APPLICATION INTEGRATION
IN
AWS

Decoupling

Decoupling usually means the utilization of SQS/SNS and involves separating the components of an application to enhance scalability, reliability, and flexibility.

SQS acts as a reliable message queue, storing messages while allowing components to operate independently and asynchronously and SNS facilitates pub/sub messaging, enabling seamless communication between microservices and supporting event-driven architectures.

Both can be used for decoupling but whether one, either or both are used will depend on the application/use-case.

SQS, SNS and EventBridge

Normally, decoupling in AWS is done using SNS, SQS and/or EventBridge.

SQS is recommended for one-to-one asynchronous communication, SNS for one-to-many fan-out scenarios, and EventBridge for service integrations and custom application integrations, especially with third-party services.

SQS provides flexibility in message processing speed, SNS offers pub/sub functionality with multiple subscribers, and EventBridge allows integration without custom code. Each service has its own strengths and limitations, making them suitable for different scenarios.

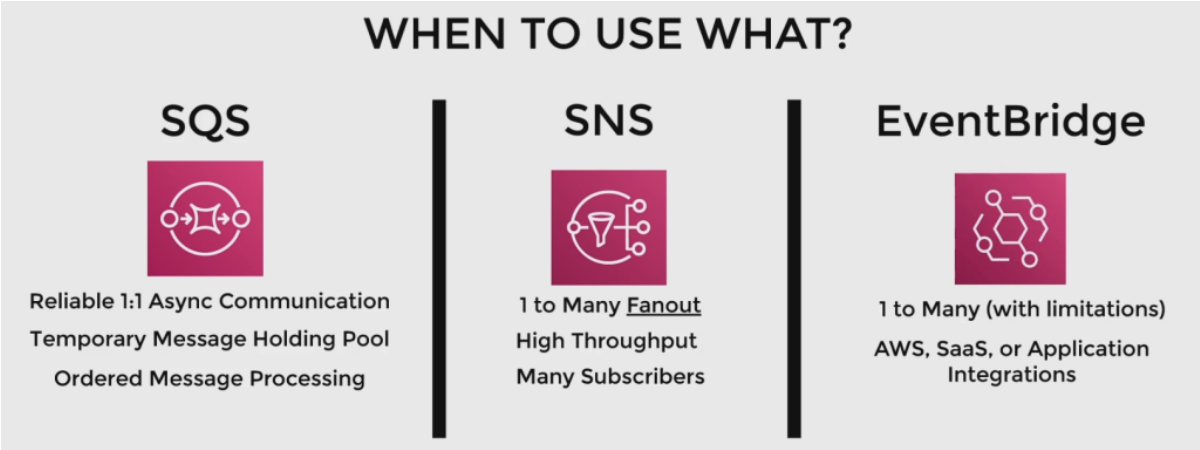


Image credit: Be a Better Dev, do check out his YouTube Channel

SQS Size-based Scaling and other functions

Quick tip:

An ASG can be scaled based on the size of an SQS queue. This is important in cases where compute capacity must increase or decrease depending on the number of orders in a queue, for example.

Additionally, a SQS queue can also be used as an invocation source for Lambda Functions, such that a lambda function is triggered for an action/event in the SQS queue.

SQS FIFO

Amazon SQS FIFO (First-In-First-Out) queues provide ordered, exactly-once processing of messages.

They guarantee that messages are processed in the order they were sent/received.

FIFO queues are ideal for applications that require strict message ordering and exactly-once processing, such as financial transactions, order processing systems, and workflow management.

Used in cases like:

An application on AWS sends information about new orders to an Amazon API Gateway REST API to process. The company wants to ensure that orders are processed in the order that they are received.

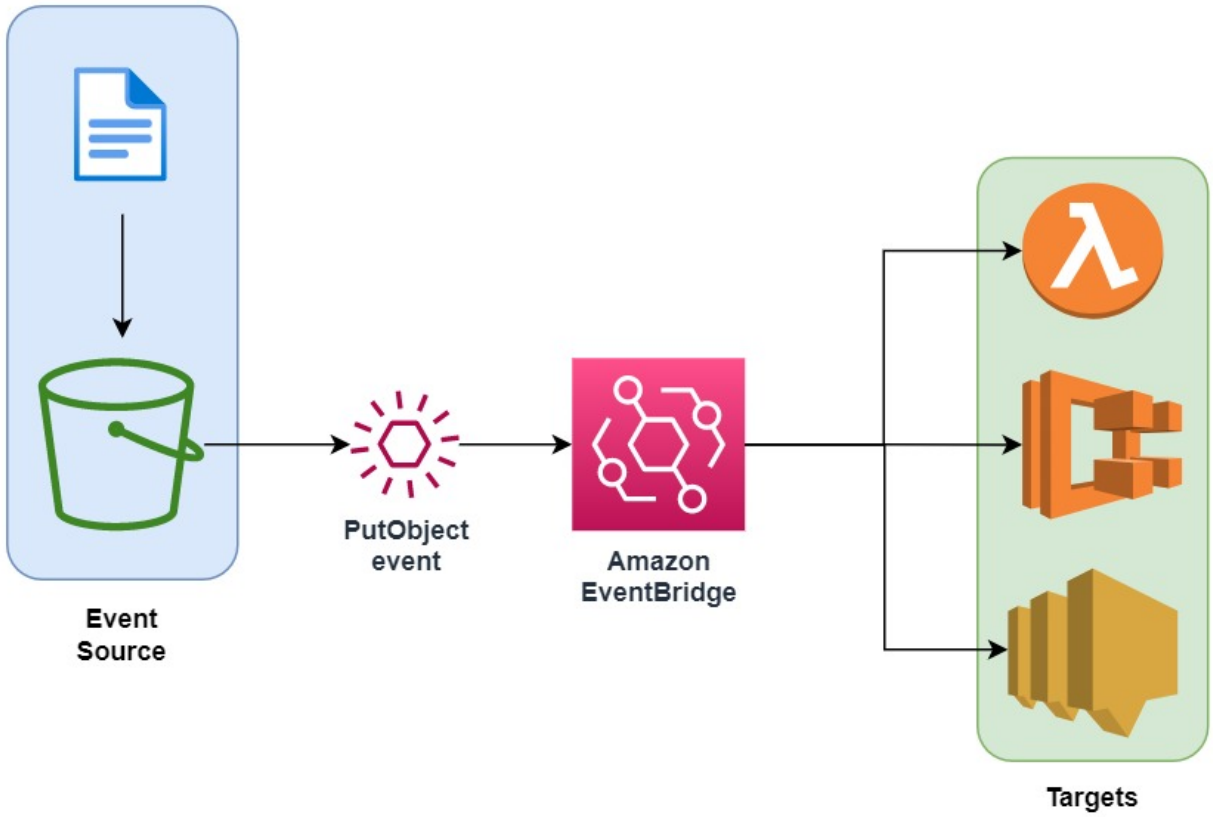
SQS duplication

Quick Tip:

To avoid duplicate messages being read from SQS, use the **ChangeMessageVisibilty** API call to increase the *visibility timeout*.

Amazon EventBridge

Amazon EventBridge (Amazon CloudWatch Events) is a serverless event bus that makes it easy to connect applications together. It uses data from your own applications, integrated software as a service (SaaS) applications, and AWS services. This simplifies the process of building event-driven architectures by decoupling event producers from event consumers. This allows producers and consumers to be scaled, updated, and deployed independently. Loose coupling improves developer agility in addition to application resiliency.



You can use Amazon EventBridge (Amazon CloudWatch Events) to run Amazon ECS tasks when certain AWS events occur.

You can set up an EventBridge rule that runs an Amazon ECS task whenever a file is uploaded to a certain Amazon S3 bucket using the Amazon S3 PUT operation for example.

Simple Email Service (SES)

As the name suggests, SES is used for sending mails using AWS EventBridge or other scheduled events. Often used for sending bulk emails/emails en masse to customers.

Kinesis Data Streams vs Firehose

Amazon Kinesis is a powerful service for real-time data streaming, allowing you to collect, process, and analyze data continuously at any scale. It's ideal for applications that require real-time analytics, such as monitoring logs, processing IoT data, and running machine learning models. Kinesis enables you to ingest large streams of data and process it with low latency, providing immediate insights and actions.

Amazon Kinesis Firehose simplifies the process of loading streaming data into data lakes, warehouses, and analytics services. It automatically scales to match the throughput of your data streams and can transform, batch, compress, and encrypt the data before loading it to destinations like Amazon S3, Redshift, or Elasticsearch.

Basically,

Kinesis Data Streams ⇒ Real-time, can connect to more services.

Kinses Data Firehose ⇒ Near real-time, can connect only to S3, Redshift, Opensearch and HTTP endpoints

Sometimes Firehose can also be used for data ingestion, especially when the quantity/size of the message and/or alert being ingested is large (for ex. millions of requests, worth several Terabytes) for example, **Clickstream** data.

Quicksight

Amazon QuickSight is a cloud-powered business intelligence (BI) service and reporting solution that allows you to easily create and publish interactive dashboards and visualizations as well as share them with IAM Users and Groups. These visualizations can be in the form of charts, graphs, maps and many more.

QuickSight's integration with AWS services also ensures seamless data connectivity and scalability making it ideal for say, organizations leveraging data lakes to derive actionable business intelligence efficiently providing insights into the large datasets store in the data lake.

Amazon AppFlow

AppFlow is a fully managed integration service that facilitates the secure transfer of data between **Software as a Service (SaaS)** applications and AWS services. It simplifies data transfer processes, enabling you to automate and control data flows without needing custom code.