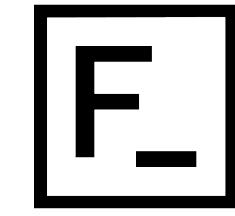




Monica Beate Tvedt **Teknologidirektør**



Forte_ Digital

TIDLIGERE

- Agency Director - Head of Microsoft Development, Mixed Reality & Microservices at Sopra Steria
- Head of UMS Innovation Center at Unified Messaging Systems
- Global Head of SaaS Development at Unified Messaging Systems
- Senior Software Engineer Consultant, Webstep @ Sparebanken Vest
- Software Engineer, CellVision
- Gründer

PROSJEKT 2020

- Kunde: **ASKO**
Rolle: Arkitekt og Front-end lead
- Kunde: **Kværner**
Rolle: Arkitekt og Mobilspesialist
- Kunde: **COVID-19 Digital Feberpoliklinikk**
Rolle: Løsningsarkitekt

FOREDRAG 2020

*Oslo Business Forum 2020, Relevans 2020,
Global AI on Tour 2020, Women in Tech 2020,
Lørn.Tech.*

DIVERSE INTERESSER

*Alpint, tennis, programmering, tegne,
lese bøker*

- 0.0 Recap: Azure Virtual Machines
- 1.0 Public, Private and the Hybrid Cloud
- 2.0 Cloud Service Models
- 3.0 PowerShell and Automating Azure Tasks
- 4.0 Cost Prediction and optimize spending
- 5.0 Azure Resource Manager
-
-
- 6.0 Self Study

0.0 - Recap

Azure Virtual Machines:
availability set.. which is?

1.0

Public, Private, and the Hybrid Cloud.

Cloud Computing

There are Azure services for almost any business computing need. Do you need an interactive website? A back end for a mobile app? Secure storage for your client data? All of these and more are available. And these resources are available when you need them, and you're typically only charged for the amount you use.

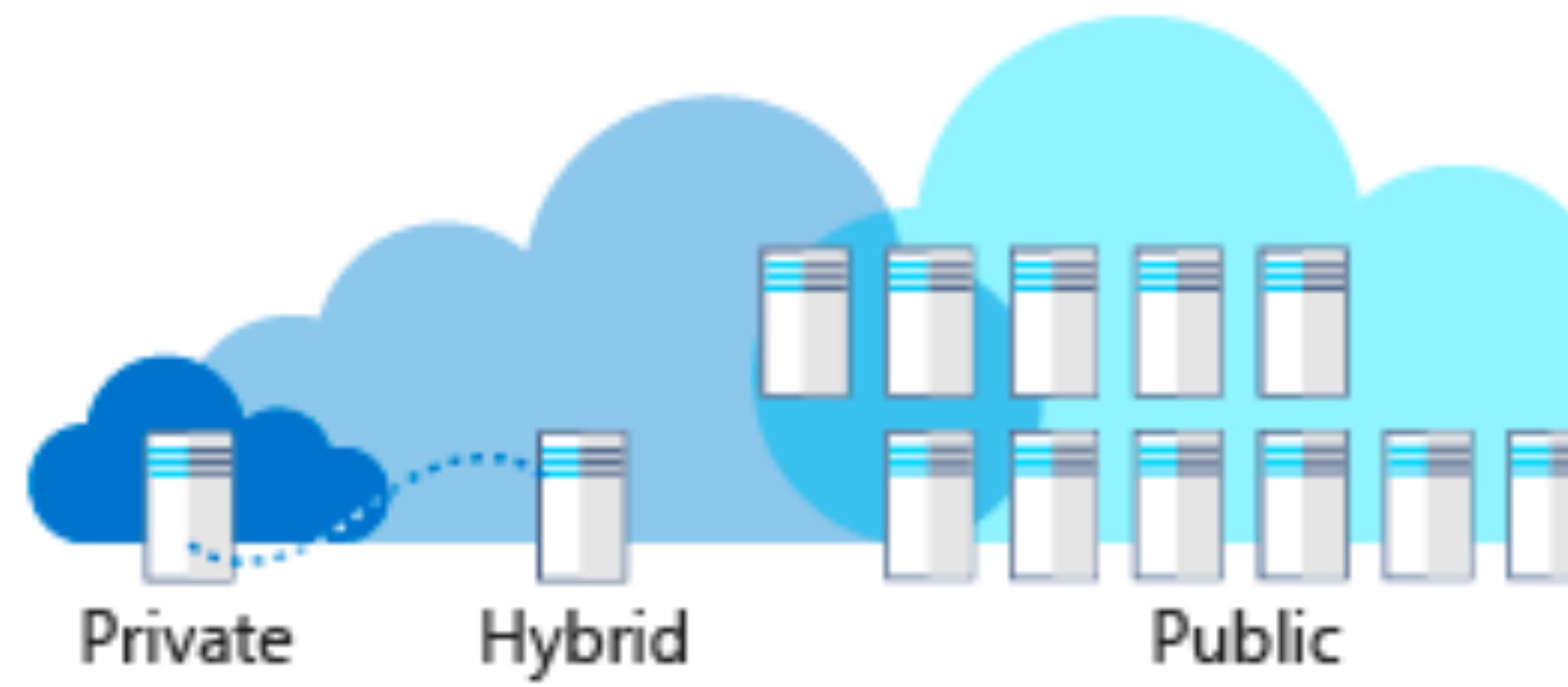
But what if you **already have existing on-premises infrastructure?** Or you have **highly sensitive data** that you're not willing or able to store off-site?

Public, Private, and Hybrid Cloud

There are three deployment models for cloud computing: public cloud, private cloud, and hybrid cloud.

Cloud computing is the provisioning of services and applications on demand over the internet.

Servers, applications, data, and other resources are provided **as a service**.



Public Cloud

Services are offered over the public internet and available to anyone who wants to purchase them.

Servers and storage are **owned and operated by a third-party cloud service provider** and delivered over the internet.

Services may be free or sold on demand, allowing customers to **pay only per usage** for the CPU cycles, storage, or bandwidth they consume.

Public clouds can be deployed **faster** than on-premises infrastructures and with an almost **infinitely scalable** platform. Every employee of a company can use the same application from any office or branch using their device of choice as long as they can access the internet.



Why Public Cloud

Examples of why you would use public cloud:

- **Service consumption through on-demand or subscription model:** The on-demand or subscription model allows you to pay for the portion of CPU, storage, and other resources that you use or reserve.
- **No up-front investment of hardware:** No requirement to purchase, manage, and maintain on-premises hardware and application infrastructure. The cloud service provider is held responsible for all management and maintenance of the system.
- **Automation:** Quickly provision infrastructure resources using a web portal, scripts, or via automation.
- **Geographic dispersity:** Store data near your users, or in desired locations without having to maintain your own datacenters.
- **Reduced hardware maintenance:** The service provider is responsible for hardware maintenance.

Private Cloud

Consists of computing resources used exclusively by users from **one business** or organization.

It can be physically located at your organization's on-site datacenter, or it can be hosted by a third-party service provider. The term *private cloud* **should not be** considered a rebranding of traditional on-premises datacenters.

A private cloud uses on-premises infrastructure and services to **provide similar benefits of the public cloud**. It uses an **abstraction platform to provide cloud-like services** such as Kubernetes clusters or a complete cloud environment like *Azure Stack*.



Why Private Cloud

A private cloud can provide **more flexibility** to an organization.

Your organization can customize its cloud environment to meet specific business needs.

Since resources are not shared with others, **high levels of control and security** are possible.

Examples of why you would use private cloud:

- **Pre-existing environment:** An existing operating environment that can't be replicated in the public cloud. A large investment in hardware and employees with solution expertise. A large organization may choose to commoditize their computing resources.
- **Legacy applications:** Business-critical legacy applications that can't easily be physically relocated.
- **Data sovereignty and security:** Political borders and legal requirements may dictate where data can physically exist.
- **Regulatory compliance / certification:** PCI or HIPAA compliance. Certified on-premises datacenter.

Hybrid Cloud

A computing environment that **combines** a public cloud and a private cloud by allowing data and applications to be shared between them. When computing and processing demand fluctuates, hybrid cloud computing gives businesses the **ability to seamlessly scale their on-premises infrastructure** up to the public cloud to handle any overflow - without giving third-party datacenters access to the entirety of their data.

Organizations gain the flexibility and computing power of the public cloud for basic and **non-sensitive computing tasks**, while keeping business-critical applications and data on-premises, safely behind a company firewall.

Companies pay only for resources they temporarily use instead of having to purchase, program, and maintain additional resources and equipment that could remain idle over long periods of time. Integration is generally **through a secure VPN** between cloud providers like Azure and on-premises datacenters.

Why Hybrid Cloud

Hybrid cloud allows your organization to control and maintain a [private infrastructure for sensitive assets](#). It also gives you the [flexibility](#) to take advantage of additional resources in the public cloud when you need them. With the [ability to scale](#) to the public cloud, you pay for extra computing power only when needed. It can also [ease transitioning to the cloud](#). You can migrate gradually by phasing in workloads over time.

Examples of why you would use hybrid cloud:

- **Existing hardware investment:** Business reasons require that you use an existing operating environment and hardware.
- **Regulatory requirements:** Regulation requires that the data needs to remain at a physical location.
- **Unique operating environment:** Public cloud can't replicate a legacy operating environment.
- **Migration:** Move workloads to the cloud over time.

Knowledge Check

Which cloud deployment model would be the best match for the following situation? A SQL server database is needed for a short-term project. The IT department does not have available hardware that meets the performance requirements or resources to deploy it. The project starts next week. Once the project is over, the database is no longer needed.

1. Public Cloud
2. Private Cloud
3. Hybrid Cloud

Knowledge Check

Which cloud deployment model is described in the following scenario? You create several virtual machines in the cloud. The VMs are networked together using a virtual network. The VMs have access to x-ray image files in cloud storage. One of the VMs is a web server that host a website exposed to the Internet for customers to access their records. There is a VPN that connects the solution to your on-premises datacenter for customer information to display with the image files.

1. Public Cloud
2. Private Cloud
3. Hybrid Cloud

Knowledge Check

Which cloud deployment model is described in the following scenario?
You have two datacenters in your organization. One datacenter has a database that can only reside in one of the datacenters because of a regulatory requirement. You want to access the database from the other datacenter. You create a VPN using a cloud provider to connect the two datacenters.

1. Public Cloud
2. Private Cloud
3. Hybrid Cloud

2.0

Cloud Service

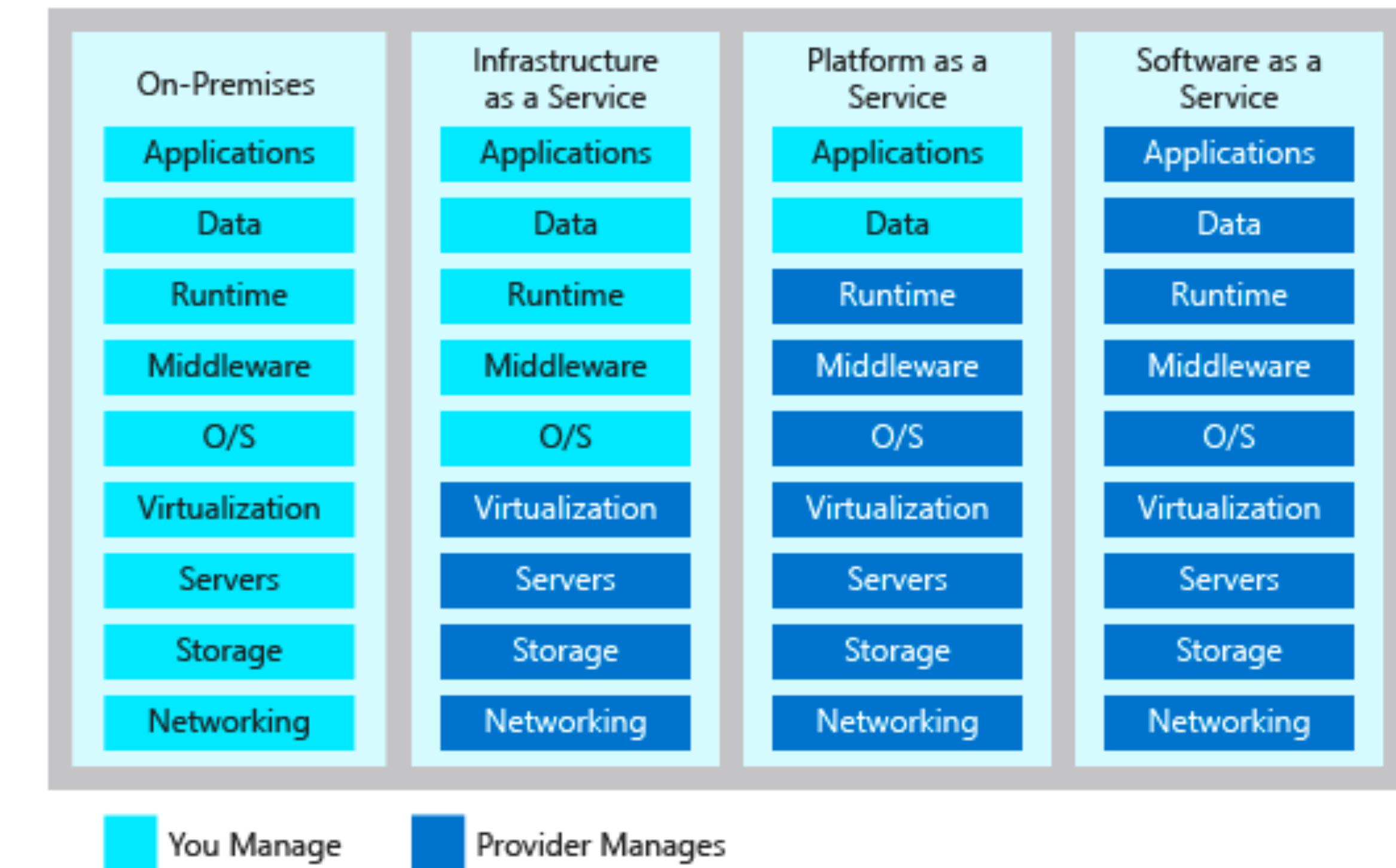
Models.

SaaS, PaaS, and IaaS

Infrastructure-as-a-service (IaaS) provides instant computing infrastructure that you can provision and manage over the Internet.

Platform as a service (PaaS) provides ready-made development and deployment environments that you can use to deliver your own cloud services.

Software as a service (SaaS) delivers applications over the Internet as a web-based service.



Infrastructure-as-a-service (IaaS)

Advantages

- Eliminates capital expense and reduces ongoing cost
- Improves business continuity and disaster recovery
- Respond quicker to shifting business conditions
- Increase stability, reliability, and supportability

Platform-as-a-service (PaaS)

Advantages

By delivering infrastructure as a service, PaaS has similar advantages as IaaS. But its additional features including middleware, development tools, and other business tools provide additional advantages:

- Reduced development time
- Efficiently manage the application lifecycle

Software-as-a-service (SaaS)

Advantages

Software as a service (SaaS) allows users to connect to and use cloud-based apps over the Internet. Common examples are email, calendaring, and office tools such as Microsoft 365.

- Gain access to sophisticated applications
- Use free client software
- Access app data from anywhere

Knowledge Check

Which cloud service model would be the best match for the following situation? A SQL Server database is needed for a short-term project. The IT department does not have available hardware that meets the performance requirements or resources to deploy it. The project starts next week. Once the project is over, the database is no longer needed.

1. IaaS
2. PaaS
3. SaaS

Knowledge Check

Which cloud service model is described in the following scenario? You create several virtual machines in the cloud. The VMs are networked together using a virtual network. The VMs have access to x-ray image files in cloud storage. One virtual machine is a web server that hosts a website exposed to the internet for customers to access their records. There is a VPN that connects the solution to your on-premises datacenter for customer information to display with the image files..

1. IaaS
2. PaaS
3. SaaS

Knowledge Check

Which cloud service model would be the best match for the following situation? You work at a start-up company with a small number of employees who need to collaborate. They need email, calendar scheduling, and somewhere to store documents. The team is technical but do not have the time or hardware to implement and manage a solution.

1. IaaS
2. PaaS
3. SaaS

3.0

PowerShell and

Automating Azure Tasks.

Azure PowerShell

Creating administration scripts is a powerful way to optimize your work flow. You can automate common, repetitive tasks, and once a script has been verified, it will run consistently, likely reducing errors.

We recommend using Azure PowerShell interactively for one-off tasks and [write scripts to automate repeated tasks](#).

Azure PowerShell consists of two components that needs to be installed:

- **The base PowerShell product**
- **The Azure PowerShell module**

Creating Azure Resources using scripts in Azure PowerShell

```
Get-AzSubscription
```

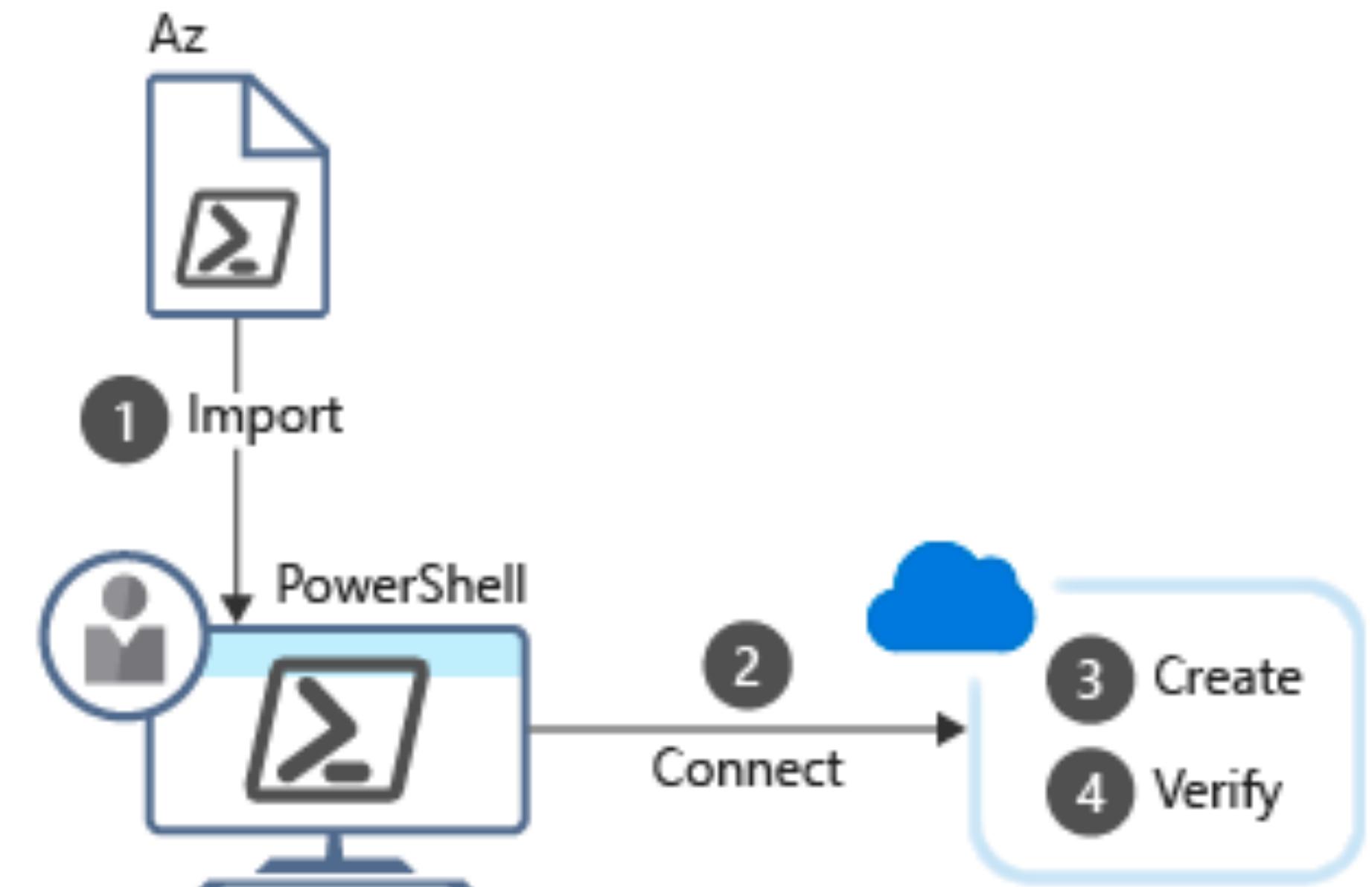
```
Select-AzSubscription -SubscriptionId  
'6d926ea2-1d51-4633-b94f-bd33d9fe439a'
```

```
Get-AzResourceGroup
```

```
Get-AzResourceGroup | Format-Table
```

```
New-AzResourceGroup -Name MeetupForte -Location 'North Europe'
```

```
Get-AzResource | ft
```



Creating Virtual Machines using scripts in Azure PowerShell

```
Get-AzVM -Status
```

```
New-AzVm
```

```
-ResourceGroupName learn-ed50831f-2155-48b9-918d-d2d3cbe6266a  
-Name "testvm-eus-01"  
-Credential (Get-Credential)  
-Location "East US"  
-Image UbuntuLTS  
-OpenPorts 22
```

```
$vm = (Get-AzVM -Name "testvm-eus-01" -ResourceGroupName learn-ed50831f-2155-48b9-918d-d2d3cbe6266a)  
$vm  
$vm.StorageProfile.OsDisk
```

Task

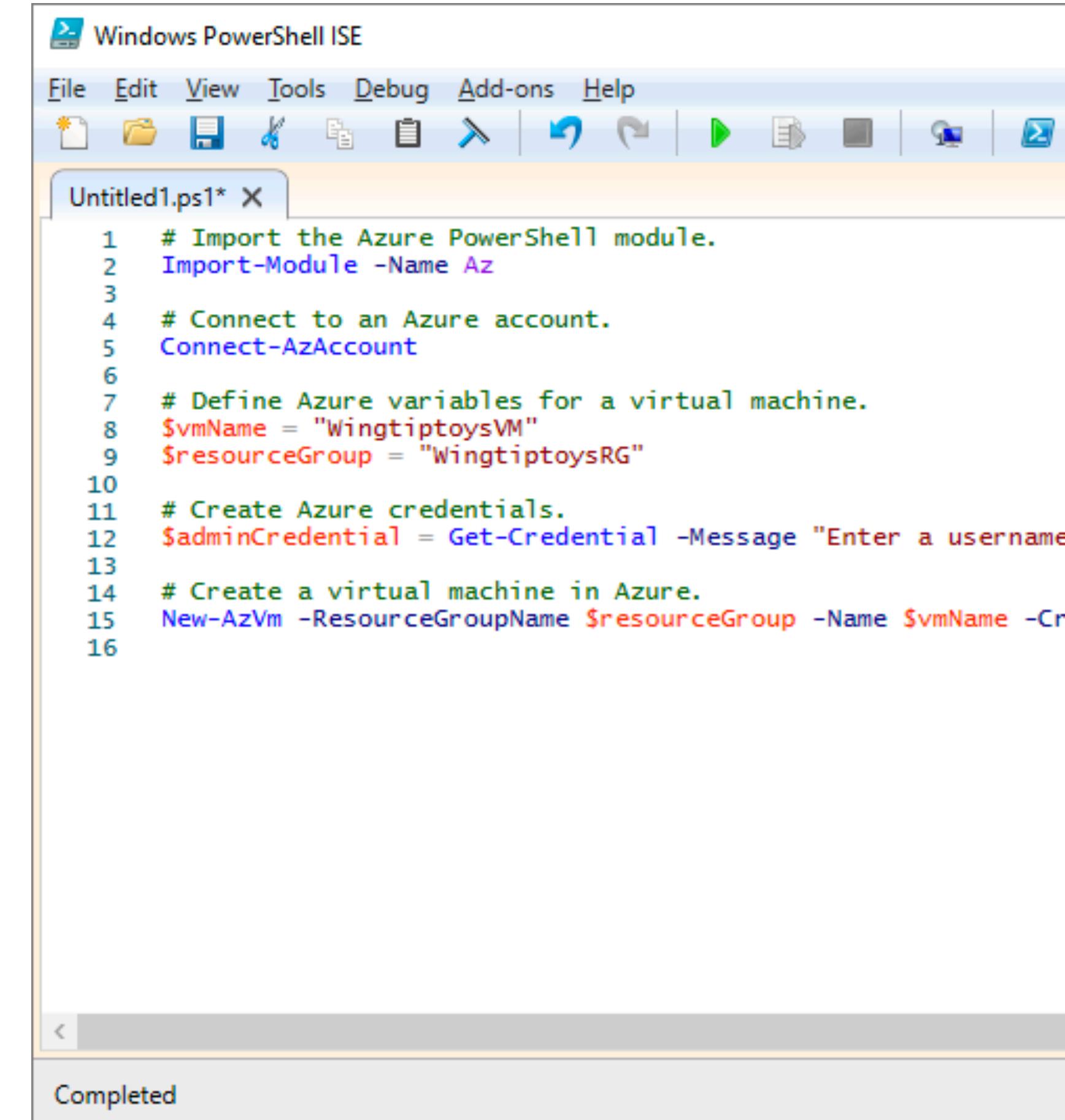
Exercise - Creating Virtual Machines using
scripts in Azure PowerShell

<https://docs.microsoft.com/nb-no/learn/modules/automate-azure-tasks-with-powershell/6-exercise-create-resource-interactively>

Create and save scripts in Azure PowerShell

A PowerShell script is a text file containing commands and control constructs. The commands are invocations of cmdlets. The control constructs are programming features like **loops, variables, parameters, comments**, etc. supplied by PowerShell.

PowerShell script files have a **.ps1** file extension. You can create and save these files with any text editor.



```
Windows PowerShell ISE
File Edit View Tools Debug Add-ons Help
Untitled1.ps1*
1 # Import the Azure PowerShell module.
2 Import-Module -Name Az
3
4 # Connect to an Azure account.
5 Connect-AzAccount
6
7 # Define Azure variables for a virtual machine.
8 $vmName = "WingtiptoysVM"
9 $resourceGroup = "WingtiptoysRG"
10
11 # Create Azure credentials.
12 $adminCredential = Get-Credential -Message "Enter a username and password for the new virtual machine."
13
14 # Create a virtual machine in Azure.
15 New-AzVm -ResourceGroupName $resourceGroup -Name $vmName -C...
16
```

Completed

Techniques

//Variables

```
$loc = "East US"
```

```
$iterations = 3
```

```
$adminCredential = Get-Credential
```

//Usage

```
$loc = "East US"
```

```
New-AzResourceGroup -Name "MyResourceGroup" -Location $loc
```

//Loops

//The comparison operators are written **-lt** for "less than", **-le** for "less than or equal", **-eq** for "equal", **-ne** for "not equal", etc

```
For ($i = 1; $i -lt 3; $i++)  
{  
    $i  
}
```

Parameters

```
//example passing size and location as params  
.\\setupEnvironment.ps1 -size 5 -location "East US"
```

```
//capture inside our script  
param([string]$location, [int]$size)
```

Task

Exercise - Create and save scripts in Azure
PowerShell

<https://docs.microsoft.com/nb-no/learn/modules/automate-azure-tasks-with-powershell/8-exercise-create-resource-using-script>

Knowledge Check

True or false: The Azure portal, the Azure CLI, and Azure PowerShell offer significantly different services, so it is unlikely that all three will support the operation you need.

Knowledge Check

Suppose you are building a video-editing application that will offer online storage for user-generated video content. You will store the videos in Azure Blobs, so you need to create an Azure storage account to contain the blobs. Once the storage account is in place, it is unlikely you would remove and recreate it because this would delete all the user videos. Which tool is likely to offer the quickest and easiest way to create the storage account?

- Azure Portal
- Azure CLI
- Azure PowerShell

Knowledge Check

What needs to be installed on your machine to let you execute Azure PowerShell cmdlets locally?

- Azure Cloud Shell
- The Base PowerShell Product and the AZ Module
- The Azure CLI and and Azure PowerShell

4.0

Cost prediction and
optimize spending.

Total Cost of Ownership (TCO) Calculator

The Total Cost of Ownership (TCO) Calculator can help you compare the cost of running in the datacenter versus running on Azure.

The term *total cost of ownership* is commonly used in finance. It can be hard to see all the hidden costs related to operating a technology capability on-premises. Software licenses and hardware are additional costs.

With the TCO Calculator, you enter the details of your on-premises workloads. Then you review the suggested industry average cost (which you can adjust) for related operational costs. These costs include electricity, network maintenance, and IT labor. You're then presented with a side-by-side report. Using the report, you can compare those costs with the same workloads running on Azure.

Total Cost of Ownership (TCO) Calculator

Estimate the cost savings you can realize by migrating your workloads to Azure

Help us improve. Is the TCO calculator helpful?

[Yes](#)[No](#)**1**

Define your workloads

2

Adjust assumptions

3

View report

View report

Timeframe 

3 Years

Region 

North Europe

Licensing program 

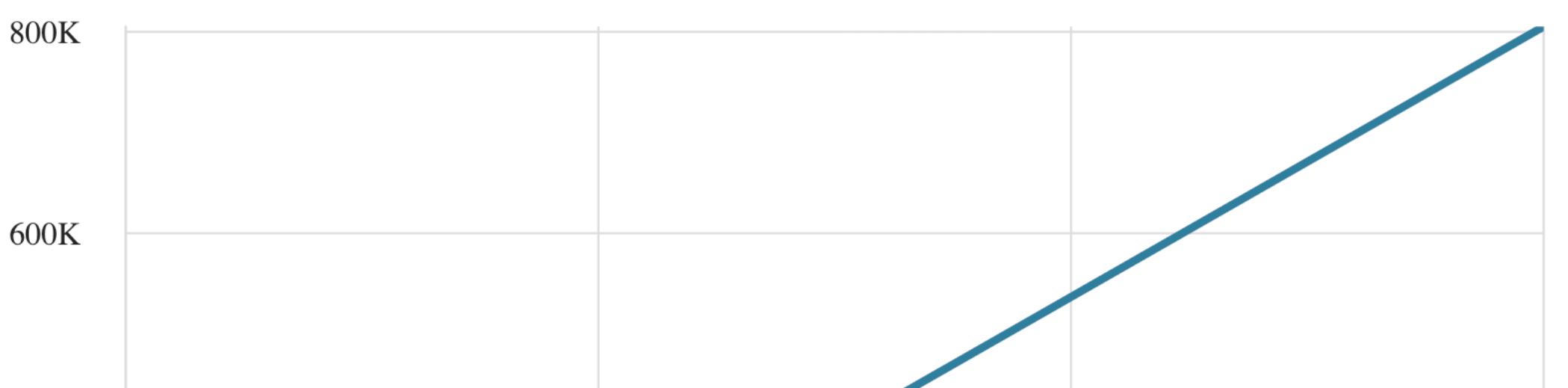
Microsoft Online Services Program

Show Dev/Test Pricing 

Over 3 year(s) with Microsoft Azure, your estimated cost savings could be as

much as **\$410,382**

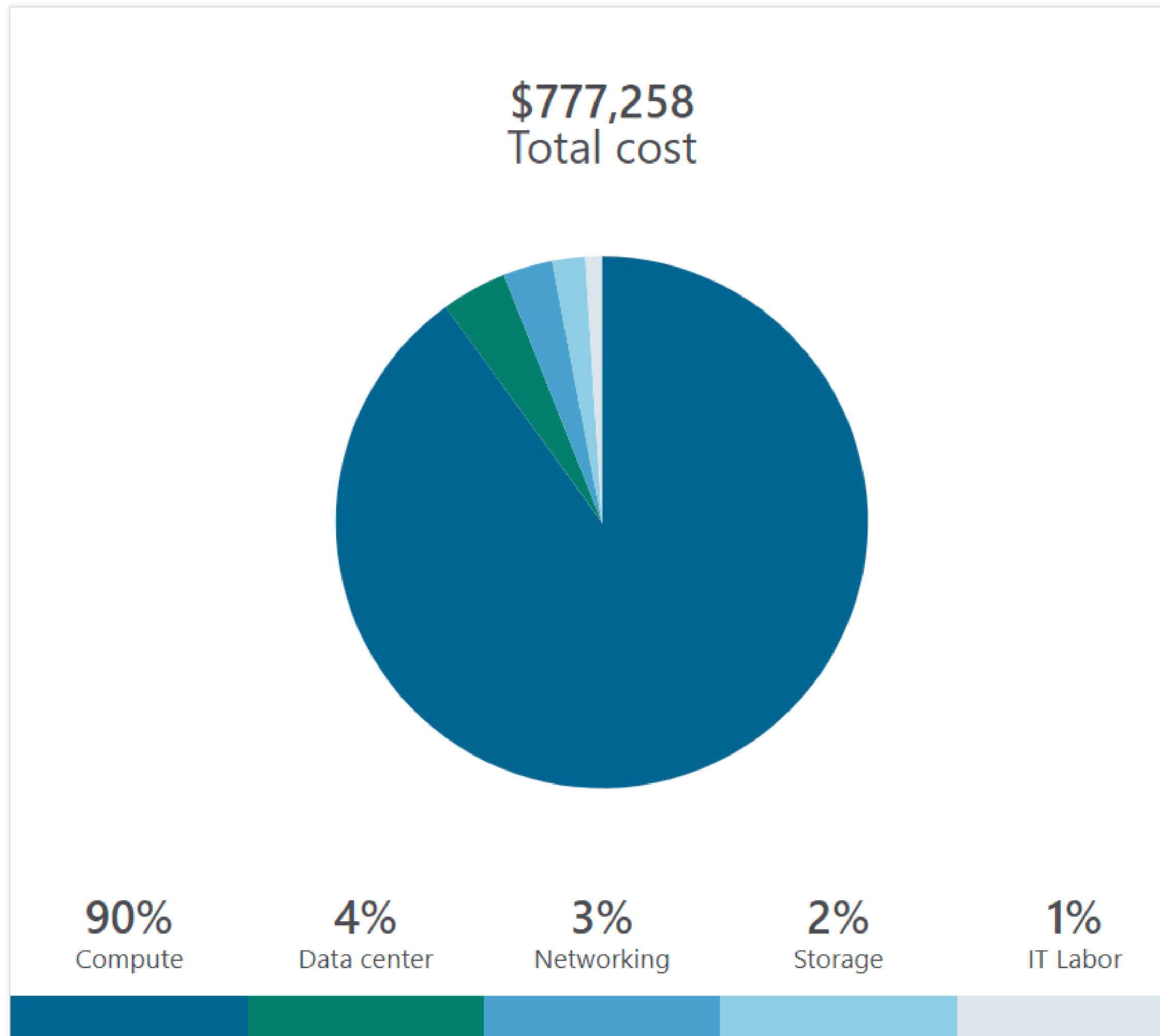
■ On-premises cost ■ Microsoft Azure cost



Total on-premises vs. Azure cost over time

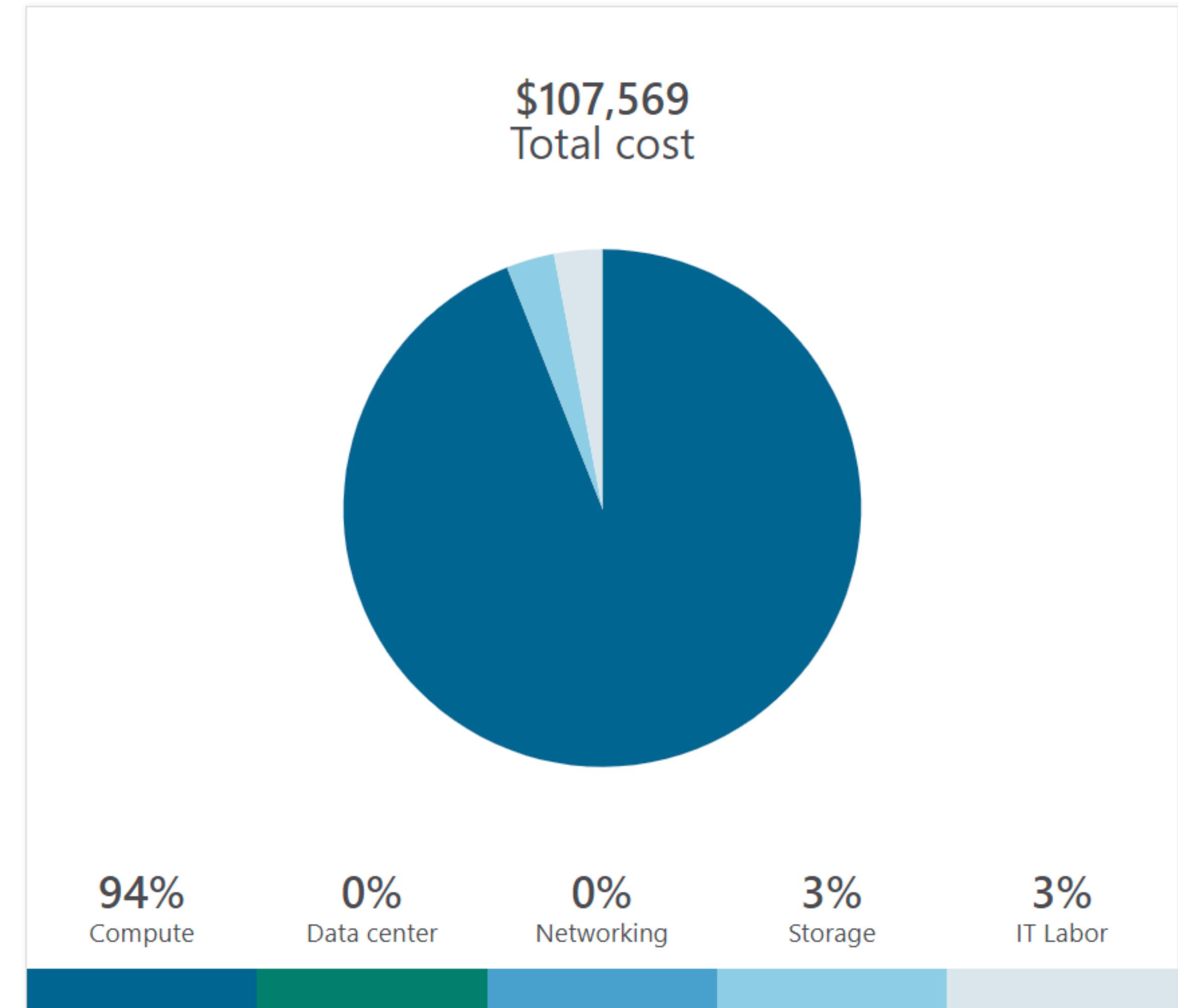
Total on-premises over 2 year(s)

TCO of on-premises environments tends to be driven by compute and data center costs.



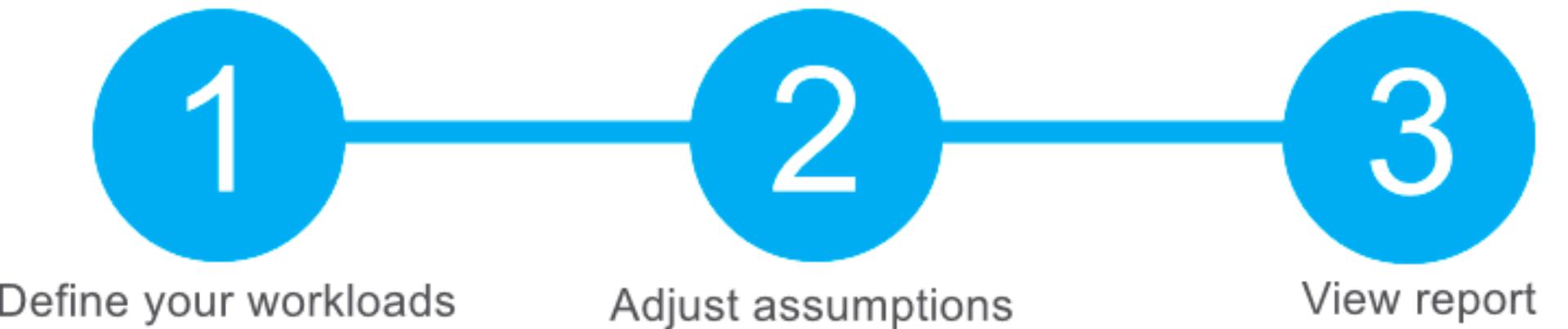
Total Azure cost over 2 year(s)

In Azure, certain cost categories decrease or go away completely.



| Estimated on-premises cost (2 year(s)) | Estimated Azure cost (2 year(s)) |
|--|----------------------------------|
| Compute cost | Azure compute cost |
| Data center cost | Azure data center cost |
| Networking cost | Azure networking cost |
| Storage cost | Azure storage cost |
| Hardware | Page Blob storage |
| Local Disk/SAN-HDD | Usable storage volume in GB |
| Cost per GB | \$0.045 |
| Storage (RAID 10 configuration) volume in GB | 1,024 |
| | \$552.96 |
| Total storage procurement cost | \$1,105.92 |

Get the Report in 3 steps



Step 1: Define your workloads

- Servers, Databases, Storage (including any backup or archive storage), Networking bandwidth

Step 2: Adjust assumptions

- Specify whether your current on-premises licenses are enrolled for Software Assurance
- Specify whether you need to replicate your storage to another Azure region for greater redundancy.
- Improve the accuracy of the TCO Calculator results by adjusting the values so that they match the costs of your current on-premises infrastructure.

Step 3: View the report

- Choose a time frame between one and five years. the TCO Calculator generates a report that's based on the information you've entered.

Exercise - Compare sample workload costs by using the TCO Calculator

<https://docs.microsoft.com/en-us/learn/modules/plan-manage-azure-costs/3-compare-workload-costs-tco-calculator>

Calculate the Total Cost

The Azure Pricing calculator displays

Azure products in categories.

You add these categories to your estimate

and configure according to your specific requirements.

Your Estimate

Virtual Machines 1 D2 v3 (2 vCPU(s), 8 GB RAM) x 730 Hours;

\$188.57

The screenshot shows the Azure Pricing calculator interface. At the top, it says "Your Estimate". Below that, it lists "Virtual Machines" with a quantity of "1" and a configuration of "D2 v3 (2 vCPU(s), 8 GB RAM) x 730 Hours", resulting in a total price of "\$188.57". There are three circular icons at the top right: a blue double-headed arrow, a grey left arrow, and a blue trash can. To the right of the main list, there are two buttons: "Clone" (blue background with white text) and "Delete" (white background with blue text). Further down, there's a section titled "Virtual Machines" with dropdown menus for "REGION: West US", "OPERATING SYSTEM: Windows", "TYPE: (OS Only)", "TIER: Standard", and "INSTANCE: D2 v3: 2 vCPU(s), 8 GB RAM, 50 GB Temporary storage, \$0.209/hour". On the far right, there are three links: "More info", "Pricing details" (with a dollar sign icon), "Product details" (with a blue information icon), and "Documentation" (with a blue document icon).

You then receive a consolidated estimated price, with a detailed breakdown of the costs associated with each resource you added to your solution. You can export or share that estimate or save it for later. You can load a saved estimate and modify it to match updated requirements.

You also can access pricing details, product details, and documentation for each product from within the Pricing calculator.

The screenshot shows the Microsoft Azure Pricing calculator interface. At the top, there's a navigation bar with links for Overview, Solutions, Products, Documentation, Pricing, Training, Marketplace, Partners, Support, Blog, More, and a prominent 'Free account' button. The main heading is 'Pricing calculator' with the sub-instruction 'Configure and estimate the costs for Azure products'. Below this, there are tabs for Products, Example Scenarios, Saved Estimates, and FAQ. A large blue banner at the top says 'Select a product to include it in your estimate.' A search bar labeled 'Search products' is present. To the left, a sidebar lists categories like Featured, Compute, Networking, Storage, Web, Mobile, Containers, Databases, Analytics, and AI + Machine Learning. The main content area displays cards for various Azure services: Virtual Machines, Storage Accounts, Azure SQL Database, App Service, Azure Cosmos DB, Azure Kubernetes Service (AKS), Azure Functions, Azure Cognitive Services, and Azure Cost Management and Billing.

Pricing calculator

Configure and estimate the costs for Azure products

Contact Sales Search My account Portal Sign in

Overview Solutions Products Documentation **Pricing** Training Marketplace Partners Support Blog More **Free account >**

Products Example Scenarios Saved Estimates FAQ

Select a product to include it in your estimate.

Search products ×

Featured

- Compute
- Networking
- Storage
- Web
- Mobile
- Containers
- Databases
- Analytics
- AI + Machine Learning

Virtual Machines
Provision Windows and Linux virtual machines in seconds

Storage Accounts
Durable, highly available, and massively scalable cloud storage

Azure SQL Database
Managed, intelligent SQL in the cloud

App Service
Quickly create powerful cloud apps for web and mobile

Azure Cosmos DB
Fast NoSQL database with open APIs for any scale

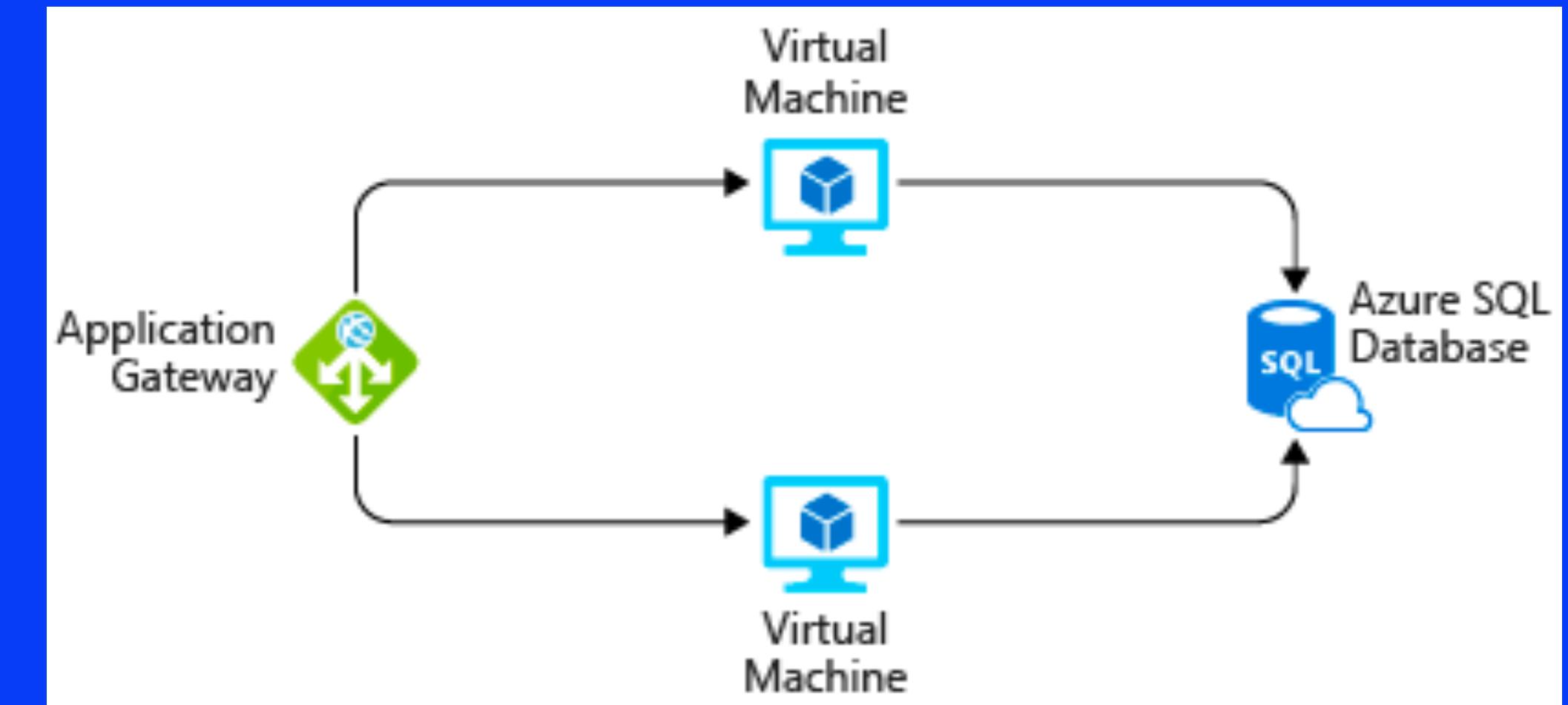
Azure Kubernetes Service (AKS)
Simplify the deployment, management, and operations of Kubernetes

Azure Functions
Process events with serverless code

Azure Cognitive Services
Add smart API capabilities to enable contextual interactions

Azure Cost Management and Billing
Manage your cloud spending with confidence

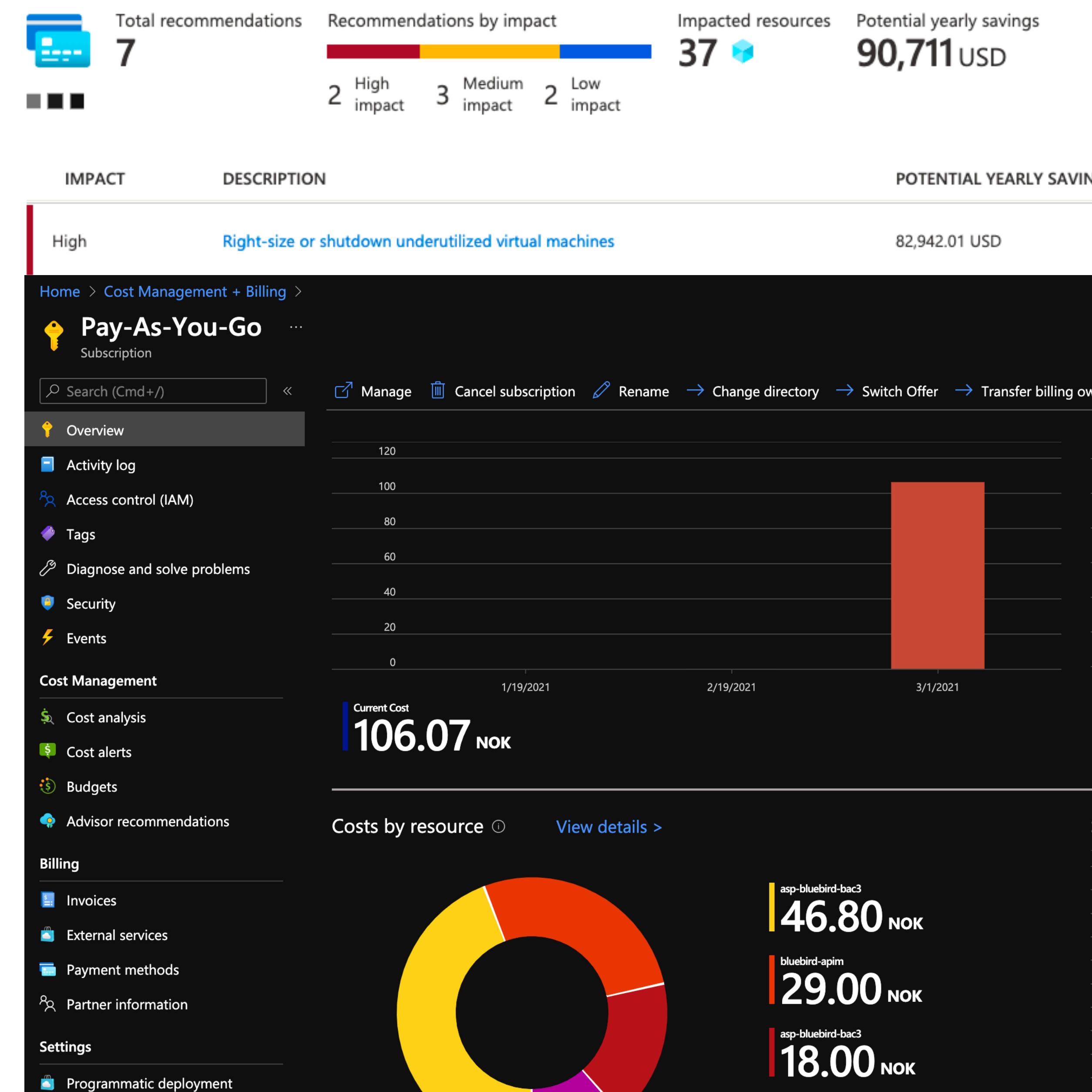
Exercise - Estimate workload cost by using the Azure Pricing calculator



<https://docs.microsoft.com/en-us/learn/modules/plan-manage-azure-costs/5-estimate-workload-cost-pricing-calculator>

Manage and minimize total cost on Azure

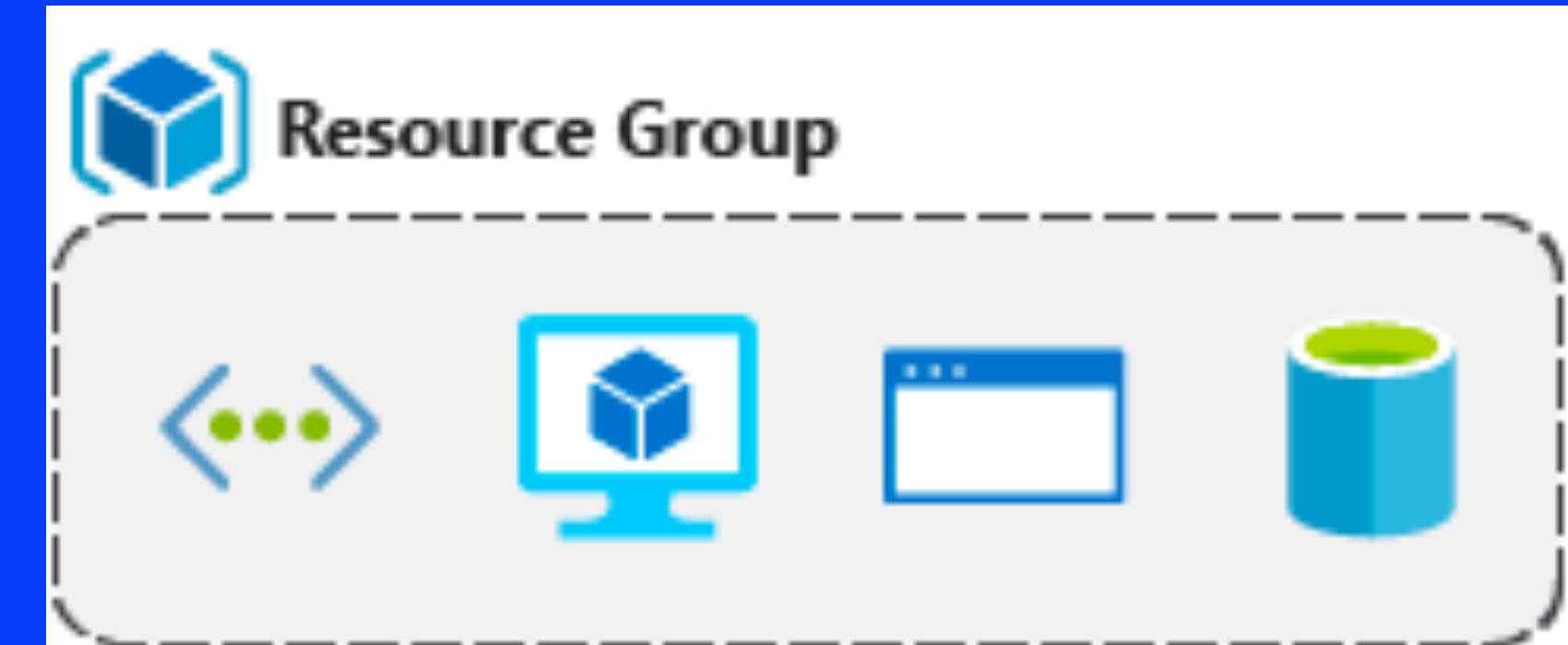
- Use the **Azure Pricing Calculator**.
- Use the **Total Cost of Ownership (TCO)** Calculator
- Only add the products, services, and resources that you need for your solution.
- Use **Azure Advisor** to monitor your usage:
Azure Advisor identifies unused or underutilized resources and recommends unused resources that you can remove
- Use **spending limits** to restrict your spending
- Use **Azure Reservations** to prepay - can save you up to 72 percent as compared to pay-as-you-go prices.
- Choose low-cost *locations* and *regions*
- Use **Azure Cost Management + Billing** to control spending
- Migrate from IaaS to PaaS services



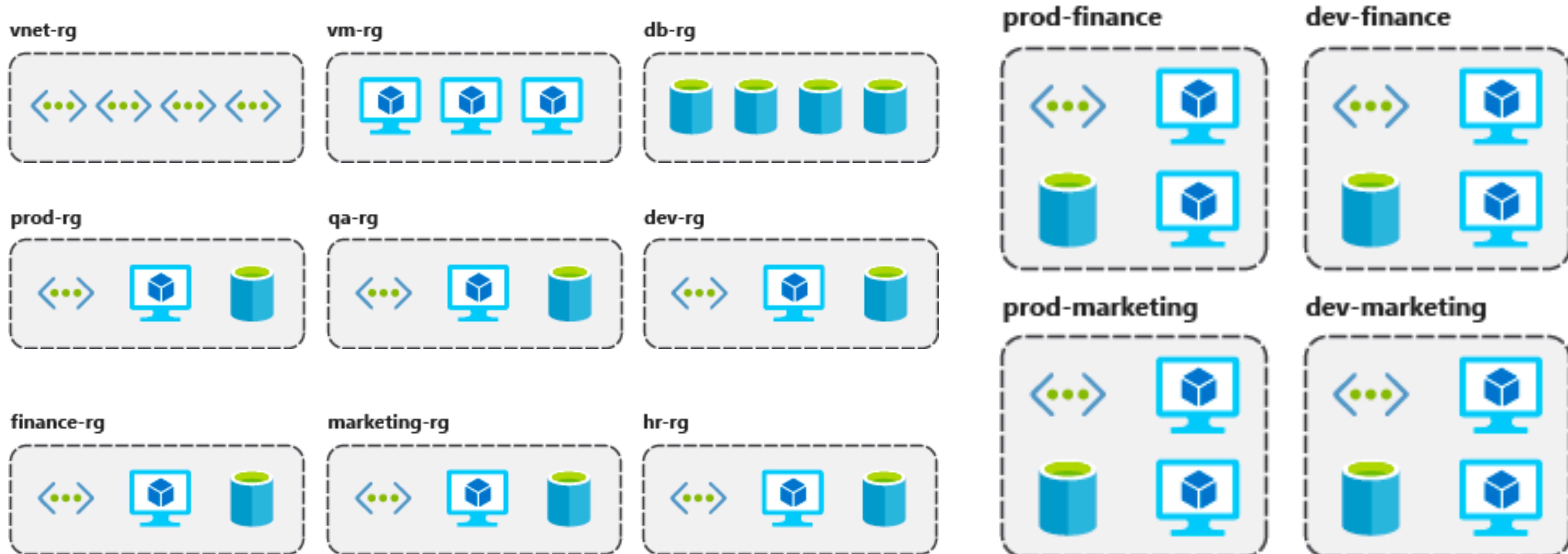
5.0

Azure Resource Manager.

Topics - Azure Resource Manager



- Bruke ressursgrupper for å organisere Azure-ressurser
- Bruke merker (tags: avdeling, miljø, kostsenter) for å organisere ressurser
- Bruke polcyer for å håndheve standarder i dine Azure-miljøer
- Bruke ressurslåser for å beskytte kritiske Azure-ressurser mot utilsiktet sletting



6.0

Self Study

Microsoft Learn - Manage Resources in Azure

*[https://docs.microsoft.com/en-us/learn/parts/
manage-resources-in-azure/](https://docs.microsoft.com/en-us/learn/parts/manage-resources-in-azure/)*

Thank you.