# Cloud Computing Fundamentals(MS Azure focused)

- **The Azure Fundamentals Learning Path: https://docs.microsoft.com/en-us/learn/paths/azure-fundamentals/**

- **Azure Docs: https://docs.microsoft.com/en-us/azure/**

# Contents

- Understand cloud concepts
- Understand core Azure services
- Understand core solutions and management tools
- Understand security, privacy, compliance and trust
- Understand Cost management and support

# CLOUD CONCEPTS
## - PRINCIPLES OF CLOUD COMPUTING

# Key Terminologies

- **Cloud Agility**

  Cloud agility is **the ability to rapidly change** an IT infrastructure in order to **adapt to the evolving needs of the business**

  (e.g. if your **service peaks one month**, you can **scale to demand** and pay a larger bill for the month. If the **following month the demand drops**, you can **reduce the used resources** and be charged less).

- **High Availability (HA)**

  The **ability of the application to continue running** in a healthy state, **without significant downtime**.

  By "healthy state," we mean the application is responsive, and users can connect to the application and interact with it.

- **Elasticity**

  **Automatically add or remove resources** based on demand.

# Key Terminologies

- **Scalability**
  **Increase or decrease the resources and serv**ices used based on the demand or workload **at any given time**.
  - **Vertical Scaling (scaling up)**
    The process of adding resources to **increase the power of an existing s**erver (e.g. adding a faster CPU, additional CPUs, more memory).
  - **Horizontal Scaling (scaling out)**
    The process of **adding more servers** that function together as one unit (e.g. adding more servers).

# Key Terminologies

- **Fault Tolerance**
  - ✓ Redundancy is often built into cloud services architecture so if **one component fails, a backup component takes its place**.
  - ✓ This is referred to as fault tolerance and it ensures that your customers **aren't impacted when an unexpected accident occurs**.

- **Disaster Recovery**
  - ✓ The ability to **recover from rare but major incidents**: non-transient, wide-scale failures, such as service disruption that affects an entire region.
  - ✓ Disaster recovery includes data backup and archiving, and may include manual intervention, such as restoring a database from backup.

# Key Terminologies

- **Economies of Scale**

  Economies of scale is **the ability to do things more efficiently** or **at a lower-cost per unit** when **operating at a larger scale**

  (e.g. the ability to acquire hardware at a lower cost than if a single user or smaller business were purchasing it, cloud providers can also make deals with local governments and utilities to get tax savings, lower pricing on power, cooling, and high-speed network connectivity between sites).

# Key Terminologies

- **Capital Expenditure (CapEx)**
  - ✓ CapEx is the **spending of money on physical infrastructure up front**, and then deducting that expense from your tax bill over time.
  - ✓ CapEx is an upfront cost, which has a value that reduces over time.

    **Example:** Server costs, Storage costs, Network costs, Backup and archive costs,

- **Operational Expenditure (OpEx)**
  - ✓ OpEx is **spending money on services or products now** and being billed for them now.
  - ✓ You can deduct this expense from your tax bill in the same year.
  - ✓ There is no upfront cost, you pay for a service or product as you use it.

    **Example**: Lease/rent storage in a data center, Leasing software

# What is Cloud Computing-1

**Microsoft :**

- Cloud computing is the **delivery of computing services** including servers, storage, databases, networking, software, analytics, intelligence and more **over the Internet** ("the cloud") to offer faster innovation, flexible resources and economies of scale.

**AWS :**

- Cloud computing is the **on-demand delivery of** compute power, database storage, applications, and other **IT resources** through a cloud services platform **via the internet with pay-as-you-go pricing.**

# What is Cloud Computing-2

**The NIST Cloud Computing Definition:**

- Cloud computing is a model for enabling **convenient, on-demand network access** to a **shared pool of configurable computing resources** (e.g., networks, servers, storage, applications, and services) that can be **rapidly provisioned** and released with **minimal management effort** or service provider interaction.

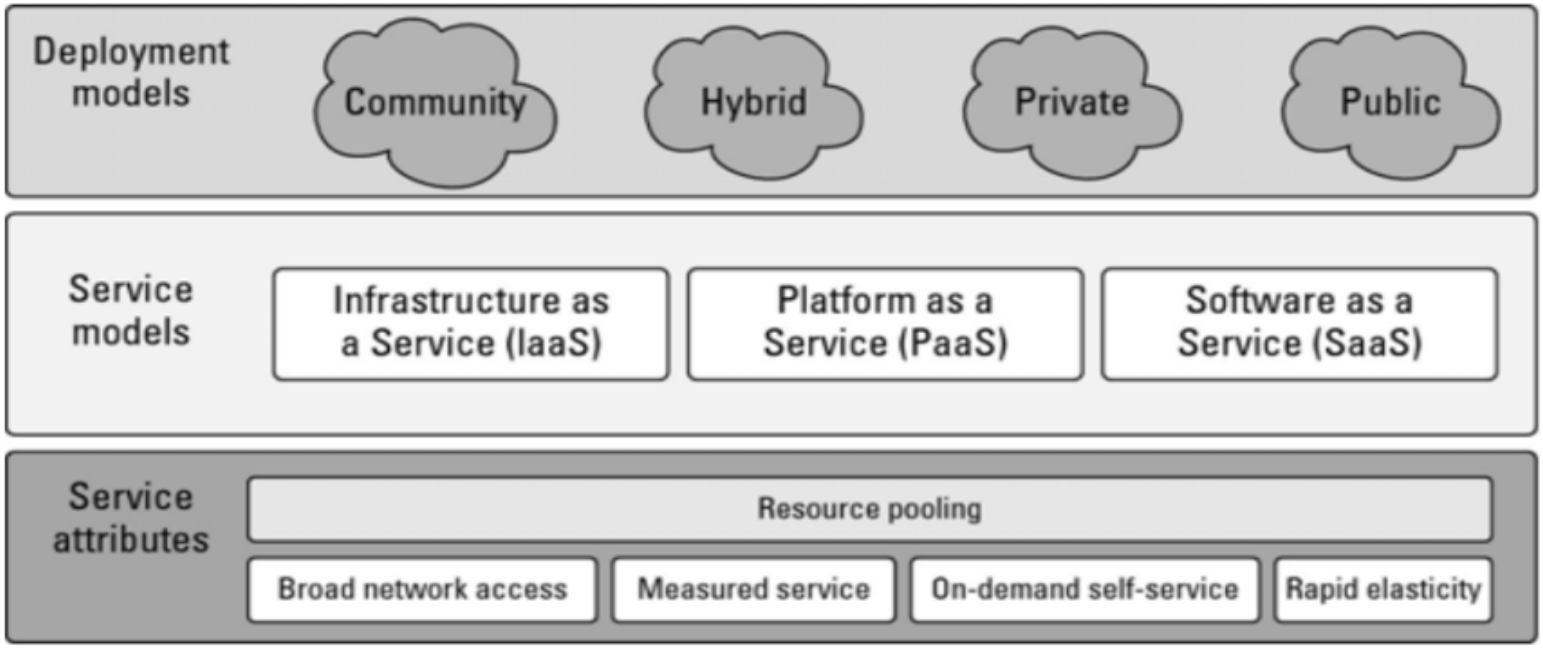
# What is Cloud Computing-3

**The NIST Cloud Computing Definition:**

- Five essential characteristics
  - ✓ On-demand self-service,
  - ✓ Broad network access,
  - ✓ Resource pooling,
  - ✓ Rapid elasticity,
  - ✓ Measured Service
- Three service models
  - ✓ Cloud Software as a Service (SaaS),
  - ✓ Cloud Platform as a Service (PaaS),
  - ✓ Cloud Infrastructure as a Service (IaaS))
- Four deployment models
  - ✓ Private cloud,
  - ✓ Community cloud,
  - ✓ Public cloud,
  - ✓ Hybrid cloud

# What is Cloud Computing-4

## The NIST Cloud Computing Definition:



# TYPES OF CLOUD SERVICES

- **Infrastructure-as-a-Service (IaaS) (shared responsibility model)**
  - ✓ Infrastructure as a Service is the **most flexible category of cloud services**.
  - ✓ It aims to give you **complete control over the hardware** that runs your application (IT infrastructure servers and virtual machines (VMs), storage, networks, and operating systems).
  - ✓ Instead of buying hardware, with IaaS, you rent it. It's an instant computing infrastructure, provisioned and managed over the internet.

- **Platform-as-a-Service (PaaS)**
  - ✓ PaaS provides an **environment for building, testing, and deploying software** applications.
  - ✓ The goal of PaaS is to help you create an application quickly without managing the underlying infrastructure.
  - ✓ For example, when deploying a web application using PaaS, you don't have to install an operating system, web server, or even system updates. PaaS is a complete development and deployment environment in the cloud.

- **Software-as-a-Service (SaaS)**
  - ✓ SaaS is **software that is centrally hosted and managed for the end customer**.
  - ✓ It is usually based on an architecture where one version of the application is used for all customers, and licensed through a monthly or annual subscription.
  - ✓ Office 365, Skype, and Dynamics CRM Online are perfect examples of SaaS software.

# CLOUD DEPLOYMENT MODELS

- **Public Cloud (most common)**

  This is the most common deployment model. In this case, you have **no local hardware to manage** or keep up-to-date – everything runs on your cloud provider's hardware.

- **Private Cloud**

  In a private cloud, you create **a cloud environment in your own datacenter** and provide self-service access to compute resources to users in your organization.

- **Hybrid Cloud**

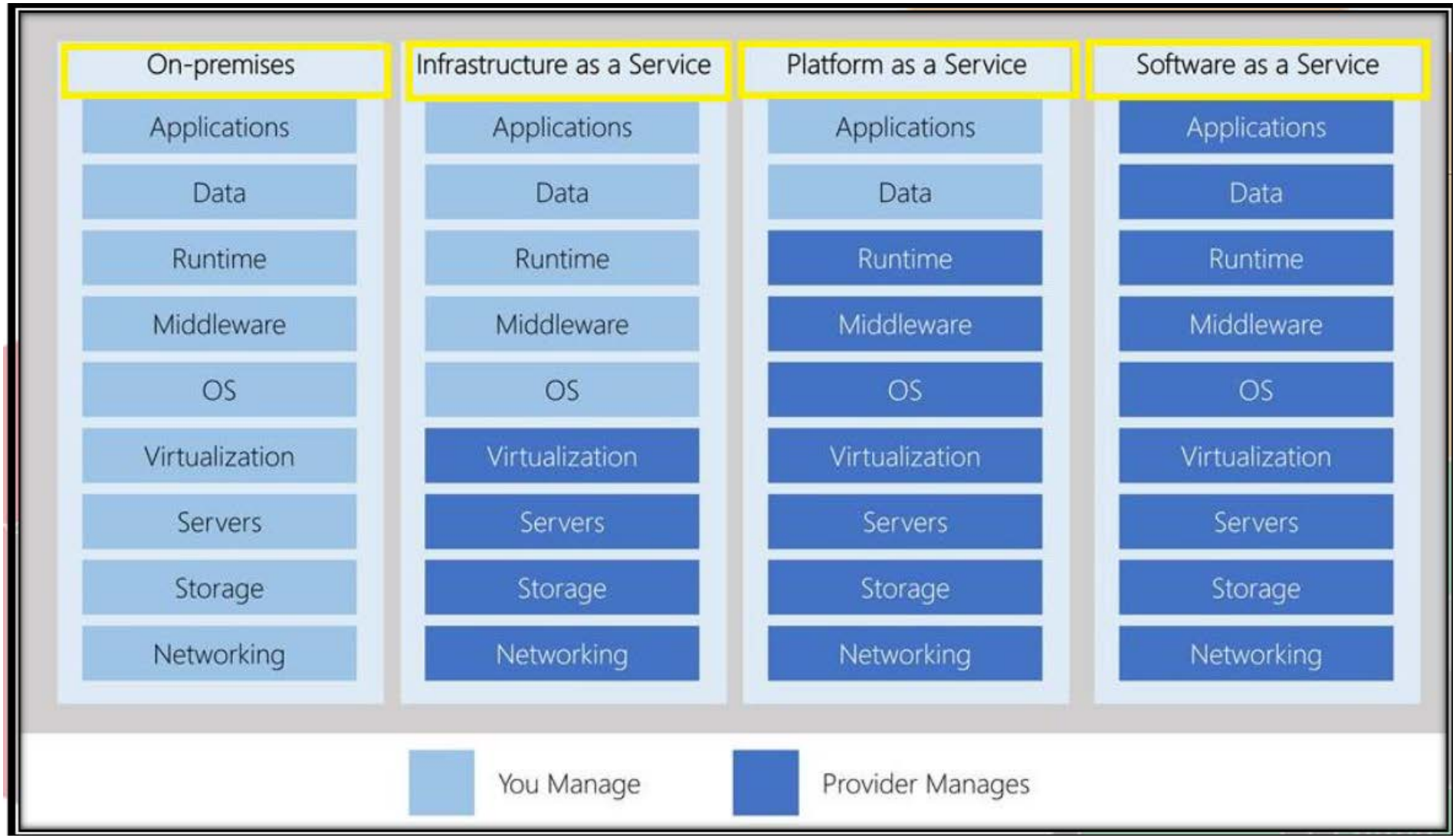
  hybrid cloud **combines public and private clouds**, allowing you to run your applications in the most appropriate location.

- **Community Cloud**

  It is a **mutually shared model between organizations** that **belong to a particular community** such as banks, government organizations, or commercial enterprises.

  (Examples include universities cooperating in certain areas of research, or police departments within a county or state sharing computing resources..)

# Management Responsibilities



# Advantages of Cloud Computing

- **Cost Effective:** Pay-as-you-go, consumption-based pricing model. Rather than paying for hardware up-front, you rent hardware and pay for the resources that you use.
- **Scalable:** Increase or decrease the resources and services used based on the demand or workload at any given time.
- **Elastic:** Automatically add or remove resources based on demand.
- **Current:** Computer hardware and software is automatically maintained by the cloud provider.
- **Reliable:** Cloud providers offer data backup, disaster recovery, and data replication services. Redundancy is often built into cloud services architecture so if one component fails, a backup component takes its place.
- **Global:** Cloud providers have fully-redundant datacenters located in various regions all over the globe (performance, redundancy, compliance).
- **Secure:** Cloud providers offer a broad set of policies, technologies, controls, and expert technical skills that can provide better security than most organizations can otherwise achieve.