

MIT WORLD PEACE UNIVERSITY

Cloud Infrastructure and Security
Third Year B. Tech, Semester 6

CLOUD COMPUTING AND VIRTUALIZATION

STUDY ASSIGNMENT

Prepared By

Krishnaraj Thadesar
Cyber Security and Forensics
Batch A1, PA 10

April 16, 2024

Contents

1	Question 1	1
2	Question 2	1
3	Question 3	2
4	Question 4	2
5	Question 5	3

1 Question 1

How does networking contribute to the scalability of cloud computing, briefly explain with example. Explain challenges in networking for cloud computing.

1. **Contribution to Scalability:** Networking in cloud computing enables scalability by providing flexible and dynamic resource allocation. For example, load balancers distribute incoming traffic across multiple servers to ensure optimal performance and scalability. As demand fluctuates, additional resources can be dynamically provisioned or deprovisioned to meet changing workload requirements, resulting in improved scalability and resource utilization.
2. **Example:** Consider a web application hosted on a cloud platform. During peak traffic periods, the application experiences a surge in user requests. Networking components such as auto-scaling groups and content delivery networks (CDNs) automatically allocate additional server instances and cache content closer to users, ensuring efficient handling of traffic spikes without compromising performance or reliability.
3. **Challenges in Networking:** Challenges in networking for cloud computing include latency, bandwidth limitations, security concerns, and network configuration complexity. For instance, ensuring low latency and high bandwidth between distributed cloud resources can be challenging, especially in multi-region deployments. Additionally, securing network communications and implementing effective access controls to protect sensitive data require careful configuration and management.

2 Question 2

Describe the key components of cloud computing reference models and their roles in providing a framework for understanding cloud services.

1. **Key Components:** Cloud computing reference models typically consist of three main layers: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS). These layers represent different levels of abstraction and service offerings provided by cloud providers.
2. **Roles:**
 - **IaaS:** Provides virtualized computing resources such as virtual machines, storage, and networking infrastructure. Users have control over the operating system, middleware, and applications, enabling flexibility and customization.
 - **PaaS:** Offers a platform for developing, deploying, and managing applications without the complexity of infrastructure management. Developers can focus on building and deploying applications, leveraging pre-configured development environments and tools provided by the platform.
 - **SaaS:** Delivers software applications over the internet on a subscription basis. Users access and use applications hosted by the provider via web browsers or client applications, eliminating the need for installation and maintenance.
3. **Framework for Understanding Cloud Services:** Cloud computing reference models provide a conceptual framework for understanding the different layers of cloud services and their

relationships. They help users and organizations navigate the complexities of cloud computing by defining standardized interfaces, service models, and deployment options, facilitating interoperability, portability, and integration across cloud environments.

3 Question 3

Explain the concept of brownfield deployment in the context of cloud computing and briefly describe when is it possible for an organization to opt for a brownfield deployment over a greenfield approach.

1. **Brownfield Deployment:** Brownfield deployment refers to the migration or integration of existing systems, applications, or infrastructure to the cloud environment. It involves transitioning from legacy on-premises environments to cloud-based solutions while preserving existing investments and functionality.
2. **Scenario for Brownfield Deployment:** Organizations may opt for a brownfield deployment over a greenfield approach when they have existing legacy systems, data, or infrastructure that they want to leverage or modernize. Brownfield deployment allows organizations to gradually migrate workloads to the cloud, minimizing disruption and risk, while taking advantage of cloud benefits such as scalability, flexibility, and cost efficiency.

4 Question 4

What is Cloud Migration? What challenges might be encountered during the migration process in a brownfield deployment and how can they be mitigated?

1. **Cloud Migration:** Cloud migration refers to the process of moving applications, data, and workloads from on-premises environments or other cloud platforms to a cloud infrastructure. It involves assessing, planning, executing, and optimizing the migration of resources to the cloud while ensuring minimal disruption to business operations.
2. **Challenges in Brownfield Deployment Migration:**
 - **Legacy Systems Integration:** Legacy systems may have dependencies or compatibility issues with cloud environments, requiring careful integration and customization.
 - **Data Migration Complexity:** Migrating large volumes of data from on-premises systems to the cloud can be complex and time-consuming, requiring efficient data transfer mechanisms and data consistency measures.
 - **Application Refactoring:** Legacy applications may require refactoring or modernization to be compatible with cloud platforms, posing challenges in code modification and testing.
3. **Mitigation Strategies:**
 - Conducting thorough assessment and planning to identify dependencies, risks, and migration priorities.
 - Implementing phased migration approaches to minimize disruption and manage risks.
 - Leveraging automation and migration tools to streamline the migration process and reduce manual effort.
 - Collaborating with cloud service providers and migration experts to address technical challenges and ensure successful migration outcomes.

5 Question 5

Brief on any real-world scenario where a greenfield deployment is the ideal choice and another where a brownfield deployment makes more sense. Also enlist the factors that influence the decision between greenfield and brownfield deployments in these scenarios.

1. **Greenfield Deployment Scenario:** A startup company launching a new digital platform for online retail chooses a greenfield deployment approach to build their infrastructure from scratch using cloud-native technologies. Factors influencing the decision include agility, scalability, and the ability to design and implement solutions tailored to specific business requirements without legacy constraints.
2. **Brownfield Deployment Scenario:** A large enterprise with legacy on-premises systems decides to migrate its existing ERP (Enterprise Resource Planning) application to the cloud to modernize and optimize its operations. Brownfield deployment is chosen to minimize disruption to business processes, leverage existing investments in infrastructure and applications, and gradually transition to cloud-based solutions.
3. **Factors Influencing Deployment Choice:**
 - **Legacy Systems:** The presence of legacy systems and infrastructure may favor brownfield deployment to leverage existing investments.
 - **Time to Market:** Greenfield deployment may be preferred for new initiatives requiring rapid deployment and innovation.
 - **Business Goals:** Alignment with organizational goals, risk tolerance, and strategic priorities influence deployment decisions.
 - **Cost Considerations:** Brownfield deployment may offer cost savings by optimizing existing resources, while greenfield deployment may incur higher initial investment but provide long-term benefits.