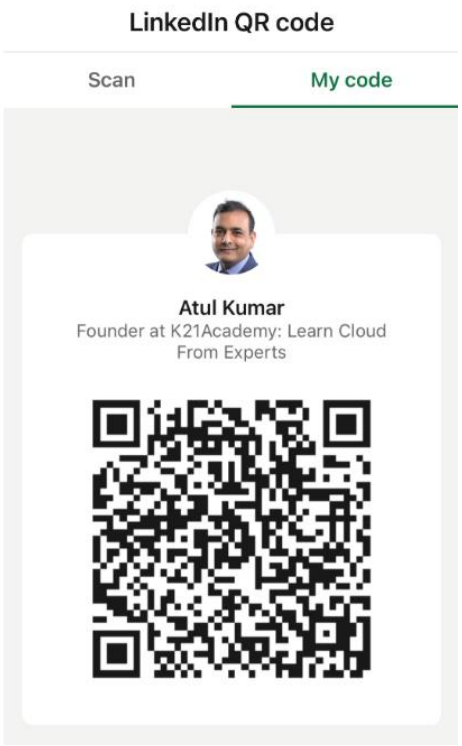
K21Academy
Learn Cloud from Experts

amazon web services

# Application Services And AWS Lambda


Atul Kumar
Author & Cloud Expert

# Atul Kumar




- Author & Cloud Architect
- 21+ Years working in IT & Certified Cloud Architect
- Helped **6000+ individuals** to learn Cloud & Cloud Native

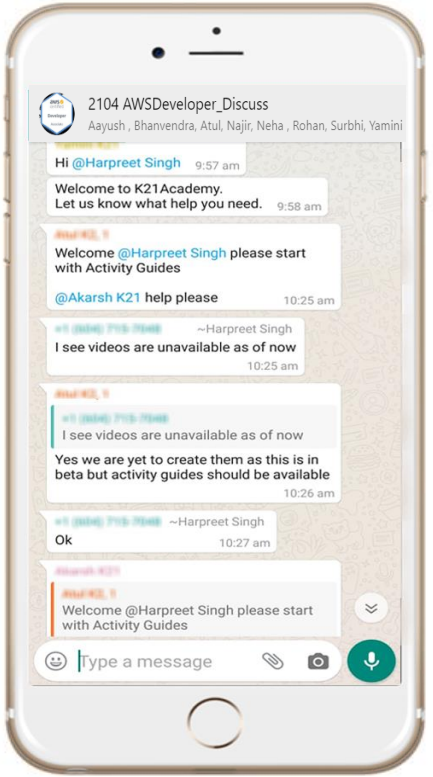



# WhatsApp & Ticketing System

K21Academy
Learn Cloud from Experts

support@k21academy.com

zendesk




# Module Agenda

# Agenda: Module

- Application Services
- Amazon Simple Email Service (SES)
- Amazon Simple Notification Service (SNS)
- Demo - Send A Notification Through SNS
- Amazon Simple Queue Service (SQS)
- Simple Workflow Service (SWF)
- What Is Serverless Computing
- AWS Lambda


# Application Services

# Application Services

- AWS provides different managed Application Services to coordinate between your distributed applications. They are:
- Simple Email Service (SES)
- Simple Notification Service (SNS)
- Simple Queue Service (SQS)
- Simple Workflow Service (SWF)


K21Academy
Learn Cloud from Experts

# Amazon Simple Email Service (SES)

# Amazon Simple Email Service

K21Academy
Learn Cloud from Experts

- SES is highly scalable and cost-effective platform for sending and receiving email.
- It reduces the complexity of building an in-house email solution and installing and operating a third-party email solution.
- Pay only for the messages you send and receive.
- Use Cases: Digital Marketing Organizations, Application Developers and Online Retailers.

# Why SES

- **Scalable:** Can increase the size from zero to millions in a day without any additional cost.
- **Seamless Integration:** As it can be easily integrated with other services like S3, SNS, CloudWatch and Lambda.
- **High Performance:** Can quickly send millions of emails in few hours.
- **Reliable e-mail delivery:** Uses in house content filtering to ensure that it meets the standard of ISP.
- **Cost Effective:** The amount you pay depends on the volume and the number of messages you send or receive through it.

# Sending Email With Amazon SES

# To Receive An Email

K21Academy
Learn Cloud from Experts

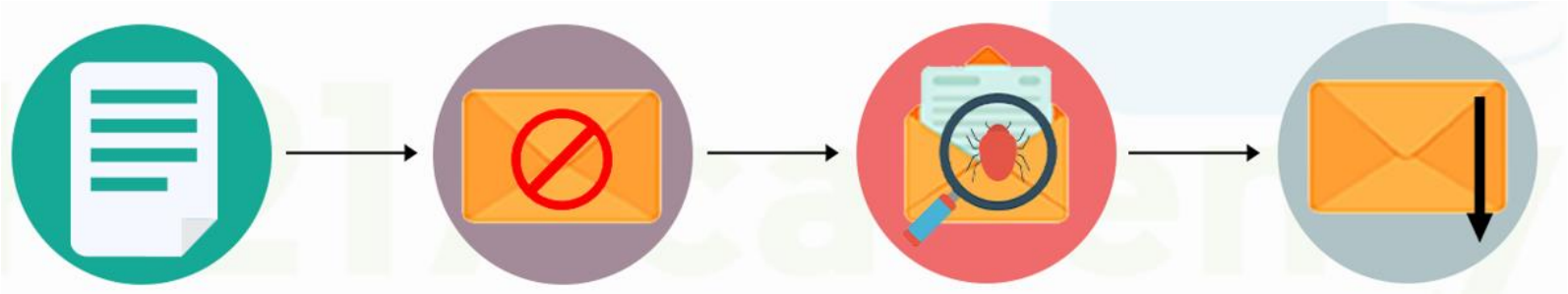
- **Verify your domain:** The verification process with SES ensures that you own that domain.
- **Publish MX record:** it specifies which mail server can accept the mail sent to your domain.
- **Give Permission:** To enable SES to push a SNS, topic or write email to S3, attach policies to the resources.
- **IP Address Filter:** It helps to reject or accept the mails originating from a specific IP address.
- **Receipt Rule:** It defines what has to be done when an email has been sent to your domain.

# Common Use Cases

- **Marketing Emails:** To promote products and services to your customers as advertisements.
- **Transactional Emails:** Sends automated emails that keep your customers informed like status, update and order confirmation.
- **Notifications:** Sends out Notifications for any event that requires reporting.
- **Receiving Emails:** Receive emails and deliver it to S3 bucket, Push notification through SNS and call custom code to AWS Lambda Function.

# Operations Done By SES After It Receives Email

- Refer to your active receipt rule set.
- If there are not any matches it rejects the email.
- Perform virus scan on the mail to ensure they are virus free.
- SES accepts the mail from recipients in your domain and applies that are defined.



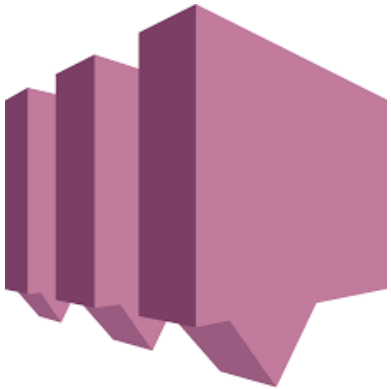
# Limitations In SES

| | |
|---|---|
| Sending limits | Sending quota: 200 emails in 24-hour<br>Max send rate: 1 EMAIL /second |
| Maximum message size (including attachments) | 10 MB per message |
| Accepted attachment types | Amazon SES accepts : All file attachment types except email attachments with .exe, .com, .cmd, .scr, etc |
| Maximum number of recipients per message | 50 recipients/ message.<br>"To", "CC", or "BCC" address all are part of recipients |
| Maximum number of identities you can verify | 1000 identities /AWS account per region |


# Amazon Simple Notification Service (SNS)

# Simple Notification Service (SNS)

- **SNS** is managed service of AWS which is used to deliver the push messages from the application to the subscribing ends or other applications.
- It is a completely managed messaging service for both application to application (A2A) and application to person (A2P) communication.
- It provides the ability to create a Topic that is a logical access point and communication channel.



# Working of SNS

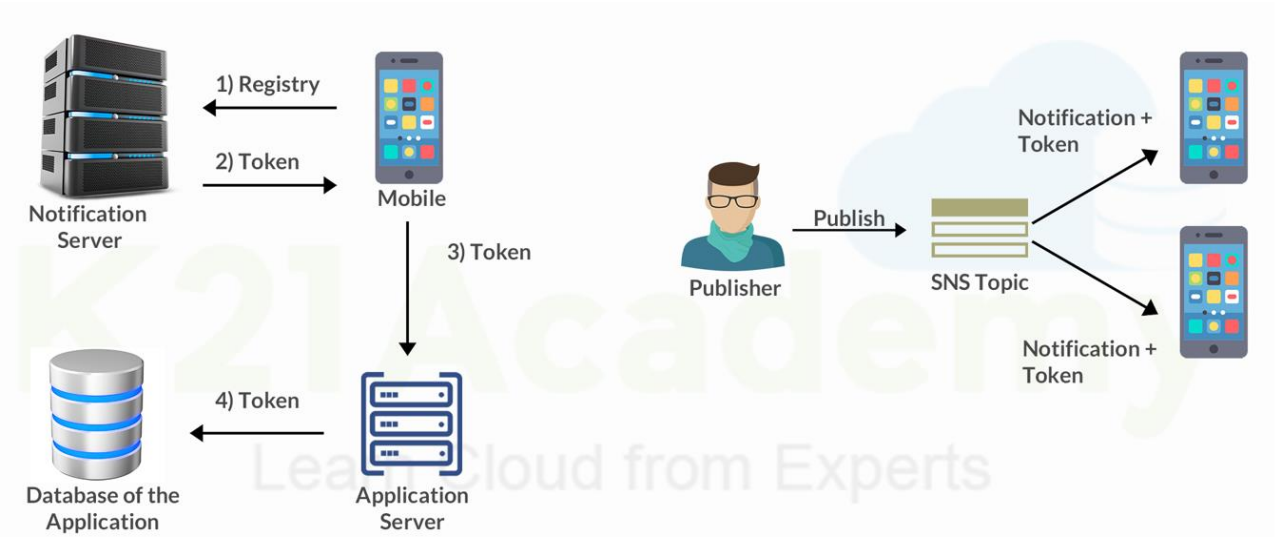
- Creates a topic which acts as an access point.
- Set policies to limit the access to either publish the message or subscribe to notification and specify which protocols to be supported.
- Either you subscribe to the topic or get subscribed by the topic owner.
- Publish the message to a topic.
- Deliver the message to all the subscribed owners.

# Benefits of SNS

- Send message to individual or broadcast.
- Instantaneous push-based delivery.
- Easy integrations with applications.
- Point and click interface.
- Multiple transport protocols.
- Pay as you go model.

# SNS Mobile Push

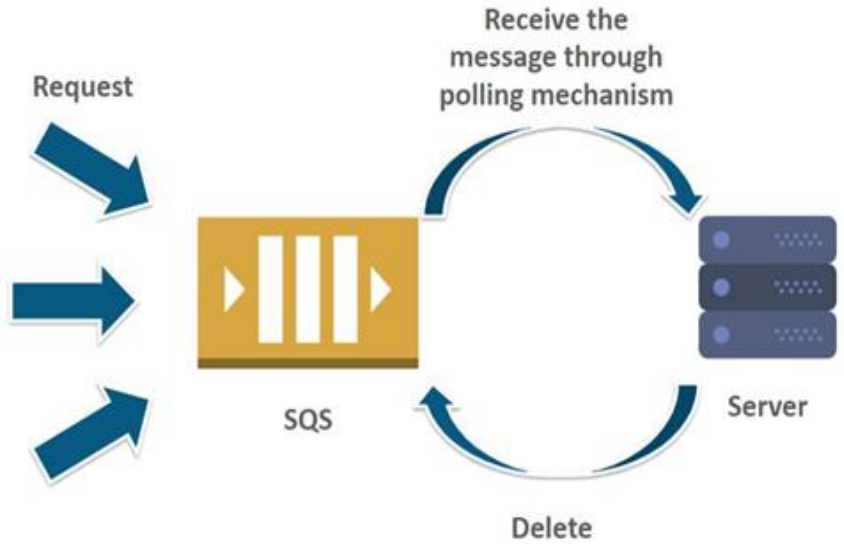
- SNS helps you send notification to the apps on your mobile through push mechanism without opening your application.
- Let's you push notifications to Apple, Fire OS, Google, Windows and Android devices with Baidu Cloud Push.




# Amazon Simple Queue Service (SQS)

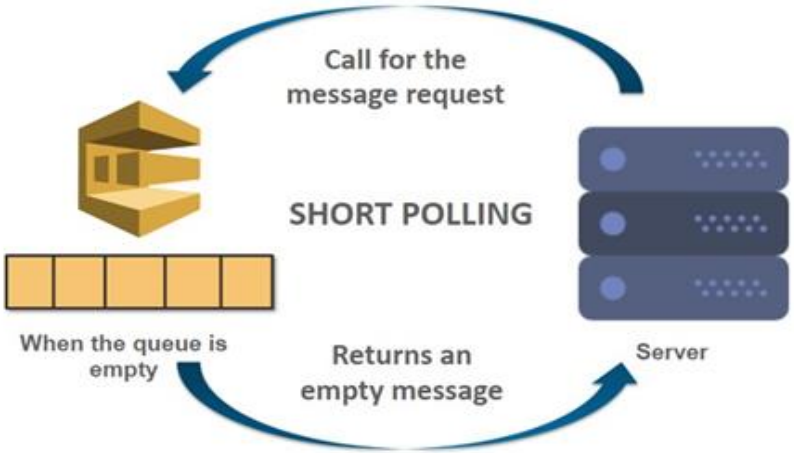
# Simple Queue Service (SQS)

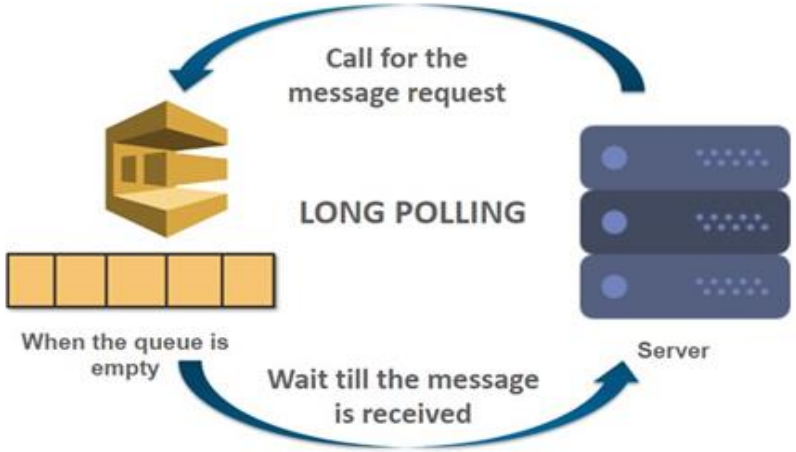
- SQS is a messaging queue service, which handles messages or workflows between other components in a system.
- It provides highly available, scalable, reliable and managed queues for storing messages as they travel between systems.



# Long Polling

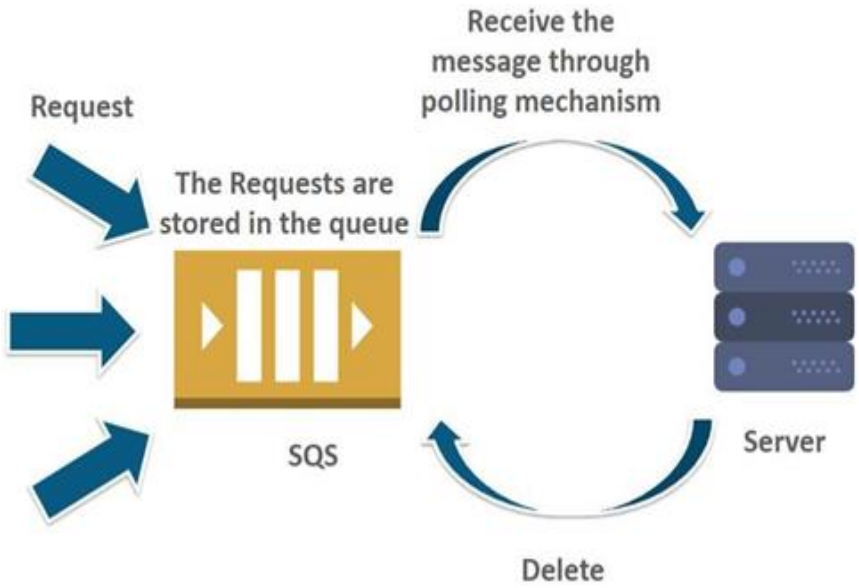
- Long Polling helps you to achieve higher performance as it eliminates the number of empty requests by waiting till the message is available at the queue or polls time out



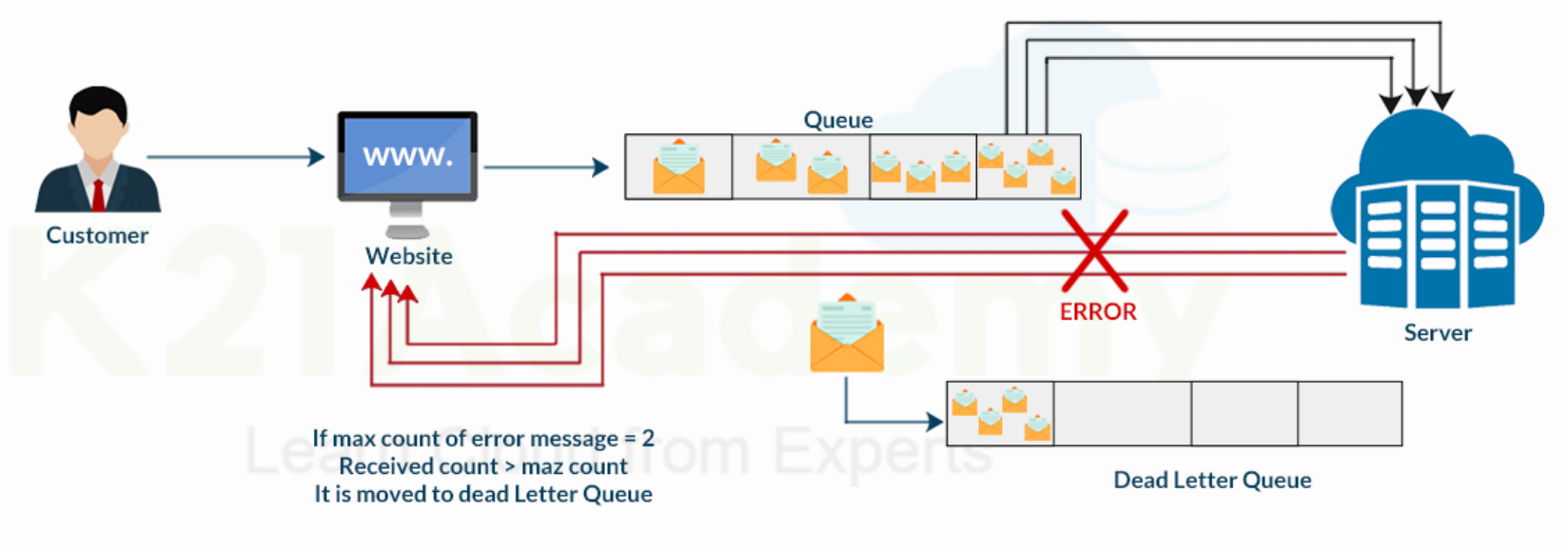
# SQS Visibility Time Out

- A period of time that prevents other consumers from processing the message is called SQS Visibility Time Out.



# Dead Letter Queues

- Dead Letter Queue helps in handling message failure as it isolates the failure messages such that we can determine why the processing failed.



# SQS Features

- **Reliable:** It runs in Amazons high availability data center.
- **Message Batching:** Message batching for higher throughput and reduced cost.
- **Scalable:** Automatically scales for unlimited queue and message available.
- **Hold Message:** It holds the message until you explicitly delete them.
- **Flexible:** Standard queues for high throughput and FIFO queues for strict ordering.
- **Fan-out:** When it is combined with SNS it can send multiple copies of messages to multiple queries parallelly.

# Types Of SQS

| Standard Queue | FIFO Queue |
| --- | --- |
| The order of the messages in which they have sent might be different from the order they have received | The order of the sent and received messages are strictly preserved |
| Unlimited number of transactions/sec | First-in-first-out delivers up to the limit 3000 message/sec with batching |
| Guarantee that a message is delivered at least once | Message gets delivered only once, where the duplicates are not allowed here |
| Ex: Helps to validate large number of credit card request | Ex: Stopping a student from enrolling in a course before registering for an account |


# Simple Workflow Service(SWF)

# AWS SWF

- SWF is a flow framework that helps to build the workflow among the distributed applications.
- It mainly coordinates the task such as execution of dependencies, scheduling and concurrency as per logical flow of the application.
- The developer has full control over implementing process steps and coordinating the task that drives them.

# Why AWS SWF?

- Many applications rely on Asynchronous and distributed processing because of its features like scalability, availability and deployment flexibility.
- SWF provides a programming infrastructure and model for coordinating distributed components along with state of execution.
- This in turn helps you focus in building different aspects of your application.

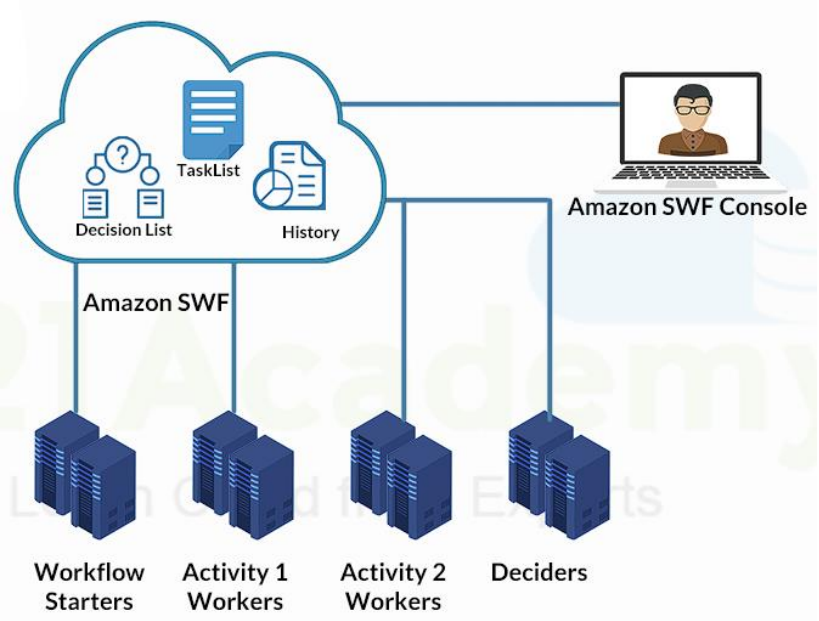
# Workflow of SWF

K21Academy
Learn Cloud from Experts

- Workflow is a set of activities that coordinates with each other to achieve objective.
- Define and register all activities with SWF to create a Workflow.
- Application to start for Workflow: Workflow Starter.
- Activity Task List contain task that are to be performed again and again.
- Activity Worker is the program which receives, programs and provides the result of Activity Task.
- Decider is software program that includes the coordination logic to run a workflow.
- SWF is the place where data gets exchanged between activity and decider task list and history is maintained.

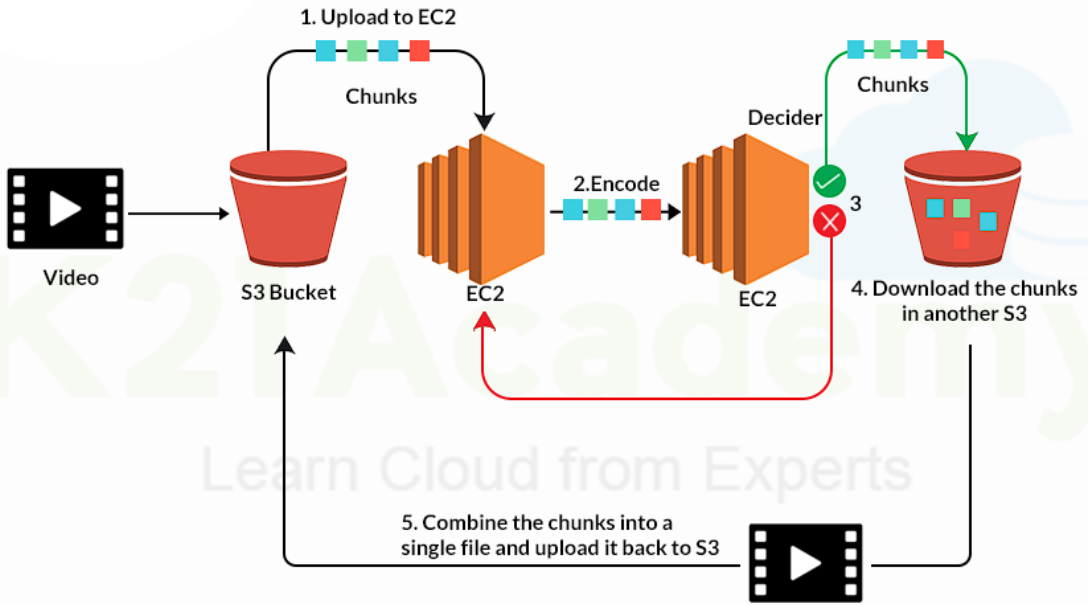
# SWF Architecture

- Workflow starter initiates the application.
- Decider schedules activity tasks.
- Provides input data to the activity workers.
- Processes events that arrive while the workflow is in progress.
- Finally ends the workflow when the objective has been complete.



# Use Cases of SWF

- Upload a chunk to EC2.
- Encode the chunk.
- Decider determines whether the encoding is passes or failed.
- Download the chunks in other S3.
- Combine the file to a single chunk and upload it back to S3.




# Serverless Computing

# Serverless Computing

- Serverless computing enables you to build and run application without worrying about Servers, as the server in which its running is fully managed, provisioned and scaled by AWS.
- Scale with usage.
- No server to provision or manage.
- Never pay for idle.
- Less components.


# AWS Lambda

# AWS Lambda

- Lambda is server-less compute platform where you can run a code for any type of backend service in response to events.
- Compute Service: Run attributes without managing servers.
- Event Driven: The codes run when there is a need to run.

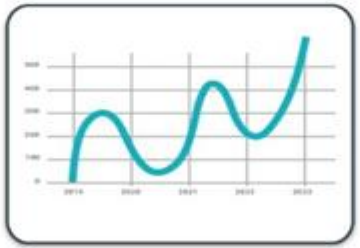
# How AWS Lambda Works

K21Academy
Learn Cloud from Experts

- Upload your code to AWS Lambda.
- Set up you code to trigger from other AWS services, HTTP endpoint or in app activity.
- Lambda runs your code only when triggered, using only the compute resources needed.
- Pay as you go.

# Benefits of AWS Lambda

- **No server to manage:** It automatically runs the code without managing servers
- **Continuous Scaling:** Automatically scales and runs the code in parallel for each individual trigger.
- **Sub Second Billing:** Charged for every 100ms the code executes and the number of times the code is triggered.



# Event Sources- Can Be Integrated With Lambda

# Use Cases of AWS Lambda

- Data processing.
- App Backend development.
- Control System.
- Serverless Websites.
- Security Updates.

# Limitations of AWS Lambda

K21Academy
Learn Cloud from Experts

| Resource | Default Limit |
|---|---|
| Memory allocation | 128 MB to 3008 MB |
| Number of file descriptors | 1,024 |
| Number of processes and threads (combined total) | 1,024 |
| Maximum execution duration per request | 900 seconds |
| Invoke request body payload size (RequestResponse) | 6 MB |
| Concurrent executions | 1000 |
| Total size of the deployment package (.zip/.jar file) | 250 MB |
| Total size of all the deployment packages that can be uploaded per region | 75 GB |

# Lab Exercises

K21Academy
Learn Cloud from Experts

**Send an Email through AWS SES**

- Send an E-mail through AWS SES
- Send a Test Mail

K21Academy
Learn Cloud from Experts

amazon web services

Contents

# Lab Exercises

K21Academy
Learn Cloud from Experts

**Event-Driven Architectures Using AWS Lambda, SES, SNS and SQS**

- Send an E-mail Notification when an object is added to S3 Bucket by triggering Lambda Function
- Send an E-mail Notification when a message is populated in SQS Queue by triggering Lambda Function

# Quiz

K21Academy
Learn Cloud from Experts

Which of the following are true? (Choose two.)

A. SNS and SQS are interchangeable at an API level.
B. SNS is a pull-based system while SQS is a push-based system.
C. SNS manages notifications and SQS manages messages.
D. SNS is a push-based system while SQS is a pull-based system.

**Answer: C, D.**
**Explanation:** SNS is the Simple Notification Service and SQS is the Simple Queue Service. The two are not interchangeable (A is wrong). SNS pushes notifications, while SQS allows for pulls of its messages (so B is wrong, but D is correct). Finally, SNS handles notifications, and SQS handles messages (C is correct).

# Quiz

K21Academy
Learn Cloud from Experts

You want to provide task- and event-level tracking in a complex application. You've been asked to then attach custom code to these tasks and events. However, you are working on an MVP that needs to quickly go to market. Which AWS services would provide you with the most out-of-the-box functionality and require the least amount of infrastructure coding?

A. SQS, Lambda
B. SWF, CloudWatch
C. SWF, Lambda
D. Elastic Beanstalk, CloudWatch

**Answer :** C
**Explanation:** Lambda is best for writing custom code without the overhead of provisioning EC2 instances, so both A and C are potentially correct answers. While SQS does offer queuing of code, SWF (the Simple Workflow Service) offers you prebuilt tracking of application-level events and tasks. Attach Lambda to this and you have a ready-to-use event-driven service.

# Find Us

https://www.facebook.com/K21Academy

http://twitter.com/k21Academy

https://www.linkedin.com/company/k21academy

https://www.youtube.com/k21academy