Télécom Saint-Étienne
Cloud Computing
Working With Amazon AWS

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Remarks

- You need to form groups of two students (binôme).
- A binôme should write a report containing the answers of questions and exercises listed in this document and send them to amro.najjar@telecom-st-etienne.fr.
- **you can write the report in French**.
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The goal of this TD is to introduce you the Amazon AWS (Amazon Web Services) which groups all the cloud services provided by Amazon.

To do this TD, you have two choices:

1. Either you create your AWS account. This is a free account no payment is needed. However, Amazon requires getting your bank card number (Carte Bleu) but not the cryptogramme.
2. Or, if you do not want to put your card number, you can fully make the TD by using the user-name and password provided by the instructor.

Objectives

- Learn the AWS Dashboard.
- Create a security group and launch your first instance on EC2
- Log to your instance (SSH then SFTP)
- Install an appach web server on the instance and see how you transform it into a web page.
- Install Eclipse AWS plugin
- Use your instance to run a basic algorithm.

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1 AWS Dashboard

log in to AWS using either user-name and password or the ones provided by the instructor. If you use the instructor credentials, you should go to this link.

The account you get does not have full permessions. However, it is enough to do all the TD. The Frankfurt (EU) region is selected by this account. However, not all features of AWS work in this region. For this reason, sometimes you may need to change the region before starting a specific service. Check out AWS dashbord:

- **Amazon Compute Cloud** including EC2, Elastic Beanstalk & Lambda, etc.
- **Storage & Content Delivery** including S3, Cloudfront, etc.
- **Database**: RDS, DynamoDB, etc.
- **Management Tools** CloudWatch, CloudTrails, etc.
- **Security & Identity**
- **Mobile Services**

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Question 1: Please describe breifly the following services:
- EC2, Elastic Beanstalk, Lambda
- S3, Cloudfront, Elastic File System
- RDS, DynamoDB.
-CloudCommit and CloudDeploy
-CloudWatch, CloudTrail
-Choose one of the analytics section and explain it.
-IoT (Internet of Things)
-Choose one of the Mobile services
-AppStream
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2 Launch Your First EC2 Instance

1. From the Dashboard, click on the EC2 service.
2. Before launching the instance, let us create a security group. Click on the **Security Groups** on the left list. A security group specifies the set of security rules to be applied on a instance[1] or any other resource from the cloud.
   - To create a security group, click on **Create Security Group** button. Give a name and a description to the security group (name it SSH).
   - To add a security rule, click on the button **Add Rule**. Specify the rule type to be **SSH**, and put the **source** to be **anywhere**.
   - When you finish, click on **Create**
3. Go back to EC2 Dashboard, and click on the button **Launch Instance**.
4. Select the image to be Amazon Linux (You have 22 types, but this is for free). Take a look at the other instance types (including Windows and Windows MySQL Server).
5. Select the instance type (or size) to be t2.micro. Do not forget to take a look at the other available sizes. Then click on **Next**.
6. In this page, check out the **Monitoring** and **Tenancy** and check out what options you have (but do not change the tenancy option) and click on **Next**.
7. In this step (Step 4) you will add storage. Here you can add a hard-disk space and choose how many Giga-bytes. Do change anything. Just click on **Next**.
8. In this step you can tag the instance. Tagging is useful to :
   (a) Name the instance and what is the task undertaken by it.
   (b) Keep track of costs of the instances, their health, and status. For instance, suppose that your company provide several services (e.g. a game & a VoD service), then you can add a tag **Game** for VMs working on the gaming service and the tag **Video** for the video instances.
9. Click on **Next**.
10. In this step (Step 6), you should add a security group to your instance. Choose the option **Select an existing security group** and select the security group the you created before. Then launch the instance by clicking on **Review and Launch**. When you launch the instance measure the time it needs to become **running**. This time is called the **Instance Strart-up time**.
11. Before you are able to launch your instance, you need to create a new key pair (a key pair is a public key with Amazon, and a private Key you keep).
12. Select the option **Create a New Key Pair** and give it a name. Download the key. You will always need this key to log into your instance. If you lose it, your instance becomes useless.

1. Remember that instance= Virtual Machine

13. Be ready to measure the start-up time, & click on launch.
14. To see the status of the instance, go to this link.

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Question 2 Answer the following questions:
-What is a security group.
-Define the term Multi-Tenancy.
-The storage type is EBS (Amazon Elastic Block Store).
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3 Connect to Your Instance

Now you will connect to your instance, first using SSH then using the web **(HTTP)**.

3.1 SSH Connection

- Go the EC2 main page (this link) and click on **Connect** button.
- Follow the instructions on the window you got. If you work under windows, then you need PuTTY.
- Voila, you got your instance and you logged into it. Congratulations!

3.2 SFTP Connection

To create an SFTP connection, you need an **SFTP** client. you can use **fileZilla**. It works on Windows and Mac, etc. If you are have a windows computer, you can also use WinSCP.

- Download fileZilla from this link.
- Go to the fileZilla parameters and choose the SFTP option. Here your should add the key your created to access your instance to fileZilla.
- Click on add private key (Ajouter une clÃľ privÃ‌e). Find your key (it is a file .pem) and convert it.
- Now go to `Fichier` ►Gestionnaire de Sites ►Nouveau Site. The name of your site should be amazon-ec2.
- Then, you should provide the **HÃťte** (the host). To find the host, go the EC2 panel, select your instance and go to the **Description** and copy the value of public DNS and paste it in the host field of fileZilla. The `protocol` should be **SFTP**. The `Identifiant` (i.e. the user name). Usually, the user name of instances of the type *Amazon Linux* is `ec2-user`. No password is needed. Then Click on `Connexion`.
- Now, using fileZilla explorer, you can navigate through the file system of your instance (Do not close the connection, we will use it later).

4 Turn Instance into a Web Server

In this part, you will see how you can easily provide a web interface to your instance.

1. From EC2 panel, choose your instance. Go down to the `Description` section. Copy the `Public IP` address. Paste it in your navigator. The navigator will not be able to open the instance. This is due to 2 reasons:
   (a) No web server software is installed on your instance (e.g. Apache).
   (b) The security group controlling the access to your instance does not allow HTTP access.

4.1 Install Web Server

Before installing the web server, let us use `CloudWatch` to monitor your instance. To do so, go the EC2 panel ►Choose your instance ►Click on the `Monitoring` tab. Take a look and see how almost no transactions are taking place on your instance.

Now let us install Apache web server:

- SSH your instance using your private key file (.pem).
- When you log to your instance, install Apache HTTP server using `sudo yum install httpd`.This will install all the dependencies and then you have an Apache HTTP server running on your instance.
- Go to monitoring and check out what happened to your instance.
- Try to log to your instance using your navigator. oops, it does not work. This is because you did not modify the security group.

4.2 The Security Group

- In EC2 main page, go to `Security Groups` under the `Network & Security` section. Choose the security group that you created. Click the button `Actions` ►`Edit inbound rules`.
- Add a new rule. Choose HTTP as a type, select the source to be anywhere and click on `Save`.
- Now try to log into your instance from the web browser.
- It works put as you see, there is not homepage. Create a HTML home page It is your home page. Use fileZilla to copy your page into your instance. It should go into `var/www/html/`.
- try to log to the machine from the browser.

5 Install AWS Eclipse Plugin

Open Eclipse EE. To install AWS plugin follow these instructions.

1. Go to `Help` ►`Install New Software`.
2. Enter âĂIJhttp://aws.amazon.com/eclipseâĂİ as the âĂIJWork withâĂİ site.
3. Select all the AWS toolkit items to install, and click through all of the prompts (accept license agreements, etc).
4. Restart Eclipse after the AWS toolkit has been installed.
5. Then you need to provide Eclipse with your Access Key ID & Access Key Secret. If you are using the user-name provided by the instructor, ask the instructor to give you your keys. Otherwise you can create your own keys by going to `AWS Dashboard` ►`Service & Identity` Section ►`Identity & Access Management` ►`Users`.
6. Put the Access Key ID & Access Key Secret into Eclipse window and click Finish.
7. You have the plugin working.

6 Create AWS Java Project

- Go to `New` ►`Other` ►`AWS` ►`AWS Java Project` ►Next.
- Add the project name and from the `AWS SDK for Java Samples` choose the sample `Amazon EC2 Spot Instance Getting Started Sample`.
- This code is a sample explaining how to use Java API to request Spot instance. You will get 4 classes. Take a long look at this code: what is its aim? what does it do? what is the minimum price for spot instances? (The classes `Request` and `GettingStartedApp` are the most important.)

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Question 3 What are Spot instances ? What is their pricing policy ? give a full explanation.
(You can use resources from internet to understand Spot instances)
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7 Hello World Application

Now you should run a `Hello World` application on your instance. To do so, follow the following steps:

1. Create a simple Java project that contains one class whose only method is the main method.
2. Create a Jar file by exporting the project. Go to `File` ►`Exports`.
3. Under `Java` choose runnable jar file.
4. Under launch configuration select the `Runnable Jar File`.
5. Select the export destination (including name of output file).
6. Use your SFTP tool (e.g. fileZilla) to copy this jar file into your instance.
7. SSH your machine, and launch the java project using the command `java -jar name-of-jar-file`

8 More Complex Application

Create a small text file containing a list of random 100 numbers. Store this file on the instance (using the SFTP). Then write a java program that calculates the min, max, average, median, and the standard deviation.

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Question 4 Answer the following questions:
-Are you getting a IaaS or Paas Service?. Explain? remember that Java was installed on your machine.
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