Application Services

Welcome to the ninth lesson of AWS Solutions Architect Associate level—"Application Services."

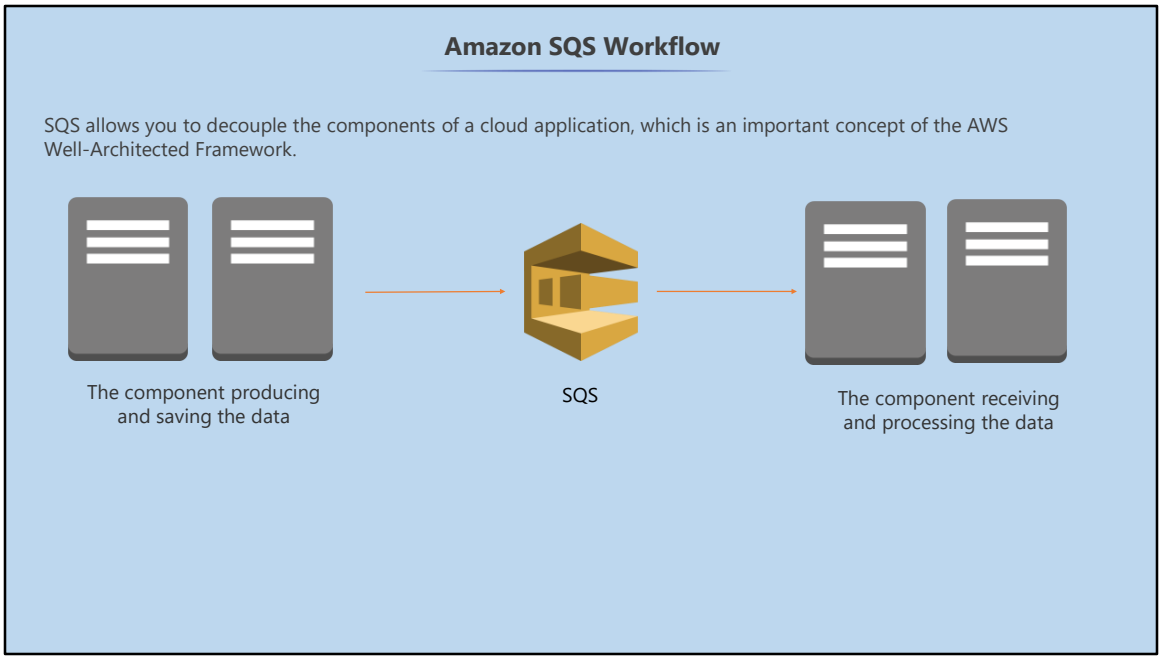
By the end of the lesson you will be able to:

- Explain what the key application services provided by AWS are
- Discuss how SQS is used to control workflows
- Describe how SWF can coordinate tasks
- Illustrate how SNS allows AWS resources to notify you about events
- Describe the overview of what Elastic Transcoder is used for
- List the best practices for application servers
- Identify the costs associated with application services

Amazon Simple Queue Service (SQS)

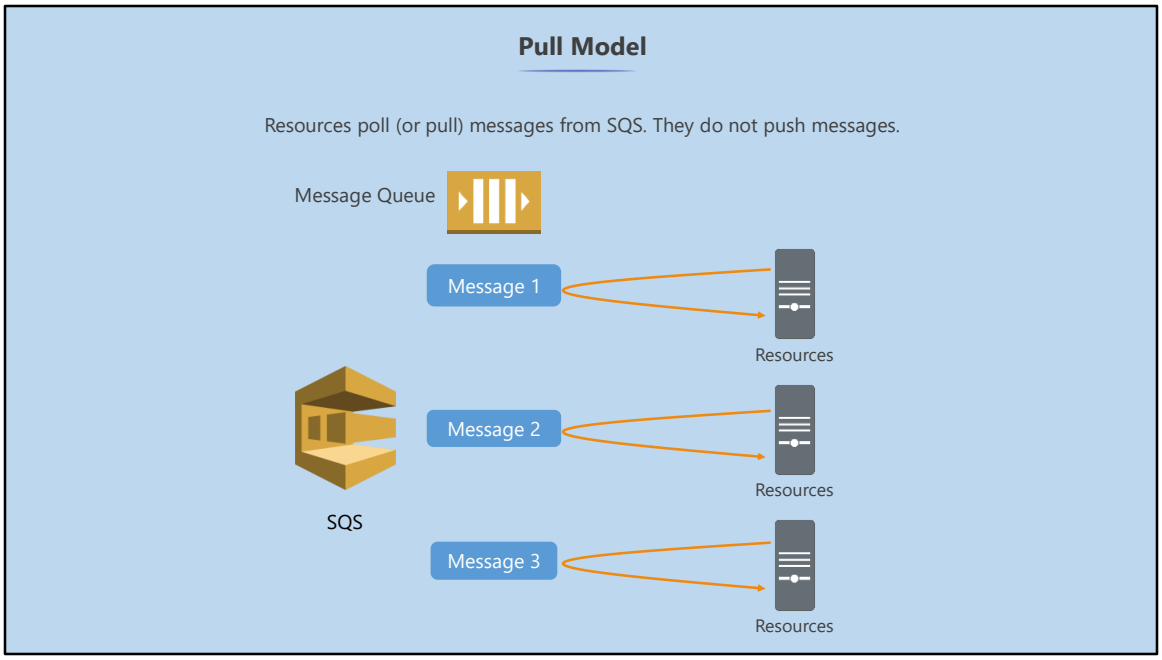
In this section you'll learn about Amazon Simple Queue Service and its features.

According to Amazon, "Amazon Simple Queue Service (SQS) is a fast, reliable, scalable, and fully managed message queuing service. It can be used to control workflow processes."
SQS allows you to transmit large volumes of data without losing messages and it doesn't require other services to be available.
SQS was one of the first services released by AWS.

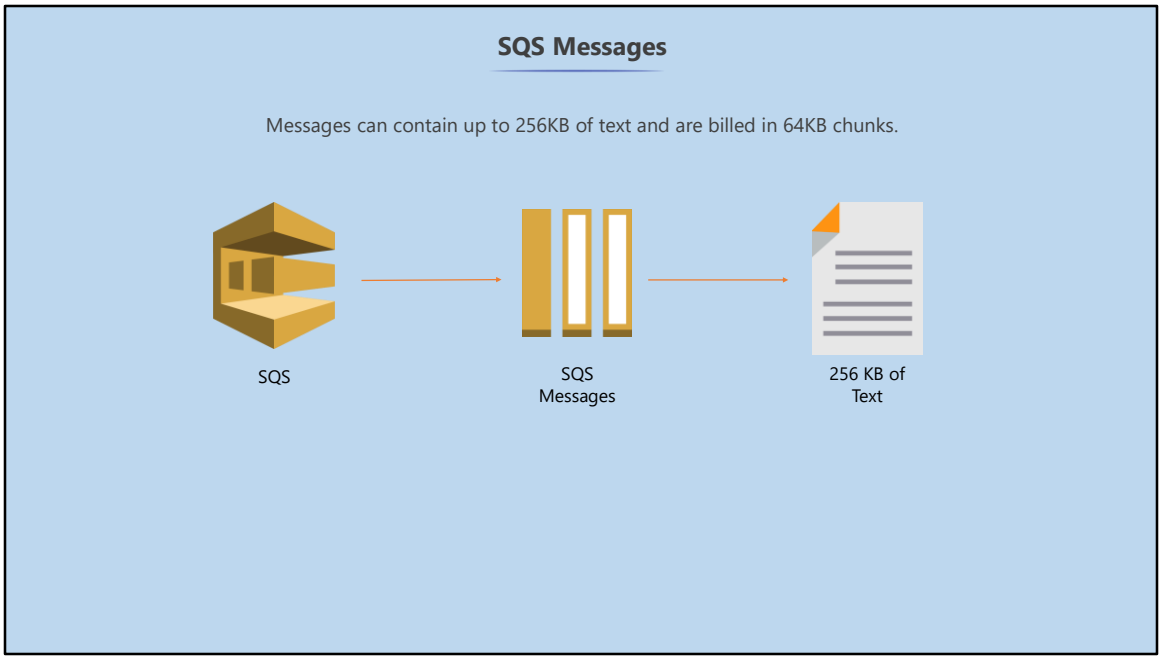


The message queue acts as a buffer between the component producing and saving data, and the component receiving the data for processing.
SQS allows you to decouple the components of a cloud application.

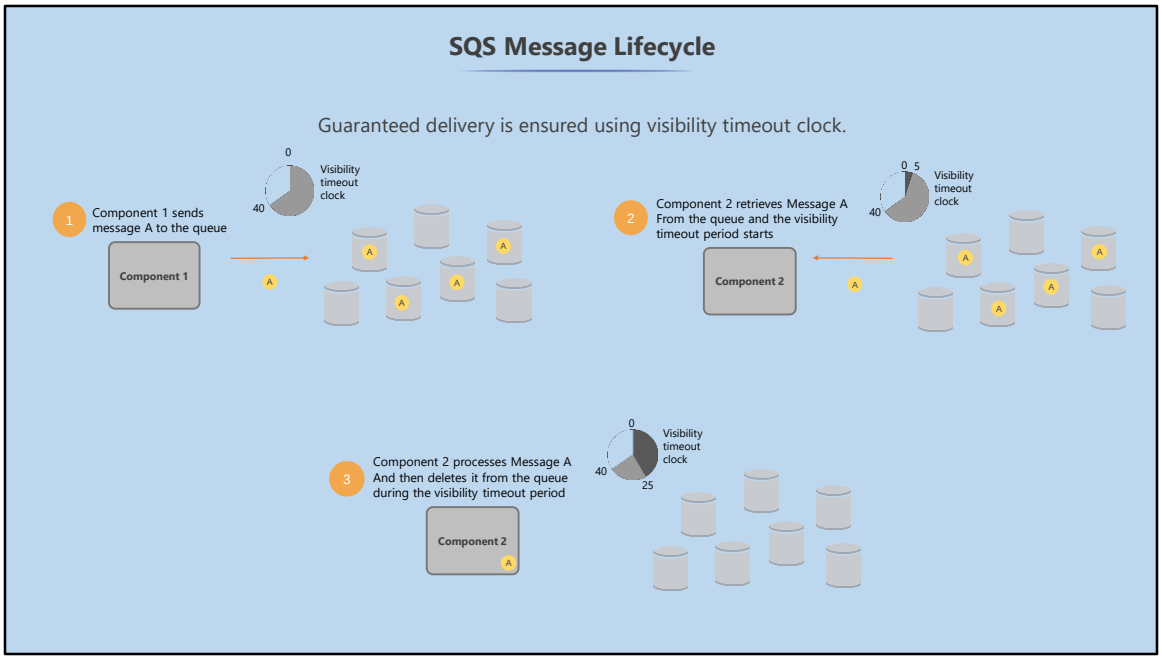
SQS is always available and ensures delivery of each message at least once.
SQS does not guarantee first in, first out. If you require your messages to be delivered in the order that they arrived, you can place sequencing information in each message.



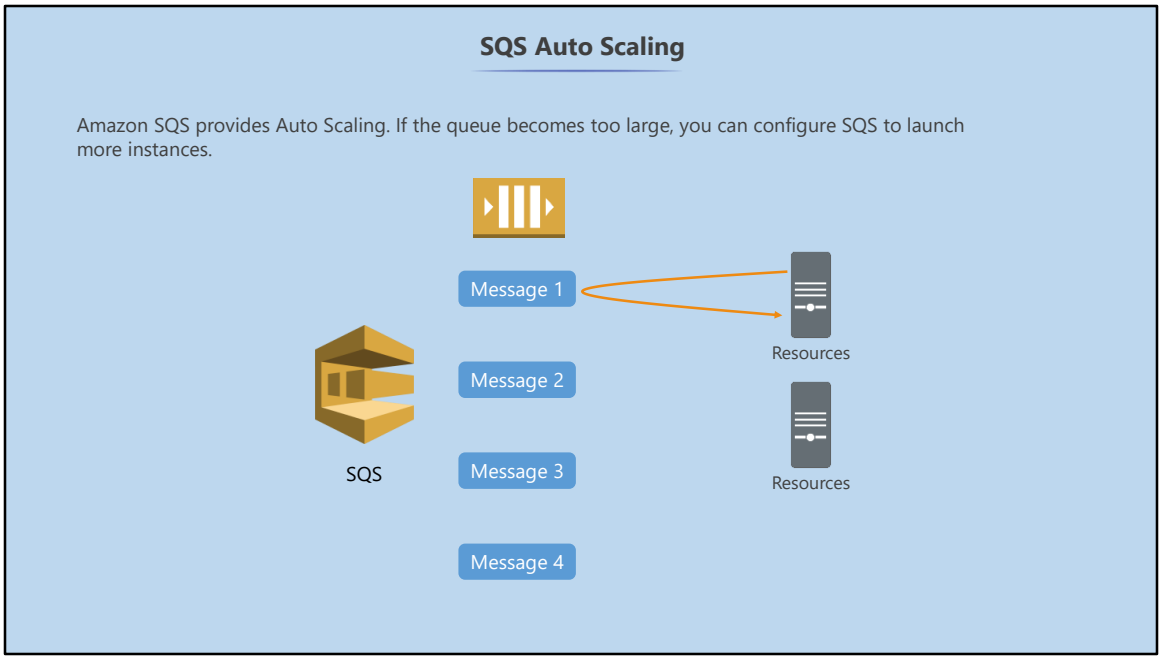
Resources poll (or pull) messages from SQS. It does not push messages.



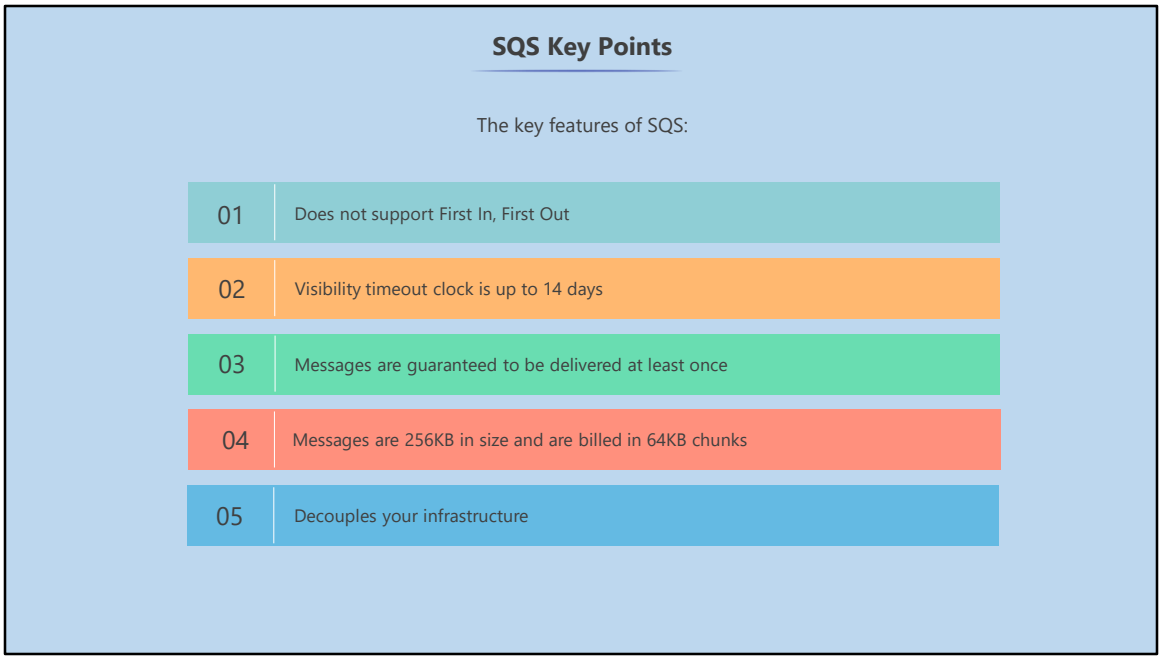
Messages can contain up to 256KB of text and are billed in 64KB chunks.



Guaranteed delivery is ensured using Visibility time out clock, which can be configured up to 14 days.
Component 1 sends Message A to a queue and it is distributed to the SQS servers. When Component 2 is idle and is ready to process a message, it polls SQS and Message A is returned. While Message A is being processed by component 2, the message stays in the queue and is not returned to any other components that are polling the message queue for the duration of the visibility timeout.
When Component 2 has processed the message, it deletes it from the queue to avoid the message being processed again once the visibility timeout expires.
If the visibility timeout expires, it is assumed that the message was not processed successfully. While using SQS you need to configure your resources according to the jobs and you need to make sure they can handle multiple deliveries.



Amazon SQS can provide Auto Scaling. If the queue is getting too large, you can configure it to launch more instances.



- It does not offer first in, first out
- The visibility timeout clock is up to 14 days (default 4 days)
- Messages are guaranteed to be delivered at least once
- The message size is 256KB (earlier used to be 64KB) which is billed in 64KB chunks
- It decouples your infrastructure

Knowledge Check

1 **Amazon SQS ensures that each message is _____.**

Pushed to resources at least once

Available to resources on a First In, First Out basis

Guaranteed to be delivered at least once

Only delivered once to resources

1 **Amazon SQS ensures that each message is _____.**

Pushed to resources at least once

Available to resources on a First In, First Out basis

Guaranteed to be delivered at least once

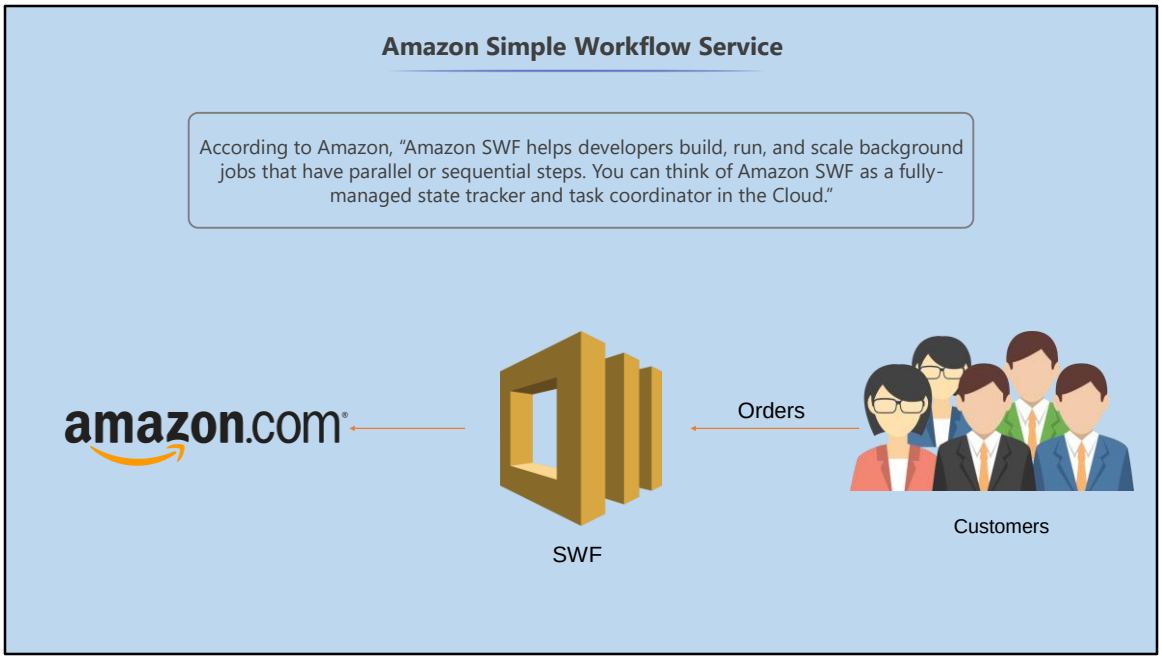
Only delivered once to resources

c

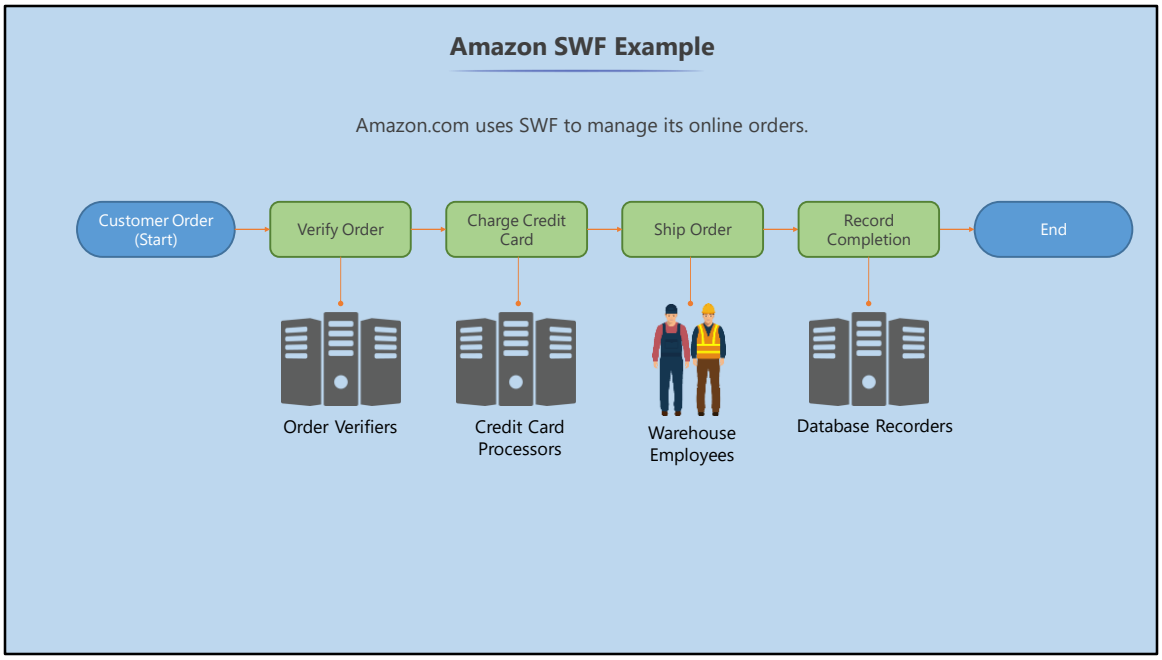
Amazon SQS guarantees that all messages are delivered at least once using a poll based model.

Amazon Simple Workflow Services (SWF)

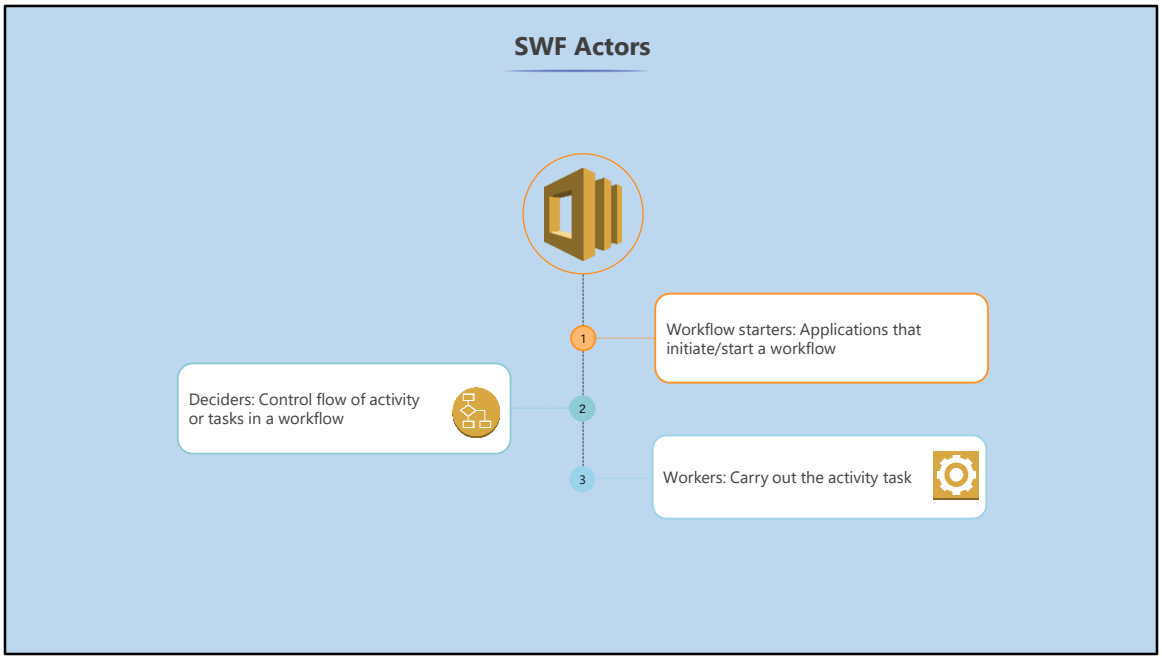
In this section you'll learn about Amazon SWF and its features.



Amazon SWF is a fully-managed task coordinator and tracker that allows you to build, run, and scale background jobs that have parallel or sequential steps. It allows you to coordinate tasks without a given framework.
SWF doesn't have to be AWS related, for example Amazon uses SWF to manage orders on their website.



Amazon.com uses SWF to manage its online orders:
A simple sequential customer order workflow with four activities (Verify Order, Charge Credit Card, Ship Order, and Record Completion) explains how SWF works. A customer places an order, the first task is to verify the order, the second task involves applying the charges to the credit card, and then the order is processed for shipping. It's the job of the warehouse employees to do that for you, and the final task is the record completion which states that the order has been shipped.



- Workflow Starters—this is an application that can initiate or start a workflow, that is, a website placing an order.
- Deciders—they control the flow of activity tasks in a workflow. Deciders decide what to do next when a process completes or fails.
- Workers—they carry out the activity task.

SWF versus SQS

A comparison between SWF and SQS:

	SWF	SQS
Message Retention Period	Up to 1 year	Up to 14 days
API	Task oriented	Message oriented
Delivery	Assigned once and Never duplicated	Message can be delivered more than once
Tracking	Keeps track of all tasks and events	Need to create your own application-level tracking

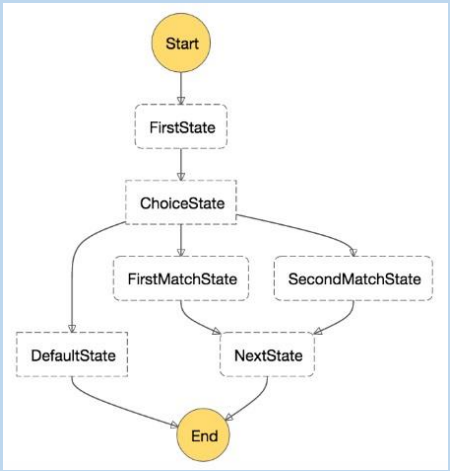
A comparison between SWF and SQS:
SQS has retention period of 14 days.
SWF has a retention period of up to 1 year for workflow service.

SWF presents a task-oriented API.
SQS offers a message-oriented API.

SWF tasks are assigned only once and is never duplicated.
In SQS you need to handle duplicated messages.

SWF keeps tracks of all tasks and events in an application.
In SQS you need to create your own application-level tracking (especially for multiple queues).

Step Functions



- Step is a fully managed service that makes it easy to coordinate the components of distributed applications and microservices using visual workflow.
- It was announced in AWS re:Invent 2016.
- AWS recommends using AWS Step Functions for all new applications.

AWS Step Functions is a fully managed service that makes it easy to coordinate the components of distributed applications and microservices using visual workflows.

It was announced at AWS Re:Invent 2016.

AWS recommend using AWS Step Functions for all your new applications.

Knowledge Check

1 **How long is an Amazon SWF message valid?**

Up to 12 months

Up to 14 days

12 months exactly

4 days

1 **How long is an Amazon SWF message valid?**

Up to 12 months

Up to 14 days

12 months exactly

4 days

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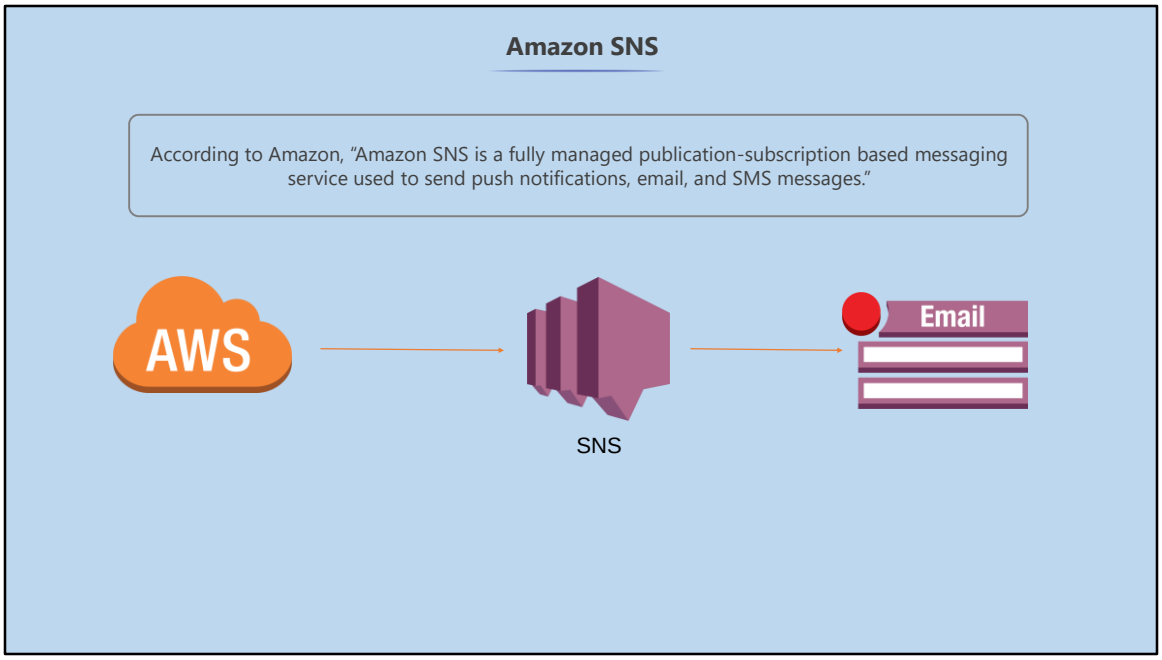
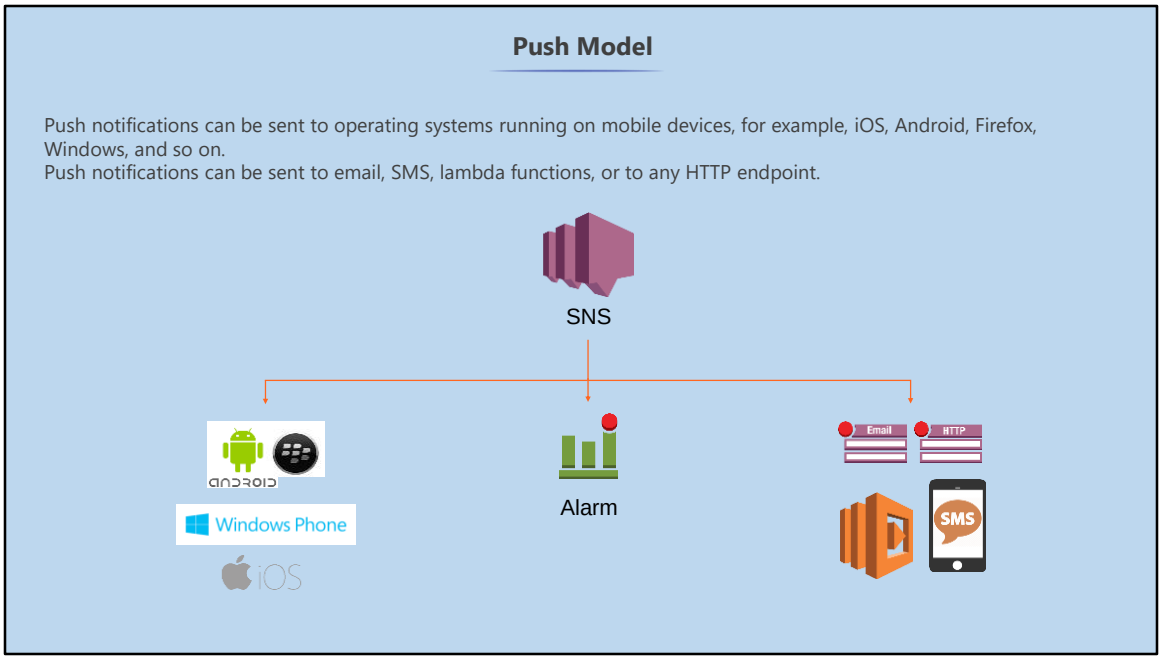
Amazon SWF messages are valid for up to 12 months.

Amazon Simple Notification Service (SNS)

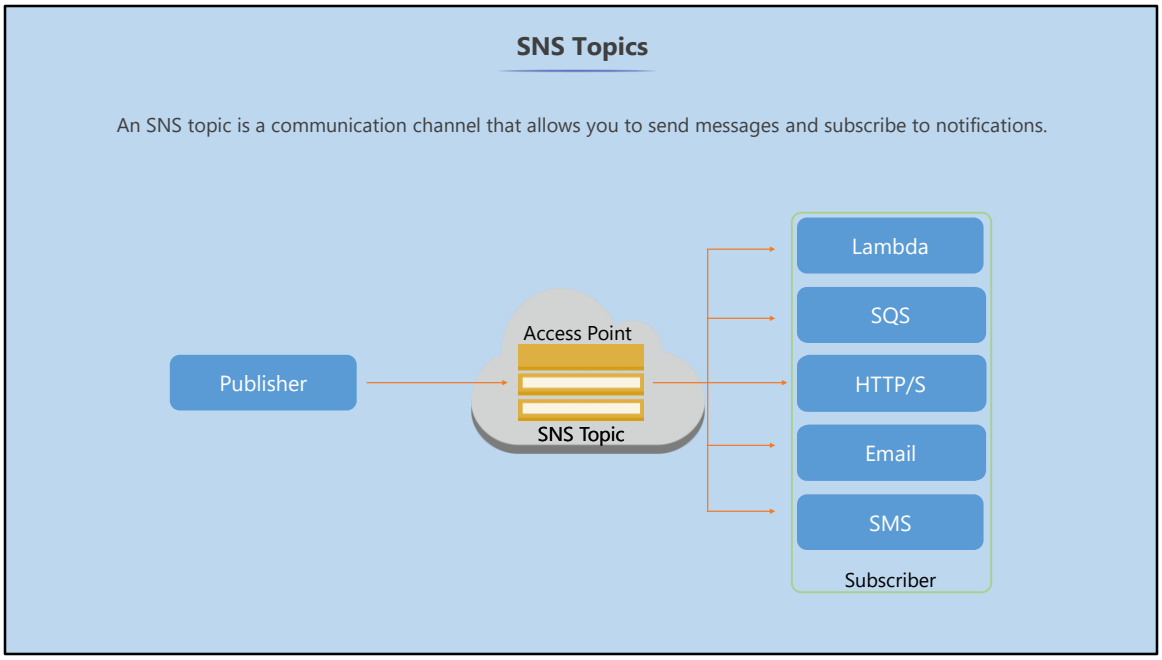
In this section you'll learn about Amazon Simple Notification service and its features.



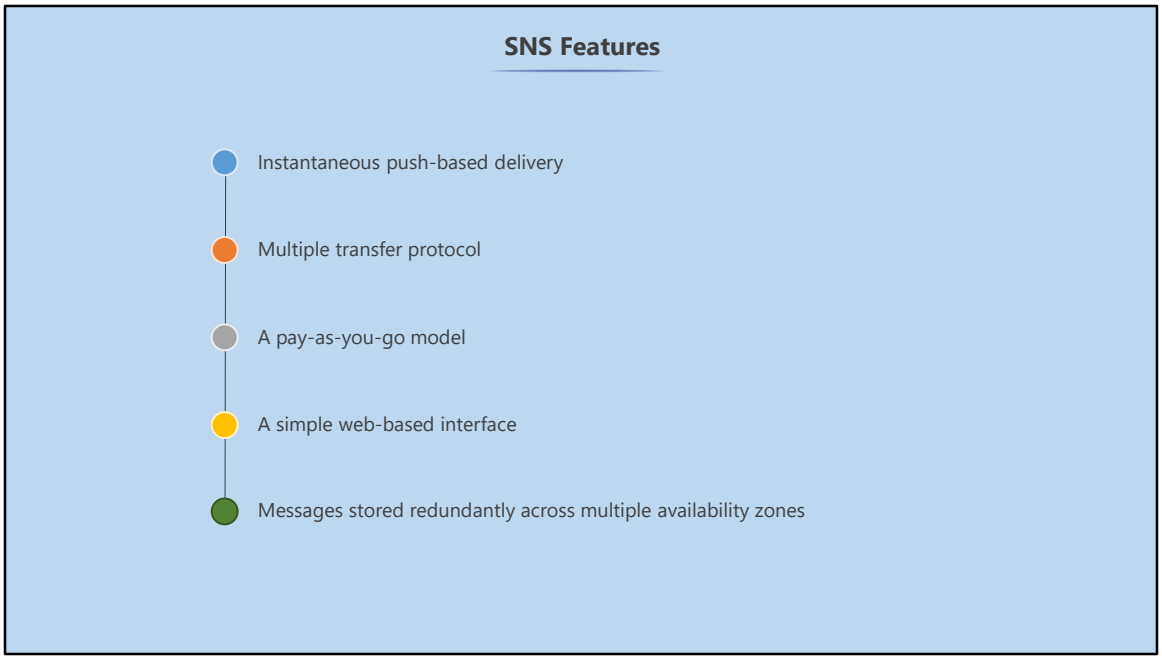
Amazon SNS is a fully managed, publication-subscription based messaging service that can be used to send push notifications, emails, and SMS messages.
SNS is used to send messages from AWS resources or can be used as an enterprise-messaging infrastructure.



SNS pushes messages to devices.
Push notifications can be sent to operating systems running on mobile devices for example, iOS, Android, Firefox, Windows, and so on.
Push notifications can be sent to email, SMS, lambda functions, or to any HTTP endpoint.
It can be used to send notifications, alerts, or alarms from your AWS resources, for example when Auto Scaling events occur.



An SNS topic is a communication channel that allows you to send messages and subscribe to notifications.
It provides an access point for publishers and subscribers to communicate with each other.
You can group multiple recipients in a topic. A topic is an "access point" that allows recipients to subscribe to it and then get the notifications.
If you group Android, Windows, and SMS recipients then when you publish to a topic, SNS will deliver correctly formatted messages to each subscriber.



The SNS features are the following:

- Instantaneous, push based delivery—no Polling
- Multiple transfer protocols (SMS, Email, HTTP, SQS)
- Pay-as-you go model
- Web-based interface
- Messages are stored redundantly across multiple Availability Zones

SNS versus SQS

A comparison between SNS and SQS:

SNS	SQS
PUSH based	POLL based (PULL)
Allows applications to send time-critical messages to multiple subscribers	A service used by distributed applications to exchange messages

SQS and SNS are both messaging services within AWS.

Amazon SNS allows applications to send time-critical messages to multiple subscribers through a “push” mechanism; there is no need to poll for updates. Amazon SQS is a message queue service used by distributed applications to exchange messages through a polling model; it is used to decouple infrastructure.

Demo: Amazon SNS

In this demonstration you'll learn how to configure Amazon SNS to send notifications.

Knowledge Check

1 **SNS is unable to send messages to:**

SMS

Amazon S3

Lambda

HTTP Endpoints

1 **SNS is unable to send messages to:**

SMS

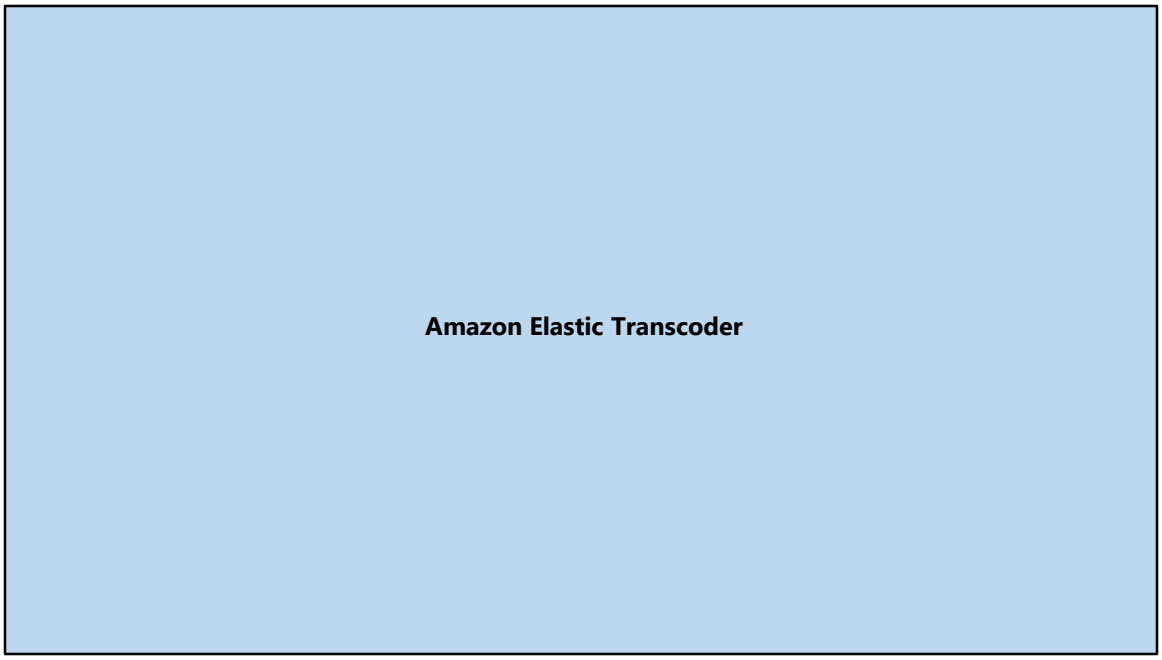
Amazon S3

Lambda

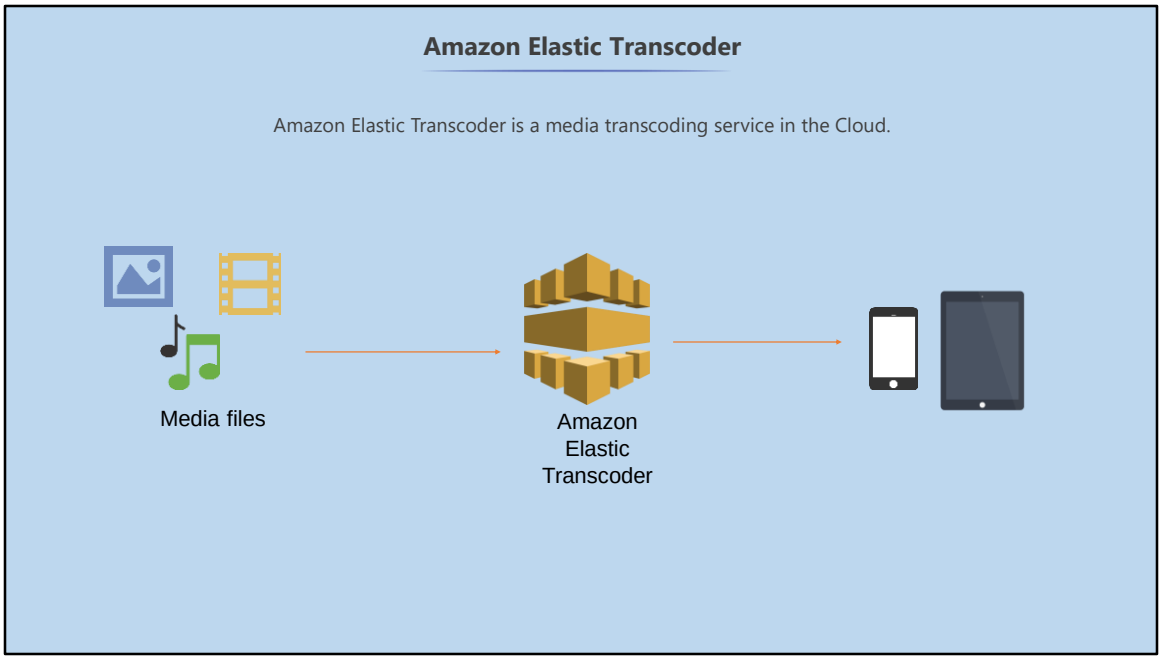
HTTP Endpoints

b

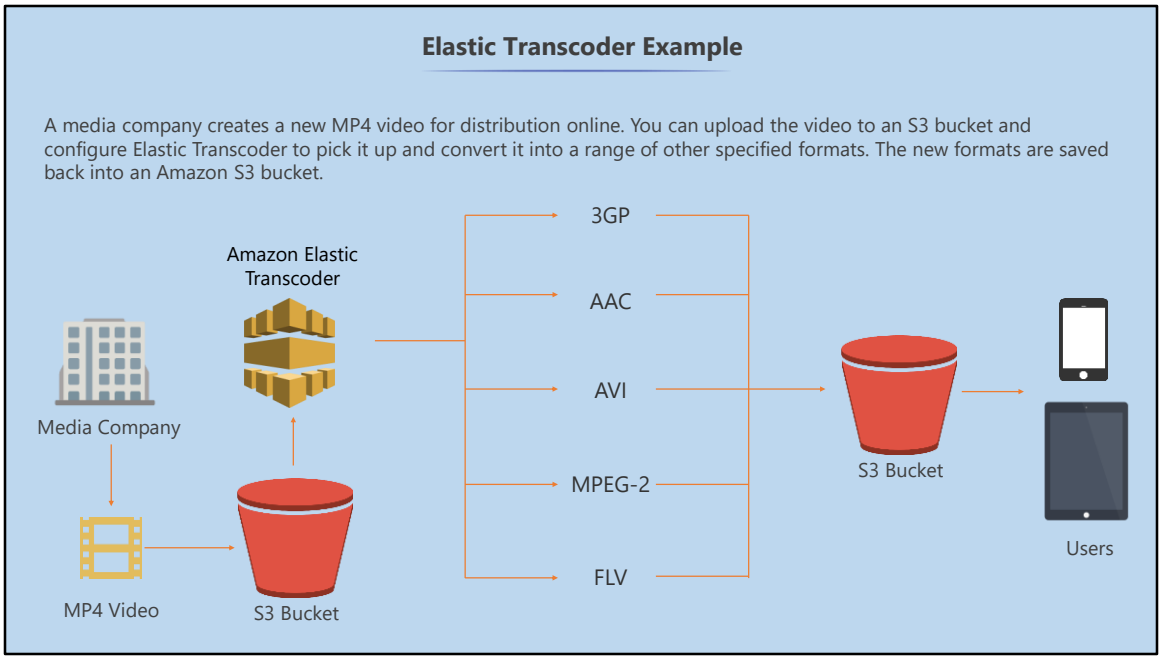
Amazon SNS can send messages from Amazon S3 but not directly to Amazon S3.



In this section you'll learn about Amazon Elastic Transcoder and its features.



Amazon Elastic Transcoder is a media transcoding service in the cloud.
It converts media files from their original format to other formats that can play on smartphones, tablets, and so on.



For example, a media company creates a new MP4 video for distribution online. You can upload the video to an S3 bucket and configure Elastic Transcoder to pick it up and convert it into a range of other specified formats. The new formats are saved back into an Amazon S3 bucket. You can now distribute the new formats online.

Knowledge Check

1 **What is Amazon Elastic Transcoder used for?**

Streaming real time media

Storing media files cost effectively

Converting media files to different formats

Providing low latency media content to end users

1 **What is Amazon Elastic Transcoder used for?**

Streaming real time media

Storing media files cost effectively

Converting media files to different formats

Providing low latency media content to end users

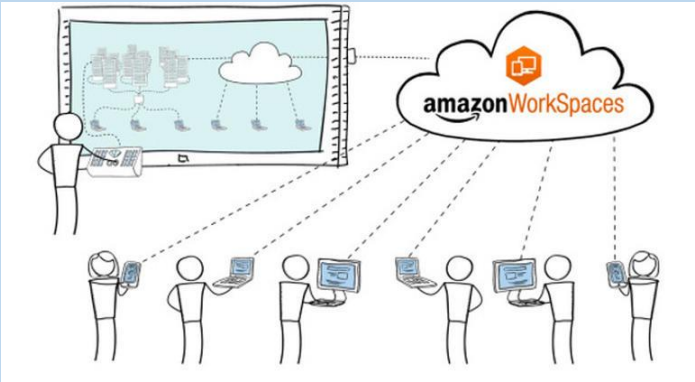
c

Elastic Transcoder is used to convert media files from original format into other formats that will play on smartphones, tablets, and so on.

Amazon WorkSpaces

Amazon WorkSpaces

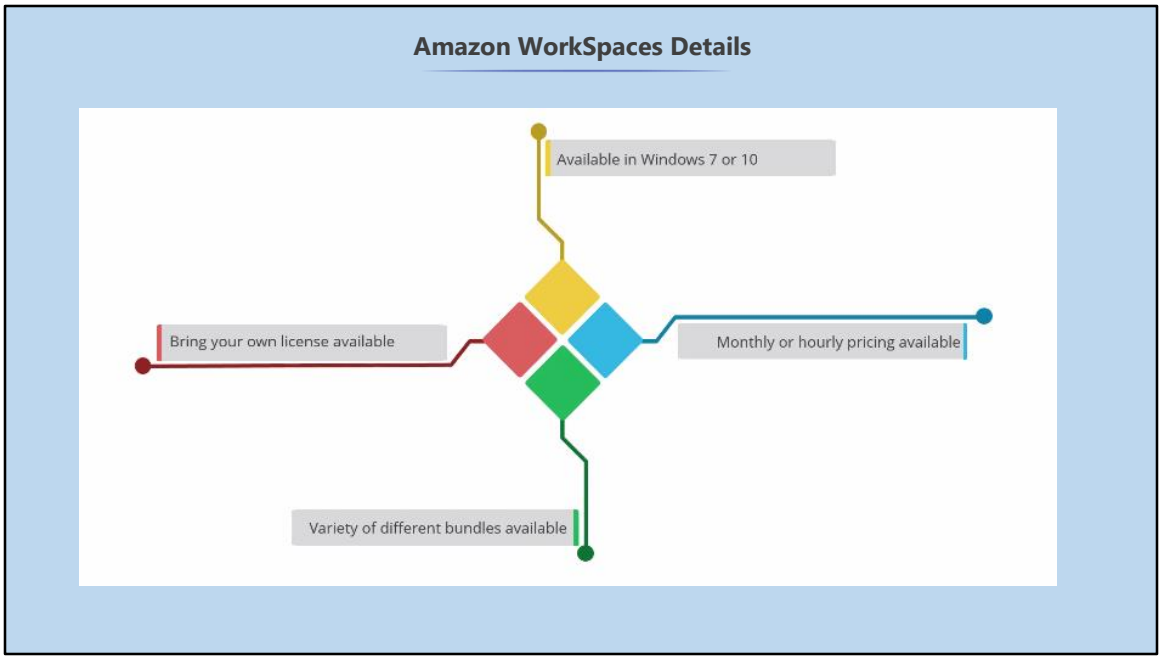
Amazon WorkSpaces is a fully-managed, secure Desktop-as-a-Service solution that runs on AWS.



Amazon WorkSpaces is a fully managed, secure Desktop-as-a-Service (DaaS) solution which runs on AWS.

Virtual desktop in the cloud.

- No need to buy your own hardware (desktops or VDI)
- No need to support and manage your own hardware
- Fully scalable, can launch and terminate virtual desktops in minutes
- Can be accessed from anywhere from most operating systems and devices
- User data backed up every 12 hours
- Users do not need an AWS account
- Can create your own desktop images for easy deployment
- Disk volumes can be encrypted



- Available in Windows 7 or 10
- BYOL available
- Monthly or hourly pricing available
- Variety of different bundles available

Amazon WorkSpaces Details (Contd.)

Value	Standard	Performance	Graphics
• 1 vCPU, 2 GiB memory • 10 GB storage (SSD) • Utilities software bundle	• 2 vCPU, 4 GiB memory • 50 GB storage (SSD) • Utilities software bundle	• 2 vCPU, 7.5 GiB memory • 100 GB storage (SSD) • Utilities software bundle	• 8 vCPU, 15 GiB memory • 1 GPU, 4 GiB video memory • 100 GB storage (SSD) • Utilities software bundle

- Available in Windows 7 or 10
- BYOL available
- Monthly or hourly pricing available
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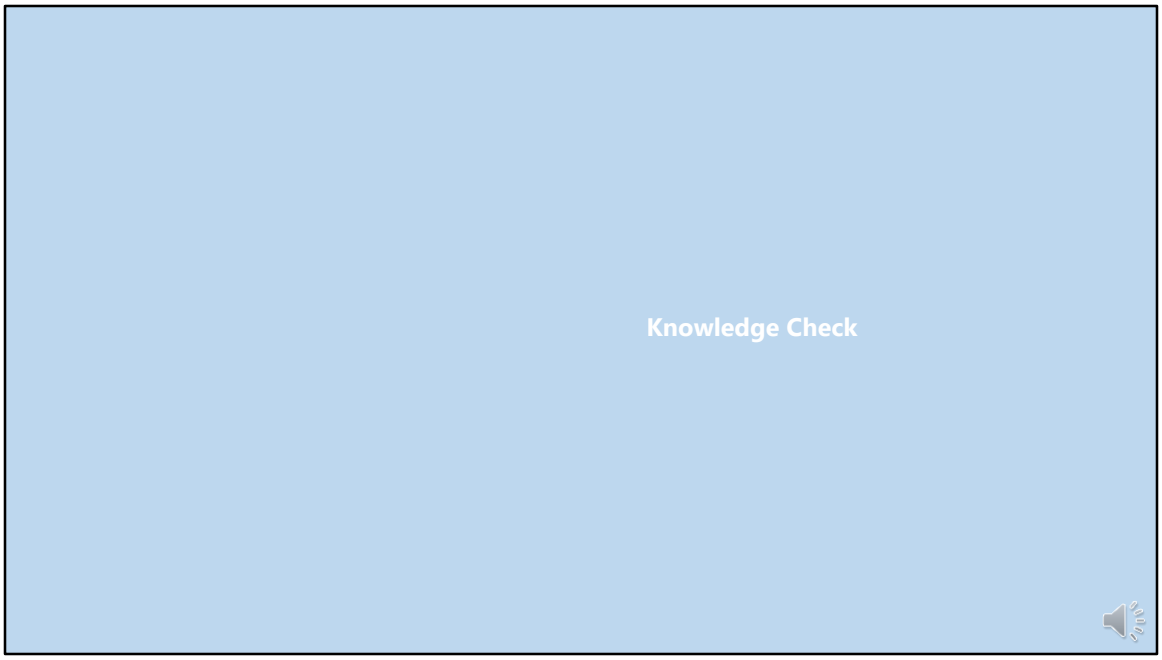

Knowledge Check

1 **How often are Amazon WorkSpaces user volumes backed up?**

Every 24 hours

Weekly

Every 12 hours

Never

1 How often are Amazon WorkSpaces user volumes backed up?

Every 24 hours

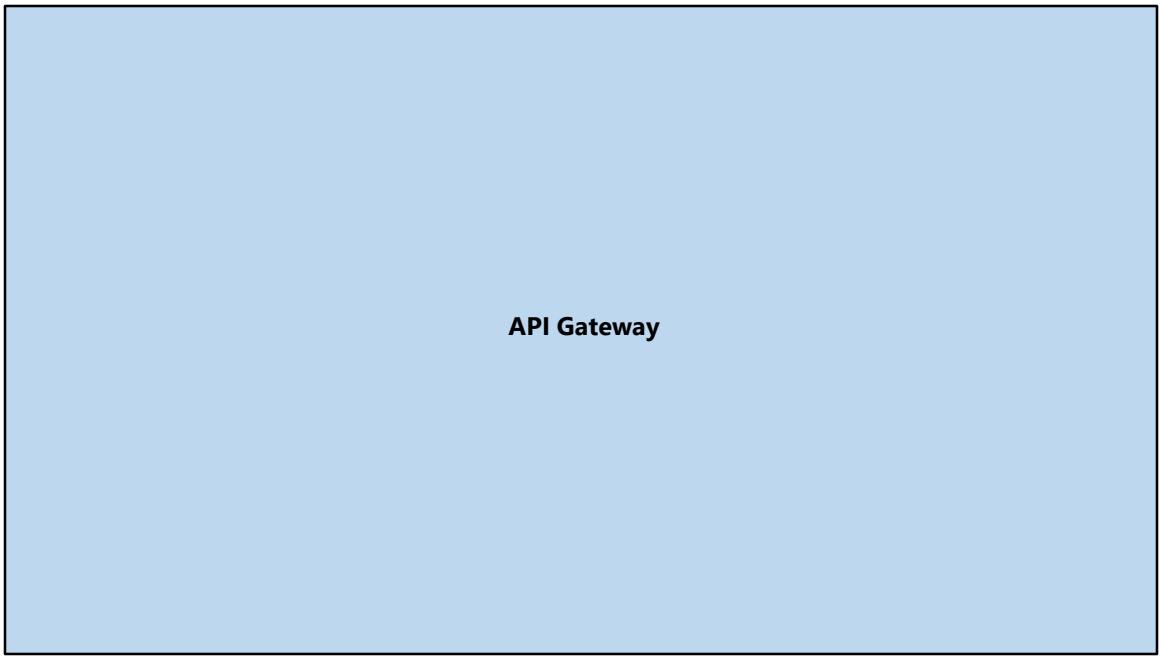
Weekly

Every 12 hours

Never

c

Amazon WorkSpaces back up user volumes every 12 hours.


API Gateway

API Gateway

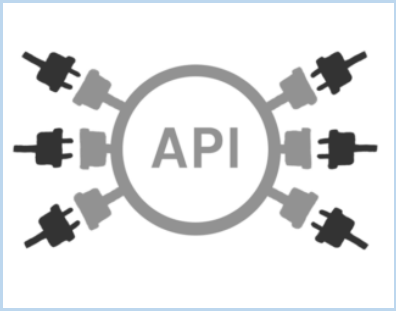
API Gateway is a fully-managed, scalable API management service that allows you to create, publish, maintain, monitor, and secure your API's.

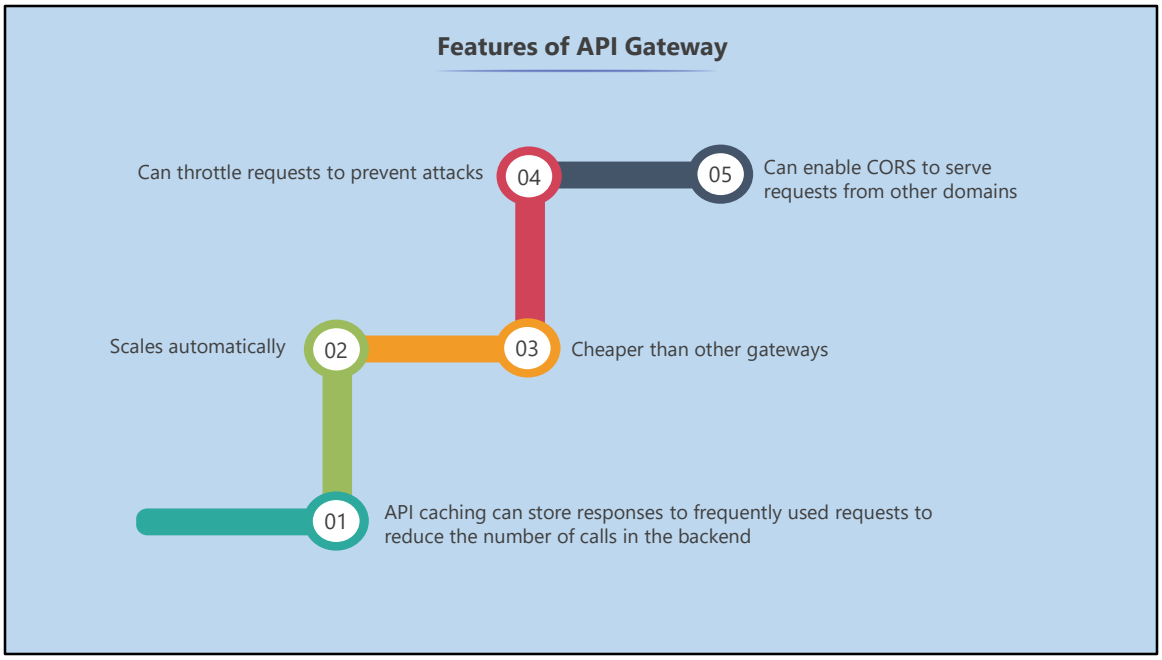
API Gateway is a fully managed, scalable API management service.
Allows you to create, publish, maintain, monitor and secure your API's.

API

API stands for Application Programming Interface.

It allows two applications to talk to each other and is created for apps to access data, logic, etc.





API caching – caches endpoints response to reduce the number of calls to the API.
Use TTL to define how long results are stored in the cache.
Scales automatically
Low cost
Can throttle requests to prevent attacks – set it to only serve x number of requests per second to maintain stability of your backend.
Can enable CORS (cross origin resource sharing to serve requests from other domains

Knowledge Check

1 **Which of these is not a feature associated with API Gateway?**

Automatic scaling

Accelerated video streaming

Ability to throttle requests to prevent attacks

API caching

1 **Which of these is not a feature associated with API Gateway?**

Automatic scaling

Accelerated video streaming

Ability to throttle requests to prevent attacks

API caching

b

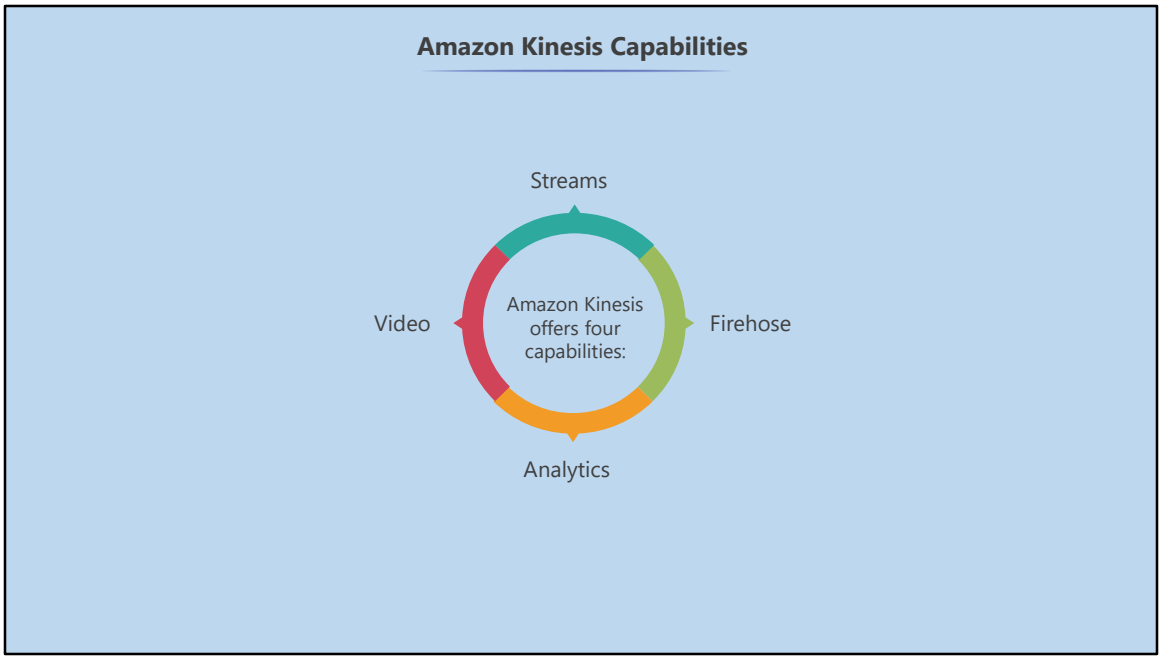
Accelerated video streaming is a feature of Amazon Kinesis, not API Gateway.

Amazon Kinesis

Amazon Kinesis

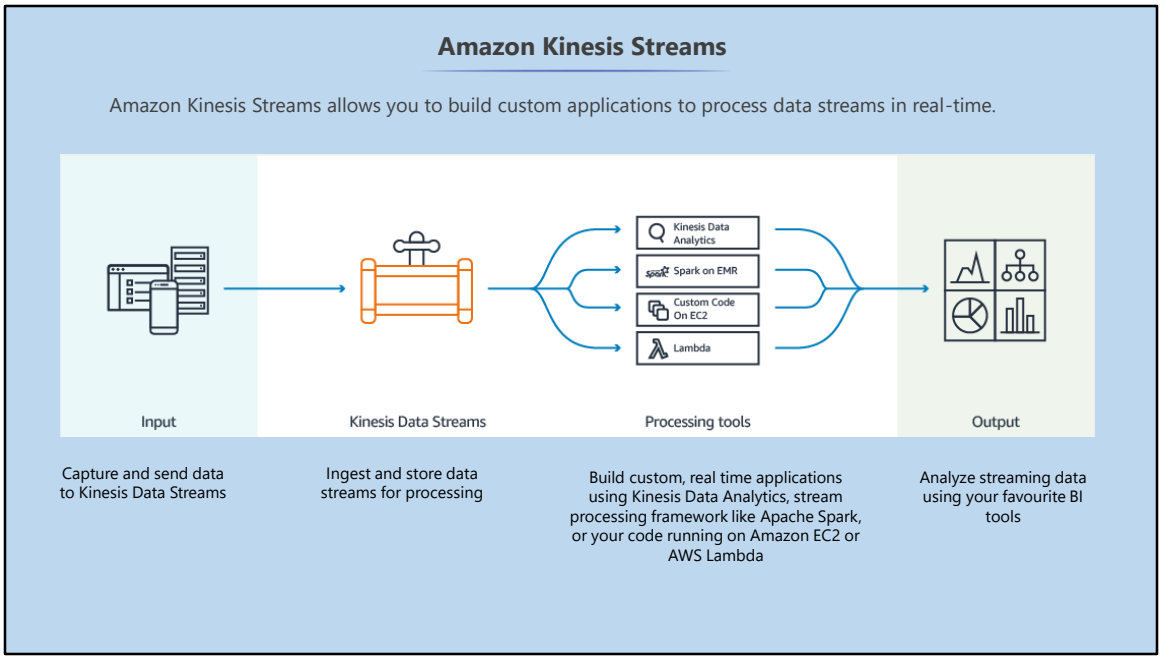
Amazon Kinesis manages services to allow the collection, processing, and analysis of real-time, streaming data.

Managed service to allow the collection, processing, and analysis of real-time, streaming data.
Streaming data - data that is generated continuously by multiple data sources, which is sent simultaneously. Stock prices, store purchases, social media data, geospatial data, iOT data, etc.



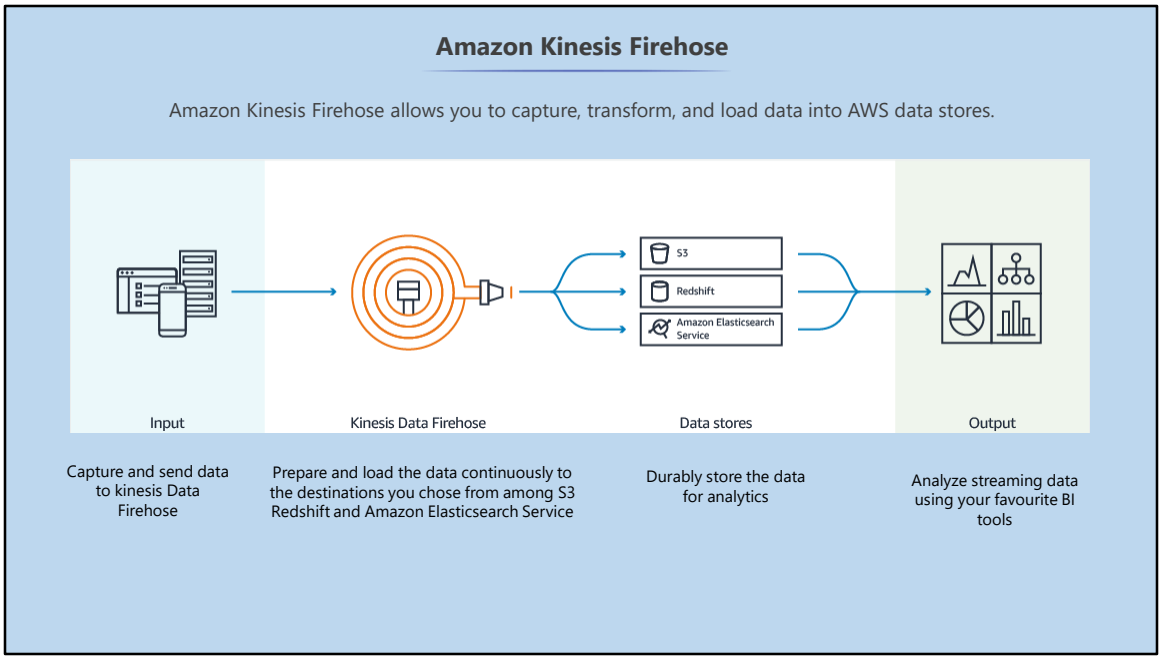
Amazon Kinesis offers 4 different capabilities:

Streams
Firehose
Analytics
Video

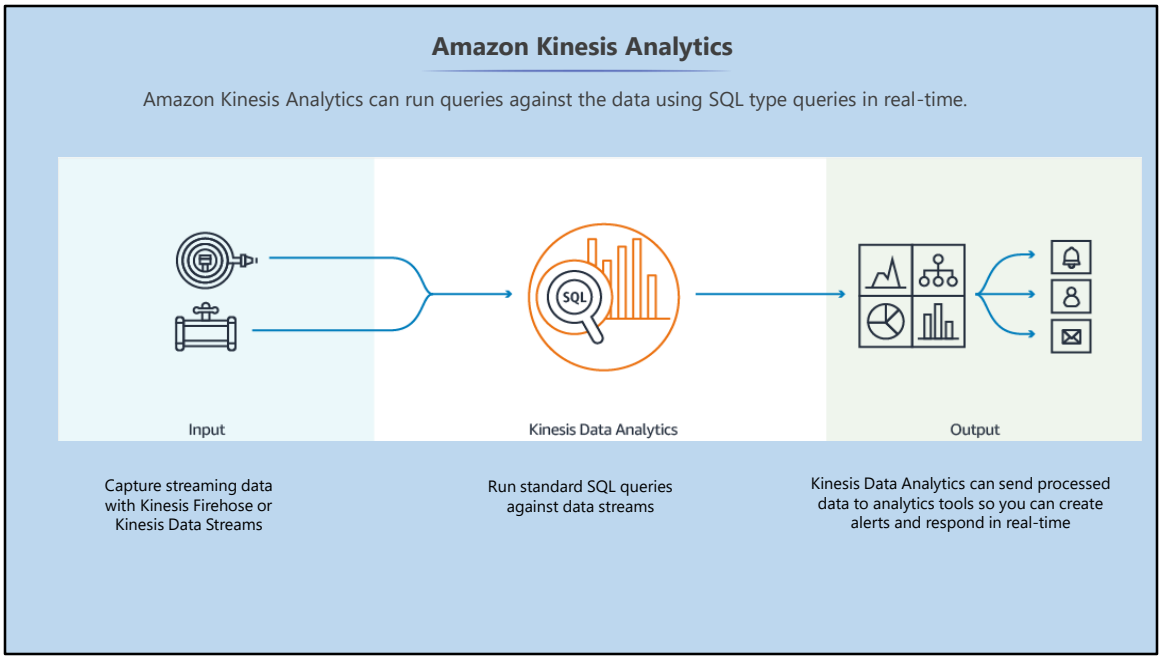


Amazon Kinesis Data Streams enables you to build custom, real-time applications that process data streams using popular stream processing frameworks.

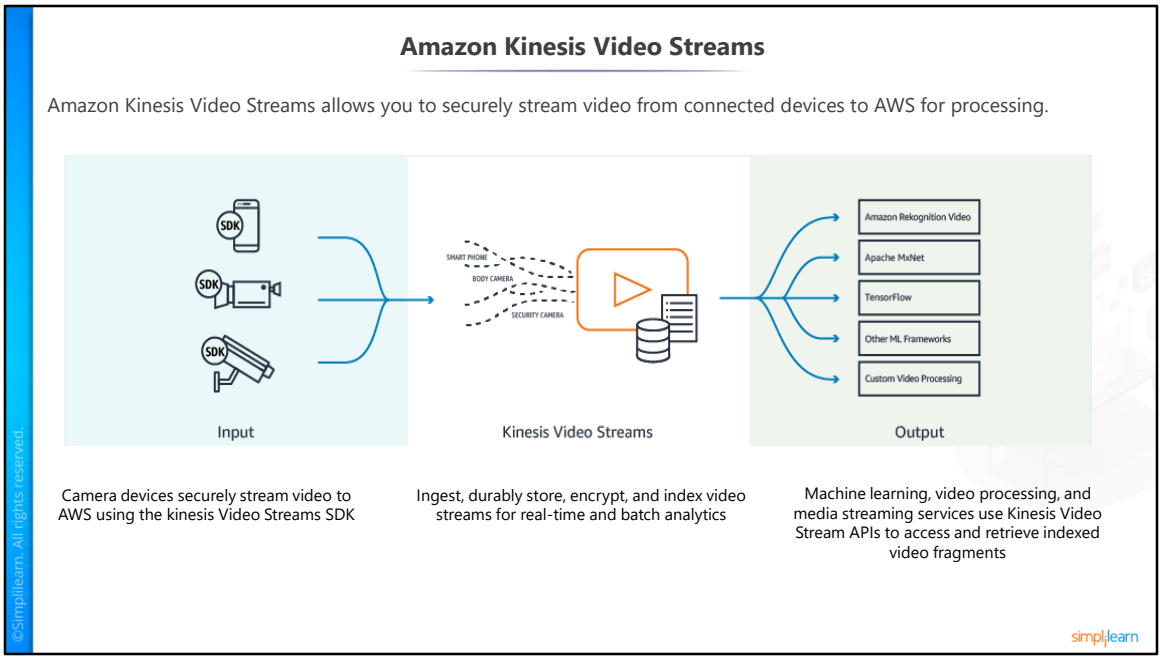
Producers (ec2, phones, laptops, etc.) -> Kinesis streams (stored in shards for 24 hours-7 days) -> consumers (EC2, lambda) take data from shards and do something with them -> storage (s3/emr, dynamodb, redshift, BI tools)



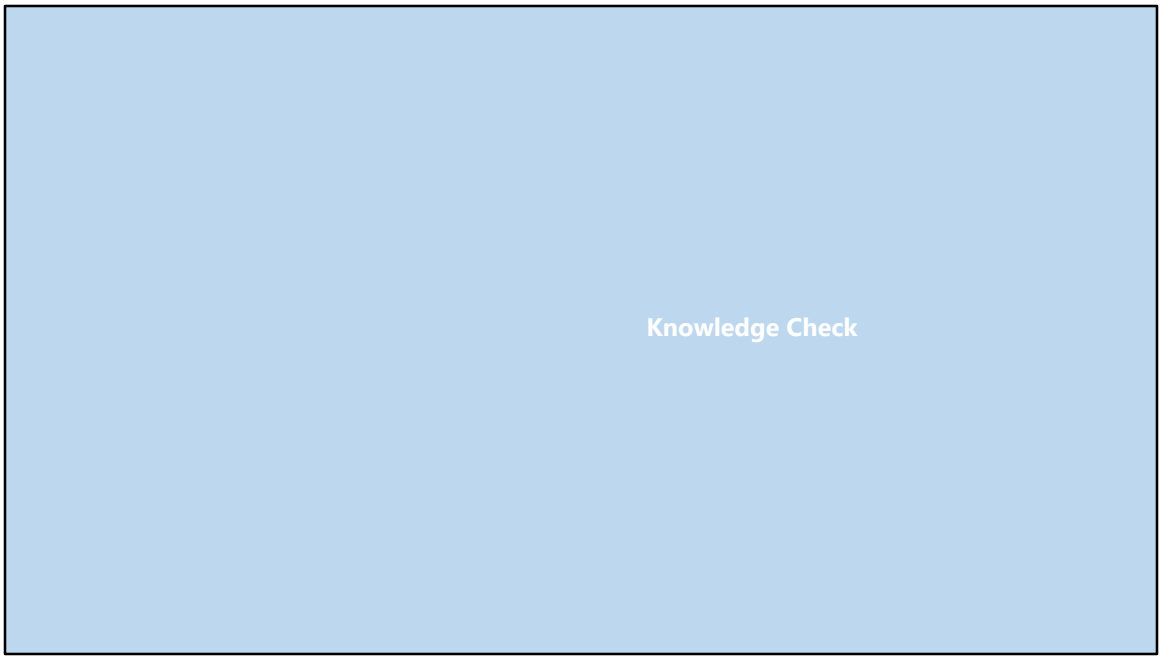
No need to worry about shard/streams or consumers. Automated. Data stored in S3/db,elastic search, etc.



Amazon Kinesis Data Analytics can run queries against the data using SQL type queries in real-time.



Amazon Kinesis Video Streams makes it easy to securely stream video from connected devices to AWS for analytics, machine learning (ML), and other processing.


Knowledge Check

1 **Amazon Kinesis Streams are stored in:**

Consumers

Shards

Producers

Firehose

1 **Amazon Kinesis Streams are stored in:**

Consumers

Shards

Producers

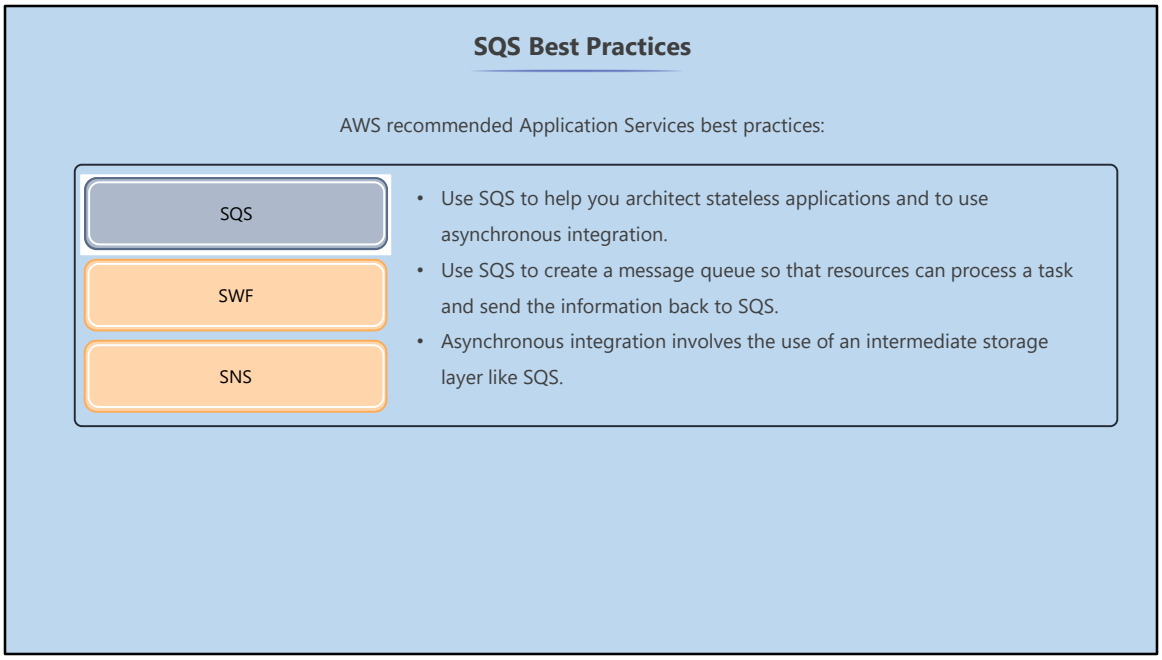
Firehose

b

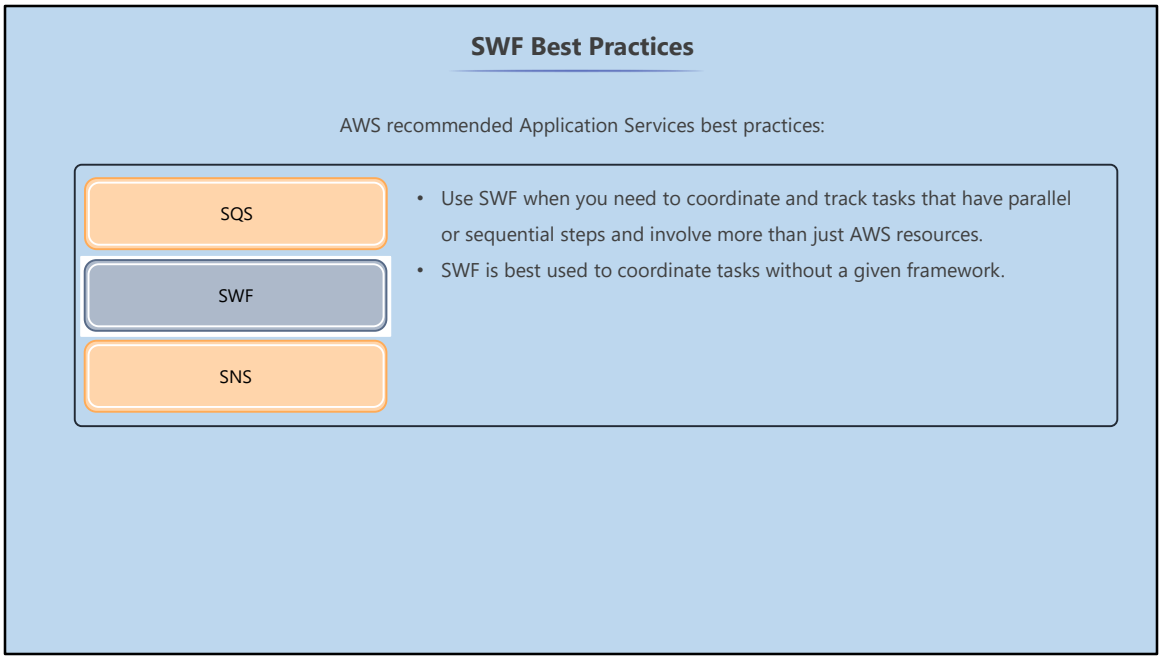
Amazon Kinesis streams are stored in shards between 24 hours and 7 days.

Application Services Best Practices and Costs

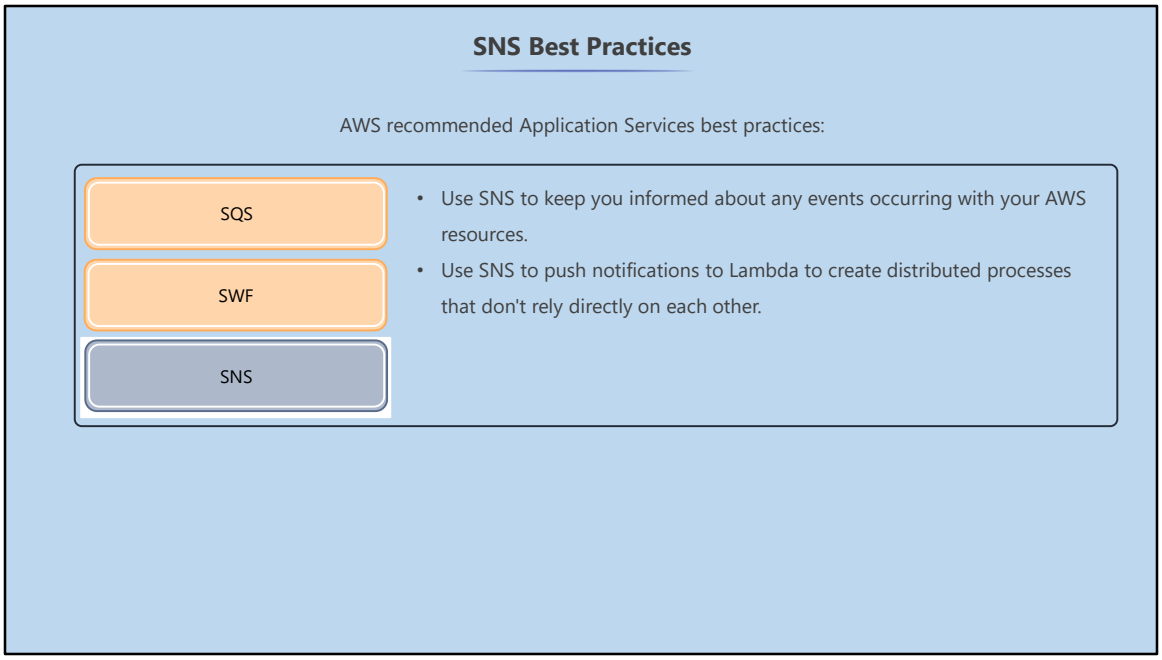
In this section you'll learn about the AWS recommended Application Services best practices.



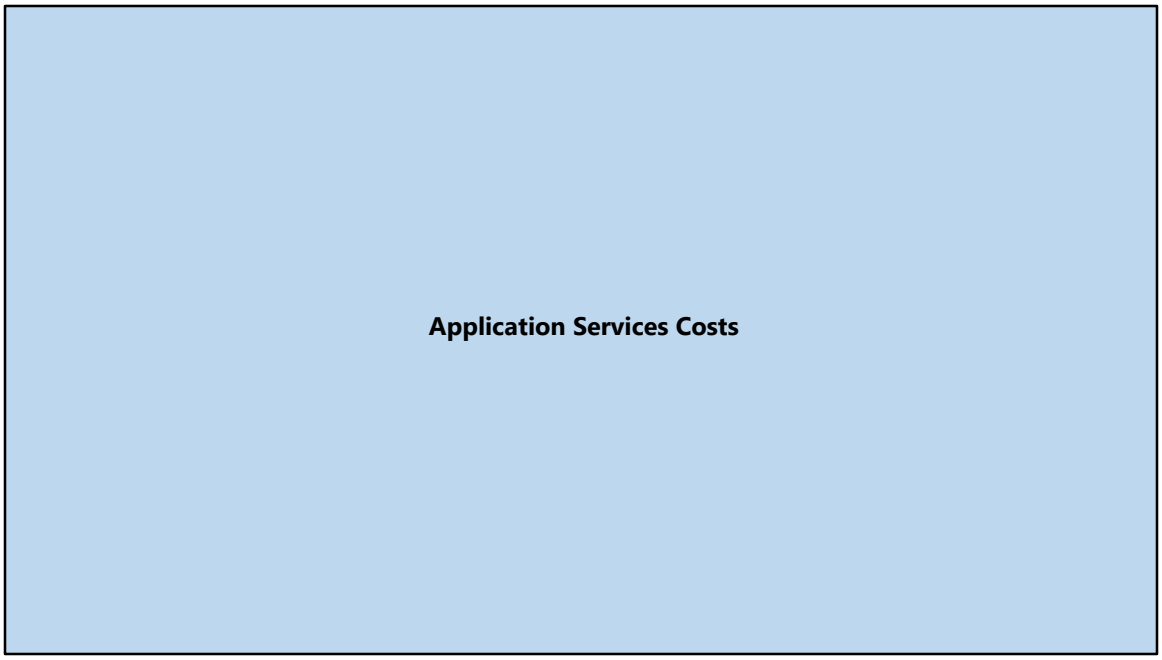
- You can use SQS to help you architect stateless applications and asynchronous integration.
- You can use SQS to create a message queue so that resources can process a task and send the information back to SQS.
- With the pull model, tasks that need to be performed can be stored as messages in a queue and multiple compute resources can pull and process the messages in a distributed fashion.
- Asynchronous integration involves the use of an intermediate storage layer like SQS.



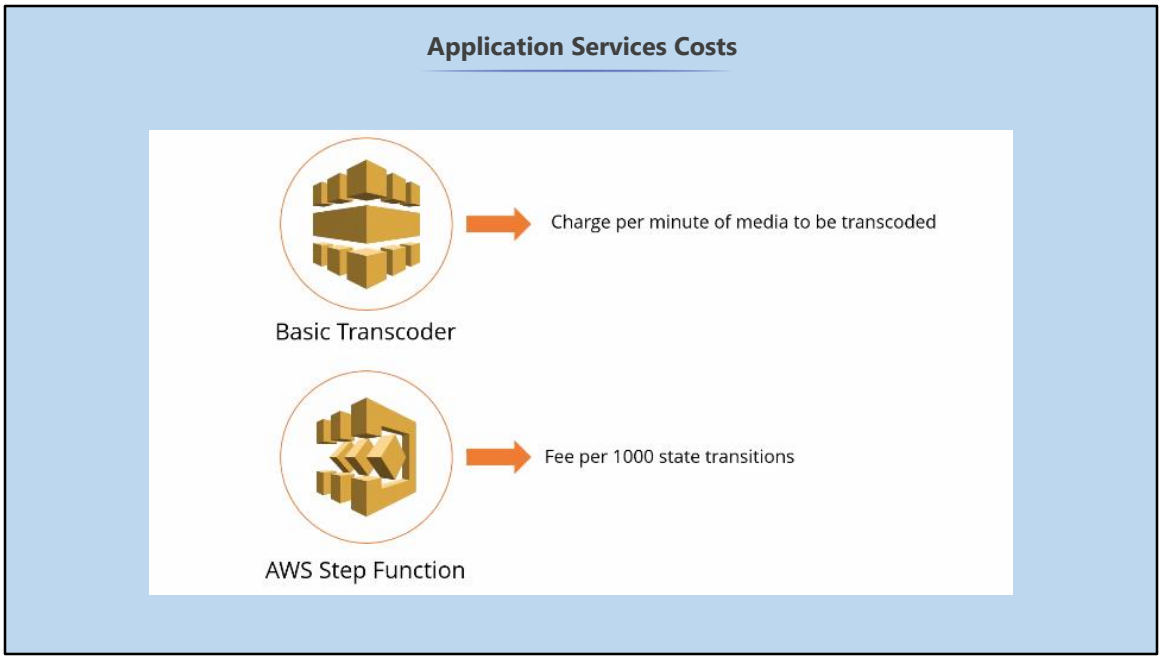
- You can use SWF when you need to coordinate and track tasks that have parallel or sequential steps and involve more than just AWS resources.
- SWF is perfect when you are trying to coordinate tasks without a given framework.



- You can use SNS to keep you informed about any events occurring within your AWS resources, for example Auto Scaling or files being deleted from an S3 bucket.
- You can use SNS to push notifications to Lambda to create distributed processes that don't rely directly on each other.



In this section you'll learn about the costs associated with the Application Services.


Application Services Costs
Charge per minute of media to be transcoded
Basic Transcoder
Fee per 1000 state transitions
AWS Step Function

Application Services Costs (Contd.)

Practice Assignment: Amazon SNS

Your company wants to be notified when users delete files from their Amazon S3 bucket.

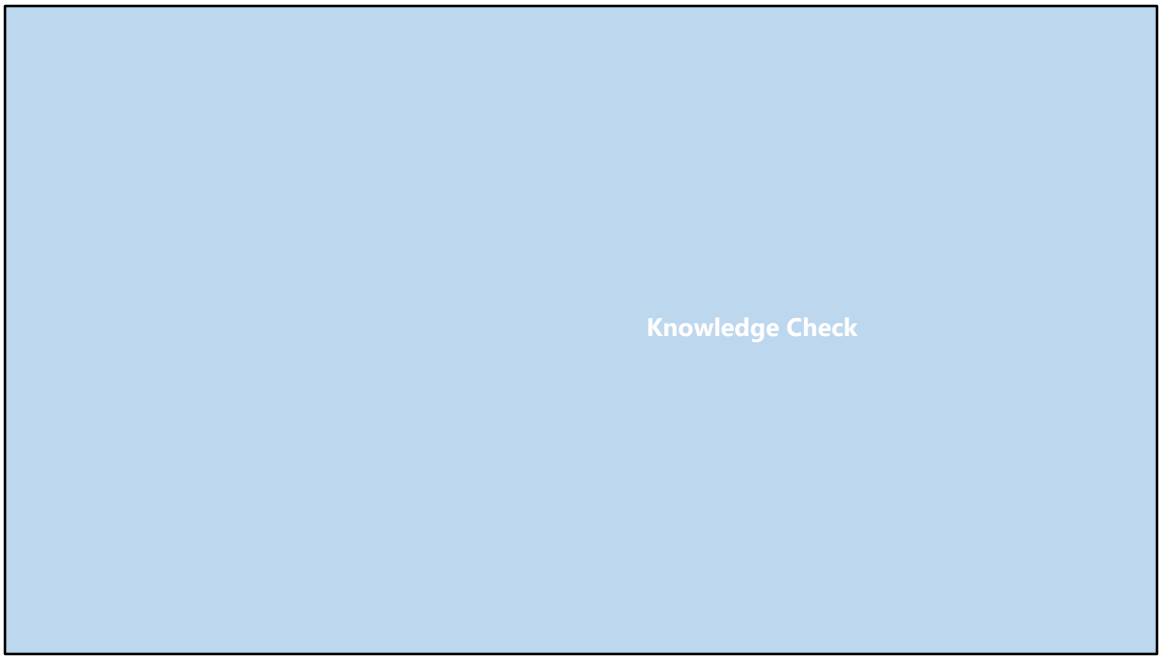
You will need to perform the following steps:

1. Configure an SNS topic
2. Add your email address as a subscriber to the topic
3. Configure the topic policy to allow permissions from other resources
4. Configure an S3 event for the delete
5. Verify that your event notification worked

You can use Demonstration 1 from this lesson as a reference for this Practice Assignment.

In this section you'll configure an SNS topic to send alerts.

- Amazon Simple Queue Service (SQS) is a fast, reliable, scalable, and fully-managed message queuing service.
- Amazon SWF is a fully-managed task coordinator and tracker that allows you to build, run, and scale background jobs that have parallel or sequential steps.
- SWF and SQS differ based on the criteria of message retention period, API, delivery, and tracking.
- Amazon SNS is a fully-managed publication-subscription based messaging service that can be used to send push notifications, emails, and SMS messages
- Amazon Elastic Transcoder is media transcoding service in the Cloud.



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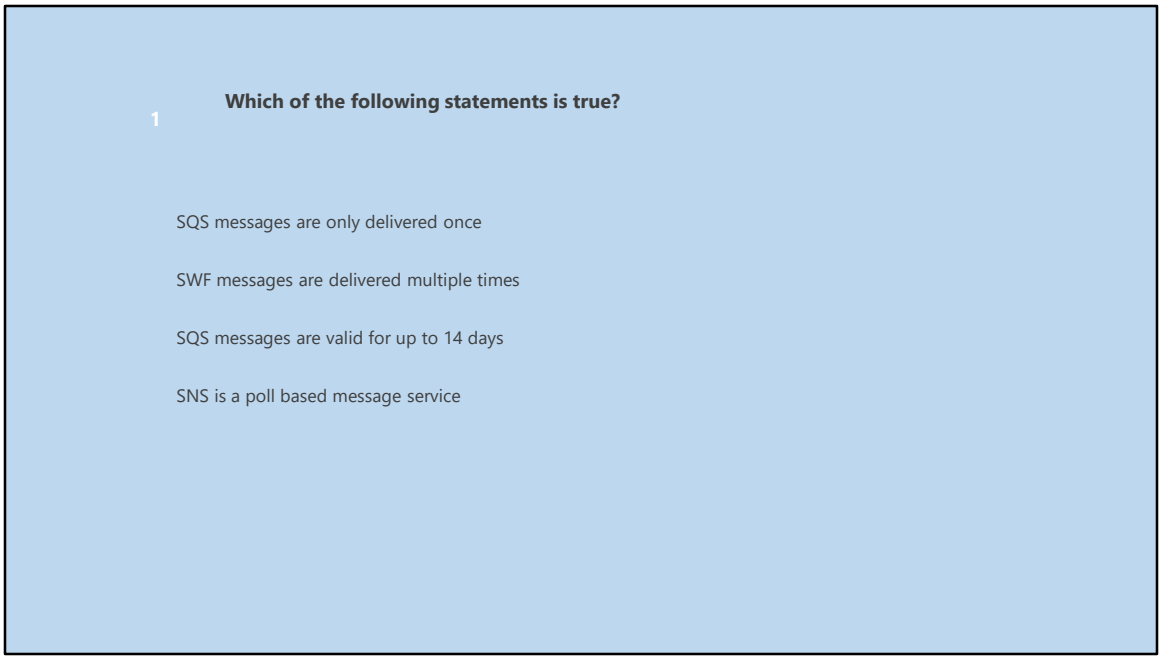

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1 **Which of the following statements is true?**

SQS messages are only delivered once

SWF messages are delivered multiple times

SQS messages are valid for up to 14 days

SNS is a poll based message service

c

SQS messages are valid for up to 14 days; all the other statements are incorrect.

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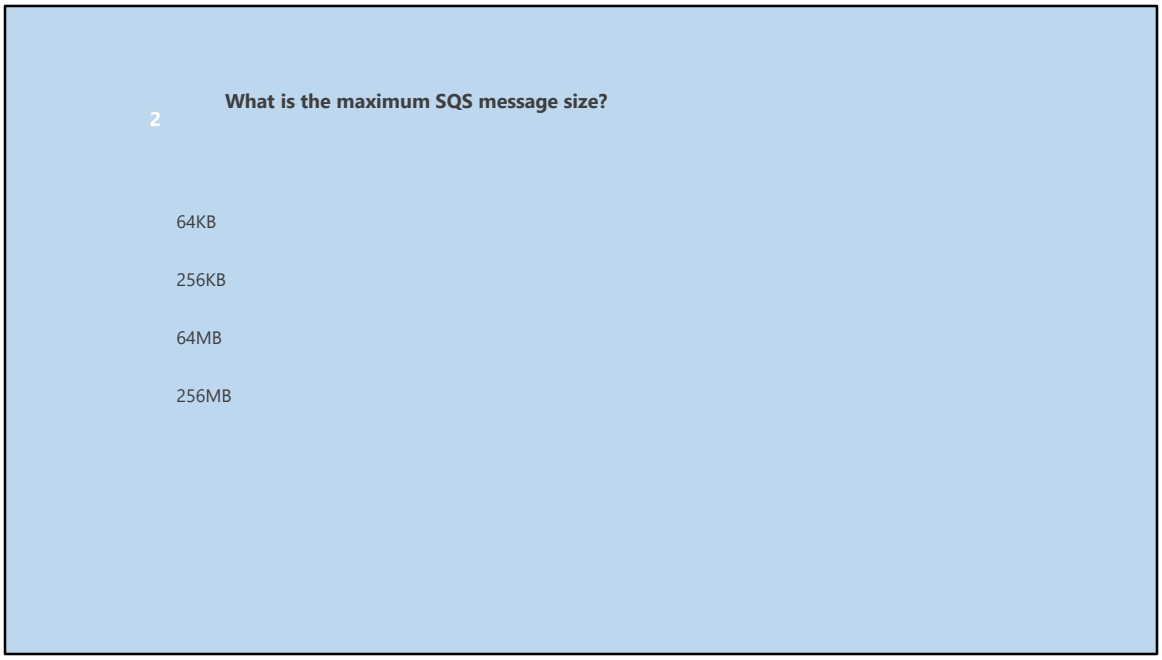

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2 What is the maximum SQS message size?

64KB

256KB

64MB

256MB

b

SQS messages can be up to 256KB in size, and you are billed in 64KB chunks.

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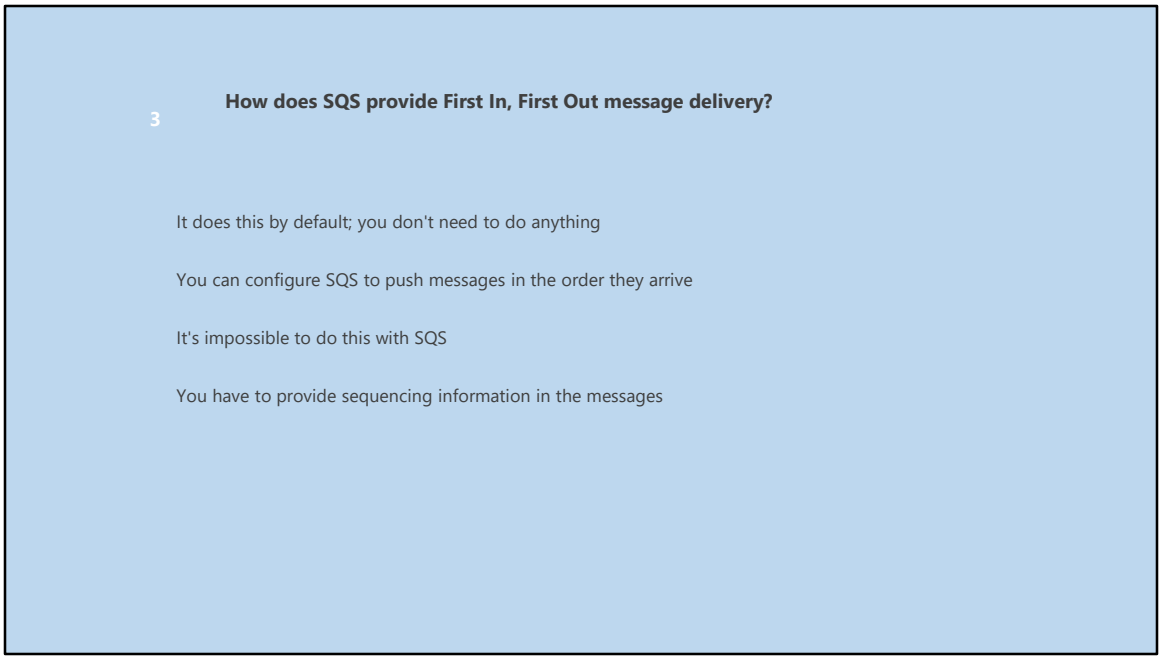

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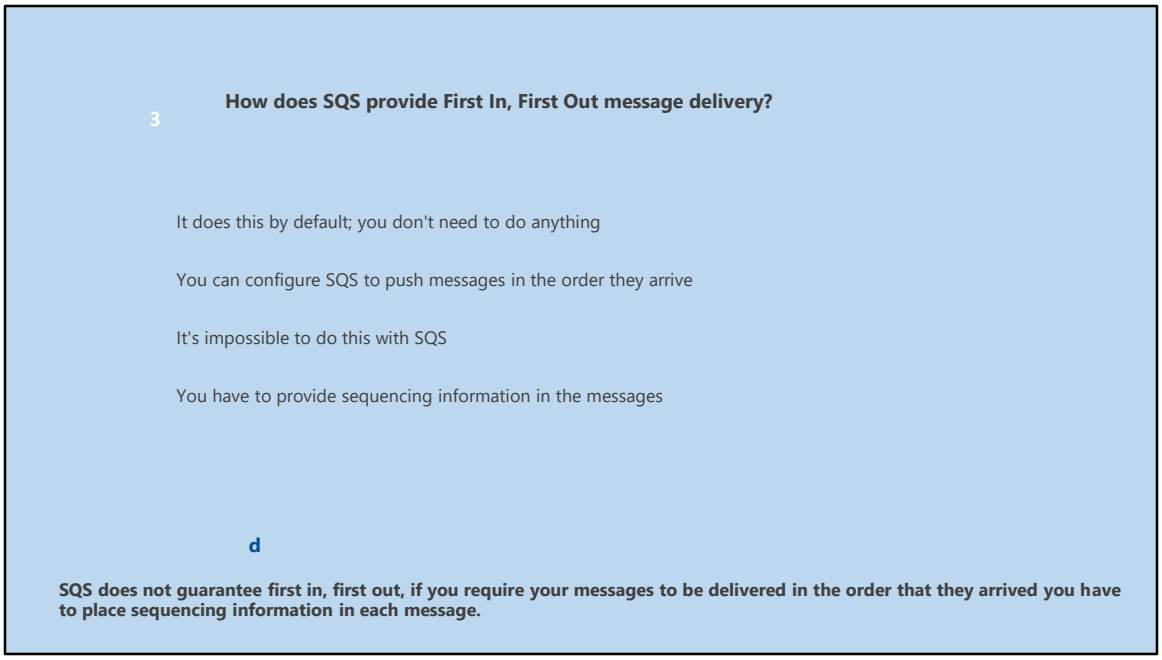

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4 **What are the three SWF actor types?**

Workflow Starters, Deciders, and Workers

Workflow Initiators, Determiners, and Operators

Workflow Commencers, Resolvers, and Actors

Workflow Originators, Assessors, and Contractors

a

Workflow Starters, Deciders, and Workers are the three types of AWS actors.

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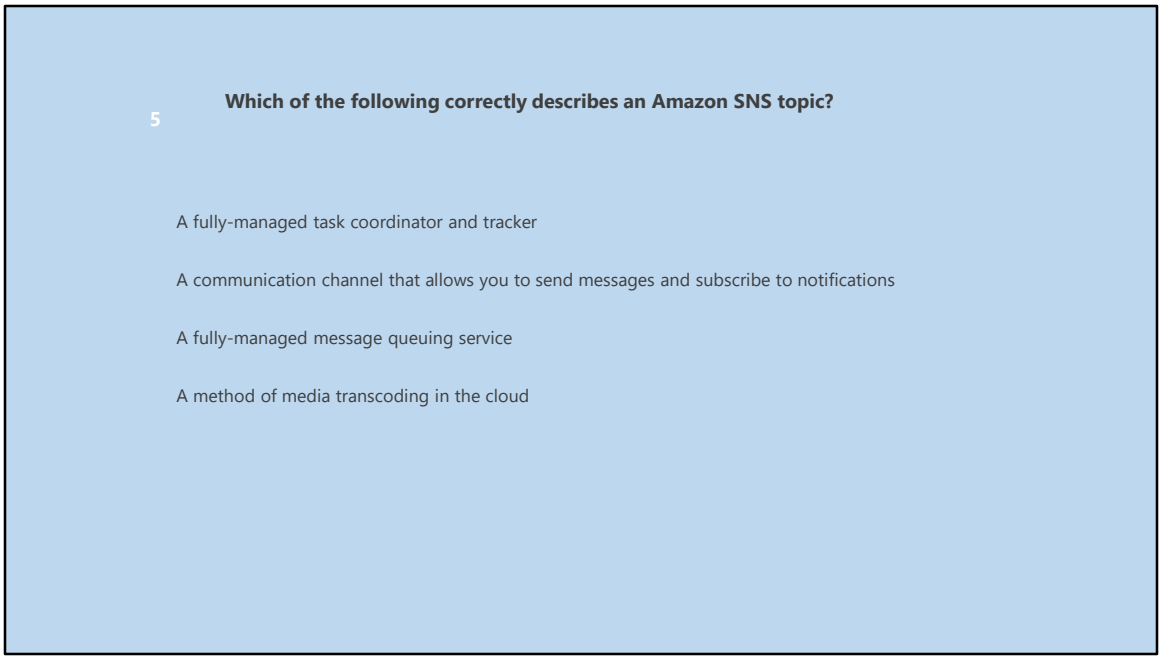

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5 **Which of the following correctly describes an Amazon SNS topic?**

A fully-managed task coordinator and tracker

A communication channel that allows you to send messages and subscribe to notifications

A fully-managed message queuing service

A method of media transcoding in the cloud

b

An SNS topic is a communication channel that provides an access point for publishers and subscribers to communicate with each other.

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