**Lab1:**

**Overview of EC2:**

Amazon Elastic Compute Cloud (Amazon EC2) is a web service provided by Amazon Web Services (AWS) that allows you to rent virtual servers, known as "instances," in the cloud. EC2 provides scalable computing resources that can be easily configured and managed, offering a wide range of options for different computing needs. Here's an overview of EC2:

**Key Concepts:**

* **Instances:**
* These are virtual servers that you can rent on-demand from AWS. Instances come in various types, each optimized for different use cases (e.g., general-purpose, compute-optimized, memory-optimized, etc.).
* AMI (Amazon Machine Image): An AMI is a pre-configured virtual machine image that includes the operating system and any additional software you choose. You can use existing AMIs or create your own.
* **Instance Types**:
* Each instance type is designed for specific workloads and comes with different amounts of CPU, memory, storage, and networking capacity.
* Regions and Availability Zones: AWS has multiple physical data centers located in different geographic regions around the world. Each region is further divided into availability zones (AZs), which are distinct data centers with their own power, cooling, and networking. Deploying instances across multiple AZs improves availability and fault tolerance.
* Security Groups and Network: You can configure network settings and security groups to control inbound and outbound traffic to your instances.
* **Elastic IP Addresses:**
* These are static public IP addresses that you can allocate to your instances, providing a consistent IP even if the instance is stopped and started.
* **EBS (Elastic Block Store):**
* EBS provides scalable block storage volumes that can be attached to EC2 instances. It offers different types of storage optimized for various use cases.

**Benefits and Use Cases:**

* **Scalability**:
* EC2 allows you to scale your computing capacity up or down based on demand, ensuring you pay only for what you use.
* **Flexibility:**
* You can choose the instance types and configurations that best suit your applications' requirements.
* **Cost Control**:
* EC2 offers a variety of pricing options, including On-Demand, Reserved, and Spot Instances, allowing you to optimize costs based on your workload.

**Diverse Workloads**:

EC2 is used for a wide range of applications, from web hosting and data processing to machine learning and high-performance computing.

* **Testing and Development**:
* EC2 instances are often used for testing new software, development environments, and building applications.
* **High Availability:**
* By distributing instances across availability zones, you can achieve high availability and fault tolerance for your applications.

**Getting Started:**

* **Launch Instance:**
* To create an instance, you select an AMI, choose an instance type, configure network settings, and launch the instance.
* **Management:**
* EC2 instances can be managed using the AWS Management Console, Command Line Interface (CLI), or SDKs.
* **Auto Scaling**:
* You can set up Auto Scaling to automatically adjust the number of instances based on demand.
* **Load Balancing**:
* Amazon Elastic Load Balancing (ELB) can distribute incoming traffic across multiple EC2 instances for improved performance and availability.
* **Monitoring and Logging**
* EC2 instances can be monitored using Amazon CloudWatch, which provides insights into resource utilization, performance metrics, and logs Amazon EC2 is a cornerstone of cloud computing, offering a flexible and scalable way to deploy and manage virtual servers without the need for significant upfront investments in hardware.

**Docker installation on EC2.**

| **sudo apt update** |
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| sudo apt install apt-transport-https ca-certificates curl software-properties-common |
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**curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo apt-key add -**

| sudo add-apt-repository "deb [arch=amd64] https://download.docker.com/linux/ubuntu bionic stable" |
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| sudo apt update |
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| apt-cache policy docker-ce |
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| sudo apt install docker-ce |
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| sudo systemctl status docker  Output  ● docker.service - Docker Application Container Engine  Loaded: loaded (/lib/systemd/system/docker.service; enabled; vendor preset: enabled)  Active: active (running) since Mon 2021-08-09 19:42:32 UTC; 33s ago  Docs: https://docs.docker.com  Main PID: 5231 (dockerd)  Tasks: 7  CGroup: /system.slice/docker.service  └─5231 /usr/bin/dockerd -H fd:// --containerd=/run/containerd/containerd.sock |
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