

ASSIGNMENT - I

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Sub name :- cloud computing

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Evaluation of cloud computing scenario: A traditional manufacturing company is transitioning to cloud computing to optimize operations and improve flexibility.

① ~~Ex~~ Parameter: Understanding cloud computing evolution from early IT systems to modern cloud services.

Questions: Analyze the key stages in the evolution of cloud computing and their impact on transforming traditional IT Infrastructures into flexible cloud based systems.

Key stages:-

1. Main frame era (1960s-1980s)

→ centralized computing with dumb terminals

→ limited accessibility and very expensive

→ used in large enterprises and government

2. client-server computing (1980s-1990s)

distributed architecture: clients request services from centralized servers

More user-friendly, but still hardware-dependent

Scalability limited and maintenance complex.

3. virtualization era (late 1990s)

→ Introduction of hypervisors (eg... VMWare)

→ Multiple virtual Machine (VMs) run on a single server

→ Reduced hardware costs and improved efficiency.

4. Cloud Emergence (2000s) :-

→ companies like Amazon (AWS), Google, and Microsoft introduce cloud platforms

- Introduction of :

- IaaS (Infrastructure as a Service)
- PaaS (Platform as a Service)
- SaaS (Software as a Service)

5. Modern cloud (2010s - present) :-

- Innovations like containerization (Docker), orchestration Serverless, computing, and edge computing
- Enhanced scalability, automation, and global availability.

B. Impact on Traditional IT Infrastructures :-

- Cost Reduction : shifts from capital expenditure to operational expenditure (OpEx)
- Flexibility : Resources can be scaled on demand
- Accessibility : Systems are available any time
- Innovation : faster deployment of new features and services.
- Maintenance : offloaded to cloud providers, reducing internal IT workload.

②

Hardware evolution in cloud computing

Scenario: A global research institute needs high performance computing for simulations and data analysis.

Parameter: Understanding the role of hardware advancements in cloud environments

Questions: Discuss how innovations in hardware have contributed to the evolution of cloud computing and enabled high-performance workloads

Key Hardware Innovations:-

Graphics processing Units:-

→ Initially for graphics, now essential for parallel tasks like AI/ML and scientific simulations

→ offer superior performance over CPU for data-intensive workloads.

Solid state drives:-

→ faster data access and lower latency than traditional HDDs.

→ critical for real time applications, big data, and transactional systems.

Energy-efficient processors:-

→ low power consumption, reduced heat output.

→ ideal for data centers seeking energy efficiency and sustainability.

High-speed Networking:-

- Supports faster communication between cloud resources and users.
- Enhance performance of distributed computing and storage.

B. contribution to High-performance cloud computing.

- Accelerated processing
- Scalable storage
- Reduced operational costs
- Improved User experience.

3 Internet Software Evolution:-

Scenario: An e-learning platform relies on internet software for real-time content delivery.

Understanding the evolution of internet software for cloud solution.

Analyze how advancements in internet software have modern cloud computing solutions.

Advancements in Internet Software:-

1. Web servers:-

- Handle HTTP requests efficiently
- Load balancing and caching for high traffic.

2. API Schemas, GraphQL

- Enable integration between services
- REST is stateless and uses standard HTTP verbs
- GraphQL allows clients to specify needed data.

3. Web protocols:-

- HTTP/2: multiplexing for faster data transmission
- Websockets: Real time, two way communication
- QUIC: Reduces latency and improves connection reliability.

4. Container Orchestration:-

- Automates deployment, scaling, and operations of containers.
- supports microservices architecture

Role in cloud computing:-

- Real Time Content Delivery: protocols like websockets
- scalability: dynamic Overloads.
- Interoperability: APIs connects services
- Global Access: web software allows users worldwide to access services consistently.

4. Server virtualization.

Scenario: A healthcare provider wants to consolidate its IT infrastructure.

Parameter: Understanding the role of server virtualization in cloud computing.

Sol:-

What is Server virtualization

- Use of hypervisors to create multiple virtual machines on a single physical server.
- each VM operates as a separate system with its own OS and resources.

Benefits and functions:-

1. Efficient Resource Utilization:-

- Maximize usage of CPU, memory, and storage
- Reduces like hardware

2. Scalability:-

- Add/remove VMs as per demand
- supports business growth without large capital investments.

3. Cost efficiency:-

- fewer physical servers needed
- lower power and cooling requirements.

Improved Availability:-

VM migration and snapshots help with quick recovery and minimal downtime.

Security and Isolation:-

→ Faults in one VM do not affect others.

→ Better control over data access.

⑤ Web services Overview:-

Scenario:- A fintech company integrates third-party APIs for seamless payments.

Parameter:- Understanding the role of web services in cloud ecosystems.

Sol:-

Types of web services:-

1. Simple Object Access protocol:-

→ A standardized XML-based protocol.

→ Used in enterprise applications where security and transaction matter.

2. Restful APIs:-

→ Lightweight, stateless and use HTTP methods.

→ Most commonly used modern web and mobile applications.

3. GraphQL :-

- client-driven queries for more efficient data fetching
- Useful in complex systems with nested data.

Importance in cloud ecosystems!

1. Integration :-

- Apps connect different services
- Enable rapid innovation without building in house.

2. Interoperability :-

- Services written in different languages / platforms can work together.
- standard formats (JSON, XML) ensure compatibility

3. Scalability and flexibility :-

- Microservices architecture supported by APIs
- easier to scale individual components of an applications.

4. Real Time Communication :-

- API enable real time data exchange between systems and users.