



# ECAP470: CLOUD COMPUTING

**Dr. Tarandeep Kaur**  
Assistant Professor

# Learning Outcomes

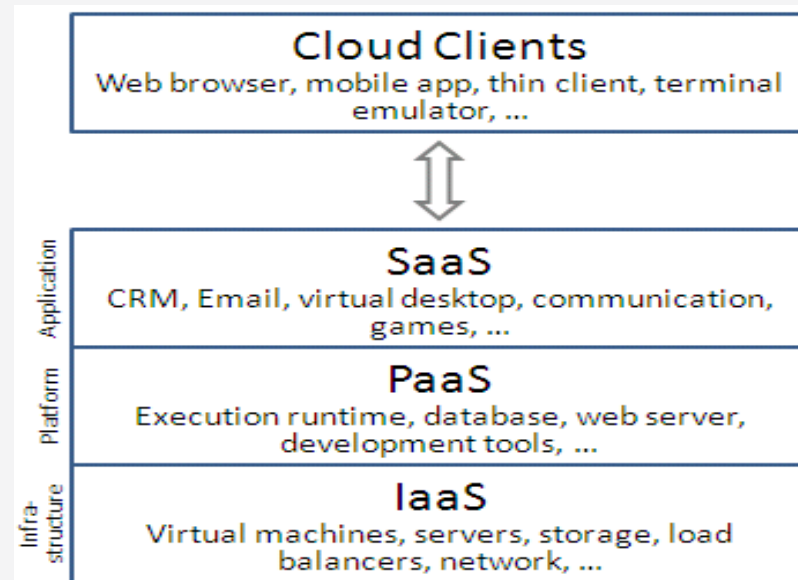


**After this lecture, you will be able to,**

- ✓ **Know about different services offered by Amazon Web Services (AWS).**

# Infrastructure-as-a-Service (IaaS)

Category of cloud services which provides capability to provision processing, storage, intra-cloud network connectivity services, and other fundamental computing resources of the cloud infrastructure.



# Highlights of IaaS

- On demand computing resources
  - Eliminate the need of far ahead planning
- No up-front commitment
  - Start small and grow as required
  - No contract, Only credit card!

# Highlights of IaaS

- Pay for what you use
- No maintenance
- Measured service
- Scalability
- Reliability

# Infrastructure-as-a-Service (IaaS)- Amazon EC2



# AWS EC2

- **Amazon Elastic Compute Cloud (EC2)** is a web service that provides resizable computing capacity that one uses to build and host different software systems.
- Designed to make web-scale computing easier for developers.
- **A user can create, launch, and terminate server instances as needed, paying by the hour for active servers, hence the term "elastic".**
  - Provides scalable, pay as-you-go compute capacity
  - Elastic - scales in both direction

# EC2 Concepts

AMI & Instance

Region & Zones

Storage

Networking and Security

Monitoring

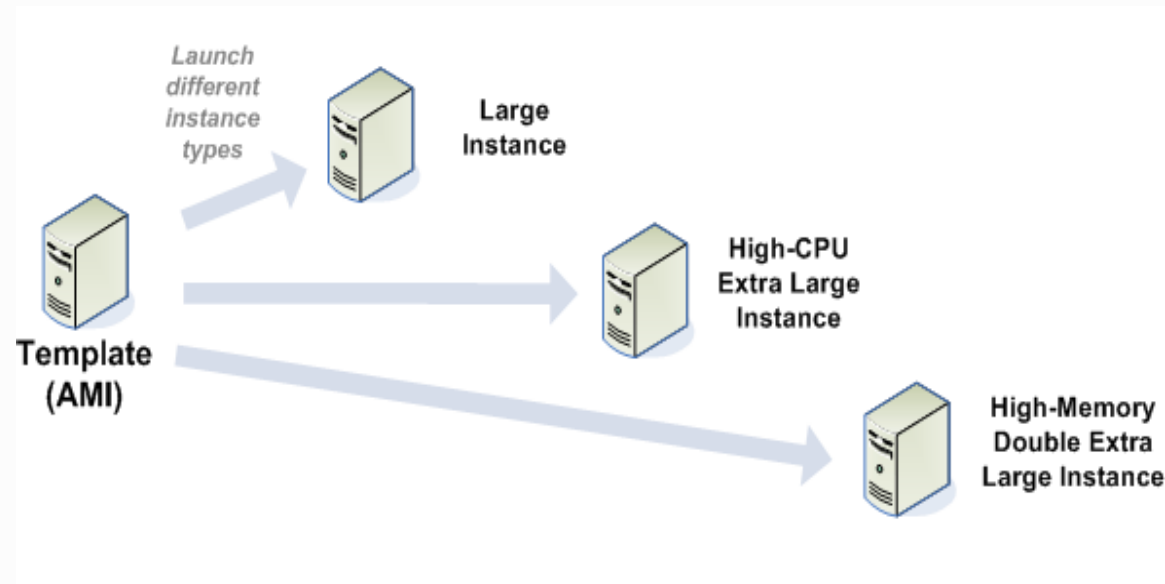
Auto Scaling

Load Balancer



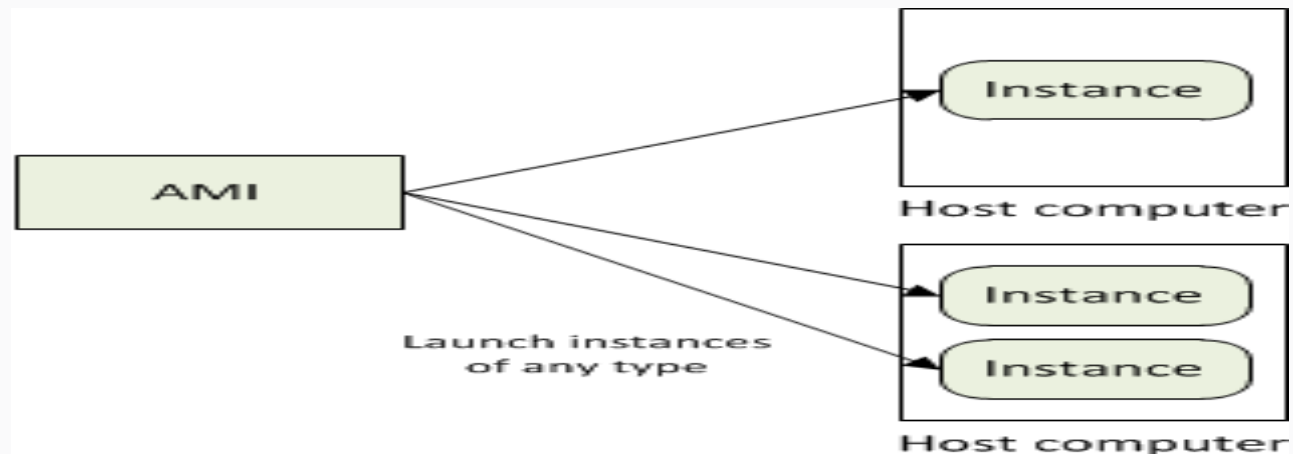
# Amazon Machine Images (AMI)

- An immutable representation of a set of disks that **contain an operating system, user applications and/or data.**
- From an AMI, one can launch multiple instances, which are running copies of the AMI.



# AMI and Instance

- Amazon Machine Image (AMI) is a template for software configuration (Operating System, Application Server, and Applications).
- Instance is a AMI running on virtual servers in the cloud.
- Each instance type offers different compute and memory facilities.



# Region and Zones

- Amazon have **data centers in different region** across the globe
- An instance can be launched in different regions depending on the need.
  - Closer to specific customer
  - To meet legal or other requirements

# Region and Zones

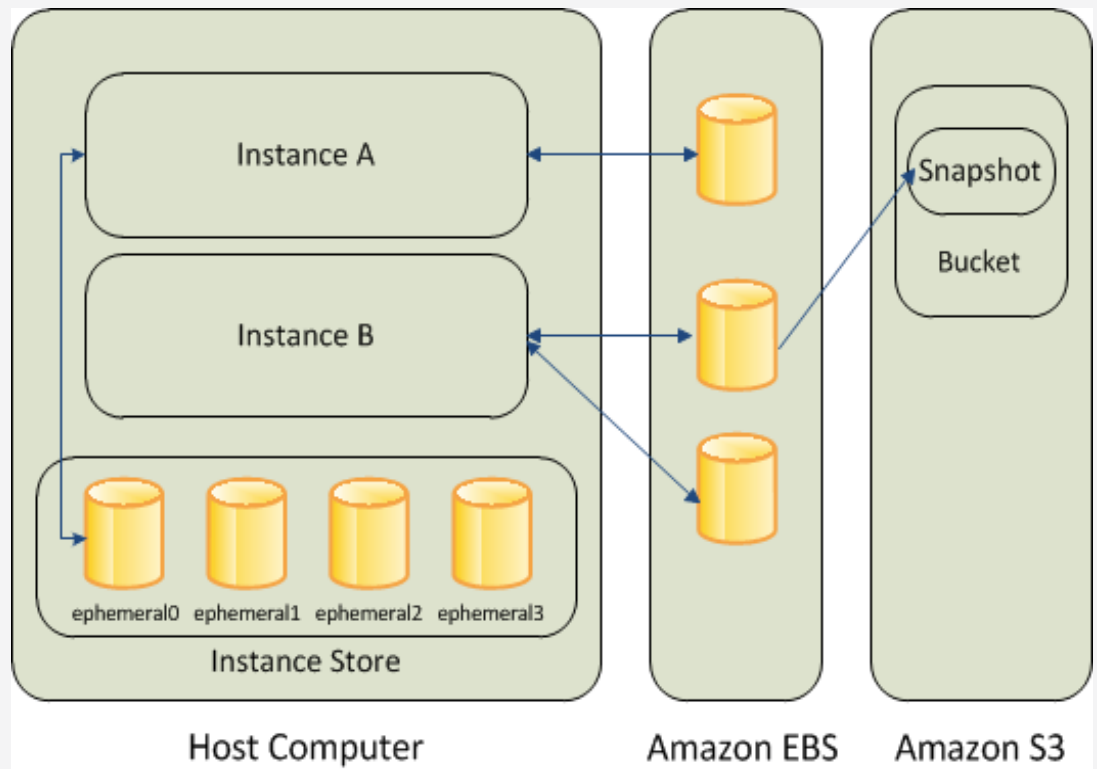
Each region has set of zones

- Zones are isolated from **failure in other zones**
- Inexpensive, **low latency connectivity** between zones in same region

# Storage

Amazon EC provides  
three type of storage  
option:

- Amazon EBS
- Amazon S3
- Instance Storage



# Networking and Security

- Instances can be launched on one of the two platforms
  - EC2-Classic
  - EC2-VPC
- Each instance launched is assigned two addresses **a private address and a public IP address.**
  - A replacement instance has a different public IP address

# Networking and Security

- Instance IP address is dynamic:
  - new IP address is assigned every time instance is launched
- Amazon EC2 offers Elastic IP addresses (static IP addresses) for dynamic cloud computing
  - Remap the Elastic IP to new instance to mask failure
  - Separate pool for EC2-Classic and VPC
- Security Groups to access control to instance

# Monitoring, Auto Scaling and Load Balancing

Monitor statistics of instances and EBS

- **CloudWatch** (monitor, manage and publish various metrics; configure alarms based on metrics)



# Monitoring, Auto Scaling and Load Balancing

Automatically scales amazon EC2 capacity up and down based on rules

- Add and remove compute resource based on demand
- Suitable for businesses experiencing variability in usage

# Monitoring, Auto Scaling and Load Balancing

**Distribute incoming traffic across multiple instances**

- Elastic Load Balancing**

# Amazon S3

- S3 stands for = Simple Storage Service
- SOA– Service Oriented Architecture which provides online storage using web services.
- Allows read, write and delete permissions on objects.
- Uses REST and SOAP protocols for messaging.

# Amazon SimpleDB

- Amazon SimpleDB is a highly available, flexible, and scalable **non-relational data store** that offloads the work of database administration.
- Creates and manages **multiple geographically distributed replicas** of your data automatically to enable high availability and data durability.
- The service charges you only for the resources actually consumed in storing your data and serving your requests.

# AWS Lambda

- Truly Serverless.
- You no longer have the overhead of administration.
- No need to manage any servers.
- Focus is entirely on your business logic.

# AWS DynamoDB

- Database that delivers single-digit millisecond performance at any scale.
- Fully managed, cost effective, durable, multi-region NoSQL database.

# AWS Amazon API Gateway

- Fully managed service.
- Simple way to create, publish, maintain, monitor, and secure APIs at any scale. RESTful APIs and WebSocket APIs are types of APIs you can create using API Gateway.

# AWS EC2 Practical

- Launching an Instance
- Connecting
- Terminating
- Stop
- Budget & Preferences setting



# AWS Management Console

S3

EC2

VPC

Elastic MapReduce

CloudFront

RDS

SNS

Navigation

Region: US East

> EC2 Dashboard

INSTANCES

> Instances

> Spot Requests

IMAGES

> AMIs

> Bundle Tasks

ELASTIC BLOCK STORE

> Volumes

> Snapshots

NETWORKING & SECURITY

> Elastic IPs

> Security Groups

> Placement Groups

> Load Balancers

> Key Pairs

My Instances

Launch Instance

Instance Actions

Reserved Instances

Show/Hide

Refresh

Help

Viewing: All Instances All Instance Types

	Name	Instance	Type	Status	Lifecycle	Public DNS
<input checked="" type="checkbox"/>	Web Server	i-841948e9	m1.small	running	normal	ec2-67-202-15-66.compute-1.

1 EC2 Instance selected

EC2 Instance: i-841948e9

Description

Monitoring

Tags

AMI ID:	ami-08728661	Zone:	us-east-1b
Security Groups:	80_22_open	Type:	m1.small
Status:	running	Owner:	043708602122
VPC ID:	-	Subnet ID:	-
Virtualization:	paravirtual	Placement Group:	
Reservation:	r-7de68517	RAM Disk ID:	-
Platform:	-	Key Pair Name:	GSG_Keypair
Kernel ID:	aki-407d9529	Monitoring:	basic
AMI Launch Index:	0	Elastic IP:	-
Root Device:	/dev/sda1	Root Device Type:	ebs

# AWS Management Console- All Services

## ★ Favorites


Add favorites by clicking on the star next to the service name.

## Recently visited

EC2  
Console Home  
Billing  
Cloud9  
Elastic Beanstalk  
Support

## All services

### Compute

EC2  
Lightsail   
Lambda  
Batch  
Elastic Beanstalk  
Serverless Application Re...  
AWS Outposts  
EC2 Image Builder  
AWS App Runner

### Containers

Elastic Container Registry  
Elastic Container Service  
Elastic Kubernetes Service  
Red Hat OpenShift Servic...


### Storage

S3  
EFS

### Developer Tools

CodeStar  
CodeCommit  
CodeArtifact  
CodeBuild  
CodeDeploy  
CodePipeline  
Cloud9  
CloudShell  
X-Ray  
AWS FIS

### Customer Enablement

AWS IQ   
Support  
Managed Services  
Activate for Startups

### Robotics

AWS RoboMaker

### Machine Learning

Amazon SageMaker  
Amazon Augmented AI  
Amazon CodeGuru  
Amazon DevOps Guru  
Amazon Comprehend  
Amazon Forecast  
Amazon Fraud Detector  
Amazon Kendra  
Amazon Lex  
Amazon Personalize  
Amazon Polly  
Amazon Rekognition  
Amazon Textract  
Amazon Transcribe  
Amazon Translate  
AWS DeepComposer  
AWS DeepLens  
AWS DeepRacer  
AWS Panorama

### AWS Cost Management

AWS Cost Explorer  
AWS Budgets  
AWS Marketplace Subscri...  
AWS Application Cost Pro...

### Front-end Web & Mobile

AWS Amplify  
Mobile Hub  
AWS AppSync  
Device Farm  
Amazon Location Service

### AR & VR

Amazon Sumerian

### Application Integration

Step Functions  
Amazon AppFlow  
Amazon EventBridge

The image features a teal gradient background. In the center is a 3D oval button with a light blue-to-white gradient and a dark teal border. The text "That's all for now..." is centered on the button in a bold, black, sans-serif font.

**That's all for now...**