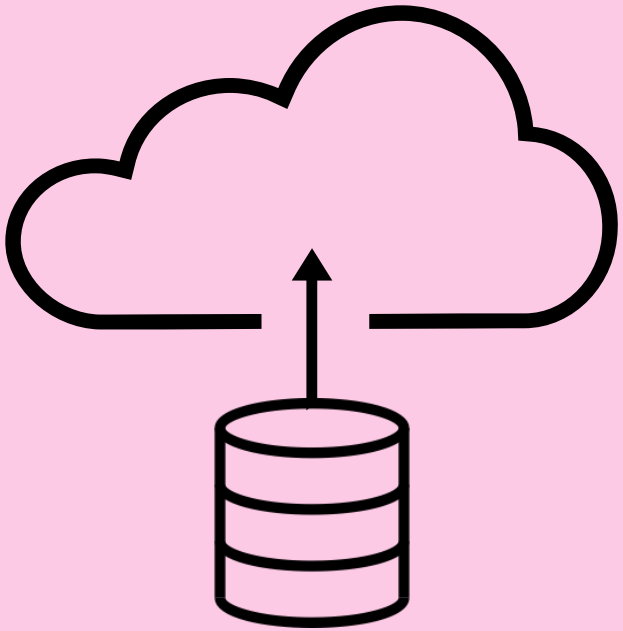
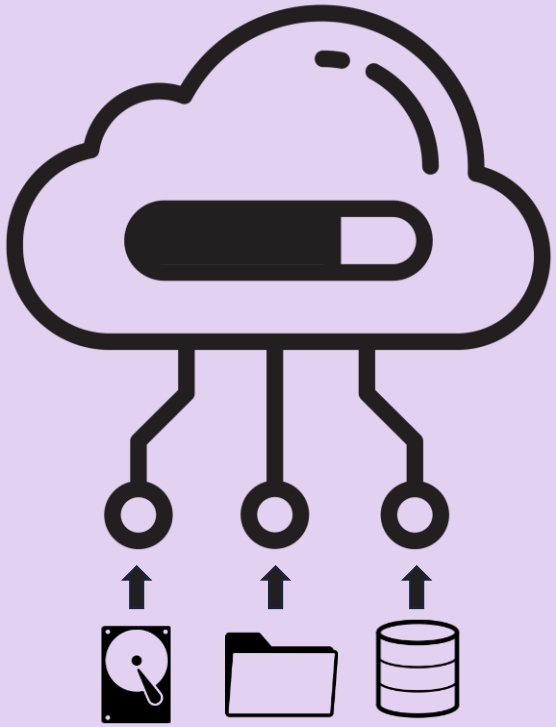
Migration to Cloud



Database Migration

From my other training

Reach out for a discount code if you need



Data Migration

Going beyond AWS analytics services

Certification specific details vs. complete service details

Sections from my other trainings

Security Services in AWS

Ashish Prajapati

4.7 ★★★★☆ (188)

12.5 total hours · 67 lectures · Intermediate

AWS For Everyone

Ashish Prajapati

5.0 ★★★★★ (8)

39 total hours · 154 lectures · Intermediate

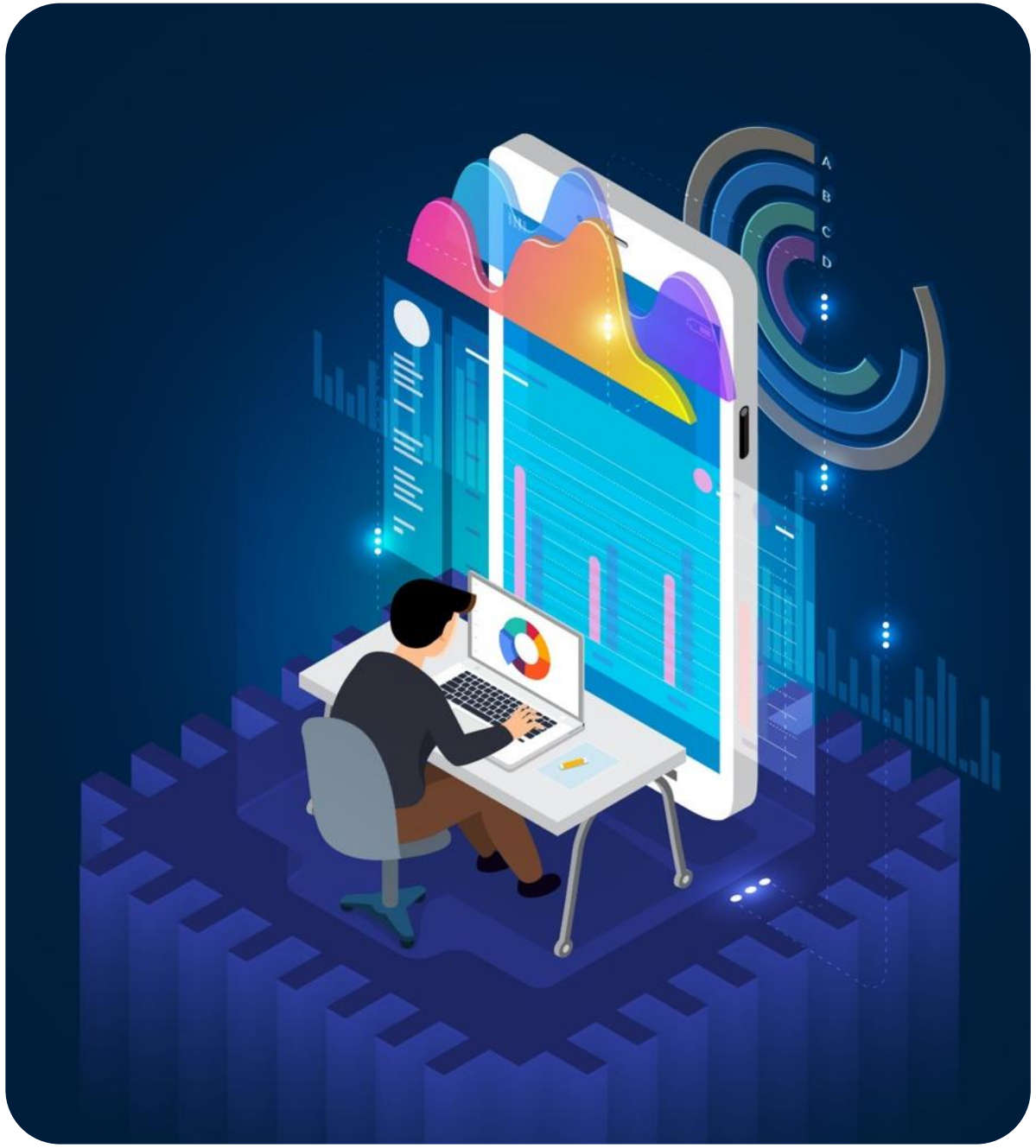
Migration to AWS

Ashish Prajapati

4.9 ★★★★★ (64)

14 total hours · 62 lectures · Intermediate

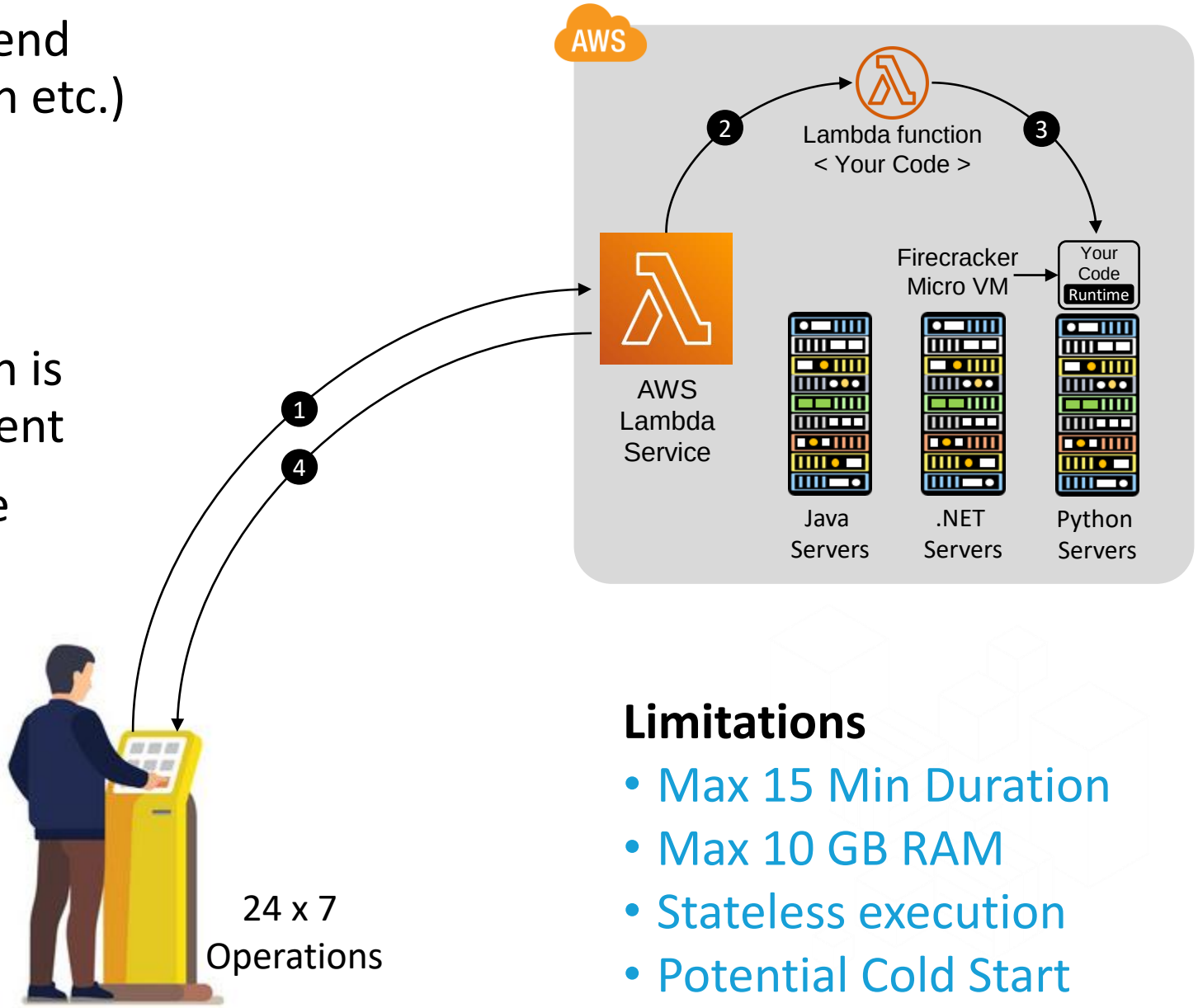
Run code without thinking about servers



How Lambda works?

How AWS Lambda works?

1. An event is triggered from frontend (Click / API Call / Fingerprint scan etc.)
2. AWS Lambda Service receives invocation call and triggers corresponding Lambda function
3. Code inside the Lambda function is executed in a suitable environment
4. Results are delivered back to the frontend (optional)

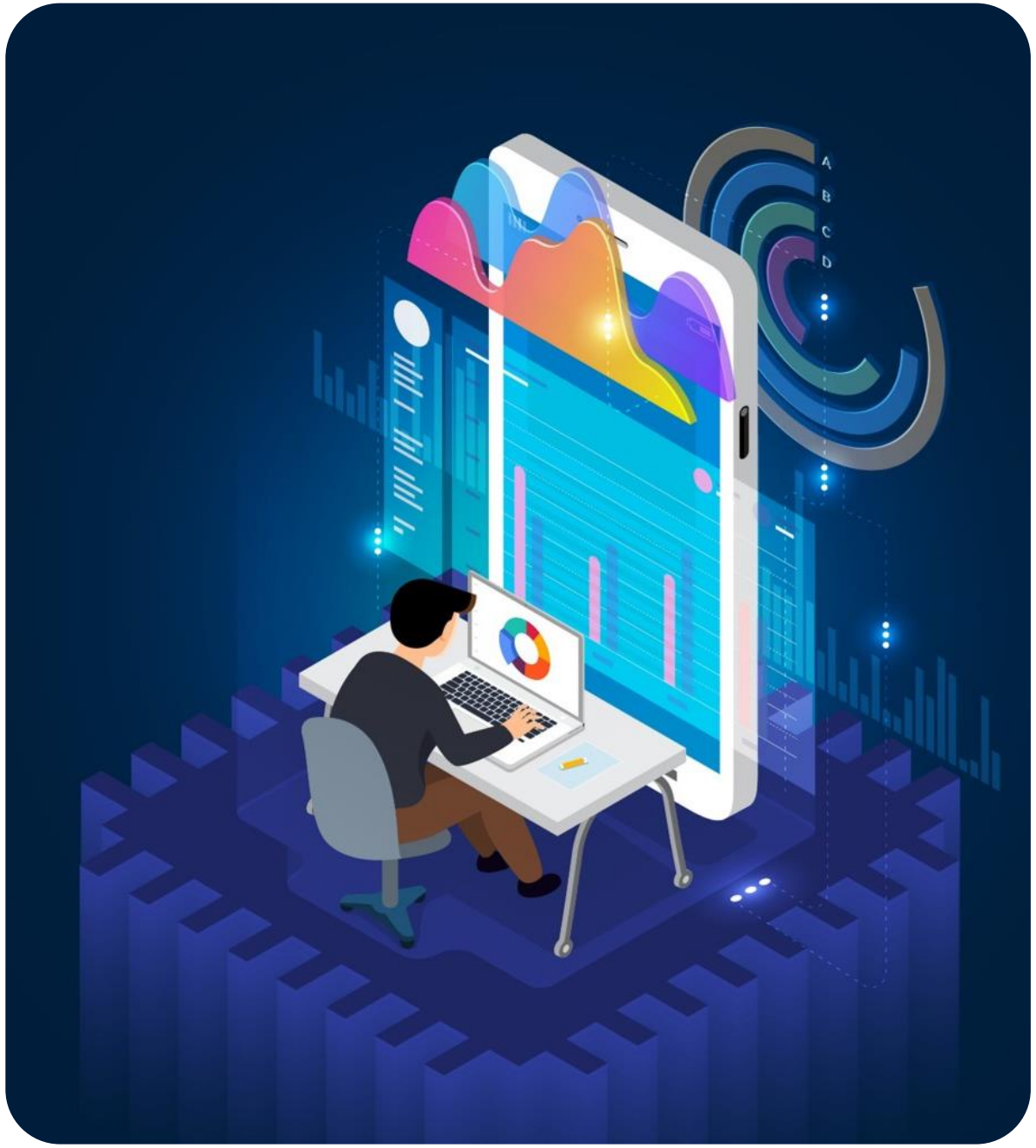


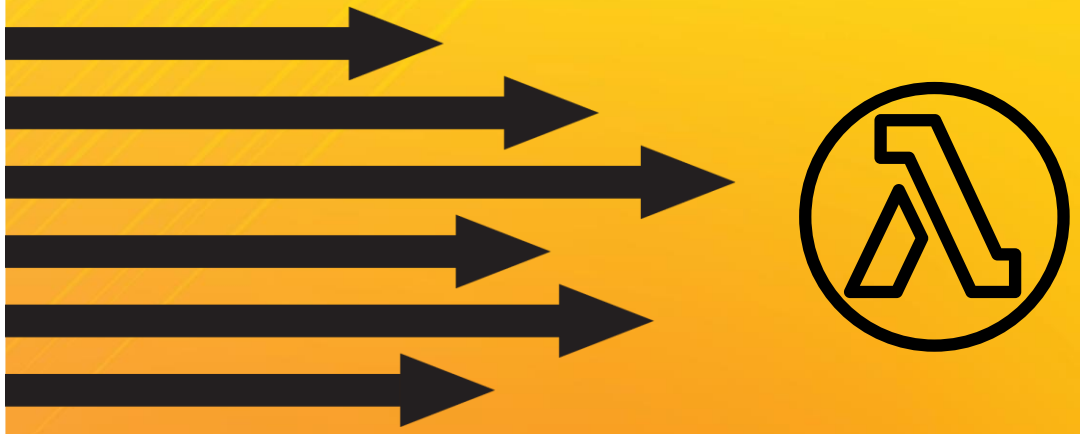
Advantages

- No servers to mange
- Millisecond billing
- Automatic scaling
- Rich ecosystem

Limitations

- Max 15 Min Duration
- Max 10 GB RAM
- Stateless execution
- Potential Cold Start

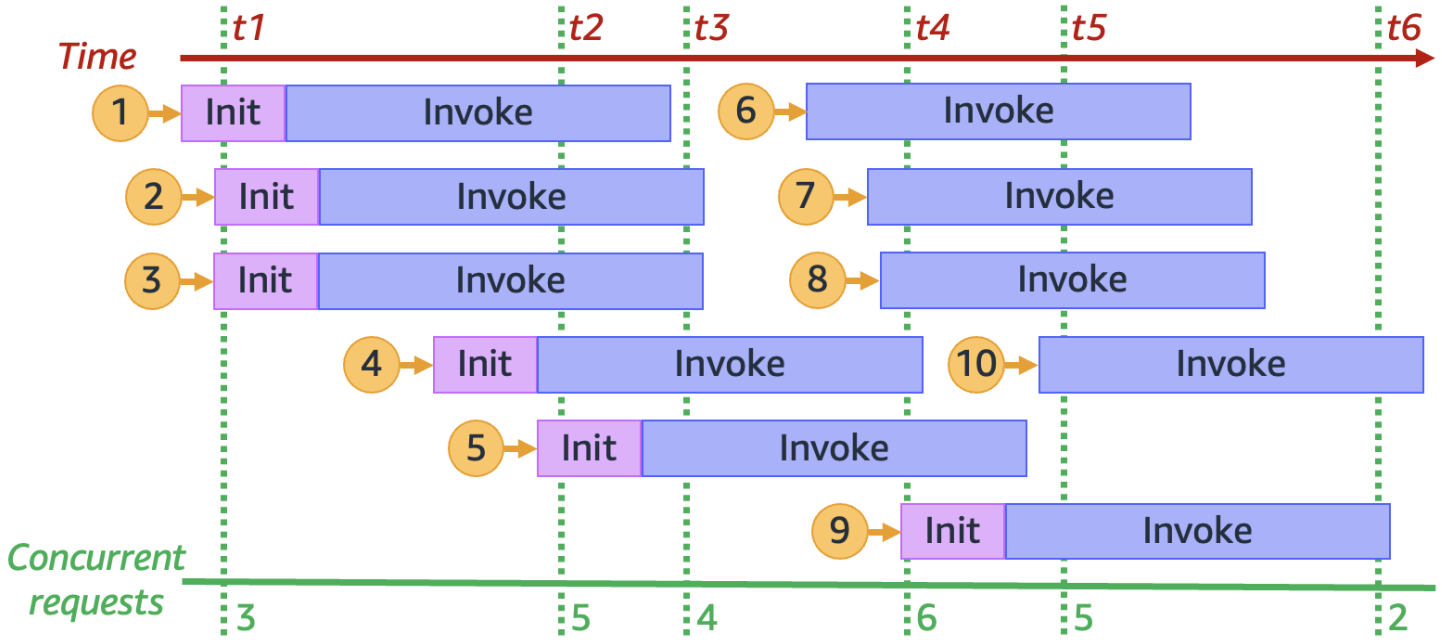




Lambda Concurrency

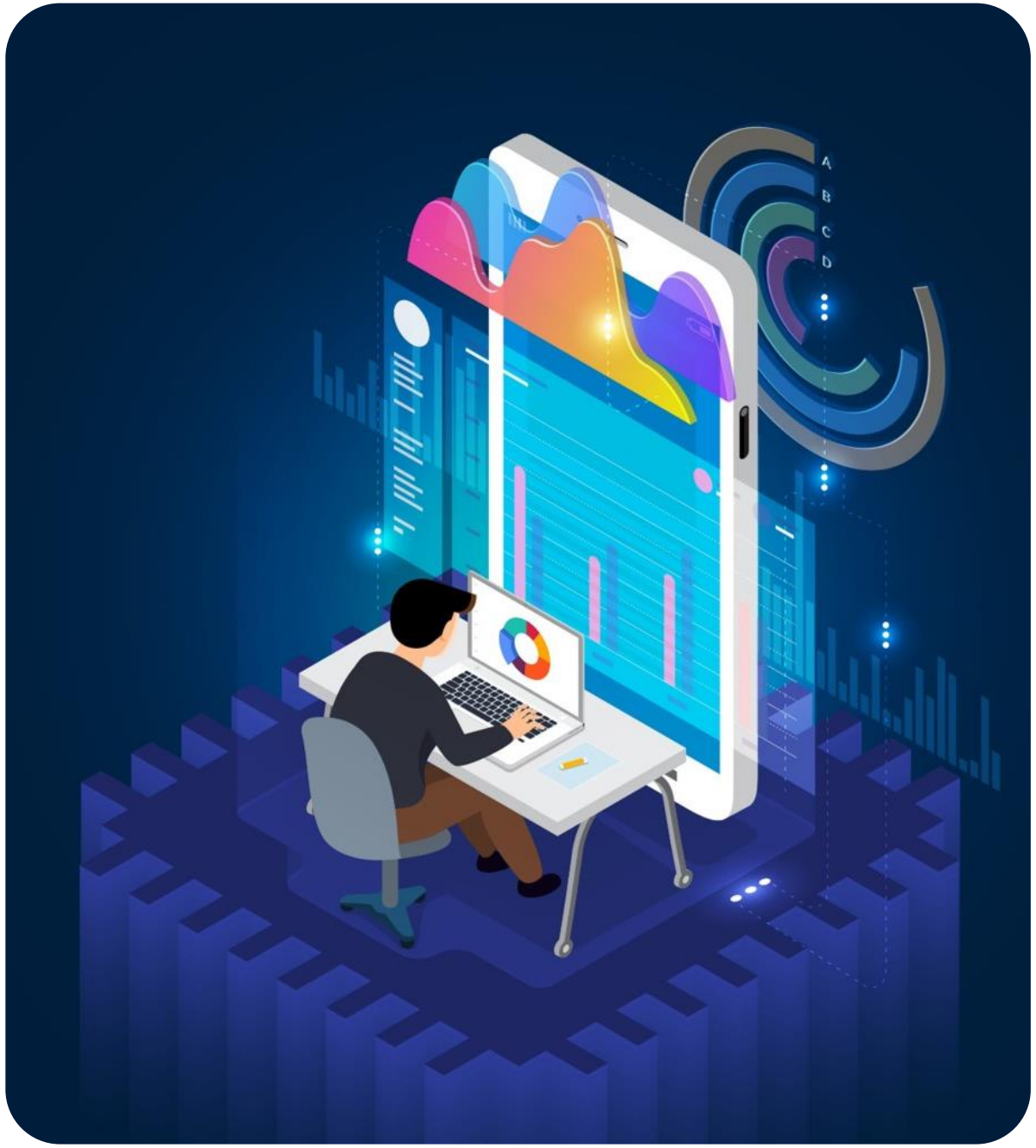
Concurrency

- In Lambda, concurrency is the number of in-flight requests that your function is handling at the same time.
- For each concurrent request, Lambda provisions a separate instance of your execution environment.
- By default, Lambda provides your account with a total concurrency limit of 1,000 concurrent executions across all functions in an AWS Region.
- Lambda emits Amazon CloudWatch metrics to help you monitor concurrency for your functions.



Two types of concurrency control

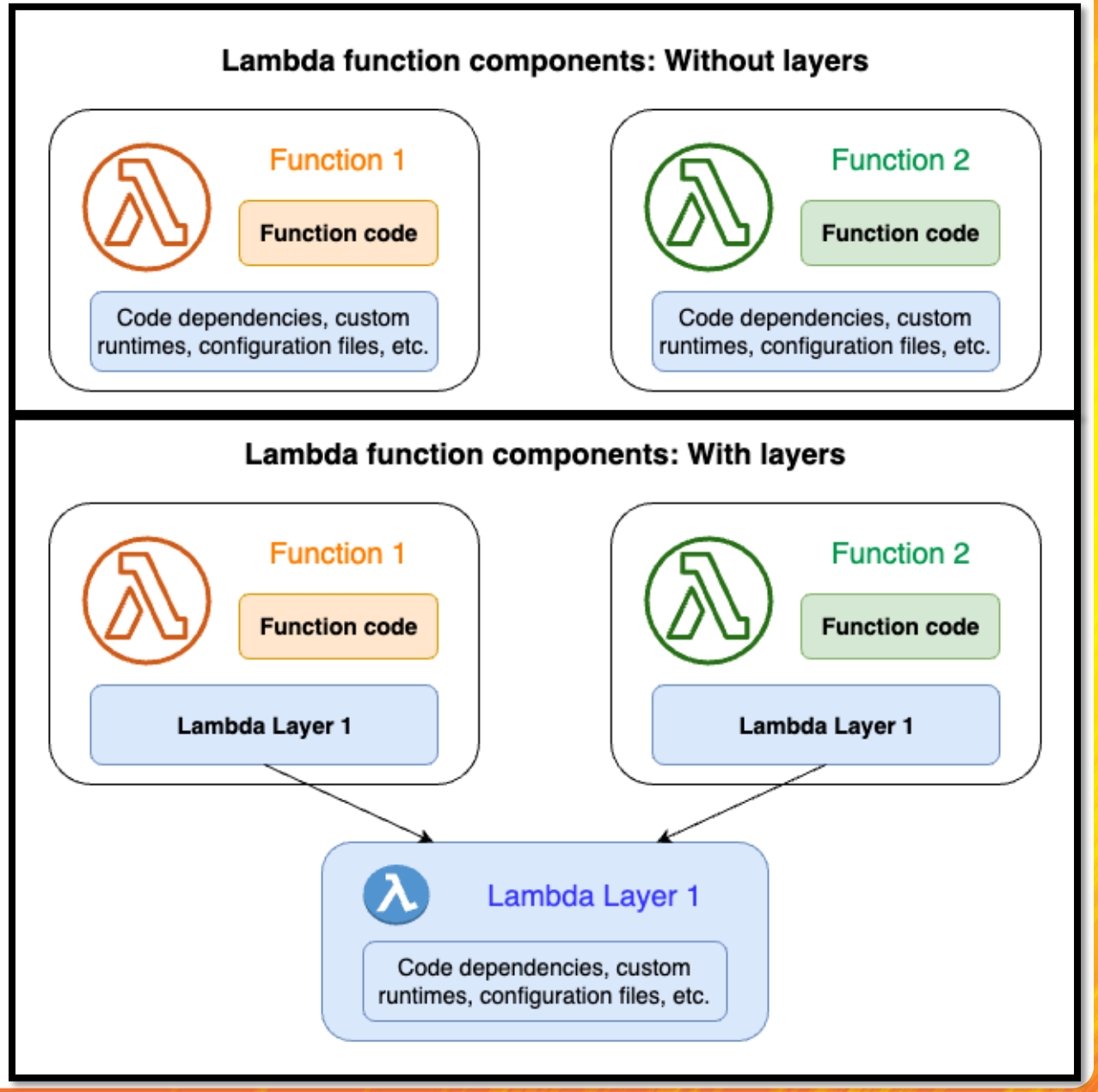
- Reserved concurrency
  - This represents the maximum number of concurrent instances allocated to your function. When a function has reserved concurrency, no other function can use that concurrency.
  - Reserved concurrency is useful for ensuring that your most critical functions always have enough concurrency to handle incoming requests.
  - Configuring reserved concurrency for a function incurs no additional charges.
- Provisioned concurrency
  - This is the number of pre-initialized execution environments allocated to your function. These execution environments are ready to respond immediately to incoming function requests.
  - Provisioned concurrency is useful for reducing cold start latencies for functions.
  - Configuring provisioned concurrency incurs additional charges to your AWS account.



Lambda Layers

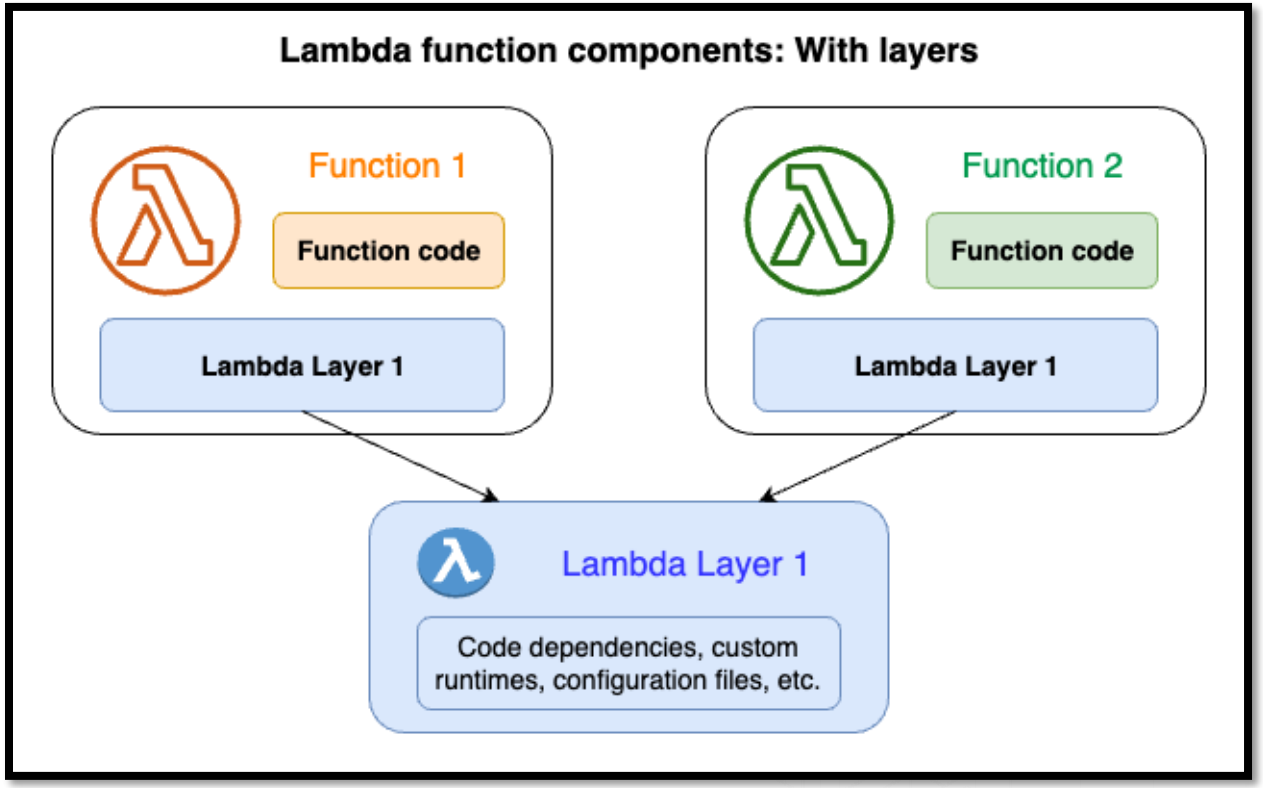
Lambda Layers

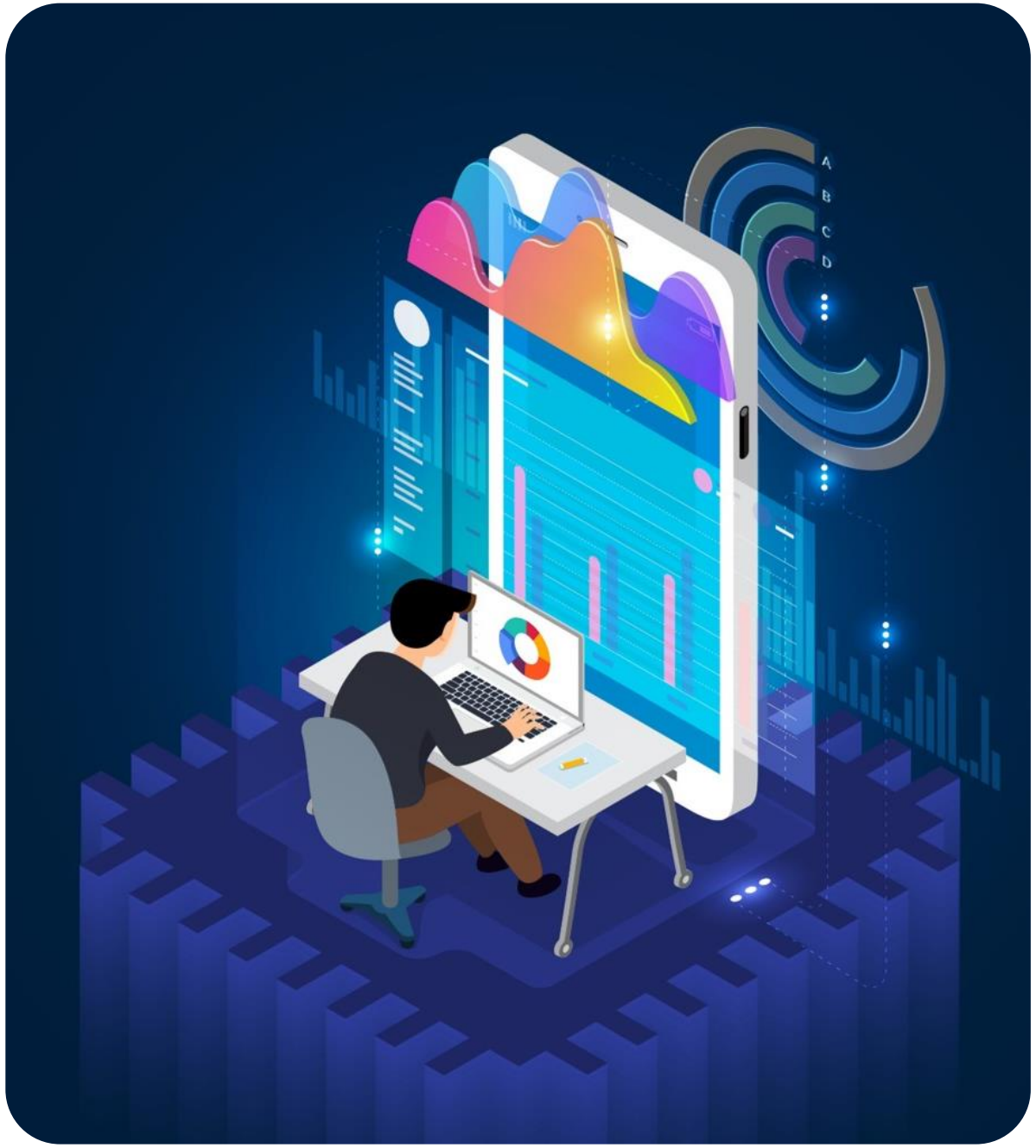
- A Lambda layer is a .zip file archive that contains supplementary code or data. Layers usually contain library dependencies, a custom runtime, or configuration files.
- There are multiple reasons why you might consider using layers:
  - To reduce the size of your deployment packages.
  - To separate core function logic from dependencies.
  - To share dependencies across multiple functions.
  - To use the Lambda console code editor.

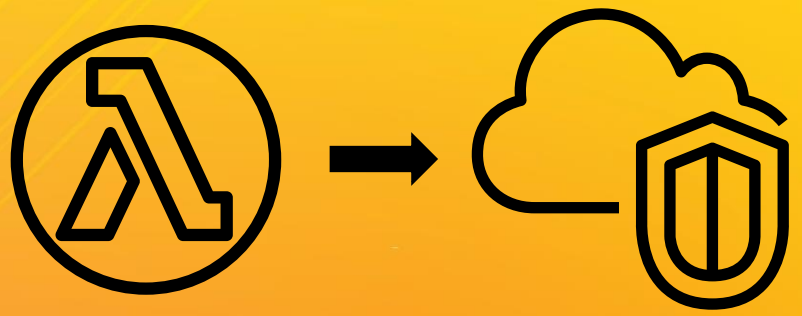


Lambda Layers

- To create a layer, you can either upload the .zip file archive from your local machine or from Amazon Simple Storage Service (Amazon S3).
- Lambda extracts the layer contents into the /opt directory when setting up the execution environment for the function.
- You can add up to five layers to a Lambda function.
- The total unzipped size of the function and all layers cannot exceed the unzipped deployment package size quota of 250 MB.

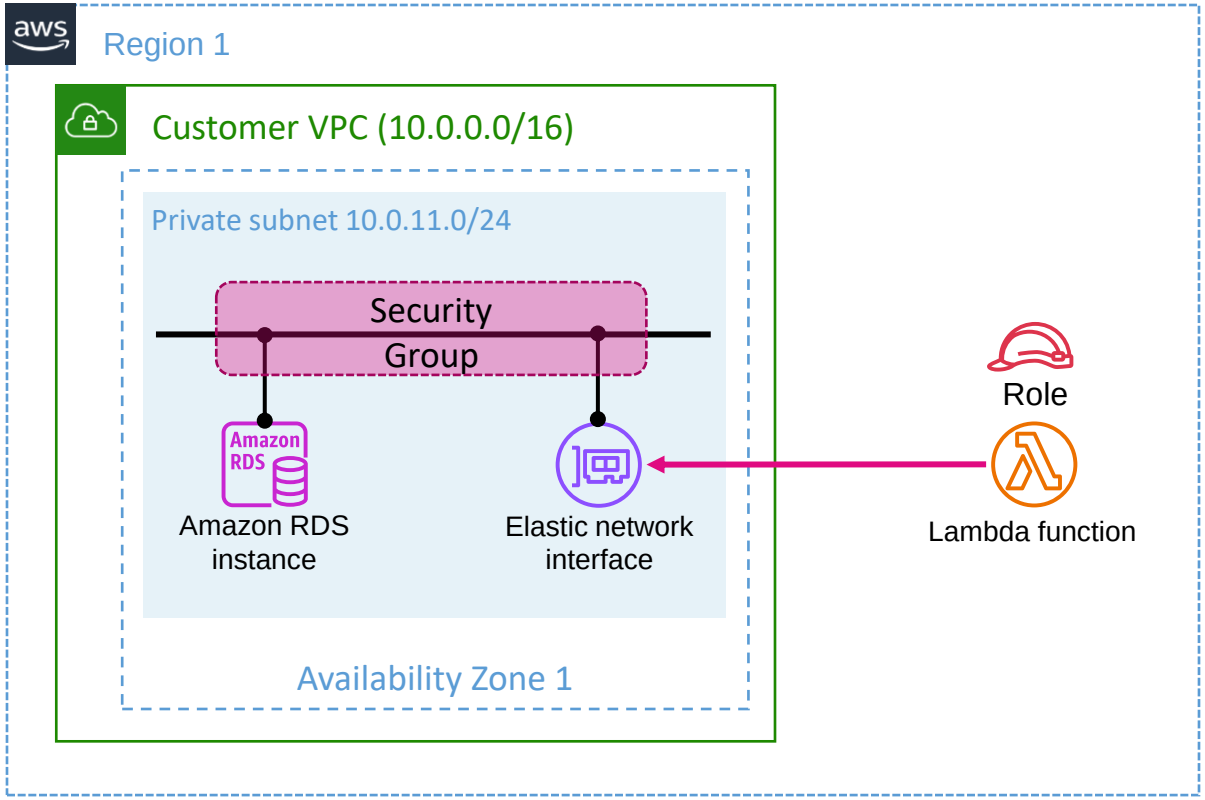






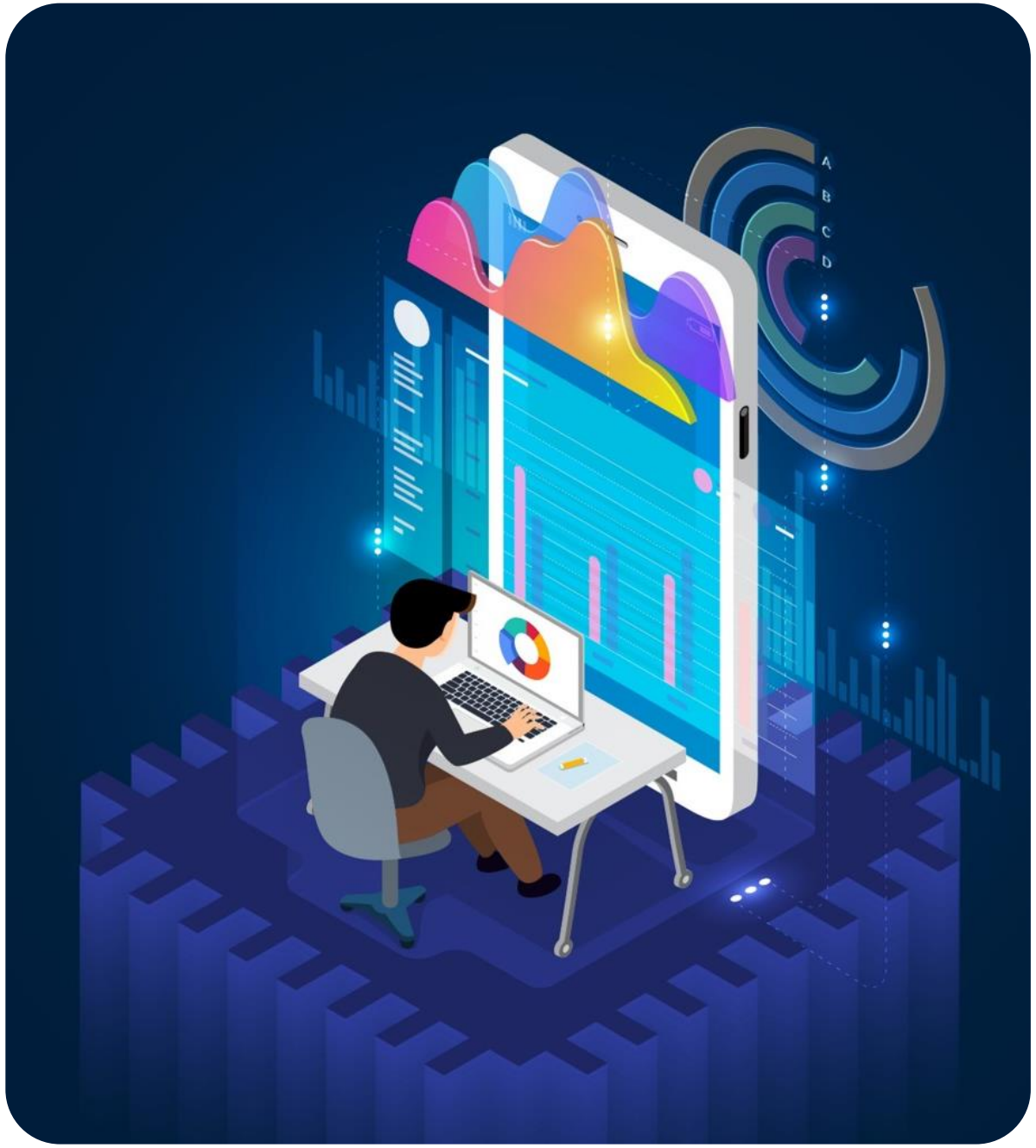
VPC Connectivity

Accessing resources in a Private Subnet



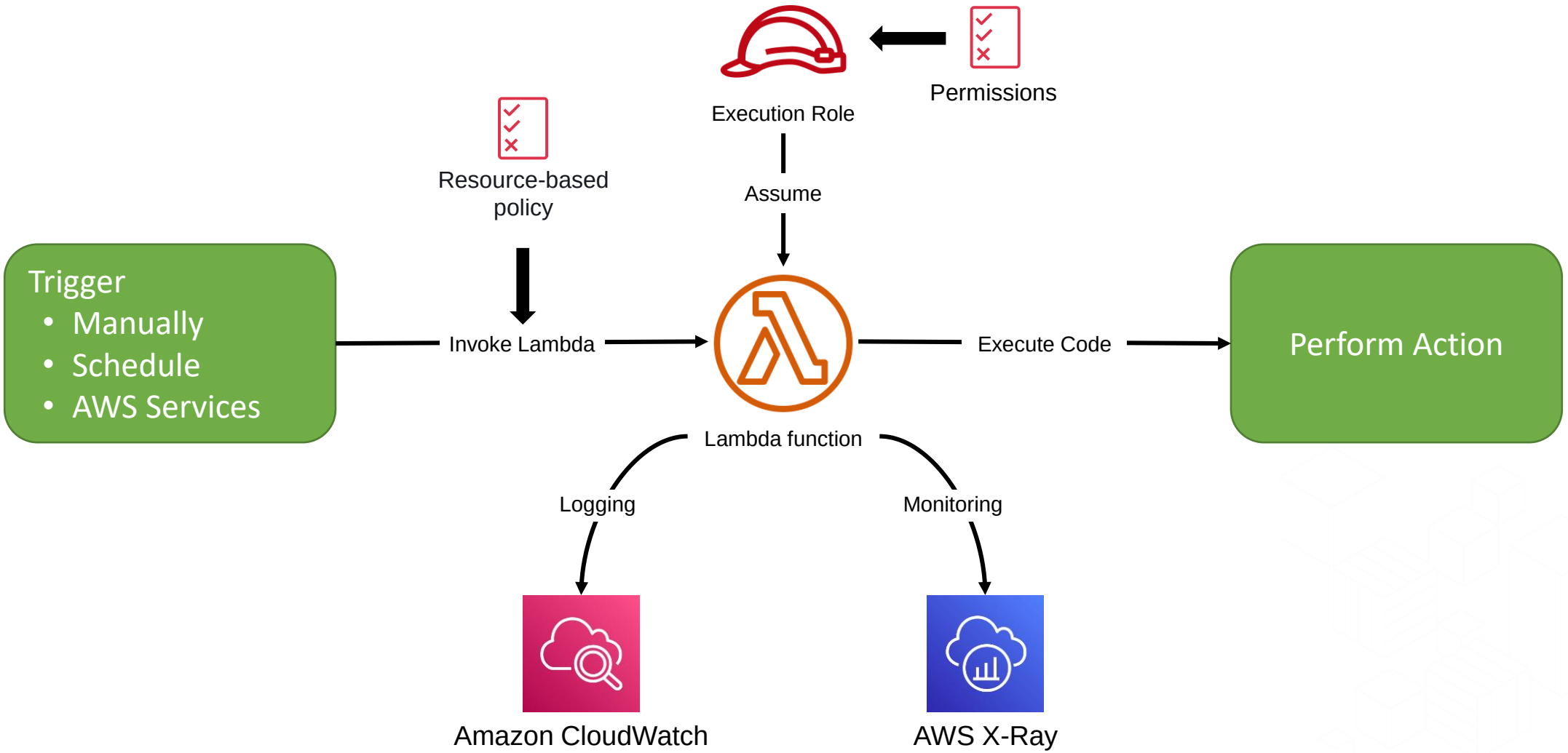
- Lambda functions can communicate to private subnet resources using hyperplane ENI.
- Your Lambda functions will need
  - IAM role to access RDS instance
  - Security Group settings to allow communication
  - Database credentials

- A Lambda function and RDS instance can be in the same VPC or in a different peered VPC.
- They may share the same security groups or can have different security groups which allow communication.



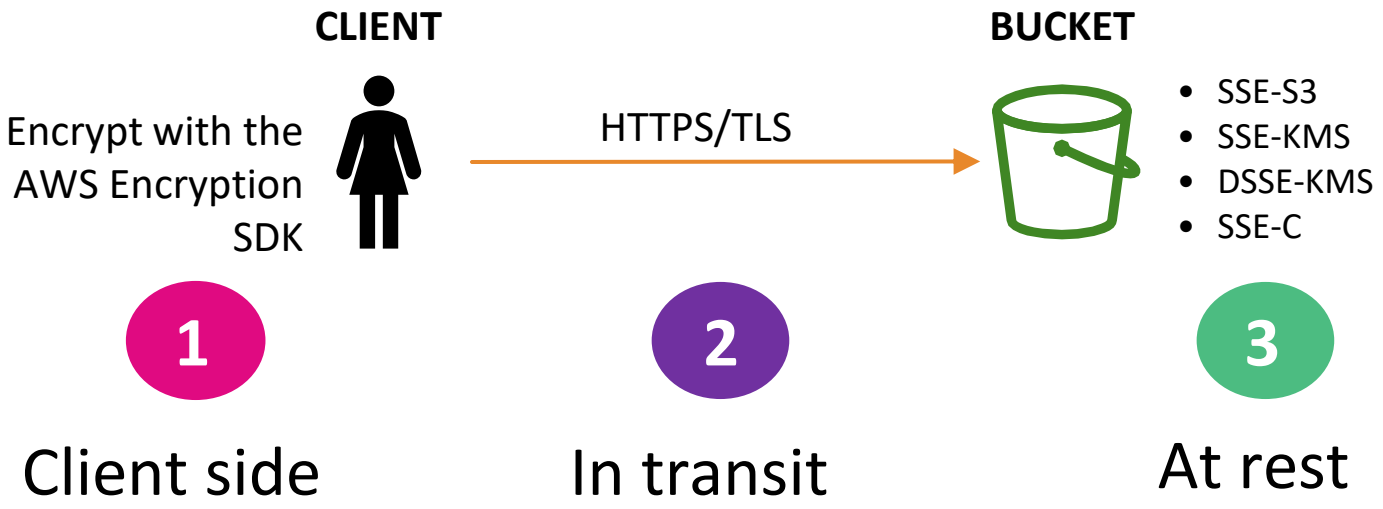
Lambda Security

AWS Lambda Function Execution



Amazon S3 Features

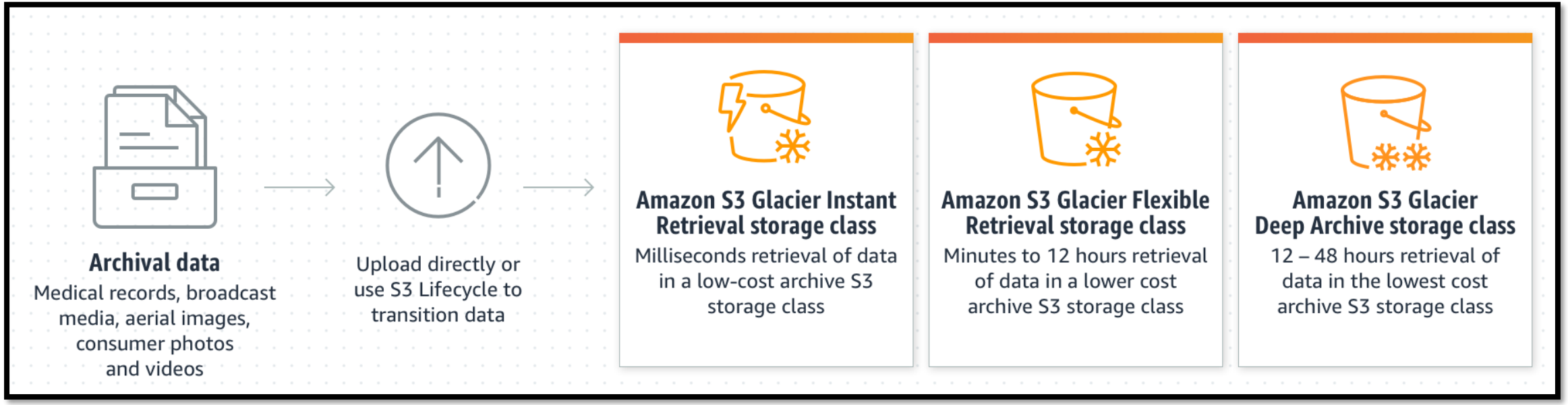
Encryption



- DSSE-KMS combines server-side encryption with SSE-S3 and SSE-KMS. In DSSE-KMS, the data is encrypted twice, once with SSE-S3 and then with SSE-KMS using a customer master key (CMK) managed by AWS KMS.
- With the help of DSSE-KMS, you can fulfil regulatory requirements to apply multiple layers of encryption to your data (National Security Agency CNSSP 15 for FIPS compliance, and Data-at-Rest Capability Package (DAR CP) version 5).

Amazon S3 Glacier storage classes

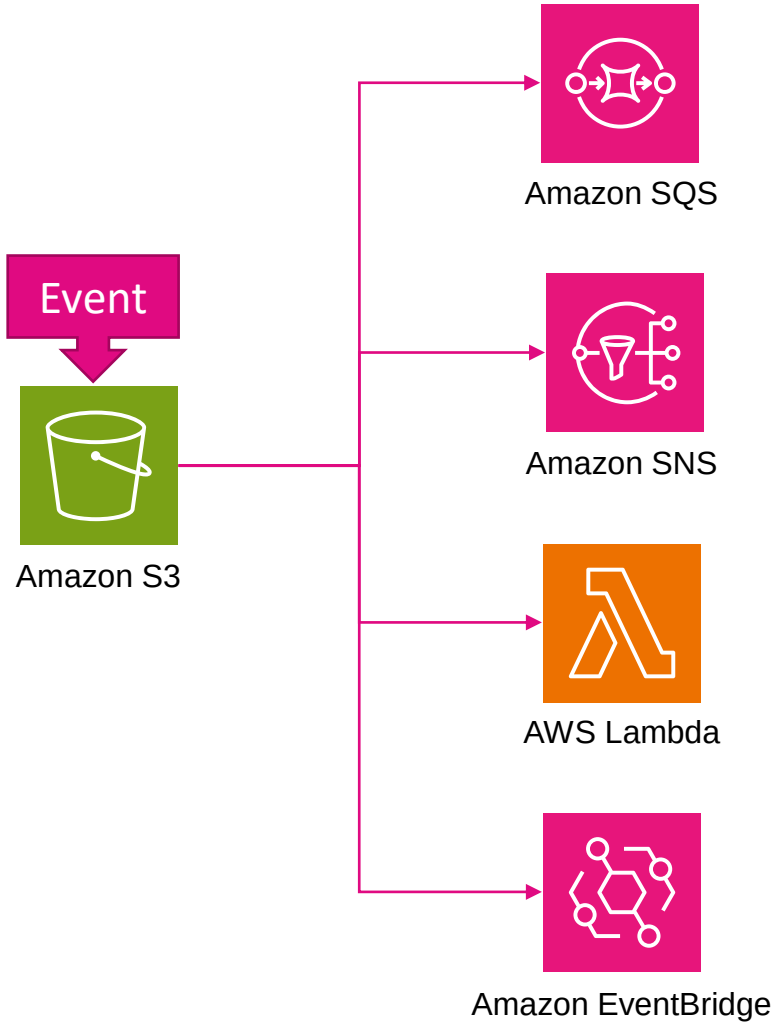
- The Amazon S3 Glacier storage classes are purpose-built for data archiving, providing you with the highest performance, most retrieval flexibility, and the lowest cost archive storage in the cloud.
- You can choose from three archive storage classes optimized for different access patterns and storage duration.



- Amazon S3 Glacier Select allows queries to run directly on data stored in Amazon S3 Glacier without having to retrieve the entire archive.

Event Notification

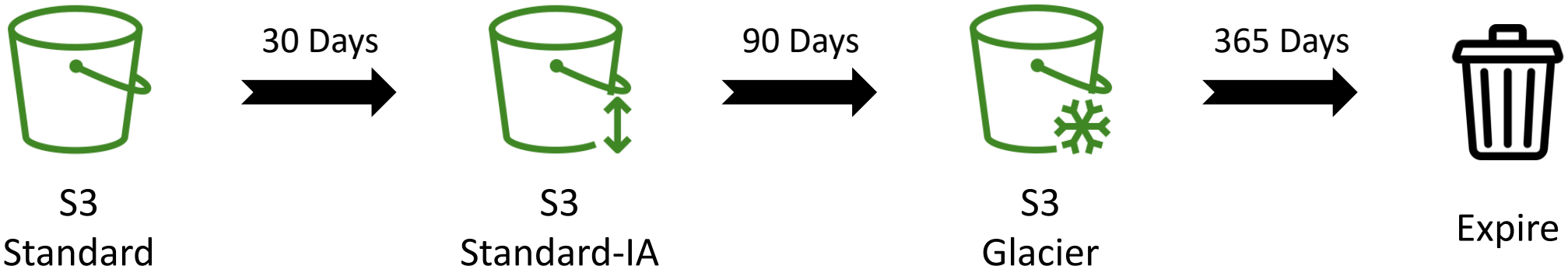
- Amazon S3 Event Notifications provides users a mechanism for initiating events when certain actions take place inside an S3 bucket.



- Amazon S3 can send event notification messages to the following destinations.
  - Amazon SNS topics
  - Amazon SQS queues
  - AWS Lambda
  - Amazon EventBridge
- However, only one destination type can be specified for each event notification.
- You can use the s3:ObjectCreated:* event type to request notification regardless of the API (PUT, POST, and COPY) that was used to create an object.

S3 Life Cycle Policies

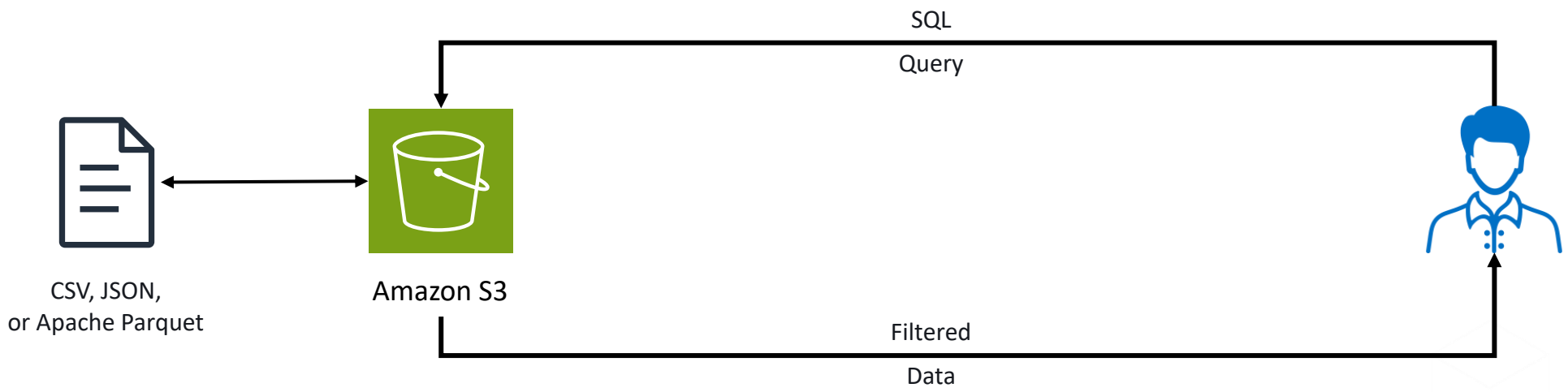
- Storing objects cost effectively throughout their lifecycle



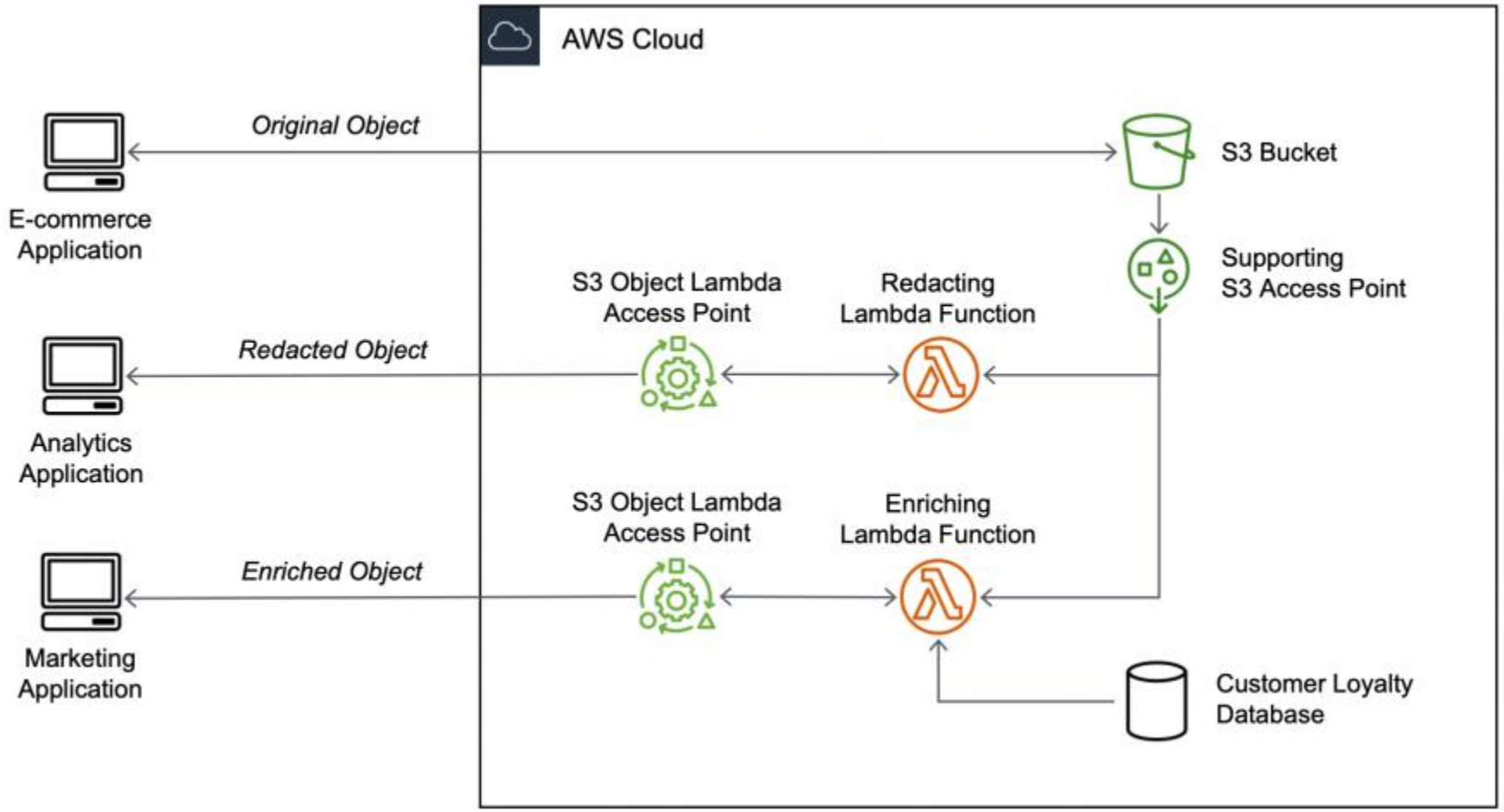
EBOOK

How to optimize storage costs using Amazon S3

- With Amazon S3 Select, you can use structured query language (SQL) statements to filter the contents of an Amazon S3 object and retrieve only the subset of data that you need.



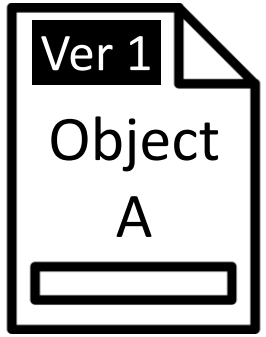
- By using Amazon S3 Select to filter this data, you can reduce the amount of data that Amazon S3 transfers, which reduces the cost and latency to retrieve this data.


AWS Cloud
Original Object
E-commerce Application
S3 Bucket
Supporting S3 Access Point
S3 Object Lambda Access Point
Redacting Lambda Function
Redacted Object
Analytics Application
S3 Object Lambda Access Point
Enriching Lambda Function
Enriched Object
Marketing Application
Customer Loyalty Database

Bucket Versioning

- Versioning is a means of keeping multiple variants of an object in the same bucket.

https://<bucket>.s3.amazonaws.com/ObjectA

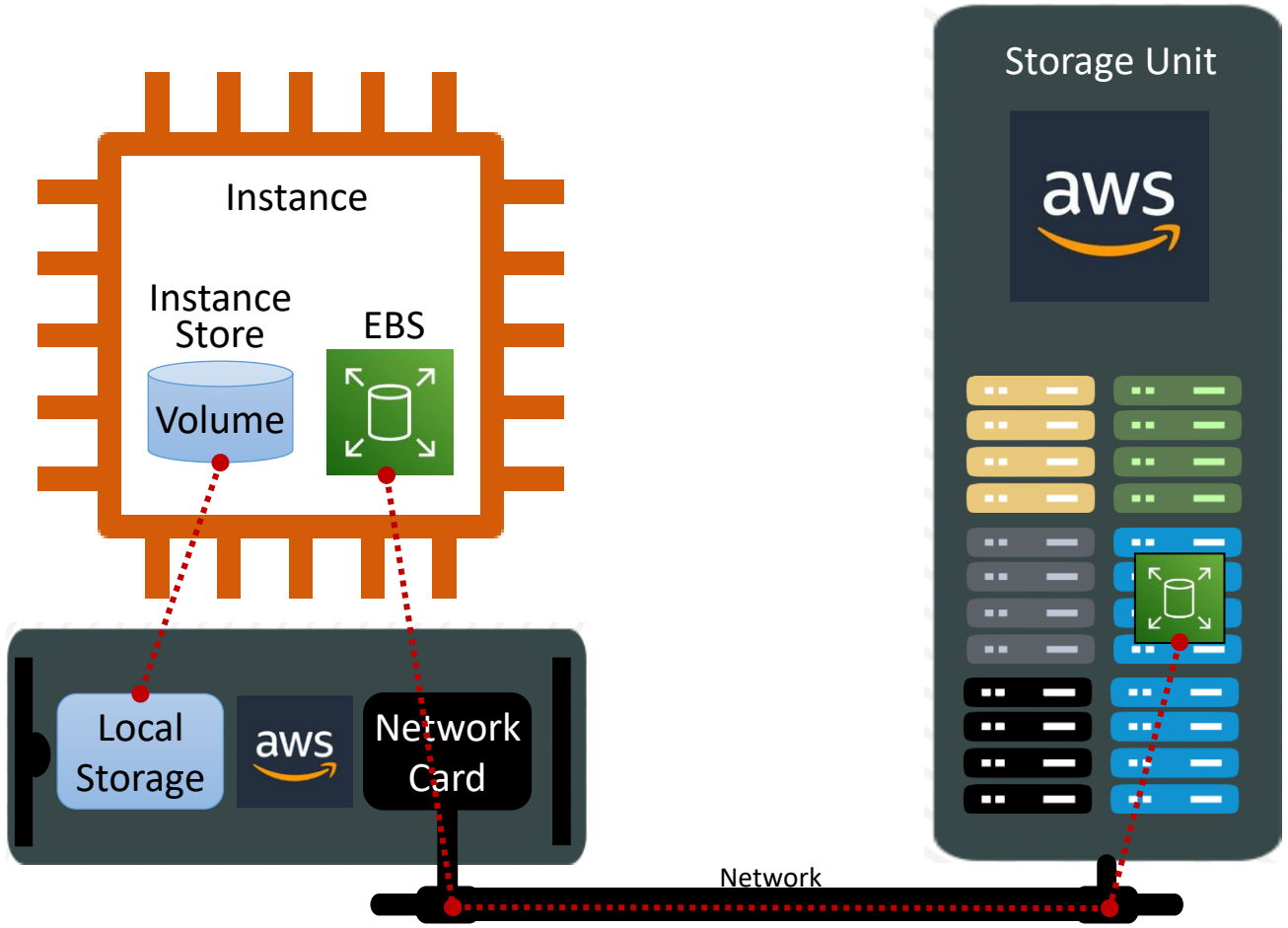


https://<bucket>.s3.amazonaws.com/ObjectA**?versionId=22222**

Amazon EBS Volumes

EC2 Storage Options – Block Storage

- Instance Store
  - Local Storage
  - Ephemeral
  - Limited Size
  - Not available on all instance types
  - Use case
    - Swap space
    - Temp. Storage



- Elastic Block Store (EBS)
  - Over Network
  - Persistent Storage
  - 64 TB Max Size
  - Choice of volume types
  - EBS Optimized instance type*
  - Use case
    - Any block storage need (OS/DB/Log)

Amazon EBS Volume

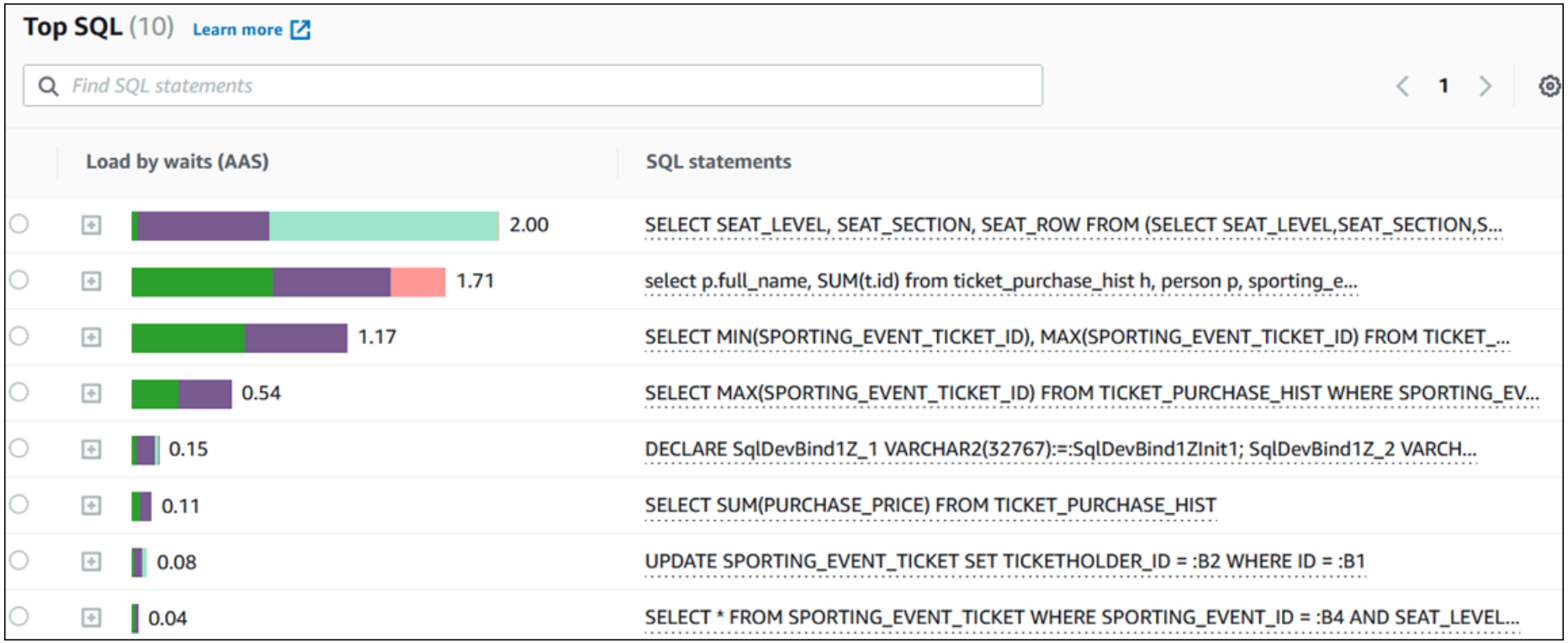
- Specific to a AZ
- Choose based on performance/price
- Can be expanded (can’t shrink)
- Can be changed while instance is running

- Supports Snapshot
- Snapshots can be copied to another Region or account
- Supports encryption
- Attached to Single EC2 Instance*

Amazon RDS - Performance Insights

Amazon RDS Performance Insights

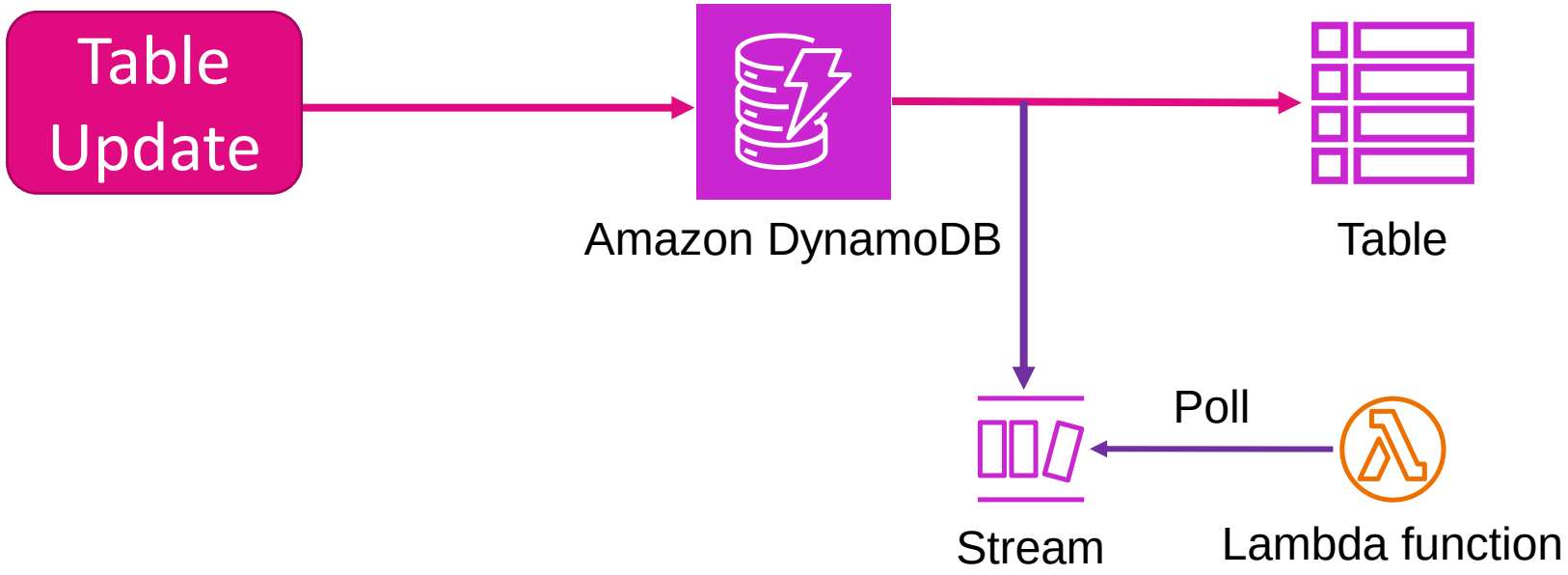
- Amazon RDS Performance Insights is a database performance tuning and monitoring feature that helps you quickly assess the load on your database, and determine when and where to take action.
- Performance Insights allows non-experts to detect performance problems with an easy-to-understand dashboard that visualizes database load.



Amazon DynamoDB

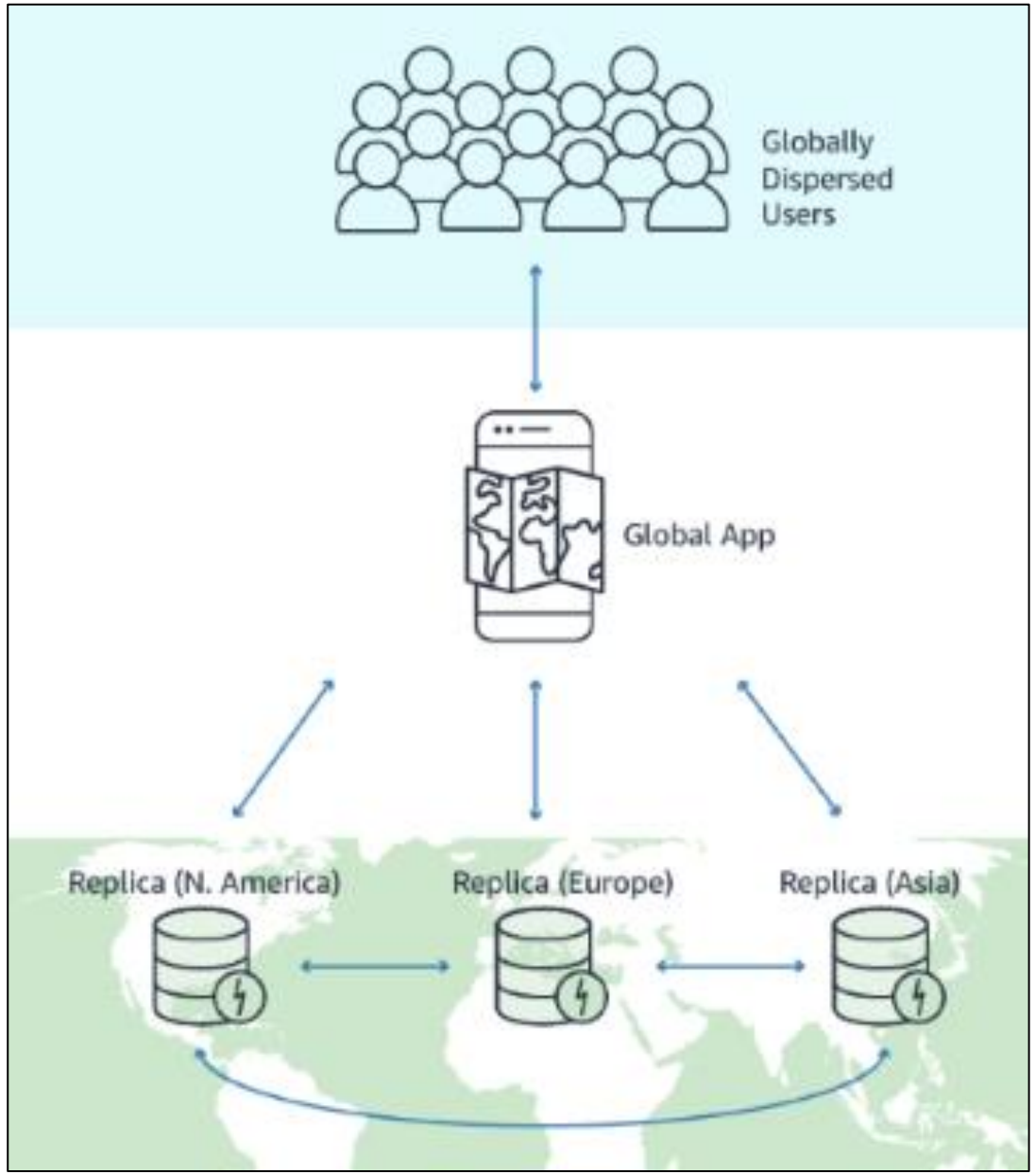
DynamoDB Streams

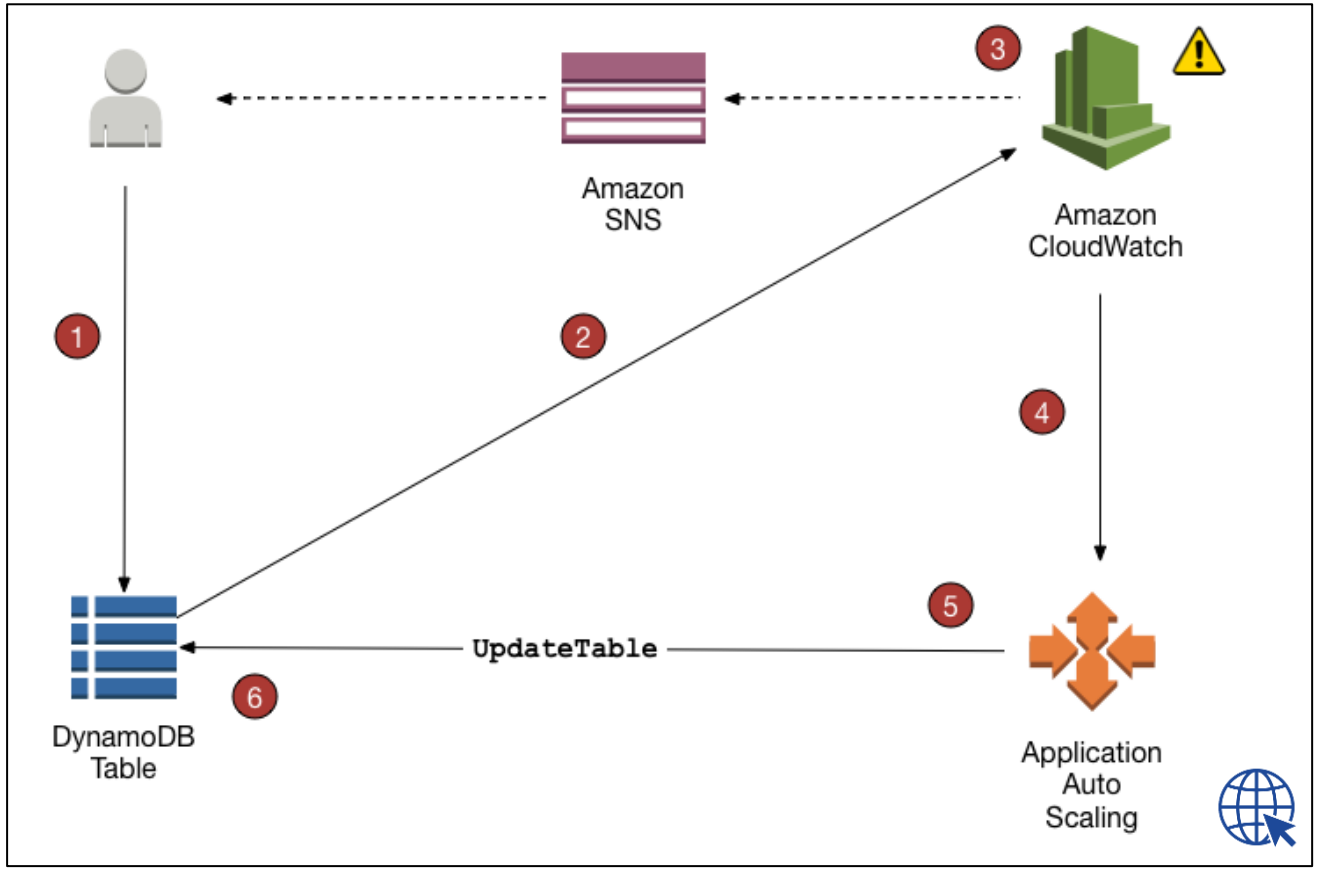
- With DynamoDB Streams, you can trigger a Lambda function to perform additional work each time a DynamoDB table is updated.
- For example, you can set a trigger so that when an item in a table is modified a new record immediately appears in that table's stream.
- The AWS Lambda service polls the stream for new records four times per second.



Amazon DynamoDB global tables

- Amazon DynamoDB global tables is a fully managed, serverless, multi-Region, and multi-active database.
- As global tables replicate your Amazon DynamoDB tables automatically across your choice of AWS Regions, you can achieve fast, local read and write performance.
- Prior to adding an additional replica in a different region to an Amazon DynamoDB global tables, the table must have DynamoDB Streams enabled.



Application Auto Scaling policy for your DynamoDB table

- With Application Auto Scaling, you create a *scaling policy* for a table or a global secondary index.
- The scaling policy specifies whether you want to scale read capacity or write capacity (or both), and the minimum and maximum provisioned capacity unit settings for the table or index.
- You need to configure following settings:
  - Minimum capacity units – Enter your lower boundary for the auto scaling range.
  - Maximum capacity units – Enter your upper boundary for the auto scaling range.
  - Target utilization – Enter your target utilization percentage for the table.