



## Cloud Computing & Azure Fundamentals — Instructor Explanation

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### 1 Overview of Cloud Computing

Cloud computing means **renting IT resources** (servers, storage, databases, networks, software) from a vendor like Microsoft Azure instead of owning them.

#### ✓ Why Cloud? (Benefits)

Use this analogy:

#### 🏠 Old Way (On-Premises) — Owning a House

- You buy land (data center)
- Build the house (servers)
- Maintain plumbing, electricity (network, cooling)
- Pay for maintenance even if no one lives there

#### 🏢 Cloud Way — Renting a Flat

- Move in instantly
- Pay monthly
- Maintenance is handled
- Upgrade/downgrade anytime

#### 🔥 Key Cloud Benefits

Benefit	Explanation	Analogy
Scalability	Increase/decrease resources as needed	Add extra rooms during festivals, remove later
Flexibility	Choose resources as per requirement	Choose car/bike based on the journey
Cost Efficient	Pay only for what you use	Pay per km (Uber), not buying a car
Security	Cloud provider manages security	Gated community with 24/7 security

Benefit	Explanation	Analogy
<b>High Availability</b>	Apps always accessible	Backup power + generators

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## 💡 CAPEX vs OPEX

### 💰 CAPEX (Capital Expenditure)

- Upfront investment
- Servers, storage, data center, networking
- High maintenance

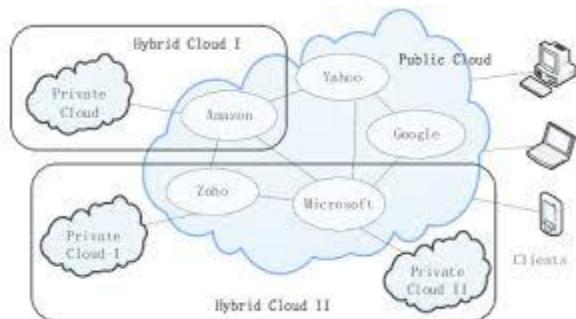
### 💸 OPEX (Operational Expenditure)

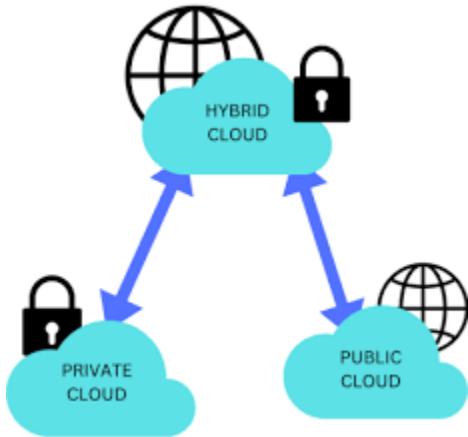
- Pay-as-you-go
- Subscription-based
- No upfront investment

Cloud shifts CAPEX → OPEX

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## 2 Public, Private & Hybrid Cloud





### **Public Cloud**

- Owned by cloud vendors (Azure, AWS)
- Shared physical infrastructure
- Pay per use

→ **Example:** Hosting your website on Azure App Service.

### **Private Cloud**

- Dedicated infrastructure for one organization
- Higher control & security

→ **Used by:** Banks, Govt, Defense

### **Hybrid Cloud**

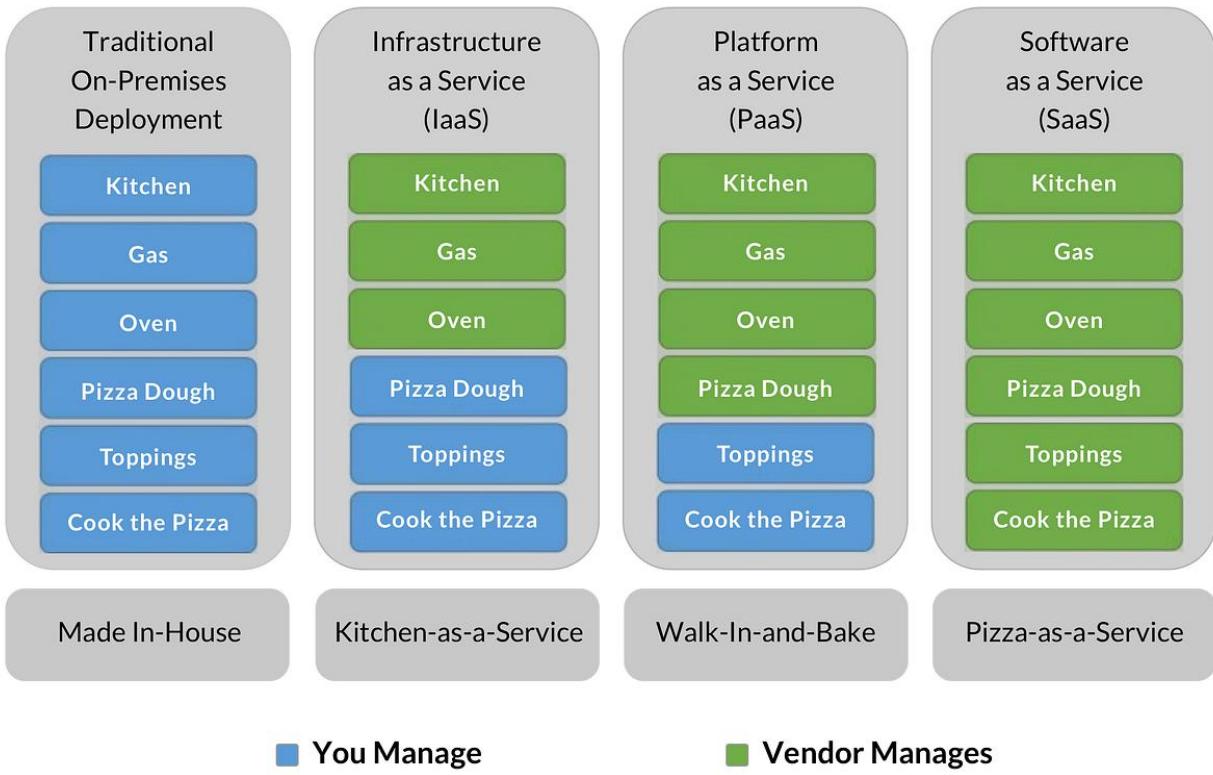
- Combination of On-Prem + Cloud
- Most used in real enterprises

→ **Example Use Case:**

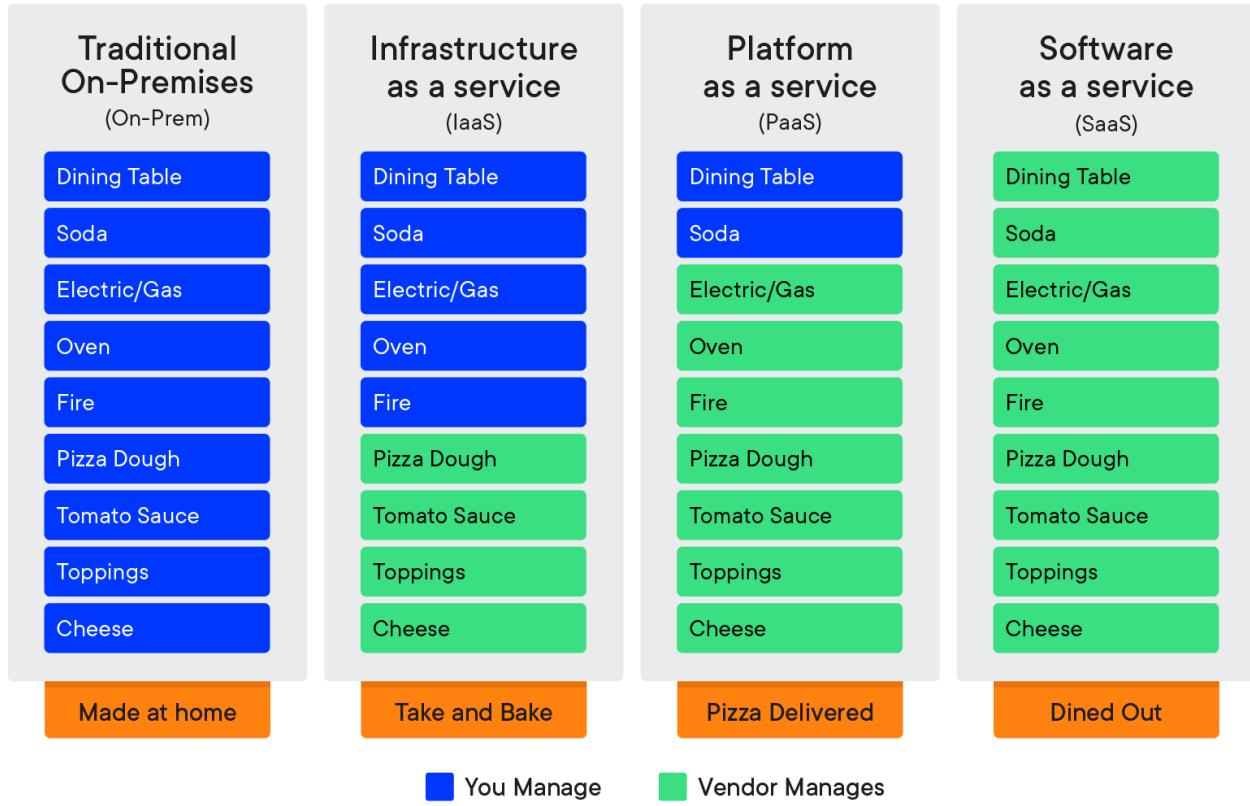
Bank keeps customer data on-prem (private) but uses Azure for analytics (public).

## **3 IaaS, PaaS, SaaS (Service Models)**

# New Pizza as a Service



# Pizza as a service



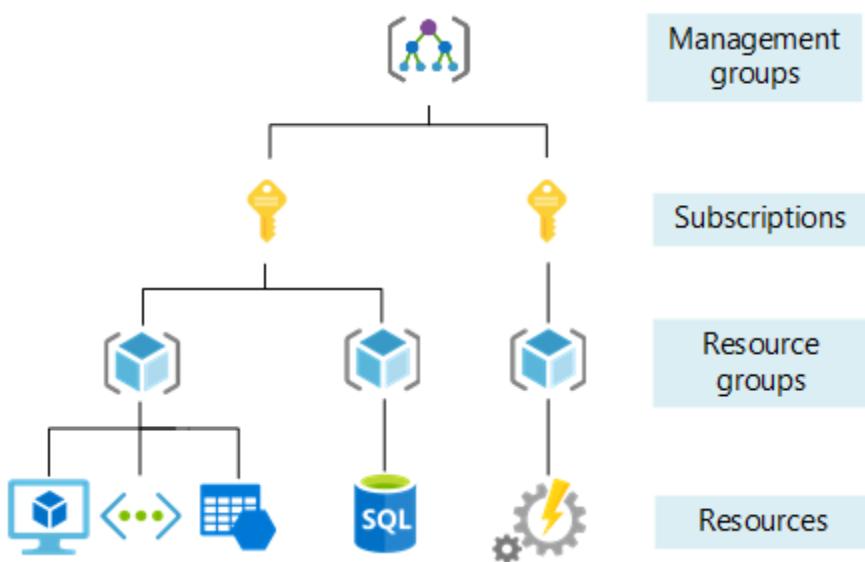
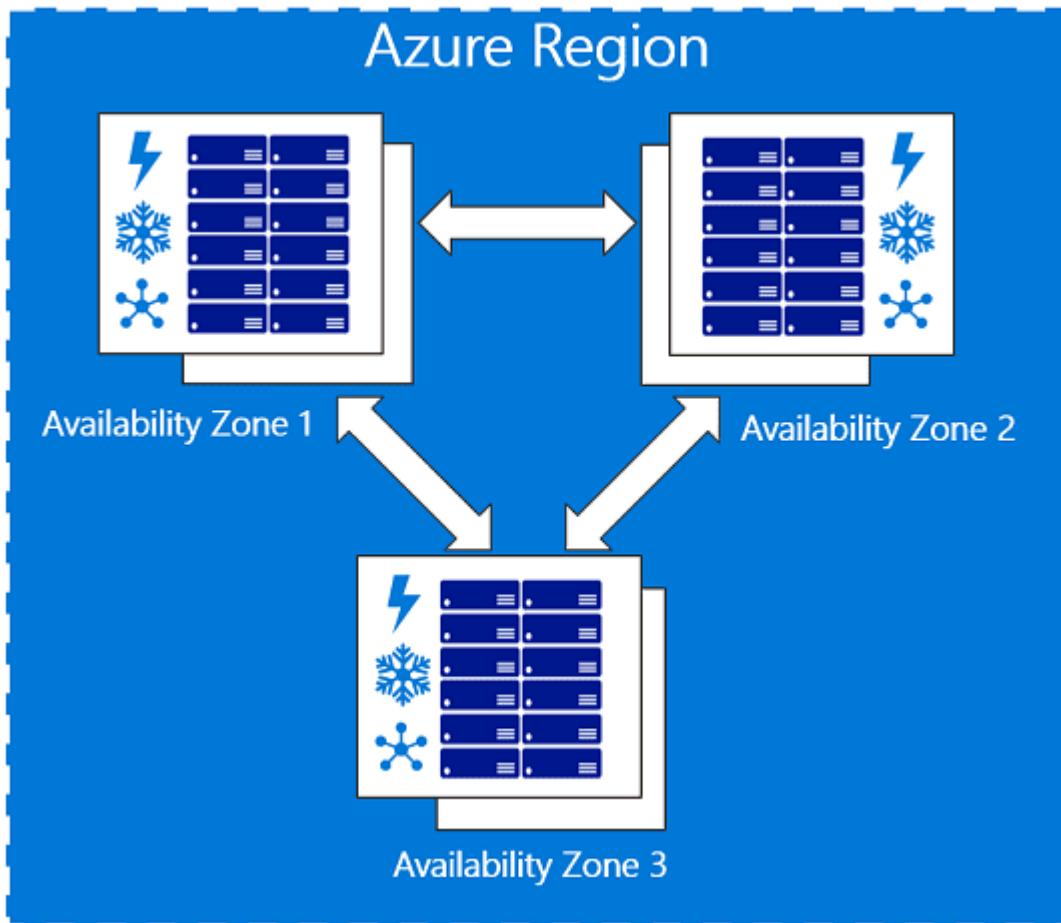
## 🍕 Pizza Analogy (Best for Students)

Model	Cloud Responsibility	Customer Responsibility	Analogy
IaaS	Hardware, Virtualization	OS, App, Data	Take & Bake pizza (you cook at home)
PaaS	Hardware, OS, Runtime	App, Data	Home delivery pizza
SaaS	Everything	Only use the software	Eating pizza at restaurant

## 💻 Examples:

- **IaaS:** Azure VMs, Azure Storage
- **PaaS:** Azure SQL, Azure App Service, Azure Functions
- **SaaS:** Office 365, Gmail, Salesforce

#### 4 Availability Zones, Resource, Resource Group & ARM



#### Availability Zones (AZ)

- Physically separate datacenters inside a region

- Each has its own power, cooling, network
- Ensures high availability

→ **Use Case:**

Deploy a VM in Zone 1, another in Zone 2 → If one zone goes down, app still works.

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### Azure Resource

Any item you create in Azure:

- VM
  - Storage account
  - SQL Database
  - VNet
- ... all are **resources**
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### Resource Group

A **container** to organize resources.

**Analogy:**

A folder in your laptop containing files of the same project.

→ **Example:**

#### Ecommerce-RG

- VM
  - App Service
  - SQL Database
  - Storage
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### Azure Resource Manager (ARM)

The **brain of Azure**.

- Manages deployments

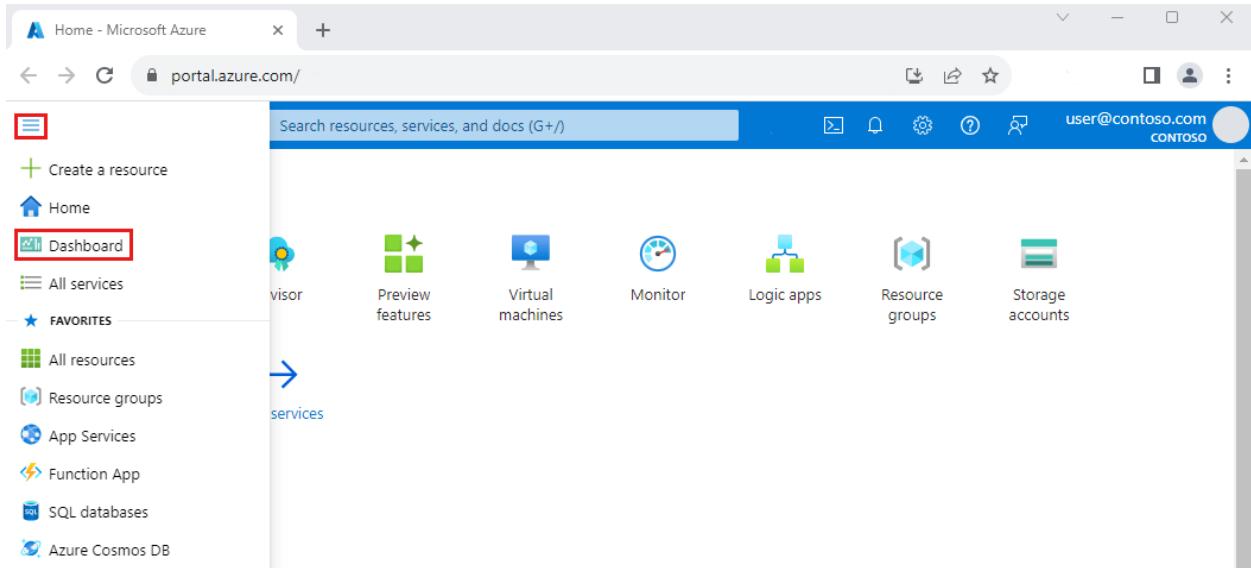
- Controls access
- Enables tagging
- Provides templates (ARM Templates, Bicep, Terraform)

**Analogy:**

ARM = "Azure Traffic Police" that routes all API requests.

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## 5 Microsoft Azure Portal Overview





Azure Portal is a **web-based UI** to manage cloud resources.

### 🔍 What You Can Do:

- Create/monitor/manage resources
- Check billing & cost
- View metrics & logs
- Configure access control

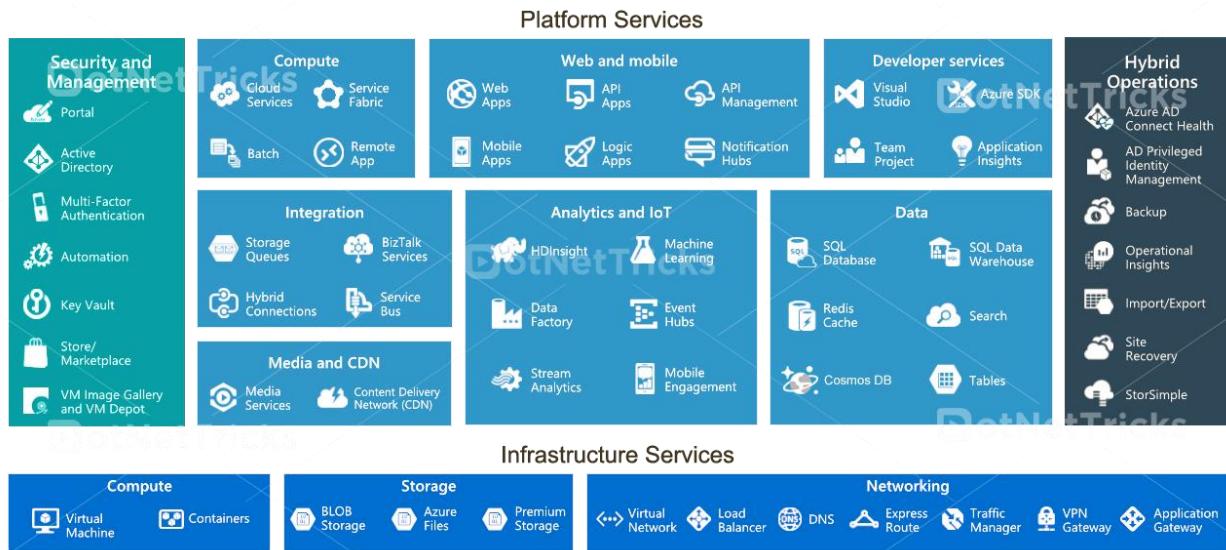
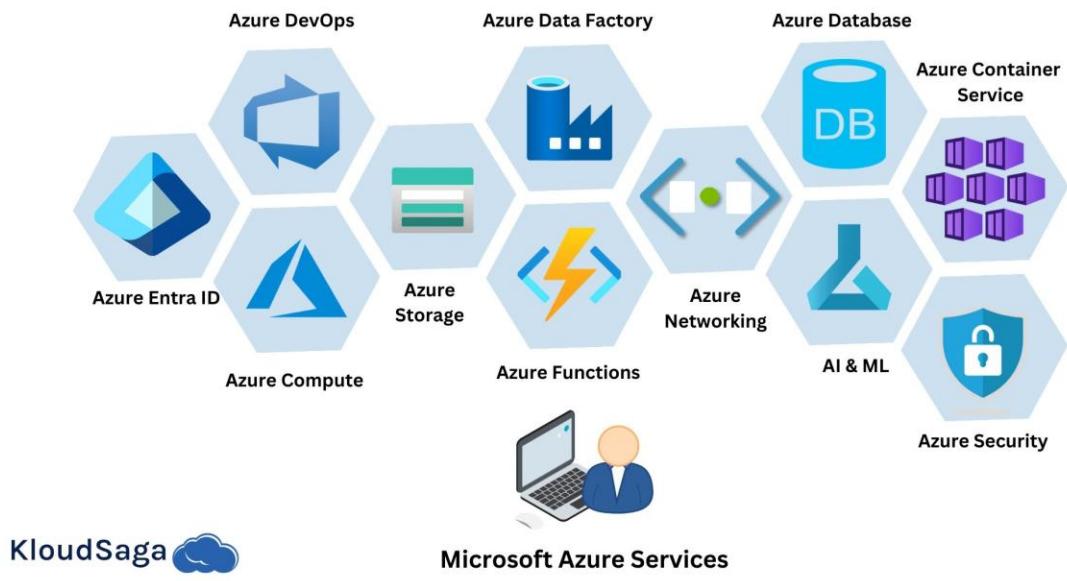
### 💰 Azure Cost Section:

- Cost analysis
- Budgets & alerts
- Cost optimization recommendations

### → Use Case

If a VM suddenly exceeds budget, Azure triggers an alert.

### 6 Core Azure Services



Azure has 200+ services. Categorize them for students:

## Compute

- Azure Virtual Machines
- Azure App Service
- Azure Functions
- AKS (Kubernetes)

## Storage

- Blob Storage
- File Storage
- Disk Storage

## Networking

- Virtual Network
- Load Balancer
- VPN Gateway
- Application Gateway

## Identity

- Azure AD (now Entra ID)
- RBAC
- MFA

## Databases

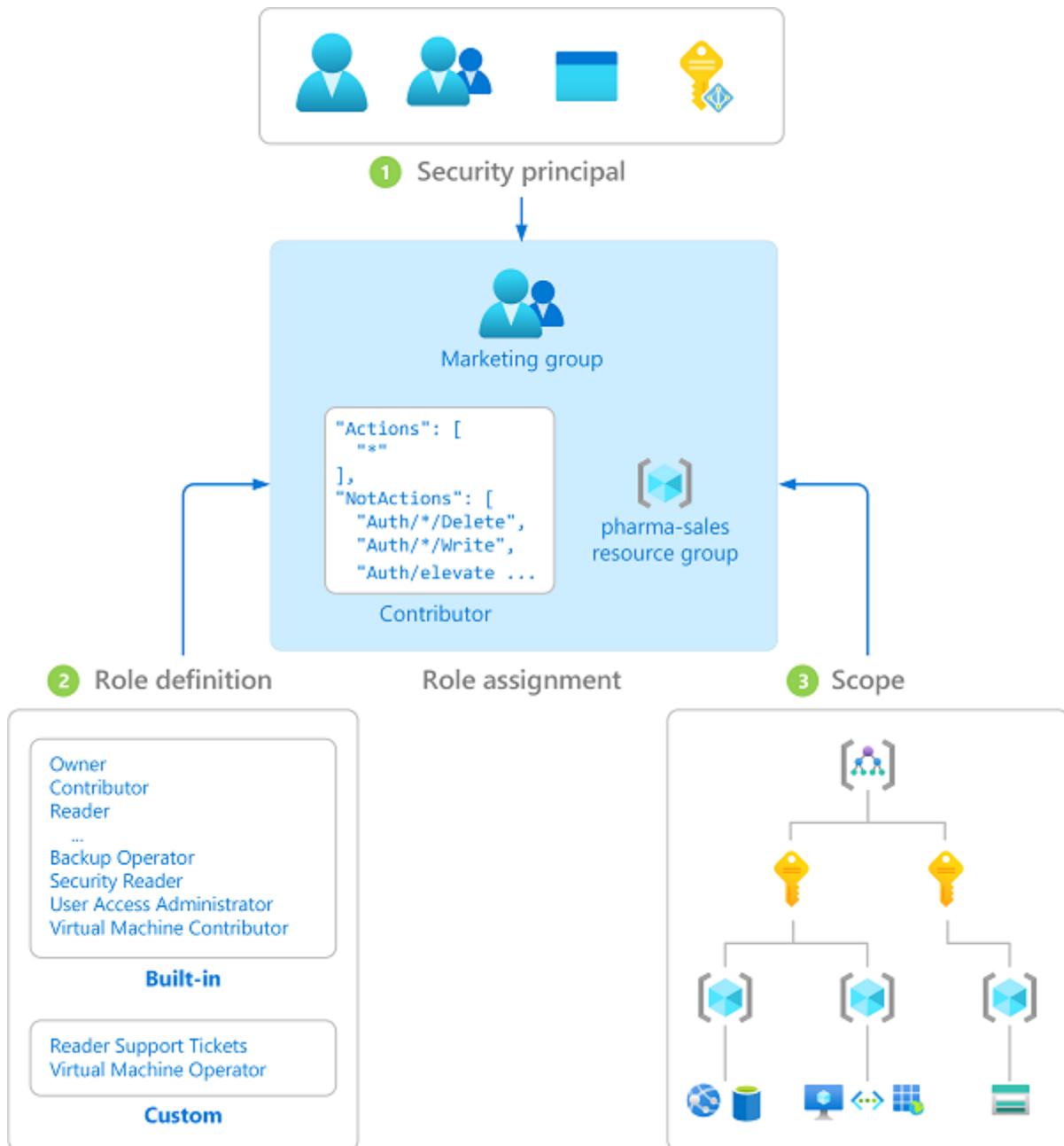
- Azure SQL
- Cosmos DB
- PostgreSQL/MySQL

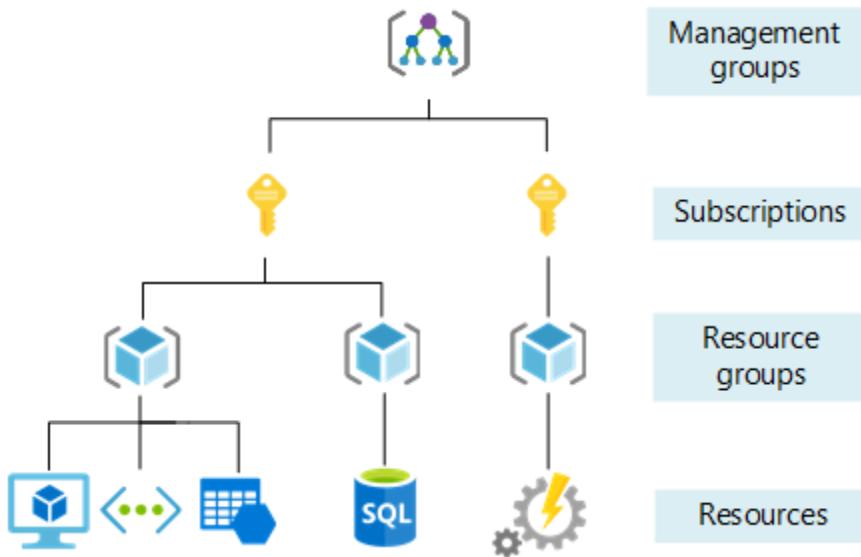
## Monitoring

- Azure Monitor
- Log Analytics
- Application Insights

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## Subscriptions, Accounts, Azure Policy, RBAC





## Azure Account

Your identity → Microsoft Azure login (email + subscription).

## Azure Subscription

- Logical container for billing
- Every resource belongs to a subscription

### Analogy:

Subscription = "Electricity meter"

Resources = "Appliances"

You pay for the meter usage.

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## Azure Policy

Sets **rules & governance**, like:

- Enforce tags
- Allow only certain VM sizes
- Block deployments in certain regions

### Analogy:

Company rules:

"No one should book business class without approval."

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## RBAC (Role-Based Access Control)

Controls **WHO** can do **WHAT** on **WHICH** resource.

Role	Access
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Owner	Full control
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Contributor	Create/update, no delete
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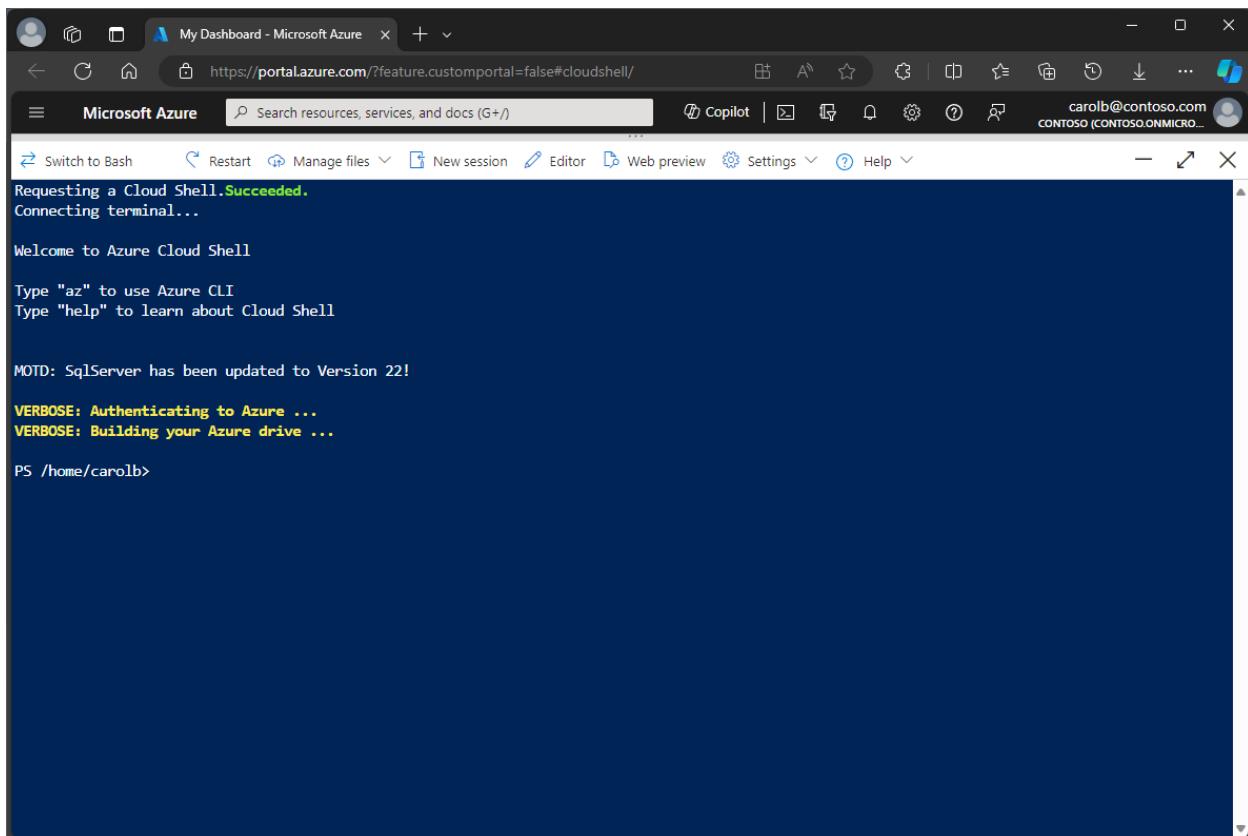
Reader	View only
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→ **Use Case:**

A developer gets Contributor access to only **Ecommerce-RG**, not entire subscription.

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## Azure Portal, Cloud Shell, Azure CLI & PowerShell



The screenshot shows a Microsoft Edge browser window with the title bar "My Dashboard - Microsoft Azure". The address bar contains the URL "https://portal.azure.com/?feature.customportal=false#cloudshell/". The main content area is a dark blue terminal window titled "Microsoft Azure". It displays the following text:

```
Requesting a Cloud Shell.Succeeded.
Connecting terminal...
Welcome to Azure Cloud Shell
Type "az" to use Azure CLI
Type "help" to learn about Cloud Shell

MOTD: SqlServer has been updated to Version 22!
VERBOSE: Authenticating to Azure ...
VERBOSE: Building your Azure drive ...

PS /home/carolb>
```

## Azure Portal (GUI)

Visual, browser-based interface

**Best for beginners.**

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## Azure Cloud Shell

- Browser-based terminal inside Portal
- Supports **PowerShell & Bash**
- Comes with tools preinstalled (az CLI, git, terraform)

→ No need to install anything on your local machine.

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## Azure PowerShell

Commands start with:

Get-AzVM

New-AzResourceGroup

**Best for Windows admins & automation scripts.**

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## Azure CLI

Commands start with:

az vm create

az group create

**Best for developers, DevOps, Linux-friendly**

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## Mini Practical Demo Scenarios (Classroom Ready)

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### 1. Create a Resource Group (CLI)

```
az group create --name EcommerceRG --location eastus
```

## **2. Create a VM**

```
az vm create --resource-group EcommerceRG --name DemoVM --image UbuntuLTS
```

## **3. View cost analysis**

Azure Portal → Cost Management → Cost Analysis

## **4. Apply RBAC**

Portal → Resource Group → Access Control → Add Role Assignment

Role: Contributor

User: dev@company.com

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### **Summary Table for Students**

<b>Topic</b>	<b>Summary</b>
Cloud	Renting IT resources
CAPEX/OPEX	Cloud = OPEX
Public/Private/Hybrid	Deployment models
IaaS/PaaS/SaaS	Service models
AZ	High availability
Resource Group	Logical container
ARM	Deployment engine
RBAC	Access control
Azure Portal	GUI
Cloud Shell/CLI	Scripting tools