Welcome to Week 4

Cloud Accelerator Program

Serverless & Event-Driven Architectures (Part 1)

DevelopIntelligence

A PLURALSIGHT COMPANY

Hello

About me...

- 27+ years in the industry
- 23+ years in teaching
- Certified Cloud architect
- Passionate about learning
- Also, passionate about Reese's Cups!

Agenda

- Event-Driven Architecture – What it is, the problem it solves, and potential “gotchas”
- Common Event-Driven Architecture patterns
- Available services in AWS for building event-based applications

How we're going to work together

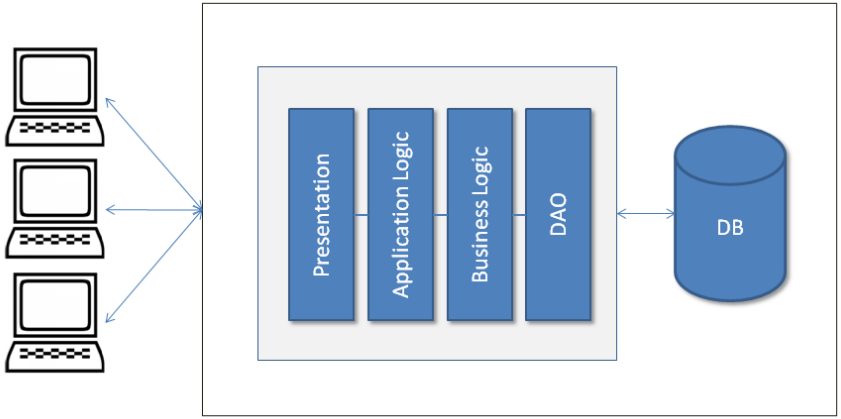
- Slides and words to highlight key concepts
- Demos to bring those concepts "to life"
- Lab work (which will take place in sandboxes provided by "A Cloud Guru") for hands-on reinforcement
- NOTE: I welcome being interrupted – if you need more info, or clarification, or anything else, just break in and ask. I am here to help you.

Event-Driven Architecture

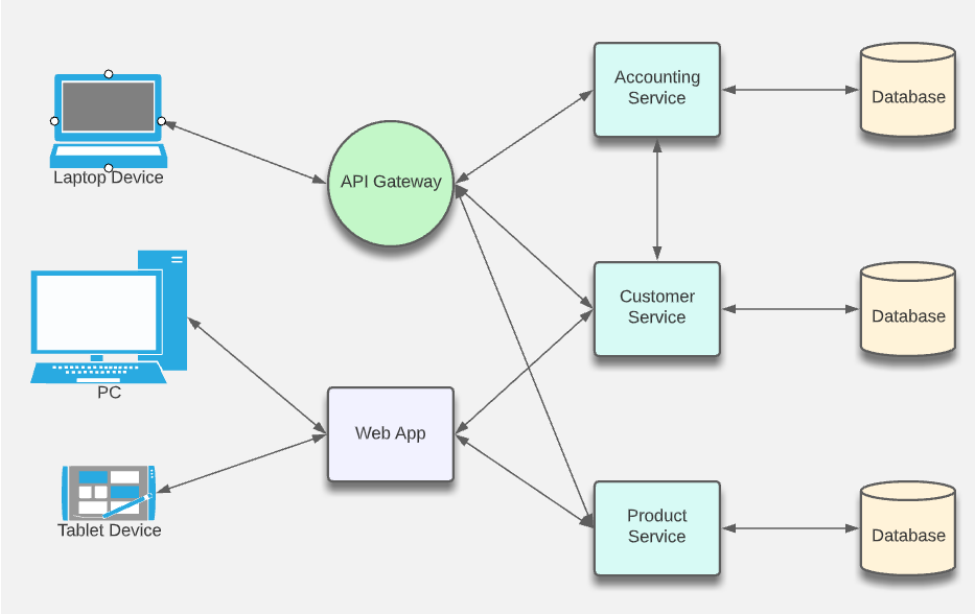
Microservices Architecture

What is a Monolith?

- Typical enterprise application
- Large codebases
- Set technology stack
- Highly coupled elements
- Whole system affected by failures
- Scaling requires the duplication of the entire app
- Minor changes often require full rebuild



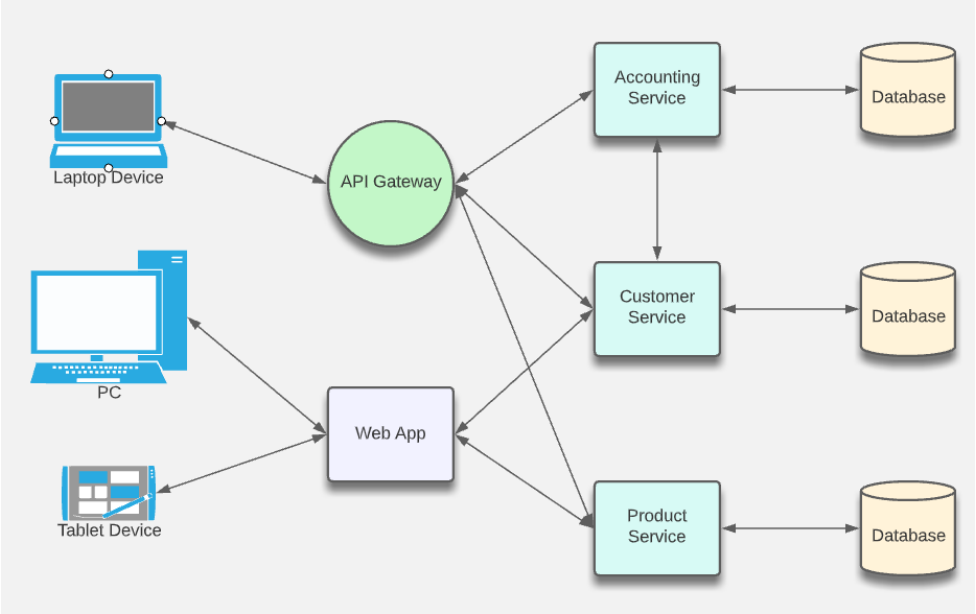
Microservices Architecture



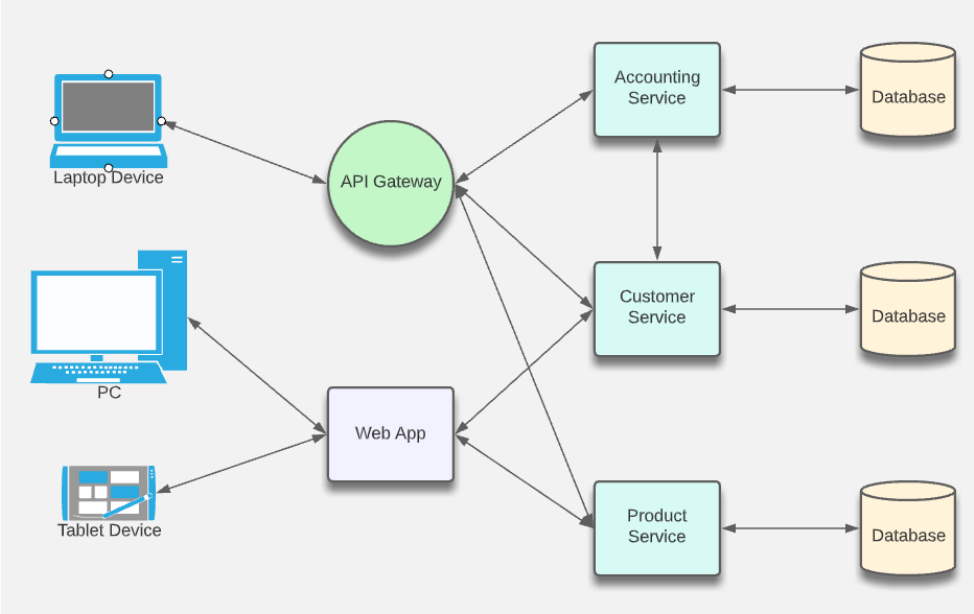
Microservices Architecture

Benefits

- Enables work in parallel
- Promotes organization according to business domain
- Advantages from isolation
- Flexible in terms of deployment and scale
- Flexible in terms of technology
- Allows multiple agile teams to maximize autonomy in effort and technology



Microservices Architecture

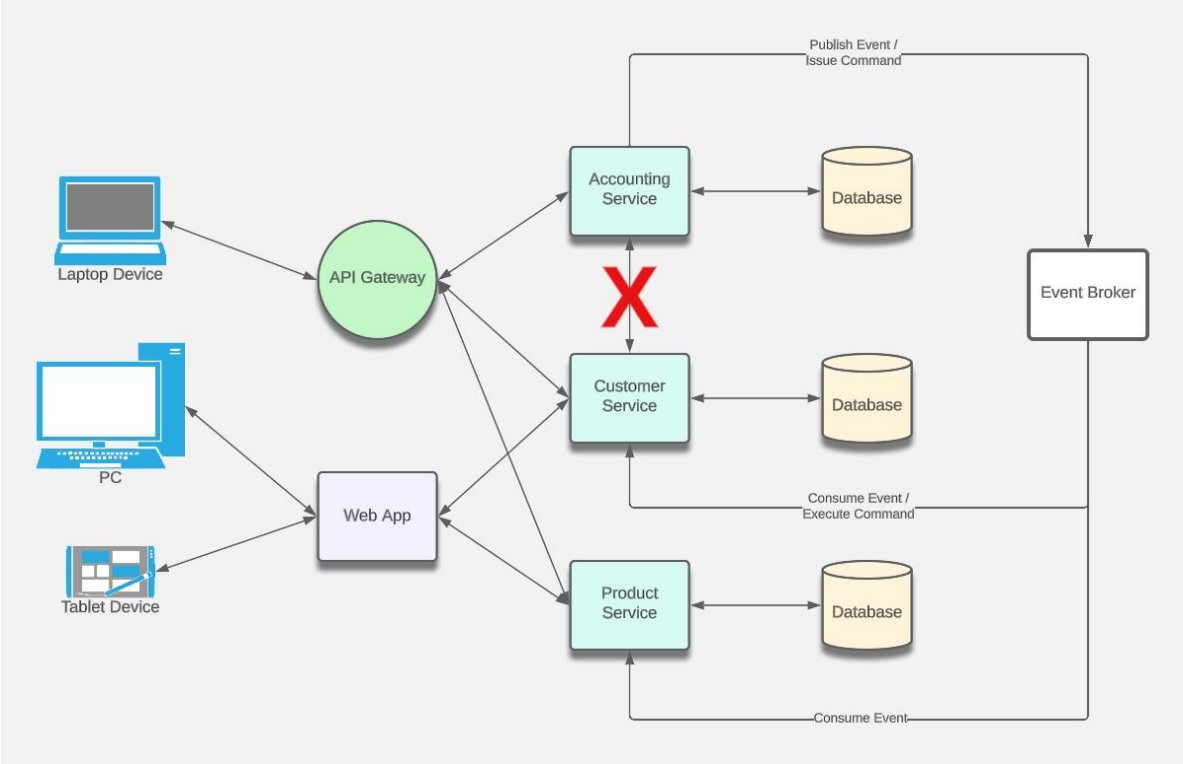


Implications

- Requires a different way of thinking
- Complexity moves to the integration layer
- Organization needs to be able to support re-org according to business domain (instead of technology domain)
- With an increased reliance on the network, you may encounter latency and failures at the network layer
- Transactions must be handled differently (across service boundaries)

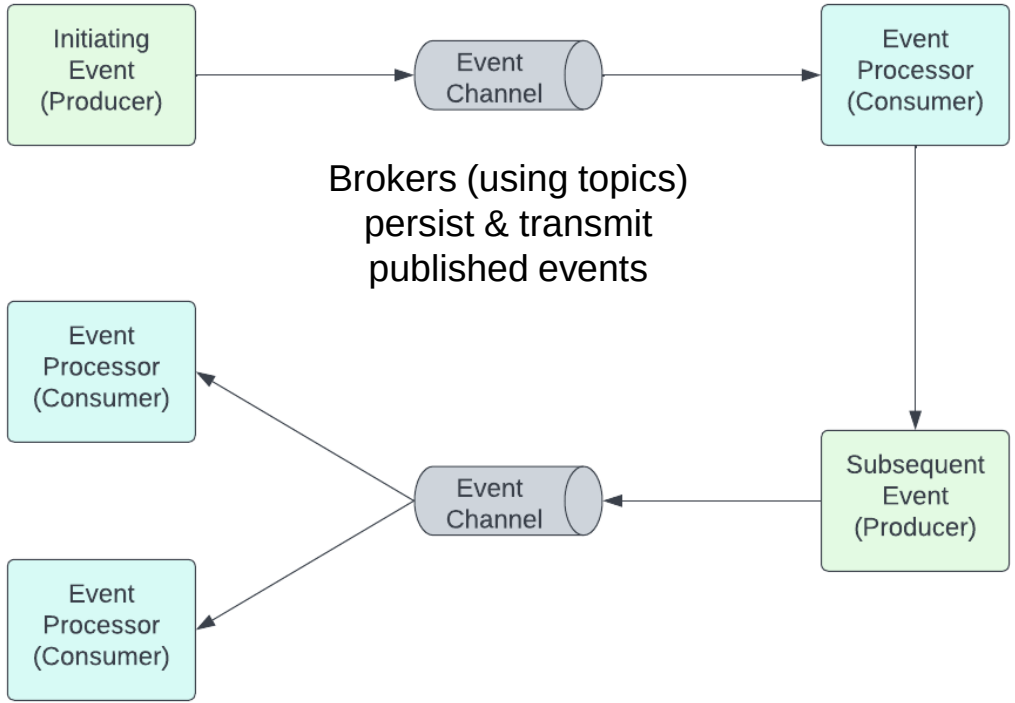
Event-Driven Architecture (EDA)

Microservices Architecture Using EDA



Event-Driven Architecture

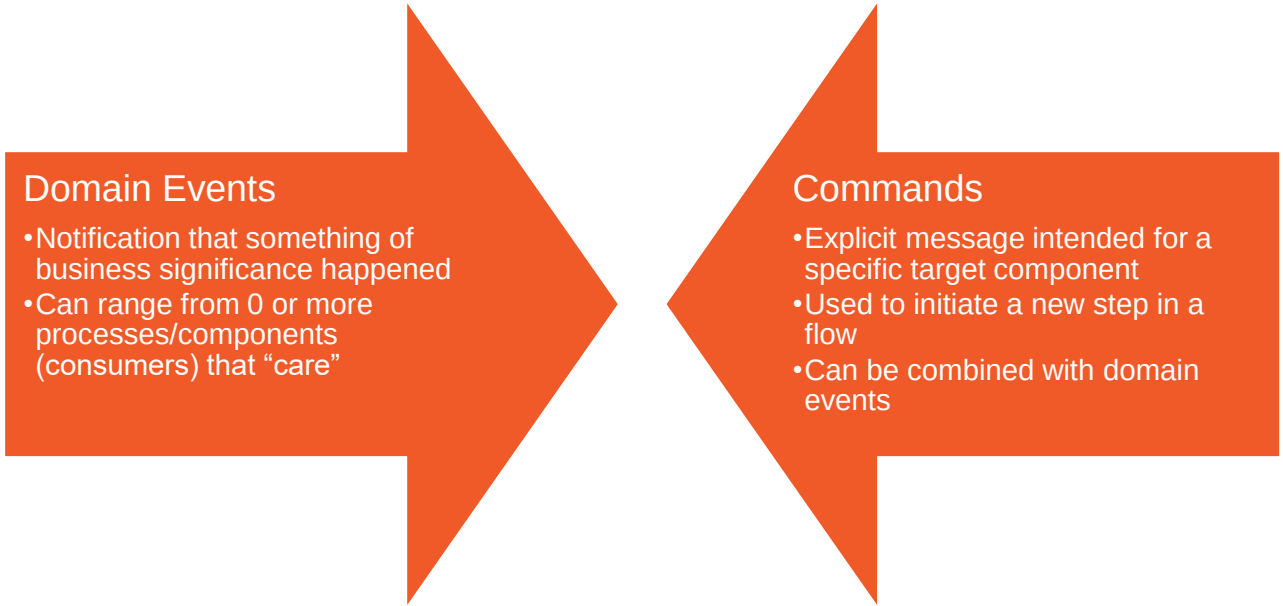
Producers publish events



Consumers subscribe to & respond to events

Consumers can also be producers

Domain Events vs. Commands (or Messages)

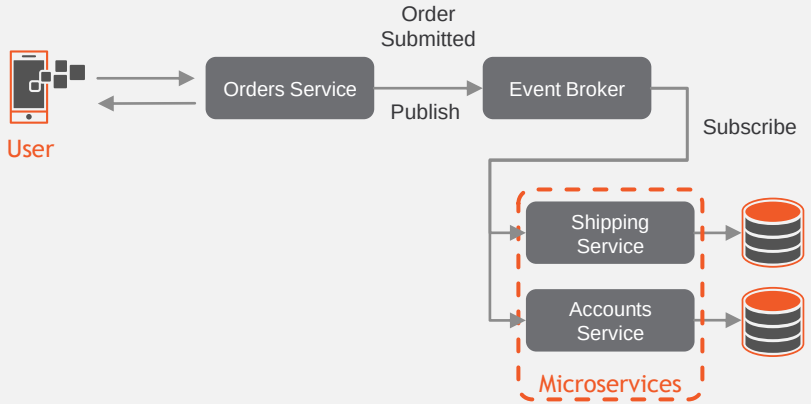


Event-Driven Architectures

As an architectural style:

- Enables looser coupling between communicating services
- Provides dynamic flexibility in the definition of integrated workflows
- Promotes resiliency as an intermediate component (the broker) is used to separately track and manage the queue events
- Uses concept of domain events – publish of events with business significance

Simplified example



Event-Driven Architectures

Benefits:

- Promotes looser coupling in cases where synchronous calls are not required
- Allows multiple services the option of being notified (vs. point-to-point)
- If given consumer is down, producer can continue to send messages and they won't be lost

Potential "gotchas":

- Additional complexity
- Can be harder to trace an action end-to-end (but there are ways to handle)
- Not a good fit if specific timing and sequencing required
- Use case might need to tolerate "eventual consistency"

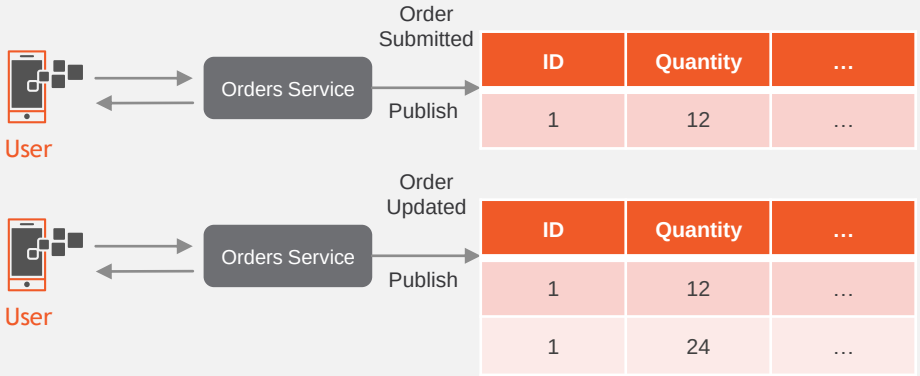
Common EDA Patterns

Event-Driven Architectures

Event Sourcing

- Data changes are captured as immutable events
- When a change is made, rather than overwrite existing record, a new record is created to reflect updated state
- Provides a full picture of what happened during an entity's lifecycle – no data destruction
- Can make reads more difficult

Simplified example

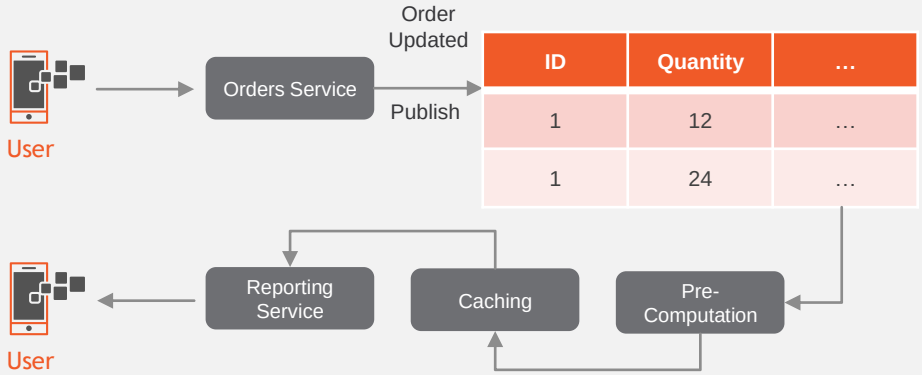


Event-Driven Architectures

CQRS

- Command-Query Responsibility Segregation
- Can help address challenges with Event Sourcing architectures
- Separate processes used for writes and reads
- Allows write optimization (“raw” events) and read optimization (dedicated aggregation)
- Also, enables denormalization and reformatting for reads separate from write structures

Simplified example

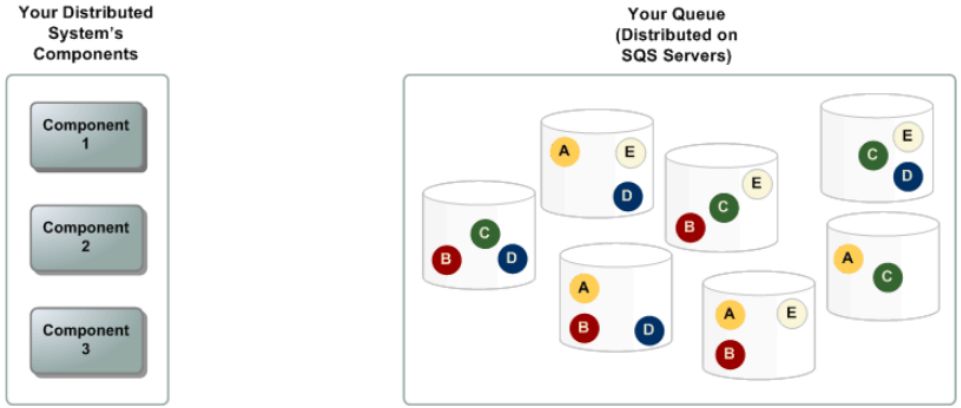


AWS Services for EDA

Simple Queue Service (SQS)

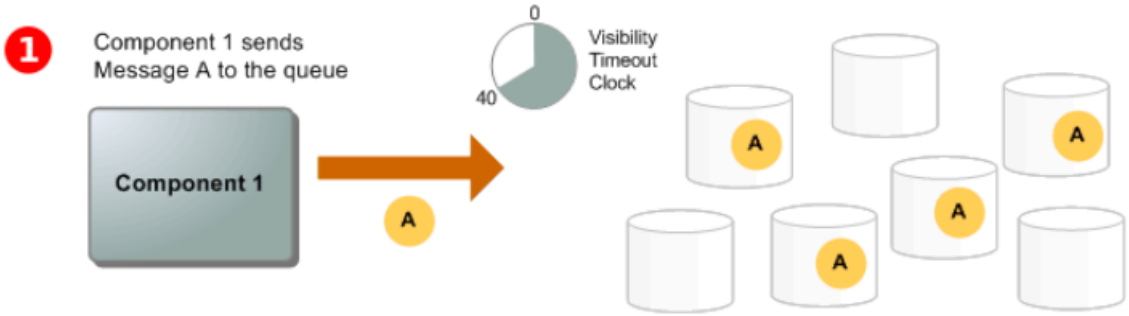
Simple Queue Service (SQS)

SQS provides a hosted and managed queue for communicating across distributed application components (e.g., microservice)



Source: https://docs.aws.amazon.com/AWSSimpleQueueService/latest/SQSDeveloperGuide/sqs-basic-architecture.html

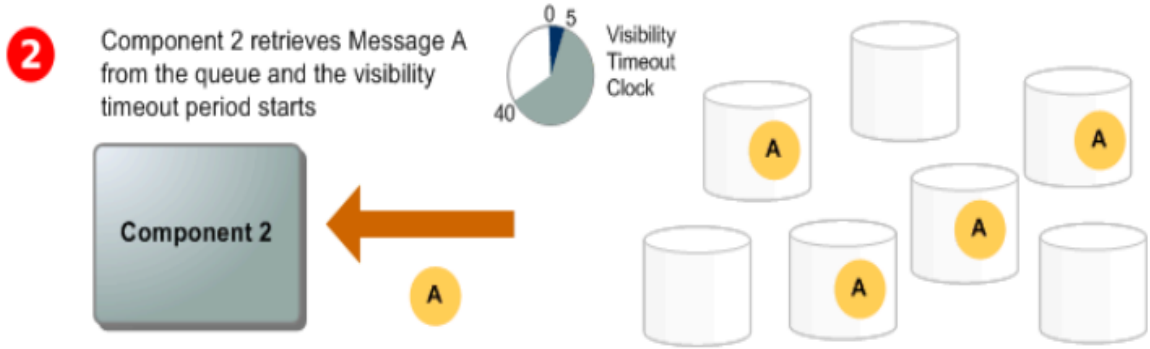
Simple Queue Service (SQS) – Message Lifecycle



1 A producer (component 1) sends message A to a queue, and the message is distributed across the Amazon SQS servers redundantly.

Source: https://docs.aws.amazon.com/AWSSimpleQueueService/latest/SQSDeveloperGuide/sqs-basic-architecture.html

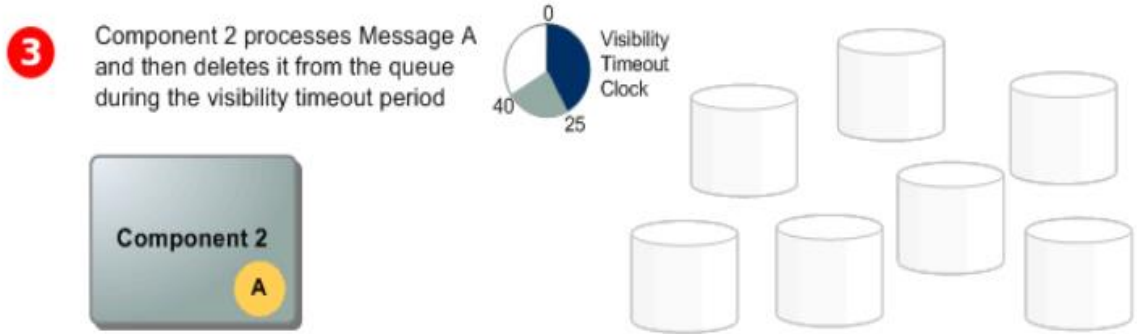
Simple Queue Service (SQS) – Message Lifecycle



2 When a consumer (component 2) is ready to process messages, it consumes messages from the queue, and message A is returned. While message A is being processed, it remains in the queue and isn't returned to subsequent receive requests for the duration of the visibility timeout.

Source: https://docs.aws.amazon.com/AWSSimpleQueueService/latest/SQSDeveloperGuide/sqs-basic-architecture.html

Simple Queue Service (SQS) – Message Lifecycle



3 The consumer (component 2) deletes message A from the queue to prevent the message from being received and processed again when the visibility timeout expires.

Source: https://docs.aws.amazon.com/AWSSimpleQueueService/latest/SQSDeveloperGuide/sqs-basic-architecture.html

LAB:

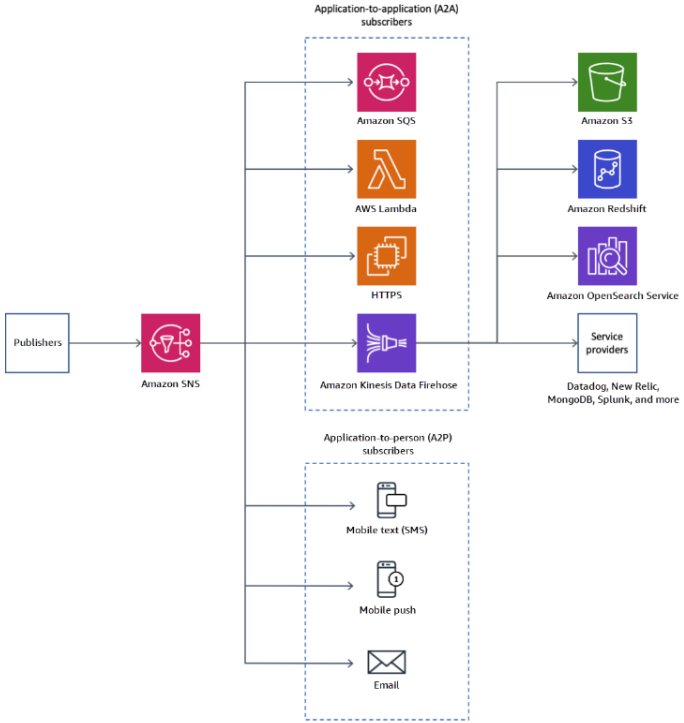
Triggering Lambda from SQS

Execute the “Hands-On” lab available at https://github.com/KernelGamut32/cloud-accel-aws-2024-public/tree/main/week04/labs/lab01

Simple Notification Service (SNS)

Simple Notification Service (SNS)

SNS provides a managed solution for message delivery using a pub/sub (producer/consumer) model for delivery of important application notifications/messages



Source: https://docs.aws.amazon.com/sns/latest/dg/welcome.html

LAB:

Lambda, SQS, and SNS

Execute the “Hands-On” lab available at https://github.com/KernelGamut32/cloud-accel-aws-2024-public/tree/main/week04/labs/lab02

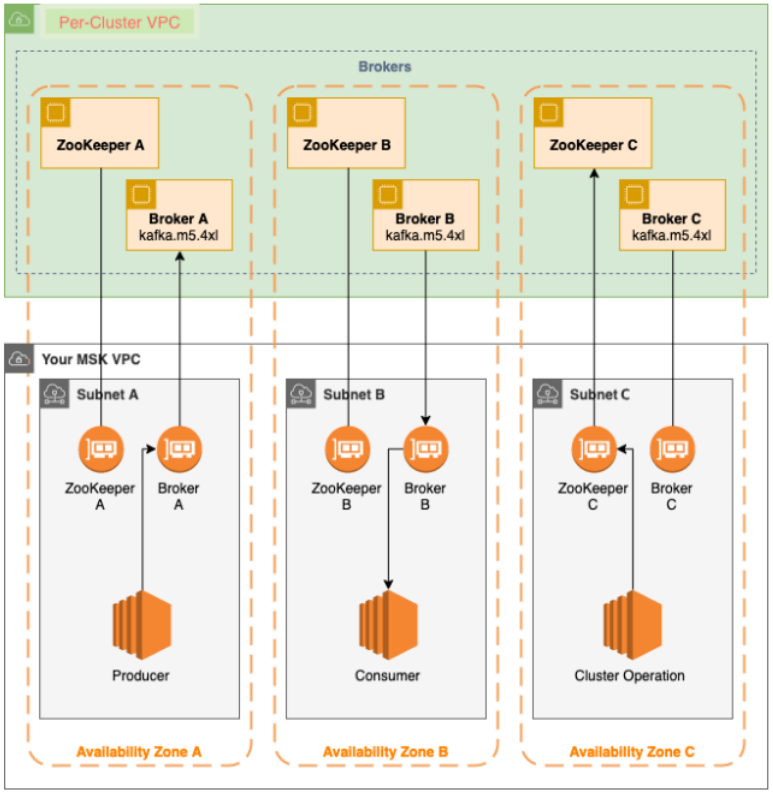
LAB:

Processing IoT Events Through SNS

Execute the “Hands-On” lab available at https://github.com/KernelGamut32/cloud-accel-aws-2024-public/tree/main/week04/labs/lab03

Managed Kafka (MSK)

MSK – Managed Streaming for Apache Kafka



Source: https://docs.aws.amazon.com/msk/latest/developerguide/what-is-msk.html

LAB:

Handling ClickStream with MSK

Execute the “Hands-On” lab available at https://github.com/KernelGamut32/cloud-accel-aws-2024-public/tree/main/week04/labs/lab04

Thank you!

If you have additional questions, please reach out to me at:
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