Amazon AWS

Terminology

- Instance = One running virtual machine.
- Instance Type = instance hardware configuration such CPUs, cores, memory, disk.
- Instance Store Volume = Temporary disk associated with instance.
- Key Pair = Credentials used to access VM
- Region = Geographic location for prices and available services (Availability Zone)

Elastic Compute Cloud (EC2)

- AMI is a template that contains a software configuration (OS, applications, packages, etc) that can run on Amazon's computing environment

- AMIs are building blocks of Amazon EC2 and are used to launch an ***instance***

Security

- AWS uses public-key cryptography
- AWS stores the public key, and the user stores the private key.
- There are two ways for creating a key pair:
  - Have Amazon EC2 generate it for you (The private key file, with .pem extension, will automatically be downloaded by the browser.)
  - Generate it yourself using a third-party tool such as OpenSSH, then import the public key to Amazon EC2

EC2

Model	vCPU	Mem (GiB)	SSD Storage (GB)
m3.medium	1	3.75	1 x 4
m3.large	2	7.5	1 x 32
m3.xlarge	4	15	2 x 40
m3.2xlarge	8	30	2 x 80

Security Groups

- A **Security Group** defines the firewall rules specifying how the incoming network traffic should be delivered to the instance.
- Security groups can be defined on the Amazon EC2 console

Connecting to an EC2 instance

- There are several ways to connect to an EC2 instance once it's launched.

- **Remote Desktop Connection** is the standard way to connect to Windows instances.

- An **SSH client** is used to connect to Linux instances.

- **Connect through the browser (**web-based SSH**)**

How to copy files to EC2 instances:

Prerequisites:

- Enable SSH traffic on the instance
- Install an SCP client (if you do not have)
- Get the ID of the Amazon EC2 instance, public DNS of the instance, and the path to the private key

scp -i my-key-pair.pem SampleFile.txt ec2-user@ec2-198-51-100-1.compute-1.amazonaws.com

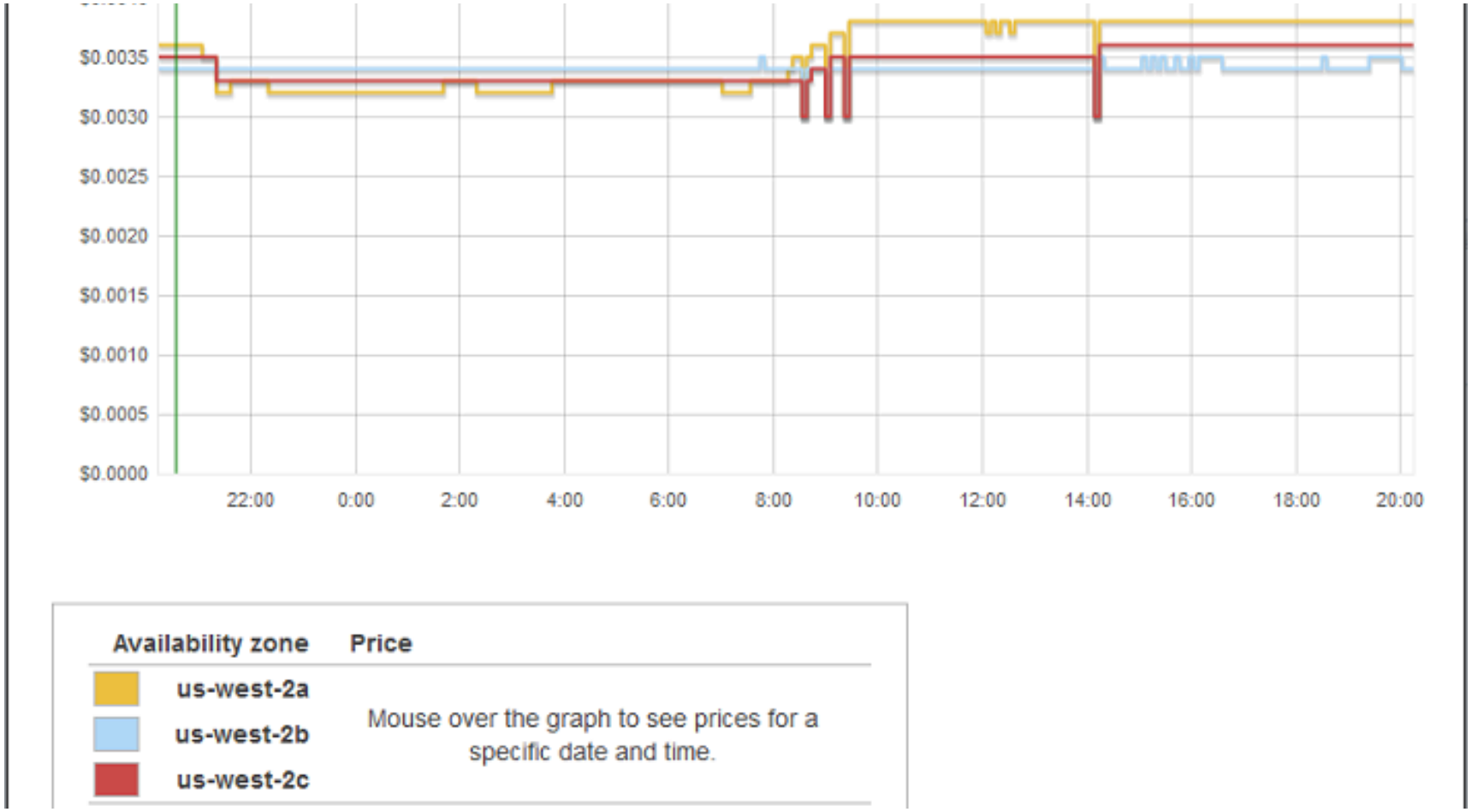
Terminating Instances

- If the instance launched is not in the free usage tier, as soon as the instance starts to boot, the user is billed for each hour the instance keeps running.
- A terminated instance cannot be restarted.
- If you stop instance, you still is billed for the EBS usage if you are not in the free usage tier

EC2 Pricing Model

- 750 hours of EC2 running Linux, RHEL, or SLES t2.micro instance usage
- 750 hours of EC2 running Microsoft Windows Server t2.micro instance usage
- 750 hours of Elastic Load Balancing plus 15 GB data processing
- 30 GB of Amazon Elastic Block Storage in any combination of General Purpose (SSD) or Magnetic, plus 2 million I/Os (with Magnetic) and 1 GB of snapshot storage
- 15 GB of bandwidth out aggregated across all AWS services
- 1 GB of Regional Data Transfer

Spot instance price history



Can you scale at large?

Q: How many instances can I run in Amazon EC2?

You are limited to running up to 20 On-Demand Instances, purchasing 20 Reserved Instances, and requesting Spot Instances per your dynamic Spot limit per region. New AWS accounts may start with limits that are lower than the limits described here. Certain instance types are further limited per region as follows:

Instance Type	On-Demand Limit	Reserved Limit	Spot Limit
m4.4xlarge	10	20	Dynamic Spot Limit
m4.10xlarge	5	20	Dynamic Spot Limit
c4.4xlarge	10	20	Dynamic Spot Limit
c4.8xlarge	5	20	Dynamic Spot Limit
cg1.4xlarge	2	20	Dynamic Spot Limit
hi1.4xlarge	2	20	Dynamic Spot Limit
hs1.8xlarge	2	20	Not offered
cr1.8xlarge	2	20	Dynamic Spot Limit
g2.2xlarge	5	20	Dynamic Spot Limit
g2.8xlarge	2	20	Dynamic Spot Limit

Simple Storage Service (S3)

- A **bucket** is a container for objects
- A bucket can hold any number of **objects**, which are files of up to 5TB.
- A bucket has a name that must be **globally unique**.
- A bucket has a **flat directory structure** (despite the appearance given by the interactive web interface.)
- Objects on S3 are **immutable**

Bucket Properties

- Access Policy – Control **when and where** objects can be accessed
- Access Control – Control who **may** access objects in this bucket.
- Lifecycle – Delete or archive objects in a bucket at a certain time.
- Logging – Keep track of how objects are accessed.
- Notification – Be notified when failures occur.

S3 Pricing

Storage Pricing

Region: US West (Oregon)

	Standard Storage	Reduced Redundancy Storage	Glacier Storage
First 1 TB / month	$0.0300 per GB	$0.0240 per GB	$0.0100 per GB
Next 49 TB / month	$0.0295 per GB	$0.0236 per GB	$0.0100 per GB
Next 450 TB / month	$0.0290 per GB	$0.0232 per GB	$0.0100 per GB
Next 500 TB / month	$0.0285 per GB	$0.0228 per GB	$0.0100 per GB
Next 4000 TB / month	$0.0280 per GB	$0.0224 per GB	$0.0100 per GB
Over 5000 TB / month	$0.0275 per GB	$0.0220 per GB	$0.0100 per GB

Except as otherwise noted, our prices are exclusive of applicable taxes and duties, including VAT and applicable sales tax. For customers with a Japanese billing address, use of the Asia Pacific (Tokyo) Region is subject to Japanese Consumption Tax. Learn more.

Data Transfer Pricing

The pricing below is based on data transferred "in" to and "out" of Amazon S3.

Region: US West (Oregon)

	Pricing
Data Transfer IN To Amazon S3	
All data transfer in	$0.000 per GB
Data Transfer OUT From Amazon S3 To	
Amazon EC2 in the same region	$0.000 per GB
Another AWS Region	$0.020 per GB
Amazon CloudFront	$0.000 per GB
Data Transfer OUT From Amazon S3 To Internet	
First 1 GB / month	$0.000 per GB
Up to 10 TB / month	$0.090 per GB
Next 40 TB / month	$0.085 per GB

Elastic Block Store

- An EBS volume is a **virtual disk** of a fixed size with a block read/write interface.
- It can be **mounted** as a filesystem on a running EC2 instance where it can be **updated incrementally.** Unlike an instance store, an EBS volume is **persistent.**
- EBSs are typically 3x more expensive by volume and 10x more expensive by IOPS than S3 (this can change based on Amazon pricing policy).
- Pricing is different. Check: https://aws.amazon.com/ebs/pricing/

Amazon Glacier

- Low-cost storage service for data archiving and online backup (Backup for data on S3)
- Glacier is structured like S3:
  - a **vault** is a container for an arbitrary number of **archives**.
- However:
  - All operations are asynchronous and notified via SNS.
  - Vault listings are updated once per day.
  - Archive downloads may take up to four hours.
  - Only 5% of total data can be accessed in a given month.
- Pricing: check Amazon

S3 Command Line Examples (CLI)

```
$ aws s3 mb s3://b_name
$ aws cp localfile s3://b_name/key_name
$ aws mv s3://b_name/key_name s3://b_name/new_name
$ aws ls s3://b_name
$ aws rm s3://b_name/key_name
$ aws rb s3://b_name
$ aws s3 help
$ aws s3 ls help
```

Using High-Level s3 Commands

http://docs.aws.amazon.com/cli/latest/userguide/using-s3-commands.html

EC2 Command Line Examples

```
$ aws    ec2        describe-instances
$ aws    run-instances --image-id ami-xxxxx – count 2
                              --instance-type m1.medium --key-name keyfile
$ aws    stop-instances --instance-id i-xxxxxx

$ aws    aws ec2 help
```

You are paying as you go

- Do not forget to terminate your ec2 instances after you finish to avoid further charges.
- This applies to all the services for which you are paying
- AWS interface is constantly changing as well as the pricing so make sure to check that regular for the pricing