UNIT-4

Cloud platform in industry:

Amazon web services

AWS stands for Amazon Web Services. It's a cloud computing platform provided by Amazon that offers a variety of services like compute, storage, communication, and Additional services over the internet, allowing individuals and organizations to build and manage their applications and services without having to invest in physical infrastructure.

Compute services

- Compute services are a type of cloud computing service that provides users with virtualized computing resources, such as processing power, memory, and storage over the internet.
- These services enable users to deploy and manage virtual servers known as instances.
- These services provide a flexible and scalable platform for running applications, managing workload, and executing computational tasks without the need of physical infrastructure.
- One of the key benefits of compute services is their ability to dynamically allocate and scale resources based on demand, allowing users to adjust their computing capacity in real-time to match workload requirements.
- Cost-efficiency in managing their computational workloads and applications.

Storage services:

In AWS (Amazon Web Services), storage services are designed to provide scalable, durable, and cost-effective storage solutions for a wide range of use cases. Some key storage services offered by

AWS include:

- Amazon Simple Storage Service (S3): S3 is a highly scalable object storage service that allows users to store and retrieve any amount of data from anywhere on the web. It offers features such as encryption, versioning, and lifecycle management, making it suitable for a variety of storage needs, including backup, archiving, and content distribution.
- Amazon Elastic Block Store (EBS): EBS provides block-level storage volumes that can be attached to EC2 (Elastic Compute Cloud) instances to provide persistent storage for applications. It offers features such as snapshots and encryption, making it suitable for databases, file systems, and other transactional workloads.
- Amazon Elastic File System (EFS): EFS is a scalable and fully managed file storage service that provides a simple and scalable file system for EC2 instances. It supports the NFS (Network File System) protocol and can be accessed concurrently from multiple EC2 instances, making it ideal for shared file storage and content management.4. Amazon Glacier: Glacier is a low-cost storage service designed for long-term archival and backup of data that is infrequently accessed. It offers features such as flexible retrieval options and encryption, making it suitable for compliance, regulatory, and disaster recovery requirements.

Communication services:

In AWS (Amazon Web Services), communication services encompass a variety of tools and platforms that enable users to establish, manage, and optimize communication within their applications and systems. Some key communication services offered by AWS include:

1. **Amazon Simple Notification Service (SNS):** SNS is a fully managed messaging service that allows users to send notifications to individuals or groups via email, SMS, mobile push, or HTTP endpoints. It provides scalable, reliable, and cost-effective communication capabilities for event-driven architectures.

2. **Amazon Simple Queue Service (SQS):** SQS is a fully managed message queuing service that enables decoupling of application components by providing a reliable and scalable mechanism for message communication between distributed systems. It helps in building fault-tolerant and scalable applications.

3. **Amazon Simple Email Service (SES):** SES is a cloud-based email sending service that enables users to send transactional and marketing emails at scale. It provides features such as email validation, content filtering, and analytics to ensure high deliverability and compliance with email regulations.

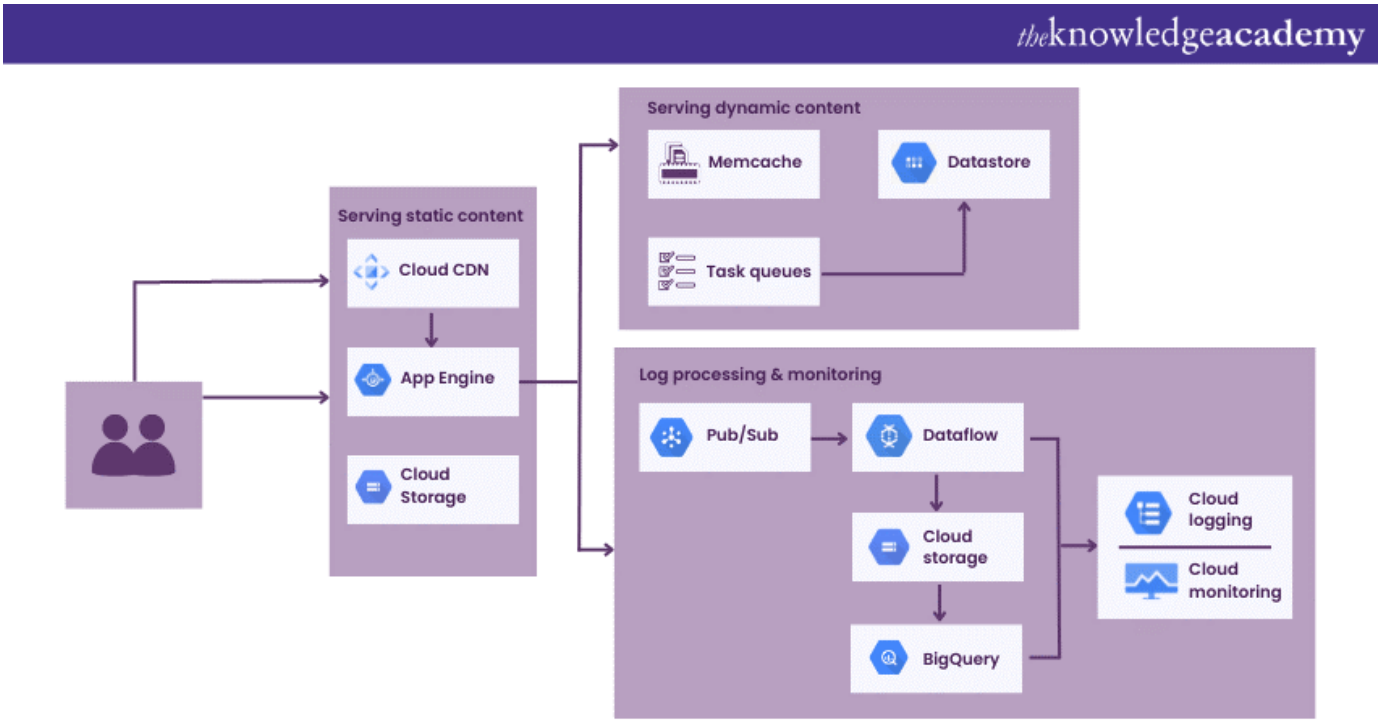
4. **Amazon Chime:** Chime is a secure and reliable online meeting and conferencing service that allows users to conduct video conferences, online meetings, and screen sharing sessions. It provides features such as chat, file sharing, and integration with calendar and scheduling tools.
5. **Amazon Connect:** Connect is a cloud-based contact center service that enables businesses to set up and manage customer contact centers in the cloud. It provides features such as intelligent routing, interactive voice response (IVR), and real-time analytics to deliver seamless customer experiences.

Additional services:

- AWS offers a wide range of additional services beyond its core cloud capabilities.
- These additional services cover various areas such as analytics, networking, content delivery, Internet of Things (IoT), developer tools, end-user computing, and supporting services for observability of databases.
- Some examples of these additional services include Amazon API Gateway, AWS Managed Services, Amazon Athena, AWS CodeStar, Amazon Workspaces, and Amazon Event Bridge.

Google App Engine- Architecture

Google App Engine's architecture in Cloud Computing is both scalable and robust, designed to cater to a diverse range of applications and services. Here's a concise breakdown of its structure below:



1) Datastore: Serving as the central data management system in Cloud Computing, Google App Engine's Datastore is a NoSQL database renowned for its scalability. What sets it apart is its dynamic nature, adapting in real-time to the demands of the application. Whether it's a minor data retrieval or a massive data influx, the datastore scales on-the-fly, ensuring that data remains consistently accessible and safeguarded against potential threats.

2) Task queues: In any application, there exist tasks that don't necessitate immediate user feedback. Google App Engine's Task queues are designed to manage such background operations. By queuing these tasks, they're executed asynchronously, optimising application performance and ensuring users aren't bogged down with processing delays.

3) Memcache: As a rapid-access in-memory caching system, Memcache plays a pivotal role in enhancing data retrieval speeds. Especially beneficial for frequently queried data, it acts as a buffer, reducing the datastore's workload. This not only ensures quicker response times but also contributes to the longevity and efficiency of the main Datastore.

4) Blobstore: In today's digital age, applications often deal with voluminous data, be it high-definition images, videos, or other large files. The Blobstore is Google App Engine's dedicated solution for such requirements. By efficiently managing and storing these large objects, it ensures that the primary datastore isn't overwhelmed, maintaining a harmonious data ecosystem.

5) Automatic scaling: One of Google App Engine's crowning features, Automatic Scaling, epitomises proactive resource management. By continually monitoring application traffic and user requests, it dynamically scales resources. This ensures optimal performance even during unexpected traffic surges, eliminating the need for manual adjustments and guaranteeing a consistently smooth user experience.

6) Integrated services: Google App Engine isn't an isolated entity but a cog in the vast machinery of Google Cloud Computing services. Its ability to seamlessly mesh with other services, from Data Analytics platforms to state-of-the-art Machine Learning tools, transforms it from a mere hosting platform to a comprehensive, integrated Cloud solution. This interoperability enhances the capabilities of applications hosted on Google App Engine, giving Developers a richer toolset to work with.

Core Concepts of Google App Engine

Multiple language support

Google App Engine is adept at embracing a variety of programming languages. Whether you're fluent in Java, Python, PHP, Go, or numerous others, Google App Engine has got you covered. This multifaceted support ensures that developers aren't constrained by language limitations. Instead, they can pick and choose based on their comfort and expertise, making the development process smooth and intuitive.

Automated management

Looking deeper into Google App Engine's automated management reveals a world where manual intervention is minimised. Google App Engine takes the reins when it comes to managing applications. From maintaining the core infrastructure to adeptly routing traffic, overseeing software patches, and ensuring a robust failover system, this tool does it all. For Developers and businesses, this translates to a significant reduction in operational intricacies and the hours usually spent on infrastructure oversight.

Scalability

Google App Engine has a one of a kind scalability feature. Imagine an application that intelligently scales up or down in response to the ebb and flow of user traffic, ensuring consistent performance without manual tweaks. Google App Engine's automatic scaling discerns the needs of the application based on traffic and usage patterns, empowering it to handle even unexpected surges in demand effortlessly.

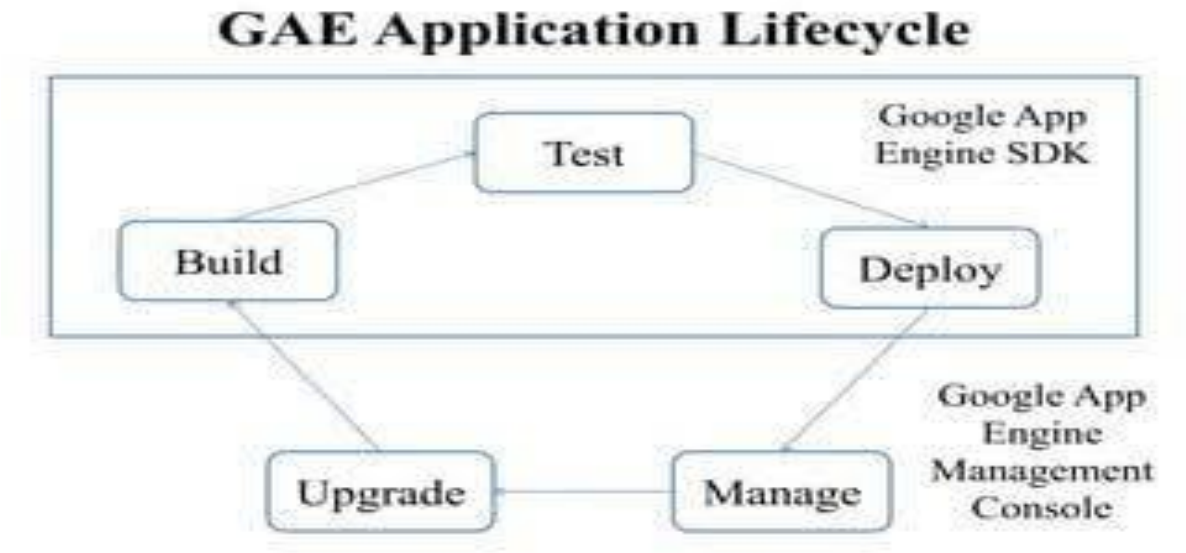
Integrated environment

The synergy between various Google Cloud Computing services is palpable when you use Google App Engine. A harmonious integration with platforms like Cloud Datastore, Cloud Storage, and

Google Workspace paves the way for a holistic development environment. This not only streamlines the development process but also offers a plethora of tools and services at one's fingertips. Such an integrated approach fosters efficiency, making it simpler to both develop and sustain applications over time

Application life cycle of google app engine

Google App Engine (GAE) is a Platform as a Service (PaaS) offering from Google Cloud Platform (GCP) that allows developers to build and deploy scalable web applications and services. The application lifecycle in Google App Engine typically involves several stages, from development to deployment and maintenance. Let's break down the application lifecycle in detail:



- **Development:**

- Developers write code for their applications using programming languages such as Python, Java, Go, or Node.js.
- During development, developers can simulate the App Engine environment locally to test their applications before deployment.

- **Configuration:**

- Developers configure their App Engine application by creating configuration files, typically named app. yaml for Python or app. yaml for other languages..
- Configuration also includes setting up services like Data store, Cloud Storage, or other Google Cloud services that the application may use.

- **Testing:**

- Before deploying the application to the production environment, thorough testing is necessary.
- Developers perform unit tests, integration tests, and sometimes load testing to ensure that the application functions as expected under various conditions.

- **Deployment:**

- Once the application is developed and tested, it is ready for deployment.
- During deployment, the application's code and configuration files are uploaded to Google Cloud Platform, where they are managed and executed by the App Engine infrastructure.

- **Scaling:**

- Google App Engine automatically scales the application based on incoming traffic. It can handle sudden spikes in traffic by dynamically allocating more resources to instances of the application.

- **Monitoring and Maintenance:**

- After deployment, developers monitor the application's performance, availability, and health using monitoring tools provided by Google Cloud Platform, such as Stack driver Monitoring.
- Regular maintenance tasks include updating dependencies, applying security patches, and optimizing performance.

- **Versioning and Rollback:**

- App Engine supports versioning, allowing developers to deploy multiple versions of their application concurrently.
- This enables A/B testing, canary releases, and easy rollback to a previous version if necessary.

- **Scaling Down or Decommissioning:**

- If the application's usage decreases or if it's no longer needed, developers can scale down or decommission the application.
- Scaling down involves adjusting scaling settings or stopping instances to reduce costs.
- Decommissioning involves removing the application and its associated resources from Google Cloud Platform.

Microsoft Azure

Microsoft Azure is a cloud computing platform and a collection of cloud services offered by Microsoft. It provides a wide range of cloud-based services, including computing, storage, analytics, networking, databases, machine learning, artificial intelligence, Internet of Things (IoT), and more. Azure enables businesses to build, deploy, and manage applications and services through Microsoft's global network of data centers.

Core Concepts Microsoft Azure

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Core Concepts

Azure, Microsoft's cloud computing platform, encompasses several core concepts essential for understanding its functionality and structure:

1. **Compute Services**: Compute services in Azure provide virtualized computing resources to run applications and workloads. These services include:
   - Azure Virtual Machines (VMs): On-demand, scalable computing instances running Windows or Linux operating systems.
   - Azure App Service: Platform as a Service (PaaS) offering for building, deploying, and scaling web, mobile, and API applications.
   - Azure Kubernetes Service (AKS): Managed Kubernetes container orchestration service for deploying, managing, and scaling containerized applications.
   - Azure Functions: Serverless compute service for running event-driven code without provisioning or managing servers.
   - Azure Batch: Managed service for parallel processing of large-scale compute-intensive workloads.
2. **Storage Services:** Azure provides various storage options to store, access, and manage data at scale. These services include:
   - Azure Blob Storage: Scalable object storage for unstructured data such as documents, images, videos, and logs.
   - Azure File Storage: Fully managed file shares in the cloud accessible via Server Message Block (SMB) protocol.
   - Azure Queue Storage: Messaging service for asynchronous communication between application components.

- Azure Table Storage: NoSQL key-value store suitable for storing structured data.
- Azure Disk Storage: Persistent block storage for Azure Virtual Machines and containerized applications.

3. **Core Infrastructure Services:** These services form the foundational components of Azure's infrastructure offerings:
   - Azure Virtual Network (VNet): Isolated network environment in Azure for securely connecting Azure resources and on-premises networks.
   - Azure Load Balancer: Provides high availability and scalability by distributing incoming traffic across multiple VM instances.
   - Azure VPN Gateway: Enables secure connectivity between Azure Virtual Network and on-premises networks using VPN tunnels.
   - Azure ExpressRoute: Dedicated private connection to Azure, bypassing the internet for enhanced security and reliability.
   - Azure DNS: Managed DNS hosting service for domain name resolution.
4. **Other Services:** This category encompasses various additional Azure services across different domains:
   - Databases: Azure offers a range of fully managed database services including Azure SQL Database, Azure Cosmos DB, Azure Database for MySQL, Azure Database for PostgreSQL, and more.
   - Analytics: Services such as Azure Synapse Analytics (formerly SQL Data Warehouse), Azure Data Lake Analytics, and Azure HDInsight for big data analytics and processing.
   - AI and Machine Learning: Azure Cognitive Services, Azure Machine Learning, and Azure Databricks for building AI-driven applications and solutions.
   - Internet of Things (IoT): Azure IoT Hub, Azure IoT Central, and Azure IoT Edge for connecting, monitoring, and managing IoT devices and data.
   - Developer Tools: Azure DevOps, Azure DevTest Labs, and Visual Studio Team Services for application lifecycle management, continuous integration, and deployment.

SQL Azure:

SQL Azure, now known as Azure SQL Database, is a fully managed relational database service provided by Microsoft Azure. It is a cloud-based version of Microsoft SQL Server, the popular relational database management system (RDBMS). Azure SQL Database allows users to create, manage, and scale relational databases in the cloud without the need to manage underlying infrastructure.

Windows Azure Platform Appliance: The Windows Azure Platform Appliance was a product offered by Microsoft that allowed customers to run Azure services in their own data centers. It was essentially a pre-configured bundle of hardware and software components that enabled organizations to create private or hybrid cloud environments using Azure technologies.

Key components of the Windows Azure Platform Appliance included:

1. Hardware
2. Software
3. Management Tools
4. Customization and Integration