

# Amazon Elastic Cloud-The Complete Reference

Aman Jagga

Computer Science & Engineering, Thapar University, Patiala, India  
Email - amanjagga@gmail.com

**Abstract:** Amazon.com's Elastic Compute Cloud (EC2) offer enterprise class computing facilities to any organization or individual in the world with a valid credit card. This paper details complete understanding Amazon EC2, setting up an Amazon EC2 instance and using it for different purposes. It includes an analysis of the overall system, going into technical understanding of each feature, ease-of-use and to measure how secure is it. This paper also details of how Amazon elastic cloud can be different from the physical server. I conclude with a report of advantages of EC2 and steps to set up an Amazon EC2 account.

**Keywords:** Elastic Cloud, Amazon, EC2, EC2 setup, Advantages of EC2, Difference between Elastic Cloud and Physical Server, Features of EC2, API's with EC2

## 1. Introduction

Amazon Elastic cloud computing also known as Amazon EC2 is one of the most important and very important aspect of cloud computing. As cloud computing is divided into mainly 3 services IAAS (Infrastructure as a Service), PAAS (Platform as a service), SAAS (software as a service), Amazon EC2 is categorized into IAAS as it provides Infrastructure on cloud. It is just as similar as renting a CPU for doing computations but you don't have the direct access to that CPU, as it is on Cloud, Instead you have the network access to that CPU or more precisely to that server. Amazon EC2 can be used for developing applications, hosting dynamic websites or for doing any type of computational work. There are many advantages of elastic cloud over the traditional computers or servers. It has better uptime, data security; hassle of maintaining backups, static IP, scalable, extensible and most importantly it is resizable.

## 2. Setting up an Amazon EC2 Instance

It is very easy to set up an Amazon elastic cloud for the user but one should have the technical understanding of how Amazon servers run and managed for hassle free maintenance and customized use. In general to setup a cloud, a base operating system is loaded on a physical system of cloud, on the base operating system a hypervisor is loaded to virtualize the system. Regarding Amazon servers, Amazon has never officially said anything about the base operating system but it is generally accepted that it's a customized version of Red Hat Enterprise Linux (RHEL). On top of the base operating system, for the virtual machines they use Xen hypervisor to host various operating systems in the form of Xen images.

### 2.1 Operating system

Base operating system and hypervisor is loaded by the Amazon itself. Setting up an instance(an instance is a term which refers to 1 unit of virtual CPU at Amazon servers) starts from choosing an operating system on Xen hypervisor to host Linux; Open Solaris; Solaris; Windows 2003 and 2008; and FreeBSD and NetBSD which means you can choose form a variety of operating system depending on the needs. Even you have choices to choose from 32 bit or 64 bit system. Instead of choosing an operating system you can also make you of other customized Xen images to run on Amazon known as Amazon Machine Images (AMI's). Customers can make their own AMI, or choose from the

community AMI's already built by the Amazon customers or can buy images from the AWS marketplace. All this is done through the Amazon elastic cloud console of your amazon cloud by launching an instance.

### 2.2 Type of the Instances

An instance is just a 1 unit CPU of a virtual machine and launching an instance means reserving an instance. An instance can be of many types depending on your needs. You can choose among the following instances but remember you will also be charged according to the increasing capacity. So you have to take this decision very wisely.

Type	CPU Units	CPU Cores	Memory
T1 Micro (t1.micro) ★ Free tier eligible	Up to 2 ECUs	1 Core	613 MiB
M1 Small (m1.small)	1 ECU	1 Core	1.7 GiB
M1 Medium (m1.medium)	2 ECUs	1 Core	3.7 GiB
M1 Large (m1.large)	4 ECUs	2 Cores	7.5 GiB
M1 Extra Large (m1.xlarge)	8 ECUs	4 Cores	15 GiB
M2 High-Memory Extra Large (m2.xlarge)	6.5 ECUs	2 Cores	17.1 GiB
M2 High-Memory Double Extra Large (m2.2xlarge)	13 ECUs	4 Cores	34.2 GiB
M2 High-Memory Quadruple Extra Large (m2.4xlarge)	26 ECUs	8 Cores	68.4 GiB
M3 Extra Large (m3.xlarge)	13 ECUs	4 Cores	15 GiB
M3 Double Extra Large (m3.2xlarge)	26 ECUs	8 Cores	30 GiB
C1 High-CPU Medium (c1.medium)	5 ECUs	2 Cores	1.7 GiB
C1 High-CPU Extra Large (c1.xlarge)	20 ECUs	8 Cores	7 GiB

\*Free tier eligible means that the user can avail the free trial for the first year with that instance

Then instances can be again divided into 3 types:-

**On demand instances-**The instance let customer pay for resources used on the hourly basis with no long term commitments and you can increase or decrease your instance depending on the traffic within the period.

**Reserved Instances**-Reserved instances let customer pay for a one time, low payment fee for an appropriate time compared to the on demand instances which are on hourly basis.You can even sell your unused computing capacity of the reserved instance before the reserved instance time period expires

**Spot instances**-These instances let you bid on the unused Amazon EC2 capacity and run those instances as long as the bid exceeds the current spot price.The spot price depend on supply and demand and customers can buy spot instance if they flexible time applications to run After choosing an suitable instance type and either a customized one or an operating system image).User will be allotted a virtual machine on cloud with a kernel ID and RAM disk ID and a certain roles to perform with server.

**2.3 Multiple Locations**

Users have a choice to choose from one of several locations US Standard, US West (Oregon), US West (Northern California), EU (Ireland), Asia Pacific (Singapore), Asia Pacific (Tokyo), Asia Pacific (Sydney), South America (Sao Paulo), and GovCloud (US) Regions to minimize latency.Before launching an instance or before doing anything, you have to choose one of several location depending on the geographical location of traffic.

**2.4 Storage types**

Users have to select the type of storage volume they need to use with EC2 instance for doing computations or for storing computed data. There are mainly two types of services used for storage.

**Amazon Elastic Block Store(EBS)**- It is a web service that is specially designed to use with Amazon EC2.It is very similar to using an external hard drive on computer. User get a raw, unformatted block of space and need to be mounted with an instance [1].

**Amazon S3 services**-It is a web service to store data on the net and can also be used to store images and data of Elastic cloud.

Comparison between **Elastic block store and S3 services** [2].

S.no	Elastic Block Store(EBS)	S3 Storage Service
1	Specially designed for EC2 storage.	General Internet Storage service But can be used with EC2
2	It is a mountable drive with EC2	Requires special software to read and write data with EC2
3	1 EBS volume can be used by only 1 instance	1 S3 unit can be used by multiple instances
4	Less delay in reading and writing data	More delay in reading and writing data
5	No partitioning of a volume	Volume can be divided into multiple buckets(containers).
6	No redundancy. User have to keep the backup	Redundancy at multiple locations

**2.5 Security**

With the cloud computing the term security is always concerned. Security is always the issue with cloud computing despite. Amazon servers are much more secure. To login to your Amazon management console you already have username and password.Then you have a key pair to ssh to your instance and generation of key pair is also your next step. Just name the key pair and download the key file from your console.This is a key pair as it is a combination of public key and private key.When you run an instance, you specify the name of the key pair and the corresponding public key is provided to that instance. When you ssh to the above username on the instance, you specify the private key so the instance can authenticate you and let you in. You can have multiple sshkey pairs associated with a single AWS account and also you can have single key pair associated with multiple instances. Even EC2 is equipped with a firewall which blocks certain ports for security purposes. By default all the ports are closed, user can open ports depending on the requirements. In EC2 enabling SSL is also there, which allows users to connect instead of port 80 http protocol, the client can elect to connect to the server on port 443 using TLS. AWS secures authenticates its TLS server using a 1024 bit RSA certificate signed by VeriSign. Amazon takes no responsibility of the privacy of information and advises organizations requiring security to encrypt their data.[3].This is your last step for creating an instance, now you successfully created an instance.

**2.6 AWS and DNS**

With an instance Amazon elastic cloud provides you with Elastic IP which is again very much similar to static IP but as static IP is always the address of a machine and as we do not have any physical machine here, instead we have a virtual machine. So elastic IP is just a number similar to IP address and is programmatically (virtually) mapped to each virtual machine. You can simply map an elastic IP by clicking on Elastic IP from your console, selecting an instance and mapping to it. Amazon warns developers that DNS resolutions should not be cached for an extended period of time: "Amazon cannot guarantee the validity of an

IP address at any given time. It is necessary to change IP addresses from time to time for a variety of reasons, including hardware changes. Amazon does, however, guarantee that the URL resource name for a given service will not change without public notification. The IP addresses connect to load balancers which then distribute requests with Amazon's infrastructure [4].

### 2.7 EC2 Virtualization and Tools

Amazon has created a collection of programs written in Java that control EC2 through SOAP commands sent over SSL to computers at Amazon. The tools can list available AMI images, boot an instance from an image, display the instances that the user is running, display console output, terminate an instance, etc. EC2 instances have two access control mechanisms. Amazon's EC2 tools can write an ssh public key[7] into the AMI image, allowing a user who has the matching private key to log into the super user account. Amazon also provides a firewall that can be used to restrict network connectivity to a user's instances based on IP address and TCP port number [5].

### 2.8 Elastic Load Balancing

Amazon elastic cloud even offers user with an option on load balancing. Elastic Load Balancing automatically distributes incoming application traffic across multiple Amazon EC2 instances. It enables you to achieve even greater fault tolerance in your applications, seamlessly providing the amount of load balancing capacity needed in response to incoming application traffic. This is an extra feature of EC2 and requires an extra charge beyond instance charges. Elastic Load Balancing detects unhealthy instances within a pool and automatically reroutes traffic to healthy instances until the unhealthy instances have been restored. You can enable Elastic Load Balancing within a single Availability Zone or across multiple zones for even more consistent application performance [8]. Amazon Cloud Watch can be used to capture a specific Elastic Load Balancer's operational metrics, such as request count and request latency, at no additional cost beyond Elastic Load Balancing fees.

### 2.9 Use of API's

There are many competitors of Amazon Elastic cloud like Google Compute Engine, Rack space etc. but the best advantage of using Amazon EC2 over other services is that you can use all other Amazon API's like S3(storage service), Cloud front (monitoring services), Amazon CDN(content Delivery Network) with full ease. You can use multiple API's into a single EC2 instance.

## 3. Conclusion

My finding that EC2 delivers its promise of providing ready-to-go virtual machines at a reasonable cost with additional features. It provides you hassle free maintenance, service and availability. Availability of the Amazon service was excellent. Amazon services are innovative, useful, and represent a practical alternative for organizations interested in storing large amounts of data or making use of conventional computing. My primary concerns with the service are the risk and result of password compromise, and an extremely broad License Agreement [6] which allows Amazon to curtail or stop service for any reason, at

any point of time, and without any recourse to the end user. I don't think that the security has been compromised and regarding license agreement, this never happens in past unless you stop paying the monthly bills. Even in future the case is not going to happen unless exceptional circumstances and the chances of it is more with traditional server. As there are much more utilities than harms it would be a very wise decision of turning to Elastic cloud. After reading this paper you will be having more than the sufficient knowledge to start with Amazon elastic cloud and in nutshell I would like to discuss steps to set up an Amazon elastic cloud instance and using it.

### 3.1 Steps

- 1) Register yourself on [aws.amazon.com](http://aws.amazon.com) with a valid credit card to avail Amazon web services.
- 2) Go to your registered account console, from console you can set up any Amazon web service
- 3) For EC2, click on that and then launch an instance
- 4) Before launching an instance you can also give preference for location to minimize latency
- 5) Choose an image of operating system or any customized Xen image for your instance
- 6) Choose a suitable instance type depending on your needs.
- 7) Attach a storage device to your instance
- 8) Configure security and network access for your instance
- 9) Configure firewall to open and close ports and you are ready with your virtual server.
- 10) As you get an Elastic IP with an instance, map elastic IP with your instance.
- 11) Now your instance is ready and can be accessed by the IP.
- 12) Deploy application software by remote connection to your server depending on your needs.

## 4. References

- [1]. Amazon Elastic Block store documentation ipaddresses <http://aws.amazon.com/ebs>
- [2]. Tech republic Inc. <http://www.techrepublic.com/blog/datacenter/what-is-the-difference-between-ebs-and-s3-storage-on-amazon/4991>
- [3]. T. Berners-Lee, R. Fielding, and L. Masinter. RFC 3986: Uniform resource identifier (uri): Generic syntax, January 2005.
- [4]. Amazon Elastic cloud documentation ip addresses <http://aws.amazon.com/ec2>

- [5]. Simson L. Garfinkel. TR 01-07: Harvard University Cambridge. October 2007.
- [6]. Amazon Web Services. Web services licensing agreement, October 3 2006.
- [7]. P. Barham, B. Dragovic, K. Fraser, S. Hand, T. Harris, A. Ho, R. Neugebauer, I. Pratt, and A. Warfield, "Xen and the art of virtualization," in Proceedings of SOSP'03, Oct. 2003.
- [8]. E. Walker, "Benchmarking amazon ec2 for high-performance scientific computing," in USENIX ;login: magazine, Oct. 2008.