MODULE 6: Compute Services Overview

1. Compute Service Overview
2. Amazon EC2
3. Container Services
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1. Compute Service Overview

a. EC2
- ➔ Provides Virtual Machine
- ➔ Instance-based service
- ➔ IaaS

b. AWS LAMBDA
- ➔ Low cost
- ➔ Serverless computing
- ➔ Function-based

c. AMAZON ECS, EKS, FARGATE, ECR
- ➔ Container-based computing and instance-based computing

d. AMAZON BEANSTALK
- ➔ PaaS
- ➔ Web application used

How to choose optimal service?
- ➔ It will depend on the use case.
- ➔ Consider 3 aspects:
  1. What is application design
  2. Usage pattern
  3. Configurations service you want to manage
- ➔ If we choose the wrong compute service, then work efficiency will be low.
- ➔ It is good practice to understand the aspects before picking.

2. Amazon EC2

EC2
- ➔ Provides VM
- ➔ You can launch as many instances of any size into any AZ anywhere in the world.
- ➔ You can control traffic to and from the instances.

EC2 Applications
- ➔ Web server
- ➔ Application server
- ➔ Mail server
- ➔ Game server
- ➔ Media server

- ➔ Database server
- ➔ Catalogue server
- ➔ File server
- ➔ Computing server
- ➔ Proxy server

AWS Compute Services

- ➔ EC2
- ➔ EC2 AutoScaling
- ➔ Elastic Container Registry (ECR)
- ➔ Amazon Elastic Container Service (ECS)
- ➔ VMWare Cloud on AWS
- ➔ AWS Elastic Beanstalk
- ➔ Lamba
- ➔ Elastic Kubernetes Services (EKS)
- ➔ Lightsail
- ➔ AWS Batch
- ➔ AWS Fargate
- ➔ AWS Outposts
- ➔ AWS Serverless Application Repository

Launch EC2

- ➔ AMI
- ➔ Instance Type
- ➔ Network setting
- ➔ IAM Role
- ➔ User Data
- ➔ Storage Option
- ➔ Tags
- ➔ Security Groups
- ➔ Key Pairs
- ➔ Option to launch instance with AWS CLI

Cloudwatch is used to monitor the instances.

- ➔ **Basic:** Every 5 minute, free of charge.
- ➔ **Detailed:** Every 1 minute, fix charges.

EC2 Cost Optimisation

6 types of pricing models

a. **On-Demand Instances:** Pay by the hour, no long term commitments, eligible for AWS tier.
b. **Reserved Instances:** Full partial or no upfront payment for instance you reserve, discount on hourly charge for that instance, one year term or three year term.
c. **Dedicated Host:** A physical server with EC2 instance, capacity fully dedicated to your use.
d. **Dedicated Instances:** Instances that run in a VPC or hardware that is dedicated to a single customer.
e. **Scheduled Reserved Instance:** 1 year term, purchase a capacity reservation that is always available on a recurring schedule you specify.

f. **Spot Instances:** It runs as long as they are available, they can be interrupted by AWS with a 2 min notification.

NOTE: Per second billing available for on-demand, reserved, spot instances that run Amazon Linux or Ubuntu.

Benefits of pricing models

➔ **On-Demand:** Low cost and flexibility.
➔ **Spot:** Large scale and dynamic workload.
➔ **Reserved:** Predictability ensures compute capacity is available when needed.
➔ **Dedicated Host:** Save money on licensing cost, help meet compliance and regulatory requirements.

Use cases of pricing models

➔ **On-Demand:** Spiky workloads.
➔ **Spot:** Time insensitive workload.
➔ **Reserved Instance:** Steady state workload.
➔ **Dedicated Host:** Highly sensitive workloads, Bring Your Own License (BYOL).

4 pillars of Cost optimisation

a. Right size
b. Increase elasticity
c. Optimal pricing model
d. Optimise storage choice

3. Containers Services

Containers: a method of operating system virtualisation.

Benefits of Container

➔ Repeatable
➔ Self contained environment
➔ Software runs the same in different environment
➔ Faster to launch and stop on terminal than Virtual Machine

Docker

➔ Software platform that enables you to build Test and deploy application weekly.
➔ You run containers on docker.

Elastic Container Service

➔ High scalable
➔ Fast container management service

Kubernetes

➔ Open source software for container orchestration.
➔ Automates container provisioning, networking, load distribution, scaling.

EKS

- ➔ Enables you to run kubernetes on AWS.
- ➔ Supports linux and windows containers.
- ➔ It is used to manage clusters to manage clusters of EC2 instances, run containers that are orchestrated by kubernetes on those instances.

ECR

- ➔ It is a fully managed docker container registry that make it easy for developer to store, manage, and deploy docker container images.

4. Introduction to AWS Lambda

- ➔ Serverless compute service build to run and build applications.

Benefits

- ➔ Supports multiples programming languages
- ➔ Completely automated administration
- ➔ Built in fault tolerance
- ➔ Supports of orchestration of multiple functions
- ➔ Pay per use pricing

AWS Lambda Event Source

- ➔ S3
- ➔ DynamoDB
- ➔ SNS: Simple Notification Service
- ➔ SQS: Simple Queue Service
- ➔ API Gateway
- ➔ Application Load Balancer

Configure LAMBDA Function

- ➔ Function code
- ➔ Dependencies
- ➔ Execution role

AWS Lambda Quotas

a. **Soft limits per region**
   - ➔ concurrent execution = 1000 & function and layer storage = 75GB

b. **Hard limits for individual function:**
   - ➔ Max function memory allocation 3008 MB & and function time out 15 min & deployment packet size = 250 MB unzipped.

5. AWS Elastic Beanstalk

- ➔ Easiest way to run web applications.
- ➔ It automatically handles few things:
  a. Infrastructure provisioning and configuration
  b. Deployment
  c. Load balancing

d. Automate scaling
e. Health monitoring
f. Analysis and debugging
g. Logging
h. Free of charges

Support Web Application Written in

- ➔ Java
- ➔ PHP
- ➔ .Net
- ➔ Python
- ➔ Node.js
- ➔ Go
- ➔ Ruby
- ➔ Docker

Benefits

- ➔ Fast and simple to start using Elastic Beanstalk
- ➔ Developer productivity
- ➔ Difficult to outgrow
- ➔ Complete resource control