

Assignment 01

Problem 1

1. Sign in to AWS management console. Select EC2 service. Then select ‘Launch instance’. Launch an instance in EC2 to create my AMI. My region is N.Virginia.

The screenshot shows the AWS EC2 Dashboard. On the left, there's a sidebar with links like EC2 Dashboard, Instances, Images, and Network & Security. The main area has a heading 'Create Instance' with a note: 'To start using Amazon EC2 you will want to launch a virtual server, known as an Amazon EC2 instance.' Below this is a 'Launch Instance' button. To the right, there's a 'Service Health' section showing 'US East (N. Virginia)' status as 'operating normally'. Further right is a 'Scheduled Events' section for 'US East (N. Virginia)' which says 'No events'. On the far right, there's an 'Account Attributes' section with 'Supported Platforms' (VPC), 'Default VPC' (vpc-dfb48aba), and an 'Additional Information' section with links to Getting Started Guide, Documentation, All EC2 Resources, Forums, Pricing, and Contact Us. At the bottom right, there's an 'AWS Marketplace' section with a link to 'Vantage Cloud Subscriptions - Ti'.

2. Create new instance. Select ‘Community AMIs’. Enter ‘ami-008db468’ in the search criteria. Select the AMI bitnami shown here (Redhat machine).

The screenshot shows the 'Choose AMI' step of the instance creation wizard. The left sidebar has tabs for Quick Start, My AMIs, AWS Marketplace, and Community AMIs (which is selected). A search bar at the top right contains 'Q. ami-008db468'. Below it, a list shows one result: 'bitnami-ocportal-9.0.19-0-linux-redhat-6.6-x86_64-ebs - ami-008db468'. This result includes the URL 'https://bitnami.com', 'Root device type: ebs', and 'Virtualization type: paravirtual'. To the right of the list are 'Select' and '64-bit' buttons. At the bottom of the sidebar, there's a 'Operating system' section with checkboxes for Amazon Linux, Cent OS, Debian, Fedora, and Suse.

3. Choose Micro Instance type. Leave defaults. Continue.

Screenshot of the AWS EC2 instance creation process, Step 2: Choose an Instance Type.

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.

Filter by: All instance types ▾ All generations ▾ Show/Hide Columns

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

	Family	Type	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance
<input checked="" type="checkbox"/>	Micro instances	t1.micro Free tier eligible	1	0.613	EBS only	-	Very Low
<input type="checkbox"/>	General purpose	t2.micro Free tier eligible	1	1	EBS only	-	Low to Moderate
<input type="checkbox"/>	General purpose	t2.small	1	2	EBS only	-	Low to Moderate
<input type="checkbox"/>	General purpose	t2.medium	2	4	EBS only	-	Low to Moderate
<input type="checkbox"/>	General purpose	t2.large	2	8	EBS only	-	Low to Moderate
<input type="checkbox"/>	General purpose	m4.large	2	8	EBS only	Yes	Moderate
<input type="checkbox"/>	General purpose	m4.xlarge	4	16	EBS only	Yes	High
<input type="checkbox"/>	General purpose	m4.2xlarge	8	32	EBS only	Yes	High

Cancel Previous Review and Launch Next: Configure Instance Details

- Configure instance details. Leave defaults. Here I chose ‘Protect against accidental termination’ because I don’t want the AMI terminates accidentally. But I will change this setting at last to enable the ‘terminate’ function.

Screenshot of the AWS EC2 instance creation process, Step 3: Configure Instance Details.

Step 3: Configure Instance Details

Configure the instance to suit your requirements. You can launch multiple instances from the same AMI, request Spot Instances to take advantage of the lower pricing, assign an access management role to the instance, and more.

Number of instances: 1

Purchasing option: Request Spot Instances

Network: vpc-dfb48aba (172.31.0.0/16) (default) Create new VPC

Subnet: No preference (default subnet in any Availability Zone) Create new subnet

Auto-assign Public IP: Use subnet setting (Enable)

IAM role: None Create new IAM role

Shutdown behavior: Stop

Enable termination protection: Protect against accidental termination

Monitoring: Enable CloudWatch detailed monitoring Additional charges apply.

Tenancy: Shared tenancy (multi-tenant hardware) Additional charges will apply for dedicated tenancy.

Advanced Details

Cancel Previous Review and Launch Next: Add Storage

- Configure ‘Add Storage’ page. Leave defaults. Continue.

Screenshot of the AWS EC2 instance creation process, 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.

Type	Device	Snapshot	Size (GiB)	Volume Type	IOPS	Delete on Termination	Encrypted
Root	/dev/sda1	snap-5a823026	10	Magnetic	N/A	<input checked="" type="checkbox"/>	Not Encrypted

Add New Volume

6. Create a tag for the instance. I just name it as ‘My Tomcat Server’.

[1. Choose AMI](#) [2. Choose Instance Type](#) [3. Configure Instance](#) [4. Add Storage](#) [5. Tag Instance](#) [6. Configure Security Group](#) [7. Review](#)

Step 5: Tag Instance

A tag consists of a case-sensitive key-value pair. For example, you could define a tag with key = Name and value = Webserver. [Learn more](#) about tagging your Amazon EC2 resources.

Key	(127 characters maximum)	Value	(255 characters maximum)
Name		My Tomcat server	X
Create Tag (Up to 10 tags maximum)			

7. Configure the security group. Add port 80 for HTTP and port 443 for HTTPS.

[1. Choose AMI](#) [2. Choose Instance Type](#) [3. Configure Instance](#) [4. Add Storage](#) [5. Tag Instance](#) [6. Configure Security Group](#) [7. Review](#)

Step 6: Configure Security Group

A security group is a set of firewall rules that control the traffic for your instance. On this page, you can add rules to allow specific traffic to reach your instance. For example, if you want to set up a web server and allow Internet traffic to reach your instance, add rules that allow unrestricted access to the HTTP and HTTPS ports. You can create a new security group or select from an existing one below. [Learn more](#) about Amazon EC2 security groups.

Assign a security group: Create a new security group
 Select an existing security group

Security group name: launch-wizard-1
Description: launch-wizard-1 created 2015-09-08T16:22:34.034-04:00

Type	Protocol	Port Range	Source
SSH	TCP	22	Anywhere 0.0.0.0/0 X
HTTP	TCP	80	Anywhere 0.0.0.0/0 X
HTTPS	TCP	443	Anywhere 0.0.0.0/0 X

[Add Rule](#)

Warning
Rules with source of 0.0.0.0/0 allow all IP addresses to access your instance. We recommend setting security group rules to allow access from known IP addresses only.

[Cancel](#) [Previous](#) [Review and Launch](#)

8. Review instance description and launch the instance.

[1. Choose AMI](#) [2. Choose Instance Type](#) [3. Configure Instance](#) [4. Add Storage](#) [5. Tag Instance](#) [6. Configure Security Group](#) [7. Review](#)

Step 7: Review Instance Launch

[Edit AMI](#)

AMI Details

bitnami-ocportal-9.0.19-0-linux-redhat-6.6-x86_64-ebs - ami-008db468
<https://bitnami.com>
Root Device Type: ebs Virtualization type: paravirtual

[Edit instance type](#)

Instance Type

Instance Type	ECUs	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance
t1.micro	Variable	1	0.613	EBS only	-	Very Low

[Edit security groups](#)

Security Groups

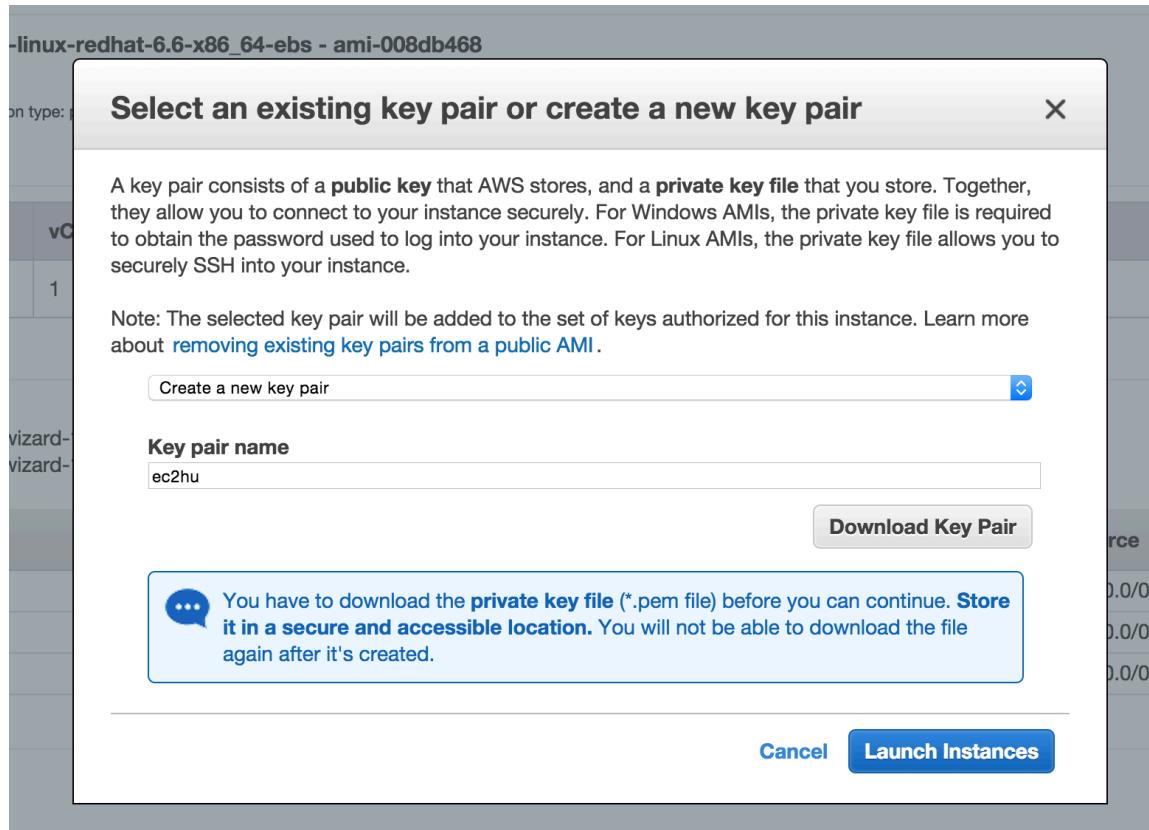
Security group name: launch-wizard-1
Description: launch-wizard-1 created 2015-09-08T16:22:34.034-04:00

Type	Protocol	Port Range	Source
SSH	TCP	22	0.0.0.0/0
HTTP	TCP	80	0.0.0.0/0
HTTPS	TCP	443	0.0.0.0/0

[Edit instance details](#)

[Cancel](#) [Previous](#) [Launch](#)

9. Create a new key pair and download the key. I just name the key as ‘ec2hu’. Download the key pair.



10. Review the launch status. Instance is launching.

Launch Status

Your instances are now launching
The following instance launches have been initiated: i-3eab65eb [View launch log](#)

Get notified of estimated charges
[Create billing alerts](#) to get an email notification when estimated charges on your AWS bill exceed an amount you define (for example, if you exceed the free usage tier).

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

Here are some helpful resources to get you started

- [How to connect to your Linux instance](#)
- [Amazon EC2: User Guide](#)
- [Learn about AWS Free Usage Tier](#)
- [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](#)

AWS Services Edit Hanjiao Qiu N. Virginia Support

EC2 Dashboard Events Tags Reports Limits

INSTANCES Instances Spot Requests

Launch Instance Connect Actions

Filter by tags and attributes or search by keyword

Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status	Public DNS	Public IP
My Tomcat s...	i-3eab65eb	t1.micro	us-east-1b	running	2/2 checks ...	None	ec2-52-3-120-83.com...	52.3.120.83

11. Check the AMI ID and Public (DNS) name of the new instance.

The screenshot shows the AWS EC2 Instances page. On the left, there's a sidebar with various navigation links like EC2 Dashboard, Events, Tags, Reports, Limits, Instances, Images, Elastic Block Store, Network & Security, Load Balancing, and Auto Scaling. The main area displays a table of instances. One instance is selected, showing its details. The instance has the following properties:

Description	Value	Description	Value
Instance ID	i-3eab65eb	Public DNS	ec2-52-3-120-83.compute-1.amazonaws.com
Instance state	running	Public IP	52.3.120.83
Instance type	t1.micro	Elastic IP	-
Private DNS	ip-172-31-10-147.ec2.internal	Availability zone	us-east-1b
Private IPs	172.31.10.147	Security groups	launch-wizard-1, view rules
VPC ID	vpc-dfb48aba	Scheduled events	No scheduled events
Subnet ID	subnet-66024a11	AMI ID	bitnami-ocportal-9.0.19-0-linux-redhat-6.6-x86_64-ebs (ami-008db468)
Network interfaces	eth0	Platform	-
Source/dest. check	True	IAM role	-
EBS-optimized	False	Key pair name	ec2hu
Root device type	ebs	Owner	217134905396
Root device	/dev/xvda1	Launch time	September 8, 2015 at 5:16:06 PM UTC-4 (less than one hour)
		Termination protection	None

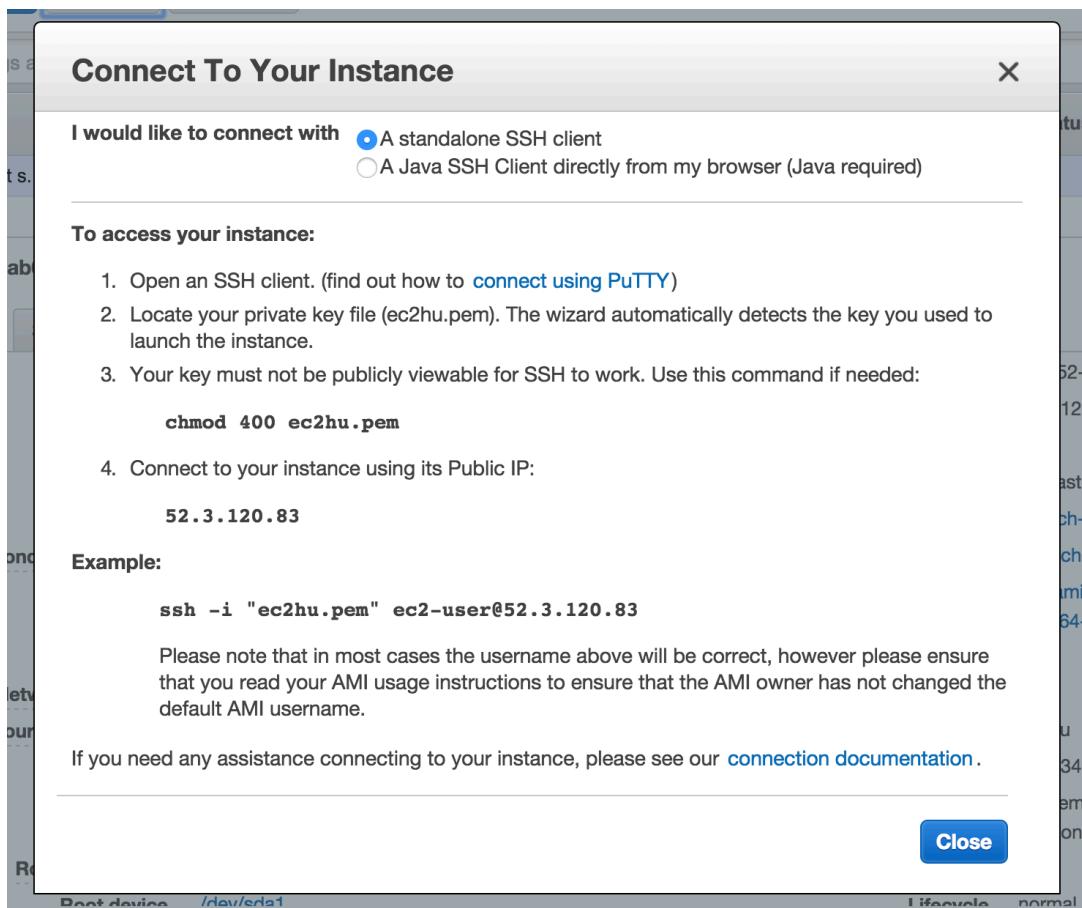
12. Test at DNS name and port 80 is successful. Apache is visible.

The screenshot shows a web browser window with the URL 'ec2-52-3-120-83.compute-1.amazonaws.com'. The page displays a 'Congratulations!' message: 'You are now running Bitnami oPortal 9.0.19-0 on RHEL on the Amazon Cloud.' It includes links to 'Access my application', 'Access phpMyAdmin', 'Bitnami Wiki', and 'Bitnami Forums'. A yellow box on the right says 'Want more from the cloud?' and lists features: 'Automatic backups', 'Multi-app deployments', 'One click server resizing', 'Control over the disk size', 'Apache and MySQL Monitoring', and 'and more!'. There's also a 'Free Developer Plan' button.

Problem 2

Since I'm using Mac OS, I skip the steps to install Cygwin here.

1. On the EC2 Instances page, besides 'Launch Instance', there's a button called 'Connect'. It will show the steps to connect to the instance using SSH.



2. Check if I can SSH to the EC2 instance through my laptop.
 - a. Change the permission of my key using:
 >> sudo chmod 400 ec2hu.pem
 - b. Connect to the instance using the instance's public DNS name. Try the username 'bitnami'.
 >> ssh -i "ec2hu.pem" bitnami@ec2-52-3-120-83.compute-1.amazonaws.com

```
hqiu@bos-mpdei:> ssh -i "ec2hu.pem" bitnami@ec2-52-3-120-83.compute-1.amazonaws.com
The authenticity of host 'ec2-52-3-120-83.compute-1.amazonaws.com (52.3.120.83)' can't be established.
RSA key fingerprint is 12:fc:69:d2:d7:e2:0a:10:25:1e:93:cf:15:1b:51:5b.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added 'ec2-52-3-120-83.compute-1.amazonaws.com,52.3.120.83' (RSA) to the list of known hosts.
Last login: Tue Sep  8 20:57:16 2015 from c-71-233-46-151.hsd1.ma.comcast.net
Red Hat Enterprise Linux Server release 6.6 (Santiago)
```

```
*** Welcome to the Bitnami ocPortal 9.0.19-0 on RHEL ***
*** Bitnami Wiki:  https://wiki.bitnami.com/      ***
*** Bitnami Forums: https://community.bitnami.com/ ***
[bitnami@ip-172-31-10-147 ~]$
```

3. Change the permission of the directory ‘/mnt’. Give the write permission to this directory. (>> sudo chmod 777 /mnt)

```
[bitnami@ip-172-31-10-147 ~]$ sudo chmod 777 /mnt
[bitnami@ip-172-31-10-147 ~]$ ls -lart /mnt
total 650012
dr-xr-xr-x. 26 root root      4096 Sep  8 21:16 ..
drwxrwxrwx.  2 root root      4096 Sep  8 21:16 .
-rw-r--r--  1 root root 665600000 Sep  8 21:17 .bitnami.swap
```

4. Create a simple web page and transfer that to the directory ‘/mnt’.

```
>> scp -i ec2hu.pem ..//Homework/HW1/new_page.html bitnami@ec2-52-3-120-83.compute-1.amazonaws.com:/mnt
```

```
hqiuh@bos-mpdei>> scp -i ec2hu.pem ..//Homework/HW1/new_page.html bitnami@ec2-52-3-120-83.compute-1.amazonaws.com:/mnt
new_page.html                                         100%   612      0.6KB/s   00:00
```

5. In directory ‘/opt/bitnami/apache2/htdocs’, rename the existing ‘index.html’ to ‘index.html.bak’ and copy our ‘new_page.html’ here. The original ‘index.html’ is the page we see in Problem 1 (A congratulation page). Rename the ‘new_page.html’ to ‘index.html’.

```
>> cd /opt/bitnami/apache2/htdocs/
>> mv index.html index.html.bak
>> cp /mnt/new_page.html index.html
```

```
[bitnami@ip-172-31-10-147 htdocs]$ cd /opt/bitnami/apache2/htdocs/
[bitnami@ip-172-31-10-147 htdocs]$ ls
503.html applications.html bitnami.css img index.html
[bitnami@ip-172-31-10-147 htdocs]$ cp index.html index.html.bak
[bitnami@ip-172-31-10-147 htdocs]$ cp /mnt/new_page.html index.html
[bitnami@ip-172-31-10-147 htdocs]$ ls
503.html applications.html bitnami.css img index.html index.html.bak
[bitnami@ip-172-31-10-147 htdocs]$
```

6. Visit the Public DNS address again through browser.



Sample "Hello, World" Application

This is the home page for the HelloWorld Web application.

To prove that they work, you can execute either of the following links:

- To a [JSP page](#).
- To a [servlet](#).

The browser now displays my new HTML page. It contains some text, links and images. I only transfer the main textual HTML page to the instance (no other links or images). It won't show any image or links here for now. But it can be done by transferring more stuff onto the instance.

Problem 3

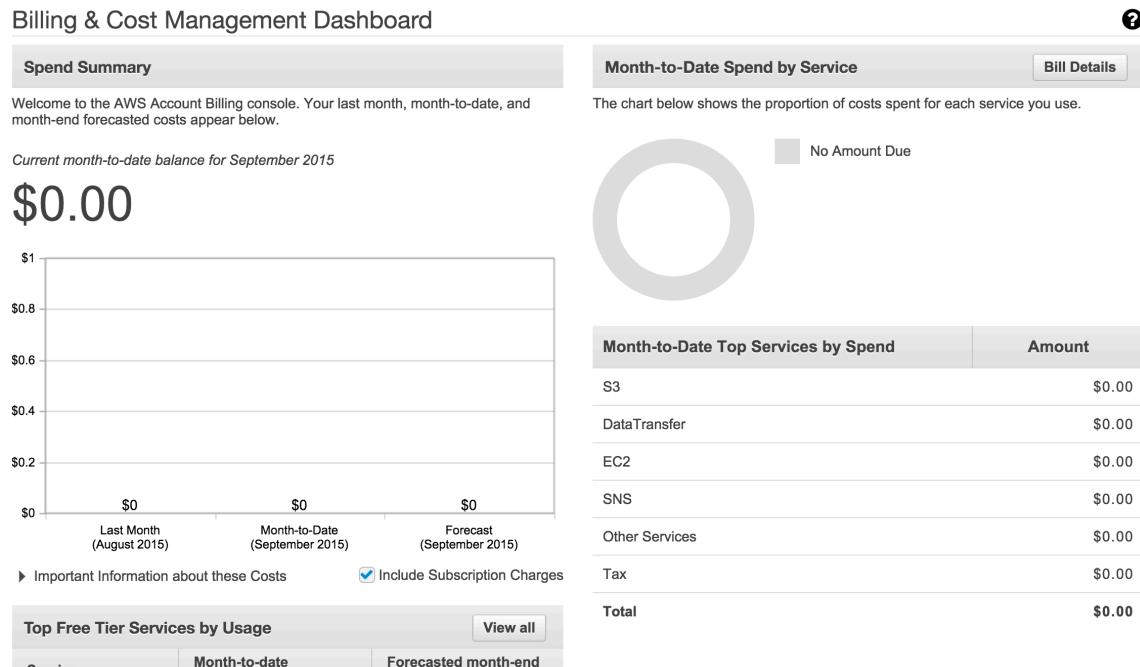
There are several ways to check the usage information.

1. Check from 'Billing & Cost Management Dashboard'.

All Free Tier services by usage

Service	Month-to-date actual usage		Month-end forecasted usage		Free Tier usage limit	Status
S3 - Puts	21.00 Requests	1.05%	63.00 Requests	3.15%	2,000 Requests	✓
S3 - Gets	75.00 Requests	0.38%	225.00 Requests	1.13%	20,000 Requests	✓
EC2 - Linux	2.00 Hrs	0.27%	6.00 Hrs	0.80%	750 Hrs	✓
EBS - Volumes	0.03 GB-Mo	0.09%	0.08 GB-Mo	0.28%	30 GB-Mo	✓
KMS - Requests	3.00 Requests	0.02%	9.00 Requests	0.05%	20,000 Requests	✓
S3 - Storage	0.00 GB-Mo	0.01%	0.00 GB-Mo	0.03%	5 GB-Mo	✓

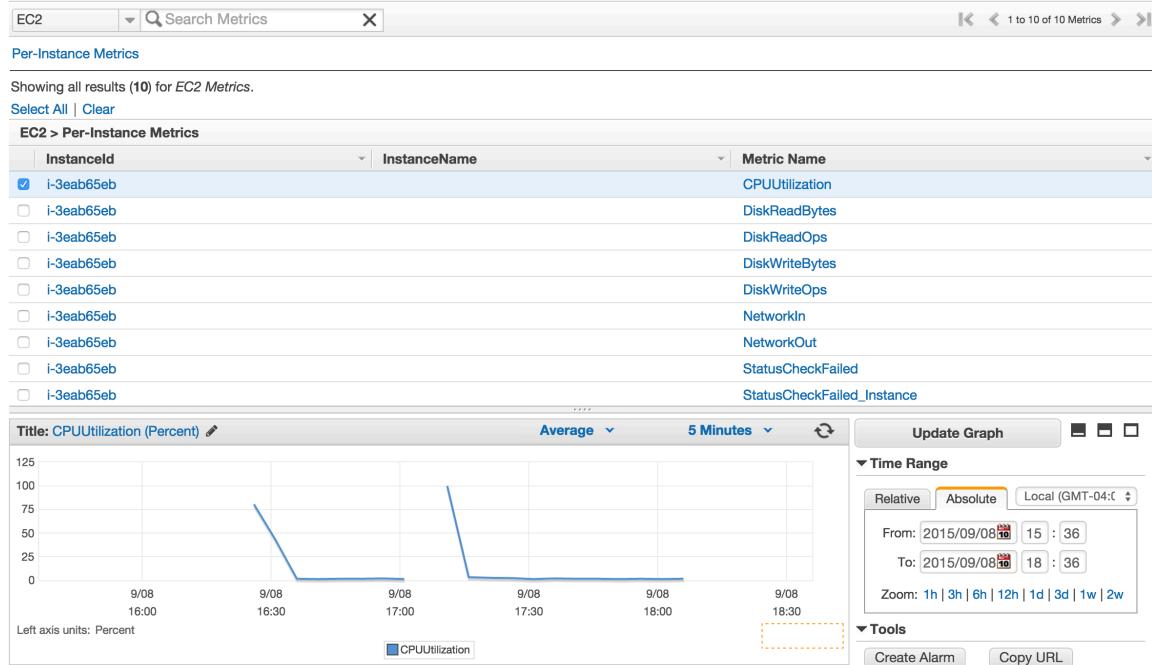
The above picture shows I used 2 hours EC2-Linux for this problem set. Since I'm using the free Tier. It doesn't make any cost for now. But if I don't use micro-instance or use more than 750 Hrs per month. I will be charged. This screenshot below also show the monthly charges for each product.



2. Check from Instance Metrics. Open the cloud watch console at:

<https://console.aws.amazon.com/cloudwatch/home?region=us-east-1>.

In EC2 metrics, we can select ‘CPUUtilization’. It shows the time range when I use the machine. We can choose ‘Relative’ or ‘Absolute’ on the bottom right corner. Here I used the EC2 instance for almost 2 hours for this problem set.



- Check the EC2 Reports. The EC2 Instance Usage Report should be activated manually. We need to create a S3 bucket to store the usage information.

The screenshot shows the 'EC2 Reports' section of the AWS EC2 console. On the left, a sidebar lists 'Events', 'Tags', 'Reports' (which is selected), and 'Limits'. Under 'INSTANCES', it lists 'Instances', 'Spot Requests', and 'Reserved Instances'. Under 'IMAGES', it lists 'AMIs' and 'Bundle Tasks'. Under 'ELASTIC BLOCK STORE', it lists 'Volumes' and 'Snapshots'. The main content area is titled 'Welcome to EC2 Reports' and describes EC2 reports for usage and billing data. Below this, the 'EC2 Usage Reports' section is shown, which includes the 'EC2 Instance Usage Report' (with a bar chart icon) and the 'EC2 Reserved Instance Utilization Report' (with a line chart icon). Both reports are described as interactive reports for analyzing usage trends and reserved instance performance respectively.

Preferences

- Credits
- Tax Settings
- DevPay

Receive Billing Reports

Turn on this feature to receive ongoing reports of your AWS charges once or more daily. AWS delivers these reports to the Amazon S3 bucket that you specify where indicated below. For consolidated billing customers, AWS generates reports only for paying accounts. Linked accounts cannot sign up for billing reports.

Save to S3 Bucket: Valid Bucket

Note: You must apply appropriate permissions to your S3 bucket [sample policy](#)

You can also configure the granularity of these reports to display your AWS usage. In the table below, select whether you want the reports to display data by the month, day, or hour. Your reports can also display usage by custom tags that you create, or by AWS resource.

Report	
Monthly report <small>?</small>	<input type="checkbox"/>
Detailed billing report <small>?</small>	<input type="checkbox"/>
Cost allocation report <small>?</small>	<input type="checkbox"/>
Detailed billing report with resources and tags* <small>?</small>	<input checked="" type="checkbox"/>

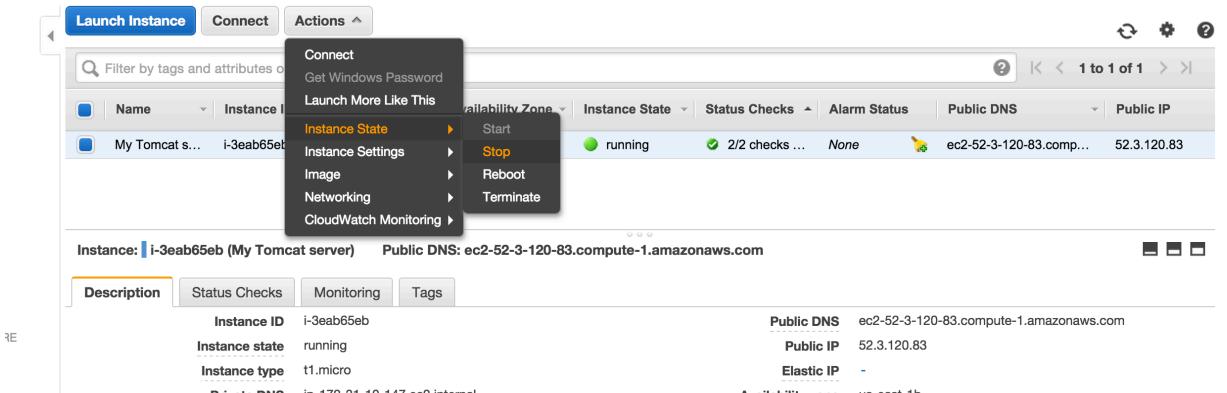
* Needed for EC2 Usage Reports [Manage report tags](#)

Below is the EC2 usage report. It shows I used the EC2 instance for 2 hours on Sept.8th.

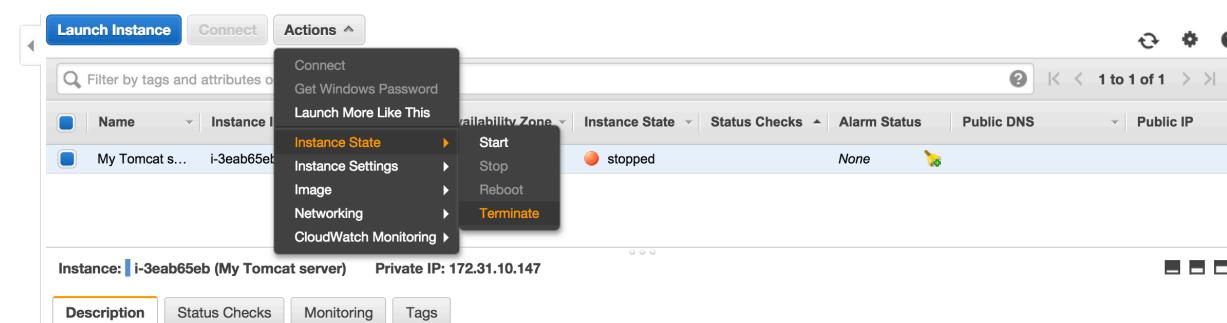
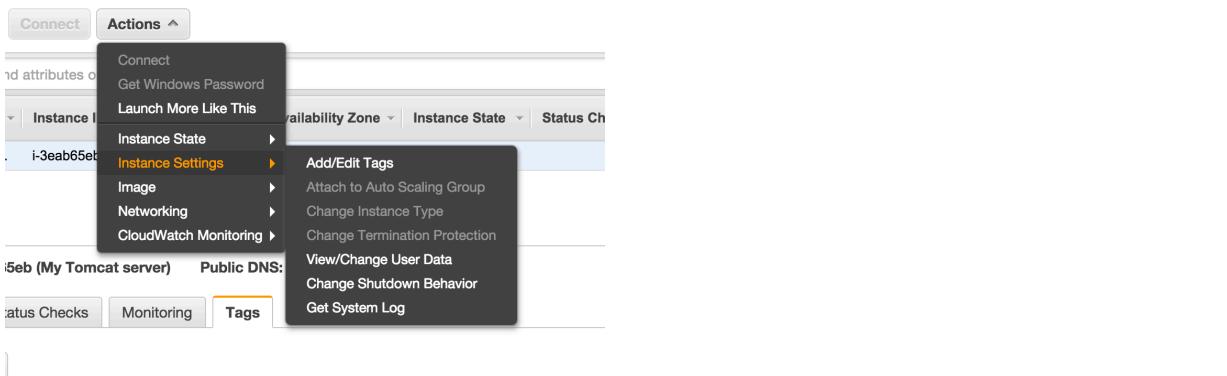


Problem 4

1. Stop the instance. Follow ‘Actions->Instance State->Stop’.



2. Terminate the instance. Since I enable the ‘Termination Protection’ before, I first disable this functionality. Then terminate the instance. Follow ‘Actions->Instance State->Terminate’.



Launch Instance		Connect	Actions ▾		
<input type="text"/> Filter by tags and attributes or search by keyword					
	Name	Instance ID	Instance Type	Availability Zone	Instance State
<input checked="" type="checkbox"/>	My Tomcat s...	i-3eab65eb	t1.micro	us-east-1b	● terminated