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Cloud Computing Assignment

(4) ADVANTAGES AND DISADVANTAGES OF PUBLIC CLOUD

Advantages →

1. Scalability: Public cloud providers ~~pr~~ offer on-demand scaling, which is essential for handling high traffic volumes.
2. Cost-effective - Public clouds operate on a pay-as-you-go model reducing upfront capital expenses.
3. Maintenance-Free - The cloud provider manages infrastructure, reducing the burden on the development team.
4. Global Availability - Public cloud providers have multiple data centers worldwide, improving performance and availability.

Disadvantages →

1. Security concerns - Sensitive user data may be at risk since public infrastructure is shared with other users.
2. Limited customization - Public clouds provide predefined configurations, which may not meet specific security and performance needs.
3. Potential performance issues - Since resources are shared among multiple customers, performance can vary depending on demand.

ADVANTAGES AND DISADVANTAGES OF PRIVATE CLOUD.

Advantages →

1. Enhanced security: Dedicated infrastructure ensures better data protection and compliance with regulatory requirements.
2. Performance optimization - Resources are dedicated to the application, reducing latency and improving performance.
3. Greater control - Full control over hardware, software, and configurations allow for optimizations tailored to the application's needs.

Disadvantages →

1. High costs : Setting up and maintaining a private cloud requires significant upfront investment and ongoing maintenance costs.
2. Limited scalability : Scaling requires purchasing additional hardware, which may slow down expansion.
3. Maintenance Responsibility – The company must handle updates, security patches and hardware failures requiring a dedicated IT team.

(2) Identifying the Root Cause of Connectivity Issues →

1. Network Congestion – High traffic volumes might be overwhelming the cloud provider's network.
2. Server Overload – Insufficient (CPU, RAM, storage) may be causing performance degradation.
3. Misconfigured Load Balancer – Poorly configured load balancing might lead to uneven traffic distribution.
4. Cloud Provider Downtime : The hosting provider may be experiencing outages or degraded performance.
5. Database Bottlenecks – Slow queries, high read/write operations, or unoptimised database architecture can impact performance.

Steps to Resolve this Issue →

1. Monitor Traffic and Resources – Use cloud monitoring tools (AWS CloudWatch, Azure Monitor, or Google Cloud Operations) to analyse server performance and network usage
2. Scale resources – Implement auto-scaling to adjust capacity based on demand.
3. Optimise Load Balancing – Configure a load balancer to distribute traffic efficiently.

ENSURE HIGH AVAILABILITY AND PERFORMANCE:-

1. Load Balancing
   - → Distribute traffic across multiple instances to prevent overload.
   - → Use DNS load balancing
2. Auto scaling
   - → Configure auto-scaling groups to automatically add or remove instances based on traffic demands
   - → Use container orchestration for efficient scaling
3. Content Delivery Network (CDN)
   - → Implement a CDN to cache static content and improve response times

COMPARISON OF MAJOR CLOUD PROVIDERS

Features	AWS	Microsoft Azure	Google Cloud.
1. Strengths.	Extensive global network, vast service offerings, mature ecosystem	strong hybrid cloud capabilities, enterprise integrations, security compliance	AI & machine learning expertise, strong analytics, high speed networking.
2. Weaknesses	complex pricing, steep learning curve	Can be expensive for small business, fewer data centers than AWS	Fewer enterprise clients, limited third party integrations.
3. Pricing Model.	Pay-as-yo-go, instances reserved, spot instances	Pay-as-you-go, reserved instances, hybrid pricing.	Pay-as-yo-go, committed-use discounts.
4. Best for	Scalability, enterprise level applications	Enterprises using Microsoft products, hybrid cloud solution	AI-driven applications, high performance networking.

Recommended Provider : AWS

→ Scalability : Auto scaling, ensuring the app can handle peak traffic.

→ Global Availability : AWS has the largest number of data centres, reducing latency.

→ Robust Load Balancing : AWS Elastic Load Balancer efficiently distributes traffic.

→ Security & Compliance : Strong security measures for protecting sensitive data.

→ Cost effective pricing : AWS offers pay-as-you-go and reserved instance discounts, making it budget friendly.

JPEG Assignment.

1. IaaS for Disaster Recovery

→ Provides cloud-based backup & recovery to protect against data loss.

→ Offers scalability to quickly restore services after a cyberattack.

→ Ensures redundancy with geographically distributed datacentres.

→ Reduces capital costs by eliminating the need for on-premise disaster recovery infrastructure.

2. Virtualisation for cost and Efficiency.

→ Consolidates multiple underutilised servers into VMs reducing hardware needs.

→ Improves resource allocation by dynamically adjusting workloads.

→ Lowers maintenance & energy costs by minimizing physical infrastructure.

→ Enhances scalability & flexibility for future growth.

3. Load Balancing for High-Traffic Websites

→ Distributes traffic across multiple servers to prevent overload.
→ Reduces response times by directing users to the least busy server.
→ Ensures fault tolerance – if one server fails, traffic is rerouted to another.
→ Supports auto-scaling, dynamically adding resources as traffic spikes.

4. Load Balancing for High availability in Banking.

→ Use multi-region deployment for redundancy and low latency.
→ Implement failover mechanisms to switch to backup servers.
→ Combine auto-scaling & health monitoring to handle traffic surges and prevent downtime.
→ Deploy global load balancers for seamless distribution.

5. Best Hosting for a Small Bakery Website.

→ Low cost : Ideal for a limited budget
→ Easy Management : No need for technical expertise
→ Sufficient for low traffic : No need for expensive dedicated resources.
→ Providers : Bluehost, Hostinger, SiteGround, or Godaddy