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**Class:** L.Y. BTech (Computer) (L3)

**Subject:** Cloud Computing.

**Aim:** Case Study on Amazon EC2 to learn about Amazon EC2. Amazon EC2 Elastic Compute cloud is a central part of Amazon.com’s Cloud Computing platform, Amazon Web Services How EC2 allows users torrent virtual computers on which to run their own computer applications

**Theory:**

**What is Amazon EC2?**

Amazon Elastic Compute Cloud (Amazon EC2) provides scalable computing capacity in the Amazon Web Services (AWS) Cloud. Using Amazon EC2 eliminates your need to invest in hardware up front, so you can develop and deploy applications faster. You can use Amazon EC2 to launch as many or as few virtual servers as you need, configure security and networking, and manage storage. Amazon EC2 enables you to scale up or down to handle changes in requirements or spikes in popularity, reducing your need to forecast traffic.

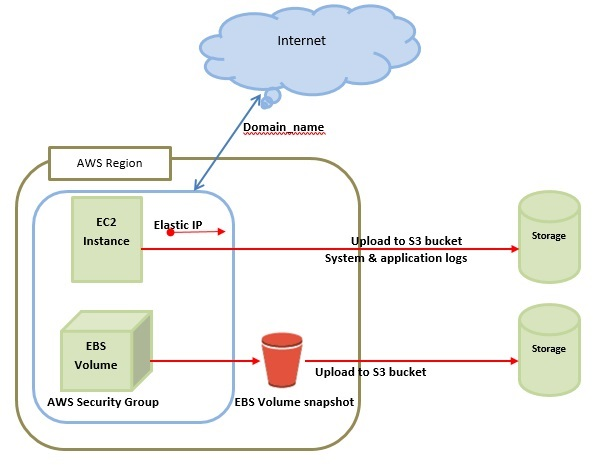
## **Features of Amazon EC2**

Amazon EC2 provides the following features:

* Virtual computing environments, known as *instances*
* Preconfigured templates for your instances, known as *Amazon Machine Images (AMIs)*, that package the bits you need for your server (including the operating system and additional software)
* Various configurations of CPU, memory, storage, and networking capacity for your instances, known as *instance types*
* Secure login information for your instances using *key pairs* (AWS stores the public key, and you store the private key in a secure place)
* Storage volumes for temporary data that's deleted when you stop, hibernate, or terminate your instance, known as *instance store volumes*
* Persistent storage volumes for your data using Amazon Elastic Block Store (Amazon EBS), known as *Amazon EBS volumes*
* Multiple physical locations for your resources, such as instances and Amazon EBS volumes, known as *Regions* and *Availability Zones*
* A firewall that enables you to specify the protocols, ports, and source IP ranges that can reach your instances using *security groups*
* Static IPv4 addresses for dynamic cloud computing, known as *Elastic IP addresses*
* Metadata, known as *tags*, that you can create and assign to your Amazon EC2 resources
* Virtual networks you can create that are logically isolated from the rest of the AWS Cloud, and that you can optionally connect to your own network, known as *virtual private clouds* (VPCs)

**Architecture of EC2:-**

This is the basic structure of AWS EC2, where EC2 stands for Elastic Compute Cloud. EC2 allows users to use virtual machines of different configurations as per their requirement. It allows various configuration options, mapping of individual servers, various pricing options, etc. We will discuss these in detail in the AWS Products section. Following is the diagrammatic representation of the architecture.



## **EC2 Components:-**

In AWS EC2, the users must be aware about the EC2 components, their operating systems support, security measures, pricing structures, etc.

### **Operating System Support**

Amazon EC2 supports multiple OS in which we need to pay additional licensing fees like: Red Hat Enterprise, SUSE Enterprise and Oracle Enterprise Linux, UNIX, Windows Server, etc. These OS needs to be implemented in conjunction with Amazon Virtual Private Cloud (VPC).

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### **Security**

Users have complete control over the visibility of their AWS account. In AWS EC2, the security systems allow create groups and place running instances into it as per the requirement. You can specify the groups with which other groups may communicate, as well as the groups with which IP subnets on the Internet may talk.

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### **Pricing**

AWS offers a variety of pricing options, depending on the type of resources, types of applications and database. It allows the users to configure their resources and compute the charges accordingly.

### **Fault tolerance**

Amazon EC2 allows the users to access its resources to design fault-tolerant applications. EC2 also comprises geographic regions and isolated locations known as availability zones for fault tolerance and stability. It doesn’t share the exact locations of regional data centers for security reasons.

When the users launch an instance, they must select an AMI that's in the same region where the instance will run. Instances are distributed across multiple availability zones to provide continuous services in failures, and Elastic IP (EIPs) addresses are used to quickly map failed instance addresses to concurrent running instances in other zones to avoid delay in services.

### **Migration**

This service allows the users to move existing applications into EC2. It costs $80.00 per storage device and $2.49 per hour for data loading. This service suits those users having large amounts of data to move.

**Reliable**

Amazon EC2 offers a highly reliable environment where replacement of instances is rapidly possible. Service Level Agreement commitment is 99.9% availability for each Amazon EC2 region.

**Designed for Amazon Web Services**

Amazon EC2 works fine with Amazon services like Amazon S3, Amazon RDS, Amazon DynamoDB, and Amazon SQS. It provides a complete solution for computing, query processing, and storage across a wide range of applications.

**Secure**

Amazon EC2 works in Amazon Virtual Private Cloud to provide a secure and robust network to resources.

**Flexible Tools**

Amazon EC2 provides the tools for developers and system administrators to build failure applications and isolate themselves from common failure situations.

**Inexpensive**

Amazon EC2 wants us to pay only for the resources that we use. It includes multiple purchase plans such as On-Demand Instances, Reserved Instances, Spot Instances, etc. which we can choose as per our requirement.

## **How to Use AWS EC2**

Step 1 − Sign-in to AWS account and open IAM console by using the following link [https://console.aws.amazon.com/iam/.](https://console.aws.amazon.com/iam/)

Step 2 − In the navigation Panel, create/view groups and follow the instructions.

Step 3 − Create an IAM user. Choose users in the navigation pane. Then create new users and add users to the groups.

Step 4 − Create a Virtual Private Cloud using the following instructions.

* Open the Amazon VPC console by using the following link − <https://console.aws.amazon.com/vpc/>
* Select VPC from the navigation panel. Then select the same region in which we have created key-pair.
* Select start VPC wizard on VPC dashboard.
* Select the VPC configuration page and make sure that VPC with a single subnet is selected. Then choose Select.
* VPC with a single public subnet page will open. Enter the VPC name in the name field and leave other configurations as default.
* Select create VPC, then select Ok.

Step 5 − Create WebServerSG security groups and add rules using the following instructions.

* On the VPC console, select Security groups in the navigation panel.
* Select create security group and fill the required details like group name, name tag, etc.
* Select your VPC ID from the menu. Then select yes, create a button.
* Now a group is created. Select the edit option in the inbound rules tab to create rules.

Step 6 − Launch EC2 instance into VPC using the following instructions.

* Open EC2 console by using the following link − <https://console.aws.amazon.com/ec2/>
* Select launch instance option in the dashboard.
* A new page will open. Choose Instance Type and provide the configuration. Then select Next: Configure Instance Details.
* A new page will open. Select VPC from the network list. Select subnet from the subnet list and leave the other settings as default.
* Click Next until the Tag Instances page appears.

Step 7 − On the Tag Instances page, provide a tag with a name to the instances. Select Next: Configure Security Group.

Step 8 − On the Configure Security Group page, choose the Select an existing security group option. Select the WebServerSG group that we created previously, and then choose Review and Launch.

Step 9 − Check Instance details on Review Instance Launch page then click the Launch button.

Step 10 − A pop up dialog box will open. Select an existing key pair or create a new key pair. Then select the acknowledgement checkbox and click the Launch Instances button.

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## **Advantages of EC2**

### **1. Save Time**

When you utilise your own servers, you might be able to push through but processing can take a lot of time. For big data decision-making, utilising EC2 services with tons of processing power will help you get the results much quicker.

### **2. Enjoy Security**

All AWS machines are stored in facilities with backups. As a leader in the world of technology, you can rest assured that the company protects its investments—using security measures worth so much more than what you might be able to provide on your own.

### **3. Reduce The Need for Expertise**

Hiring experts on networks and hardware can be difficult and costly. However, if you work with EC2 instance management, you get simpler servers that are easier to maintain, so your employees can utilise their time for other tasks.

### **4. Access Other AWS Solutions**

When you use EC2, you can also access other AWS solutions like CloudFront, Virtual Private Cloud (VPC), Simple Storage Service (S3), and Relational Database Services (RDS).

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## **Disadvantages of EC2**

### **1. Price Variations**

There are various things that can affect EC2 costs, such as land, taxes, electricity, and fiber. So, you have to look at your region-specific pricing plus other personal requirements to identify your monthly bill.

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### **2. General Issues**

Since Amazon is an industry giant with millions of customers, this means that eventually, the servers may need some maintenance and you may experience downtime.

**References:-**

**[1] *https://www.tutorialspoint.com/amazon\_web\_services/amazon\_web\_services\_elastic\_compute\_cloud.htm***

[2]

[*https://www.tutorialspoint.com/amazon\_web\_services/amazon\_web\_services\_elastic\_compute\_cloud.htm*](https://www.tutorialspoint.com/amazon_web_services/amazon_web_services_elastic_compute_cloud.htm)

[3]

<https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/concepts.html>

**Conclusion:**

In this practical we have done the case study on Amazon EC2 to learn about Amazon EC2. Amazon EC2 Elastic Compute cloud is a central part of Amazon.com’s Cloud Computing platform, Amazon Web Services How EC2 allows users torrent virtual computers on which to run their own computer applications