/describe-features-tools-manage-deploy-azure-resources/2-describe-interacting-azure>

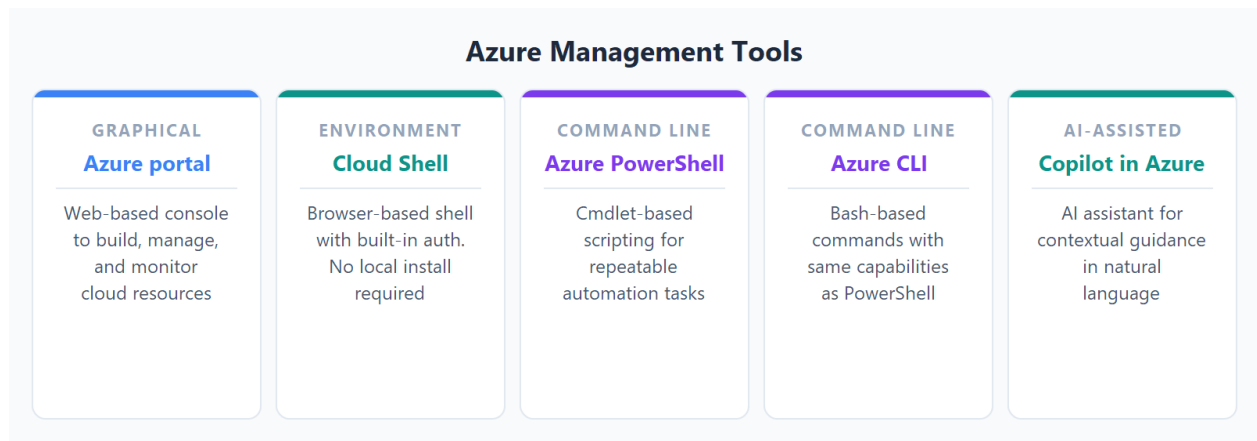
Describe tools for interacting with Azure

Completed

To get the most out of Azure, you need a way to interact with the Azure environment, the management groups, subscriptions, resource groups, resources, and so on. Azure provides multiple tools for managing your environment, including the:

- Azure portal
- Azure PowerShell
- Azure Command Line Interface (CLI)

Many teams also use Copilot in Azure to accelerate common operations tasks such as exploring services, understanding configuration options, and drafting commands or scripts.



AI-assisted operations with Copilot in Azure

Copilot in Azure is an AI assistant experience that can help administrators work faster by providing contextual guidance in natural language. Depending on your environment, some Copilot workflows can be agent-like, where the assistant helps coordinate multi-step tasks.

At a fundamentals level, treat Copilot as an operational assistant. You should still validate recommendations, confirm permissions, and review deployment changes before applying them in production.

What is the Azure portal?

The Azure portal is a web-based, unified console that provides an alternative to command-line tools. With the Azure portal, you can manage your Azure subscription by using a graphical user interface. You can:

- Build, manage, and monitor everything from simple web apps to complex cloud deployments
- Create custom dashboards for an organized view of resources
- Configure accessibility options for an optimal experience

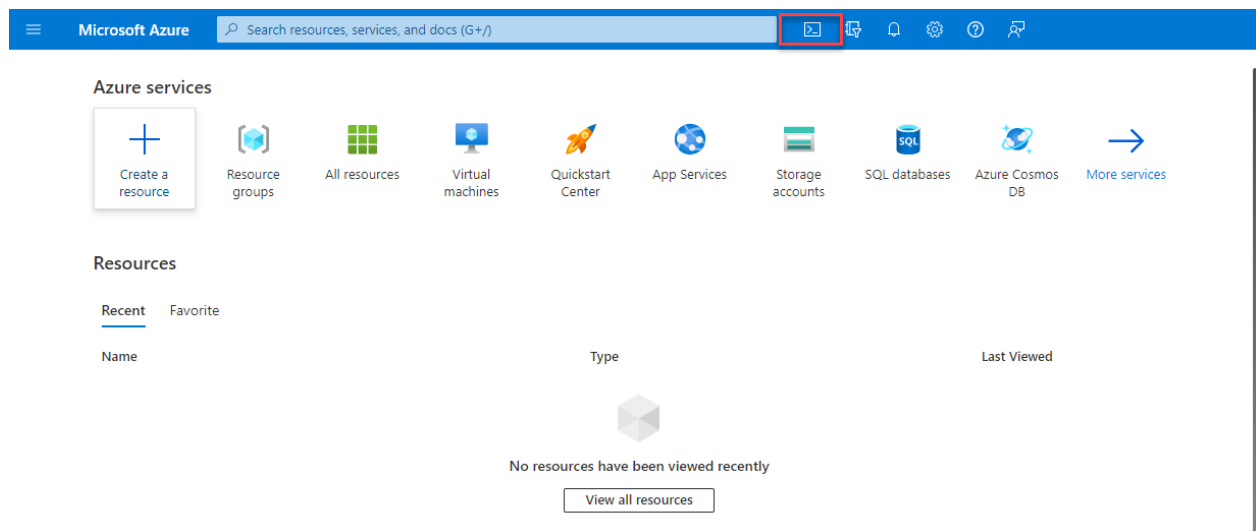
The following video introduces you to the Azure portal:

The Azure portal is designed for resiliency and continuous availability. It maintains a presence in every Azure datacenter. This configuration makes the Azure portal resilient to individual datacenter failures and avoids network slowdowns by being close to users. The Azure portal updates continuously and requires no downtime for maintenance activities.

Azure Cloud Shell

Azure Cloud Shell is a browser-based shell tool that allows you to create, configure, and manage Azure resources using a shell. Azure Cloud Shell support both Azure PowerShell and the Azure Command Line Interface (CLI), which is a Bash shell.

You can access Azure Cloud Shell via the Azure portal by selecting the Cloud Shell icon:



Azure Cloud Shell has several features that make it a unique offering to support you in managing Azure. Some of those features are:

- It is a browser-based shell experience, with no local installation or configuration required.
- It is authenticated to your Azure credentials, so when you log in it inherently knows who you are and what permissions you have.
- You choose the shell you're most familiar with; Azure Cloud Shell supports both Azure PowerShell and the Azure CLI (which uses Bash).

What is Azure PowerShell?

Azure PowerShell is a shell with which developers, DevOps, and IT professionals can run commands called command-lets (cmdlets). These commands call the Azure REST API to perform management tasks in Azure. Cmdlets can be run independently to handle one-off changes, or they may be combined to help orchestrate complex actions such as:

- The routine setup, teardown, and maintenance of a single resource or multiple connected resources.
- The deployment of an entire infrastructure, which might contain dozens or hundreds of resources, from imperative code.

Capturing the commands in a script makes the process repeatable and automatable.

In addition to being available via Azure Cloud Shell, you can install and configure Azure PowerShell on Windows, Linux, and Mac platforms.

What is the Azure CLI?

The Azure CLI is functionally equivalent to Azure PowerShell, with the primary difference being the syntax of commands. While Azure PowerShell uses PowerShell commands, the Azure CLI uses Bash commands.

The Azure CLI provides the same benefits of handling discrete tasks or orchestrating complex operations through code. It's also installable on Windows, Linux, and Mac platforms, as well as through Azure Cloud Shell.

Due to the similarities in capabilities and access between Azure PowerShell and the Bash based Azure CLI, it mainly comes down to which language you're most familiar with.

3. Describe the purpose of Azure Arc

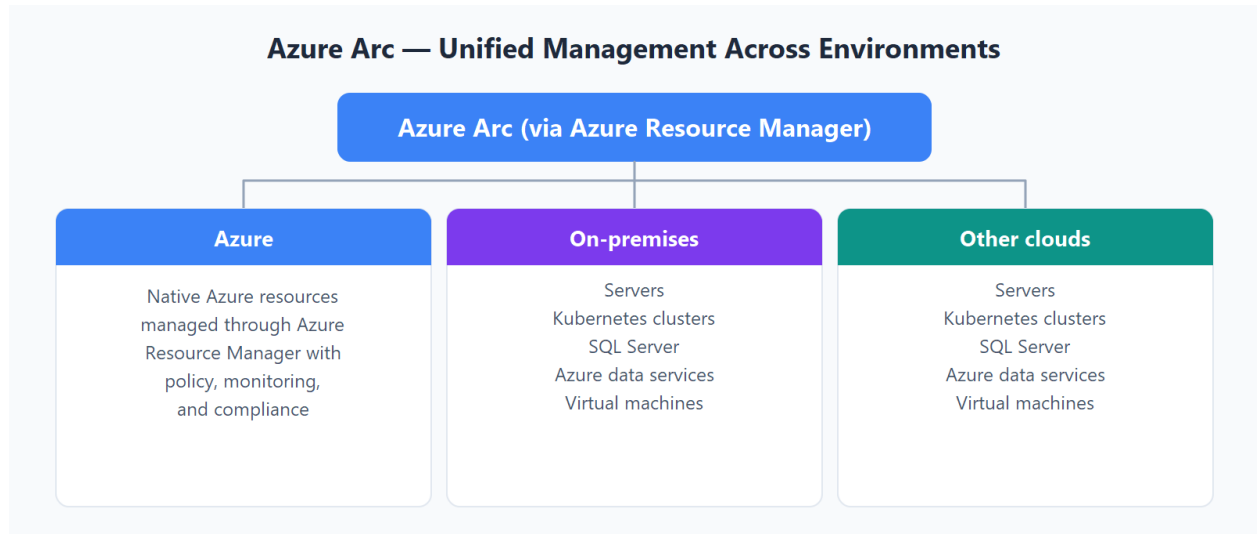
<https://learn.microsoft.com/en-us/training/modules/describe-features-tools-manage-deploy-azure-resources/3-describe-purpose-of-azure-arc>

Describe the purpose of Azure Arc

Completed

Managing hybrid and multicloud environments can rapidly get complicated. Azure provides a host of tools to provision, configure, and monitor Azure resources. What about the on-premises resources in a hybrid configuration or the cloud resources in a multicloud configuration?

Azure Arc works with Azure Resource Manager to extend your Azure compliance and monitoring to hybrid and multicloud configurations. Azure Arc simplifies governance and management by delivering a consistent multicloud and on-premises management platform.



Azure Arc provides a centralized, unified way to:

- Manage your entire environment together by projecting your existing non-Azure resources into Azure Resource Manager.
- Manage multicloud and hybrid virtual machines, Kubernetes clusters, and databases as if they are running in Azure.
- Use familiar Azure services and management capabilities, regardless of where they live.
- Continue using traditional ITOps while introducing DevOps practices to support new cloud and native patterns in your environment.
- Configure custom locations as an abstraction layer on top of Azure Arc-enabled Kubernetes clusters and cluster extensions.

Practical scenario

Imagine your organization runs workloads in Azure, an on-premises datacenter, and another public cloud. With Azure Arc, operations teams can apply consistent governance, policy, and inventory tracking across these environments from Azure, instead of managing each environment with disconnected tools.

What can Azure Arc do outside of Azure?

Currently, Azure Arc allows you to manage the following resource types hosted outside of Azure:

- Servers
- Kubernetes clusters
- Azure data services
- SQL Server

- Virtual machines (preview)

4. Describe Azure Resource Manager and Azure ARM templates

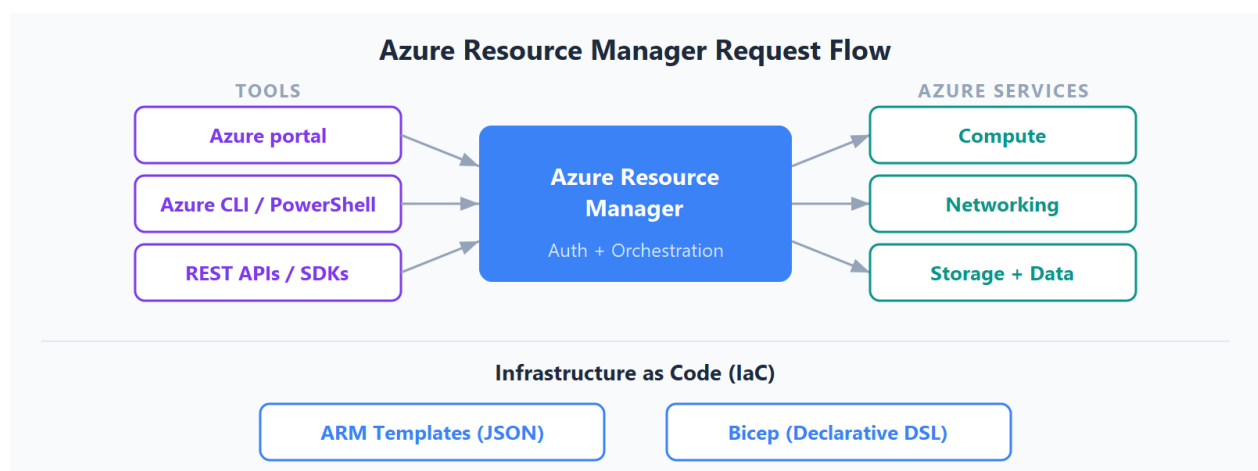
<https://learn.microsoft.com/en-us/training/modules/describe-features-tools-manage-deploy-azure-resources/4-describe-azure-resource-manager-azure-arm-templates>

Describe Azure Resource Manager and Azure ARM templates

Completed

Azure Resource Manager is the deployment and management service for Azure. It provides a management layer that enables you to create, update, and delete resources in your Azure account. Anytime you do anything with your Azure resources, Azure Resource Manager is involved.

When a user sends a request from any of the Azure tools, APIs, or SDKs, Azure Resource Manager receives the request. Azure Resource Manager authenticates and authorizes the request. Then, Azure Resource Manager sends the request to the Azure service, which takes the requested action. You see consistent results and capabilities in all the different tools because all requests are handled through the same API.



Azure Resource Manager benefits

With Azure Resource Manager, you can:

- Manage your infrastructure through declarative templates rather than scripts. A Resource Manager template is a JSON file that defines what you want to deploy to Azure.

- Deploy, manage, and monitor all the resources for your solution as a group, rather than handling these resources individually.
- Re-deploy your solution throughout the development life-cycle and have confidence your resources are deployed in a consistent state.
- Define the dependencies between resources, so they're deployed in the correct order.
- Apply access control to all services because RBAC is natively integrated into the management platform.
- Apply tags to resources to organize your subscription and support cost reporting.

The following video provides an overview of Azure Resource Manager.

Infrastructure as code

Infrastructure as code (IaC) means managing infrastructure through code and templates instead of manual configuration. At a fundamentals level, this can start with Azure CLI or Azure PowerShell and grow into repeatable environment deployments by using Azure Resource Manager templates and Bicep.

Azure Resource Manager templates

Azure Resource Manager templates describe desired Azure resources in declarative JSON. Azure validates the template before deployment, then orchestrates resource creation in the right order and in parallel when possible. Teams define the desired end state, and Azure Resource Manager handles deployment execution.

Templates can also call PowerShell or Bash deployment scripts when setup steps are needed before or after resource creation.

Benefits of using Azure Resource Manager templates

Azure Resource Manager templates provide several key benefits:

- **Declarative syntax:** Define what to deploy instead of writing step-by-step deployment commands.
- **Repeatable results:** Reuse the same template across environments for consistent outcomes.
- **Orchestration:** Azure Resource Manager handles dependency order and parallel deployment automatically.
- **Modularity:** Split templates into reusable components and nested templates.

- **Extensibility:** Add deployment scripts when additional setup actions are required.

Bicep

Bicep is a declarative language for deploying Azure resources through ARM. Compared to JSON ARM templates, Bicep is generally simpler and more concise.

Benefits of Bicep include:

- **Support for current Azure resources:** Bicep tracks Azure resource types and API versions.
- **Simple syntax:** Bicep is easier to read and write than equivalent JSON templates.
- **Repeatable deployments:** Bicep files are idempotent for consistent lifecycle deployments.
- **Built-in orchestration:** Azure Resource Manager handles dependencies and parallel deployment execution.
- **Modularity:** Reuse logic by organizing deployments into Bicep modules.

5. Module assessment

<https://learn.microsoft.com/en-us/training/modules/describe-features-tools-manage-deploy-azure-resources/5-knowledge-check>

Module assessment

Completed

6. Summary

<https://learn.microsoft.com/en-us/training/modules/describe-features-tools-manage-deploy-azure-resources/6-summary>

Summary

Completed

In this module, you were introduced to features and tools for managing and deploying Azure resources. You learned about the Azure portal (a graphic interface for managing Azure resources), command line, and scripting tools that help deploy or configure resources. You also learned about Azure services that help you manage your on-premises and multicloud environment from Azure.

You also learned where Copilot in Azure can assist with discovery, guidance, and multistep operational workflows while keeping administrators in control of final decisions.

Learning objectives

You should now be able to:

- Describe Azure portal.
- Describe Azure Cloud Shell, including Azure CLI and Azure PowerShell.
- Describe the purpose of Azure Arc.
- Describe Azure Resource Manager (ARM), ARM templates, and Bicep.
- Describe how Copilot in Azure can assist with operations tasks while humans remain responsible for validation and approval.

Additional resources

The following resources provide more information on topics in this module or related to this module.

- [Implement resource management security](#) in Azure is a Microsoft Learn learning path that provides more information on managing Azure resources.

Explore with Copilot

Tip

Try one of these prompts in Copilot Chat:

- "Compare Azure portal, Cloud Shell, Azure CLI, and Azure PowerShell across common admin tasks and explain when each is the best choice."
- "Design an agent-assisted deployment workflow with ARM templates or Bicep that includes human approval checkpoints for validation, staged rollout, and rollback decisions."
- "Explain how Azure Arc extends Azure management to on-premises and multicloud resources with one practical operations scenario."

Describe monitoring tools in Azure

1. Introduction

<https://learn.microsoft.com/en-us/training/modules/describe-monitoring-tools-azure/1-introduction>

Introduction

Completed

In this module, you'll be introduced to tools that help you monitor your environment and applications, both in Azure and in on-premises or multicloud environments.

Learning objectives

After completing this module, you'll be able to:

- Describe the purpose of Azure Advisor.
- Describe Azure Service Health.
- Describe Azure Monitor, including Azure Log Analytics, Azure Monitor Alerts, and Application Insights.

2. Describe the purpose of Azure Advisor

<https://learn.microsoft.com/en-us/training/modules/describe-monitoring-tools-azure/2-describe-purpose-of-azure-advisor>

Describe the purpose of Azure Advisor

Completed

Azure Advisor evaluates your Azure resources and makes recommendations to help you improve reliability, security, performance, and cost efficiency. Think of it as a personalized best-practices guide

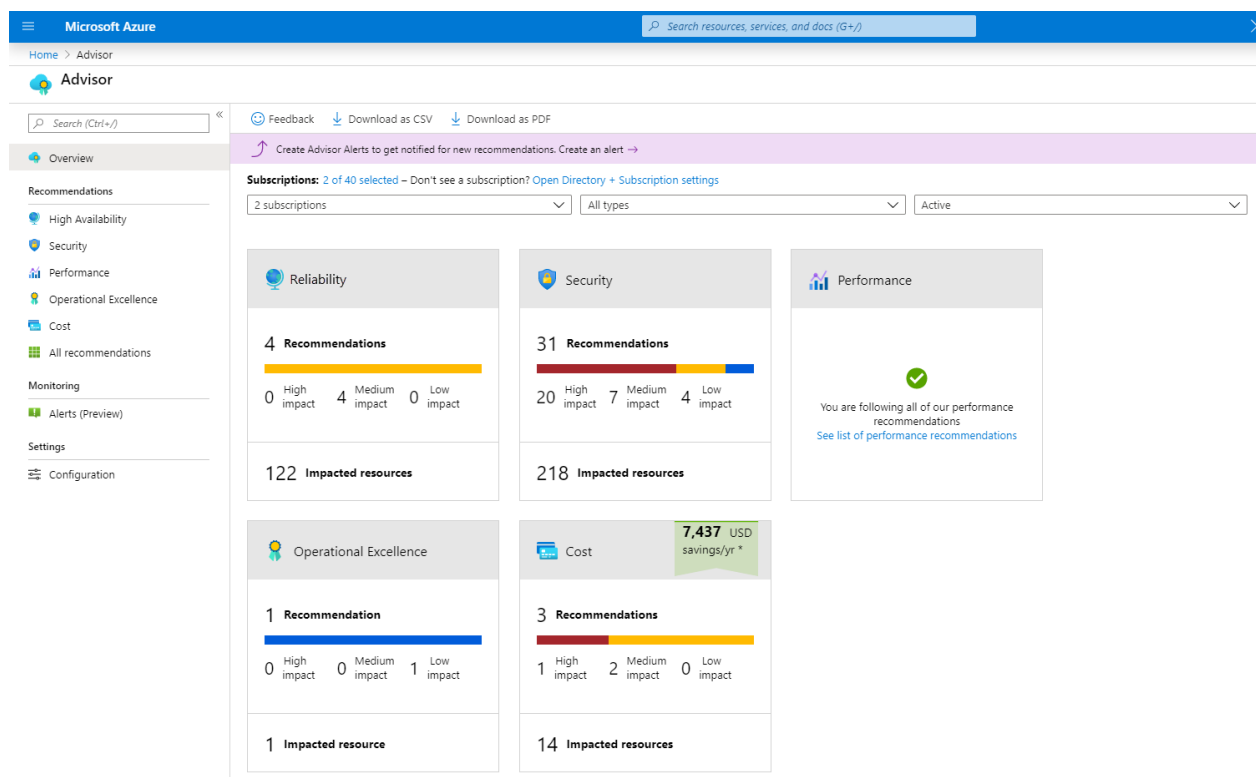
built into the Azure portal. Each recommendation includes a suggested action you can take right away, postpone, or dismiss.

You can also set up notifications so Advisor alerts you when new recommendations appear.

The Advisor dashboard displays recommendations for all your subscriptions, and you can filter by subscription, resource group, or service. Recommendations fall into five categories:

- **Reliability** helps keep your applications running by flagging configuration risks.
- **Security** detects threats and vulnerabilities that could lead to breaches.
- **Performance** identifies changes that can speed up your applications.
- **Operational Excellence** suggests workflow and deployment improvements.
- **Cost** finds ways to reduce your Azure spending.

The following image shows the Azure Advisor dashboard.



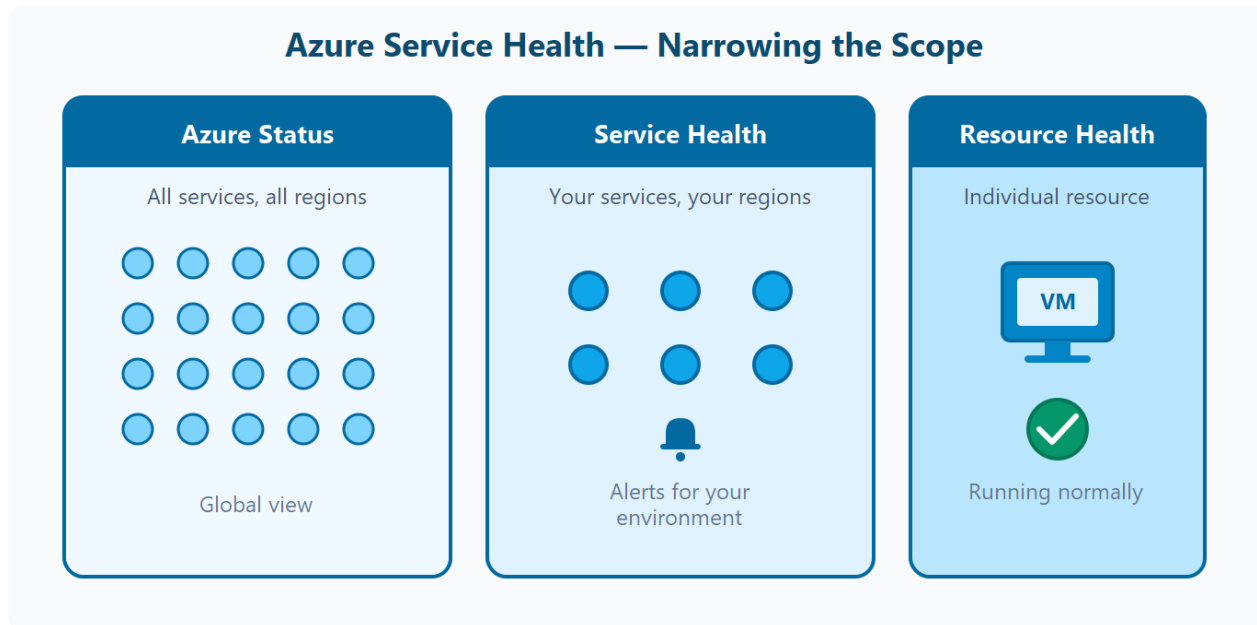
3. Describe Azure Service Health

<https://learn.microsoft.com/en-us/training/modules/describe-monitoring-tools-azure/3-describe-azure-service-health>

Describe Azure Service Health

Completed

Azure Service Health helps you stay informed about the health of Azure itself and the specific resources you run. It combines three views that narrow in scope from global down to individual resources.



Three health views

- **Azure Status** gives you a global picture of Azure health across all services and regions. Check this page when you hear about a widespread outage and want to know whether it affects Azure.
- **Service Health** focuses on the Azure services and regions you actually use. Because you're signed in, Service Health knows which services matter to you and shows outages, planned maintenance, and health advisories relevant to your environment. You can set up alerts so you're notified automatically.
- **Resource Health** zooms in on individual resources, such as a specific virtual machine. It tells you whether a resource is running normally or experiencing a problem, and whether the issue is on Azure's side or yours.

Used together, these three views give you visibility from broad service events all the way down to a single resource. Historical alerts are also retained so you can spot recurring trends.

Operational value

When an event affects one of your workloads, Azure Service Health provides links to support so you can respond quickly.

4. Describe Azure Monitor

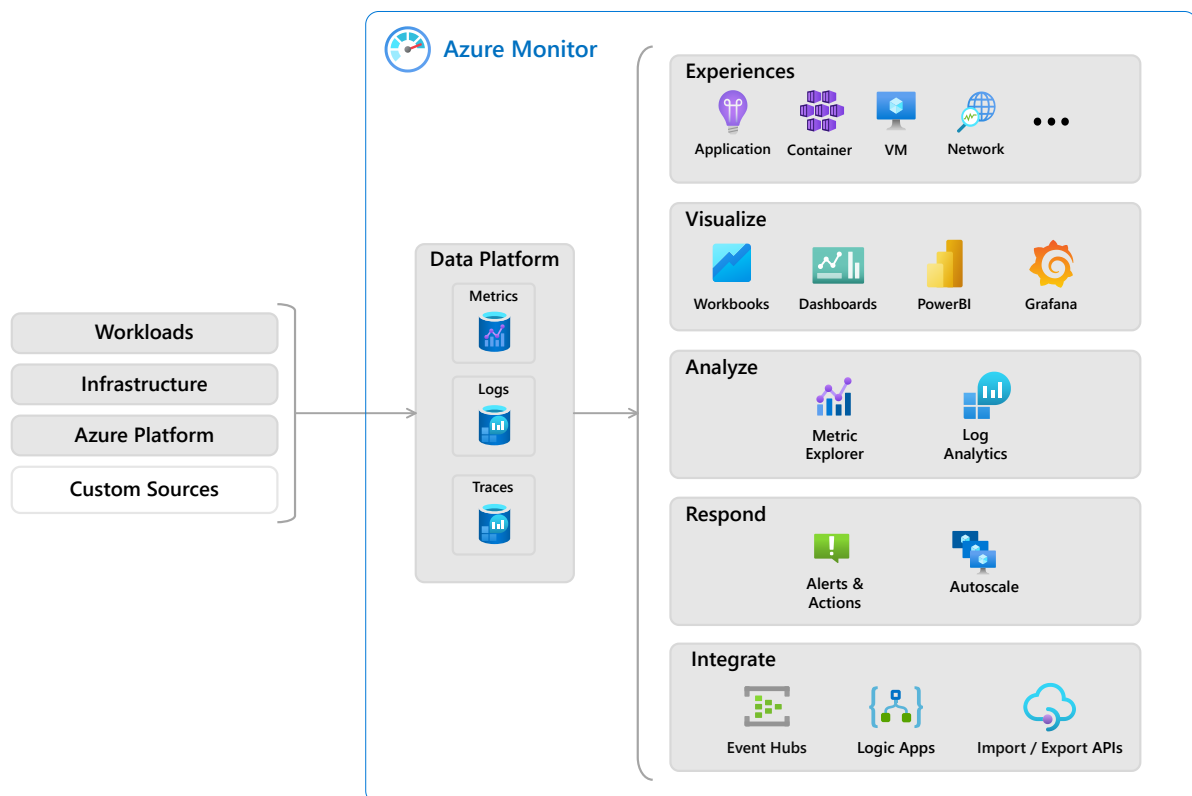
<https://learn.microsoft.com/en-us/training/modules/describe-monitoring-tools-azure/4-describe-azure-monitor>

Describe Azure Monitor

Completed

Azure Monitor is a platform for collecting, analyzing, and acting on data from your Azure resources and applications. It works with Azure, on-premises, and multicloud environments.

The following diagram illustrates the breadth of Azure Monitor:



Azure Monitor gathers logs and metrics from your applications, operating systems, and network layers, stores that data centrally, and makes it available through dashboards, queries, and alerts.

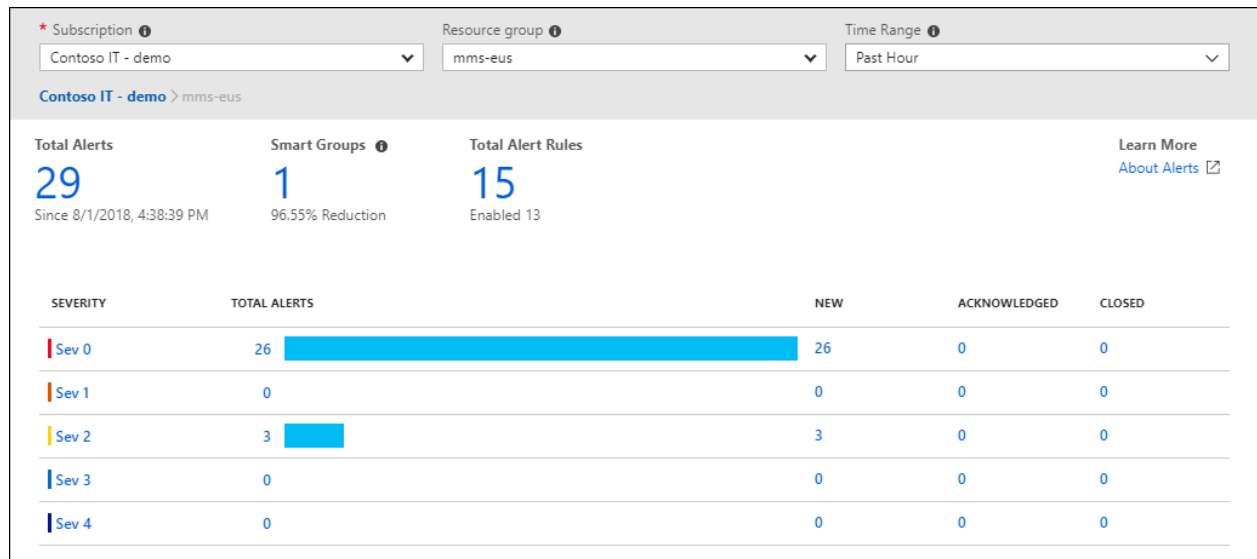
Azure Log Analytics

Log Analytics is the tool in the Azure portal where you write and run queries against the data Azure Monitor collects. You can do simple filtering, like finding all errors in the last hour, or run advanced

analytics to visualize trends over time.

Azure Monitor Alerts

Alerts notify you when Azure Monitor detects that a condition you defined has been met. You create an alert rule that specifies the condition, and an action group that controls who gets notified and what happens next.



Alerts can be metric-based or log-based. For example, a metric alert can send you an email when a VM's CPU stays above 80%, while a log alert can watch for a specific error pattern across multiple resources. Action groups are reusable across Azure Monitor, Service Health, and Azure Advisor.

Application Insights

Application Insights is an Azure Monitor feature that monitors the performance and usage of your web applications, whether they run in Azure, on-premises, or in another cloud.

You can set up Application Insights by adding an SDK to your application code or by enabling the Application Insights agent without code changes.

Application Insights can monitor:

- Request rates, response times, and failure rates
- Dependency calls and their performance
- Page load times, user counts, and session trends
- Server performance counters such as CPU, memory, and network usage

You can also set up availability tests that send synthetic requests to your application so you know it's responding, even during low-traffic periods.

5. Module assessment

<https://learn.microsoft.com/en-us/training/modules/describe-monitoring-tools-azure/5-knowledge-check>

Module assessment

Completed

6. Summary

<https://learn.microsoft.com/en-us/training/modules/describe-monitoring-tools-azure/6-summary>

Summary

Completed

In this module, you were introduced to tools that help you monitor your environment and applications, both in Azure and in on-premises or multicloud environments.

Learning objectives

You should now be able to:

- Describe the purpose of Azure Advisor.
- Describe Azure Service Health.
- Describe Azure Monitor, including Azure Log Analytics, Azure Monitor Alerts, and Application Insights.

Additional resources

The following additional resources are intended to provide more information on topics in this module or on additional topics related to this module.

- [Get started with Azure Advisor](#) is a Microsoft Learn module that helps you get started with Azure Advisor.

- [Intro to Azure Service Health](#) is a Microsoft Learn module that provides additional information about Azure Service Health.
- [Monitor the usage, performance, and availability of resources with Azure Monitor](#) is a Microsoft Learn learning path that dives deeper into Azure Monitor. It provides helpful guidance on setting up and getting the most from the Azure Monitor service.

Explore with Copilot

Tip

Try one of these prompts in Copilot Chat:

- "Design a monitoring strategy that combines Azure Advisor, Service Health, Azure Monitor, Log Analytics, Alerts, and Application Insights."
- "Walk through an outage scenario and explain which monitoring tool to check first at each stage of diagnosis and response."
- "Define an alerting model with severity levels, thresholds, action groups, and escalation paths for a production workload."