VIT®

Vellore Institute of Technology

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Reg. No. : 22BCE1720

Final Assessment Test(FAT) - Nov/Dec 2024

Programme	B.Tech.	Semester	Fall Semester 2024-25
Course Code	BCSE355L	Faculty Name	Prof. Tamilarasi K
Course Title	AWS Solutions Architect	Slot	F1+TF1
		Class Nbr	CH2024250101139
Time	3 hours	Max. Marks	100

General Instructions

- Write only Register Number in the Question Paper where space is provided (right-side at the top) & do not write any other details.

Course Outcomes

1. Demonstrate an in-depth understanding of AWS Cloud architecture, services, and design patterns.
2. Apply security and compliance measures effectively in AWS architectures using encryption, access controls, and monitoring.
3. Optimize cost and performance by selecting appropriate AWS services and utilizing cost-effective resource management strategies.
4. Configure and manage advanced AWS networking features, storage solutions, database technologies, and compute resources.

Section - I

Answer all Questions (10 × 10 Marks) *M - Marks

Q.No	Question	*M	CO	BL
01.	As of January 2016, Xlight OTT has expanded into 130 new countries. It uses multiple AWS Cloud regions which are spread all over the world to create a better and more enjoyable streaming experience for Xlight members. Xlight demands scalability, computing, and storage, business logic and distributed databases. Cloud Computing has made it possible to survive failures without impacting the member experience. Xlight could easily move all its existing systems to AWS. It took the cloud-native approach, to rebuilt all their technology and fundamentally changed the way they operate the whole company. Xlight migrated from a single application to thousands of micro-services. What are the possible services used by the Xlight for their above successful business and purpose of using each service?	10	1	2
02.	Nilton is a large e-commerce online shopping portal migrated their applications to EC2 instances in AWS cloud platform. The complete shopping application of Nilton is made available and active through EC2. If the CPU usage on EC2 reaches 80%, the load needs to be reduced to ensure effective functioning of online portal. The complete shopping application relies on S3 for critical data storage which need to ensure high availability and redundancy as failure to do so may result in reduction of customer's count. (i). Depict the complete architecture for effective functioning of online portal. (4 Marks) (ii). Elaborate how the S3 features could help in achieving high availability and redundancy? (6 Marks)	10	1	3

03.	Sarah's company operates two AWS VPCs: one designated for the development environment and another for production. The development team occasionally requires access to production resources, but security regulations demand stringent control over this access. Furthermore, the two VPCs are in different AWS regions, creating challenges with latency for certain real-time applications. To facilitate communication, Sarah's must establish a secure and efficient cross-region VPC peering connection. This solution must balance security, performance, latency, and cost efficiency. Her. task is to design this connection while ensuring that only necessary resources are accessible between the two VPCs. (i). Design a secure cross-region VPC peering solution that limits development environment access to only necessary production resources. Include relevant security configurations such as Security Groups, and IAM policies. (5 Marks) (ii). Consider the latency challenges and the cost implications of cross-region VPC peering. Illustrate AWS services to optimize real-time performance and optimize the cost with required data transfer charges. (5 Marks)	10	3	3
04.	Luca, a data analyst at a large chemical manufacturing company, is tasked with monitoring the company's cloud infrastructure for performance and security. The company has recently migrated its applications to AWS, and Luca needs to ensure that the cloud environment is both efficient and secure, especially given the sensitive nature of confidential data (i). Suggest and illustrate Luca to use AWS monitoring and audit services to monitor and manage the company's cloud resources effectively. (5 Marks) (ii). Discuss the specific metrics you would track, how you would set up alarms for performance anomalies? and the significance of CloudTrail for auditing user activities in your cloud environment. (5 Marks)	10	2	3
05.	Martina Insurance, a car insurance company has been experiencing rapid growth in customer sign-ups and claim process. To improve its database management, the company decides to migrate its existing database to Amazon RDS. They want to implement high availability and access of resources from nearby location for web and mobile applications. (i). Illustrate how to achieve the above requirement for Martina Insurance? (5 Marks) (ii). Explain the methods to improve the performance of their applications and describe a potential application to implement these requirements. (5 Marks)	10	3	3
06.	Conweb organization migrates a sensitive application to AWS that handles financial transactions and stores personally identifiable information (PII). The expert team is responsible for ensuring application security, compliant with regulations and resilient against potential threats. Consider yourself as a security expert, implement AWS security services and best practices for the responsibilities shared between Conweb organization and AWS. (i). To protect the security of the AWS, illustrate the Shared Responsibility Model for applications. What key management practices would you implement for data at rest and transit. (5 Marks) (ii). Design a security plan incorporating AWS WAF and AWS Shield to protect the application from web exploits and DDoS attacks. What specific rules should be configured in AWS WAF? (5 Marks)	10	2	4

07.	Genix continuously generate large volume of data for analysis, store data efficiently and reliably. The data processing pipelines involves scientific analysis for large scale ordered execution of steps with parallelization across multiple machines. The scientific analysis data consist of various components like pairs of images, stitching of multi-gigapixel panoramas images, and tiling of these gigapixel images to load the data on demand. Consider this process to be assigned to workers, tracks their progress, and maintains their state, including details on their completion of analysis. Illustrate the suitable AWS service to build, track, and scalable resources for the above requirement and run the jobs parallelly.	10	3	4
08.	A travel booking company operates a platform where users can book flights, hotels, and car rentals. The system handles a high volume of concurrent booking requests, and each booking triggers multiple actions like payment processing, reservation confirmation, and sending notifications. To ensure scalability and reliability, the company uses Amazon SQS to manage communication between microservices that process the bookings and Amazon SNS to send real-time notifications (email, SMS, and app notifications) to customers about their bookings. (i). Explain how the combination of Amazon SQS and Amazon SNS can be used to build a reliable and scalable booking system for this travel platform? (6 Marks) (ii). Illustrate the role of SQS in decoupling the backend services. (4 Marks)	10	4	2
09.	UltraLabs has one of the biggest malware signature databases in the world. When the company began to outgrow its infrastructure, it needed to take action to improve the performance and stability of its cloud databases. UltraLabs opted to replace its database engines and migrate to AWS services. Using AWS, UltraLabs reduced CPU usage, improved query processing times, and achieved lower latency. To reduce costs, UltraLabs decided to change its database engine from SQL to PostgreSQL. UltraLabs needed to migrate over 40 TB of data, replicating ongoing changes during the migration process and source database remains fully operational and secure. (i). Explain the services used by UltraLabs to achieve these benefits. (5 Marks) (ii). Discuss the process of various types of migration for the database. (5 Marks)	10	4	3
10.	A financial institution is migrating its legacy Database Systems to the cloud and wants to transition its on-premises Application Servers to AWS. They require solution that ensure continuous data replication and source database to be operational during migration process. Also, automatic conversion of physical servers to the AWS with minimal downtime and non-disruptive test before migration. Explain the process of migration for both the requirements which is to be adopted by the financial institution for cost optimization and zero downtime.	10	4	4

BL-Bloom's Taxonomy Levels - (1.Remembering, 2.Understanding, 3.Applying, 4.Analysing, 5.Evaluating, 6.Creating)

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