TNGS Learning Solutions AWS Solutions Architect Online Course

AWS Lambda and AWS Simple Queue Service (SQS)

AWS Lambda

- Amazon Web Services (AWS) Lambda is a serverless computing service that lets you run code without provisioning or managing servers.
- It enables you to execute code in response to various events, such as changes to data in an Amazon S3 bucket, updates to a DynamoDB table, or HTTP requests via Amazon API Gateway.
- Lambda automatically scales and manages the compute resources needed to run your code, allowing you to focus on building applications without the need to worry about infrastructure.

AWS Lambda

- **Event-Driven Execution**: Lambda is designed for event-driven computing. Your code can be triggered by events such as changes in data, HTTP requests, or custom events generated by other AWS services.
- **Supported Runtimes**: Lambda supports multiple programming languages, including Node.js, Python, Ruby, Java, Go, .NET Core, and custom runtimes through the use of custom execution environments.

AWS Lambda

- **Stateless and Stateless Containers**: Lambda functions are stateless, meaning each function execution is independent and doesn't retain state between invocations. However, you can use other AWS services like Amazon S3 or DynamoDB to store and retrieve persistent data.
- **Automatic Scaling**: AWS Lambda automatically scales your applications by running code in response to each trigger. It scales from a few requests per day to thousands of requests per second.

AWS Lambda

- **Resource Management**: Lambda manages the compute fleet for you, including server and operating system maintenance, capacity provisioning, and automatic scaling.
- **No Server Management**: With Lambda, you don't need to worry about server provisioning, patching, or monitoring. AWS takes care of the infrastructure, allowing you to focus on writing code.

AWS Lambda

- **Pay-Per-Use Pricing Model**: You pay only for the compute time that you consume. There is no charge when your code is not running.
- **Integrated with AWS Services**: Lambda integrates seamlessly with other AWS services, allowing you to build serverless applications that leverage services like S3, DynamoDB, API Gateway, SNS, SQS, and more.

AWS Lambda

- **Custom Execution Environments (Lambda Layers)**: You can create custom runtime environments using Lambda Layers, which allow you to package and reuse libraries, custom runtimes, and other function dependencies.
- **Versioning and Aliases**: Lambda supports versioning and aliases, enabling you to deploy multiple versions of your functions and direct traffic to specific versions or aliases.

AWS Lambda

- **Monitoring and Logging**: AWS CloudWatch provides monitoring and logging capabilities for Lambda functions. You can log function output, monitor execution duration, and set up alerts.
- **Security and IAM Integration**: Lambda functions can be associated with IAM roles, providing fine-grained access control to other AWS services. Functions can also be configured to run inside a VPC for enhanced network security.

AWS Lambda

- **Environment Variables**: Lambda supports the use of environment variables, allowing you to configure and parameterize your functions without modifying code.
- **Lambda@Edge**: Lambda@Edge allows you to run Lambda functions in response to CloudFront events, enabling you to execute code globally, closer to end-users.

AWS Lambda

- Lambda is widely used for a variety of use cases, including data processing, real-time file processing, web application backends, microservices, chatbots, and more.
- Its serverless architecture simplifies development, reduces operational overhead, and provides cost-effective scalability.

AWS Simple Queue Service

- Amazon Simple Queue Service (SQS) is a fully managed message queuing service provided by Amazon Web Services (AWS).
- SQS enables decoupling of the components of a cloud application, allowing them to communicate asynchronously.
- It provides a reliable and scalable way to exchange messages between different parts of a distributed system without requiring components to be directly connected or aware of each other.

AWS Simple Queue Service

- **Messaging Decoupling**: SQS decouples the components of a system by allowing them to communicate via messages. This enables better scalability, flexibility, and fault isolation.
- **Fully Managed Service**: SQS is a fully managed service, meaning AWS handles the operational aspects, such as hardware provisioning, patching, and infrastructure maintenance. This allows developers to focus on building applications rather than managing messaging infrastructure.

AWS Simple Queue Service

- **Reliable Message Delivery**: SQS provides reliable message delivery with multiple copies of each message stored across multiple servers and data centers. This ensures that messages are not lost, even if a server or data center fails.
- **At-Least-Once Delivery**: SQS provides at-least-once delivery of messages. This means that a message might be delivered more than once, but it won't be lost.

AWS Simple Queue Service

- **Simple API**: SQS offers a simple API for sending and receiving messages. It supports both standard queues, which provide best-effort ordering, and FIFO (First-In-First-Out) queues, which guarantee order and exactly-once processing.
- **Scalability**: SQS is designed to scale horizontally to handle a large number of messages and can automatically scale to accommodate varying workloads.

AWS Simple Queue Service

- **Message Visibility Timeout**: When a consumer receives a message from the queue, SQS makes the message invisible to other consumers for a specified period (visibility timeout). This helps prevent multiple consumers from processing the same message simultaneously.
- **Delay Queues**: SQS supports delay queues, allowing you to delay the delivery of messages for a specified period. This is useful for scenarios where messages should not be processed immediately.

AWS Simple Queue Service

- **Dead Letter Queues (DLQ)**: SQS supports dead letter queues, which are used to capture and store messages that cannot be processed successfully. This helps in identifying and addressing issues with message processing.
- **Access Control and Security**: SQS integrates with AWS Identity and Access Management (IAM), allowing you to control access to queues. It also provides encryption options for data in transit (HTTPS) and at rest (SSE).

AWS Simple Queue Service

- **Message Attributes**: SQS allows you to attach metadata to messages in the form of message attributes. These attributes can be used for additional information or routing decisions.
- **Long Polling**: SQS supports long polling, which reduces the number of empty responses returned when there are no messages available in the queue, thus minimizing costs and improving efficiency.

AWS Simple Queue Service

- **CloudWatch Metrics and Monitoring**: SQS integrates with Amazon CloudWatch, allowing you to monitor various metrics related to your queues, such as the number of messages sent, received, and deleted.

AWS Simple Queue Service

- Amazon SQS is commonly used in various scenarios, including distributed systems, microservices architectures, event-driven applications, and workflow systems.
- It provides a reliable and scalable messaging infrastructure, enabling seamless communication between different components of a cloud application.