

The Azure logo icon, featuring a blue cloud with a white 'A' inside, connected by lines to a smartphone, a laptop, and a server rack.

# Azure Overview

CSCI E-94

Fundamentals of Cloud Computing - Azure

Joseph Ficara

Copyright © 2013-2025



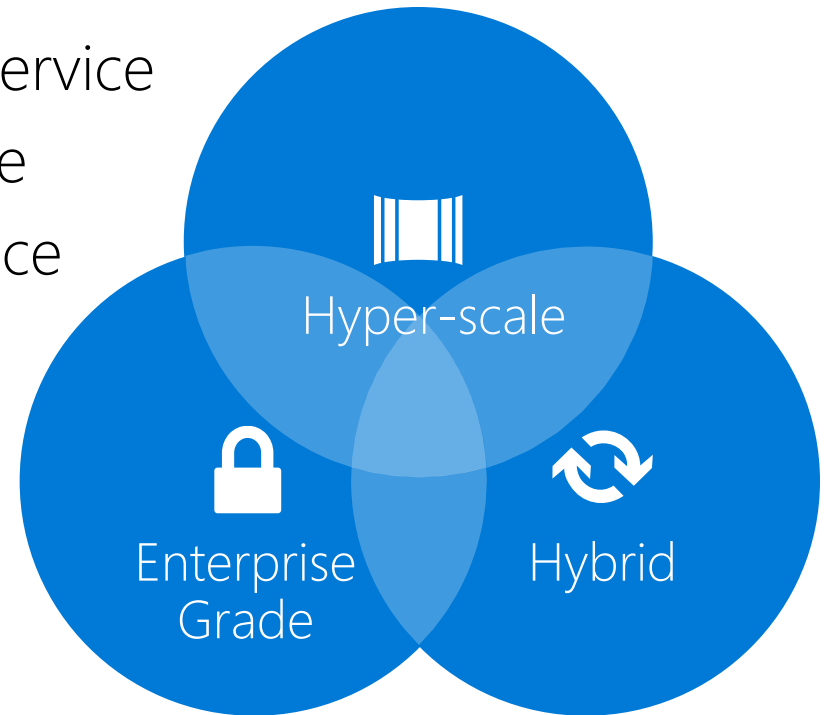
# Agenda

- Azure Overview
- Azure Infrastructure as a Service (IaaS)
- Azure Container as a Service (CaaS)
- Azure Platform as a Service (PaaS)
- Azure Serverless
- Azure Hybrid Cloud



# Azure Overview

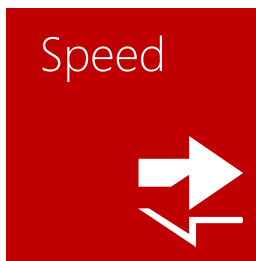
- What is Azure?
  - Microsoft's cloud offering  
See: [Azure cloud solutions](#)
    - Infrastructure **as a Service**
    - Platform **as a Service**
    - Container **as a Service**
    - Serverless
    - Hybrid Cloud
    - [Software Defined Networking \(SDN\)](#)





# Azure Overview

- Why do you care?
  - Address market faster
    - Develop, Build & Deploy, Make \$\$\$
  - Minimal capital investment
    - Cost matches scale needs
  - Scale elastically
    - Automatically accommodate spikes on demand



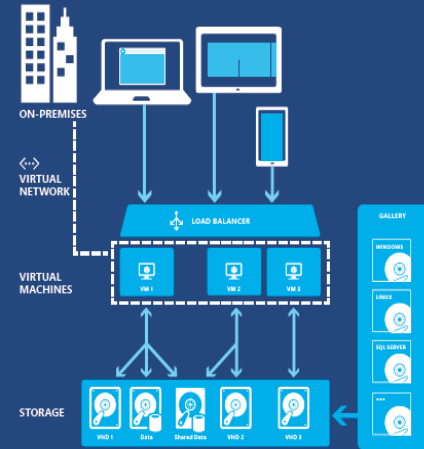




# What is Microsoft Azure?

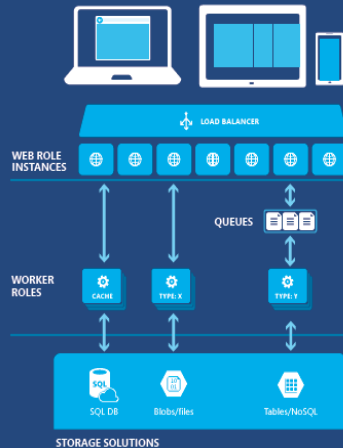
## Virtual Machines

VMs are basic cloud building blocks. Get full control over a virtual machine with virtual hard disks, install and run software you want. Configure multiple machines with different roles to create complex solutions. VMs are nearly identical to conventional (web) servers, and are the easiest way to move existing workloads to the cloud.



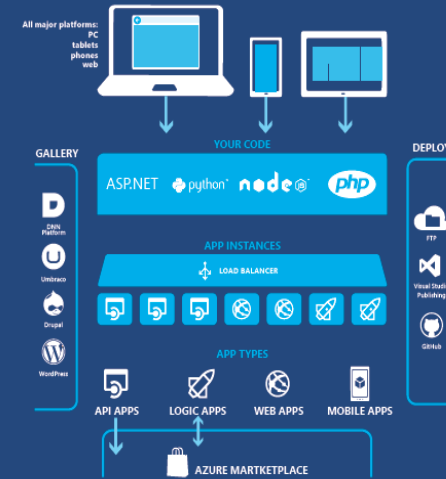
## Cloud Services

Easily access and manage these general-purpose VMs. We maintain and update each VM as needed with system updates. You configure the VM size as needed, and scale out as many copies as needed. Two types of VMs: worker roles and web roles—worker roles are made for computing and running services. The web role is simply a worker role with IIS already installed and configured.



## App Service

Azure App Service is a high productivity solution for developers who need to create enterprise-grade web and mobile app experiences. App Service provides a complete platform as a service solution that enables you to deploy and elastically scale applications in the cloud, and seamlessly integrate them with on-premises resources and SaaS based applications.



# Microsoft Azure

Microsoft Azure is a flexible, open, and secure public cloud built for business. Access a broad collection of integrated services that accommodate many languages and operating systems. Use world-class tools to accelerate a wide variety of app development and delivery capabilities.

## Free trial!

Use \$200 credit to try any combination of Azure resources:

[aka.ms/TryAzure](https://aka.ms/TryAzure)

Search [azure.microsoft.com](https://azure.microsoft.com), MSDN, or TechNet for keywords found in this poster

## Catalog of Services

### COMPUTE

<b>Virtual Machines</b> Get full control over a server in the cloud and maintain it as your business requires.	<b>Cloud Services</b> Managed virtual machines with stateless web and worker roles.	<b>Service Fabric</b> Build highly scalable, reliable stateless and stateful applications composed of microservices.	<b>Batch</b> For running large scale parallel and high performance computing (HPC) applications.	<b>Scheduler</b> Create jobs that run reliably on simple or complex schedules to invoke any type of service.	<b>Remote App</b> Access Windows apps from any device and any location that run within Remote App VMs.
---	--	---	---	---	---

### WEB & MOBILE

<b>Web Apps</b> Managed web platform, get started for free and scale as you go using many tools/languages.	<b>Mobile Apps</b> Add backend capabilities to mobile apps with native client support on most device platforms.	<b>API Apps</b> Create and surface your app logic as APIs for other services and apps to consume.	<b>Logic Apps</b> Build service business processes by linking your own custom APIs with an API Gateway/Marketplace.	<b>API Management</b> Publish and manage APIs to developers, partners and employees securely and at scale.	<b>Notification Hubs</b> Deliver millions of cross platform push notifications from any application backend, anywhere.
---	--	--	--	---	---

### STORAGE & BACKUP

<b>Storage Blobs &amp; Files</b> Store binary application data and web content - store for dedicated and shared virtual disks for VMs.	<b>Backup</b> Managed service that handles backup/recovery of Windows Server machines/backup agent.	<b>Import / Export</b> For massive data transfer - ship encrypted data to move data in/out of blob storage.	<b>Site Recovery</b> Coordinate replication and recovery of System Center private clouds.	<b>StorSimple</b> Automated, policy driven solution to extend on-premises primary storage for backup and disaster recovery.
---	--	--	--	--

### HYBRID INTEGRATION

<b>Storage Queues</b> Simple message queue for application decoupling architecture for scale out.	<b>BizTalk Services</b> Build ESB and Enterprise App Integration (EAI) solutions in the cloud.	<b>Hybrid Connections</b> Connect apps in Azure with on-premises resources without a VPN or dedicated line.	<b>Service Bus</b> Messaging capabilities (publish, queues) and on-premises to cloud connectivity solution.	<b>Automation</b> Run durable PowerShell scripts to automate frequent, long running, complex Azure tasks.	<b>Portal</b> Web based experience to provision, control and monitor all Azure services.	<b>Key Vault</b> Safeguard and control keys and secrets in cloud-scale hardware security modules.	<b>Operational Insights</b> Analyze and troubleshoot on-premises IT infrastructure without using instrumented code.	<b>Store / Marketplace</b> Find and manage other services provided by third parties.	<b>VM Depot</b> Find free open source VM images that you can download and run in Azure Virtual Machines.
--	---	--	--	--	---	--	--	---	---

### NETWORKING

<b>Virtual Network</b> Provision and manage VNETs in Azure and securely link to your on-premises IT infrastructure.	<b>Express Route</b> Connect on-premises and cloud datacenters directly through dedicated, non-Internet lines.	<b>Traffic Manager</b> Load-balance incoming global traffic across multiple services running in multiple datacenters.
--	---	--

### ANALYTICS

<b>HDInsight</b> Big Data based on Apache Hadoop analytics that integrate easily with Microsoft Office.	<b>Machine Learning</b> Mine historical data with compute power to predict future trends or behavior.	<b>Stream Analytics</b> Process data streams in real-time to discover and react to trends.	<b>Data Factory</b> Ingest data from multiple sources to combine into a cloud-based data warehouse.	<b>Event Hubs</b> Ingest, persist, process millions of events per second from millions of devices.	<b>Mobile Engagement</b> Real-time actionable analytics on user behavior to increase app usage.
--	--	---	--	---	--

### DATA

<b>SQL Database</b> Managed relational database service with high availability and selectable performance levels.	<b>DocumentDB</b> Store/retrieve millions of JSON objects from a highly scalable NoSQL document database.	<b>Redis Cache</b> Make applications scale and be more responsive under load by keeping data closer to app logic.	<b>Search</b> Managed, scalable search service for your apps. Create tunable search results and ranking models.	<b>Tables</b> Key/value type data in this schema-less NoSQL store.
--	--	--	--	---

### MANAGEMENT

<b>Automation</b> Run durable PowerShell scripts to automate frequent, long running, complex Azure tasks.	<b>Portal</b> Web based experience to provision, control and monitor all Azure services.	<b>Key Vault</b> Safeguard and control keys and secrets in cloud-scale hardware security modules.	<b>Operational Insights</b> Analyze and troubleshoot on-premises IT infrastructure without using instrumented code.	<b>Store / Marketplace</b> Find and manage other services provided by third parties.	<b>VM Depot</b> Find free open source VM images that you can download and run in Azure Virtual Machines.
--	---	--	--	---	---

### IDENTITY & ACCESS

<b>Active Directory</b> Identity and access management for cloud applications and ability to link to on-premises Server AD.	<b>Multi-Factor Authentication</b> Safeguard access to data and apps with additional physical layer of security control.
--	---

### MEDIA & CDN

<b>Media Services</b> Range of services that support videos on-demand and live streaming workflows.	<b>CDN</b> Cache content for your apps in Content Delivery Network (CDN) at 800+ edge locations to improve user experiences.
--	---

### DEVELOPER SERVICES

<b>Visual Studio Online</b> Store code, plan and track projects, build, deploy and test apps in the cloud collaboratively.	<b>Application Insights</b> Analyze app usage, availability and performance to detect issues and solve problems proactively.
---	---

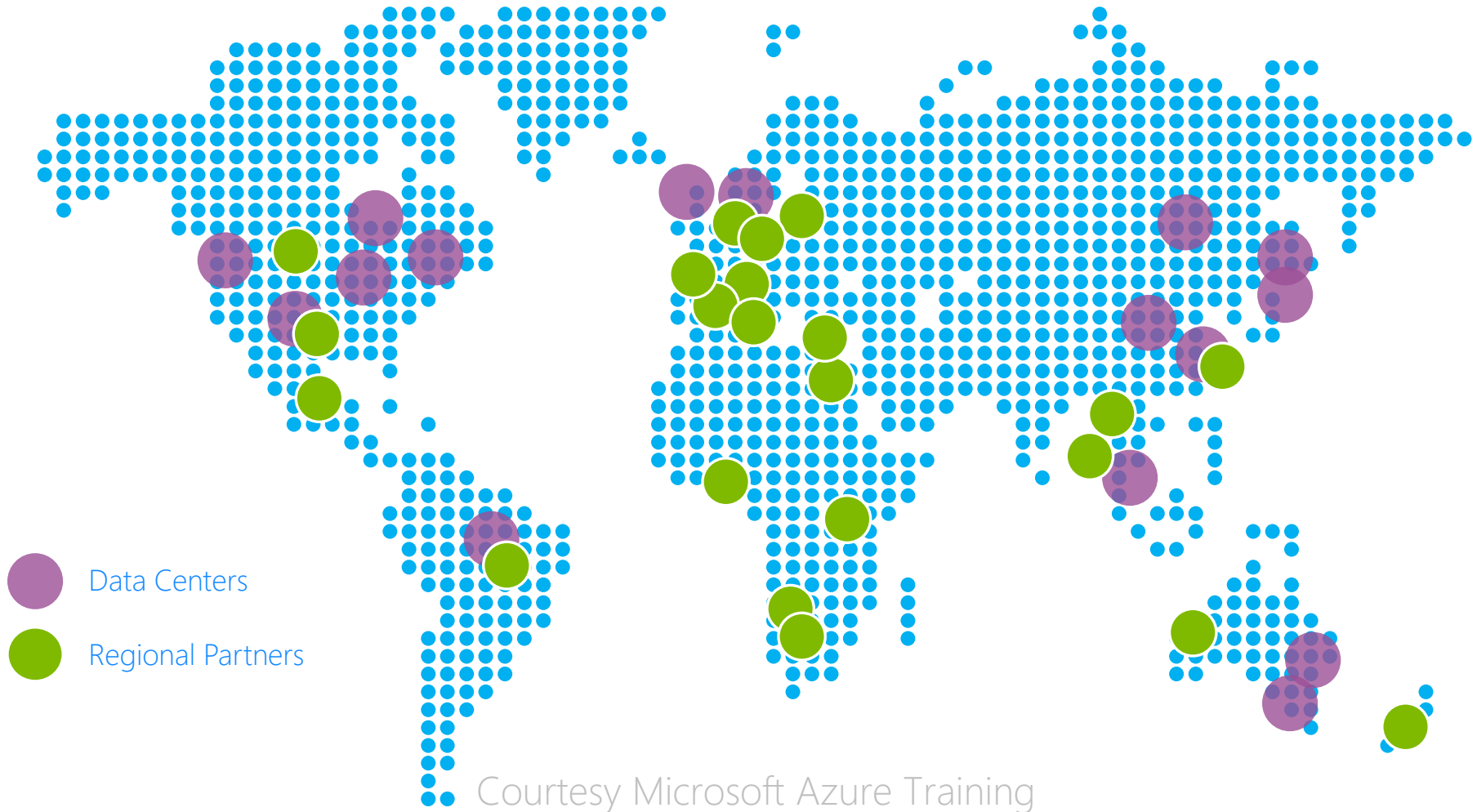
### COMMERCE

<b>Store / Marketplace</b> Find and manage other services provided by third parties.	<b>VM Depot</b> Find free open source VM images that you can download and run in Azure Virtual Machines.
---	---



# Azure Overview

## Regions



~60 regions and ~140 countries worldwide in 2025 – Microsoft – See: [Azure geographies](#)



# Azure Overview

## Compliance

Compliance: <http://aka.ms/AzureCompliance>



Courtesy Microsoft Azure Training





# Azure Overview

## Open-Source Support

Languages



CMS



Devices



Databases / Apps



Operating systems



Management



**GOBBLER**

Focus on the music,  
not the files

**Engine Yard**

**ScaleArc**

**Clustrix**

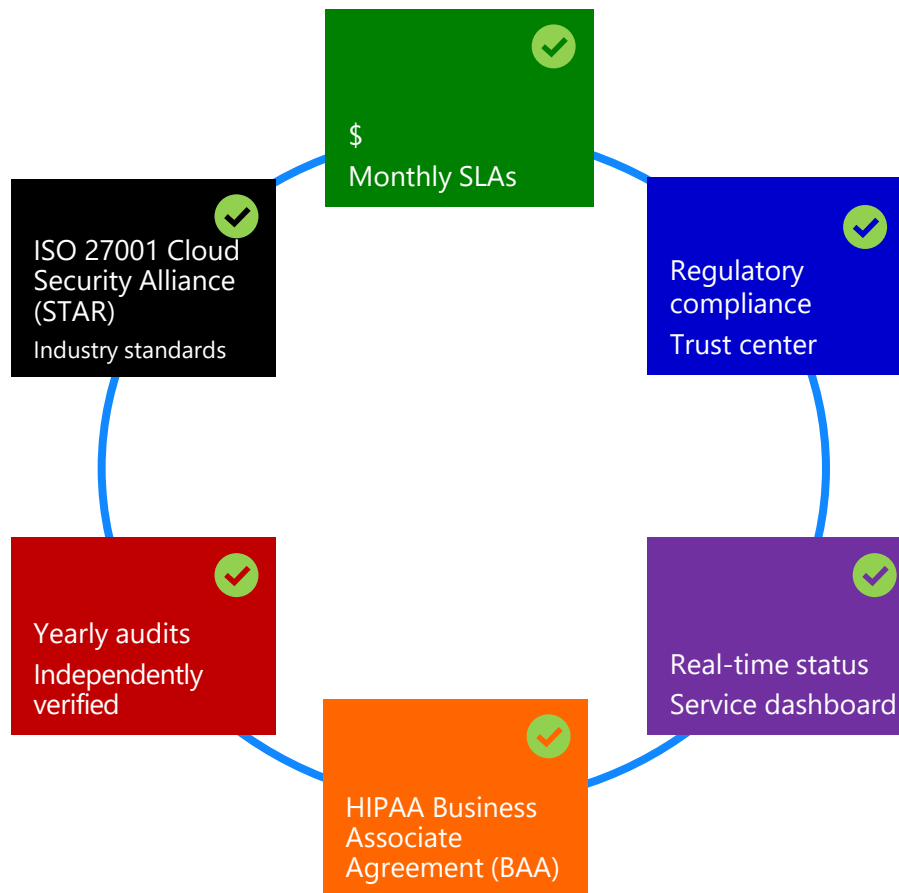
**Cassandra**

[Open Source on Azure](#)



# Azure Overview

## Transparency





# Azure Infrastructure as a Service

## What is Azure

### ■ Infrastructure as a Service (IaaS)

- Think traditional VMs and on premises services in the cloud
- Main benefits
  - Reduce capital investment
  - Reduced management requirements
  - Minimal lead time, minutes
    - New resource provisioning
  - Scale up and down as needed
  - Cloud & On Premises hybrid options



# Azure Infrastructure as a Service

## What is Azure

- Virtual Machines - Windows & Linux
  - VM Image Templates
    - Windows Server
    - SQL Server
    - BizTalk Server
    - SharePoint
    - Visual Studio
    - JDK
    - Oracle WebLogic & Database
    - Linux OS: Ubuntu, SUSE, CentOS



# Azure Infrastructure as a Service

## What is Azure

### ■ Storage

- Worldwide data centers
- Geo-replication
- File
  - SMB and NFS protocols
  - Azure or On Premises Access
  - Scale on the fly
- Disk
  - 160,000 IOPS, 4000 MB/sec, faster with caching



# Azure Infrastructure as a Service

## What is Azure

### ■ Azure SQL Managed Instance

- Near 100% compatibility w/ SQL Enterprise
- Native virtual network implementation
- Lift and shift on-premises applications
  - With minimal changes
- A PaaS offering
  - Automatic patching, version updates



# Azure Infrastructure as a Service

## What is Azure

### ■ Backup & Recovery

- Azure Backup
- Centralized management
- Volume Shadow Copy Service
- Durable Storage options

### ■ High Performance Computing

- HPC cluster applications
  - High Performance Computing



# Azure Container as a Service

- ☒ Azure Container Instances
  - Docker - Windows & Linux
  - Integrated Docker Support
  - Linux & Windows Containers
  - Microservice & classic app workloads
  - Active Directory Integration
  - Elastic bursting with Azure Kubernetes Services (AKS)





# Azure Platform as a Service

- ☒ Platform as a Service (PaaS)
  - Think fully managed services
  - Benefits
    - Auto scaling & tuning
    - Minimal management
    - Simple provisioning
    - Secure
    - Patching, OS configuration etc...
      - Automatically handled by Azure



# Azure Platform as a Service

- App Service
- Azure SQL
- Azure Cognitive Search
- Azure Active Directory
- Application Gateway
- Azure Load Testing
- Azure Cache for Redis
- Azure Container Apps
- Key Vault
- Azure App Config
- Azure Front Door
- SignalR Service
- Web Application Firewall
- Static Web App
- Traffic Manager
- Many more ...



# Azure Serverless

- It's about abstraction
  - There are server(s)
    - You can't see them, touch or manage them
- Reduced costs
  - Many services offer consumption-based plans
- Reduce infrastructure complexity
- Low code/no-code scenarios



# Azure Serverless

## ■ Some of the “*serverless*” offerings

<https://azure.microsoft.com/en-us/solutions/serverless/#overview>

- **Azure Functions**
- **Logic Apps**
- Azure Event Grid
- Azure Bot Services
- Azure Machine Learning
- Azure SQL Database Serverless
- CosmosDB
- Azure Monitor / App Insights
- Stream Analytics
- Azure Blob Storage
- Azure DevOps
- Azure API Management
- Azure Service Bus
- Many more...



# Azure Multi/Hybrid Cloud

- Bridge between
  - On premises, Azure Cloud other clouds ...
- ExpressRoute
  - Private connections between Azure and on premises
- Connect
  - On premises Azure Directory to Azure Active Directory
- Azure Arc-enabled data services
  - Manage and Analyze data across
    - Entire digital estate

See: <https://azure.microsoft.com/en-us/solutions/hybrid-cloud-app/#overview>



# Azure AI

- Azure AI Platform:
  - Suite for building AI applications.
- Machine Translation:
  - Tools for translating text between languages.
- Conversational AI:
  - Create interactive chatbots and virtual assistants.
- Document Processing:
  - Automate extraction & analysis of information from documents.



# Azure AI Portfolio

- Azure AI Studio:
  - Platform for developing generative AI solutions
  - Custom copilots
- Azure OpenAI Service:
  - OpenAI's GPT Models for custom AI experiences.
    - Range of models are available
    - Data is kept private
- Azure AI Search:
  - Enhanced search capabilities using natural language processing.



# Azure AI Portfolio

- Azure AI Content Safety:
  - Tools to ensure content safety and compliance.
- Responsible AI dashboard:
  - Monitoring and managing AI applications responsibly.
- Machine learning operations (MLOps):
  - Streamlining the machine learning lifecycle.





# Azure Overview





# Links & Resources

- [What is Azure?](#)
- [Azure Products](#)