

Cloud Computing and Serverless Programming: A Journey Through Scalable Solutions

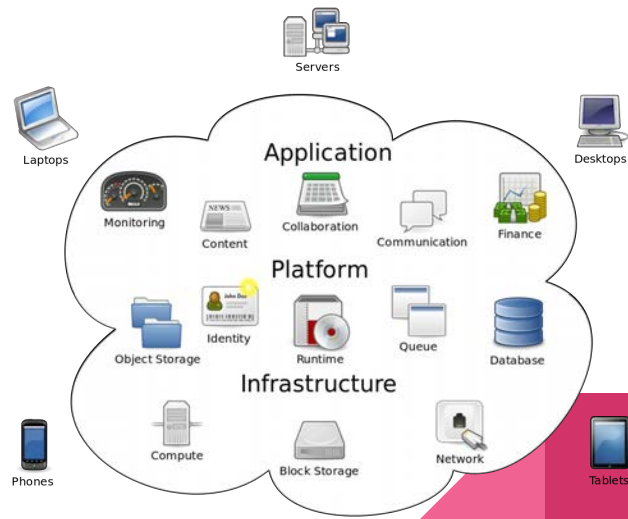
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What is Cloud Computing?

Cloud computing is the on-demand availability of computer system resources, particularly data storage and computing power, that does not require direct active management by the user.

Major cloud computing platforms:

1. *Amazon Web Services (AWS)*
2. *Microsoft Azure*
3. *Google Cloud Platform (GCP)*




Amazon Web Service (AWS)

Key Features:

- The world's most popular cloud platform
(over 50% of global public cloud share)
 - Customers in 190 countries
 - Over 200 cloud services and products
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Top AWS Products and Services


1. Amazon EC2 (Elastic Compute Cloud) offers web-scale cloud computing capacity without the need for physical resources.
 2. Amazon RDS (Relational Database Service) allows for creation of database instances.
 3. Amazon S3 (Simple Storage Service) enables frictionless data organisation and configurable access controls.
 4. Amazon Lambda allows you to run code without owning or managing a server.
 5. Amazon CloudFront improves website performance and provides access to cloud-based data in order to efficiently deliver content to end users.
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Microsoft Azure

Key Features:

- The largest portfolio in the industry: over 90 compliance offerings
 - 95% of Fortune 500 companies use Azure
 - More than 200 products and cloud services
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Top Microsoft Azure Products and Services


1. Azure Virtual Machines (VMs) handle computing tasks ranging from development and testing to large-scale applications.
 2. Azure Blob Storage is useful for data lakes, websites, mobile apps, and big data analytics.
 3. Azure Kubernetes Service (AKS) offers a managed Kubernetes environment for containerised application deployment, management, and scaling.
 4. Azure Functions enables you to run small pieces of code, or "functions," in the cloud.
 5. Azure Active Directory (AD) enables employees to sign in and access resources like Microsoft Office 365 and the Azure portal.
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Google Cloud Platform (GCP)

Key Features:

- It powers all of Google's services and products, such as Gmail and Google Search.
 - Millions of customers worldwide benefit from more than 150 products and services.
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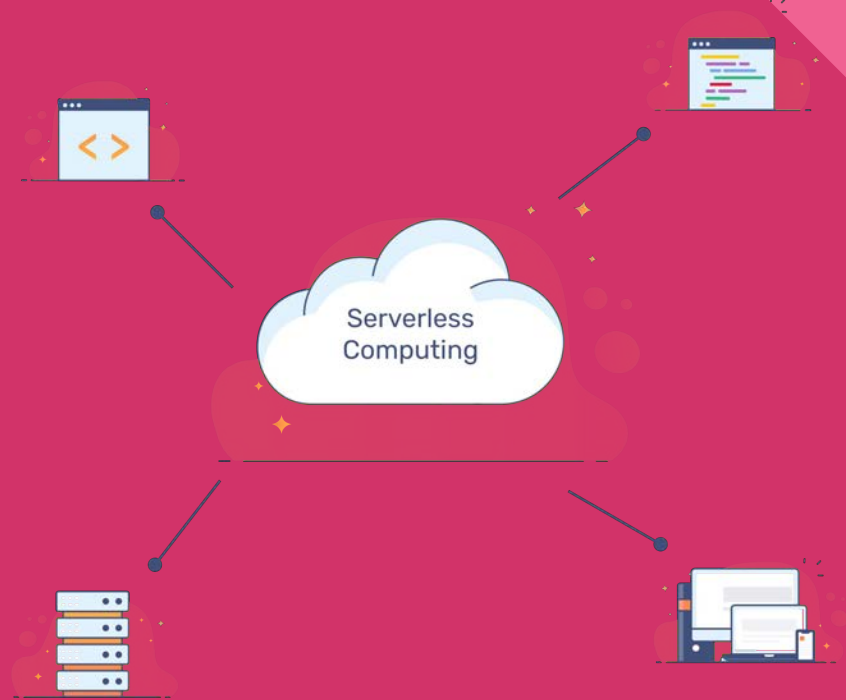
Top GCP Products and Services

1. Google Compute Engine offers customisable virtual machine instances that can be quickly scaled up or down for applications.
 2. Google Cloud Storage offers long-term object storage with global accessibility and high data consistency.
 3. BigQuery allows you to run SQL queries across petabytes of data without the need for database administration.
 4. Google Kubernetes Engine (GKE) enables automated containerised application scaling and management.
 5. Google Cloud Platform's AI and machine learning suite includes tools for building custom models, AutoML for automated model training, and AI Platform for simple deployment.
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What is Serverless Computing?

Serverless computing is a method of obtaining on-demand backend services using servers provided by a serverless vendor.

Users only pay for the compute resources they use while executing code, rather than managing servers or infrastructure.



Serverless Computing

Benefits:

Scalability: The ability of applications to automatically adapt to changing workloads.

Cost-effectiveness: Because users are billed based on actual usage, serverless computing can save a significant amount of money.

Performance: Serverless platforms provide tools and services for monitoring and optimising application performance at scale.

Top serverless computing platforms:

1. AWS Lambda
2. Azure Functions
3. Google Cloud Services

Use Cases: E-commerce

Amazon uses **AWS** to effectively handle traffic spikes during events like Prime Day and Black Friday, ensuring a smooth shopping experience for **millions of customers**.



Use Case: Healthcare

Kaiser Permanente, a major American healthcare provider, uses Microsoft Azure to collect and analyse data from medical devices, ensuring data-driven decision making and personalised patient care for **12.4 million patients**.



Use Case: Gaming

Supercell, the developer of popular mobile games like Clash of Clans, has built its entire game infrastructure on AWS. With the ability to scale server capacity based on player demand, they can efficiently handle traffic surges while keeping costs low during quieter periods.

SUPERCCELL



Challenges: Security and Compliance

What is the problem?

Protecting personal data in the cloud is difficult.

Solution:

Critical data security measures include regular security audits as well as strong identity and access management (IAM) controls.

Challenges: Vendor Lock-in

What is the problem?

Vendor lock-in occurs when the cost of switching to a different vendor is prohibitively expensive, leaving the customer essentially stuck with the original vendor.

Solution:

Organisations can reduce vendor lock-in risks by implementing cloud-agnostic technologies such as containerisation and microservices architecture, which make it easier to switch cloud providers if necessary.

Challenges: Cost Management

What is the problem?

Tracking and comprehending serverless spending can be difficult.

Solution:

Implementing resource cleanup practices, creating budget alerts to track spending, and reviewing usage patterns on a regular basis to rightsize resources and cut unnecessary costs.

Trends

Edge Computing and the Internet of Things

- **Edge computing** brings computation closer to the data source, lowering latency and allowing for real-time processing. It is critical for **IoT devices**, self-driving cars, and remote monitoring.



Trends

Machine Learning and AI Integration

- Cloud providers offer specialised services and frameworks that allow businesses to efficiently **build and scale AI solutions**.



Trends

Hybrid and Multi-Cloud Strategies

- **Hybrid cloud environments**, which combine on-premises infrastructure with public and private cloud resources, enable data and workloads to flow seamlessly between them.
- **Multi-cloud strategies** use multiple cloud providers for different purposes, reducing vendor lock-in and improving performance.





Thank you for your attention!