

## **Guidelines Practice 01**

### **Working with Amazon EC2 and S3 services, practical website creation with EC2 and S3**

#### **Objectives**

In this tutorial you will learn how to

- Access and work with the AWS Management Console and VM instances for Linux
- Create an Amazon Linux Instance from an Amazon Machine Image (AMI)
- Access your Amazon Machine Instance with SSH client on MAC/Linux and Windows
- Create Amazon S3 Bucket and access it from Internet
- Create Elastic Block Storage Volume (EBS)
- Create Amazon Elastic Load Balancer (ELB)
- Create Amazon EC2 Spot Instance request

Reflect on experience with the AWS services model

- When working with EC2 or S3 services pay attention on all settings details, experiment with different configurations.
- If you found services unavailable for your account, try to find different solution with the services available
- Investigate the AWS portal structure, available service groups, try to access different services. However, be aware about and check cost of offered services.
- Describe your experience in the practice report.

Note: Current step-by step guidelines are provided as initial starting point. You will learn AWS cloud services by investigating the AWS portal and experimenting with basic services and their configuration.

#### **Advice: How to fulfil successfully practical assignments.**

1. Read all assignment/guidelines, identify main tasks you will perform and resources you need. Understand how they are related.
2. Note what configuration parameters you need to set. Try to investigate and understand what their meaning and why they are needed.
3. Start executing your tasks.
4. If you see a problem, try to investigate the reason and how it can be either avoided or corrected. You may need to start the process from the beginning. With cloud it is easy and almost at no cost.
5. After finishing block of tasks, read research and self-check questions, try to answer them. You may need to do additional research, look additional tutorials, search discussion forums.

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## Part A. Preparation

### A.1. Obtaining your Amazon Web Services Account

For the purpose of this tutorial you need an AWS account.

There might be few options:

- 1) An account is provided as a part of the course organisation created by your institution or as a part of the AWS Educate Class created by Amazon  
**NOTE: When registering to AWS Educate Classroom be sure to enter your graduation date/year that is after your current course end date.**
- 2) You apply for AWS Educate Starter Account as a Student and you obtain starter credit 30USD at <https://aws.amazon.com/education/awseducate/>  
**NOTE: When applying for AWS Educate Starter use your university email and be sure to enter your graduation date/year that is after your current course end date**
- 3) You obtain your free tier account at AWS: <https://aws.amazon.com/free/>
- 4) For short tutorials or advance experimentation you may be provided with the **oxfed** virtual lab account. In this case you will receive also a password to access AWS portal.

In the following text we will use account names of form “ccengstudent#”, e.g. “ccengstudent01”  
We will refer to your account name and a password by joint name “credentials” or “login credentials”.

### A.2. Accessing your AWS services

There few options depending on type of AWS account you are using.

- In general, you can access your AWS services by logging in to AWS Management Console at <https://console.aws.amazon.com>
- If you are using oxford virtual lab account (i.d. received a ccengstud\* ID with corresponding creds), you need to use your study group console URL <https://oxfed.signin.aws.amazon.com/console>
- If you are using AWS Educate class account, you first login to your AWS Educate account and next you will be redirected to AWS console.

1. Use your appropriate access option and corresponding login credentials username and password (keep you password privately)

2. At the first screen you will see all AWS services available to your account.  
From the first screen you can select a specific service you want to work, e.g.

EC2: <https://console.aws.amazon.com/ec2/>

S3: <https://console.aws.amazon.com/s3/>

You are typically logged in to the default availability region which is “region=us-east-1” which you can later change

<https://console.aws.amazon.com/ec2/v2/home?region=us-east-1>

<https://console.aws.amazon.com/s3/home?region=us-east-1>

**Note. Although for most of practical cases when deploying resource you are advised change to EU-based regions e.g. EU (Frankfurt) or EU (Paris), AWS Educate is providing most of resources only in “region=us-east-1”.**

3. To use AWS **Command Line Interface (CLI)** you need to install awscli application <https://aws.amazon.com/cli/>

Note. Normally you need to install Python on your computer to use awscli.

Note. You will need it to use with cloud automation tools.

4. From EC2 page you can go to different services provided for your Compute instances, e.g. such as required for our projects: Instances, Spot Instances, AMIs, Security Groups, Load Balances, Key Pairs, etc.

5. From S3 page you can see services provided at Amazon S3

Note: If you logged in the first time, you may see just “Create Instance” or “Create Bucket”. Proceed this way and create your first EC2 instance or S3 bucket as explained below.

6. Investigate other service groups presented at the console. You will need them in other practice assignments.

## Block 1: EC2 – Elastic Cloud Computing

### Part B. Create an Amazon Linux Instance from an Amazon Machine Image (AMI)

#### B.1. Creating and configuring your AMI

To create your first Amazon Machine Instance, you need to move to the EC2 management page by selecting the Amazon EC2 icon on the Amazon Management Console. You will use wizard that will guide you through the creation process.

1. Login to the AWS Management Console and go to the Amazon EC2 page.

2. Click the Instances link to create an instance.

The screen to create an Instance will appear. Under section “Create Instance” there is a button “Launch Instance”.

3. Click Launch Instance button, to begin the process.

Note: You will have many options for AMI with different operating systems. For our purpose we will use Amazon Linux instance with MySQL, PHP and other services.

4. The first windows Step 1: Choose an Amazon Machine Image (AMI)

Choose the Amazon Linux AMI instance by clicking Select next to that AMI.

Note: The text under image name describes the software installed on this instance.

All Amazon Linux instances have default configuration 64-bit.

The Amazon Linux AMI is an EBS-backed image. It includes Linux 3.10, AWS tools, Java 7, Ruby 2, and repository access to multiple versions of Apache, MySQL, PostgreSQL, Python, Ruby and Tomcat. However you install other services and applications on your instances.

5. Step 2: Choose an Instance Type

Default free instance type is **t2.micro**.

Note that this instance type is provided with only Elastic Block Storage, other instances are provided with SSD on board storage.

Leave it default and click “Next: Configure Instance Details”.

6. Step 3: Configure Instance Details

This screen provides a number of options to set your own Virtual Private Cloud (VPC), Public IP (or use default IP address assigned to your account), access control, monitoring, runtime and shutdown behavior, and also Purchasing options.

Leave all settings default and click “Next: Add Storage” button.

7. Step 4: Add Storage

This screen shows with what storage your instance will be launched.

Default is 8 GB

Keep the default virtual hard drive and click “Next: Tag Instance”.

### 8. Step 5: Tag Instance

A tag consists of a case-sensitive key-value pair where key is “Name” (defined by the system) and name is what you define yourself to have better association with your project.

For this Lab you can use “IEEE Tutorial Lab” or “Webserver”.

Note, along all wizard process you can use help with “Learn more” or “i” links.

Type your tag in a form and click “Next: Configure Security Group”.

### 9. Step 6: Configure Security Group

A security group is a set of firewall rules that control the traffic for your instance.

At this step you can create and configure a security group by defining a set of rules. For examples, if you want to create a webserver that should be accessed from Internet, you need to set a Rule “Anywhere” with source of 0.0.0.0/0 that allow all IP addresses to access your instance.

Note, it also allows port 22 (SSH) from anywhere to this Linux instance.

Leave default Rule “Anywhere”, and click Review and Launch.

### 10. Step 7: Review Instance Launch

At the step you will have an overview of all the settings of your instance which you can modify before launching Instance, in particular.

- Instance type
- Security Group
- Instance Details
- Storage
- Tags

Note. You may receive an offer to configure your instance with booting option from SSD. You can select it, it is free for majority of accounts.

General Purpose SSD volume provides the ability to burst up to 3,000 IOPS per volume.

Click “Launch” button to continue.

### 11. Pop up window “Select an existing key pair or create a new key pair”

Before launching AWS Console needs to associate an SSH key pair with your Instance.

A key pair consists of a public key that AWS store and a private key that must be securely stored on your computer. SSH key allows you connect to your Instance via SSH protocol.

### 12. Select “Create a new key pair”

Select a key pair name e.g. AWSIEEELab01 or devopslab01 (can be shared by group working on the lab or project)

Note: Before launching your instance you are recommended to “Download Key Pair”.

Note, you will not be able to download file again after it is created. It is a necessary security precaution.

Downloaded key pair will be a file named by your key pair name with extension \*.pem

You will use it to configure your SSH client later.

In case in the future you will select to use existing key pair, you need to confirm that you have access to the private key.

13. After clicking “Launch Instance” button you will see few step through the launch process goes.

On the next screen confirming successful Launch Status you can check launch log.

14. Click “View Instances” button to take a look at the new instance.

You will see you Instances and in particular this one is running.

Tip: Don’t forget to stop it when you finished this lab. It is not a problem for this tutorial but in practices forgotten and running instance will drain your account money.

Tip: Did you know that this can all be done via the command line?

Complete! Once the instance state has changed to running, your instance will be ready to use!

Now, you will look

at logging into that instance.

Logging In to Your Instance

Now that you have launched your Amazon EC2 Instance, it is time to log into it.

15. Select checkbox next to your instance, in our case “IEEE Tutorial Lab”.

In the frame below you’ll all configuration of your instance.

Find a Public IP address and DNS name. With them you can access your instance from outside with SSH or via HTTP.

Public IP address: 33.12.133.80

DNS name: ec2-33-12-133-80.compute-1.amazonaws.com

## **B.2. Accessing your Instance with SSH client**

### **MAC and Linux instructions**

You need to configure your SSH client to authenticate with the private key for AMI you saved.

First you need to change the permissions of the downloaded PEM file to limit access to the file only to you/owner.

Use command like this (replace text in brackets to real location and file name):

```
chmod 600 ~/[download-location]/[keypair-name].pem
```

16. On Mac or Linux computer, use terminal to SSH to your instance. Use default AMI user name ec2-user.

Be sure to use the correct Public DNS and the correct path to your .pem file.

Use SSH command line like this:

```
ssh ec2-user@ ec2-33-12-133-80.compute-1.amazonaws.com -i ~/[download-location]/[keypair-name].pem
```

17. When you're connected (in a terminal mode) use Unix Command Line Interface (CLI) to navigate through your instance file system and available services.

## Windows instructions

To connect to your Amazon Machine Instance via SSH, you need to install SSH client. The popular one is PuTTY.

If you don't have PuTTY installed, you can download and install it from <http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html>

Tip: Install also PuTTY Key Generator. You will need it to convert private key format.

18. After installing PuTTY you need to add the generated private key for your AMI to the Authentication methods. Go Putty configuration menu Connection > SSH > Auth and browse to the .ppk file location.

Note: Putty accepts only .ppk keyfile format. If you saved your keypair in a PEM format (what is default case), you can use PuTTY Key Generator to convert private key to .PPK format. Optionally you may also setup key password.

19. Open PuTTY and type the following string into Host Name (or IP address):

**ec2-user@ ec2-33-12-133-80.compute-1.amazonaws.com**

Note: You can also use the AMI public IP address in place of the DNS name.

Click Open button.

Connection will start. When prompted, click Yes to allow PuTTY to cache the server's host key.

20. Now you are connected to your remote Amazon Linux Machine.

Use Unix shell command line interface to navigate through your instance file system and available services.

21. When ending this part of your lab, don't forget to stop your Instance. In AWS Console use Terminate (or Stop) instance.

Note: If you have installed AWSCLI, you can use AWS Command Line Interface (CLI) to stop your instance

```
aws ec2 get-console-output --instance-id i-02ab04aabe4792f2a
```

## C. Elastic Block Storage (EBS): Creating your EBS Volume

### C.1. Accessing EC2 and EBS configuration panel

To create your first Amazon EBS Volume, you first need to access the Amazon EC2 Dashboard.



Login to the Amazon Management Console and click on the EC2 icon.  
In the EC2 Dashboard, navigate to the EBS Control Panel via ELASTIC BLOCK STORE > Volumes

Here you see all volumes in use and associated with your AMIs.

Note: Storage attached to your AMI is created as EBS volumes which are similar to discs. AMI volumes work as persistent storage attached to your virtual machine.

## **C.2. Creating a new EBS Volume**

1. Create a new volume by clicking Create Volume.

In the Create Volume pop-up window, select the following:

- a. Volume Type: Magnetic (former called Standard)
- b. Size: 10 GB (min 1 GB, max 1024 GB)
- c. Availability Zone: us-east-1a (select the same Availability Zone as your AMI, typically it is done default)

Confirm creation by clicking Yes, Create

In a few seconds the Volume will be created and listed in the Table. Its status must be "Available"

The next step is to add the volume to your VM instance and manipulate the volume.

2. Adding an new EBS Volume to an Instance

From the EC2 > Elastic Block Store > Volumes window select a volume and right-click the volume you want to attach,  
From drop down menu select Attach Volume

In a window Attach Volume select the instance you want to attach, click Attach.

It will take several seconds and you will see Volume status information attached to the selected AMI.

3. Snapshot of an EBS Volume and Changing Properties or Performance

Creating a snapshot of volume replicates the data in the volume. Snapshotting allows also to change the properties of the volume, e.g. change Volume type to enable Provisioned IOPS.

3.1. Detach Volume

In EC2 > Elastic Block Store > Volumes window, right-click the volume you created, and choose Force Detach.

Confirm operation by clicking Yes, detach.

It is again not instant action but in few seconds the Volume will be detached.

Note: In production, you first need to shutdown your instance, in this case you do not need to force detach the volume.

### 3.2. Create a Snapshot

Right-click the volume again, and choose Create Snapshot.

- a. Check the Volume ID although it is done by default
- b. Name: Give a name for a snapshot e.g. EBS-snapshot
- c. Description: Provide a description, e.g. "EBS lab volume snapshot"
- d. Encryption: No

Click Create button.

Now in EC2 > Elastic Block Store > Snapshots to can view a newly created snapshot.

### 4. Creating a volume from a Snapshot

Right-click the snapshot, and choose Create Volume from Snapshot.

In the panel "Create Volume" you can select new properties of the created Volume. For our exercise, select the following:

- a. Volume Type: Provisioned IOPS (SSD)
- b. Size: 10 GB (make size not less than original volume size)
- c. IOPS: Select IOPS (for the currently offered Provisioned IOPS SSD it is min 100 and maximum 4000)
- d. Availability Zone: Select the availability zone where your VM instance is located.

Click Create.

5. Return to EC2 > Elastic Block Store > Volumes to view the property of newly created high performance drive.

This drive will contain all data from the original drive. You can attach it again to your AMI.

Note: The snapshot remains in the EBS storage and you can do other operations.

From the drop down menu in EBS > Snapshots you can see the following actions:

- Delete
- Create Volume
- Create Image
- Copy
- Modify Snapshot Permissions
- Add/Edit Tags

6. Remember that in standard conditions (not in free trial or tutorials) you will pay for the storage on Amazon cloud. You delete snapshot when it is not needed. Alternatively, you can move your snapshot to long term storage Amazon Glacier.

## D. Create a web server (LAMP server) - Optional

General guidelines <https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/install-LAMP.html>

- a) Connect to ec2 instance through ssh (So, all commands below are for the deployed **EC2** instance)

- b) Install Apache webserver with PHP (for testing)  
**\$ sudo yum update -y**  
**\$ sudo yum install -y httpd.x86\_64 php56 php56-mysqlnd**
- c) Start the HTTP server  
**\$ sudo service httpd start**
- d) Open web browser to check if server is running, if HTTP port is closed nothing will come, else it will show some test page for HTTP server.  
 ---- > <http://xxxxxxxx.compute-1.amazonaws.com> (replace xx with appropriate path for ec2 instance)  
 Note: Check that your security group allows inbound traffic for ports HTTP/80 and HTTPS/443. If no connection available, modify inbound rules: Select security group (default – launch-wizard-1) > Actions > Edit inbound rules
- e) Auto start the webserver server with each restart of instance  
**\$ sudo chkconfig httpd on**
- f) Setting permissions for the Apache web server  
**\$ sudo groupadd www**  
**\$ sudo usermod -a -G www ec2-user**  
**\$ sudo usermod -a -G apache ec2-user**
- g) Check **\$ groups**  
 ec2-user wheel apache
- h) Setup permissions (to allow you to upload and edit content in /var/www/html)  
**\$ sudo chown -R ec2-user:apache /var/www**  
**\$ sudo chown -R root:www /var/www**  
**\$ sudo chmod 2775 /var/www**  
**\$ find /var/www -type d -exec sudo chmod 2775 {} +**  
**\$ find /var/www -type f -exec sudo chmod 0664 {} +**
- i) Optional: Secure your webserver by installing support for HTTPS  
<https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/SSL-on-amazon-linux-ami.html>
- j) At this stage the webserver content folder **/var/www/html** is empty. Until you place some content at later stage (Part D) the placeholder page will be displayed (you can change modifying file **/etc/httpd/conf.d/welcome.conf**).

## Self-study and Research questions Block 1.

Question 1. AWS VM instance configuration.

You need VM with the specific set of applications, for example, LAMP server for interactive configuration and python support for server side scripting. What are VM image options for deploying such a server?

Question 2. User access.

In case of the webserver deployed in Question 1, how do you provide access to the users of your website? Will you share your key with the users? How many users you can serve?

Question 3. VM instance deployment parameters.

Why do you need tags assigned to VM instances? What is your approach in assigning tags?

Question 4. What are security group, VPN and VPC? How they can be used? Is VPC secure enough to make multi-tenancy trusted?

Question 5. What is snapshot, why it is needed and how it can be used? How you can migrate your VM between availability zones?

## **Block 2: S3 – Simple Storage Service**

### **E. Amazon Simple Storage Services (S3): Create a Bucket in Amazon S3**

S3 is an Amazon object storage. Every object in Amazon S3 is stored in a bucket. Bucket is identified by and access via URL

S3 can be used for storing static content, including hosting static webserver wholly or only static content.

Use the following sequence to create a bucket.

1. In the AWS Console click on Amazon S3 Icon and next click on Create Bucket.

Note: You are not charged for creating a bucket; you are only charged for storing objects in the bucket.

2. In the dialog box you can select a Bucket Name and a Region

Enter a bucket name in the Bucket Name field, e.g. “bucketspace01”

Select a region where the bucket will be located. For our tutorial select default region “EU (Ireland)” or “EU (Paris)”.

Click Create button.

Note: After creating a bucket you cannot change its name. While the bucket name will become a part of the URL that points to the objects stored in the bucket.

Note: You can choose a region to optimize minimize costs, minimize storage latency, or address regulatory requirements for your data. Objects stored in a region never leave the region, however you can transfer them to another region.

3. Bucket configuration items

Now you can view your newly created bucket. On the right side of the Amazon S3 console you will a number of configuration properties/items:

- Permissions
- Static Website Hosting
- Logging
- Notifications
- Versioning
- Lifecycle
- Tags
- Requester Pays

We will experiment with some of them.

4. Adding an Object to Amazon S3 bucket

The bucket is created but it is empty and you can add an object to it. An object can be any kind of file: text file, photo, video, and also simple/static web page.

When you add a file to Amazon S3, you will the option to include metadata with the file and set permissions to control access to the file.

Return to the Amazon S3 console and click the Amazon S3 Bucket where you want to upload a file and next click Upload.

In the Upload window click Add Files

The Upload will pop up. It is Java based. So, you need compatible browser.

You can add individual files with Add Files, or Drag&Drop files or folder into the uploader window.

Click Start Upload. You will see the upload progress.

## 5. Viewing an Object in Amazon S3

When upload process finished, you view uploaded content in the browser.

If you click on the bucket link, it will show the bucket content. If you uploaded entire folder(s), you can view the folder content and individual files.

## 6. Exploring Actions menu

In the Amazon S3 console when you click on the Actions button, you will see a menu of available actions:

- Open
- Download
- Make Public
- Rename
- Delete
- Cut
- Copy
- Properties

The same selection is available if you right-click on any object/file in the bucket.

You can spend some time experimenting with the available actions.

## 7. Viewing/adding metadata

Right-click in the object and select Properties and next extend Metadata menu. You will have none or default metadata Content-Type which is defined automatically, e.g. for HTML file it will have value text/html.

You can add a number of preset metadata types and also introduce proprietary metadata. Metadata are used to classify your content/object and for controlling content processing by applications and middleware appliances, e.g. cache, firewall

## 8. Moving an Object in Amazon S3

You can simply move the objects to a different bucket using S3 web browser tools.

Using the previous sequence, create a new S3 bucket.

You can do all in the Amazon S3 Console. Decide what object you want to move. Right-click on the object and then click Cut.

Tip: You can use the SHIFT and CTRL keys to select multiple objects (as in local filesystem) and perform the same action on them simultaneously.

Navigate to the destination bucket or folder. Right-click the bucket or folder and then click Paste Into. You will see the upload progress within the Transfer panel.

Check that files or object have been moved.

9. Experimenting with other Amazon S3 Console functions.

In a similar way experiment with other functions such as Delete, Copy, Rename

10. Making your S3 object public

If one of your files is html file, you can make it Public, i.e. accessible  
Select the object in the Amazon S3 Console. In the right frame you will its properties including its URL. By default the object is set Private, i.e. you cannot access it on the web.

You can make accessible on the web by changing its property to “Public”.

Select an Action “Make Public” or Right-click the object/file and select “Make Public”.

When action fulfilled, you will see property icon next to object URL has changed to Public. Now you can click on the link and a new browser windows will show your HTML file content.

11. End your lab. Go to self-check questions.

## **Self-study and Research questions Block 2.**

Question 1. Information stored in S3 bucket.

What kind of information you can store in S3 bucket? Do you need explicitly declare the type of information or file? What is max size of file?

Question 2. Static website on S3.

Why it might be beneficial to host static website on S3? Can you name few benefits of using VM for your website? Can you still use Javascript with S3 hosted website?

Question 3. S3 security.

What security services are available with S3? How can you limit access to S3 bucket for specific users, e.g. your project team?

Question 4. Notifications.

How to enable notifications of content change in you S3 bucket? How would you use notifications?

Question 5. Versioning.

You can store multiple versions of an object in your S3 bucket. What use of this functionality you can see? Can it replace code versioning system or document versioning?

## Block 3: Additional AWS EC2 services

Note: Perform these tasks if your account allows you to use these resources, otherwise investigate and answer self-check questions

### F. Elastic Load Balancer (ELB)

To create your first Amazon Elastic Load Balancer Instance, you need first to login to your AWS account. Then go to the Amazon Management Console and next to Amazon EC2 Dashboard

Note: To have a possibility to successfully configure the Amazon Elastic Load Balancer you need at least 2 AMI running. You can create additional instances using guidelines in Section B.

1. Click the Load Balancers link under Network and Security group to navigate to the Elastic Load Balancers screen.
2. Start Load Balancer Creation wizard by clicking Create Load Balancer button.
3. Create Load Balancer dialogue window will open.

Input a name such as “IEEE-Tutorial-Load-Balancer” (only alphanumeric characters and hyphen are allowed).

Leave all the remaining default settings and click Continue.

4. At the next screen you will see configuration for the Health Check and the Advanced Details.

Change all Advanced Details to the smallest possible values (value ranges are available from the “i” links next to the configuration parameter):

- a. Response Timeout: 2 seconds
- b. Health Check Interval: 0.1 min
- c. Unhealthy Threshold: 2
- d. Healthy Threshold: 2

Click Continue.

5. In the next step you will select the Security Group from your existing Security Groups. To do this, choose the radio button Choose from Existing Security Groups.

6. In the Add Instances to Load Balancer screen, select instances you want to be load balanced by clicking the check box next to each of the two instances

Click Continue.

7. Click Create to finish the Load Balancer creation.
8. Click the Load Balancers link and check their status. Check your newly created load balancer.
9. Click on the load balancer that you created.

10. Click the Instances tab and wait few minutes for instances to become available. They will likely be listed as “Out of Service” until they are fully activated.



Tip: You can refresh the status by clicking the circular arrow in the upper right corner of the Management Console until the status changes to “In Service” for both of your instances.

19. Click on the Description tab to find the load balancer’s DNS Name.

11. The elastic load balancer and resources take a few minutes to create (only for the first time). After approximately 10 minutes, copy the string between DNS Name and (A Record)

Tip: The string will look like this:

IEEE-Tutorial-Load-Balancer-800374394.us-east-1a.elb.amazonaws.com

12. Copy the URL into a web browser and you will view your load balanced page.

Load Balancer distribute load or request between two instances it is configured with.

Now you have a working load balancer.

## H. Spot Instances: Creating Spot Requests

Note: Spot Instances may not be available in the AWS Educate Class. In this case drop this part of practice.

There are a number of ways you can optimize the cost of running your AMIs. One of popular way is to select Spot Instances for running your applications.

Spot Instances are instances that in particular moment have lowest/discounted spot price. You can look at available spot instances via EC2 Dashboard “Spot Request” menu item.

Use the following sequence to configure your Spot Instance

1. In EC2 Dashboard, go to the Spot Requests Page.

The Spot Requests page contains information about all of your existing Spot Requests. This page also contains tools to submit Spot Instance requests (or bids) for a selected instance type.

The Pricing History button gives you access to the Pricing History of a selected Spot Instance type for the last 90 days

For example, you want to bid on a Linux/UNIX m1.medium instance to be launched in the us-east-1a region. In order to submit a viable bid, it is always helpful to know what the price of such instance has been in the last week or month.

2. Assuming you want to request instance m3.medium available in Availability Zones us-east-1a and optionally us-east-1b.

In the Spot Instance Pricing History window you will get a multi-parametric plot space and price indicators in the bottom of the window. To view past prices in this Spot pool, move mouse over the plot space. You will see prices at the bottom.

Make a note what price might be available and what you will be ready to bid.

Assuming that prices for the instance type m3.medium have been for the last 2 weeks below 0.018 USD/hr in AZ us-east-1b but more than 0.45 USD/hr in AZ us-east-1b

Now you are ready to proceed with the Spot Request

3. Click Request Spot Instance and follow regular procedure of creating AMI instance like you did this in Part B.

- \* Select the Amazon Linux AMI 64-bit and click Select.
- \* Select the General Purpose tab.
- \* Configure instance details, in particular Maximum price, e.g. set it at 0.12 USD
- \* Launch your First Amazon EC2 Spot Instances

4. Now can go to View Spot Requests

The page lists all Spot Requests you created. You can monitor the status of your Spot requests. The Status column will display fulfilled when your bid is successful, and an instance is launched.

5. Check to see if your request has been accepted.  
It may take some time, at this period the status will be “pending-evaluation”

If your request was successful, the instance will launch and be running.

6. Finish your lab

You have successfully created your Spot Request, your bid has been accepted and your instance is up and running.

Terminate Your Spot Instances and Cancel Your Request.

To permanently terminate a persistent Spot Instance request, you must first cancel the bid and then terminate the instance.

## **Self-study and Research questions Block 3**

Question 1. Use of load balancing.

When do need to use load balancing? What is the difference between application and network load balancers? What kind of load balancer you would need for your website? What kind of load balancer you would need for streaming server?

Question 2. What is your observation with the spot instances prices and availability: during few days up to one week, different availability zones, size? How much money can save with the spot instances?

## Reporting

1. Submit your practice report on the performed tasks. Provide max 3-5 screenshots on each of 3 blocks.
2. Provide summary on your experience, problems experienced and solved.
3. Answer at least 3 self-check/research questions to block 1 and block 2, and 2 questions to block 3. Expected length of answers – min 8-10 lines of text, however not more than 1 pages per question (with optional images if needed).
4. Submit your report by Monday midnight next week. Use Canvas submission link for Assignment 1.