

AWS COMPUTE QUESTIONS

1. What is the difference between EC2 and Lambda in AWS?

- Amazon EC2 (Elastic Compute Cloud) provides virtual machines (EC2 instances) that you can fully control and customize. You manage the operating system, and they are ideal for running applications that require persistent, long-running compute resources.
- AWS Lambda, on the other hand, is a serverless computing service. It allows you to run code in response to events without the need to manage servers. Lambda automatically scales your code in response to incoming requests and is best suited for event-driven, short-lived tasks or microservices.

2. Explain the concept of AWS Auto Scaling and how it works.

AWS Auto Scaling is a service that automatically adjusts the number of EC2 instances in a group based on predefined policies. It ensures that your application can handle varying levels of traffic, maintaining performance and cost-efficiency. Auto Scaling works by monitoring specified metrics (e.g., CPU utilization), and when thresholds are breached, it launches or terminates instances as needed to meet the desired capacity.

3. Can you compare and contrast AWS Elastic Beanstalk and AWS OpsWorks?

AWS Elastic Beanstalk is a Platform as a Service (PaaS) that simplifies application deployment and management. It abstracts infrastructure details and focuses on deploying applications quickly. AWS OpsWorks, on the other hand, is a Configuration Management service that provides more fine-grained control over infrastructure and application deployment. OpsWorks is ideal for complex, multi-component applications and offers features like Chef and Puppet integration.

4. What is the purpose of Amazon ECS, and how does it differ from EKS?

Amazon ECS (Elastic Container Service) is a container orchestration service for managing Docker containers. It's well-suited for applications that require fine-grained control over container placement and scaling. AWS EKS (Elastic Kubernetes Service), on the other hand, is a managed Kubernetes service. It's ideal for those who prefer using Kubernetes for container orchestration and management. EKS abstracts the underlying Kubernetes infrastructure, making it easier to deploy and manage Kubernetes clusters.

5. How do you configure custom AMIs (Amazon Machine Images) in AWS?

Creating custom AMIs involves launching an EC2 instance, customizing it (installing software, configurations, etc.), and then creating an AMI from that instance. You can use the AWS Management Console, AWS CLI, or SDKs to perform these tasks. Custom AMIs are valuable for maintaining consistent environments and can be used for faster instance launches.

6. What is AWS Fargate, and how does it simplify container management?

AWS Fargate is a serverless compute engine for containers. It abstracts the underlying infrastructure, allowing you to run containers without managing EC2 instances. You define your containerized applications, and Fargate handles the scaling, patching, and provisioning of the underlying resources, simplifying container management and reducing operational overhead.

7. Describe the benefits and use cases of AWS Lambda Layers.

AWS Lambda Layers allow you to centrally manage common code and dependencies that can be shared across multiple Lambda functions. This reduces duplication and simplifies updates. Lambda Layers are beneficial for sharing libraries, custom runtimes, or other resources among Lambda functions, improving code reusability and manageability.

8. Explain the differences between AWS EC2 instance types, such as General Purpose, Compute Optimized, Memory Optimized, and Storage Optimized.

AWS EC2 instance types are optimized for specific workloads:

- General Purpose (e.g., T2, M5): Balanced CPU and memory for a wide range of applications.
- Compute Optimized (e.g., C5): High CPU performance, ideal for compute-intensive tasks.
- Memory Optimized (e.g., R5): High memory capacity, suited for memory-intensive applications.
- Storage Optimized (e.g., I3): High local storage for data-intensive workloads.
- Choose an instance type based on your application's resource requirements.

9. How does AWS Spot Instances work, and when should they be used?

AWS Spot Instances allow you to bid on unused EC2 capacity at lower costs. When your bid price exceeds the current Spot market price, your instances run. Spot Instances are suitable for workloads that can handle interruptions and are cost-sensitive. Use cases include batch processing, testing, and data analysis.

10. What is the AWS Systems Manager and its key features?

AWS Systems Manager provides centralized control and visibility over your AWS infrastructure. Key features include automation, patch management, session manager, and inventory management. It helps automate operational tasks, maintain compliance, and ensure operational security.

11. Explain the concept of AWS Nitro System and its significance.

The AWS Nitro System is a combination of hardware and software innovations that offload many of the traditional virtualization functions to dedicated hardware. It enables EC2 instances to deliver high performance, security, and isolation. The Nitro System enhances instance efficiency, minimizes attack surfaces, and enables new EC2 instance types with improved capabilities.

12. How do you achieve high availability for EC2 instances in AWS?

To achieve high availability for EC2 instances, you can use various AWS services and strategies, including:

- Running instances across multiple Availability Zones (AZs).
- Implementing Auto Scaling to replace unhealthy instances.
- Using Elastic Load Balancers (ELB) to distribute traffic.
- Configuring Amazon RDS Multi-AZ for database high availability.
- Leveraging Amazon S3 for durable and highly available object storage.

13. What is the purpose of Amazon EBS (Elastic Block Store), and how does it differ from Amazon S3?

Amazon EBS provides block-level storage for EC2 instances. It's used for durable, high-performance storage that is attached to EC2 instances. EBS volumes are like hard drives for your virtual machines.

Amazon S3, on the other hand, is an object storage service for storing and retrieving data, often used for backup, data storage, and web hosting. S3 objects are accessed via HTTP, and it's designed for scalable, highly available storage of objects, not for direct block-level attachment to EC2 instances.

14. Describe the advantages of using AWS Lambda for serverless computing.

Advantages of AWS Lambda for serverless computing include automatic scaling, zero server management, pay-per-use pricing, event-driven architecture, and easy integration with AWS

services. Lambda allows developers to focus on code without worrying about infrastructure, making it ideal for microservices and event-driven applications.

15. How do you enable Enhanced Networking on Amazon EC2 instances?

Enhanced Networking can be enabled on Amazon EC2 instances by using specific instance types that support it, such as the "c3" and "c4" families. You also need to install the Elastic Network Adapter (ENA) driver and configure your instances to use Enhanced Networking through the AWS Management Console, AWS CLI, or SDKs.

16. What is the AWS Elastic Load Balancer (ELB), and what are its different types?

AWS Elastic Load Balancer (ELB) is a service that automatically distributes incoming application traffic across multiple targets, such as EC2 instances, containers, or Lambda functions, to ensure high availability and fault tolerance. There are three types of ELBs:

1. Application Load Balancer (ALB): Best suited for routing HTTP/HTTPS traffic and provides advanced routing features.
2. Network Load Balancer (NLB): Handles TCP/UDP traffic and is ideal for high-performance workloads.
3. Classic Load Balancer: The legacy option for both HTTP/HTTPS and TCP/UDP traffic.

17. Explain the concept of AWS Elastic GPU and its use cases.

AWS Elastic GPU allows you to attach GPU resources to EC2 instances for accelerating graphical and compute-intensive workloads. Common use cases include 3D rendering, machine learning, scientific simulations, and video transcoding. Elastic GPUs provide cost-effective GPU acceleration without the need to provision dedicated GPU instances.

18. How can you use AWS Lambda to trigger actions in response to CloudWatch alarms?

You can use AWS Lambda to create a custom action when a CloudWatch alarm state changes (e.g., when a threshold is breached). This can be done by configuring a CloudWatch alarm to trigger a Lambda function. The Lambda function can perform actions like sending notifications, scaling resources, or executing custom code in response to the alarm.

19. What is AWS Lambda Destinations, and how does it help with asynchronous invocations?

AWS Lambda Destinations is a feature that allows you to configure what happens after a Lambda function is invoked asynchronously (e.g., via S3 events or SNS). You can route the results or errors to different AWS services, such as S3, SQS, or Lambda functions. This

simplifies the handling of asynchronous invocations and enables better monitoring and error handling.

20. Describe the AWS Greengrass service and its role in IoT edge computing.

AWS Greengrass extends AWS services to edge devices, allowing them to run AWS Lambda functions locally. It enables local data processing, reduced latency, and offline operation for IoT devices. Greengrass securely connects edge devices to AWS and can be used for scenarios like industrial automation, agriculture, and smart homes.

21. What is AWS Batch, and how does it simplify batch processing in the cloud?

AWS Batch is a fully managed service for running batch computing workloads at any scale. It dynamically provisions compute resources, manages job queues, and monitors job execution. It simplifies batch processing by automating resource management and scaling based on workload demands, making it suitable for scenarios like data processing, scientific simulations, and rendering.

22. Explain the use of AWS Elastic Inference for deep learning workloads.

AWS Elastic Inference allows you to attach GPU acceleration to EC2 instances on-demand for deep learning inference tasks. It optimizes GPU usage, reducing costs compared to using dedicated GPU instances. Elastic Inference is particularly useful for deep learning workloads where GPU acceleration is required intermittently.

23. How do you configure AWS App Runner for containerized applications?

AWS App Runner is a service for building and deploying containerized applications. To configure it, you define your source code or container image, select runtime options, and specify how your application is built and run. App Runner handles the deployment, scaling, and management of your application, simplifying the process of containerized application deployment.

24. What is the AWS Elastic Container Registry (ECR), and how does it integrate with other AWS services?

AWS Elastic Container Registry (ECR) is a fully managed Docker container registry service. It integrates seamlessly with other AWS services like Amazon ECS, Amazon EKS, and AWS Lambda. You can use ECR to store, manage, and deploy container images securely, ensuring compatibility with container orchestration services and serverless applications.

25. Discuss the benefits of AWS Lambda@Edge and its use cases.

AWS Lambda@Edge allows you to run Lambda functions at AWS Edge locations (Content Delivery Network nodes). Benefits include reducing latency by executing code closer to end-users, customizing content delivery, and securing web applications. Use cases include website personalization, content delivery optimizations, and security enhancements.

STORAGE QUESTIONS AWS

26. What is the difference between Amazon S3 and Amazon EBS storage?

Amazon S3 (Simple Storage Service) is object storage used for storing and retrieving data, such as files, images, and backups. It is highly durable, scalable, and accessible over the internet. Amazon EBS (Elastic Block Store) provides block-level storage for EC2 instances, offering persistent, low-latency storage volumes. While S3 is for object storage, EBS is primarily for attaching storage volumes to EC2 instances.

27. Explain the various storage classes in Amazon S3 and their use cases.

Amazon S3 offers multiple storage classes, including Standard, Intelligent-Tiering, One Zone-IA, Glacier, and Deep Archive. Each class has different durability, availability, and cost characteristics. Choosing the right class depends on your data access patterns and budget. For example, Standard is for frequently accessed data, while Glacier is for long-term archival.

28. How does Amazon EFS (Elastic File System) work, and when should it be used?

Amazon EFS is a managed file storage service that provides scalable and shared file storage for EC2 instances. It uses the NFSv4 protocol and can be accessed by multiple instances concurrently. EFS is suitable for applications that require shared file storage across multiple EC2 instances, like web servers, content management, and data analytics.

29. Describe the concept of Amazon FSx and its supported file systems.

Amazon FSx is a managed file storage service that supports Windows File Server and Lustre. It provides scalable and fully managed file systems for Windows and HPC workloads. FSx is ideal for organizations using Windows-based applications or high-performance computing clusters.

30. What is Amazon Glacier, and how is it used for archival storage?

Amazon Glacier is a low-cost storage service designed for long-term data archival. It's used for data that is rarely accessed and can tolerate retrieval times of a few hours. Glacier offers various retrieval options, including Expedited, Standard, and Bulk, with different costs and retrieval times.

31. How do you implement cross-region replication in Amazon S3?

To implement cross-region replication in Amazon S3, you create a replication configuration that specifies the source and destination buckets. You can configure it to replicate all objects or based on object tags. This ensures data redundancy and disaster recovery by copying objects from one S3 bucket to another in a different AWS region.

32. What are AWS Storage Gateway's different types, and how are they used?

AWS Storage Gateway offers different types, including File Gateway, Volume Gateway (Cached and Stored volumes), and Tape Gateway. File Gateway provides NFS or SMB access to S3 data. Volume Gateway provides iSCSI block storage to AWS cloud. Tape Gateway emulates a virtual tape library for backup and archive workloads.

33. Explain the purpose of AWS Snowball for large data transfers.

AWS Snowball is a physical data transport service that helps you transfer large amounts of data into and out of AWS securely and efficiently. You request a Snowball device, load your data onto it, and ship it back to AWS for data transfer, reducing the time and bandwidth needed for large-scale data migrations.

34. How can you encrypt data at rest in Amazon S3 and EBS?

You can encrypt data at rest in Amazon S3 using S3 Server-Side Encryption (SSE) with options like SSE-S3, SSE-KMS, or SSE-C. In Amazon EBS, you can enable encryption when creating EBS volumes using AWS Key Management Service (KMS) keys. This ensures data remains secure even when stored on disk.

35. Describe the Amazon S3 Select feature and its advantages.

Amazon S3 Select allows you to retrieve only the necessary data from S3 objects using SQL-like queries. It reduces data transfer costs and improves query performance by processing data on the S3 side before transmitting results, particularly beneficial for large datasets.

36. What is AWS DataSync, and how does it facilitate data transfer between on-premises and AWS?

AWS DataSync is a data transfer service for moving large volumes of data between on-premises storage and AWS services, including S3, EFS, and FSx. It accelerates data transfer with features like parallel transfers and data integrity checks, making it suitable for migration, backup, and data synchronization.

37. How does Amazon EBS snapshots work, and how are they used for data backup?

Amazon EBS snapshots capture the state of an EBS volume at a specific point in time. They are incremental and only store changed data blocks. Snapshots are used for data backup, disaster recovery, and creating new EBS volumes. You can create and manage snapshots using the AWS Management Console or API.

38. What is the AWS Data Pipeline service, and how does it assist in data processing workflows?

AWS Data Pipeline is a web service for orchestrating and automating the movement and transformation of data between different AWS services and on-premises data sources. It helps you create, schedule, and manage data-driven workflows, making it easier to process and transform data in various scenarios.

39. Explain the benefits of Amazon S3 Object Lock and its use cases.

Amazon S3 Object Lock is a feature that prevents objects from being deleted or modified for a specified retention period. It ensures data immutability and is valuable for compliance and data governance requirements. Use cases include WORM (Write Once, Read Many) storage, compliance archives, and data preservation.

40. How do you optimize costs when using Amazon S3 for data storage?

To optimize costs in Amazon S3, you can use strategies like setting appropriate storage classes, enabling lifecycle policies to transition objects to lower-cost tiers, using data compression, and

removing unnecessary objects. Additionally, enabling S3 Object Lock can help prevent accidental data deletions that may incur additional costs.

41. What is AWS Transfer Family, and how does it help with secure file transfer?

AWS Transfer Family is a fully managed file transfer service that allows you to set up secure FTP, FTPS, and SFTP servers. It simplifies the process of transferring files into and out of AWS securely, ensuring data security and compliance with regulatory requirements.

42. Describe the architecture of AWS Storage Gateway and its integration with on-premises environments.

AWS Storage Gateway connects on-premises environments to AWS cloud storage using virtual appliances. These gateways provide access to AWS storage services like S3 and EBS while seamlessly integrating with existing infrastructure. Data is cached locally for low-latency access, and changes are asynchronously synced to AWS.

43. What is Amazon S3 Batch Operations, and when should it be used?

Amazon S3 Batch Operations is a feature that allows you to perform large-scale operations on Amazon S3 objects, such as copying, tagging, or deleting objects. It is used for automating and streamlining data management tasks across a large number of objects, making it useful for data lifecycle management and compliance.

44. How can you achieve low-latency data access with Amazon EFS?

Amazon EFS provides low-latency data access by design, making it suitable for applications that require real-time data access and sharing. Its architecture allows multiple EC2 instances to access the same file system simultaneously, providing low-latency read and write operations across instances.

45. Explain the benefits of using Amazon S3 Access Points for managing access to S3 buckets.

Amazon S3 Access Points simplify access management for S3 buckets by providing customized endpoints with specific permissions. They allow you to enforce fine-grained access control and reduce the risk of misconfigurations. Access Points are useful when sharing S3 buckets across multiple teams or applications while maintaining access isolation.

AWS DATABASE QUESTIONS

46. Compare Amazon RDS (Relational Database Service) and Amazon Aurora in terms of features and performance.

- Amazon RDS is a managed relational database service that supports various database engines like MySQL, PostgreSQL, and SQL Server. It simplifies database administration but relies on traditional architecture.
- Amazon Aurora is a high-performance, fully managed relational database service that is compatible with MySQL and PostgreSQL. It offers greater scalability and durability compared to standard RDS instances. Aurora provides better read and write performance through its distributed architecture, making it suitable for demanding applications.

47. How does Amazon DynamoDB differ from traditional relational databases?

Amazon DynamoDB is a NoSQL database service that differs from traditional relational databases in several ways:

1. DynamoDB is schema-less, allowing flexible data modeling.
2. It is designed for high availability and scales horizontally to handle variable workloads.
3. DynamoDB offers single-digit millisecond latency, making it suitable for real-time applications.
4. It uses a pay-as-you-go pricing model and automatic scaling, reducing operational overhead.

48. Describe the architecture of Amazon Redshift and its suitability for data warehousing.

Amazon Redshift is a fully managed data warehousing service. Its architecture consists of multiple compute nodes organized into leader nodes and compute nodes. Redshift is optimized for analytics and data warehousing tasks, providing fast query performance, parallel processing, and columnar storage. It's suitable for large-scale data analysis and reporting.

49. What is Amazon DocumentDB, and how does it support MongoDB-compatible workloads?

Amazon DocumentDB is a managed NoSQL database service compatible with MongoDB. It allows you to use existing MongoDB applications and tools with the reliability, scalability, and security of an AWS service. DocumentDB supports document data models and automatic replication, making it well-suited for MongoDB-compatible workloads.

50. Explain the use of Amazon Neptune for graph database applications.

Amazon Neptune is a fully managed graph database service. It supports two popular graph models: Property Graph and RDF (Resource Description Framework). Neptune is optimized for storing and querying highly connected data, making it suitable for applications like social networking, recommendation engines, and fraud detection.

51. What is the purpose of Amazon Timestream, and how is it optimized for time-series data?

Amazon Timestream is a fully managed time-series database service. It is purpose-built for collecting, storing, and querying time-series data at scale. Timestream can handle high write and query loads, making it suitable for applications like IoT data storage, monitoring, and analytics.

52. Compare Amazon ElastiCache and Amazon RDS in terms of use cases and caching mechanisms.

Amazon ElastiCache is an in-memory caching service, while Amazon RDS is a managed relational database service. ElastiCache is used to accelerate read-heavy workloads by caching frequently accessed data in memory. RDS, on the other hand, stores and manages structured data in a relational database.

53. How do you enable Multi-AZ deployments in Amazon RDS, and what is their purpose?

Multi-AZ (Availability Zone) deployments in Amazon RDS are enabled during instance creation. It replicates your database to a standby instance in a different AZ for high availability and automatic failover. This ensures database availability in case of an AZ-level failure.

54. Describe the benefits of Amazon QLDB (Quantum Ledger Database) for ledger applications.

Amazon QLDB is a fully managed ledger database service designed for applications that require an immutable and transparent ledger. It offers features like cryptographic verification and auditing capabilities, making it suitable for financial applications, supply chain tracking, and any use case that requires an auditable ledger.

55. What is Amazon Keyspaces (for Apache Cassandra), and how does it differ from self-managed Cassandra clusters?

Amazon Keyspaces is a managed Apache Cassandra-compatible database service. It provides scalability, availability, and durability without the need for managing the underlying

infrastructure. It simplifies database operations compared to self-managed Cassandra clusters, where you are responsible for setup, scaling, and maintenance.

56. Explain the concept of read replicas in Amazon RDS and how they improve database performance.

Amazon RDS read replicas are read-only copies of the primary database instance. They improve database performance by offloading read queries from the primary instance. This allows you to scale read-heavy workloads horizontally while maintaining a single writable primary instance.

57. How does Amazon DMS (Database Migration Service) assist in database migration and replication?

Amazon DMS is a service that helps migrate, replicate, and manage databases in the cloud. It supports various source and target database engines, making it easier to move data between different databases and environments. DMS minimizes downtime during migrations and keeps data synchronized in real-time for replication scenarios.

58. What is AWS Glue, and how does it simplify ETL (Extract, Transform, Load) processes?

AWS Glue is a fully managed ETL service that automates the process of extracting data from various sources, transforming it, and loading it into data lakes, data warehouses, or other destinations. Glue reduces the complexity of ETL tasks by providing serverless, auto-scaling, and metadata-driven capabilities.

59. Discuss the use of Amazon RDS Proxy for database scalability.

Amazon RDS Proxy is a fully managed database proxy service for Amazon RDS databases. It helps improve database scalability and availability by pooling and efficiently managing database connections. RDS Proxy can handle a large number of concurrent connections, reducing the load on the underlying database instances.

60. How can you optimize query performance in Amazon Redshift?

To optimize query performance in Amazon Redshift, you can use techniques like schema design, distribution keys, sort keys, and compression. Properly configuring these elements based on query patterns and data distribution can significantly enhance query performance in Redshift.

61. What is Amazon Managed Blockchain, and what are its supported blockchain frameworks?

Amazon Managed Blockchain is a fully managed blockchain service that supports popular blockchain frameworks like Hyperledger Fabric and Ethereum. It simplifies the creation, management, and scaling of blockchain networks, making it easier to build and deploy blockchain applications.

62. Explain the advantages of Amazon Aurora Multi-Master for high availability and write scaling.

Amazon Aurora Multi-Master allows multiple read-write instances in an Aurora cluster. It enhances high availability by providing failover across multiple writers and improves write scalability by distributing write traffic. This is beneficial for applications with high write workloads that require minimal downtime.

63. Describe the differences between Amazon Neptune and Amazon Timestream for graph and time-series data, respectively.

Amazon Neptune is a graph database designed for graph data models, while Amazon Timestream is optimized for storing and querying time-series data. Neptune is suitable for highly connected data, while Timestream is tailored for time-based data like IoT telemetry and monitoring metrics.

64. How do you implement data encryption at rest and in transit for Amazon RDS instances?

To encrypt data at rest in Amazon RDS, you can enable encryption at the time of instance creation or enable it for an existing instance. Amazon RDS supports using AWS Key Management Service (KMS) for encryption. For encryption in transit, RDS uses SSL/TLS connections.

65. What is Amazon RDS Performance Insights, and how does it assist in database performance monitoring?

- Real-time and historical performance monitoring.
- Detailed query-level metrics.
- Visual representations for intuitive analysis.
- Anomaly detection for proactive issue identification.
- Integration with AWS CloudWatch for alerts.
- Cost optimization through query analysis.
- Overall enhancement of database performance.

