

**VIT**

Vellore Institute of Technology

Final Assessment Test – November 2024

Course: BITE412L - Cloud Computing

Class NBR(s): 3594/3621

Time: Three Hours

Slot: D1+TD1

Max. Marks: 100

- KEEPING MOBILE PHONE/ANY ELECTRONIC GADGETS, EVEN IN 'OFF' POSITION IS TREATED AS EXAMMALPRACTICE
- DON'T WRITE ANYTHING ON THE QUESTION PAPER

Answer ALL Questions**(10 X 10 = 100 Marks)**

1. Assume that you are the senior cloud architect for a government agency that manages sensitive citizen information and essential services. This agency intends transition to a cloud infrastructure while ensuring compliance with stringent regulatory standards. Utilizing the NIST reference architecture, how would you develop a cloud solution for this agency? Elaborate on the functions of key participants and elucidate their interactions within this framework.
2. You have been brought on board as a cloud architect for a prominent healthcare organization that handles sensitive patient information and medical records. Currently, the organization is utilizing traditional on-premise systems and is considering various cloud deployment alternatives. They have specific concerns regarding data security, adherence to healthcare regulations, cost management, and the ability to scale for future expansion. Devise a cloud strategy utilizing different cloud deployment models that caters to the organization's requirements. Analyze the advantages and disadvantages of each model, and recommend the most suitable option with an example. What measures would you implement to ensure that this cloud infrastructure complies with healthcare regulations while also promoting flexibility and cost-effectiveness?
3. Design a competitive hardware virtualized server that accommodates six virtual machines, each operating different systems to enable diverse server functionalities at the user level. Explain the roles of the virtual machine and hypervisor in this setup and demonstrate how workload isolation is achieved in a cloud computing environment using an appropriate example.

4. Identify the enabling technologies for building the cloud platforms from virtualized and automated data centre's to provide all the three cloud services. List the various resource pools and resource provisioning strategy that enable multitenant services on demand.
5. Utilize different cloud storage models block storage, object storage, and file storage to formulate a cloud storage strategy tailored to the requirements of the media service. Tackle issues like content delivery latency, management of storage costs, data durability, global accessibility, and adaptive bitrate video streaming quality. Present a solution that guarantees high availability and redundancy, while also effectively handling backup and archiving of older video content.
6. Imagine you are a senior cloud architect at a large multinational corporation that is moving its legacy on-premises e-signature platform to the cloud. This e-signature service is utilized by more than 50,000 users each day around the globe for signing legal documents, contracts, and agreements. The system must adhere to global regulations thereby maintaining top-tier standards of data security, privacy, and user authentication. For the stated scenario design the architecture for the cloud-based e-signature solution. In your proposal, address the following points: Illuminate the selection of one or more cloud providers. How will you achieve compliance with regional data management while reducing latency? What security measures and authentication systems will you incorporate to ensure adherence to international regulations and provide non-repudiation for signatures? Additionally, explain how your architecture will manage traffic surges and maintain high availability, all while ensuring disaster recovery with minimal interruption.
7. Assume that you are developing a server less application for a real-time online quiz platform. The application needs to handle user registrations, manage quiz sessions, evaluate answers in real-time, and display results. During peak times, especially when quizzes are being taken, you anticipate a high number of concurrent users. What server less architecture would you implement to support this application? How would you manage user sessions and ensure that data is processed in real-time? In addition, what strategies would you use to handle potential bottlenecks during high traffic?

8.

Illustrate how to design and create a cloud-based task management application using Google app engine. The application must support user authentication, allow users to create and manage tasks, and provide a tagging system for organizing tasks. How would you design the architecture using GCP services to facilitate future enhancements, such as a mobile app integration?

9.a)

A newly established start-up called InnovateTech is an expanding technology firm that creates software solutions while handling extensive data sets. The company relies on a cloud storage service to oversee its data, which comprises project files, customer information, backups, and log files. They require data storage capabilities of 8 TB for project files, 5 TB for customer data, 2 TB for backups, and 1 TB for log files. With the introduction of a new product, the company anticipates the following growth in the coming year:

- Project files will grow by 50%
- Customer data will grow by 20%
- Backups will increase by 30%
- Log files will increase by 25%

If the cloud provider charges, \$0.025 per GB for the first 10 TB of storage and \$0.020 per GB for any additional storage beyond 10 TB. Involving Data Transfer Costs when InnovateTech uploads 300 GB of data each month and downloads 100 GB of data. The upload cost is \$0.01 per GB and the download cost is \$0.05 per GB.

Calculate the projected total storage requirement after one year and determine the monthly data transfer costs for uploads and downloads.

OR

9.b)

TechSavvy Corp, a growing technology solutions provider, is planning to use cloud based data management infrastructure. The company has been experiencing rapid growth in data due to increasing project demands and client acquisitions. To streamline operations and improve data accessibility, TechSavvy is considering implementing a cloud storage gateway. Demonstrate how to implement cloud storage gateway to confirm a seamless integration between on-premises storage and cloud storage.

- 10.a) MedData's security team must establish a robust cloud security framework capable of defending against DDoS attacks while safeguarding the integrity and confidentiality of patient information. What measures would you implement to protect MedData's cloud environment from prospective DDoS threats? Outline the network security strategies you would employ to maintain the application's availability. How would you guarantee that the handling and transfer of sensitive medical data in the cloud adheres to HIPAA regulations? Additionally, list the suitable encryption, logging, and monitoring strategies.

OR

- 10.b) TechCorp's Chief Information Security Officer (CISO) is worried about security vulnerabilities, especially regarding data breaches and unauthorized access. You are tasked with creating a cloud security architecture that implements robust security measures in both the public and private cloud while adhering to industry regulations. How would you approach designing a cloud security architecture for TechCorp that safeguards both public and private cloud environments? Identify the key elements of the cloud security framework and explain how they address potential security threats. What particular tools and strategies would you adopt to guarantee data protection and ensure compliance with regulations such as GDPR and PCIDSS within a hybrid cloud setting?

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