

AWS_ CLASS_2:

EC2 basics, launching EC2 instances

EC2 Basics



- **Elastic Compute Cloud is your computer in the cloud**
- **EC2 provides scalable computing capacity in the AWS cloud**
- **Use EC2 to launch as many or as few virtual servers as you need, configure security, networking & manage storage.**
- **EC2 enables you to scale up or down to handle changes in requirements**

Features of Amazon EC2

- Virtual computing environments, known as instances
- 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)

How are we charged for using EC2 ?

1) Purchasing Options:

- on-Demand
- Reserved
- Spot

2) Instance Family & Type:

- General Purpose
- Compute Optimized
- GPU Optimized
- Memory optimized
- Storage Optimizes

3) EBS Optimized (Option for higher IOPS performance)

4) AMI Type (price varies on distribution/software packages)

- Linux
- Windows

5) Data Transfer (in/out of the instance)

6) Regions

Types of EC2 instances: (based on billing type)

On-demand instances:

Pay for the instances that you use by the hour, with no long-term commitments or up-front payments.

Reserved Instances:

Make a low, one-time, up-front payment for an instance, reserve it for a one- or three-year term, and pay a significantly lower hourly rate for these instances

Generally used in companies

Spot instances:

Bid on unused instances, which can run as long as they are available and your bid is above the Spot price, at a significant discount.

AWS gives 2 minutes of notice before taking the instance back

AMI - Amazon Machine Image



- A preconfigured package required to launch an EC2 Instance; includes an Operating system, software packages & other settings
- AMI provides the information required to launch an instance, which is a virtual server in the cloud
- We can launch as many instances from the AMI as you need

Step1: Selecting an AMI

- When you launch an EC2 Instance, the first thing you do is select an AMI
- AMIs come in 2 main categories:
 - 1) Community AMIs:
 - Free to use
 - Generally it contains only the OS
 - 2) AWS Marketplace AMIs:
 - pay to use
 - generally comes packaged with additional licensed software
 - 3) My AMIs:
 - AMIs that you can create yourself

Step2: Instance Type?

- Instance type is the ^TCPU (compute power) of your instance
- When you launch an instance, the instance type determines the hardware of the host
- Each instance type offers different compute, memory & storage capabilities
- Select an instance type based on the requirement of the software that you plan to run on your instance

Instance Type Components:

- ☐ **Family:** Categorizing instance types based on what they are optimized for
- ☐ **Type:** subcategory for each family type
- ☐ **vCPUs:** number of virtual CPUs the instance type uses
- ☐ **Memory:** Amount of RAM the instance type uses
- ☐ **Instance Storage(GB):** local instance storage volume(hard drive)
- ☐ **EBS-Optimized Available:** Indicates if EBS-optimization is an option for the instance type
- ☐ **Network Performance:** Rating based on its data transfer rate(bandwidth)

| Families | Description | Example Use Cases |
|----------------------|---|--|
| t2, m4, m3 | General Purpose Balanced Performance | Websites, web applications, Dev, code repos, micro services, business apps |
| c3, c4, cc2 | Compute Optimized High CPU Performance | Front-end fleets, web-servers, batch processing, distributed analytics, science and engineering apps, ad serving, MMO gaming, video-encoding |
| g2, p2 | GPU Optimized High-end GPU | Amazon AppStream 2.0, video encoding, machine learning, high perf databases, science |
| r3, r4, x1, cr1 | Memory Optimized Large RAM footprint | In-memory databases, data mining |
| d2, i2, i3, hi1, hs1 | Storage Optimized High I/O, High density | NAS, data warehousing, NoSQL |

Step 3: Configure Instance Details

- Select number of instances you want to launch
- Configure Networking (VPC & Subnets)
- Advanced details tab Under user data section you can add commands / Scripts which will get executed when you launch your instances.

Step 4: Add storage

Step 4: Add Storage

Your instance will be launched with the following storage device settings. You can attach additional EBS volumes and instance store volumes to your instance, or edit the settings of the root volume. You can also attach additional EBS volumes after launching an instance, but not instance store volumes. [Learn more](#) about storage options in Amazon EC2.

| Volume Type ⓘ | Device ⓘ | Snapshot ⓘ | Size (GiB) ⓘ | Volume Type ⓘ | IOPS ⓘ | Throughput (MB/s) ⓘ | Delete on Termination ⓘ | Encryption ⓘ |
|----------------|-----------|------------------------|--------------|-----------------------------|------------|---------------------|-------------------------------------|---------------|
| Root | /dev/sda1 | snap-02d9369affc74b4f8 | 8 | General Purpose SSD (gp2) ▾ | 100 / 3000 | N/A | <input checked="" type="checkbox"/> | Not Encrypt ▾ |
| Add New Volume | | | | | | | | |

- Storage ==> HDD ==> EBS (Elastic block storage)
- Add new volume & attach that EBS volume to your instance.

Step 5: Add Tags

1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Add Tags 6. Configure Security Group 7. Review

Step 5: Add Tags

A tag consists of a case-sensitive key-value pair. For example, you could define a tag with key = Name and value = Webserver.

A copy of a tag can be applied to volumes, instances or both.

Tags will be applied to all instances and volumes. [Learn more](#) about tagging your Amazon EC2 resources.

| Key (128 characters maximum) | Value (256 characters maximum) | Instances ⓘ | Volumes ⓘ | Network Interfaces ⓘ |
|--|--------------------------------|-------------|-----------|----------------------|
| This resource currently has no tags | | | | |
| Choose the Add tag button or click to add a Name tag . Make sure your IAM policy includes permissions to create tags. | | | | |
| Add Tag (Up to 50 tags maximum) | | | | |

ADD tags as key value pairs

Step 6: Configure Security Groups

Security Groups ?

- Firewall is a network security system designed to prevent unauthorized access to/from a private network
- Security groups acts as a virtual firewall that controls the traffic for one or more instances
- We add rules to each SG that allow/deny traffic from its associated instances
- Best practice is to allow only traffic that is required

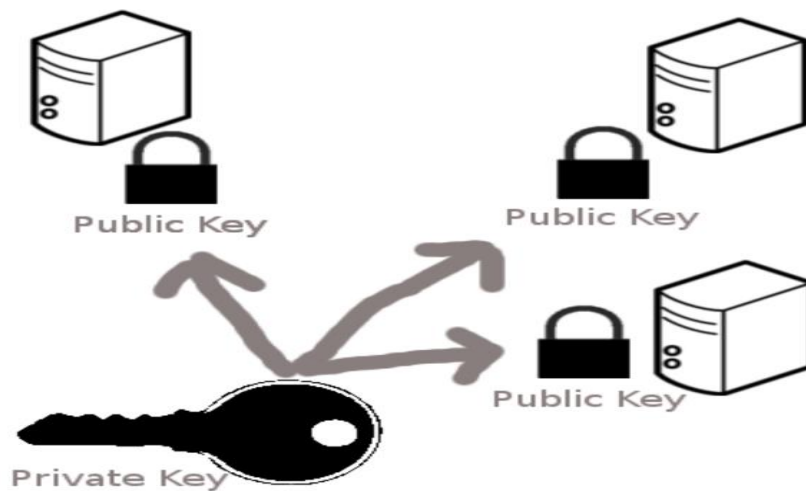


Step 7: Review & Launch instance

Key-Value pairs



Your public key (like lock) can be given to anyone / lock anything. Private key shouldn't be shared with anyone.



when you run 'ssh-keygen' command - it produces both a private (id_rsa) and a public (id_rsa.pub) key for usage.

You have both the master lock and the key to open it. With this, you can make copies of id_rsa.pub (public key/padlock) and put them onto the computers that you want someone with the private key (probably just you) to have access to.

IP Addressing ?

- Similar to having home street address to send mail
- IP address is the instances address on the network

Private IP:

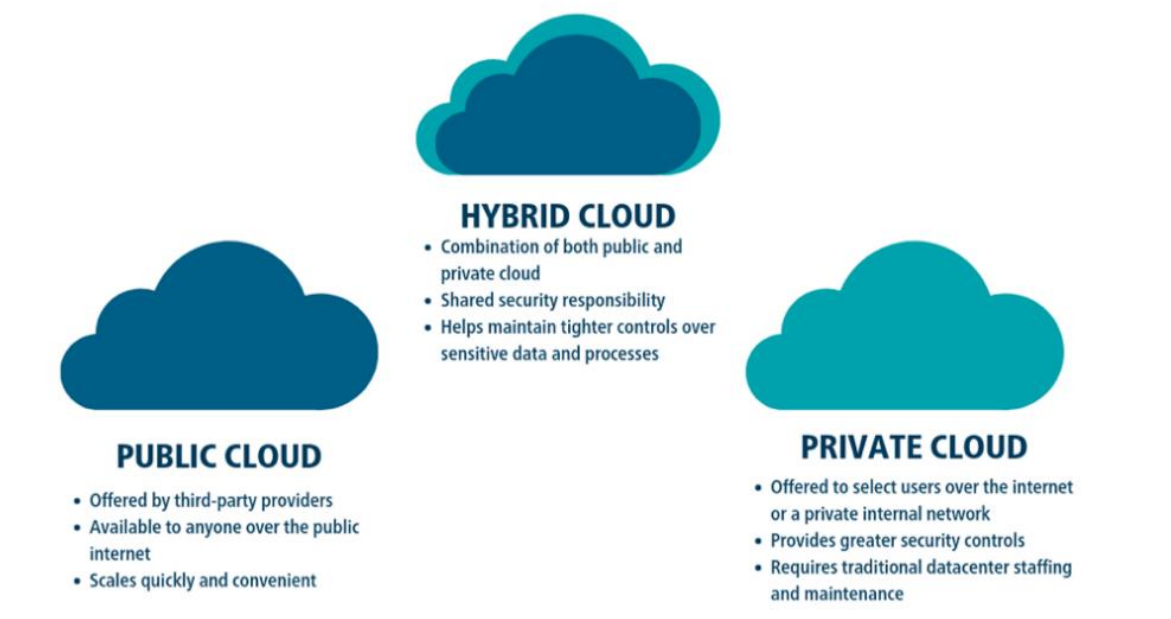
- By default every EC2 instance will be provided with a private IP address
- Private IP addresses allow instances to communicate as long as they are located in the same VPC

Public IP:

- EC2 instances can be launched with/without public IP address
- Public IP address is required for the instance to communicate with the network

Elastic IP:

- Static public IP address for the instance.
- Chargeable for each elastic IP.



Public Cloud

Public cloud is **open to all** to store and access information via the Internet using the pay-per-usage method.

In public cloud, computing resources are managed and operated by the Cloud Service Provider (CSP).

Example: AWS , azure, GCP

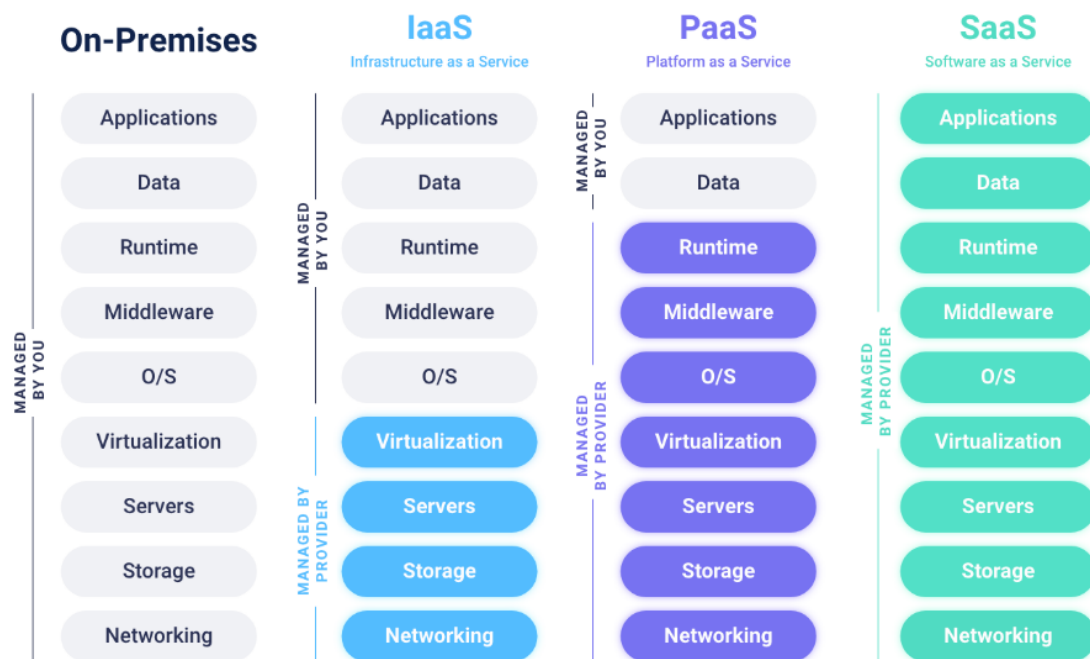
Private Cloud

Private cloud is also known as an internal cloud or corporate cloud. It is used by organizations to build and manage their own data centers internally or by the third party. It can be deployed using Opensource tools such as Openstack and Eucalyptus.

Hybrid Cloud

Hybrid cloud = Public Cloud + Private cloud.

Cloud service Models



3 building block of cloud computing are

- Saas
- Paas
- laas

Saas (Software as a service):

Software as a service is the easiest way to cloud compute.

Used By: An end-user generally uses SaaS.

The software's are accessed over the internet.

Eg. Google drive, G-mail.

Advantage of saas is

- all application is free and paid via subscription.
- Accessible from any computer.

Paas (Platform as a service):

Used By: Developers

Provides environment and tool for creating new online applications

Eg. Google app engine, salesforce (force.com)

Advantages

- Facilitation of hosting capabilities.
- Designing and developing the application.
- Private or public deployment.

Disadvantage

- Application build on one vendor cannot be moved to another.

IaaS (Infrastructure as a Service):

The IaaS service provides its users with access to various resources like virtual storage and virtual machines.

