

## Cloud Computing Assignment

- i) Advantages and disadvantages of using public and private clouds for hosting the mobile application:

Public cloud:

- i) Cost-effectiveness: Public cloud offers a pay-as-you-go model, allowing you to only pay for the resources you use.
- ii) Scalability: Public clouds can easily scale up or down to handle high traffic volumes.
- iii) Flexibility: Resources can be quickly adjusted to meet changing demands.
- iv) Performance: Public clouds often have global data centers, ensuring low latency for users worldwide.

Disadvantages:

- i) Security concerns: Public clouds may be more vulnerable to security breaches, which is critical when dealing with sensitive user data.

- ii) Limited control: You have less control over the infrastructure and may face challenges with data separation.

iii) Compliance issues: Public clouds may not meet specific regulatory requirements for sensitive data.

### Private cloud (Advantages):

- i) Enhanced Security: Private clouds offer better control over security measures, making them suitable for sensitive data.
- ii) Customization: You can tailor the infrastructure to meet specific requirements.
- iii) Compliance: Private clouds can be designed to meet strict regulatory standards.

### Disadvantages:

- i) Higher costs: Private clouds require significant upfront investment and ongoing maintenance.
- ii) Limited scalability: Scaling resources may be more challenging and resource-intensive compared to public clouds.
- iii) Expertise required: Managing a private cloud demands specialized skills and technical know-how.

2) Root cause and resolution steps: The intermittent connectivity issues are likely caused by inadequate network bandwidth, server overload, or inefficient resource allocation.

Steps to resolve the issue:

1. Conduct thorough diagnostics: Use tools like ping, traceroute, and DNS lookup to identify where the failure occurs.
2. Analyze logs: Review server and application logs for error messages indicating networking issue.
3. Optimize network configuration: Check and adjust firewall rules, routing tables, and networking interfaces.
4. Implementing caching system: Use caching mechanisms to reduce server load and improve response times.
5. Upgrade infrastructure: If necessary, increase server capacity or network bandwidth to handle the growing user base.

Ensuring high availability and performance:

1. Implement auto-scaling: Use auto-scaling to dynamically adjust the number of app servers

based on real-time traffic demand.

- ii) Set up load balancing: Distribute incoming traffic across multiple servers to prevent overload and ensure high availability.
- iii) Use content Delivery Networks: Implement CDNs to cache and serve content from locations close to users, reducing latency.
- iv) Implement redundancy: Use multiple availability zones and regions to ensure fault tolerance.
- v) Continuous monitoring: Set up robust monitoring and alerting systems to quickly identify and address performance issues.

cloud provider comparison and recommendation:

#### Amazon Web Services (AWS):

- Strengths: Extensive service offerings, large developer community, global infrastructure.
- Weakness: Complex pricing structure.
- Pricing: Pay-as-you-go model with various cost-saving options like Reserved instances and Spot instances.



## Microsoft Azure:

- Strengths: Strong enterprise focus, excellent integration with Microsoft products, hybrid cloud support.
- Weakness: Steep learning curve.
- Pricing: Pay-as-you-go model with options like Azure-Reserved VM instances.

## Google Cloud Platform (GCP):

Strengths: Advanced AI/ML capabilities, high-performance computing, superior network infrastructure.

Weaknesses: Fewer enterprise customers compared to AWS and Azure.

Pricing: Competitive pricing with sustained use discounts.

Recommendations: Based on the scenario, we should use Amazon Web Services (AWS)

for hosting the mobile application. AWS offers the best combination of scalability, performance, and extensive services that can address the current connectivity issues and support future growth. Its global infrastructure ensures low latency for users worldwide, while its

auto-scaling and load balancing capabilities can handle very high traffic volumes. Additionally, AWS provides robust security features to protect sensitive user data, and its pay-as-you-go pricing model aligns with company's budget constraints.

1. Scenario 1: cloud-based disaster recovery using IaaS. How can IaaS help them recover and ensure future resilience?

- Data Recovery: IaaS provides / offers robust disaster recovery solutions, including automated backups and replication across multiple geographical locations, ensuring data is recoverable after a cyberattack.
- Scalability: IaaS allows the company to scale resources up or down based on demand minimizing downtime during recovery.
- Cost efficiency: Pay-as-you-go pricing eliminates the need for maintaining expensive on-premise infrastructure.
- Security Features: Built-in security measures such as encryption, access controls, and monitoring can help prevent future attacks.

2. Scenario 2: Virtualization for cost reduction and efficiency. How can virtualization help reduce costs and improve efficiency?

- Resource optimization: Virtualization consolidates multiple physical servers into virtual machines, maximizing resource utilization and reducing underutilization.

- Lower Maintenance costs: Fewer physical servers mean reduced maintenance, cooling, and energy expenses.
- Flexibility: Virtual machines can be easily reallocated or resized based on workload demands, improving operational efficiency.
- Disaster Recovery: Virtualization simplifies backup and recovery processes by enabling snapshots of VMs.

3 - Scenario 3: Load balancing during high traffic periods. How can load balancing help maintain website performance during high traffic periods?

- Traffic distribution: Load balancers distribute traffic across multiple servers, preventing any single server from being overwhelmed.
- Improved performance: By evenly distributing traffic, load balancing reduces response times and ensures consistent performance for users.
- Fault tolerance: If one server fails, the load balancer redirects traffic to other available servers, minimizing downtime.
- Scalability: Load balancers integrate with auto-scaling to dynamically add or remove servers based on real-time traffic.

4. Scenario 4: Load balancing for high availability in banking applications. How can load balancing be implemented to achieve high availability?

- Redundant servers: Deploy multiple servers to ensure reliability in different regions.
- Health checks: Configure load balancers to perform continuous health checks on servers. If a server becomes unresponsive, traffic is redirected to healthy servers.
- Global Load Balancing: Use global load balancing to route users to the nearest data center for low latency and high availability.
- Disaster Recovery Integration: Combine load balancing with failover mechanisms to redirect traffic during outages.

5. Scenario 5: Hosting service for a small bakery's website. Which hosting service is best-suited for this bakery and why?

- A shared hosting service is the best option because:
  - It is cost-effective, suitable for businesses with limited budgets.
  - It provides sufficient resources for low-traffic websites like a bakery's informational site.

- Maintenance and technical requirements are minimal, making it ideal for non-technical owners.