AWS Compute

Module 2

Units

OVERVIEW : MODULE 02

AWS Compute

Learning Outcomes

- Define Amazon EC2 and understand its significance in AWS computing
- Comprehend the lifecycle of an Amazon EC2 instance, including launching stopping, and terminating
- Define serverless computing and identify its advantages and use cases
- Explore AWS Lambda as a serverless computing service and its event-driven architecture
- Evaluate and choose the appropriate AWS computing service based on specific requirements
- Apply theoretical knowledge in a practical setting by launching a sample application on Amazon EC2
- Gain hands-on proficiency in setting up and managing computing resources on AWS

Lesson Learning Outcomes

✓ Define Amazon EC2 and its significance in AWS computing services

✓ Grasp the key features and capabilities of EC2 for scalable and flexible computing

✓ Articulate the benefits of using Amazon EC2, including scalability and cost-effectiveness

✓ Understand the role of EC2 Security Groups in network security and learn to configure them

✓ Explore the pricing options for EC2 instances and understand the factors influencing costs

✓ Gain the ability to make informed decisions on choosing EC2 instances based on specific requirements

LESSON OVERVIEW

MODULE 2 INTRODUCTION TO AWS COMPUTE

Lesson 2.1 Introduction to Amazon Elastic Compute Cloud (EC2)

- EC2 Overview
- Benefits of EC2
- EC2 Security Group
- EC2 Pricing Options

Introduction to Amazon Elastic Compute Cloud (EC2)

EC2 Overview

AWS EC2

Amazon Elastic Compute Cloud (**EC2**) is a web service that provides **resizable** compute capacity in the cloud. In other words virtual machine in the AWS Cloud environment. It reduces the time required to obtain and start the new server in a minute.

AWS EC2 also allows you to quickly **scale** capacity, both up and down, as your computing requirements.
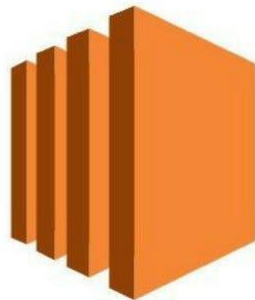
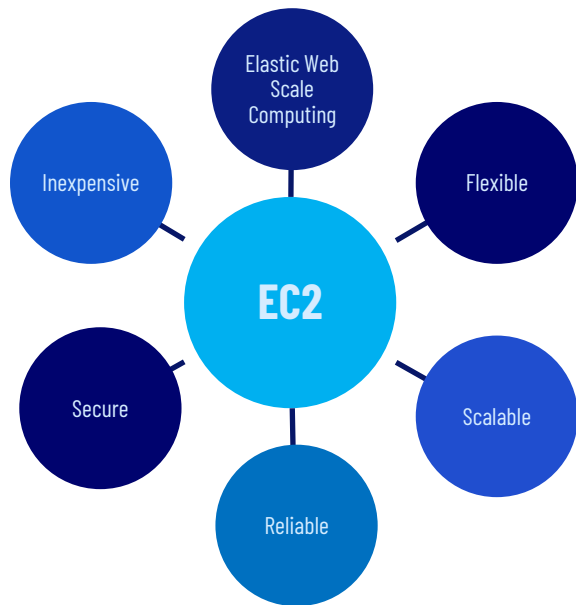Amazon EC2

Introduction to Amazon Elastic Compute Cloud (EC2)

Benefits of EC2

Scalability

EC2 allows you to easily scale your compute capacity up or down based on demand. You can add or remove instances to handle varying workloads efficiently.

Flexibility and Variety

EC2 provides a wide range of instance types optimized for different use cases, including general-purpose, compute-optimized, memory-optimized, and storage-optimized instances.

Elastic Web Scale Computing

Inexpensive

Flexible

EC2

Secure

Scalable

Reliable

Introduction to Amazon Elastic Compute Cloud (EC2)
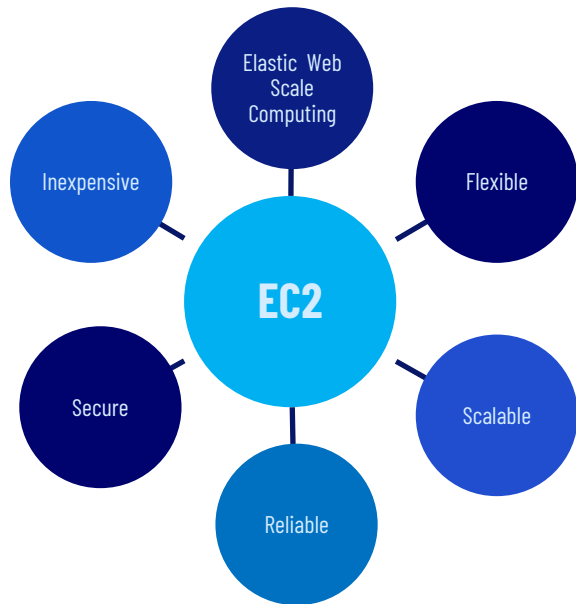
Benefits of EC2

Elasticity

EC2 allows you to easily resize our compute capacity up or down based on demand.

Reliability

EC2 is available in multiple AWS regions worldwide, allowing you to deploy instances closer to your end-users for reduced latency and improved performance.

Elastic Web Scale Computing

Inexpensive

Flexible

EC2

Secure

Scalable

Reliable

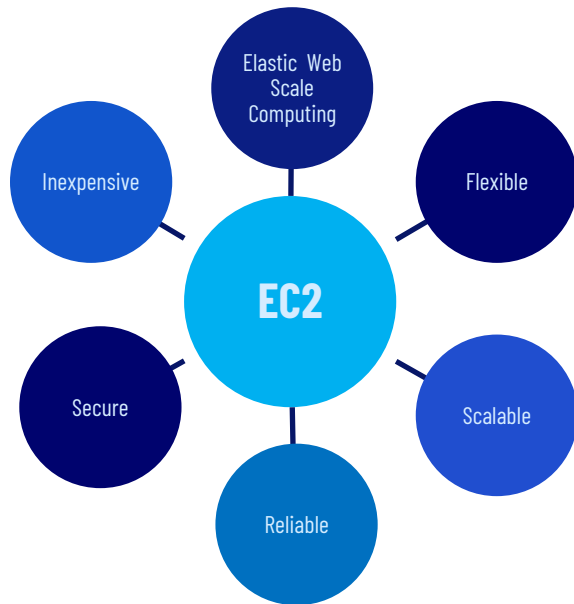# Introduction to Amazon Elastic Compute Cloud (EC2)

Benefits of EC2

Security

EC2 allows us to configure multiple levels of security.
Access level, Security Group, and Network ACL.

Cost Efficiency

EC2 operates on a pay-as-you-go pricing model, allowing you to pay only for the computing capacity you consume

Elastic Web Scale Computing

Inexpensive

Flexible

EC2

Secure

Scalable

Reliable

Introduction to Amazon Elastic Compute Cloud (EC2)

EC2 Security Group

Security Group

It is an instance-level virtual firewall for **EC2** to control incoming and outgoing traffic.

By default, everything is blocked. To communicate with **EC2** need to add rules for Inbound and Outbound Traffic

Allowed Ports & IP Address

AWS EC2 Instance

Denied PORTS & IP Address
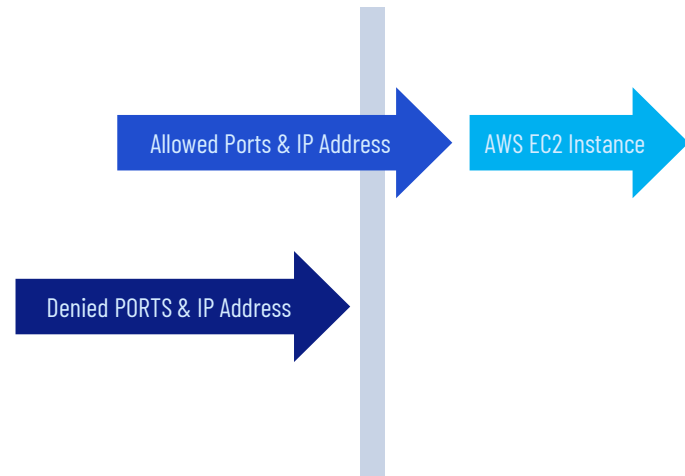
Introduction to Amazon Elastic Compute Cloud (EC2)

EC2 Pricing Options

On-Demand

Pay by the hour or second, Depending upon the instance type

Reserved

Reserved capacity for 1 or 3 years contracts up to **72%** discount on the hourly charge.

Spot

Purchase unused capacity at a discount of up to **90%**.

Dedicated Host

A physical EC2 server is dedicated for our use. Most expensive option.

EC2 Instance Pricing Models

On-Demand
Reserved Instance
Spot Instance
Dedicated Host

Introduction to Amazon Elastic Compute Cloud (EC2)

SUMMARY

- Amazon EC2 was introduced as a key AWS service for scalable and flexible computing
- Fundamental role that EC2 plays in providing virtual computing resources
- Advantages and benefits of using EC2, emphasizing its scalability, flexibility, and cost-effectiveness
- How EC2 addresses diverse computing requirements for businesses and individuals
- The concept of EC2 Security Groups was explained, emphasizing their importance in network security
- How to configure and manage EC2 Security Groups to control inbound and outbound traffic

- Various pricing options are available for EC2 instances
- The factors influencing EC2 pricing and how to optimize costs based on specific needs

Introduction to Amazon Elastic Compute Cloud (EC2)

Resources

- ✓ https://aws.amazon.com/ec2/
- ✓ https://www.sndkcorp.com/amazon-ec2
- ✓ https://docs.aws.amazon.com/vpc/latest/userguide/vpc-security-groups.html
- ✓ https://aws.amazon.com/ec2/pricing/

Lesson Learning Outcomes

✓ Define and explain the lifecycle stages of Amazon EC2 instances

✓ Develop a comprehensive understanding of the different states an EC2 instance can go through

✓ Identify and differentiate between the various states an EC2 instance can exist in

✓ Demonstrate the ability to interpret the status of an EC2 instance based on its current state

LESSON OVERVIEW
MODULE 2 INTRODUCTION AWS COMPUTE

Lesson 2.2 Introduction Amazon EC2 Instance Lifecycle
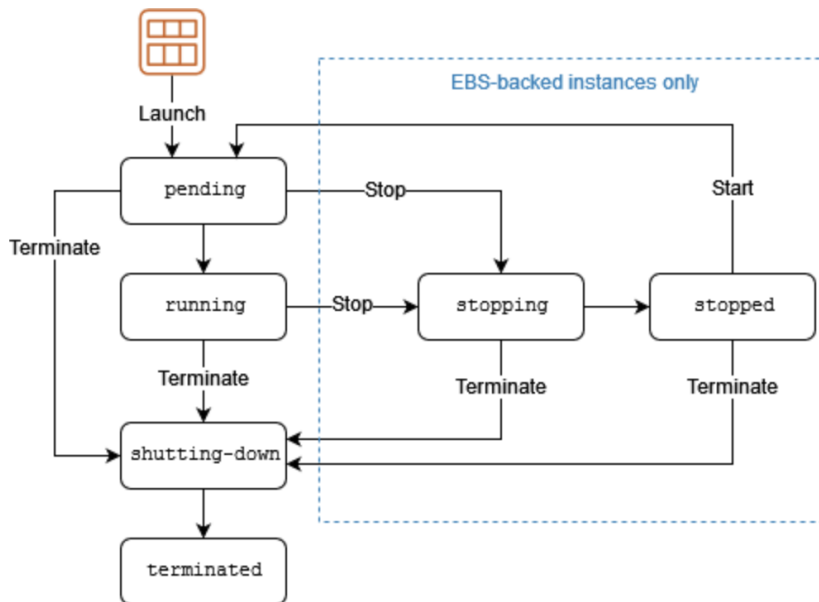
- EC2 Instance different states

2.2

Introduction Amazon EC2 Instance Lifecycle

Amazon EC2 instances go through various states during their lifecycle

Introduction Amazon EC2 Instance Lifecycle

EC2 Instance Different States

Lesson Learning Outcomes

✓ Define the concept of serverless computing

✓ Understand the fundamental idea of serverless and its implications for application development

✓ Identify how serverless computing differs from traditional server-based models

✓ Articulate the advantages and benefits of adopting serverless computing

✓ Understand the applicability of serverless in various use cases and industries

LESSON OVERVIEW

MODULE 2 INTRODUCTION TO AWS COMPUTE

Lesson 2.3 What is Serverless?

- Serverless Overview
- Benefits of Serverless
- Example of Serverless Services

2.3

What is Serverless?

Amazon Serverless computing is a cloud computing model that allows developers to build and run applications without managing the underlying infrastructure.
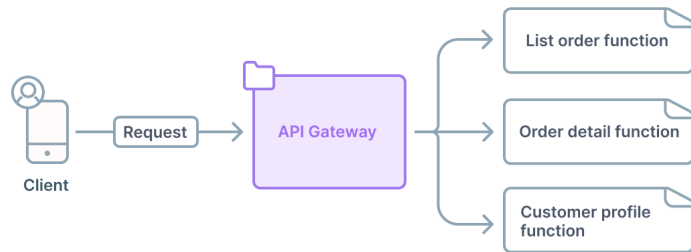
What is Serverless?

Serverless Overview

Serverless

Serverless architecture is a way to build and run applications and services without having to manage infrastructure. Your application still runs on serv but all the server management is done by AWS.

No longer have to provision, scale, and maintain servers to run applications databases, and storage systems.

Client → Request → API Gateway → List order function
API Gateway → Order detail function
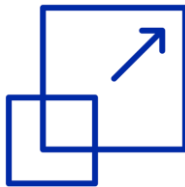API Gateway → Customer profile function

What is Serverless?

Benefits of Serverless

Benefit from a fully managed service

Scale flexibly

Only pay for resources you use

Enhance developer productivity

Seamless Connections

Develop Intelligent Apps

What is Serverless?

Example of Serverless Services

⬤ **AWS Lambda**

Lambda is a serverless compute service that enables you to run code without provisioning or managing servers.

⬤ **AWS App Runner**

AWS App Runner is a fully managed service that makes it easy to build, deploy, and scale web applications quickly.

⬤ **AWS Fargate**

AWS Fargate is a serverless compute engine for containers that allows you to run containers without having to manage the underlying infrastructure

What is Serverless?

Resources

- ✓ https://aws.amazon.com/serverless/
- ✓ https://www.serverless.com/aws-lambda
- ✓ https://aws.amazon.com/what-is/serverless-computing/

Lesson Learning Outcomes

✓ Understand how AWS Lambda facilitates the execution of code without the need to manage servers

✓ Identify and explain the key features and characteristics of AWS Lambda

✓ Recognize how AWS Lambda supports event-driven and serverless application architectures

LESSON OVERVIEW

MODULE 2 INTRODUCTION TO AWS COMPUTE

Lesson 2.4 Introduction to AWS Lambda

- AWS Lambda
- How Aws Lambda works

2.4

Introduction to AWS Lambda

Run Code Without Provisioning or Managing Infrastructure With AWS Lambda
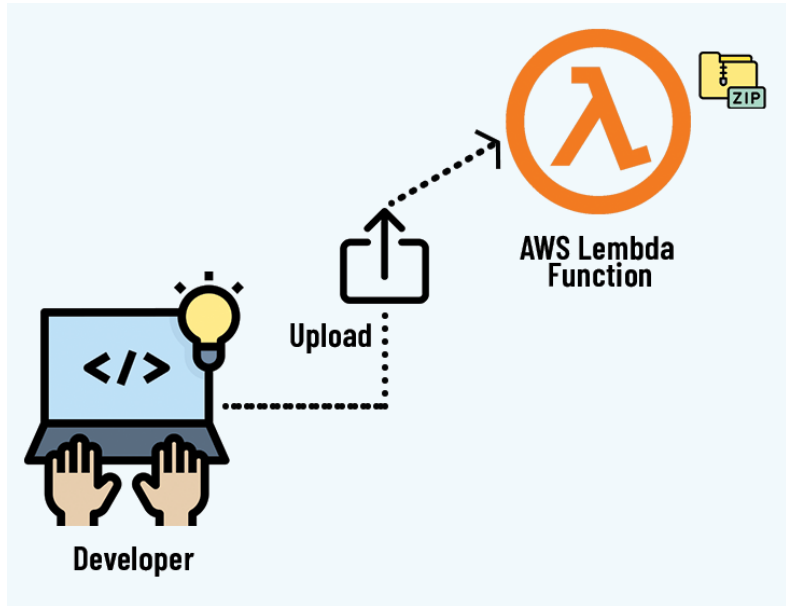
Introduction to AWS Lambda

Overview

You can run code for virtually any type of application or backend service.

This includes

- ✓ Data Processing
- ✓ Real-time Stream Processing
- ✓ Machine Learning
- ✓ WebSocket
- ✓ IoT Backends
- ✓ Mobile Backends
- ✓ Web Applications

Introduction to AWS Lambda

How AWS Lambda works

The Lambda function is the foundational principle of AWS Lambda. There are options for configuring Lambda functions using the Lambda console, Lambda API, AWS CloudFormation, or AWS Serverless Application Model (AWS SAM). We can invoke a function directly by using the Lambda API or configure an AWS service or resource to invoke your function in response to an event.

- ✓   Function
- ✓   Tigger
- ✓   Event
- ✓   Application Environment
- ✓   Deployment Packages
- ✓   Runtime

Introduction to AWS Lambda

Resources

- ✓ https://aws.amazon.com/serverless/
- ✓ https://www.serverless.com/aws-lambda
- ✓ https://aws.amazon.com/what-is/serverless-computing/

Lesson Learning Outcomes

✓ Define and categorize various AWS compute services.

✓ Understand the differences and use cases for services such as EC2, Lambda, and others.

✓ Understand the variety of EC2 instances available.

✓ Recognize different instance families, types, and sizes based on computing requirements

LESSON OVERVIEW

MODULE 2 INTRODUCTION TO AWS COMPUTE

Lesson 2.5 Choose the Right Computing Service

- Understanding the type of AWS Compute Services
- Type of EC2 Instances

2.5

Choose the Right Computing Service

Choose the Right Computing Service

Understanding the Type of AWS Compute Services

Amazon EC2

Use Case: Virtual servers in the cloud for running applications

AWS Lambda

Use Case: Serverless computing for event-driven applications.

Amazon ECS (Elastic Container Service)

Use Case: Container orchestration service for managing Docker containers

Amazon EKS (Elastic Kubernetes Service)

Use Case: Managed Kubernetes service for container orchestration.

AWS Fargate

Use Case: Serverless compute engine for containers.

AWS Elastic Beanstalk

Use Case: Fully managed platform-as-a-service (PaaS) for application deployment.

Amazon LightSail

Use Case: Simple virtual private servers with pre-configured options.

Choose the Right Computing Service

Type of EC2 Instances

Family	Specialty	Use Case
F1	Field Programmable Gate Array	Genomics research, financial analytics, real-time video processing, big data etc
I3	High Speed Storage	NoSQL DBs, Data Warehousing etc
G3	Graphics Intensive	Video Encoding/ 3D Application Streaming Map
H1	High Disk Throughput	Reduce-based workloads, distributed file systems such as HDFS and Map R-FS
T3	Lowest Cost, General Purpose	Web Servers/Small DBs
D2	Dense Storage	Fileservers/Data Warehousing/Hadoop
R5	Memory Optimized	Memory Intensive Apps/DBs
M5	General Purpose	Application Servers
C5	Compute Optimized	CPU Intensive Apps/DBs
P3	Graphics/General Purpose GPU	Machine Learning, Bit Coin Mining etc
X1	Memory Optimized	SAP HANA/Apache Spark etc
Z1D	High compute capacity and a high memory footprint.	Ideal for electronic design automation (EDA)and certain relational database workloads with high per-core licensing costs
A1	Arm-based work loads	Scale-out workloads such as web servers
U-6tb1	Bare Metal	Bare metal capabilities that eliminate virtualization overhead

2.6

Hands-On Lab

Launch a Sample Application on Amazon EC2