Module 6 — Compute

Topics

→ Compute Services Overview
→ Amazon EC2 — I
→ Amazon EC2 — II
→ Amazon EC2 — III Cost Optimization
→ Container Services
→ Introduction to AWS Lambda
→ Introduction to AWS Elastic Beanstalk.

(I) AWS Compute Services Overview

Amazon EC2 : provides resizable VMs

Amazon EC2 Auto Scaling : Supports app^n availability by auto deploy of EC2

Amazon ECR : to store & retrieve Docker Images.

Amazon ECS : is a container orchestration service supporting Docker.

VMware Cloud on AWS : Enables you to provision a Hybrid cloud with custom hardware

AWS Elastic Beanstalk : To run & manage web apps

AWS Lambda (λ) : Serverless compute solution. (pay for what you use)

Amazon EKS : Helps run Kubernetes on AWS.

Amazon Lightsail: Simple-to-use service for building website / Apps

AWS Batch : To run batch jobs at any scale

AWS Fargate : Run containers that reduce need for you to manage servers / clusters.

AWS Outpost : Provides a way to run select AWS services in your On premises datacenter

AWS Serverless App'n Repo : Provides a way to discover, deploy & publish serverless app's.

Categorizing Compute Services

Services	Key Concepts	Characteristics	Ease of Use
1. Amazon EC2	• IaaS • Instance-based • Virtual Machines	• Provision VMs that you can manage as you choose	A familiar Concept to many IT Professionals
2. AWS Lambda	• Serverless computing • Function-based • Low cost	• write & deploy code that executes on a schedule or that can be triggered by events • Use when possible (architect for the cloud)	A relatively new Concept for many IT staff members, but easy to use after you learn it
Amazon ECS Amazon EKS Amazon ECR AWS Fargate	Container-based computing Instance-based	• Spin up & execute jobs more quickly	AWS Fargate reduces administrative overhead but you can use options that give you more control.
AWS elastic Beanstalk	PaaS for web apps	focus on your code Can easily tie into other services - DNS, DB etc.	Fast & easy to start.

(II) Amazon EC2 — Part I

Host apps in its compute capacity

Common Uses: App'n Servers, Web Servers, database Servers, other types of servers.

→ Def: Amazon EC2 provides VMs — referred to as EC2 instances in the cloud.

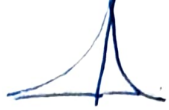
- Gives you full control over the guest operating system (windows or Linux) on each instance.

→ You can launch instances of any size into an Av. Zone anywhere in the world.

→ Instances launch from AMIs which are VM templates.

→ You can control traffic to & from these instances using security groups

→ Launching an Amazon EC2 instance



- 9 decisions to create EC2 by using AWS Management Console Launch Instance Wizard

- ~~Along the way created~~

1. Select An AMI : which AMI to Lanch instance from?

AMI → template used to create EC2 instance i.e. VM running on AWS cloud

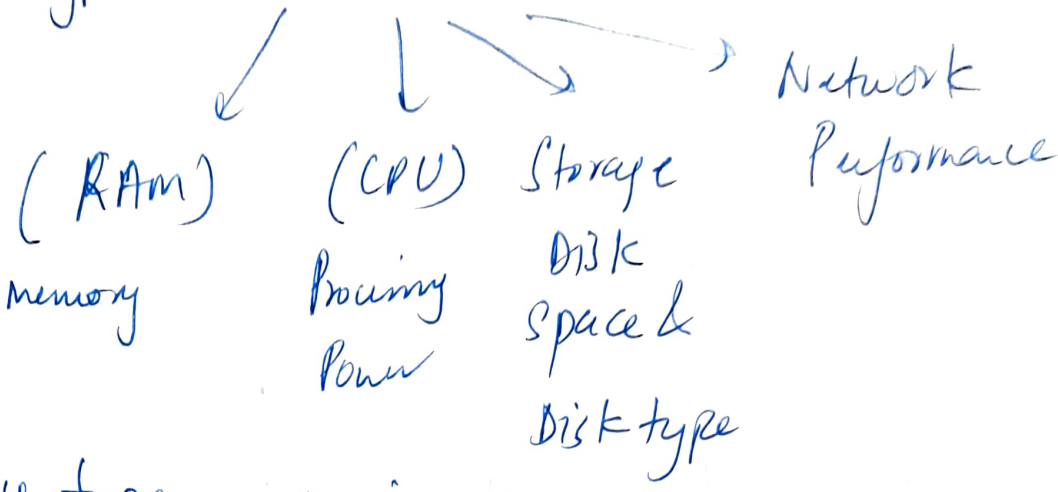
→ Contains windows / Linux OS

→ Often also has pre installed Software

AMI choices
- ↳ Quickstart (Linux / Windows)
- ↳ My AMIs (created by you)
- ↳ AWS Marketplace (from 3rd Parties)
- ↳ Community AMIs. (shared by Others.)

2. Select Instance type : How will the EC2 instance you create be used?

The Instance Type you choose determines



Instance type categories

- General Purpose
- Compute Optimised
- Memory optimized
- Storage optimized
- Accelerated computing

Instance types offer family, generation & size.

↳ Instance type naming & size

ex t3.large

T → family name

3 → generation

Large → size.

t3 → general purpose

C5 → Compute Intensive, High Performance

R5 → Memory Intensive

~~M5~~

(3.) Specify network settings — where to deploy the instance?

Identify VPC & optionally the subnet

→ Should a public IP address be automatically assigned (to make it ∈ internet accessible.

(4.) Will software on EC2 instance need to interact with other AWS services,

If yes, Attach an appropriate IAM role.

IAM role attached to EC2 instance is kept in an instance profile.

You can do this later as well.

NEVER Store AWS creds on EC2 instances.

(5.) User data Script

Use user data scripts to customize runtime env. of you instance.

(6.) Specify Storage

- Configure root vol.
- Attach additional storage volumes (optional)
- For each volume specify

Size vol. If Encrypting should be used.

Amazon EC2 Storage options

1. Amazon Elastic Block Store (EBS)
   - Durable, block-level storage vols.
   - You can stop the instance & start it again & data will be there

2. EC2 instance Store (for temp info & changing info)
   - If stopped, data is deleted

Other (not root vol.)

1. EFS
2. S3

(7.) Add tags

Tag → Label assigned to AWS resource

Consists of key & optional value

Tagging is how you can attach metadata to an EC2 instance.

For filtering, Automation, Cost allocation & access control.

(8.) Security Group

Set of firewall rules to control traffic to the instance.

Specify port no., & protocol used like TCP, UDP, ICMP

Specify source

(9.) Key Pair

At instance launch specify existing / new key pair

A key pair consist of

↓ → Public key that AWS stores

Private key file that you store

enables secure connc^n to the instance.

Sec
Network
Compute
~~Database~~
Storage
Dat

If rebooting instance → No change in DNS & IP address

Stopping → Changes DNS & IP address

169.254.169.254/latest/metadata

↓

to see metadata (instance's ~~data~~ data)

Cloudwatch → near-real time metrics
→ Provide charts Monitoring
→ 15 months of historical data

Basic Monitoring	Default Monitoring
Free	
Every 5 min	every min

(V)

Amazon EC2 cost optimization

On demand Instance

- Non long term
- Free tier eligible
- Pay the Rr pay

Dedicated Hosts

- Physical server with EC2 instance capacity fully dedicated to your

Reserved Instances

- 1 yr or 3 yr term
- Discount on hourly charge
- No upfront payment

Dedicated Instance

- Instances running in a VPC on Hardware that is dedicated to a single customer.

Spot Instance

↳ much less price than On demand

↳ run as long as they are available & your bid is above Spot instance price

Can be interrupted

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scheduled reserved instance

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(8) Container Services

- Method of OS virtualizing
- Smaller than VM
- Repeatable
- Self contained environments
- Faster to Stop & terminate than VM.

- Docker is a software platform that enables you to build, test & deploy app's quickly.
- You run containers on Docker & are created from a template called image.

Container: Libraries, System tools, Code, Runtime

Amazon ECS

Container management service

- Orchestrates running of docker containers
- Maintains & scales the fleet of nods that run your containers.
- Remove the complexity of standing up the infrastructure
- Integrated with

  EC2 sec Groups

  ELB

  EBS ~~load~~ Volumes

  IAM roles.

Do you want to manage clusters.

↳ If yes, then create Amazon ECS backed by EC2. (more detailed)

If no, then create Amazon ECS backed by Fargate. (less detailed)

(Networking only Cluster)

Kubernetes

Open. Src software for container orchestration

- Deploy & manage container apps
- Scale can be used in OR premises & cloud

Complements Docker

- Orchestrates multiple Docker Hosts (nodes)
- Enables you to run multiple containers on a single OS host.

Automates

Amazon EKS → Run Kubernetes on AWS

Amazon ECR – Manage & keep track of all those containers to store, run & Deploy docker Container images.

(Off) AWS Lambda (λ)

Serverless compute service

- Run code without servers.
- Run code on schedule or events & only runs when triggered (Pay for when in use)
- Supports many languages
- Completely automated Administration
- Built in fault tolerance
- supports orchestration of multiple func^ns.
- Pay per use pricing

- Triggered by event sources

Lambda func^ns Name, runtime ex, config, function code, dependencies, executing role

A layer is a zip archive that contains libraries or other dependencies.

(VIII) AWS Elastic Beanstalk

- Easy way to get web application running
  - No additional Charge

Deploy, Automatic Scaling, Health monitor, Analysis, Logging

Only we need to manage our code.

Auto Scaling