

# Introduction to Cloud Engineering

A Quick Overview

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# AGENDA

- What is Cloud
- Benefits
- History
- Example Usages
- Cloud Infrastructure
- Deployment Model
- Industry and Cloud Integration
- Microservices
- Cloud Solutions
- Security

# What is Cloud

- The word “cloud” is used as a metaphor for “the internet”. Some services are running somewhere which are accessed over the internet.
- Cloud computing means the delivery of computing services over the internet.
  - Servers
  - Storage
  - Databases
  - Analytics
  - Networking, Software etc.
- Cloud Engineering helps to scale business on-demand.
  - Business increase, cloud resources can be increased
  - Business shrink cloud resources are released => this is elasticity
- Rapid elasticity, Measured service.



*“You don’t generate your own electricity. Why generate your own computing?”* -**Jeff Bezos, Amazon**

# Benefits

ON-PREMISE	CLOUD COMPUTING
Higher cost, less scalability	Pay as you use
Huge spaces are needed for servers	No server spaces needed
Maintenance team is needed for hardware and software	No special team needed for hardware and software
Security is problem*	Better data security*
Less chance to recover lost data	Disaster recovery

- Cloud Cons

- Requires good internet speed with good bandwidth
- Security concern for many companies as shared resources\*
- Limited control of infrastructure

# History

- In 1999, Salesforce started to deliver applications to users by using the webpage
- In 2002, Amazon provided the first public cloud AWS (Amazon Web Service) and started to provide services like storage, and computing. A big step in cloud computing.
  - Global reach and scalability
- Microsoft launched Azure in 2009. Nowadays lots of microsoft applications are part of the cloud platform
  - Integration and security
  - Visual Studio Code
- In 2009, Google started to provide cloud computing enterprise applications
  - Data Analytics API
  - Machine learning API

## Market Share

AWS	Azure	GCP
32%	22%	11%

# Examples of usage

- Gmail
  - We just use it, nobody needs to know how it works, where the data is stored
- Office 365, Google docs
  - All are in the cloud
- Data Analytics and Business Intelligence
  - Transform raw data into meaningful insight
  - Analysis of machine data to find flaw

# Cloud Infrastructure

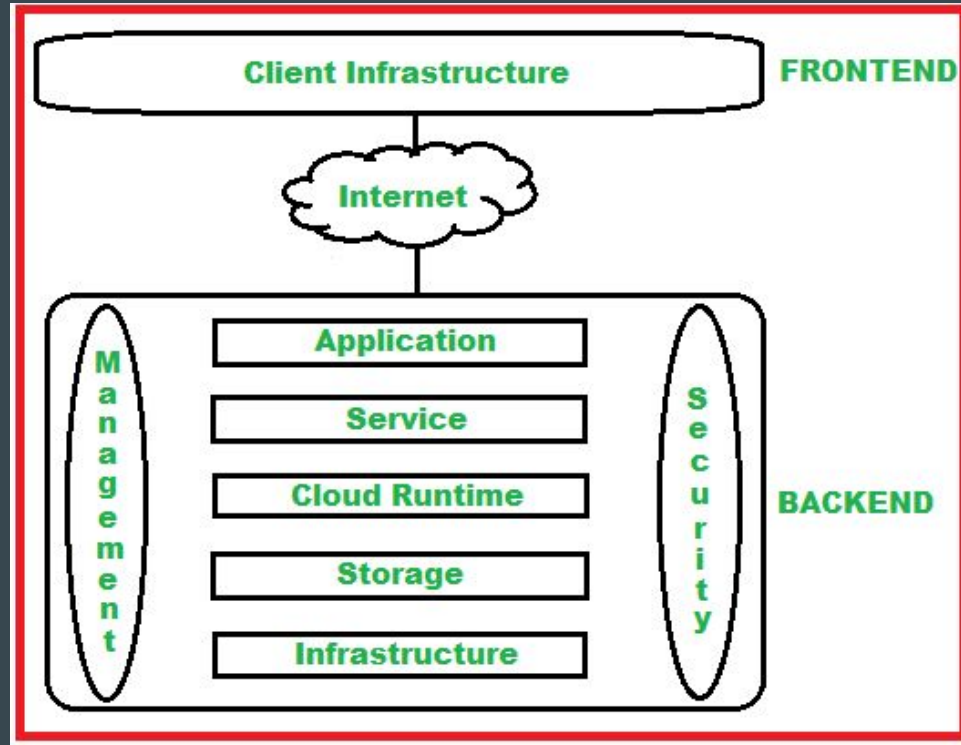
- Cloud Computing Architecture

- Frontend

- It contains the applications and user interfaces that are used to access the cloud platform

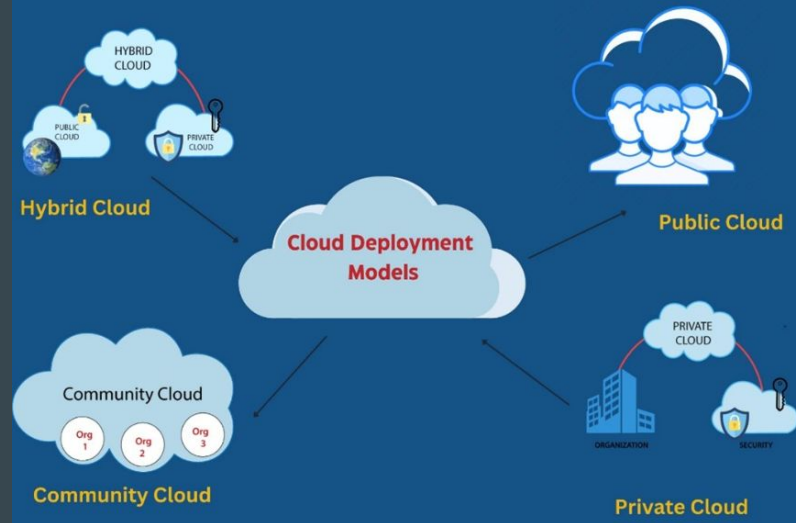
- Backend

- Application
    - Services
    - Runtime
    - Storage
    - Management
    - Security



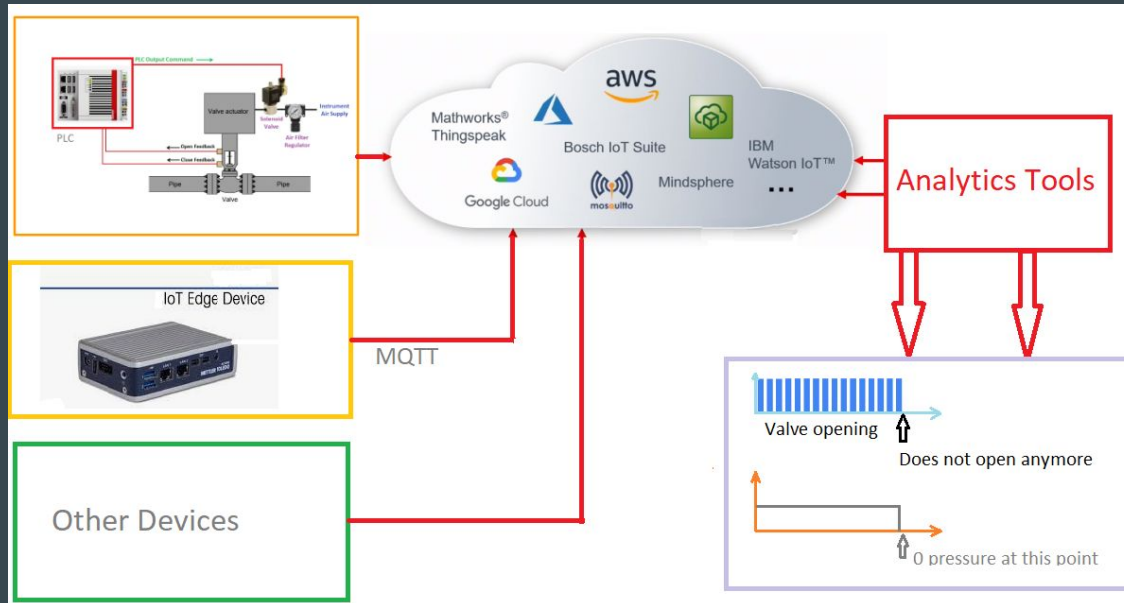
# Deployment Models

- Public Cloud: Services are delivered over the internet and shared across multiple users.
- Private Cloud: Cloud infrastructure is dedicated to a single organization.
- Hybrid Cloud: Combination of public and private cloud environments.
- Community Cloud: Shared infrastructure among several organizations with common concerns.



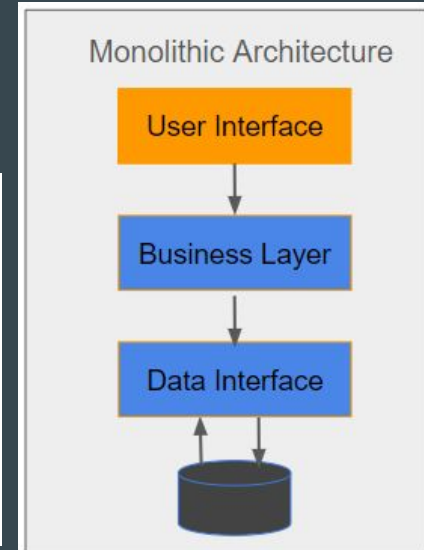
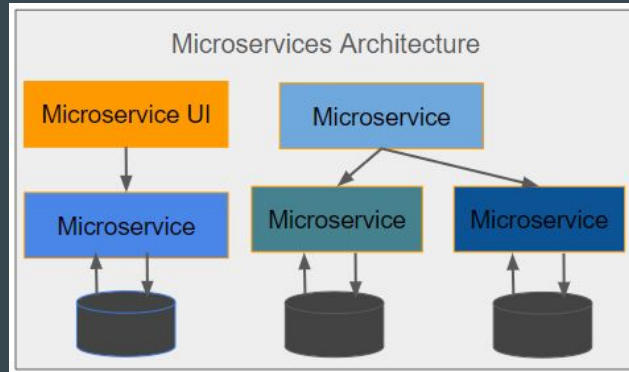
# Industry and cloud integration

- Seamless integration of industrial systems, such as automation equipment and processes, with cloud computing technologies.
- The Data Chain:
  - Raw data acquisition
  - Data storage and communication
  - Data preparation and pre analysis
  - 24/7 data collection, analysis and integration into operations
  - Visualization of the analysis results
  - Measures and optimizations



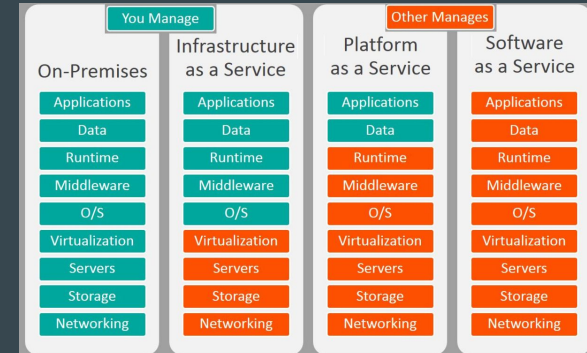
# Microservices

- Microservices architecture is an approach to software development that structures an application as a collection of loosely coupled services, each representing a specific business function.
- Characteristics:
  - Decentralized: Each microservice operates independently and communicates with other services via APIs.
  - Autonomous: Services can be developed, deployed, and scaled independently.
  - Resilient: Failure of one service does not affect the entire application.
  - Scalable: Allows for horizontal scaling by replicating services based on demand.
- Benefits:
  - Agility: Enables faster development, deployment, and updates of individual services.
  - Scalability: Supports flexible scaling of services to handle varying workloads.
  - Maintainability: Easier to understand, modify, and maintain smaller, focused services.
  - Resilience: Fault isolation prevents cascading failures and improves system reliability.
- Company that changed from Monolithic to Microservice with huge success
  - Amazon
  - Netflix
  - Uber etc



# Cloud solutions

- A cloud solution can be applications, data storage, on-demand services, computer networks, or other resources that are accessed over the internet from different providers.
- Infrastructure as a Service (IaaS): Offers virtualized computing resources, such as virtual machines and storage, over the internet.
- Platform as a Service (PaaS): Provides a platform for developing, deploying, and managing applications without the complexity of infrastructure management.
- Software as a Service (SaaS): Delivers software applications over the internet on a subscription basis, eliminating the need for installation and maintenance.



# Security

- **Data Encryption:**
  - Encrypt data at rest and in transit to protect it from unauthorized access.
- **Access Management (AM):**
  - Establish strong identity and access controls to prevent unauthorized access to cloud resources..
- **Network Security:**
  - Implement network security controls to protect cloud infrastructure and data.
  - Use virtual private networks (VPNs) and secure connections to access cloud resources.
- **Disaster Recovery:**
  - Establish backup and disaster recovery strategies to recover data and restore services in case of data loss or service disruptions.

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Thank you!

Need to take a look again

[Cloud Computing - HEMELIX](#)