

# **Cloud Platform: Amazon Web Service**

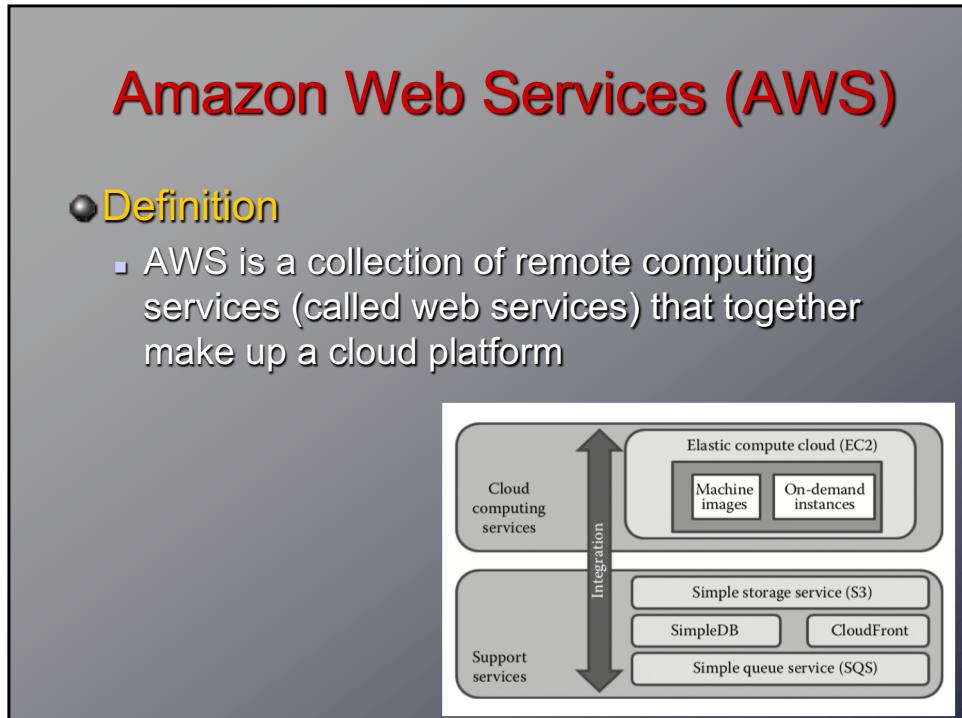
**A pioneer in deploying cloud solutions**

**Prof Tahar Kechadi**

**School of Computer Science**

## **Learning Outcomes**

- Case Study:
  - Amazon Web Services (<http://aws.amazon.com>)
- AWS offerings
- Understand the potential of an IaaS

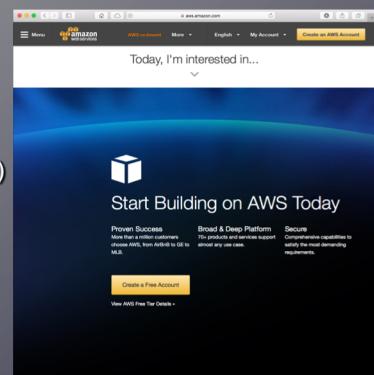


## Amazon Web Services (2)

**Amazon.com** is one of the World's largest Cloud provider and online retailer

Provides a set of business models and APIs which give access to Amazon's cloud offerings and content, including:

- Amazon Elastic Compute Cloud (EC2)
- Amazon Simple Storage Service (S3)
- Amazon Simple Queue Service (SQS)
- Amazon Elastic MapReduce
- Amazon SimpleDB
- Amazon Relational Database Service (RDS)
- Amazon CloudFront
- Amazon DevPay
- Amazon Mechanical Turk
- ....



## Amazon EC2

### ● Computing power

- EC2 provides resizable compute capacity in the cloud

### ● User Defines

- The user defines the virtual EC2 environment with the OS, services, databases, and application platform stack required for the application

- Existing pre-configured, template images
- Create your own Amazon Machine Image (AMI) containing your applications, libraries, data, and associated configuration settings, including security and network access
- Variety of instance types, multiple locations, management tools and API services provided
- Persistent storage

## Amazon EC2 - Services

- Instance, instance types
- Preconfigured templates (Amazon Machine Images)
- Key pairs
- Instance store volumes
- Elastic Block Store (EBS) volumes
- Availability Zones (e.g. EU-west-1)
- Firewall
- Elastic IP address
- Virtual Private Cloud (VPCs)

<http://aws.amazon.com/free>

## Amazon EC2 – Getting Start

- Sign up
- Access Amazon EC2 console
- Create a Key Pair
- Set Security group
- Create an instance
- Launching, connecting and using an instance.

<http://aws.amazon.com/free>

# Amazon EC2 Free Tier

AWS Free Tier Details

The screenshot shows the AWS Free Tier Details page with the following information:

- Amazon DynamoDB:** 25 GB of storage. Fast and flexible NoSQL database with seamless scalability.
- Amazon EC2:** 750 Hours per month.Resizable compute capacity in the Cloud.
- Amazon QuickSight:** 1 GB of SPICE capacity. Fast, easy-to-use, cloud-powered business analytics service at 1/10th the cost of traditional BI solutions.
- Amazon RDS:** 750 Hours per month of db.t2.micro database usage (applicable DB engine). Managed Relational Database Service for MySQL, PostgreSQL, MariaDB, Oracle MySQL, or SQL Server.
- Amazon S3:** 5 GB of standard storage. Secure, durable, and scalable object storage infrastructure.
- Amazon SageMaker:** 250 hours per month of t2.medium notebook usage for the first two months. Artifical Intelligence service.
- Amazon WorkDocs:** 30 Days trial. Business Productivity service.
- AWS Lambda:** 1 Million free requests per month. Compute service.

Below the table, the URL <http://aws.amazon.com/free/> is visible.

# AWS

Amazon Web Services

<p><b>Compute &amp; Networking</b></p> <ul style="list-style-type: none"> <li> Direct Connect</li> <li>Dedicated Network Connection to AWS</li> </ul> <ul style="list-style-type: none"> <li> EC2</li> <li>Virtual Servers in the Cloud</li> </ul> <ul style="list-style-type: none"> <li> Route 53</li> <li>Scalable Domain Name System</li> </ul> <ul style="list-style-type: none"> <li> VPC</li> <li>Isolated Cloud Resources</li> </ul> <p><b>Storage &amp; Content Delivery</b></p> <ul style="list-style-type: none"> <li> CloudFront</li> <li>Global Content Delivery Network</li> </ul> <ul style="list-style-type: none"> <li> Glacier</li> <li>Archive Storage in the Cloud</li> </ul> <ul style="list-style-type: none"> <li> S3</li> <li>Scalable Storage in the Cloud</li> </ul> <ul style="list-style-type: none"> <li> Storage Gateway</li> <li>Integrates On-Premises IT Environments with Cloud Storage</li> </ul>	<p><b>Database</b></p> <ul style="list-style-type: none"> <li> DynamoDB</li> <li>Predictable and Scalable NoSQL Data Store</li> </ul> <ul style="list-style-type: none"> <li> ElastiCache</li> <li>In-Memory Cache</li> </ul> <ul style="list-style-type: none"> <li> RDS</li> <li>Managed Relational Database Service</li> </ul> <ul style="list-style-type: none"> <li> Redshift</li> <li>Managed Petabyte-Scale Data Warehouse Service</li> </ul> <p><b>Deployment &amp; Management</b></p> <ul style="list-style-type: none"> <li> CloudFormation</li> <li>Templated AWS Resource Creation</li> </ul> <ul style="list-style-type: none"> <li> CloudTrail</li> <li>User Activity and Change Tracking</li> </ul> <ul style="list-style-type: none"> <li> CloudWatch</li> <li>Resource and Application Monitoring</li> </ul> <ul style="list-style-type: none"> <li> Elastic Beanstalk</li> <li>AWS Application Container</li> </ul> <ul style="list-style-type: none"> <li> IAM</li> <li>Secure AWS Access Control</li> </ul> <ul style="list-style-type: none"> <li> OpsWorks</li> <li>DevOps Application Management Service</li> </ul>	<p><b>Analytics</b></p> <ul style="list-style-type: none"> <li> Data Pipeline</li> <li>Orchestration for Data-Driven Workflows</li> </ul> <ul style="list-style-type: none"> <li> Elastic MapReduce</li> <li>Managed Hadoop Framework</li> </ul> <ul style="list-style-type: none"> <li> Kinesis</li> <li>Real-time Processing of Streaming Big Data</li> </ul> <p><b>App Services</b></p> <ul style="list-style-type: none"> <li> CloudSearch</li> <li>Managed Search Service</li> </ul> <ul style="list-style-type: none"> <li> Elastic Transcoder</li> <li>Easy-to-use Scalable Media Transcoding</li> </ul> <ul style="list-style-type: none"> <li> SES</li> <li>Email Sending Service</li> </ul> <ul style="list-style-type: none"> <li> SNS</li> <li>Push Notification Service</li> </ul> <ul style="list-style-type: none"> <li> SQS</li> <li>Message Queue Service</li> </ul> <ul style="list-style-type: none"> <li> SWF</li> <li>Workflow Service for Coordinating Application Components</li> </ul>
--	--	--

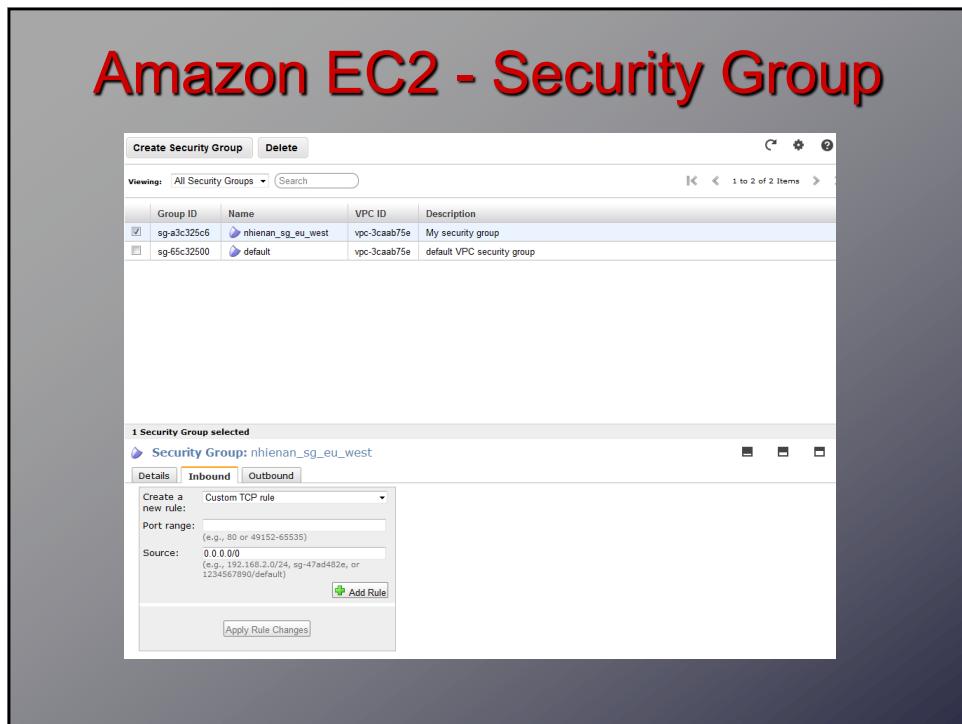
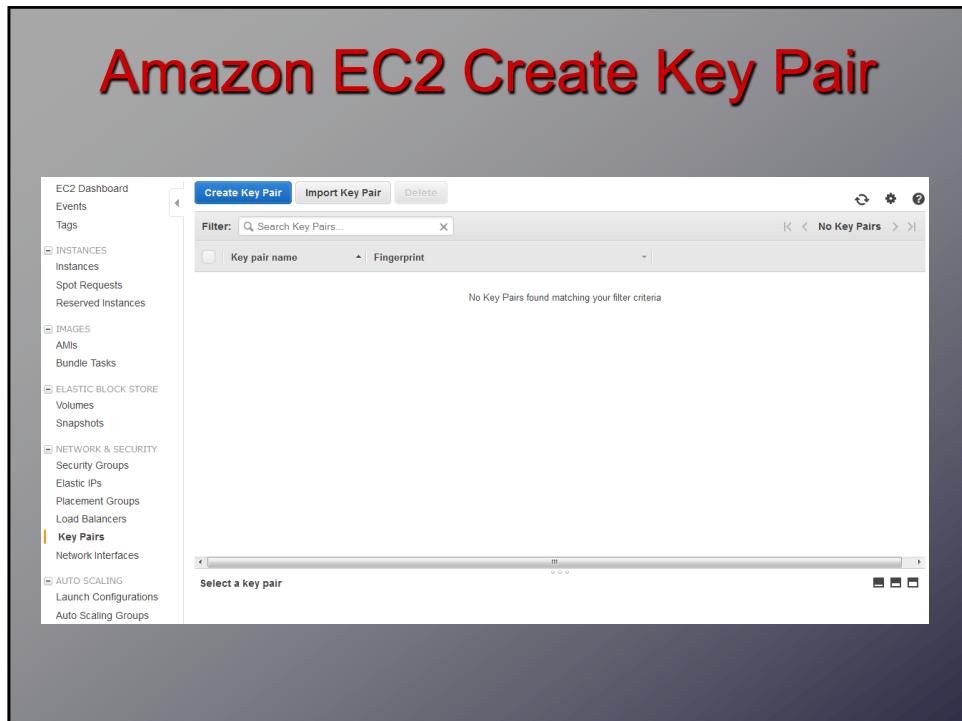
# Amazon EC2 - Region

The screenshot shows the AWS EC2 Dashboard for the US West (Oregon) region. The left sidebar includes links for EC2 Dashboard, Events, Tags, Reports, Instances, Images, Elastic Block Store, Network & Security, and Auto Scaling. The main content area displays resource counts: 0 Running Instances, 0 Elastic IPs, 0 Volumes, 0 Key Pairs, 0 Placement Groups, 0 Snapshots, 0 Load Balancers, and 1 Security Group. A 'Create Instance' section with a 'Launch Instance' button is present. The 'Service Health' section shows the US West (Oregon) service status as operating normally. The 'Scheduled Events' section indicates no events. On the right, a sidebar lists other regions: US East (N. Virginia), US West (Oregon) (selected), US West (N. California), EU (Ireland), Asia Pacific (Singapore), Asia Pacific (Tokyo), Asia Pacific (Sydney), and South America (São Paulo). Below the regions, a 'Popular AMIs on AWS Marketplace' section lists Vyatta Virtual Router/Firewall/VPN, Alert Logic Threat Manager for E, and Adobe ColdFusion.

# Amazon EC2 - Region

A table listing AWS Regions and their corresponding codes:

Code	Name
us-east-1	US East (N. Virginia)
us-east-2	US East (Ohio)
us-west-1	US West (N. California)
us-west-2	US West (Oregon)
ca-central-1	Canada (Central)
eu-central-1	EU (Frankfurt)
eu-west-1	EU (Ireland)
eu-west-2	EU (London)
eu-west-3	EU (Paris)
ap-northeast-1	Asia Pacific (Tokyo)
ap-northeast-2	Asia Pacific (Seoul)
ap-northeast-3	Asia Pacific (Osaka-Local)
ap-southeast-1	Asia Pacific (Singapore)
ap-southeast-2	Asia Pacific (Sydney)
ap-south-1	Asia Pacific (Mumbai)
sa-east-1	South America (São Paulo)



# Amazon EC2-Select AMI

**Quick Start**

- My AMIs
- AWS Marketplace
- Community AMIs
- Free tier only ⓘ

 <b>Amazon Linux</b> Free tier eligible	Amazon Linux AMI 2013.09.2 - ami-5256b825 (64-bit) / ami-6a56b81d (32-bit) The Amazon Linux AMI is an EBS-backed, PV-GRUB image. It includes Linux 3.4, AWS tools, and repository access to multiple versions of MySQL, PostgreSQL, Python, Ruby, and Tomcat. Root device type: ebs Virtualization type: paravirtual	<b>Select</b> <input checked="" type="radio"/> 64-bit <input type="radio"/> 32-bit
 <b>Red Hat</b> Free tier eligible	Red Hat Enterprise Linux 6.4 - ami-75342c01 (64-bit) / ami-b8332bff (32-bit) Red Hat Enterprise Linux version 6.4, EBS-boot. Root device type: ebs Virtualization type: paravirtual	<b>Select</b> <input checked="" type="radio"/> 64-bit <input type="radio"/> 32-bit
 <b>SUSE Linux</b> Free tier eligible	SUSE Linux Enterprise Server 11 - ami-8d1109f9 (64-bit) / ami-fd110989 (32-bit) SUSE Linux Enterprise Server 11 Service Pack 3 basic install. EBS boot with Amazon EC2 AMI Tools preinstalled; Apache 2.2, MySQL 5.5, PHP 5.3, and Ruby 1.8.7 available. Root device type: ebs Virtualization type: paravirtual	<b>Select</b> <input checked="" type="radio"/> 64-bit <input type="radio"/> 32-bit
 <b>Ubuntu</b> Free tier eligible	Ubuntu Server 12.04.3 LTS - ami-8e987ef9 (64-bit) / ami-80987ef7 (32-bit) Ubuntu Server 12.04.3 LTS with support available from Canonical ( <a href="http://www.ubuntu.com/cloud/services">http://www.ubuntu.com/cloud/services</a> ). Root device type: ebs Virtualization type: paravirtual	<b>Select</b> <input checked="" type="radio"/> 64-bit <input type="radio"/> 32-bit
 <b>Ubuntu</b> Free tier eligible	Ubuntu Server 13.10 - ami-480bea3f (64-bit) / ami-4a0bea3d (32-bit) Ubuntu Server 13.10, with support available from Canonical ( <a href="http://www.ubuntu.com/cloud/services">http://www.ubuntu.com/cloud/services</a> ). Root device type: ebs Virtualization type: paravirtual	<b>Select</b> <input checked="" type="radio"/> 64-bit <input type="radio"/> 32-bit
 <b>Microsoft Windows Server 2012 Base</b> - ami-3937da4e		<b>Select</b>

# Amazon EC2 - Instance

**Step 2: Choose an Instance Type**

Amazon EC2 provides a wide selection of instance types optimized to fit different use cases. Instances are virtual servers that can run applications. They have varying combinations of CPU, memory, storage, and networking capacity, and give you the flexibility to choose the appropriate mix of resources for your applications. [Learn more](#) about instance types and how they can meet your computing needs.

Currently selected: t1.micro (up to 2 ECUs, 1 vCPUs, 0.613 GiB memory, EBS only)

All instance types	Micro instances
<b>Micro instances</b> Free tier eligible	Micro instances are a low-cost instance option, providing a small amount of CPU resources. They are suited for lower throughput applications, and websites that require additional compute cycles periodically, but are not appropriate for applications that require sustained CPU performance. Popular uses for micro instances include low traffic websites or blogs, small administrative applications, bastion hosts, and free trials to explore EC2 functionality.
General purpose	
Memory optimized	
Storage optimized	
Compute optimized	

ⓘ Micro instances are eligible for the AWS free usage tier. For the first 12 months following your AWS sign-up date, you get up to 750 hours of micro instances each month. When your free usage tier expires or if your usage exceeds the free tier restrictions, you pay standard, pay-as-you-go service rates.

[Learn more](#) about free usage tier eligibility and restrictions

# Amazon EC2 - Instance

Step 7: Review Instance Launch

Protocol	Type	Port Range (Code)	Source
SSH	TCP	22	0.0.0.0/0

**Instance Details**

Number of Instances: 1  
Network: vpc-3caab75e  
Subnet: No preference (default subnet in any Availability Zone)  
EBS-optimized: No  
Monitoring: No  
Termination protection: No  
Shutdown behavior: Stop  
IAM role: None  
Tenancy: Shared tenancy (multi-tenant hardware)  
Kernel ID: Use default  
RAM disk ID: Use default  
User data:  
Assign Public IP: Yes  
Network interfaces

**Storage** Edit storage  
**Tags** Edit tags

Cancel Previous Launch

# Amazon EC2 - Launching

Select an existing key pair or create a new key pair

A key pair consists of a public key that AWS stores, and a private key file that you store. Together, they allow you to connect to your instance securely. For Windows AMIs, the private key file is required to obtain the password used to log into your instance. For Linux AMIs, the private key file allows you securely SSH into your instance.

Choose an existing key pair:

Select a key pair:

I acknowledge that I have access to the selected private key file (nhanan-key-pair-eu-west.pem), and that without this file, I won't be able to log into my instance.

Cancel Launch instances

**Launch Status**

- Your instance is now launching**  
The following instance launch has been initiated: i-5db8b31e [View launch log](#)
- Get notified of estimated charges**  
[Create billing alerts](#) To get an email notification when estimated charges on your AWS bill exceed \$0.0 (in other words, when you have exceeded the free usage tier).

How to connect to your instance  
Your instance is launching, and it may take a few minutes until it is in the **running** state, when it will be ready for you to use. Usage hours on your new instance will start immediately and continue to accrue until you stop or terminate your instance.  
Click [View instances](#) to monitor your instance's status. Once your instance is in the **running** state, you can [connect](#) to it from the instances screen. [Find out](#) how to connect to your instance.

Here are some helpful resources to get you started

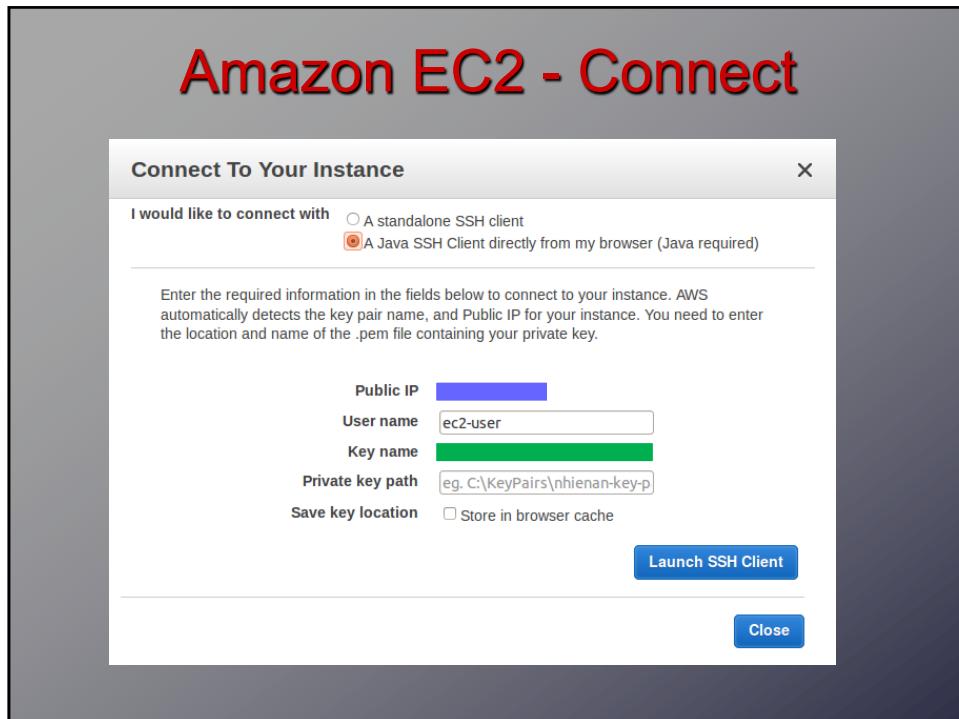
- How to connect to your Linux instance
- Learn about AWS Free Usage Tier
- Amazon EC2: User Guide
- Amazon EC2: Discussion Forum

While your instances are launching you can also

- Create status check alarms to be notified when these instances fail status checks. (Additional charges may apply)
- Create and attach additional EBS volumes (Additional charges may apply)

[Manage security groups](#)

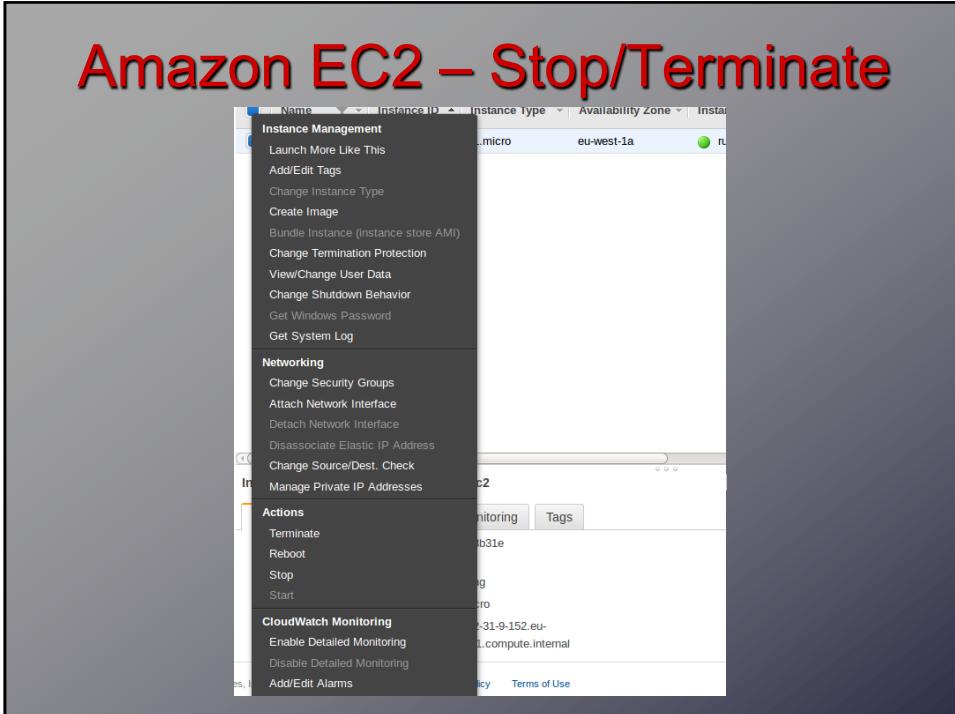
[View Instances](#)



The screenshot shows a terminal session within the 'Amazon EC2 - Connect' interface. The title bar says 'Amazon EC2 - Connect'. The terminal output is as follows:

```
[ec2-user@ip-172-31-9-152 ~]$ ls -al
total 24
drwx----- 3 ec2-user ec2-user 4096 Feb 16 15:46 .
drwxr-xr-x 3 root    root    4096 Dec 10 23:47 ..
-rw-r--r-- 1 ec2-user ec2-user   18 Sep  4 18:23 .bash_logout
-rw-r--r-- 1 ec2-user ec2-user  176 Sep  4 18:23 .bash_profile
-rw-r--r-- 1 ec2-user ec2-user 124 Sep  4 18:23 .bashrc
drwx----- 2 ec2-user ec2-user 4096 Feb 16 15:46 .ssh
[ec2-user@ip-172-31-9-152 ~]$ df
Filesystem      1K-blocks      Used Available Use% Mounted on
/dev/xvda1        8256952    1069492    7103576  14% /
tmpfs             304144         0     304144  0% /dev/shm
[ec2-user@ip-172-31-9-152 ~]$ █
```

# Amazon EC2 – Stop/Terminate



## Amazon EC2 - CLI

EC2 command line tool\*