Queues & Buses

Đà Nẵng, năm COVID thứ 2

SQS

- Offers a secure, durable, and available hosted queue that lets you integrate and decouple distributed software systems and components.
- Push-pull mechanism.
- You control who can send messages to and receive messages from an Amazon SQS queue.
- Two Queue types:
  - Standard: Best effort ordering, at-least-once message delivery, unlimited throughput.
  - FIFO: FIFO ordering, exactly-once message processing, limited throughput: 300 API calls per second, up to 10 messages per API call. So max is 3,000 messages per second.

- Messages:
  - Each message gets a Message ID.
  - You can use message attributes to attach custom metadata to messages.
  - Max size: 256 KB.
  - A message can be a pointer to an S3 or DynamoDB object.
  - Messages are stored on multiple servers.
  - Retention period: 1mn to 14 days. Default is 4 days.
  - Messages can be protected by Server-Side Encryption using KMS.

- Concurrency:
  - Multiple producers and consumers can use the same queue at the same time.
  - When a message is received/collected by a consumer, it remains in the queue.
  - To prevent other consumers from processing the message again, Amazon SQS sets a visibility timeout, a period of time during which Amazon SQS prevents other consumers from receiving and processing the message. Can be 0 sec to 12 hours. Default is 30 seconds. The consumer should delete the message from the queue after processing it.

- Short Polling & Long Polling:
  - SQS provides short polling (no wait) and long polling (with wait) to receive messages from a queue.
  - By default, queues use short polling.
- Short Polling:
  - The ReceiveMessage request queries only a subset of the servers (based on a weighted random distribution) to find messages that are available to include in the response.
  - Amazon SQS sends the response right away, even if the query found no messages.
  - To set Short polling: either in the queue parameter (WaitTimeSeconds = 0) or the request parameter (ReceiveMessageWaitTimeSeconds = 0).
- Long Polling:
  - The ReceiveMessage request queries all of the servers for messages.
  - SQS sends a response after it collects at least one available message, up to the maximum number of messages specified in the request.
  - SQS sends an empty response only if the polling wait time expires.
  - The maximum long polling wait time is 20 seconds.
  - Long polling helps reduce the cost of using Amazon SQS by eliminating the number of empty responses.

- Delay queues let you postpone the delivery of new messages to a queue for a number of seconds.
- Message timers let you specify an initial invisibility period for a message added to a queue.
- A dead-letter queue is a queue that one or more source queues can use for messages that are not consumed successfully.
- Supports SSE using KMS CMKs.
- Supports anonymous access.

- Lambda Triggers:
  - Lambda polls the queue and invokes your Lambda function synchronously with an event that contains queue messages.
  - Lambda reads messages in batches and invokes your function once for each batch: the event that is passed to your function contains all read messages.
  - You can set the batch size: number of messages that Lambda will collect at once.
  - You can set the batch window: period that Lambda should wait to collect the messages before invoking your function. Max = 5mn.
  - Lambda continues to poll messages from the SQS standard queue until batch window expires, the payload limit is reached or full batch size is reached.
  - When your function successfully processes a batch, Lambda deletes its messages from the queue.

Amazon Simple Notification Service (SNS):

- A managed service that provides message delivery from publishers to subscribers (also known as producers and consumers).
- Push-push mechanism.
- Publishers communicate asynchronously with subscribers by sending messages to a topic, which is a logical access point and communication channel.
- Each subscriber receives its own copy of each published message.
- Two types of subscribers:
  - Application to Application subscribers: Kinesis Data Firehose, SQS, AWS Lambda and HTTP/S. Through Kinesis Data Firehose, you can fan out SNS notifications to S3, Redshift and 3rd party services.
  - Application to Person subscribers: email, mobile push notifications, and SMS.

- A subscriber can assign a filter policy to the topic subscription. Can filter on JSON fields.
- Two Topic types:
  - Standard: use when message delivery order and possible message duplication are not critical.
  - FIFO: use to ensure strict message ordering, to define message groups, and to prevent message duplication. Only Amazon SQS FIFO queues can subscribe to a FIFO topic.
- Published messages are stored across multiple, geographically separated servers and data centers.
- If a subscribed endpoint isn't available, Amazon SNS runs a delivery retry policy.
- To preserve any messages that aren't delivered before the delivery retry policy ends, you can create a dead-letter queue in SQS.
- Message attributes let you provide any arbitrary metadata about the message.
- You can choose to deliver raw messages (not wrapped in a structure).
- Supports Encryption at rest.

Amazon EventBridge:

- A serverless event bus service that makes it easy to connect your applications with data from a variety of sources.
- Allows you to build event driven architectures, which are loosely coupled and distributed.
- Delivers a near real-time stream of events from:
  - System events that describe changes in AWS resources.
  - Events from you own applications.
  - SaaS partners like Salesforce.com.
- Events:
  - Events in Amazon EventBridge are represented as JSON objects.
  - All events have a similar structure, and the same top-level fields.
  - A target receives events in JSON format.

- Event Buses:
  - Streams of events are collected in event buses.
  - CloudWatch Events: one event bus that is included by default for system events from AWS services.
- Targets:
  - Supported targets include: EC2, ECS, Lambda, Batch, Step Functions, SNS, SQS, Streams in Kinesis Data Streams and Kinesis Data Firehose.
  - A rule's targets must be in the same Region as the rule.
- Rules:
  - A rule matches incoming events and routes them to one or more targets for processing.
  - A single rule can route to multiple targets, all of which are processed in parallel.
  - A rule can customize the JSON sent to the target.
- To preserve any messages that aren't delivered before the delivery retry policy ends, you can create a dead-letter queue in SQS.

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Push/Pull Mecanism Comparison:

- SNS: push-push.
- SQS: push-pull.
- MQ: push-pull.
- EventBridge: push-push.