What is Serverless?

Any service in AWS is serverless if the following apply:

No servers

- There are no servers exposed that need to be directly administered.

Elastic

- Service scales automatically and is highly available

Pay as you go

You only pay for what you use

What is Serverless?

- Serverless is a new paradigm in which the developers don't have to manage servers anymore
- Only deploy code i.e **Functions**
- Serverless was pioneered by AWS Lambda but now also includes anything that's managed: **"databases, messaging, storage, etc."**
- ***Serverless does not mean there are no servers***, basically it means you just don't **manage / provision / see** them.
- Just like RDS, SNS.

Serverless in AWS

- AWS Lambda & Step Functions (serverless workflow)
- CloudWatch
- S3
- SNS
- Athena
- DynamoDB
- Cognito
- API Gateway
- SQS
- Kinesis
- Aurora Serverless

Why Lambda?

- **EC2:**

  Virtual Servers in the Cloud

  Limited by RAM and CPU

  Continuously running

  Scaling means intervention to add / remove servers

- **Lambda:**

  Virtual **functions** – no servers to manage!

  Limited by time - **short executions (15 mins)**

  Run **on-demand**

  Scaling is automated!

AWS Lambda Language support

- **Python**
- Node.js (JavaScript)
- Java (Java 8 compatible)
- C# (.NET Core)
- Go lang
- C# / Powershell

Anatomy of Lambda Function in AWS

```
import json
def lambda_handler(event, context):
return {
'statusCode': 200,
'body':json.dumps('Hello World!')
}
```

Event Object
Data send during Lambda Function Invocation

Context Object
Methods available to interact with runtime information (log group, request id etc)

lambda_handler() Function
Function to be executed upon invocation

Benefits of AWS Lambda

- **Easy Pricing :**

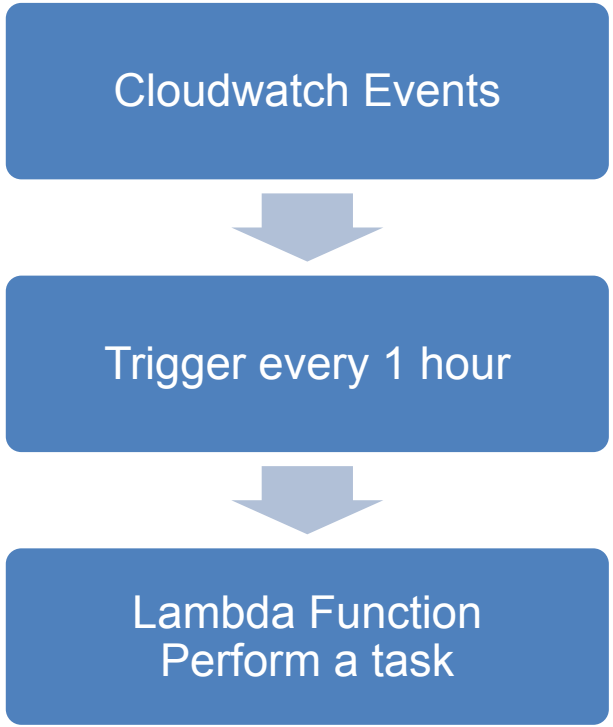
  Charged based on the number of **requests** for your functions

  and the **duration** i.e the time it takes for your code to execute.

  The AWS Lambda free usage tier includes **1M free requests per month** and **400,000 GB-seconds of compute time per month**, Lambda Pricing

- Integrated with the whole AWS Stack.
- Integrated with many programming languages.
- Easy monitoring through AWS CloudWatch.
- Easy to get more resources per functions (upto 10GB RAM)
- Increasing RAM will also improve CPU and network!

Example : Serverless Cron Job

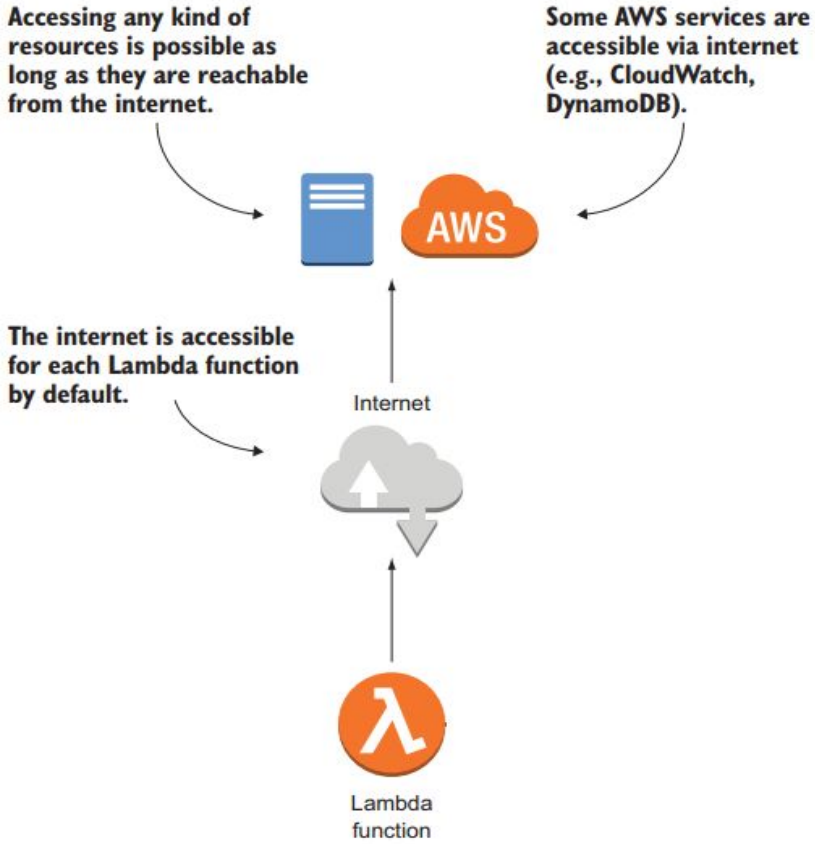


Lambda Usage

AWS Lambda Configuration

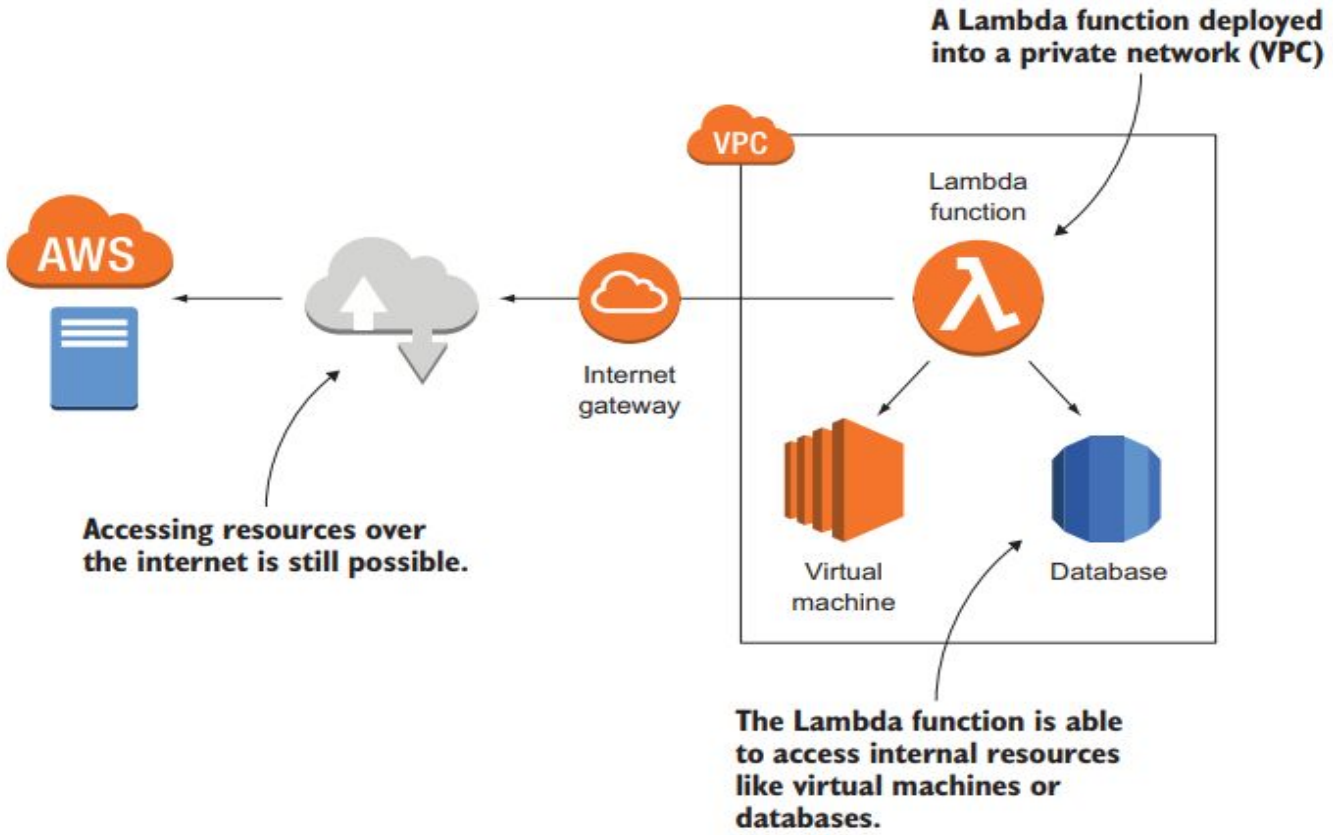
- Timeout: default 3 seconds, max of 300s (Note: new limit 15 minutes)
- Environment variables
- Allocated memory (128M to 10G)
- Ability to deploy within a VPC + assign security groups
- **IAM execution role** must be attached to the Lambda function

AWS Lambda – Internet Access



By default a Lambda function is connected to the internet and running outside your VPCs.

AWS Lambda – Within VPC



Deploying a Lambda function into your VPC allows you to access internal resources (such as database, virtual machines, and so on).

AWS Lambda Logging, Monitoring

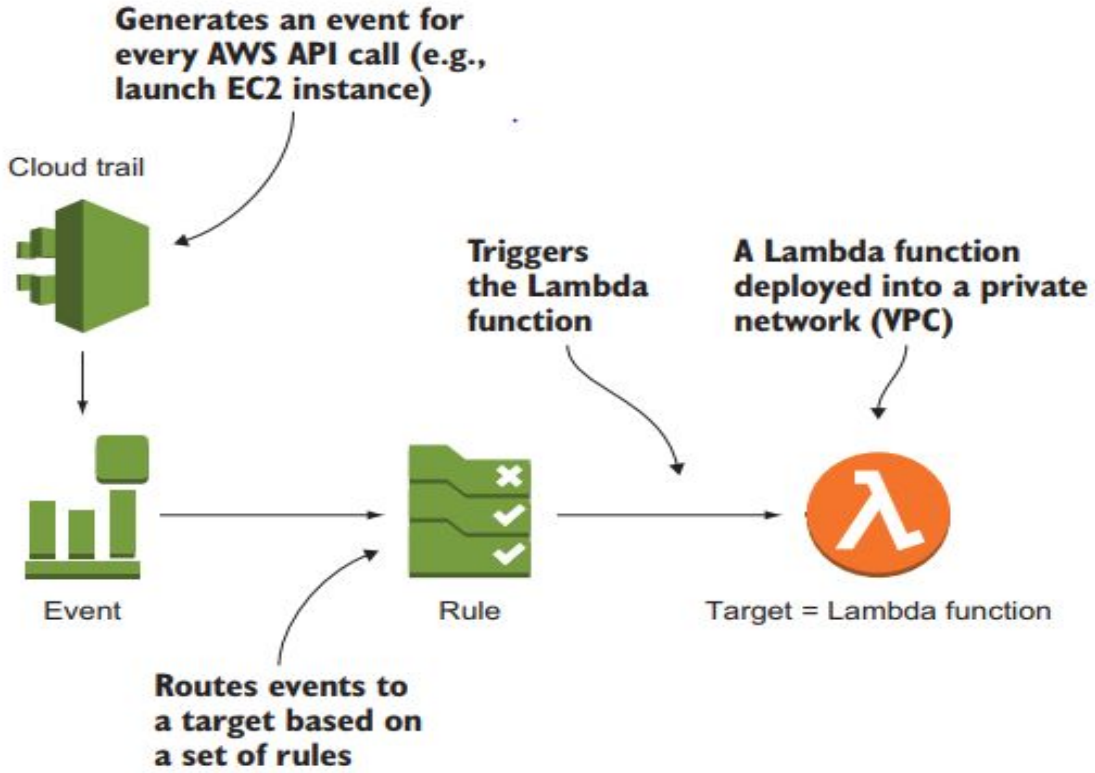
- **CloudWatch:**
  - Lambda integrates with CloudWatch Logs and pushes all logs from your code to a CloudWatch Logs group associated with a Lambda function, which is named **/aws/lambda/<*function name*>**
  - AWS Lambda metrics are displayed in AWS CloudWatch Metrics

Make sure your AWS Lambda function has an execution role with an IAM policy that authorizes writes to CloudWatch.

AWS Lambda Best Practices

- **Perform heavy-duty work outside of your function handler**
  - Connect to databases outside of your function handler
  - Initialize the AWS SDK outside of your function handler
  - Pull in dependencies or datasets outside of your function handler
- **Use environment variables for:**
  - Database Connection Strings, S3 bucket, etc… do not put these values directly in your code
  - Passwords, sensitive values can be stored in **SSM Secure Strings, Secrets Manager**.
- **Avoid using recursive code, never have a Lambda function call itself.**
- **Don't put your Lambda function in a VPC unless you have to.**

Operational Tasks with Lambda



CloudTrail generates an event for every AWS API call, a rule routes the event to the Lambda function

S3 Event Custom Email Notification