CA-S

Assignment - 3

Trends and Cloud Services Overview

1. Serverless Architecture:-

Serverless Architecture is a modern cloud-native development approach that enables developers to build and run applications without having to manage or provision servers. In a serverless setup, the cloud provider takes full responsibility for dynamically allocating resources and scaling applications based on real-time demand. This architecture reduces operational overhead and costs, as it follows a **pay-as-you-go** billing model—charging only for the actual compute time consumed. Developers can focus entirely on writing business logic, while the underlying infrastructure (scaling, patching, and availability) is handled automatically by the cloud platform. This results in quicker development cycles, improved efficiency, and enhanced scalability.

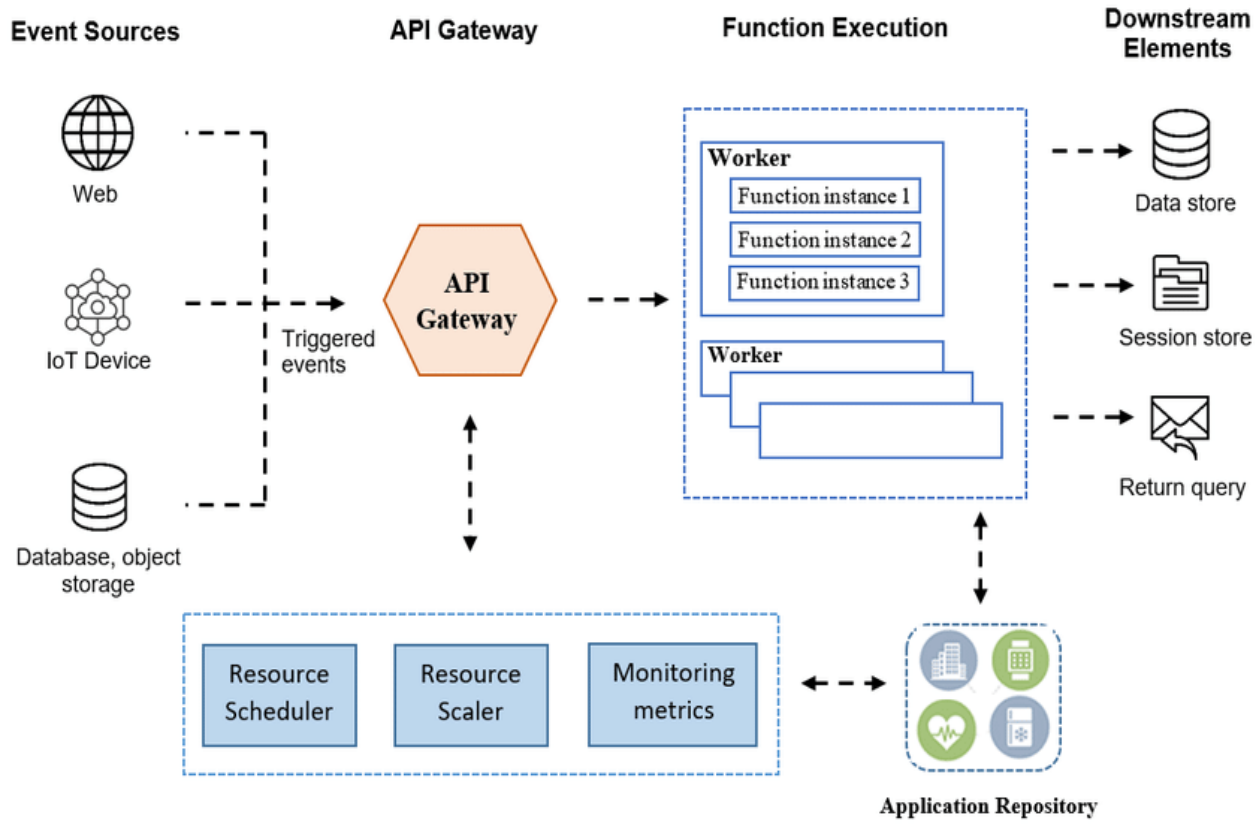

Figure 1.1: Serverless Architecture (source: ResearchGate)

2. Progressive Web Apps (PWAs):-

Progressive Web Apps are a blend of web and mobile application experiences. PWAs deliver native-like functionality through the browser, without requiring installation via app stores. They leverage modern web technologies such as **service workers**, **caching**, and **push notifications** to deliver features like offline access, fast load times, and user engagement tools. PWAs are lightweight, secure (served over HTTPS), and designed to be responsive across all devices. They are especially beneficial in regions with low or unstable internet connectivity, offering seamless performance and a consistent user experience.

3. Artificial Intelligence (AI) and Machine Learning (ML):-

AI and ML are transforming the way modern applications operate by enabling systems to learn from data, adapt to changes, and make intelligent decisions. These technologies are widely integrated into applications for use cases such as **recommendation systems**, **fraud detection**, **natural language processing**, and **predictive analytics**. Architecturally, implementing AI/ML involves creating data pipelines, training models, and deploying inference services. These components need to be scalable, fault-tolerant, and capable of handling large volumes of data in real time. Cloud platforms often provide managed services for building and deploying AI/ML models, simplifying integration into production systems.

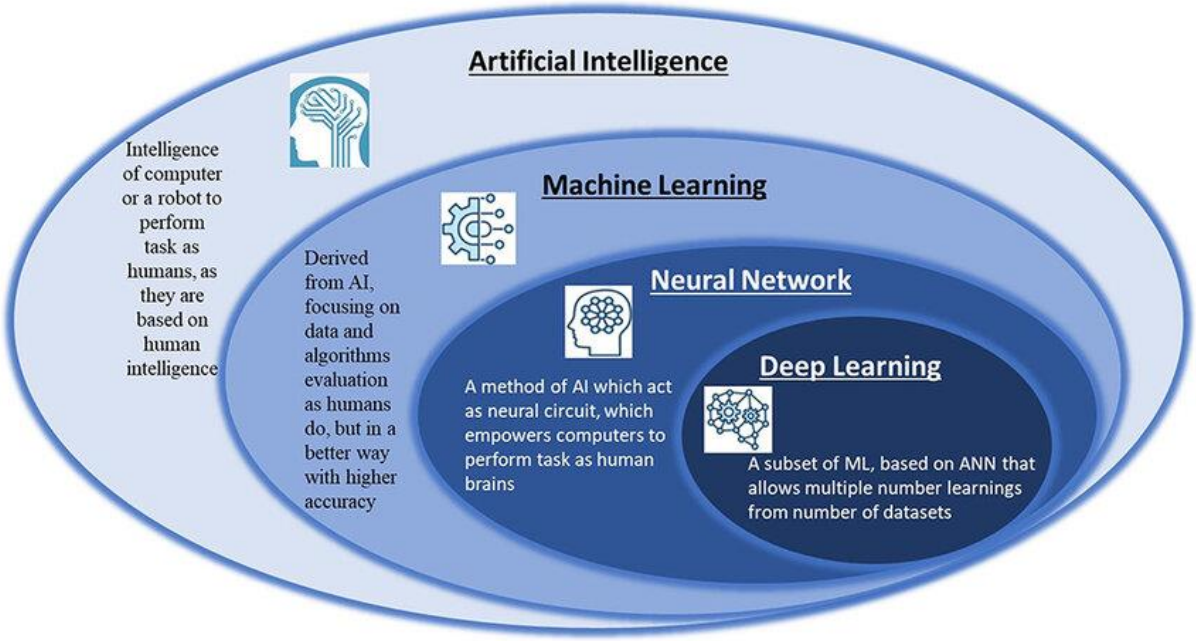

Figure 2: Artificial Intelligence and Machine Learning (source: ResearchGate)

4. Cloud Computing Service Models:-

Cloud computing offers a range of service models tailored to different use cases:

- **SaaS (Software as a Service)**: Delivers fully functional, ready-to-use software over the internet. Examples include **Gmail**, **Microsoft Office 365**, and **Salesforce**.
- **PaaS (Platform as a Service)**: Offers a development and deployment environment with tools, libraries, and infrastructure needed to build applications. Examples: **Google App Engine**, **Heroku**.
- **IaaS (Infrastructure as a Service)**: Provides virtualized computing resources over the internet such as servers, storage, and networking. Examples: **Amazon EC2**, **Microsoft Azure VMs**.

Each model supports different user requirements, from end-users seeking ready-made tools to developers needing full control over the infrastructure.

Figure 1: Cloud Pyramid[22]

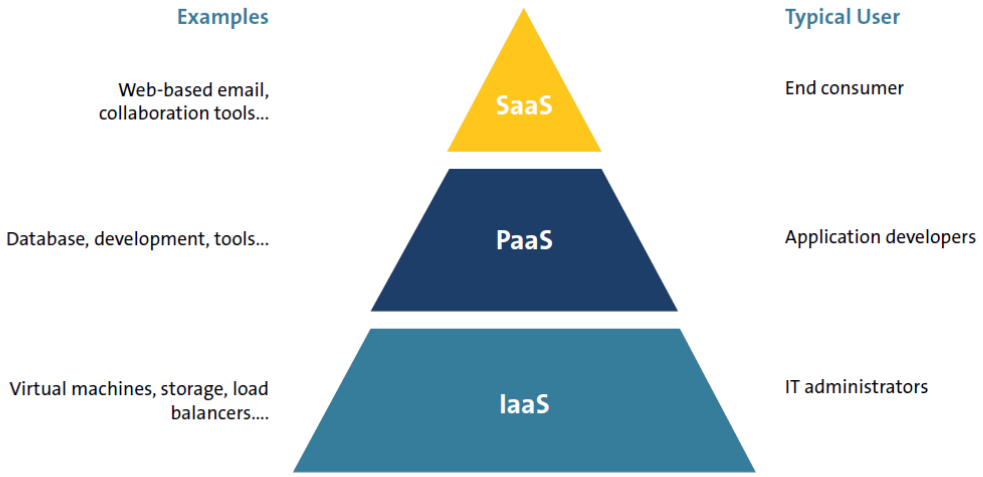

Figure 3: Cloud Computing Service Models (Source: Finra)

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