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SDP CLOUD COMPUTING MAJOR PROJECT REPORT

PROBLEM STATEMENT :

Send Fanout Event Notifications with Amazon Simple Queue Service (SQS) and Amazon Simple Notification Service (SNS)

INTRODUCTION:

- **Amazon Simple Queue Service (SQS):**

SQS is a fully managed message queuing service that enables you to decouple and scale microservices, distributed systems, and serverless applications. It provides a reliable, highly available, and scalable hosted queue for storing messages as they travel between different components of your applications.

SQS ensures that messages are delivered at least once, and in some cases, exactly once.

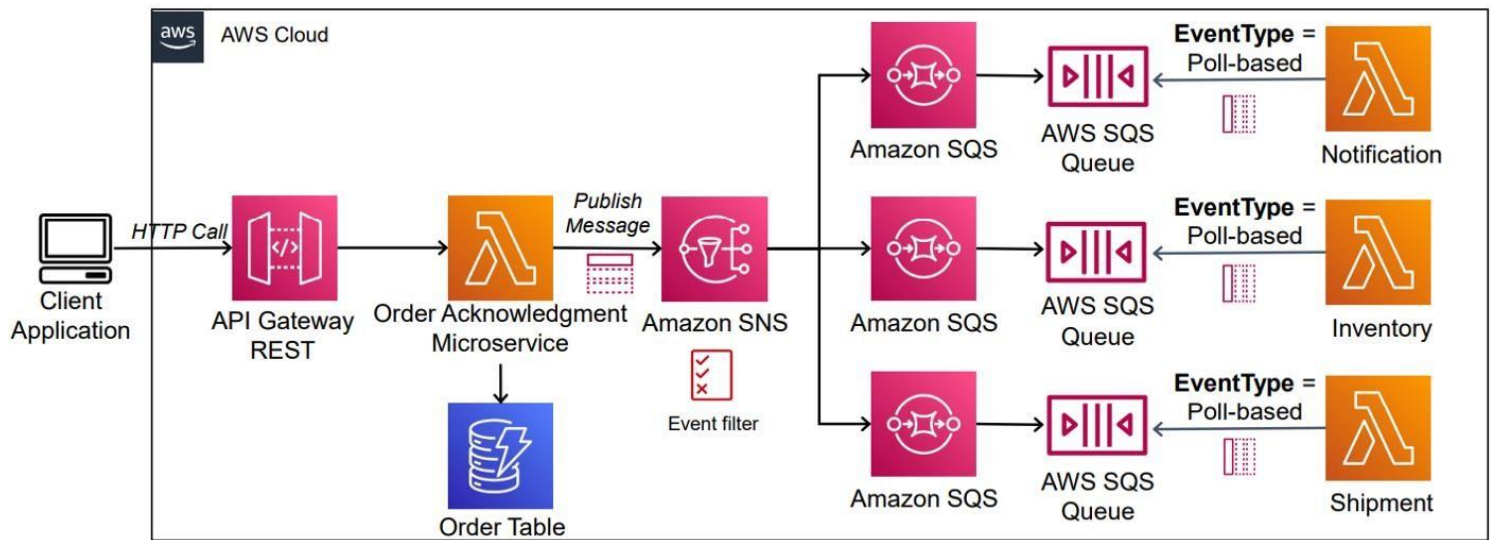
- **Amazon Simple Notification Service (SNS):**

SNS is a fully managed pub/sub messaging service that enables you to fan out messages to a large number of subscribers. It provides topics for high-throughput, push-based, many-to-many messaging between publishers and subscribers.

It ensures message delivery with retries, giving you the flexibility to define delivery policies, including message persistence and delivery retry settings.

- **Integration of SQS and SNS for Fanout Event Notifications:**
You can use SQS as a subscriber to an SNS topic, enabling fanout messaging to multiple SQS queues simultaneously.
This architecture allows you to decouple message producers from consumers and scale each independently.
When a message is published to an SNS topic, SNS delivers a copy of the message to each subscribed SQS queue.
SQS then manages the delivery of messages to consumers, providing reliable, scalable message processing.

ARCHITECTURE:

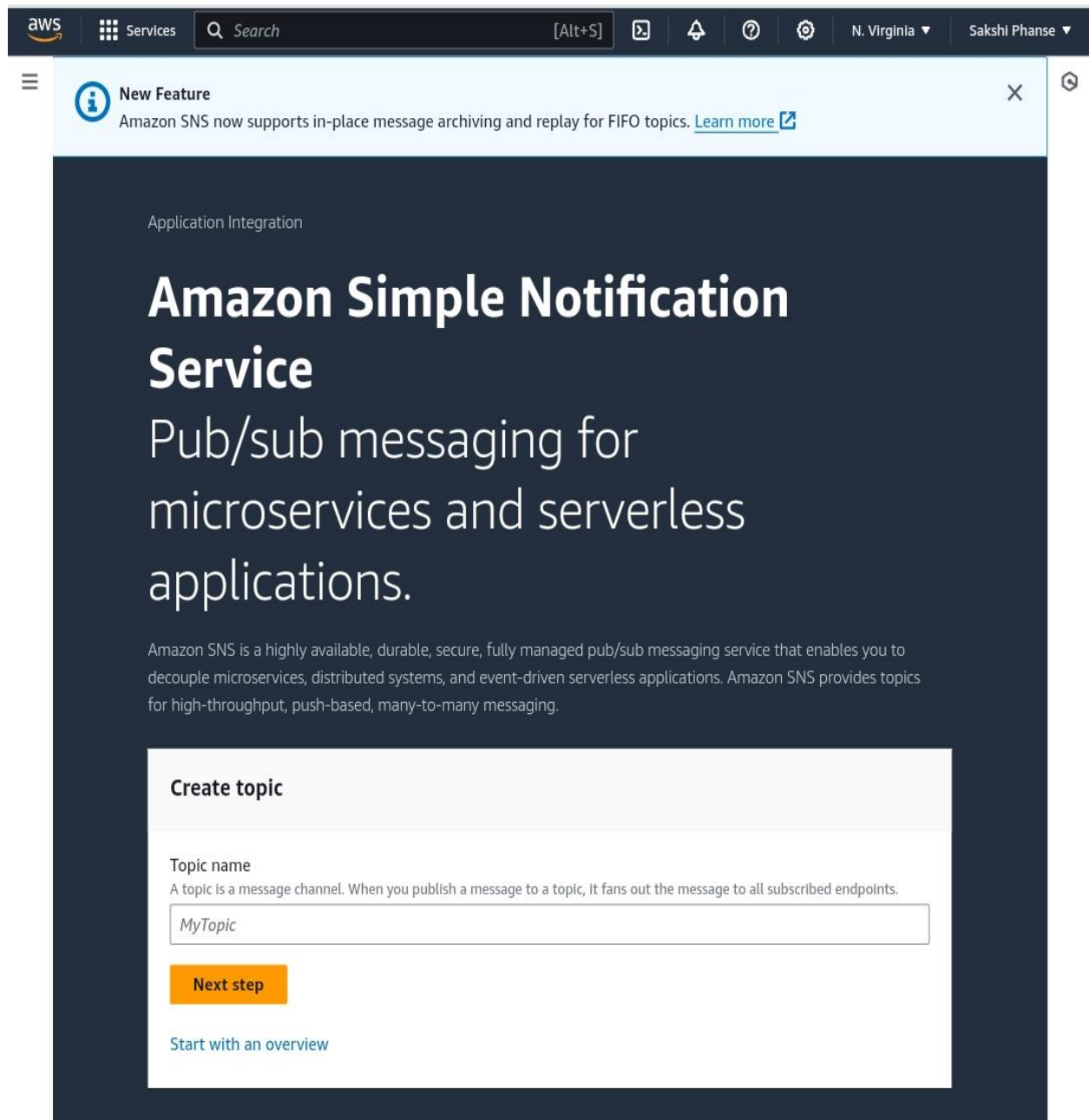


PROCEDURE:

Step 1: Create an Amazon SNS Topic.

- Login into the Amazon Management Console.
- Navigate to the Amazon SNS service.

us-east-1.console.aws.amazon.com



The screenshot shows the Amazon Management Console interface for the Amazon SNS service. At the top, there's a navigation bar with the AWS logo, 'Services' menu, a search bar, and user information for 'Sakshi Phanse' in the 'N. Virginia' region. A 'New Feature' banner is visible, stating 'Amazon SNS now supports in-place message archiving and replay for FIFO topics.' The main content area has a dark blue background with the text 'Amazon Simple Notification Service' and 'Pub/sub messaging for microservices and serverless applications.' Below this, a description of Amazon SNS is provided. The 'Create topic' form is displayed, featuring a 'Topic name' field with the value 'MyTopic' and a 'Next step' button. A link 'Start with an overview' is also present.

Application Integration

Amazon Simple Notification Service

Pub/sub messaging for microservices and serverless applications.

Amazon SNS is a highly available, durable, secure, fully managed pub/sub messaging service that enables you to decouple microservices, distributed systems, and event-driven serverless applications. Amazon SNS provides topics for high-throughput, push-based, many-to-many messaging.

Create topic

Topic name

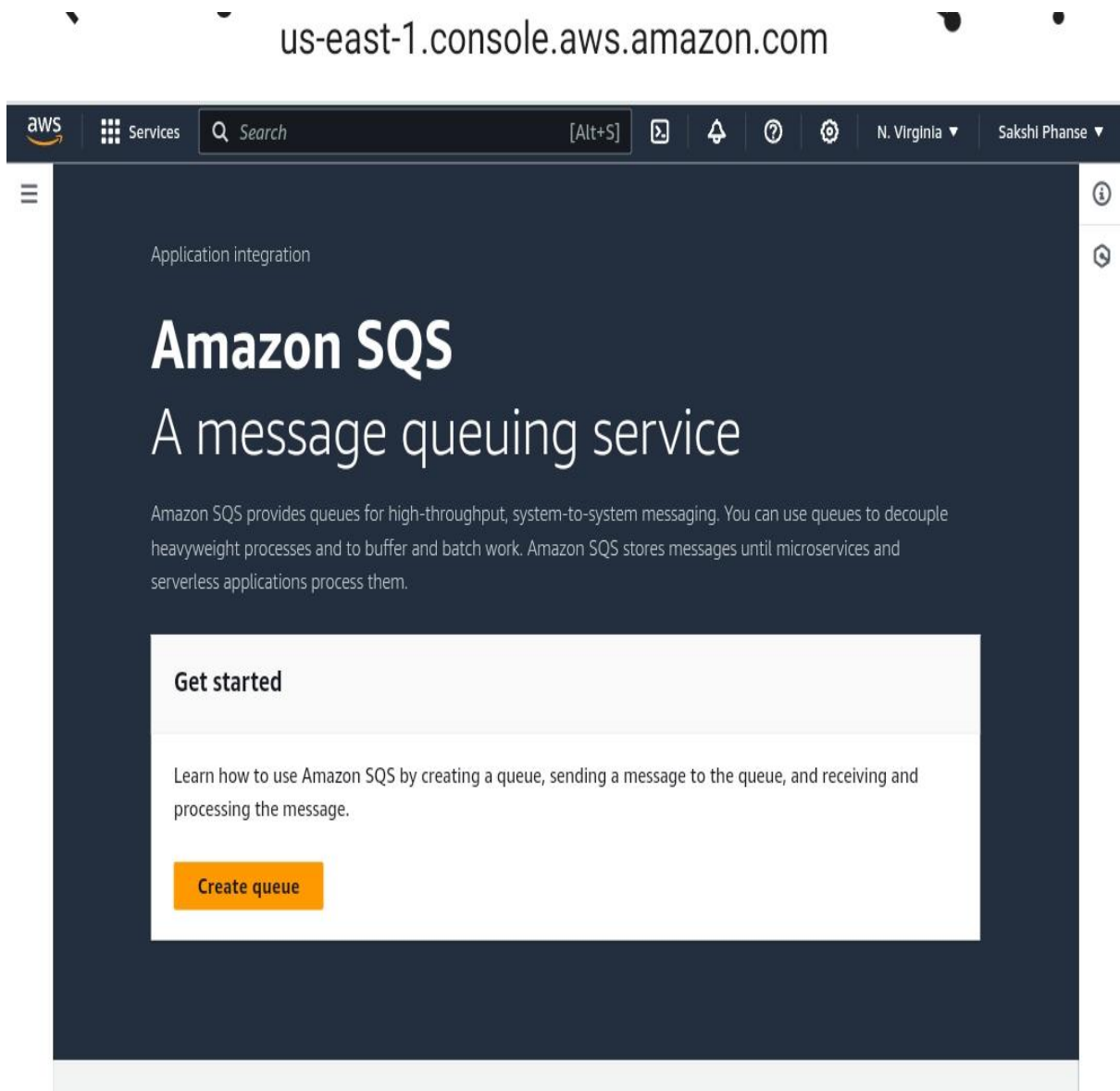
A topic is a message channel. When you publish a message to a topic, it fans out the message to all subscribed endpoints.

Next step

[Start with an overview](#)

Step2: Create the Amazon SQS Queues.

- Navigate to SQS Queues.



- Click on Create queue.
- Give the queue name.
- Go at the bottom of the page and click on create queue.

us-east-1.console.aws.amazon.com

Services [Alt+S] N. Virginia Sa

Queue sms-inventory created successfully
You can now send and receive messages.

Amazon SQS > Queues > sms-inventory

sms-inventory

Edit

Delete

Purge

Send and receive messages

Start DLQ redrive

Details [Info](#)

Name	Type	ARN
sms-inventory	Standard	arn:aws:sqs:us-east-1:322282034833:sms-inventory
Encryption	URL	Dead-letter queue
Amazon SQS key (SSE-SQS)	https://sqs.us-east-1.amazonaws.com/322282034833/sms-inventory	-

More

< SNS subscriptions

Lambda triggers

EventBridge Pipes

Dead-letter queue

Monitoring

>

Subscription region

us-east-1

SNS subscriptions (0) [Info](#)

View in SNS

Delete

Subscribe to Amazon SNS topic

< 1 >

Subscription ARN ▲ Topic ARN ▼

No Amazon SNS subscriptions

To allow your queue to receive messages, subscribe it to an Amazon SNS topic.

Subscribe to Amazon SNS topic

- Create One more Queue.

aws

Services

Q

Search

[Alt+S]

N. Virginia

Sakshi Phanse

Queue sms-notify created successfully

You can now send and receive messages.

Amazon SQS

Queues

sms-notify

sms-notify

Edit

Delete

Purge

Send and receive messages

Start DLQ redrive

Details

Info

Name

☞ sms-notify

Type

Standard

ARN

☞ arn:aws:sqs:us-east-1:322282034833:sms-notify

Encryption

Amazon SQS key (SSE-SQS)

URL

☞ https://sqs.us-east-1.amazonaws.com/322282034833/sms-notify

Dead-letter queue

-

▶ More

<

SNS subscriptions

Lambda triggers

EventBridge Pipes

Dead-letter queue

Monitoring

>

Subscription region

us-east-1

SNS subscriptions (0)

Info

↻

View in SNS

Delete

Subscribe to Amazon SNS topic

Q Search subscriptions

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1

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Subscription ARN

▲

Topic ARN

▼

No Amazon SNS subscriptions

To allow your queue to receive messages, subscribe it to an Amazon SNS topic.

Subscribe to Amazon SNS topic

Step3: Subscribe SQS Queues to SNS Topic.

- Select both the queues.
- Click on the **Action Button**.
- In dropdown menu select **Subscribe to SNS Topic**.
- Select your **SNS Topic**.
- Click on save.

The screenshot shows the AWS Management Console interface. At the top, a green banner indicates a successful subscription: "Subscribed successfully to topic arn:aws:sns:us-east-1:322282034833:sakshisms." Below this, the breadcrumb navigation shows "Amazon SQS > Queues > sms-notify". The queue name "sms-notify" is displayed with buttons for "Edit", "Delete", "Purge", "Send and receive messages", and "Start DLQ redrive".

The "Details" section for the queue includes the following information:

Name	Type	ARN
sms-notify	Standard	arn:aws:sqs:us-east-1:322282034833:sms-notify
Encryption	URL	Dead-letter queue
Amazon SQS key (SSE-SQS)	https://sqs.us-east-1.amazonaws.com/322282034833/sms-notify	-

Below the details, there are tabs for "SNS subscriptions", "Lambda triggers", "EventBridge Pipes", "Dead-letter queue", and "Monitoring". The "SNS subscriptions" tab is active, showing a subscription region of "us-east-1".

The "SNS subscriptions (1)" section includes a search bar and a table of subscriptions:

Subscription ARN	Topic ARN
arn:aws:sns:us-east-1:322282034833:sakshisms:298b239b-f52e-4da7-bdcb-2813d8ebe617	arn:aws:sns:us-east-1:322282034833:sakshisms

aws Services Search [Alt+S] N. Virginia Sakshi Phanse

Subscribed successfully to topic arn:aws:sns:us-east-1:322282034833:sakshisms.

Amazon SQS > Queues > sms-inventory

sms-inventory

Edit Delete Purge Send and receive messages Start DLQ redrive

Details Info

Name sms-inventory	Type Standard	ARN arn:aws:sqs:us-east-1:322282034833:sms-inventory
Encryption Amazon SQS key (SSE-SQS)	URL https://sqs.us-east-1.amazonaws.com/322282034833/sms-inventory	Dead-letter queue -

More

< SNS subscriptions Lambda triggers EventBridge Pipes Dead-letter queue Monitoring >

Subscription region
us-east-1

SNS subscriptions (1) Info

View in SNS Delete Subscribe to Amazon SNS topic

Search subscriptions < 1 > ⚙

Subscription ARN	Topic ARN
arn:aws:sns:us-east-1:322282034833:sakshisms:e1064779-ce05-42df-9bc7-8d25d158cad5	arn:aws:sns:us-east-

Step4: Publish a Message to the Topic.

- Navigate to SNS page.
- Go to Topic section.
- Select your Topic.
- Click on Publish Message.

us-east-1.console.aws.amazon.com

Services
Search [Alt+S]
N. Virginia
Sakshi Phanse

Amazon SNS

- Dashboard
- Topics**
- Subscriptions
- ▼ Mobile
 - Push notifications
 - Text messaging (SMS)
 - Origination numbers

New Feature

Amazon SNS now supports in-place message archiving and replay for FIFO topics. [Learn more](#)

Amazon SNS > Topics > sakshisms

sakshisms

Edit Delete Publish message

Details

Name	Display name
sakshisms	-
ARN	Topic owner
arn:aws:sns:us-east-1:322282034833:sakshisms	322282034833
Type	
Standard	

Subscriptions
Access policy
Data protection policy
Delivery

Subscriptions (2)

Edit Delete Request confirmation

Confirm subscription Create subscription

Search

ID	Endpoint	Status	Prot...
298b239b-f52...	arn:aws:sqs:us-...	Confirmed	SQS
e1064779-ce0...	arn:aws:sqs:us-...	Confirmed	SQS

- In the Subject box, Message Group ID, Message Duplication ID type Order123-4567890-1234567.
- In message Body write your message.

- Example.
 - 1 xWidget@\$29.99USD
 - 2 xWidget@\$4.99USD
 - 3 xWidget@\$34USD
- Click on Publish Message

The screenshot shows the AWS Management Console interface for Amazon SNS. The left sidebar contains navigation links: Dashboard, Topics (selected), Subscriptions, Mobile, Push notifications, Text messaging (SMS), and Origination numbers. The main content area shows the 'sakshisms' topic page. At the top, there's a 'New Feature' banner about in-place message archiving and replay. Below that, a green success message states 'Message published to topic sakshisms successfully' with message and request IDs, and a 'Publish another message' button. The topic details section shows: Name (sakshisms), Display name (-), ARN (arn:aws:sns:us-east-1:322282034833:sakshisms), Topic owner (322282034833), and Type (Standard). Below the details are tabs for Subscriptions (selected), Access policy, Data protection policy, and Deliver. The Subscriptions tab shows 2 subscriptions with buttons for Edit, Delete, Request confirmation, Confirm subscription, and Create subscription. A search bar and pagination controls are also present. The subscription table lists two confirmed subscriptions.

ID	Endpoint	Status	Prot...
298b239b-f52...	arn:aws:sqs:us-...	Confirmed	SQS
e1064779-ce0...	arn:aws:sqs:us-...	Confirmed	SQS

Step5: Verify the Subscription.

- Navigate to SQS.
- Select Your Queue.
- Click on Send and Receive Message.
- In Receive Message box click Poll for message.

us-east-1.console.aws.amazon.com

The screenshot shows the AWS Management Console interface for an Amazon SQS queue. The breadcrumb navigation is 'Amazon SQS > Queues > sms-inventory > Send and receive messages'. The page title is 'Send and receive messages' with the subtitle 'Send messages to and receive messages from a queue.'.

Send message section:

- Buttons: 'Clear content' and 'Send message'.
- Message body: A text input field with placeholder 'Enter message'.
- Delivery delay: A dropdown menu set to '0' with a unit selector set to 'Seconds'. A note states: 'Should be between 0 seconds and 15 minutes.'
- Link: 'Message attributes - Optional'.

Receive messages section:

- Buttons: 'Edit poll settings', 'Stop polling', and 'Poll for messages'.
- Summary table:

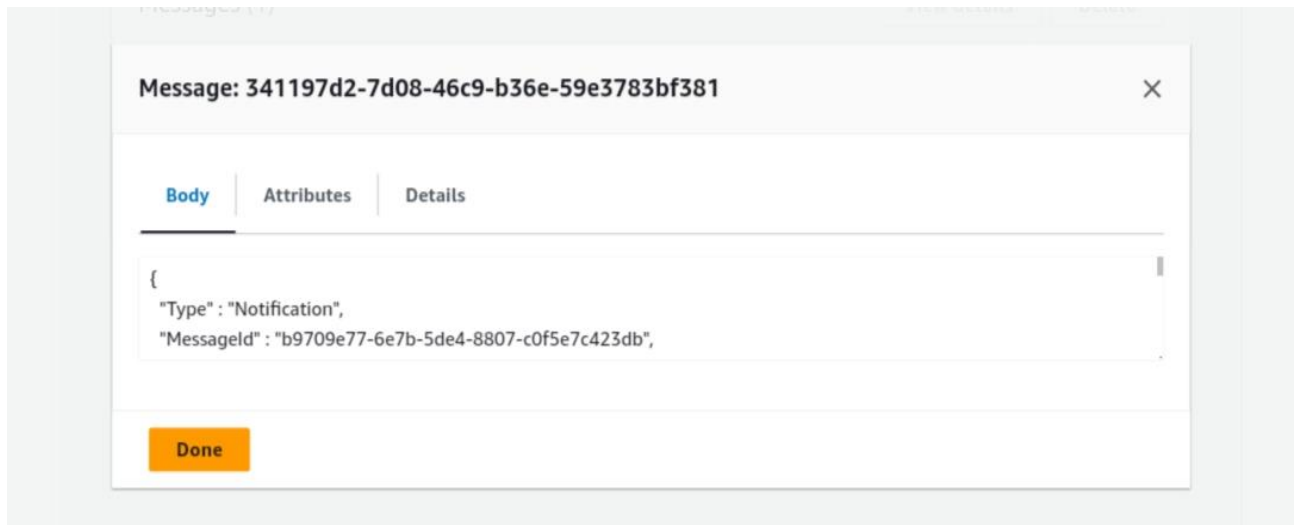
Messages available	Polling duration	Maximum message count	Polling progress
1	30	10	1 receives/second

Messages (1) section:

- Buttons: 'View details' and 'Delete'.
- Search bar: 'Search messages'.
- Table of messages:

<input type="checkbox"/>	ID	Sent	Size	Receive count
<input type="checkbox"/>	341197d2-7d08-46c9-b36e-59e3783bf381	2024-03-31T03:13+05:30	965 bytes	1

- Click on Message Id to see the message.



CONCLUSION :

Implementing a fanout messaging model with Amazon SNS and SQS provides a scalable and efficient solution for distributing event notifications to multiple subscribers. By decoupling the sender and receiver, this setup enables parallel processing and ensures timely delivery of messages without the need for manual intervention. Leveraging these AWS services fosters the development of resilient and responsive cloud-native applications, enhancing overall system reliability and performance. With the ability to handle varying workloads and adapt to changing demands, this architecture empowers developers to build robust and dynamic solutions capable of meeting the evolving needs of modern applications.