Web Exercise 04: Working with Amazon AWS Educate Starter

Due Date: **October 08** (Thursday), **2020**. 5:30pm on Blackboard. (Two weeks)

Estimated Hours: 8 hours.

Grade: **20 points.**

1. Get Your AWS Free Account and Install an EC2 Server.

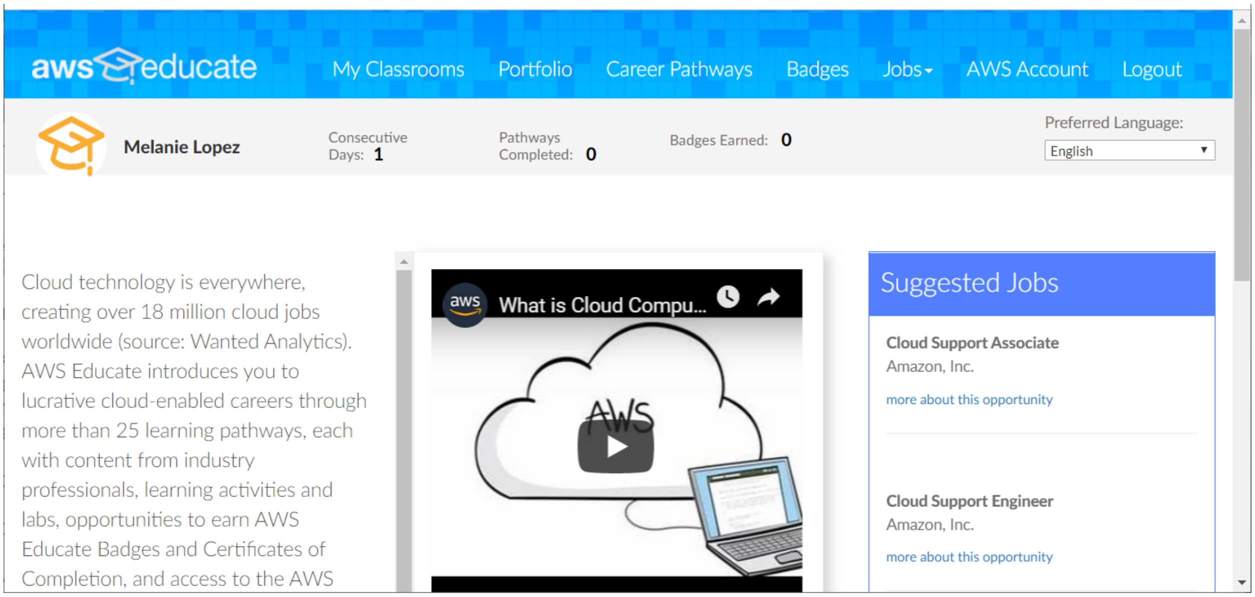
There are two ways to set up an Amazon Web Services (AWS) account.

1. **(Not recommended in this exercise)** Go to the AWS Free Trial website to establish your account. https://aws.amazon.com/free/start-your-free-trial/. However, this method will require your credit card information. This type of account will include 12 months of free tier access. But your credit card will be charged after the 12 months of free trial.
2. (You shoud use this method) To apply Amazon AWS **Educate Starter account. Your instructor has set up the invitation emails to you** about how to create the Educate Starter account. Once you receive the email from AWS, please follow their steps to set up your AWS Educate Starter account. This account will provide $100 credits for your exercises in this semester (until the end of 2020). You do not need to provide any credit card information. Just use your **SDSU-ID email** to activate this account.

You will receive an email from Amazon about how to set up your AWS Educate Student Account. Once you set up your AWS Educate Student Account, please use the following link to LOGIN:

https://www.awseducate.com/signin/SiteLogin

You will see the following welcome web page: (the website might be different in each year).



Melanie Lopez

Consecutive Days: 1

Pathways Completed: 0

Badges Earned: 0

Preferred Language: English

Cloud technology is everywhere, creating over 18 million cloud jobs worldwide (source: Wanted Analytics). AWS Educate introduces you to lucrative cloud-enabled careers through more than 25 learning pathways, each with content from industry professionals, learning activities and labs, opportunities to earn AWS Educate Badges and Certificates of Completion, and access to the AWS

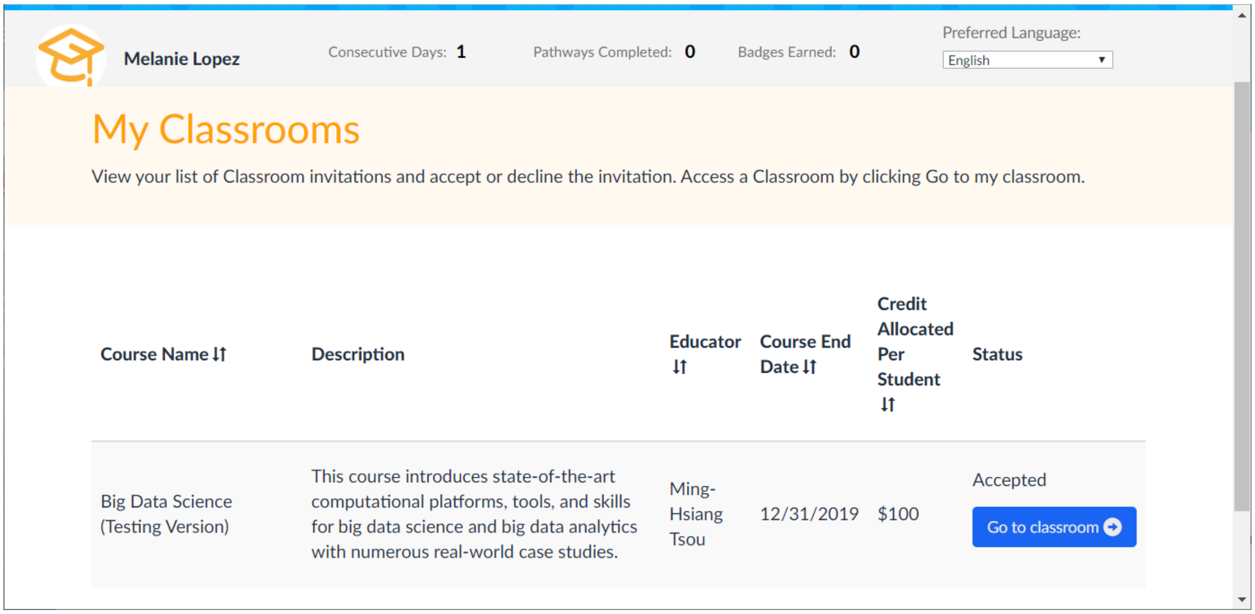
Suggested Jobs

Cloud Support Associate
Amazon, Inc.
more about this opportunity

Cloud Support Engineer
Amazon, Inc.
more about this opportunity

Click on the "**Cloud Career Pathways**" (blue box) at the bottom of web page. There are several free courses to take, such as "Cloud Computing 101", "Application Developer", "Data Scientist", etc. You can try some courses **after** you complete this exercise.

Now, click on "back" action to switch back to the welcome page. Next, at the bottom of the welcome web page, click on the "**My Classrooms**" (blue box). Please click on the "Accept Invitation" (green box) first.



Melanie Lopez Consecutive Days: 1 Pathways Completed: 0 Badges Earned: 0

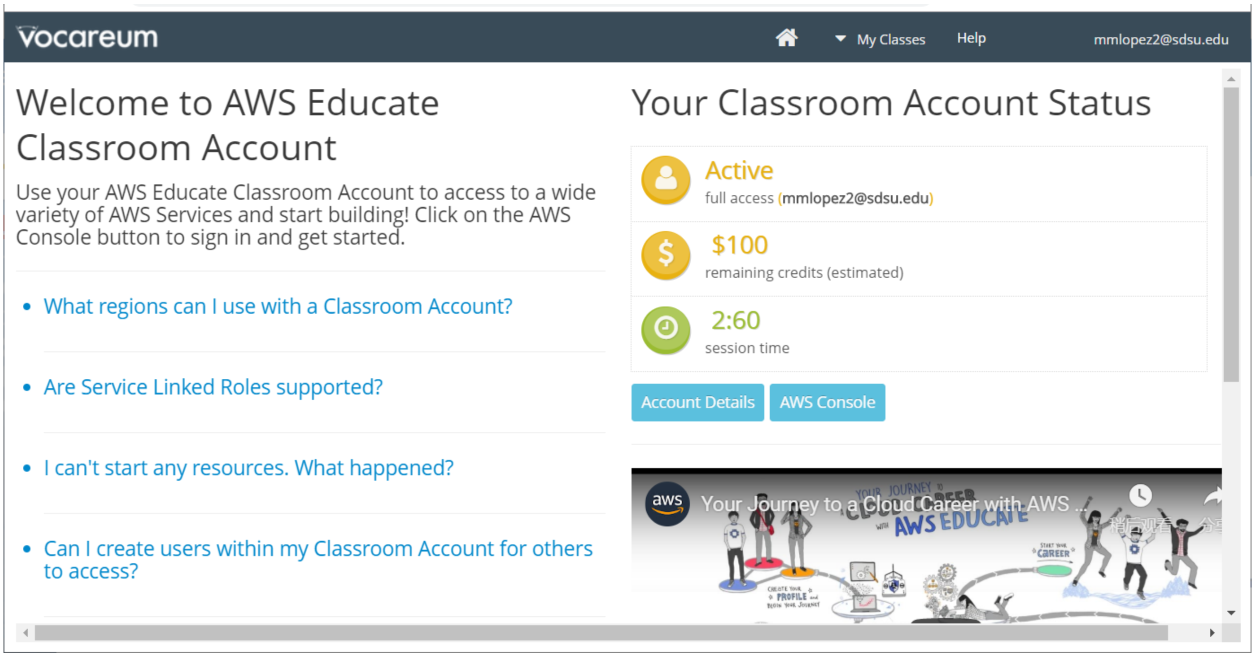
Preferred Language: English

My Classrooms

View your list of Classroom invitations and accept or decline the invitation. Access a Classroom by clicking Go to my classroom.

Course Name ⇅	Description	Educator ⇅	Course End Date ⇅	Credit Allocated Per Student ⇅	Status
Big Data Science (Testing Version)	This course introduces state-of-the-art computational platforms, tools, and skills for big data science and big data analytics with numerous real-world case studies.	Ming-Hsiang Tsou	12/31/2019	$100	Accepted Go to classroom ➔

Then, click on "Go to classroom" (Blue box). A "Confirm" popup window will show up. Click on "Continue". You will enter the AWS Educate Classroom Account.



vocareum
My Classes
Help
mmlopez2@sdsu.edu
aws
Your Journey to a Cloud Career with AWS ...
YOUR JOURNEY TO A CLOUD CAREER WITH AWS EDUCATE
CREATE YOUR PROFILE
START YOUR CAREER

Welcome to AWS Educate Classroom Account

Use your AWS Educate Classroom Account to access to a wide variety of AWS Services and start building! Click on the AWS Console button to sign in and get started.

- What regions can I use with a Classroom Account?
- Are Service Linked Roles supported?
- I can't start any resources. What happened?
- Can I create users within my Classroom Account for others to access?

Your Classroom Account Status

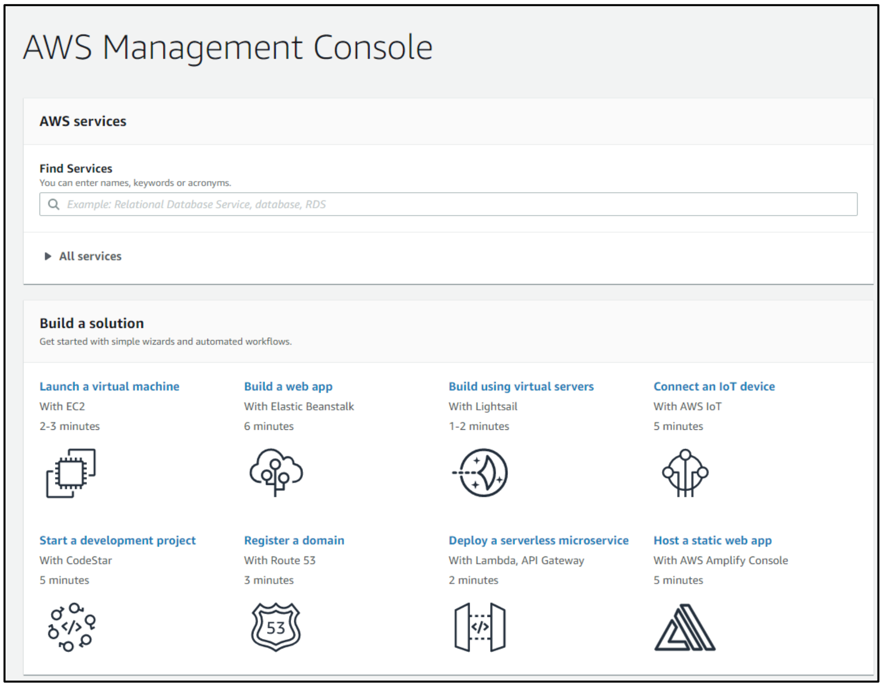
Active
full access (mmlopez2@sdsu.edu)

$100
remaining credits (estimated)

2:60
session time

Account Details AWS Console

The next step is to **start** the AWS Console. Click on the "**AWS Console**" button (blue box). After you start the AWS Console, your browser will look like the following:



AWS Management Console

AWS services

Find Services
You can enter names, keywords or acronyms.

Example: Relational Database Service, database, RDS

▶ All services

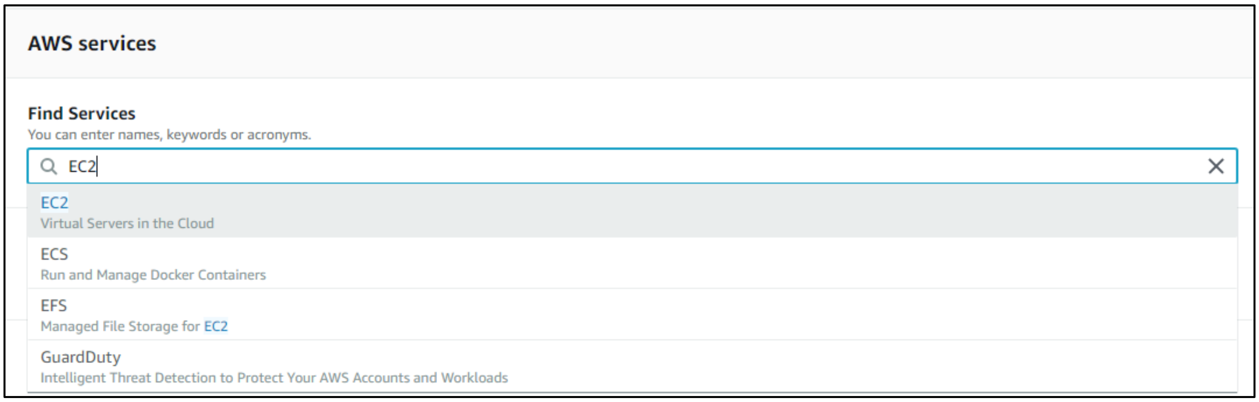
Build a solution
Get started with simple wizards and automated workflows.

Launch a virtual machine With EC2 2-3 minutes	Build a web app With Elastic Beanstalk 6 minutes	Build using virtual servers With Lightsail 1-2 minutes	Connect an IoT device With AWS IoT 5 minutes
Start a development project With CodeStar 5 minutes	Register a domain With Route 53 3 minutes	Deploy a serverless microservice With Lambda, API Gateway 2 minutes	Host a static web app With AWS Amplify Console 5 minutes

The Amazon Web Services (AWS) dashboard will let you configure and administer your Amazon services, such as EC2 (Elastic Compute Cloud). For this lab, we are only concerned with Amazon's EC2 service.

What is "EC2"? **EC2 is a Virtual Machine** (a virtual server) on the Cloud similar to a regular server (windows servers or linux servers). You can access the server and create a website, a web application, or conduct analysis inside the server (like your own computers). See the link for more information about EC2: https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/concepts.html

- Type "**EC2**" in the AWS service [Find Services] text box. Then select **EC2**.



AWS services

Find Services
You can enter names, keywords or acronyms.

EC2

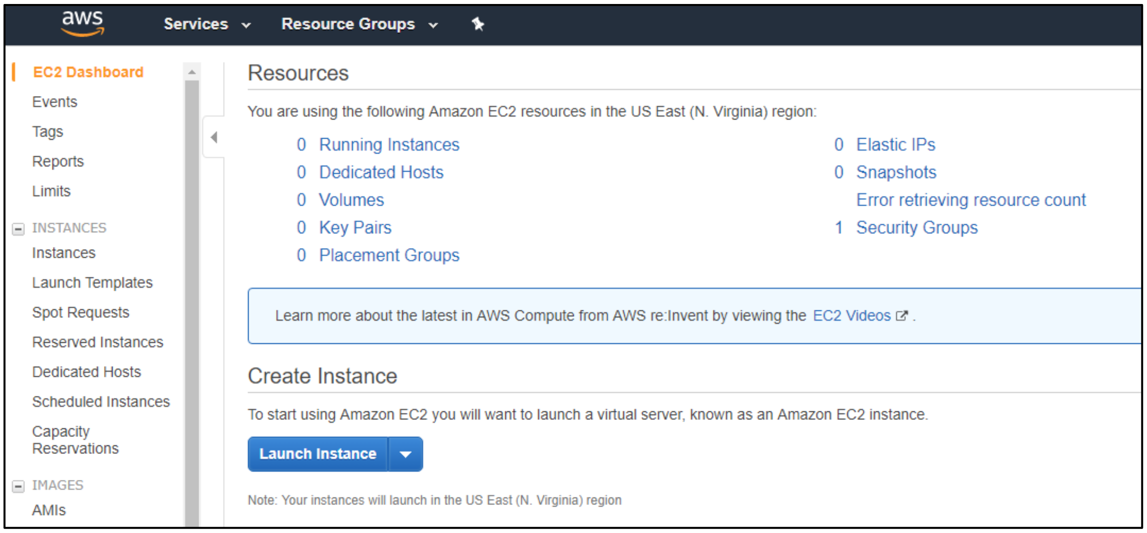
EC2
Virtual Servers in the Cloud

ECS
Run and Manage Docker Containers

EFS
Managed File Storage for EC2

GuardDuty
Intelligent Threat Detection to Protect Your AWS Accounts and Workloads

The EC2 dashboard shows us any instances of EC2 that we have created. Since we are opening a new account, there should be none present. Scroll down to the "Launch instance" section. We want to create a new instance by clicking the "**Launch Instance**" button.



Resources

You are using the following Amazon EC2 resources in the US East (N. Virginia) region:

0 Running Instances	0 Elastic IPs
0 Dedicated Hosts	0 Snapshots
0 Volumes	Error retrieving resource count
0 Key Pairs	1 Security Groups
0 Placement Groups	

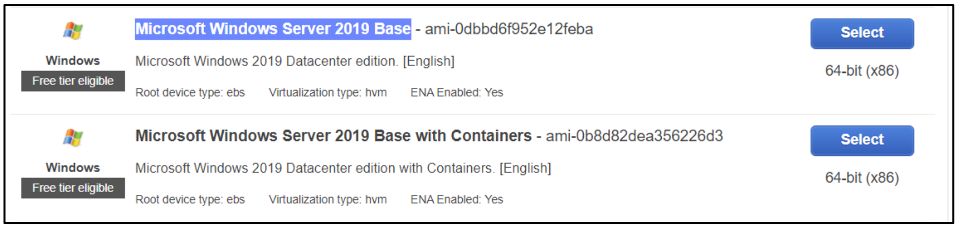
Learn more about the latest in AWS Compute from AWS re:Invent by viewing the EC2 Videos.

Create Instance

To start using Amazon EC2 you will want to launch a virtual server, known as an Amazon EC2 instance.

Note: Your instances will launch in the US East (N. Virginia) region

Step 1: Choose an Amazon Machine Image (AMI). (What is AMI? See this link to get more info: https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/AMIs.html) We can select the operating system for our instance. For this lab, we want to create an instance of "**Microsoft Windows Server 2019 Base**", so click the "Select" button for this option.



Microsoft Windows Server 2019 Base - ami-0dbbd6f952e12feba

Microsoft Windows 2019 Datacenter edition. [English]

Root device type: ebs Virtualization type: hvm ENA Enabled: Yes

64-bit (x86)

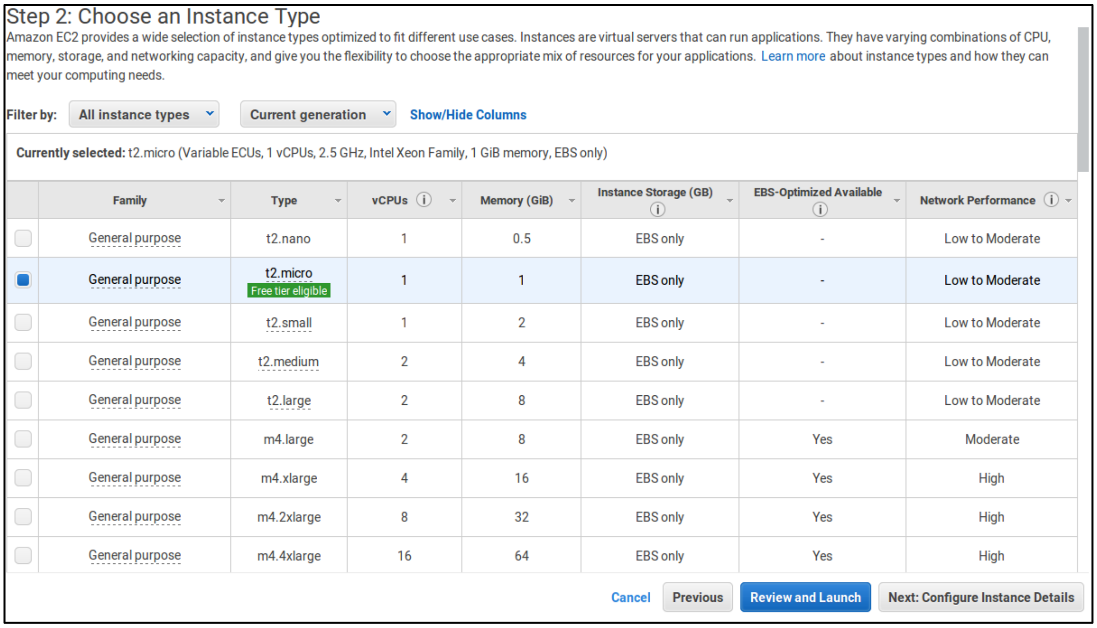
Microsoft Windows Server 2019 Base with Containers - ami-0b8d82dea356226d3

Microsoft Windows 2019 Datacenter edition with Containers. [English]

Root device type: ebs Virtualization type: hvm ENA Enabled: Yes

64-bit (x86)

In "Step 2", we can choose the size of our instance. This allows us to configure the computing power and other system resources for our instance. Since we are using a free account, we should select the "**t2 micro" option (free tier eligible)**. Then press "**Next: Configure Instance Details**" button.



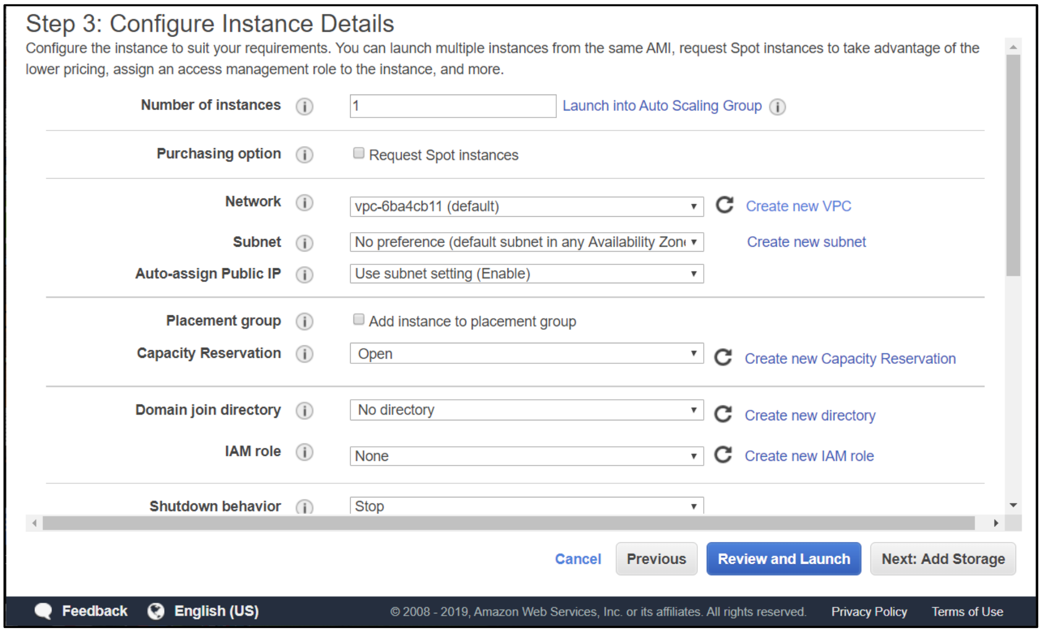
Step 2: Choose an Instance Type

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 | Current generation | Show/Hide Columns

Currently selected: t2.micro (Variable ECUs, 1 vCPUs, 2.5 GHz, Intel Xeon Family, 1 GiB memory, EBS only)

	Family	Type	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance
□	General purpose	t2.nano	1	0.5	EBS only	-	Low to Moderate
■	General purpose	t2.micro Free tier eligible	1	1	EBS only	-	Low to Moderate
□	General purpose	t2.small	1	2	EBS only	-	Low to Moderate
□	General purpose	t2.medium	2	4	EBS only	-	Low to Moderate
□	General purpose	t2.large	2	8	EBS only	-	Low to Moderate
□	General purpose	m4.large	2	8	EBS only	Yes	Moderate
□	General purpose	m4.xlarge	4	16	EBS only	Yes	High
□	General purpose	m4.2xlarge	8	32	EBS only	Yes	High
□	General purpose	m4.4xlarge	16	64	EBS only	Yes	High



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 — Launch into Auto Scaling Group

Purchasing option: □ Request Spot instances

Network: vpc-6ba4cb11 (default) — Create new VPC

Subnet: No preference (default subnet in any Availability Zon — Create new subnet

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

Placement group: □ Add instance to placement group

Capacity Reservation: Open — Create new Capacity Reservation

Domain join directory: No directory — Create new directory

IAM role: None — Create new IAM role

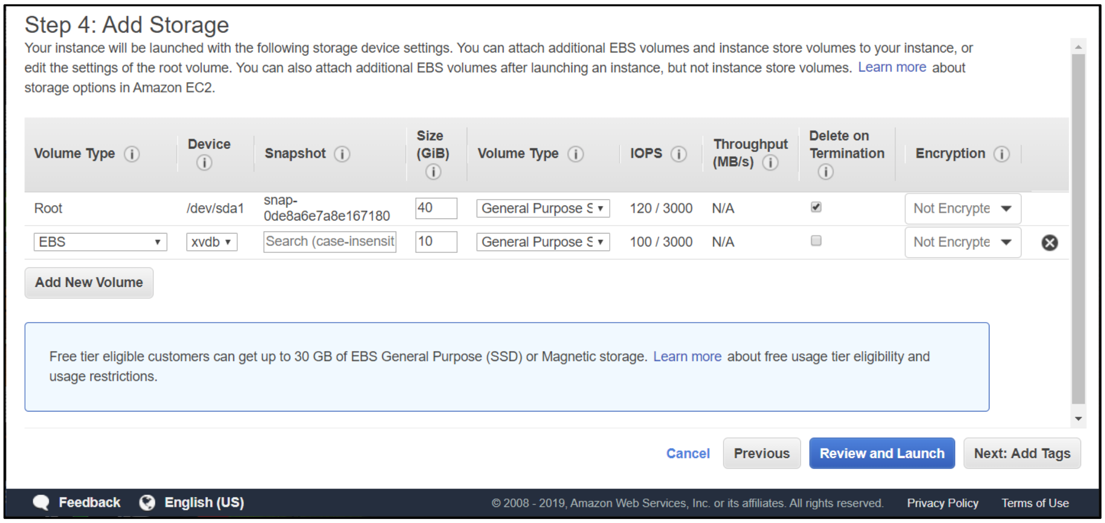
Shutdown behavior: Stop

In Step 3, you can set up your network type (inside a Virtual Private Cloud – VPC). For more information about VPCs, see the Amazon VPC User Guide. https://docs.aws.amazon.com/vpc/latest/userguide/what-is-amazon-vpc.html

You can accept the default VPC or create a new VPC. Recommend: accept all default setting in this step and click on the "**Next: Add Storage**".

In Step 4: Add Storage, you can see your default size in the **Root** hard disk is 30GB. Let's change it to **40GB**. Then click on the "**Add New Volume**". There is only one type of storage available here "EBS" (Elastic Block Store). EBS is like your additional hard disk in your local computer. You can mount your EBS drive inside your EC2 (Virtual Machine) as Drive D: or Drive E: (But it will cost money…) In the new

EBS volume, change the size to 10 (GiB). Do Not check the "Delete on Termination". Sometime, you can put the important data on this separated EBS drive. Even if you delete this virtual machine, you can still keep the important data from your project.



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.

Volume Type	Device	Snapshot	Size (GiB)	Volume Type	IOPS	Throughput (MB/s)	Delete on Termination	Encryption	
Root	/dev/sda1	snap-0de8a6e7a8e167180	40	General Purpose S	120 / 3000	N/A	☑	Not Encrypte	
EBS	xvdb	Search (case-insensit	10	General Purpose S	100 / 3000	N/A	□	Not Encrypte	⊗

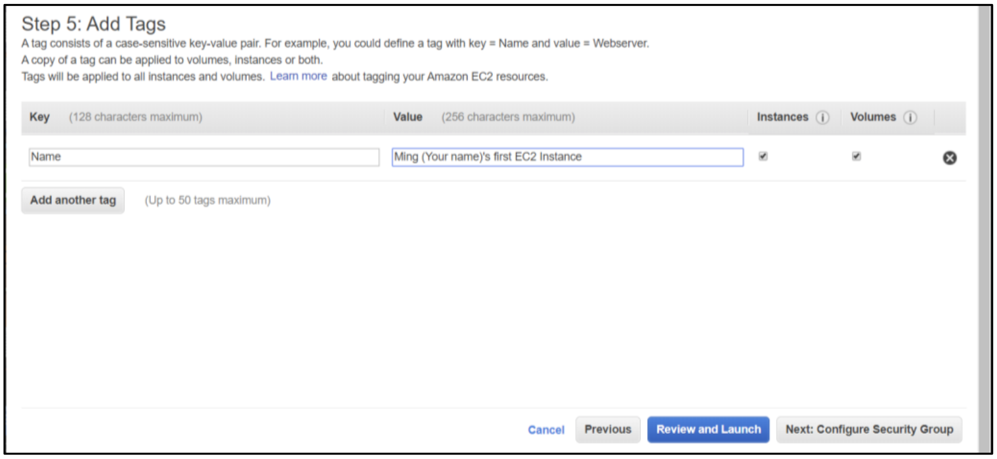
Add New Volume

Free tier eligible customers can get up to 30 GB of EBS General Purpose (SSD) or Magnetic storage. Learn more about free usage tier eligibility and usage restrictions.

Click on "**Next: Add Tags**".

Step 5: Add Tags. Tags are important methods in AWS to label different types of resources, configurations, instances, and networks. It is an important skills or "concept" for a better resource management. Learn more about Tagging HERE: https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/Using_Tags.html?icmpid=docs_ec2_console

In the Key, enter "Name", and the value, type "Yourname's first EC2 Instance", Then click on "**Next: Configure Security Group**".



Step 5: Add Tags

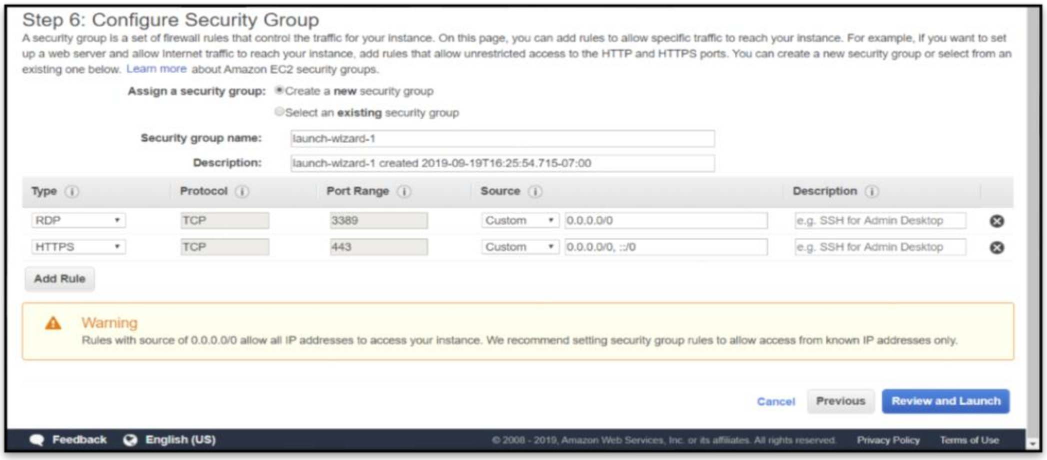
A tag consists of a case-sensitive key-value pair. For example, you could define a tag with key = Name and value = Webserver.
A copy of a tag can be applied to volumes, instances or both.
Tags will be applied to all instances and volumes. Learn more about tagging your Amazon EC2 resources.

Key (128 characters maximum)	Value (256 characters maximum)	Instances	Volumes	
Name	Ming (Your name)'s first EC2 Instance	☑	☑	⊗

Add another tag (Up to 50 tags maximum)

In Step 6: The first "Type" of network protocol is called "**RDP**", which means "**Remote Desktop Protocol**" (it is used for connecting Windows-based Virtual Machines). You can accept the default setting in the RDP. But in the real world application, you should use this step to create "firewall rules" to protect your servers. Rules with source of 0.0.0.0/0 allow all IP addresses (all computers from anywhere) to access your instance (but they will still need to know the login name and password). You can click on "learn more" to know more about how to set up firewalls.

If you like to build your server as a web server or a secured web server, you can "Add Rule" to add HTTP (for regular web sites) or HTTPS (for building a secured website). Now Click on "**Add Rule**" and Select "HTTPS" in the type, accept all default setting.



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

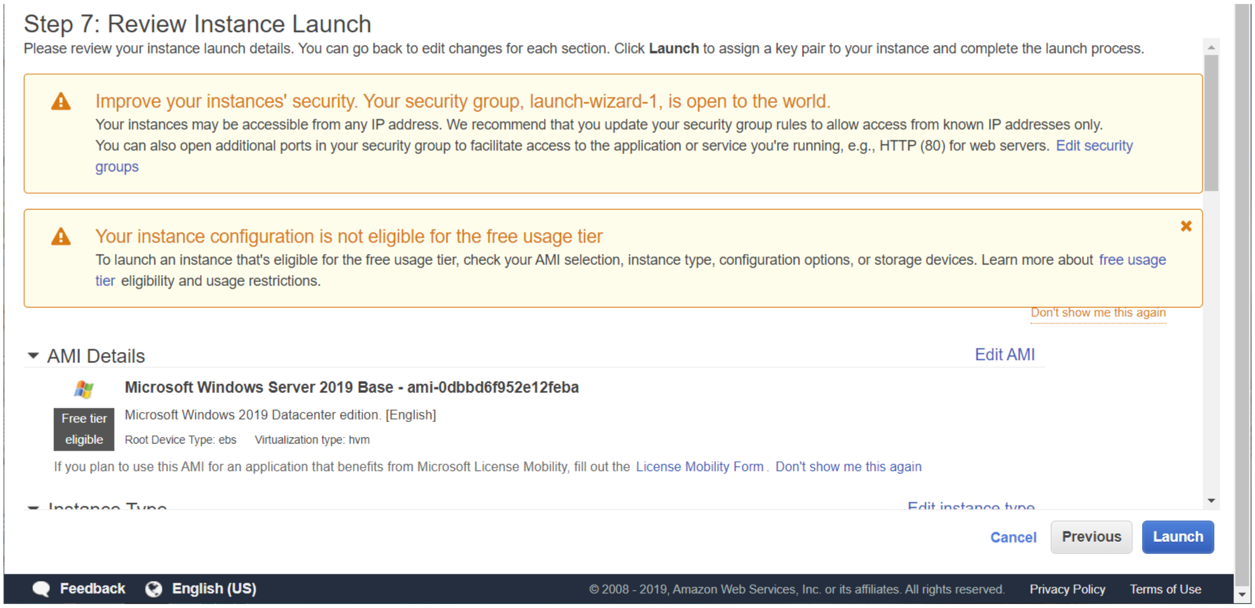
Security group name: launch-wizard-1

Description: launch-wizard-1 created 2019-09-19T16:25:54.715-07:00

Type	Protocol	Port Range	Source		Description
RDP	TCP	3389	Custom	0.0.0.0/0	e.g. SSH for Admin Desktop
HTTPS	TCP	443	Custom	0.0.0.0/0, ::/0	e.g. SSH for Admin Desktop

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.

Now, all setting is completed! Click on "**Review and Launch**". You will see some warning messages.



Step 7: Review Instance Launch

Please review your instance launch details. You can go back to edit changes for each section. Click **Launch** to assign a key pair to your instance and complete the launch process.

Improve your instances' security. Your security group, launch-wizard-1, is open to the world.
Your instances may be accessible from any IP address. We recommend that you update your security group rules to allow access from known IP addresses only.
You can also open additional ports in your security group to facilitate access to the application or service you're running, e.g., HTTP (80) for web servers. Edit security groups

Your instance configuration is not eligible for the free usage tier
To launch an instance that's eligible for the free usage tier, check your AMI selection, instance type, configuration options, or storage devices. Learn more about free usage tier eligibility and usage restrictions.

Don't show me this again

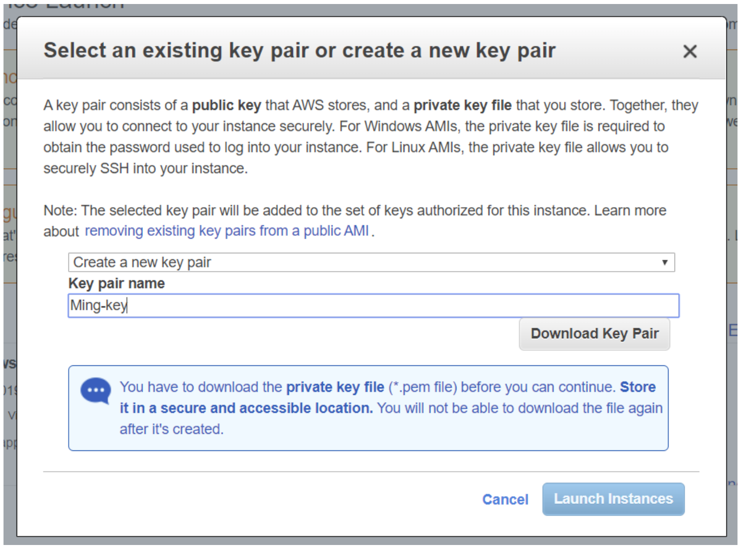
AMI Details

Microsoft Windows Server 2019 Base - ami-0dbbd6f952e12feba
Free tier eligible
Microsoft Windows 2019 Datacenter edition. [English]
Root Device Type: ebs Virtualization type: hvm
If you plan to use this AMI for an application that benefits from Microsoft License Mobility, fill out the License Mobility Form. Don't show me this again

Instance Type

One warning is about the instance configuration is not eligible for the free usage tier (because we increase the hard disk size to 40GB and add one additional 10GB disk). You can accept these warning message and click on the "**Launch**" button.

A popup window will be shown that allows you to create a key that will be used to retrieve your windows password. Select the "**Create a new key pair**" option and give the key a name (in this example, we have named it "**Yourname-Key**" (for example, "Ming-Key"). Next, click the "**Download Key Pair**" button and save the file to your local computer (the key file extension will be **.pem**). Make sure to save this pem file in your local computer (copy this file from "Download" folder to a Desktop folder or a dedicated location).



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 to securely SSH into your instance.

Note: The selected key pair will be added to the set of keys authorized for this instance. Learn more about removing existing key pairs from a public AMI.

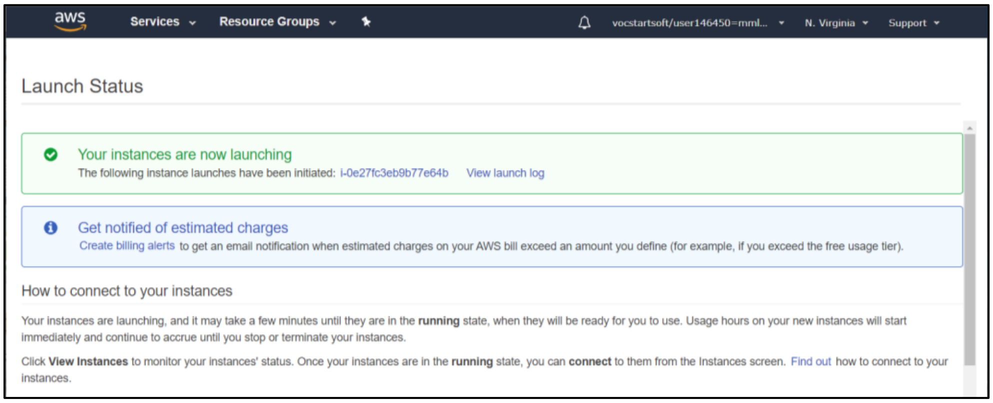
Create a new key pair

Key pair name

Ming-key

You have to download the **private key file** (*.pem file) before you can continue. **Store it in a secure and accessible location.** You will not be able to download the file again after it's created.

Next, Click on "**Launch Instance**". It will show the Launch Status as the following:



Launch Status

Your instances are now launching

The following instance launches have been initiated: i-0e27fc3eb9b77e64b View launch log

Get notified of estimated charges

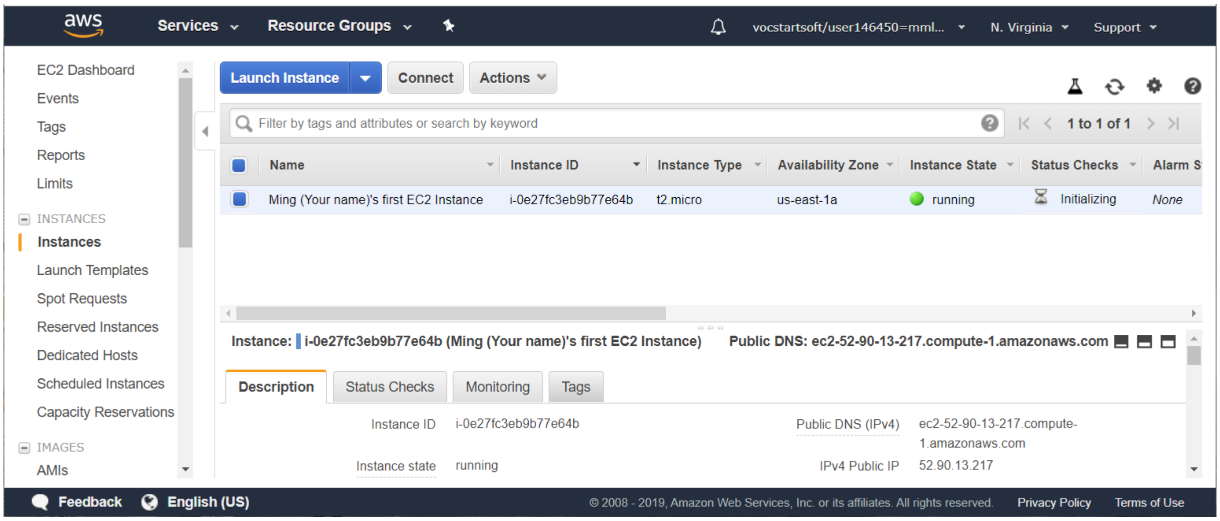
Create billing alerts to get an email notification when estimated charges on your AWS bill exceed an amount you define (for example, if you exceed the free usage tier).

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.

Scroll down to the end. Then click on "**View Instance**" to see the EC2 Dashboard again:



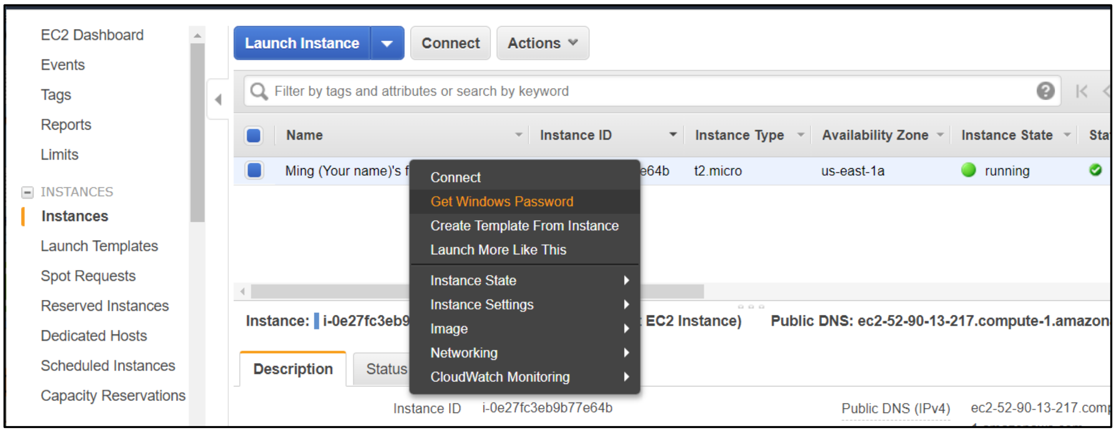
Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm S
Ming (Your name)'s first EC2 Instance	i-0e27fc3eb9b77e64b	t2.micro	us-east-1a	● running	Initializing	*None*

Instance: i-0e27fc3eb9b77e64b (Ming (Your name)'s first EC2 Instance) **Public DNS:** ec2-52-90-13-217.compute-1.amazonaws.com

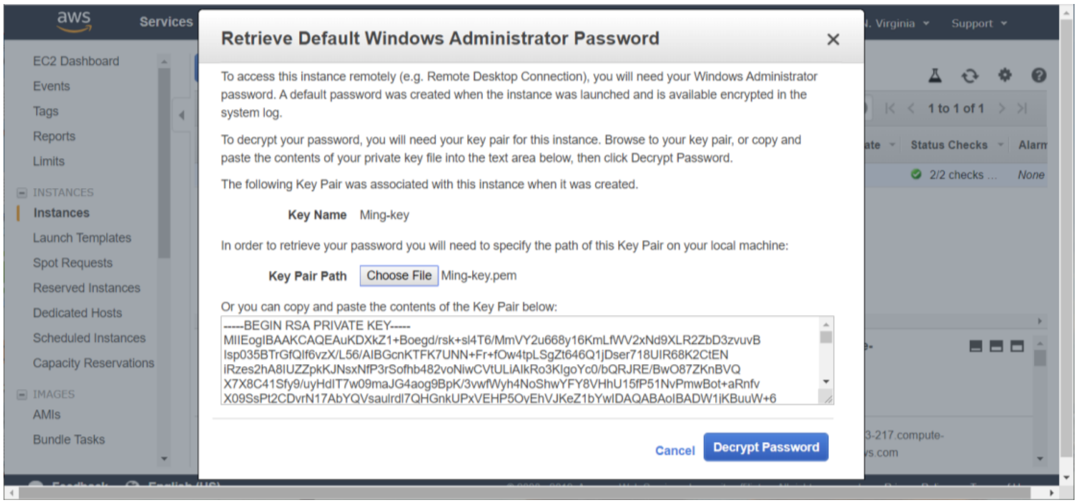
Instance ID	i-0e27fc3eb9b77e64b	Public DNS (IPv4)	ec2-52-90-13-217.compute-1.amazonaws.com
Instance state	running	IPv4 Public IP	52.90.13.217

Now new instance is running (It may take a few seconds). You can see the Name of the new instance is called "Yourname's first EC2 instance". This label is based on the tag you created in Step 5.

The next step is to **get the Password** to remotely login into the EC2 virtual server. **Right click on the new instance** and select the "**Get Windows Password**" option.



This will allow us to upload the KEY file we downloaded. (Click on the "**Choose File**" and upload the KEY file (###.pem)).



Retrieve Default Windows Administrator Password

To access this instance remotely (e.g. Remote Desktop Connection), you will need your Windows Administrator password. A default password was created when the instance was launched and is available encrypted in the system log.

To decrypt your password, you will need your key pair for this instance. Browse to your key pair, or copy and paste the contents of your private key file into the text area below, then click Decrypt Password.

The following Key Pair was associated with this instance when it was created.

Key Name Ming-key

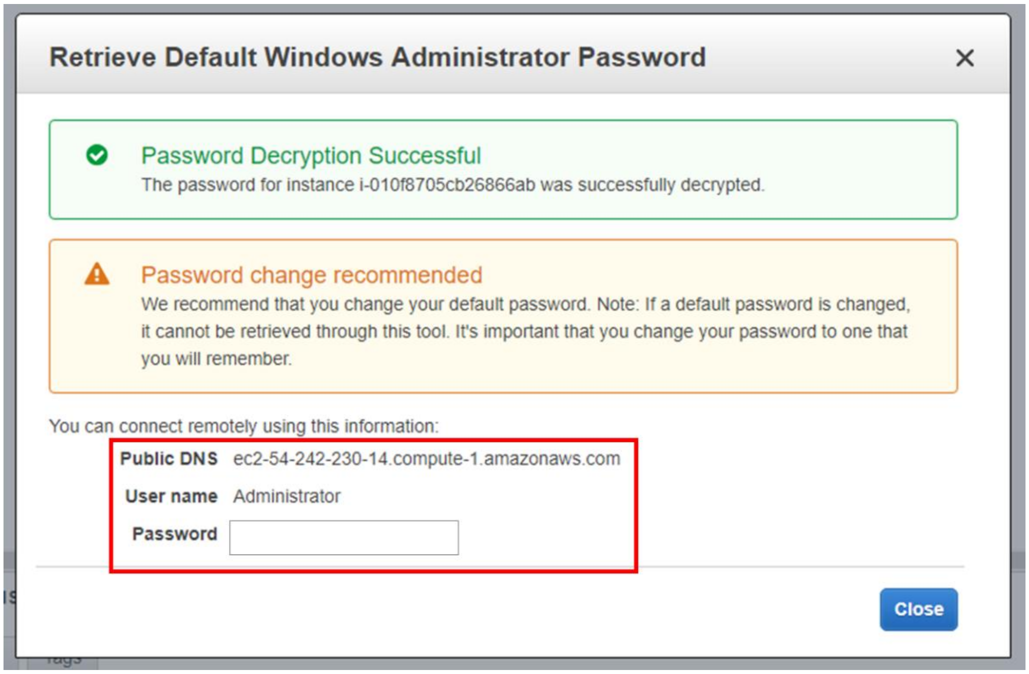
In order to retrieve your password you will need to specify the path of this Key Pair on your local machine:

Key Pair Path Choose File Ming-key.pem

Or you can copy and paste the contents of the Key Pair below:

```
-----BEGIN RSA PRIVATE KEY-----
MIIEogIBAAKCAQEAuKDXkZ1+Boegd/rsk+sl4T6/MmVY2u668y16KmLfWV2xNd9XLR2ZbD3zvuvB
Isp035BTrGfQlf6vzX/L56/AIBGcnKTFK7UNN+Fr+fOw4tpLSgZt646Q1jDser718UIR68K2CtEN
iRzes2hA8IUZZpkKJNsxNfP3rSofhb482voNiwCVtULiAIkRo3KIgoYc0/bQRJRE/BwO87ZKnBVQ
X7X8C41Sfy9/uyHdIT7w09maJG4aog9BpK/3vwfWyh4NoShwYFY8VHhU15fP51NvPmwBot+aRnfv
X09SsPt2CDvrN17AbYQVsaulrdl7QHGnkUPxVEHP5OyEhVJKeZ1bYwIDAQABAoIBADW1jKBuuW+6
```

Click the "**Decrypt Password**" button, which will give us the server name, user name and password for our EC2 instance. These will be used for logging into your instance through remote desktop.



Retrieve Default Windows Administrator Password

Password Decryption Successful
The password for instance i-010f8705cb26866ab was successfully decrypted.

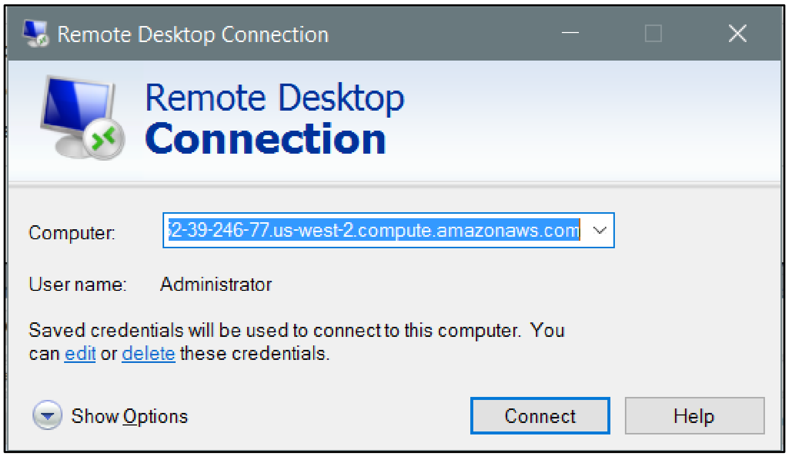
Password change recommended
We recommend that you change your default password. Note: If a default password is changed, it cannot be retrieved through this tool. It's important that you change your password to one that you will remember.

You can connect remotely using this information:

Public DNS ec2-54-242-230-14.compute-1.amazonaws.com
User name Administrator
Password

Copy the **Public DNS, User Name, and Password information** into a secured text file (or write it down).

Open a **Remote Desktop Connection** from your local computer. (click on the windows menu, type “Remote Desktop” to search for the Remote Desktop Connection App). Cut and paste the DNS server information for your instance. When you click “**Connect**”, you will be prompted for a user name and password. Enter the information (username and password) from the previous step to log into the Windows Server.



Remote Desktop Connection

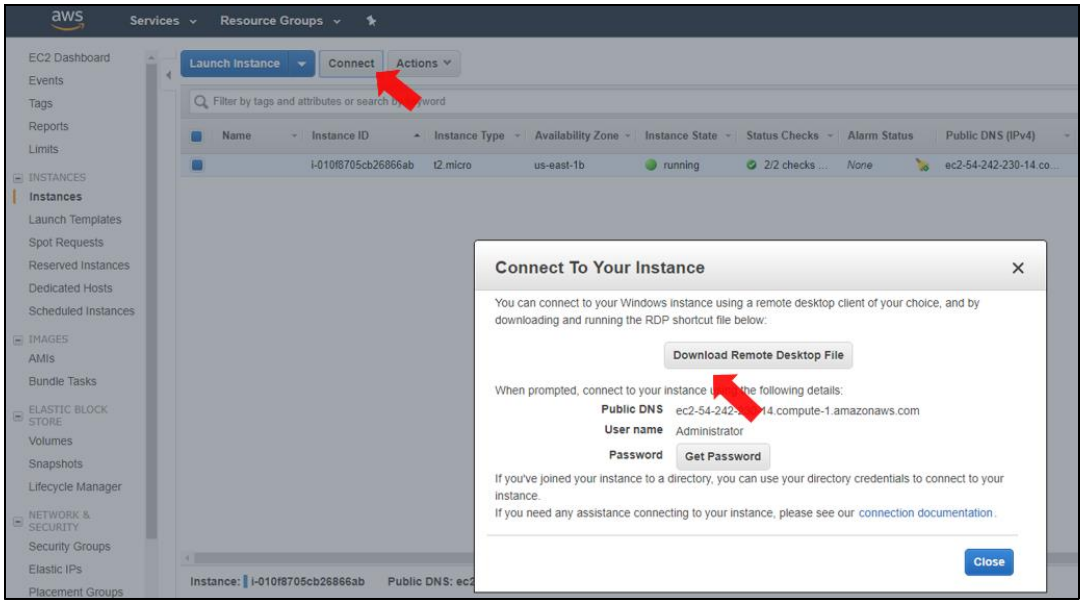
Remote Desktop
Connection

Computer: 2-39-246-77.us-west-2.compute.amazonaws.com

User name: Administrator

Saved credentials will be used to connect to this computer. You can edit or delete these credentials.

Another option to use the Remote Desktop Login is to click on the [Connect] button on the top of the window. Then click on [Download Remote Desktop File]. After downloading, double click on the file to open the Remote Desktop.



Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status	Public DNS (IPv4)
	i-010f8705cb26866ab	t2.micro	us-east-1b	running	2/2 checks ...	None	ec2-54-242-230-14.co...

Connect To Your Instance

You can connect to your Windows instance using a remote desktop client of your choice, and by downloading and running the RDP shortcut file below:

Download Remote Desktop File

When prompted, connect to your instance using the following details:

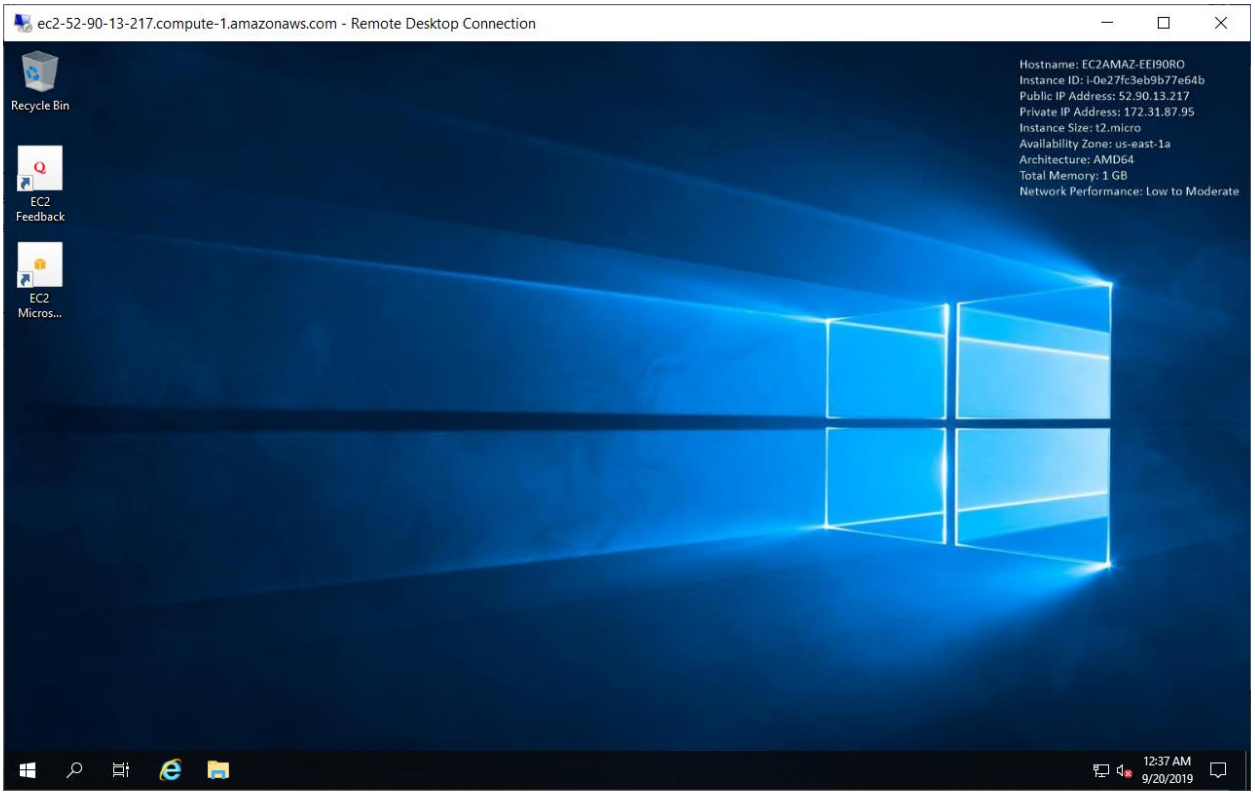
Public DNS	ec2-54-242-230-14.compute-1.amazonaws.com
User name	Administrator
Password	Get Password

If you've joined your instance to a directory, you can use your directory credentials to connect to your instance.

If you need any assistance connecting to your instance, please see our connection documentation.

Close

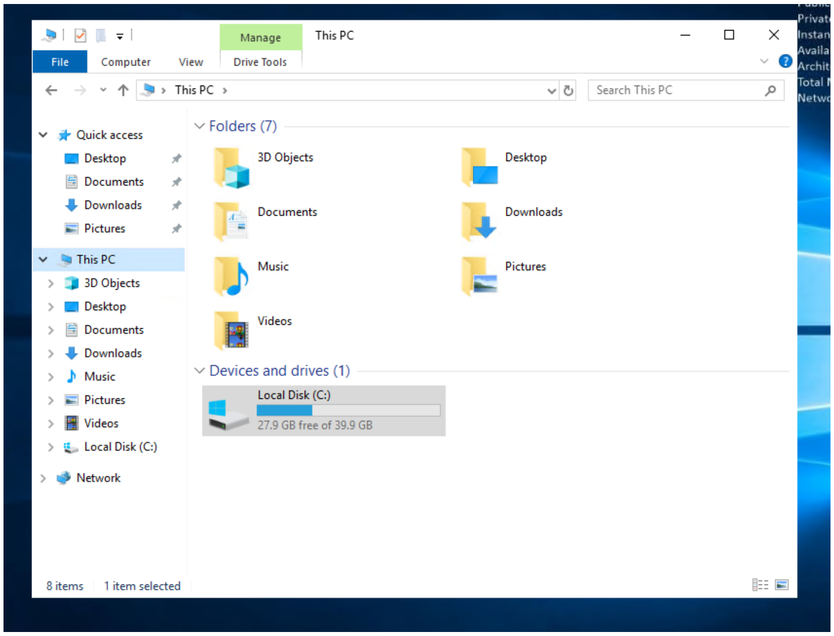
After the login, you may get another yellow warning window about “The identify of the remote computer cannot be verified”. Click on “Yes” to continue. Then you will see the Remote Desktop as the following:


ec2-52-90-13-217.compute-1.amazonaws.com - Remote Desktop Connection
Recycle Bin
EC2 Feedback
EC2 Micros...
12:37 AM
9/20/2019

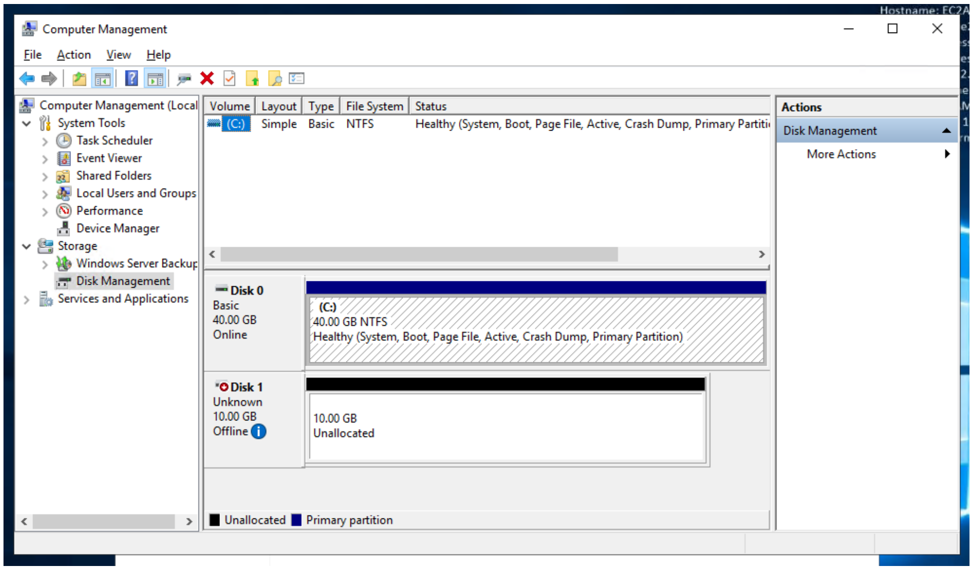
Hostname: EC2AMAZ-EEI90RO
Instance ID: i-0e27fc3eb9b77e64b
Public IP Address: 52.90.13.217
Private IP Address: 172.31.87.95
Instance Size: t2.micro
Availability Zone: us-east-1a
Architecture: AMD64
Total Memory: 1 GB
Network Performance: Low to Moderate

You can **make a screen shot** of your remote desktop and save the image into your workspace. (Your final lab report will need this image).

You can take a look at the available disks in this EC2 instance. Click on the “File Manager” icon at the bottom (Yellow folder). Click on “This PC” in the File Manager. You will see that your local disk C: has 39.9GB size (same in our EC2 setting). However, the additional disk (EBS drive) is missing. The reason is that we need to manually “mount” the EBS drive into this server.



To mount the additional EBS, select the Windows menu → Windows Administrative Tools → Computer Management to open the window of Computer Management. In the window, click on “**Disk Management**” under the “Storage”.



Volume	Layout	Type	File System	Status
(C:)	Simple	Basic	NTFS	Healthy (System, Boot, Page File, Active, Crash Dump, Primary Partiti

Disk 0
Basic
40.00 GB
Online

(C:)
40.00 GB NTFS
Healthy (System, Boot, Page File, Active, Crash Dump, Primary Partition)

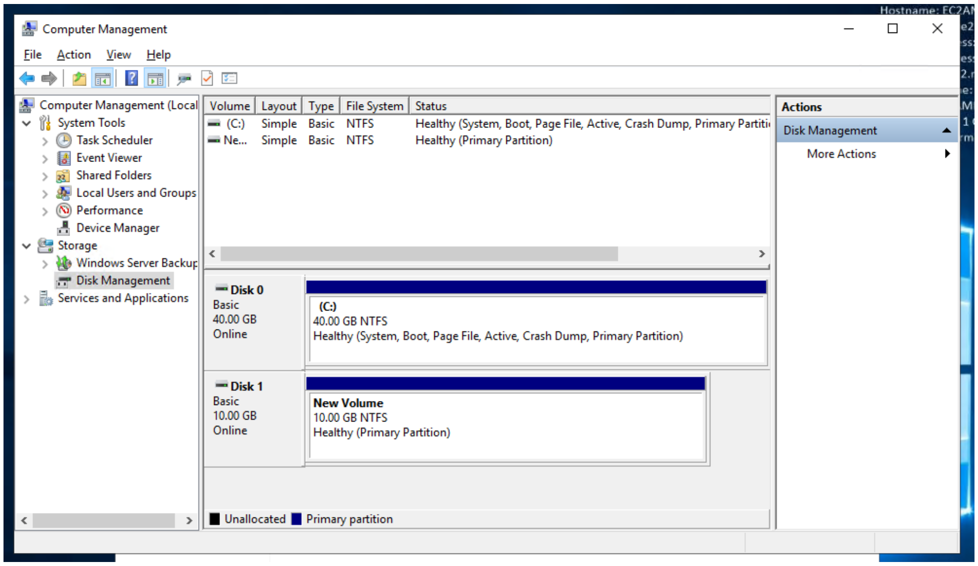
Disk 1
Unknown
10.00 GB
Offline

10.00 GB
Unallocated

You can see the Disk 0 is C: drive with 40GB size. The missing EBS disk is the Disk 1, which is offline now and need to be “allocated”.

Right Click on the Disk 1, to open the menu, and select “Online”. Then Right Click on Disk 1 again to select “Initialize Disk”. Keep the default setting (MBR) and click on “OK”. Now this new disk is almost ready to be mounted.

Right Click inside the 10.00GB box, then select “New Simple Volume…”. Accept all default setting in multiple steps, and then click on “Finish”. Now your EBS drive is mounted as D: drive in your EC2.



Volume	Layout	Type	File System	Status
(C:)	Simple	Basic	NTFS	Healthy (System, Boot, Page File, Active, Crash Dump, Primary Partiti
Ne...	Simple	Basic	NTFS	Healthy (Primary Partition)

Disk 0
Basic
40.00 GB
Online

(C:)
40.00 GB NTFS
Healthy (System, Boot, Page File, Active, Crash Dump, Primary Partition)

Disk 1
Basic
10.00 GB
Online

New Volume
10.00 GB NTFS
Healthy (Primary Partition)

■ Unallocated ■ Primary partition

Close the Computer Management window. Open the File manager again, you can see the two drives (C: and D:) are available now.

The next step to install software and a NoSQL databases that will allow us to collect tweet and store them in a database.

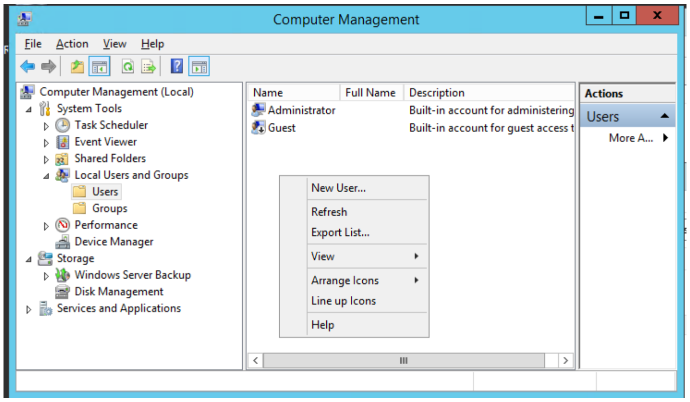
You can “**Disconnect**” your EC2 using the Remote Desktop (by clicking on the “X” on the top bar). The Server will keep running when the desktop is disconnected. You can just reconnect it when you need to continue your tasks next time. *NOTE: if you just disconnect or log out the EC2 server without shutting down, all run-time machines will cost your some credits (money).*

You can also “**Shutdown**” your EC2 server to save some cost of cloud computing. However, you need to re-start the EC2 server next time. For this exercise, please do not shut down your EC2 now.

Add one new user in this EC2 server

Our next step is to add one regular user in this EC2 server for the next exercise. Click on the Windows Icon (the lower left corner), then select the “**Administrative Tools**” icon. In the List of Tools, select “**Computer Management**”. (Double click on the Computer Management). In the Computer Management Window, select “Local Users and Group”, → “Users”.

You will see the windows like this one:

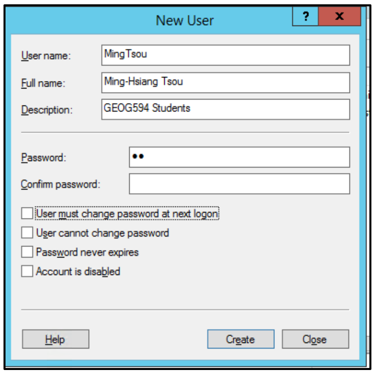


Name	Full Name	Description
Administrator		Built-in account for administering
Guest		Built-in account for guest access t

"**Right click**" on the white space under the Guest Account (See the image above) to select "**New User.**."

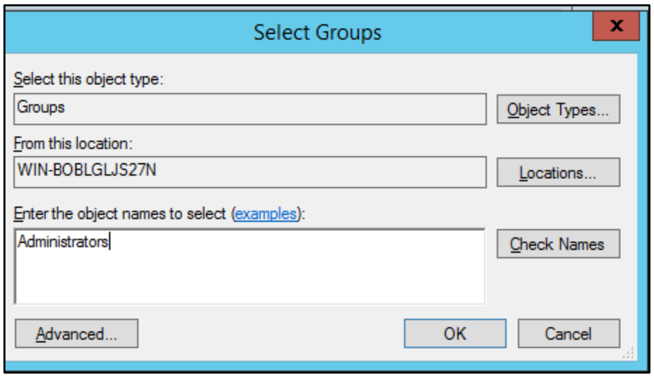
Fill out the new user name (for your own account or for your friends), Full name, and Description. Then Enter the Password and Confirm password. Uncheck the box for "User must change password". Select other options you like, then click on "**Create**". After that, click on "Close" to close New User window.

NOTE: The Password must have some features (upper case, lower case) and cannot contain User names.



User name: MingTsou
Full name: Ming-Hsiang Tsou
Description: GEOG594 Students
Password: ••
Confirm password:

□ User must change password at next logon
□ User cannot change password
□ Password never expires
□ Account is disabled

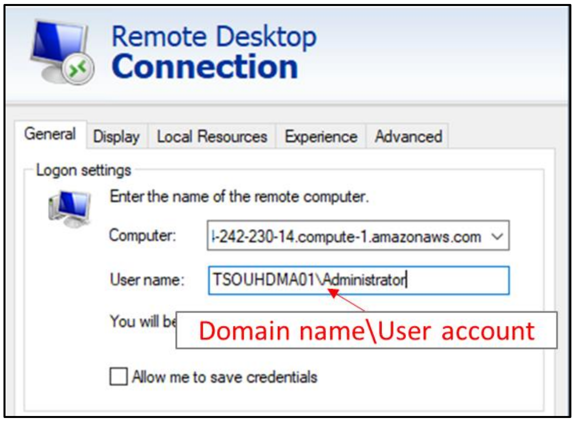


Select this object type: Groups
From this location: WIN-BOBLGLJS27N
Enter the object names to select (examples): Administrators

Once you create a new user name. Double click on the new account on the window to open the User Properties Window. Click on the "**Member of**" Tab, then click on "**Add…**"

Type "**Administrators**" in the Text box, then press "**OK**". Now your new Account has the "Administrators" privileges.

Now, Logout the "Administrator Account" and then **login with the new user account**. (You will need to use the Remote Desktop to reconnect to EC2 Again. Use the same Domain name from the previous session). If the Login window still used the "Administrator", click on "More choices", and select "Use a different account". Type-in user name and password you created in previous steps.



Remote Desktop Connection

Logon settings

Enter the name of the remote computer.

Computer: i-242-230-14.compute-1.amazonaws.com

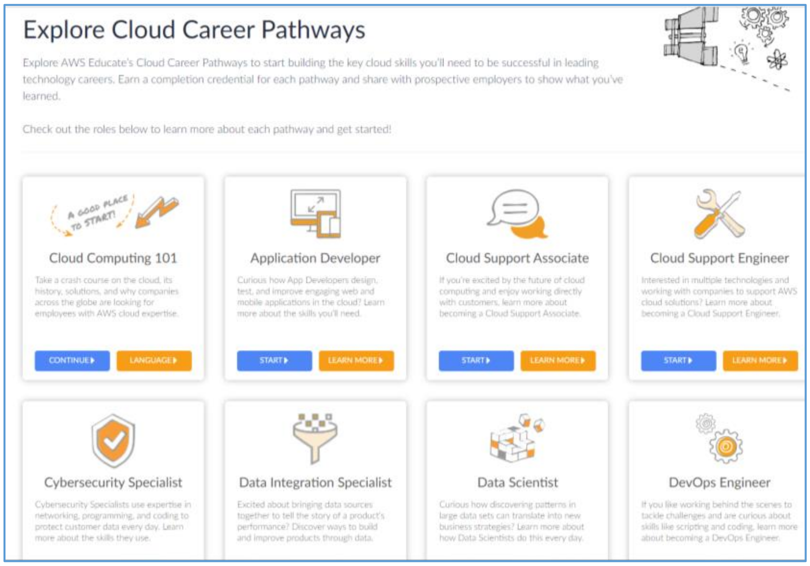
User name: TSOUHDMA01\Administrator

You will be

Domain name\User account

□ Allow me to save credentials

Now we have completed the AWS exercise Part-one. You can try to enroll some useful online classes from the “Career Pathways” in your AWS educate account in the future. Please continue the exercise in the next page.



Explore Cloud Career Pathways

Explore AWS Educate's Cloud Career Pathways to start building the key cloud skills you'll need to be successful in leading technology careers. Earn a completion credential for each pathway and share with prospective employers to show what you've learned.

Check out the roles below to learn more about each pathway and get started!

Cloud Computing 101

Take a crash course on the cloud, its history, solutions, and why companies across the globe are looking for employees with AWS cloud expertise.

Application Developer

Curious how App Developers design, test, and improve engaging web and mobile applications in the cloud? Learn more about the skills you'll need.

Cloud Support Associate

If you're excited by the future of cloud computing and enjoy working directly with customers, learn more about becoming a Cloud Support Associate.

Cloud Support Engineer

Interested in multiple technologies and working with companies to support AWS cloud solutions? Learn more about becoming a Cloud Support Engineer.

Cybersecurity Specialist

Cybersecurity Specialists use expertise in networking, programming, and coding to protect customer data every day. Learn more about the skills they use.

Data Integration Specialist

Excited about bringing data sources together to tell the story of a product's performance? Discover ways to build and improve products through data.

Data Scientist

Curious how discovering patterns in large data sets can translate into new business strategies? Learn more about how Data Scientists do this every day.

DevOps Engineer

If you like working behind the scenes to tackle challenges and are curious about skills like scripting and coding, learn more about becoming a DevOps Engineer.

There are some other resources to learn Amazon EC2 below:

- https://aws.amazon.com/ec2/getting-started/
- https://docs.aws.amazon.com/AWSEC2/latest/WindowsGuide/EC2_GetStarted.html
- https://www.coursera.org/learn/aws-fundamentals-going-cloud-native

2. Install MongoDB (NoSQL) Database

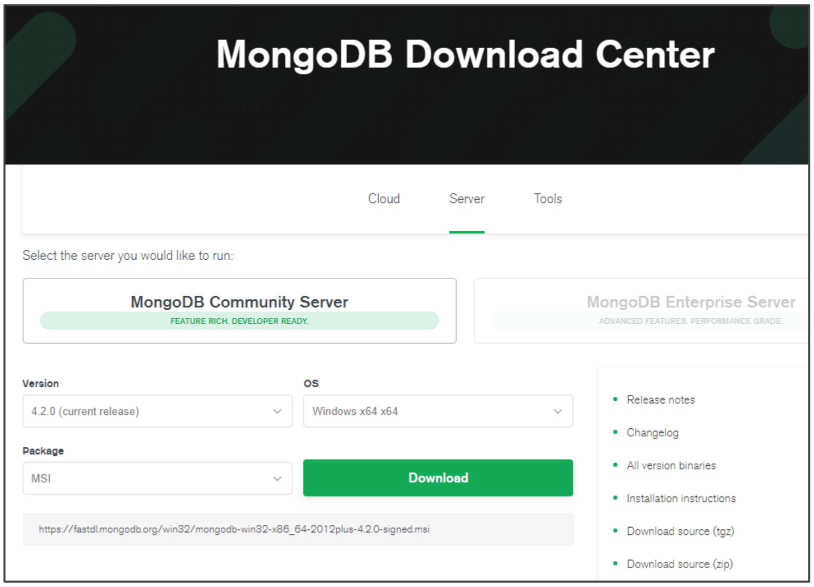
After using the Remote Desktop Login to your EC2 instance with the new user account. We need to install Google Chrome. Currently, it is very difficult to install Google Chrome using the built-in Internet Explorer (In general, using a web-browser in the server is not recommended and IE has extra security setting). **The easy way is to use your local desktop machine to download the Google Chrome installer (such as "ChromeSetup"), then COPY (from local machine) and PASTE (into your EC2 machine desktop)**. Then lunch the installer.

Note: When using the Remote Desktop Login option via the [Connect] button in the AWS window, you cannot drag and drop items such as files and the Chrome Installer. You can only do this when you utilize the Remote Desktop Connection from your local computer.

After installing Google Chrome, then use Google Chrome to install MongoDB. This is a database that is optimized for large collections of data that are often unstructured (for more information: https://en.wikipedia.org/wiki/MongoDB).

To download MongoDB, go to https://www.mongodb.com/download-center?jmp=nav#community

Click on "Software" in the top menu first, then download the "Community Server" Windows installer Package (MSI) for [Windows 64-bit x64]. You may receive a Security Alert indicating that "Do you want to run this file…" You can check the "Run" box. When you access the MongoDB website, you can add these URL into the "Trusted sites" and then continue the download process in the future.



MongoDB Download Center

Select the server you would like to run:

MongoDB Community Server — FEATURE RICH. DEVELOPER READY.

MongoDB Enterprise Server — ADVANCED FEATURES. PERFORMANCE GRADE.

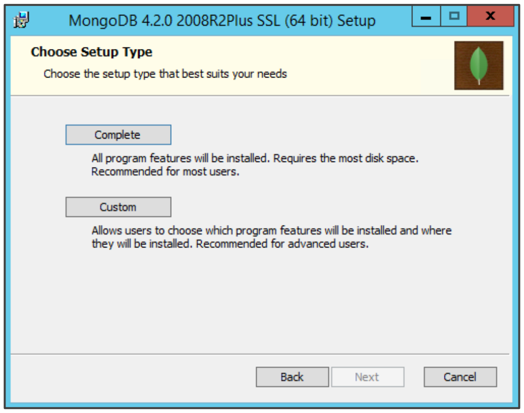
Version: 4.2.0 (current release)

OS: Windows x64 x64

Package: MSI

https://fastdl.mongodb.org/win32/mongodb-win32-x86_64-2012plus-4.2.0-signed.msi

Download and Run the installer (click on accept the user agreement, etc.) and when you get to the "Choose Setup Type" page, select the "**Custom**" option.



MongoDB 4.2.0 2008R2Plus SSL (64 bit) Setup

Choose Setup Type

Choose the setup type that best suits your needs

Complete

All program features will be installed. Requires the most disk space. Recommended for most users.

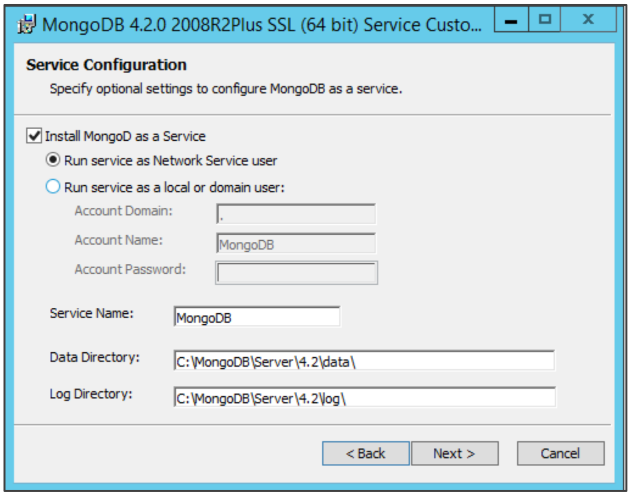
Custom

Allows users to choose which program features will be installed and where they will be installed. Recommended for advanced users.

In the "Custom Setup" page, change the Location by clicking on "Browse.." and type in the Folder name "**C:\MongoDB\Server\4.2**", then click on **OK**. This will simplify the installation and running of MongoDB. Continue with the setup selecting the default options. (click on NEXT and then).

*Check your Data Directory and Log Directory on Service Configuration.

Click on Next and **Uncheck Install MongoDB Compass** (In this tutorial, we will use Robo3T GUI tool for MongoDB). Click on the [Install] button to start the installation. If you get the message about to allow the MSI to change the computer setting, click on OK. After the installation, click on "Finish".



MongoDB 4.2.0 2008R2Plus SSL (64 bit) Service Custo...

Service Configuration

Specify optional settings to configure MongoDB as a service.

☑ Install MongoD as a Service

● Run service as Network Service user

○ Run service as a local or domain user:

Account Domain: .

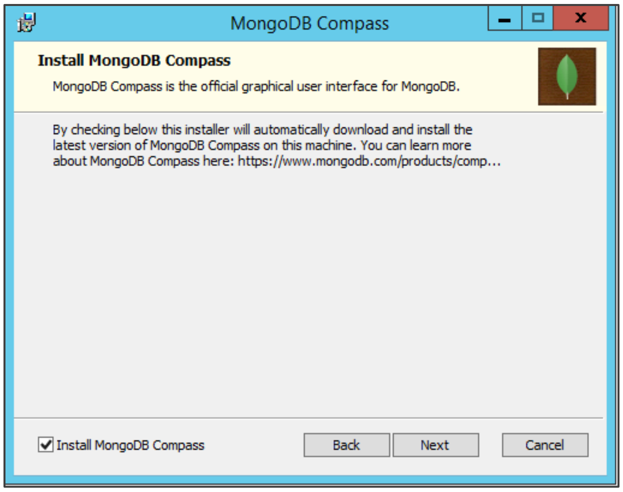
Account Name: MongoDB

Account Password:

Service Name: MongoDB

Data Directory: C:\MongoDB\Server\4.2\data\

Log Directory: C:\MongoDB\Server\4.2\log\



MongoDB Compass

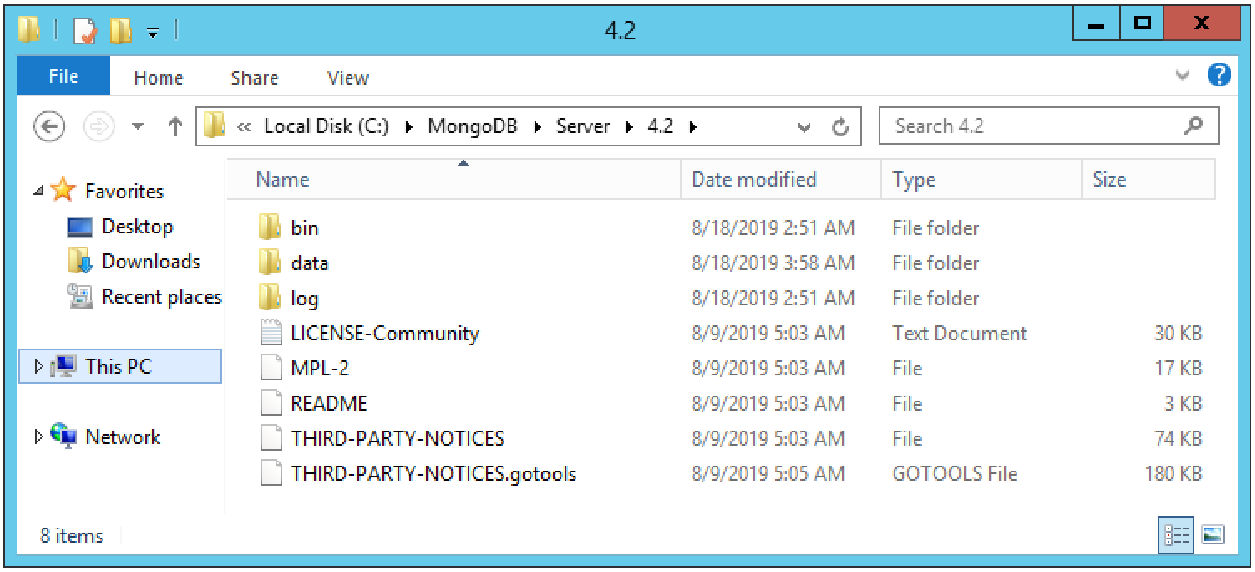
Install MongoDB Compass

MongoDB Compass is the official graphical user interface for MongoDB.

By checking below this installer will automatically download and install the latest version of MongoDB Compass on this machine. You can learn more about MongoDB Compass here: https://www.mongodb.com/products/comp...

☑ Install MongoDB Compass

You will see bin, data, log folders under **C:/MongoDB/Server/4.2** directory.

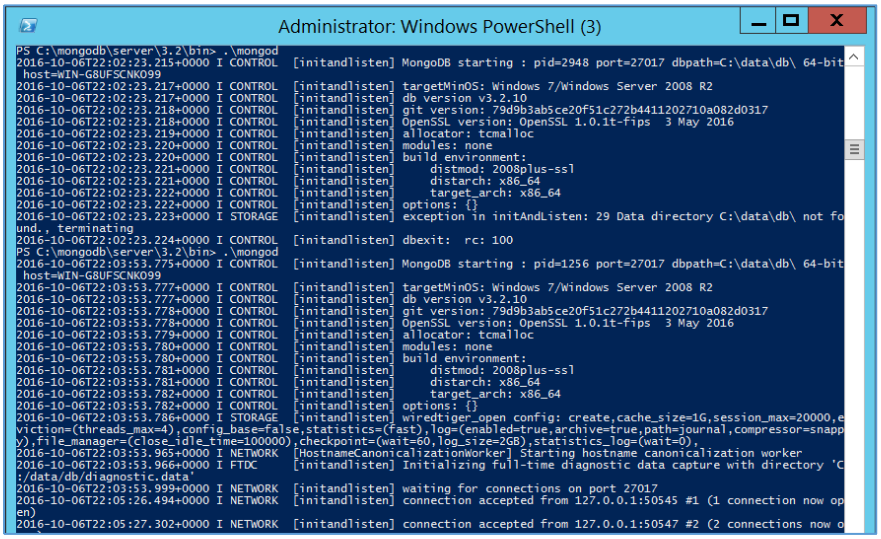


Name	Date modified	Type	Size
bin	8/18/2019 2:51 AM	File folder	
data	8/18/2019 3:58 AM	File folder	
log	8/18/2019 2:51 AM	File folder	
LICENSE-Community	8/9/2019 5:03 AM	Text Document	30 KB
MPL-2	8/9/2019 5:03 AM	File	17 KB
README	8/9/2019 5:03 AM	File	3 KB
THIRD-PARTY-NOTICES	8/9/2019 5:03 AM	File	74 KB
THIRD-PARTY-NOTICES.gotools	8/9/2019 5:05 AM	GOTOOLS File	180 KB

8 items

The default output directory of MongoDB is located in c:\data\ folder. Therefore, you need to create a "data" folder under the C: drive directly. **Please use the File manager to create a "data" folder in C: drive, then create a "db" folder inside the data folder. (Make sure to create C:\data\db folder).**

Start MongoDB by opening the [**Windows PowerShell] (right click on Start-up menu)** or click on the Windows **PowerShell** (blue icon on the Task Bar) and navigating to the folder in which you installed MongoDB (Type “**cd C:\MongoDB\server\4.2\**”. Navigate to the “bin” folder (Type “**cd bin**”). Then, type the command “**.\mongod**” to start the MongoDB. **Leave this window open, so MongoDB can continue to work on your EC2 machine. DO NOT close this window.** But you can minimize the window by click on the “_” in the upper-right corner.



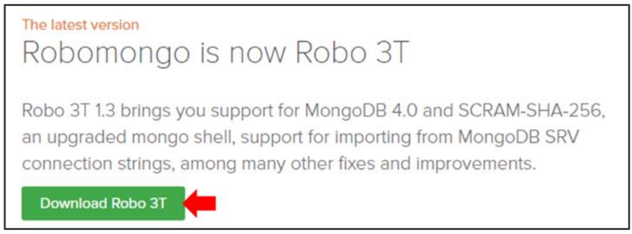
```
PS C:\mongodb\server\3.2\bin> .\mongod
2016-10-06T22:02:23.215+0000 I CONTROL  [initandlisten] MongoDB starting : pid=2948 port=27017 dbpath=C:\data\db\ 64-bit
 host=WIN-G8UFSCNKO99
2016-10-06T22:02:23.217+0000 I CONTROL  [initandlisten] targetMinOS: Windows 7/Windows Server 2008 R2
2016-10-06T22:02:23.217+0000 I CONTROL  [initandlisten] db version v3.2.10
2016-10-06T22:02:23.218+0000 I CONTROL  [initandlisten] git version: 79d9b3ab5ce20f51c272b4411202710a082d0317
2016-10-06T22:02:23.218+0000 I CONTROL  [initandlisten] OpenSSL version: OpenSSL 1.0.1t-fips  3 May 2016
2016-10-06T22:02:23.219+0000 I CONTROL  [initandlisten] allocator: tcmalloc
2016-10-06T22:02:23.220+0000 I CONTROL  [initandlisten] modules: none
2016-10-06T22:02:23.220+0000 I CONTROL  [initandlisten] build environment:
2016-10-06T22:02:23.221+0000 I CONTROL  [initandlisten]     distmod: 2008plus-ssl
2016-10-06T22:02:23.221+0000 I CONTROL  [initandlisten]     distarch: x86_64
2016-10-06T22:02:23.222+0000 I CONTROL  [initandlisten]     target_arch: x86_64
2016-10-06T22:02:23.222+0000 I CONTROL  [initandlisten] options: {}
2016-10-06T22:02:23.223+0000 I STORAGE  [initandlisten] exception in initAndListen: 29 Data directory C:\data\db\ not fo
und., terminating
2016-10-06T22:02:23.224+0000 I CONTROL  [initandlisten] dbexit:  rc: 100
PS C:\mongodb\server\3.2\bin> .\mongod
2016-10-06T22:03:53.775+0000 I CONTROL  [initandlisten] MongoDB starting : pid=1256 port=27017 dbpath=C:\data\db\ 64-bit
 host=WIN-G8UFSCNKO99
2016-10-06T22:03:53.777+0000 I CONTROL  [initandlisten] targetMinOS: Windows 7/Windows Server 2008 R2
2016-10-06T22:03:53.777+0000 I CONTROL  [initandlisten] db version v3.2.10
2016-10-06T22:03:53.778+0000 I CONTROL  [initandlisten] git version: 79d9b3ab5ce20f51c272b4411202710a082d0317
2016-10-06T22:03:53.778+0000 I CONTROL  [initandlisten] OpenSSL version: OpenSSL 1.0.1t-fips  3 May 2016
2016-10-06T22:03:53.779+0000 I CONTROL  [initandlisten] allocator: tcmalloc
2016-10-06T22:03:53.780+0000 I CONTROL  [initandlisten] modules: none
2016-10-06T22:03:53.780+0000 I CONTROL  [initandlisten] build environment:
2016-10-06T22:03:53.781+0000 I CONTROL  [initandlisten]     distmod: 2008plus-ssl
2016-10-06T22:03:53.781+0000 I CONTROL  [initandlisten]     distarch: x86_64
2016-10-06T22:03:53.782+0000 I CONTROL  [initandlisten]     target_arch: x86_64
2016-10-06T22:03:53.782+0000 I CONTROL  [initandlisten] options: {}
2016-10-06T22:03:53.786+0000 I STORAGE  [initandlisten] wiredtiger_open config: create,cache_size=1G,session_max=20000,e
viction=(threads_max=4),config_base=false,statistics=(fast),log=(enabled=true,archive=true,path=journal,compressor=snapp
y),file_manager=(close_idle_time=100000),checkpoint=(wait=60,log_size=2GB),statistics_log=(wait=0),
2016-10-06T22:03:53.965+0000 I NETWORK  [HostnameCanonicalizationWorker] Starting hostname canonicalization worker
2016-10-06T22:03:53.966+0000 I FTDC     [initandlisten] Initializing full-time diagnostic data capture with directory 'C
:/data/db/diagnostic.data'
2016-10-06T22:03:53.999+0000 I NETWORK  [initandlisten] waiting for connections on port 27017
2016-10-06T22:05:26.494+0000 I NETWORK  [initandlisten] connection accepted from 127.0.0.1:50545 #1 (1 connection now op
en)
2016-10-06T22:05:27.302+0000 I NETWORK  [initandlisten] connection accepted from 127.0.0.1:50547 #2 (2 connections now o
```

3. Install RoboMongo (a Graphic User Interface for MongoDB).

It will be helpful to install a graphical user interface for administering our MongoDB databases. Go the following page and and click on “**Download Robo 3T**” button.

Click on the first link (Download **installer** for Windows 64 bit).

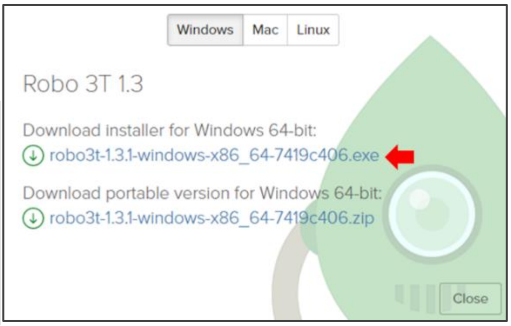
https://robomongo.org/download



The latest version

Robomongo is now Robo 3T

Robo 3T 1.3 brings you support for MongoDB 4.0 and SCRAM-SHA-256, an upgraded mongo shell, support for importing from MongoDB SRV connection strings, among many other fixes and improvements.



Robo 3T 1.3

Download installer for Windows 64-bit:
robo3t-1.3.1-windows-x86_64-7419c406.exe

Download portable version for Windows 64-bit:
robo3t-1.3.1-windows-x86_64-7419c406.zip

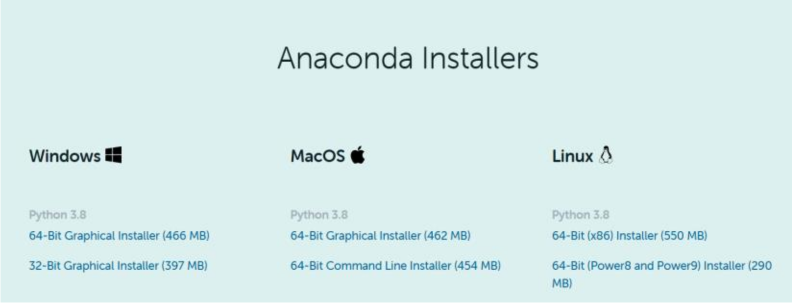
Install the Robo 3T in your EC2 machine (accept all default settings). When you run the Robo 3T first time, you will need to accept their open source license agreement.

We will not launch the Robo 3T now. The tool will be used in the last step to view the collection of tweets. To learn more about Robo 3T, see here: https://robomongo.org/

4. Install Python and related Libraries.

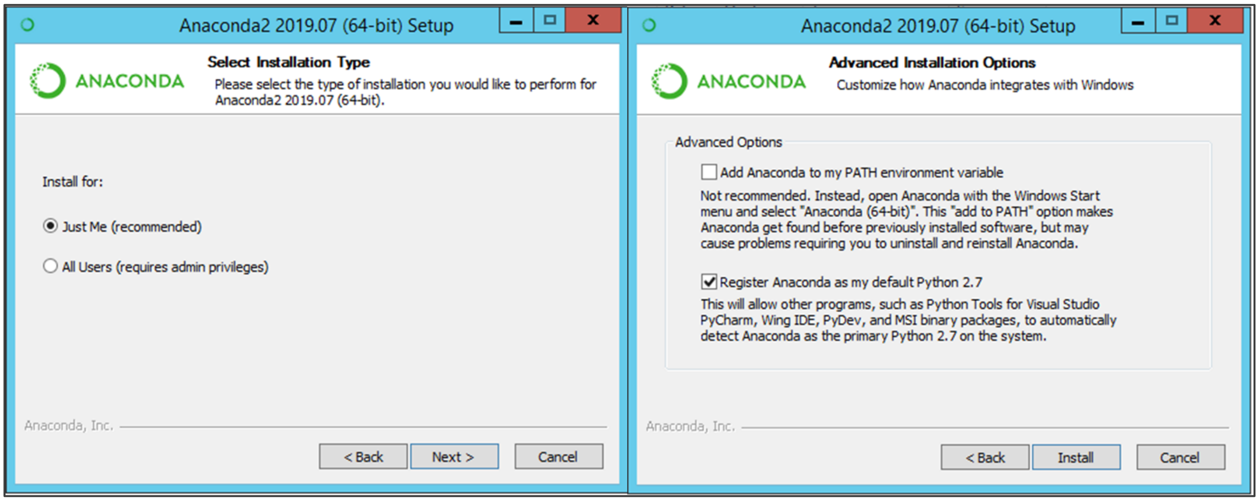
Now we want to install Python and libraries that will allow us to download tweets and insert them into MonoDB. First download **Anaconda**, which is a distribution of Python that includes many libraries that are useful for data science and scientific computing. Go to the following page to download the installer for Anaconda. Select "Windows" first, then click the "Download" button for **Python 3.8 version, 64-Bit Installer**. (Select – "**Just Me**" during the installation)

https://www.anaconda.com/download/



Anaconda Installers

Windows	MacOS	Linux
Python 3.8	Python 3.8	Python 3.8
64-Bit Graphical Installer (466 MB)	64-Bit Graphical Installer (462 MB)	64-Bit (x86) Installer (550 MB)
32-Bit Graphical Installer (397 MB)	64-Bit Command Line Installer (454 MB)	64-Bit (Power8 and Power9) Installer (290 MB)



Anaconda2 2019.07 (64-bit) Setup

Select Installation Type

Please select the type of installation you would like to perform for Anaconda2 2019.07 (64-bit).

Install for:

● Just Me (recommended)

○ All Users (requires admin privileges)

Anaconda, Inc.

Anaconda2 2019.07 (64-bit) Setup

Advanced Installation Options

Customize how Anaconda integrates with Windows

Advanced Options

□ Add Anaconda to my PATH environment variable

Not recommended. Instead, open Anaconda with the Windows Start menu and select "Anaconda (64-bit)". This "add to PATH" option makes Anaconda get found before previously installed software, but may cause problems requiring you to uninstall and reinstall Anaconda.

☑ Register Anaconda as my default Python 2.7

This will allow other programs, such as Python Tools for Visual Studio PyCharm, Wing IDE, PyDev, and MSI binary packages, to automatically detect Anaconda as the primary Python 2.7 on the system.

Anaconda, Inc.

The Python 3.8 will be installed on **C:\Users\yourusername\Anaconda2** folder. The installation will take a while. After the installation, Click on the Windows start button -> Select "Anaconda3 (64-bit) → open "**Anaconda Prompt".**

You will see **"<base> C:\Users\yourusername>"** on the new window.

Next, enter the following command to install "**tweepy**", which is a python library that will allow us to collect tweets from the Twitter API:

```
conda install –c conda-forge tweepy
```

If you see this line "Proceed ([y]/n), type "**y**" to continue.

Next, we want to install “**pymongo**”, which is a Python library that allows us to interface with MongoDB. Type the following command to install “pymongo”:

```
conda install pymongo
```

Type “y” to proceedconda cd if needed. If you installed these packages, you will see them in the package list. Type the following command to get list of packages installed in Anaconda:

```
conda list
```

Next we will create a Python script that downloads tweets from the Twitter API and places them into MongoDB.

Learning Python

In this exercise, we will not focus on the learning of basic Python Programming skills. You should try some of the following exercises or tutorials to get a basic understanding for the Python programs:

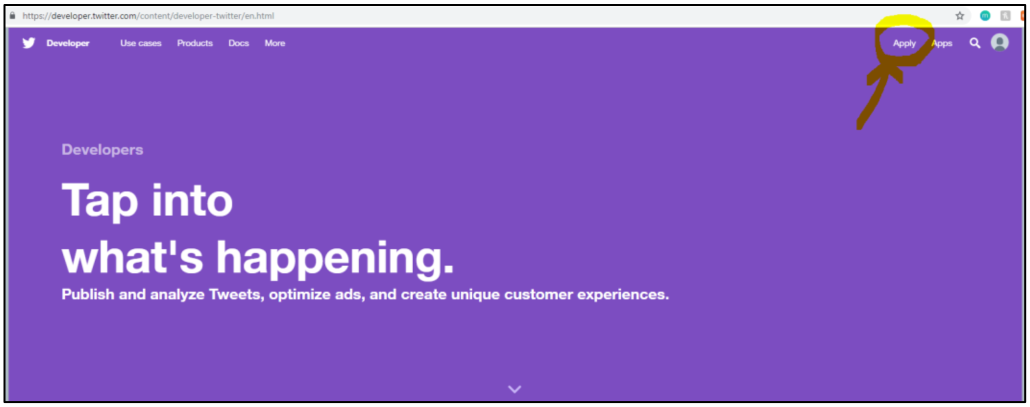
- Python Tutorial for Beginners [Full Course] 2019 https://www.youtube.com/watch?v=_uQrJ0TkZlc
- Python For Beginners https://www.python.org/about/gettingstarted/
- Python Tutorial (from W3C Schools) https://www.w3schools.in/python-tutorial/
- Python Tutorial for Beginners: Learn Python Programming in 7 Days https://www.guru99.com/python-tutorials.html
- Learn Python 2 (from Codecademy) https://www.codecademy.com/learn/learn-python

5. Get the Twitter API Keys/Tokens.

First, we will need to sign up for a Twitter account (if you don't already have one) and obtain some information that will allow us to connect to the Twitter API. **Make sure to add your mobile phone number to your Twitter Profile before the following step**.

Here are the simple procedure to get your Twitter API key/Tokens (next page).

1. Log on to Twitter Developer (**https://developer.twitter.com/**) and sign in with your Twitter account.
2. Click on "Apply" next to Sign-in button.
3. Click on **"Apply for a developer account"** and **fill out a form and** submit the application.
4. Confirm your email to complete your application.

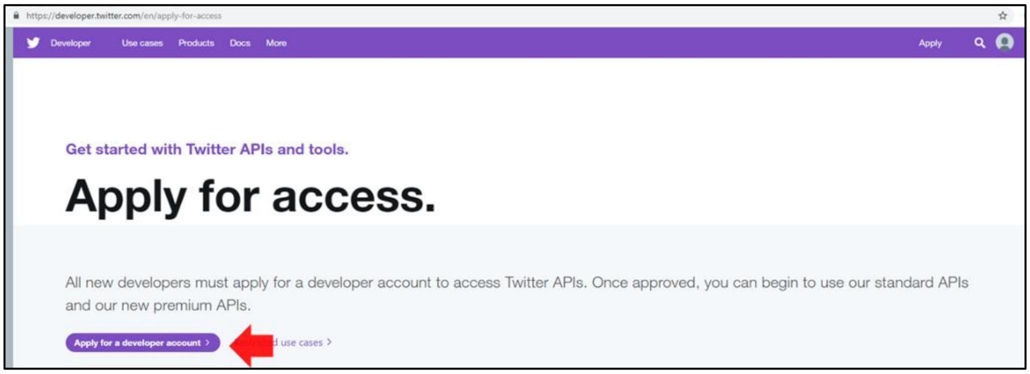


https://developer.twitter.com/content/developer-twitter/en.html

Developers

Tap into what's happening.

Publish and analyze Tweets, optimize ads, and create unique customer experiences.

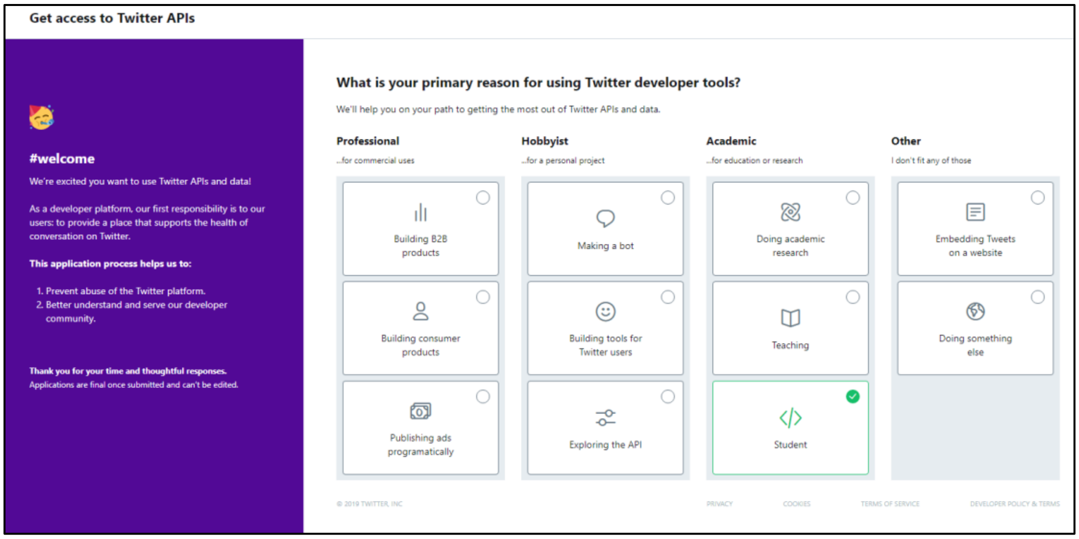


https://developer.twitter.com/en/apply-for-access

Get started with Twitter APIs and tools.

Apply for access.

All new developers must apply for a developer account to access Twitter APIs. Once approved, you can begin to use our standard APIs and our new premium APIs.



Get access to Twitter APIs

#welcome

We're excited you want to use Twitter APIs and data!

As a developer platform, our first responsibility is to our users: to provide a place that supports the health of conversation on Twitter.

This application process helps us to:

1. Prevent abuse of the Twitter platform.
2. Better understand and serve our developer community.

Thank you for your time and thoughtful responses.
Applications are final once submitted and can't be edited.

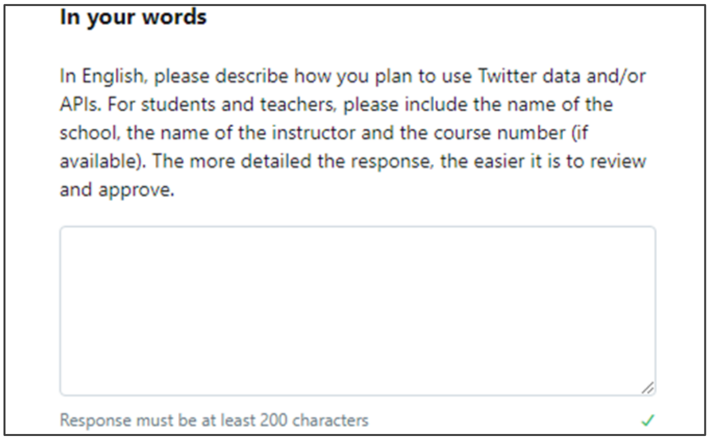
What is your primary reason for using Twitter developer tools?

We'll help you on your path to getting the most out of Twitter APIs and data.

Professional ...for commercial uses	Hobbyist ...for a personal project	Academic ...for education or research	Other I don't fit any of those
○ Building B2B products	○ Making a bot	○ Doing academic research	○ Embedding Tweets on a website
○ Building consumer products	○ Building tools for Twitter users	○ Teaching	○ Doing something else
○ Publishing ads programatically	○ Exploring the API	● Student	

© 2019 TWITTER, INC PRIVACY COOKIES TERMS OF SERVICE DEVELOPER POLICY & TERMS

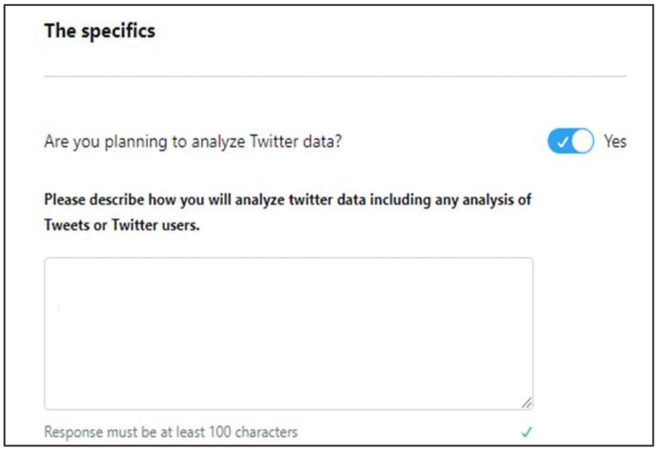
Fill out the application form. When you fill out a form (In your word), provide a class information such as "**BDA 594 Big Data Science (Instructor: Dr. Ming-Hsiang Tsou) class at San Diego State University. We will use the API to learn how to retrieve around 200 tweets from the Twitter RESTful API with user-defined keywords. We will also use this API for the class group projects in the Fall 2020 semester**".



In your words

In English, please describe how you plan to use Twitter data and/or APIs. For students and teachers, please include the name of the school, the name of the instructor and the course number (if available). The more detailed the response, the easier it is to review and approve.

Response must be at least 200 characters ✓

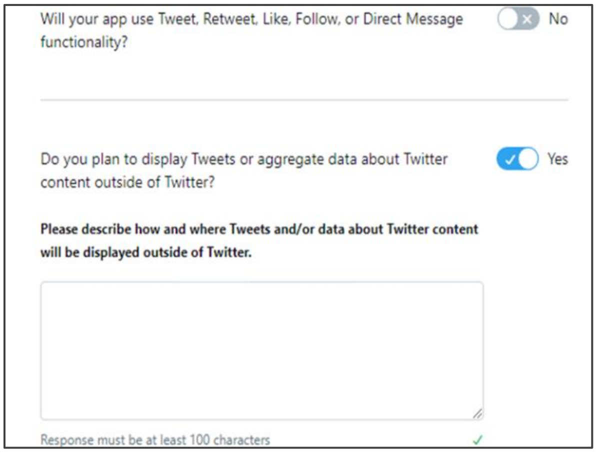


The specifics

Are you planning to analyze Twitter data? Yes

Please describe how you will analyze twitter data including any analysis of Tweets or Twitter users.

Response must be at least 100 characters ✓



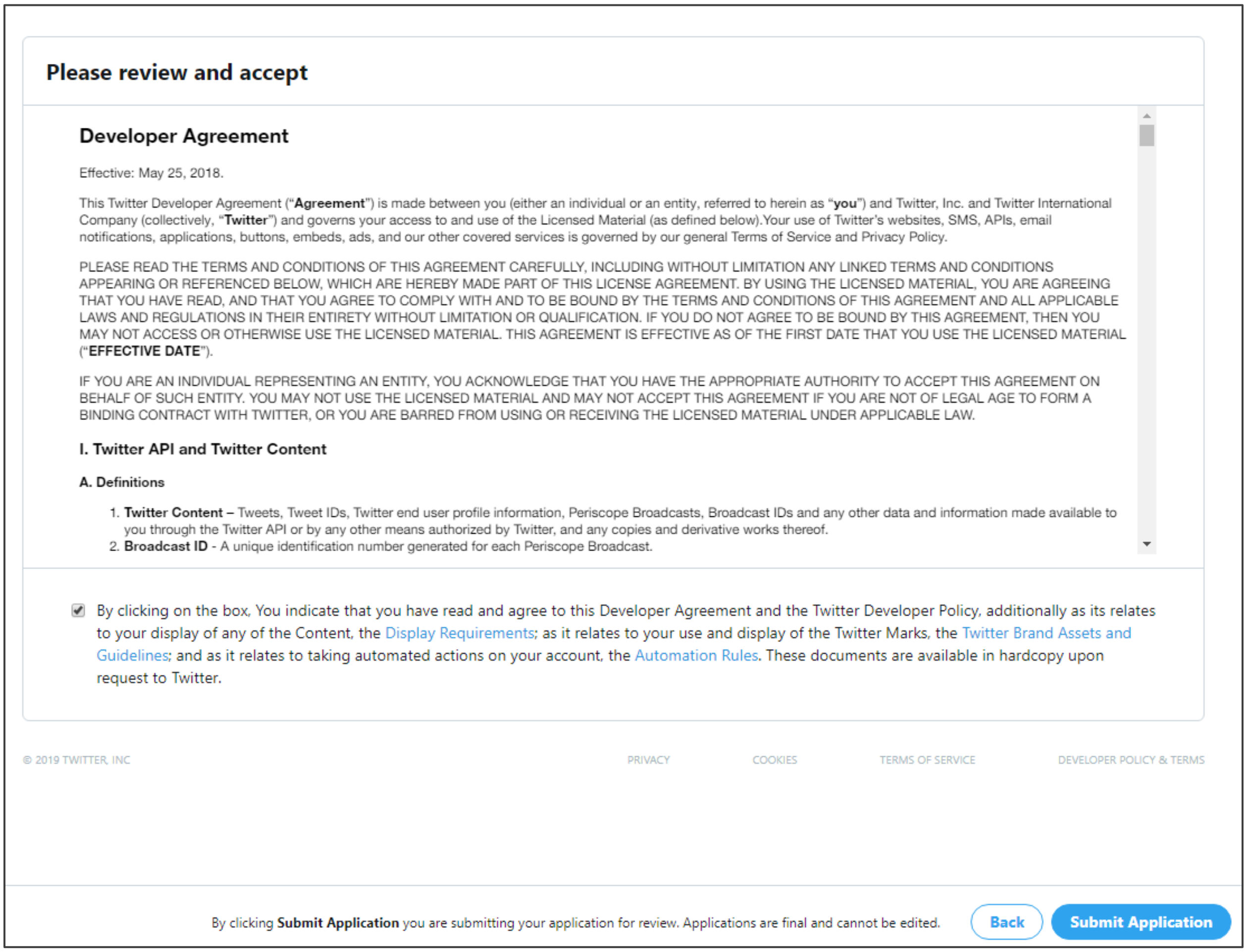
Will your app use Tweet, Retweet, Like, Follow, or Direct Message functionality? No

Do you plan to display Tweets or aggregate data about Twitter content outside of Twitter? Yes

Please describe how and where Tweets and/or data about Twitter content will be displayed outside of Twitter.

Response must be at least 100 characters ✓

In **the Specifics**, type "**The Twitter APIs will only be used for the class exercises and projects at San Diego State University. No business purpose. We will test the Twitter APIs to collect some testing keywords, such as iPhone, SDSU, COVID19, etc. Then we will create some word cloud images or sentiment analysis exercises (with python libraries) on these topics for the class projects only. Additionally, we will not interact with Twitter accounts or their contents. Our Twitter APIs will not involve tweeting, retweeting, or like content.**". Select **NO** on the "Will your app use Tweet, Retweet, Like ….". In the "Please describe how and where Tweets and/or data …", type "**The Twitter content will not be displayed publicly. The content will only be displayed inside a database (MongoDB) for internal class exercises only and for the class exercise report (internally inside a class grading system with a password protection). We may create Word Cloud images by aggregating keywords in collected tweets together in the class exercise report.**"



Please review and accept

Developer Agreement

Effective: May 25, 2018.

This Twitter Developer Agreement ("**Agreement**") is made between you (either an individual or an entity, referred to herein as "**you**") and Twitter, Inc. and Twitter International Company (collectively, "**Twitter**") and governs your access to and use of the Licensed Material (as defined below).Your use of Twitter's websites, SMS, APIs, email notifications, applications, buttons, embeds, ads, and our other covered services is governed by our general Terms of Service and Privacy Policy.

PLEASE READ THE TERMS AND CONDITIONS OF THIS AGREEMENT CAREFULLY, INCLUDING WITHOUT LIMITATION ANY LINKED TERMS AND CONDITIONS APPEARING OR REFERENCED BELOW, WHICH ARE HEREBY MADE PART OF THIS LICENSE AGREEMENT. BY USING THE LICENSED MATERIAL, YOU ARE AGREEING THAT YOU HAVE READ, AND THAT YOU AGREE TO COMPLY WITH AND TO BE BOUND BY THE TERMS AND CONDITIONS OF THIS AGREEMENT AND ALL APPLICABLE LAWS AND REGULATIONS IN THEIR ENTIRETY WITHOUT LIMITATION OR QUALIFICATION. IF YOU DO NOT AGREE TO BE BOUND BY THIS AGREEMENT, THEN YOU MAY NOT ACCESS OR OTHERWISE USE THE LICENSED MATERIAL. THIS AGREEMENT IS EFFECTIVE AS OF THE FIRST DATE THAT YOU USE THE LICENSED MATERIAL ("**EFFECTIVE DATE**").

IF YOU ARE AN INDIVIDUAL REPRESENTING AN ENTITY, YOU ACKNOWLEDGE THAT YOU HAVE THE APPROPRIATE AUTHORITY TO ACCEPT THIS AGREEMENT ON BEHALF OF SUCH ENTITY. YOU MAY NOT USE THE LICENSED MATERIAL AND MAY NOT ACCEPT THIS AGREEMENT IF YOU ARE NOT OF LEGAL AGE TO FORM A BINDING CONTRACT WITH TWITTER, OR YOU ARE BARRED FROM USING OR RECEIVING THE LICENSED MATERIAL UNDER APPLICABLE LAW.

I. Twitter API and Twitter Content

A. Definitions

1. **Twitter Content** – Tweets, Tweet IDs, Twitter end user profile information, Periscope Broadcasts, Broadcast IDs and any other data and information made available to you through the Twitter API or by any other means authorized by Twitter, and any copies and derivative works thereof.
2. **Broadcast ID** - A unique identification number generated for each Periscope Broadcast.

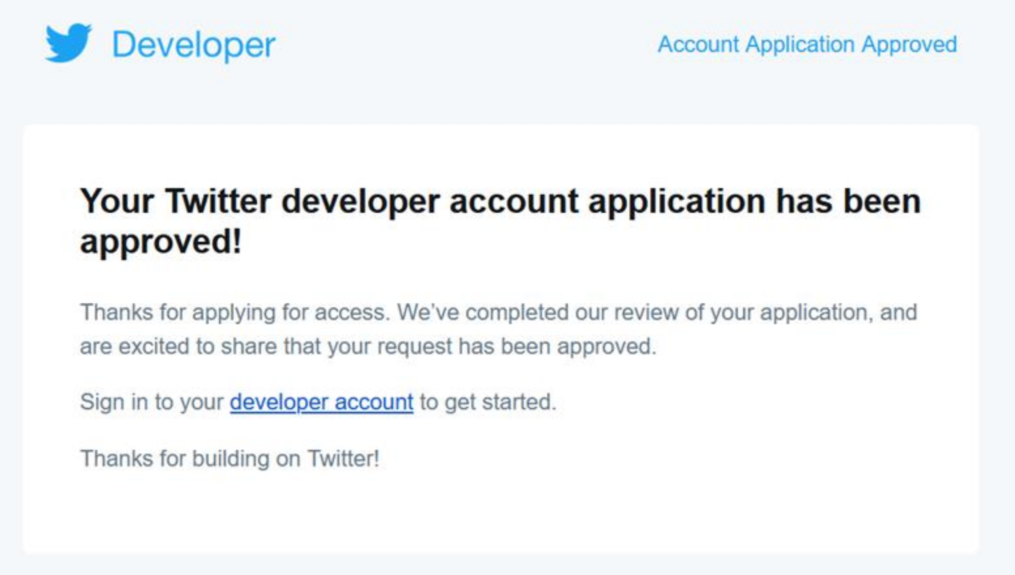
☑ By clicking on the box, You indicate that you have read and agree to this Developer Agreement and the Twitter Developer Policy, additionally as its relates to your display of any of the Content, the Display Requirements; as it relates to your use and display of the Twitter Marks, the Twitter Brand Assets and Guidelines; and as it relates to taking automated actions on your account, the Automation Rules. These documents are available in hardcopy upon request to Twitter.

By clicking **Submit Application** you are submitting your application for review. Applications are final and cannot be edited.

5. Click on "**Submit application**" button. (Note: you need to add your mobile phone to your Twitter profile before creating an application.)

Please check your email and click the confirmation link **to complete the application process (It may take a few days).

6. Once your developer account is approved, click on "**developer account**" button in the email.



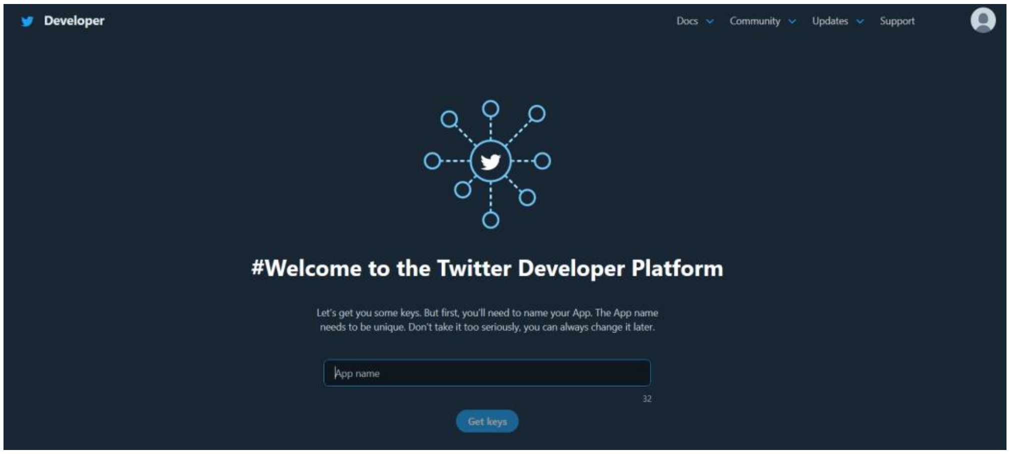
Your Twitter developer account application has been approved!

Thanks for applying for access. We've completed our review of your application, and are excited to share that your request has been approved.

Sign in to your developer account to get started.

Thanks for building on Twitter!

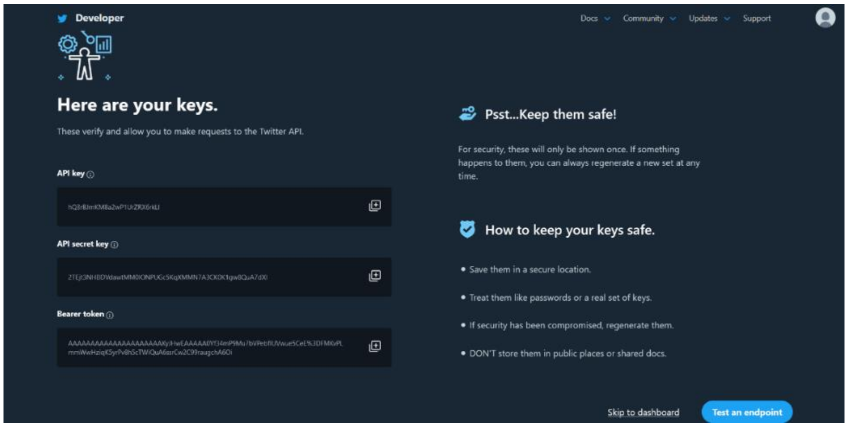
7. Name your App in the text field and click on the "Get keys" button.



#Welcome to the Twitter Developer Platform

Let's get you some keys. But first, you'll need to name your App. The App name needs to be unique. Don't take it too seriously, you can always change it later.

8. Then you will see the API and API secret keys as following figure.



Here are your keys.

These verify and allow you to make requests to the Twitter API.

API key: hQ3rBJmKM8a2wP1UrZRX6rkLl

API secret key: 2TEjt3NHBDVdawtMM0KONPUGc5KqXMMN7A3CK0K1qw8QuA7dXl

Bearer token: AAAAAAAAAAAAAAAAAAAAAKyIHwEAAAAA0Yf34mP9Mu7bVPebfUVwue5CeE%3DFMKvPL
mmWwHziqK5yrPv8hScTWiQuA6ssrCw2C99raugchA6Oi

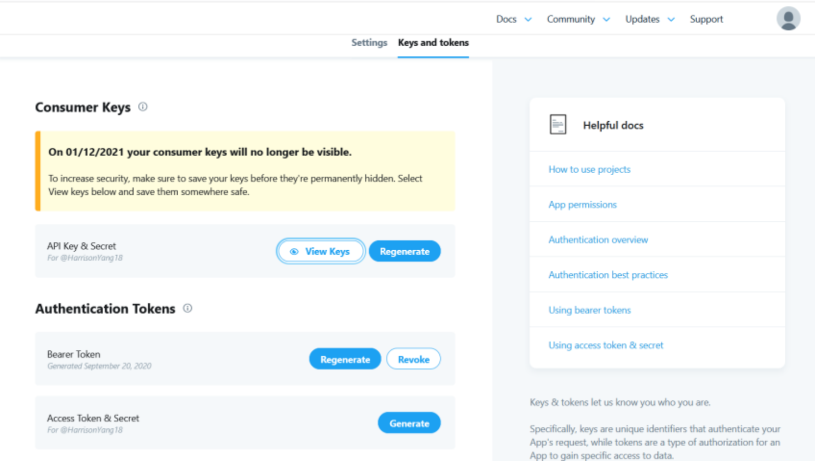
Psst...Keep them safe!

For security, these will only be shown once. If something happens to them, you can always regenerate a new set at any time.

How to keep your keys safe.

- Save them in a secure location.
- Treat them like passwords or a real set of keys.
- If security has been compromised, regenerate them.
- DON'T store them in public places or shared docs.

9. Then go to the dashboard and click on “Keys and tokens” next to “Settings” on the upper menu. Then click on the “Generate” to get the Access Token & Secret. **Copy and Save** your Consumer key (API Key), Consumer secret (API Secret), Access Token, and Access Token Secret into your local file (in Word or text file). You will need to use the four items in the next step.



Consumer Keys

On 01/12/2021 your consumer keys will no longer be visible.

To increase security, make sure to save your keys before they're permanently hidden. Select View keys below and save them somewhere safe.

API Key & Secret
For @HarrisonYang18

Authentication Tokens

Bearer Token
Generated September 20, 2020

Access Token & Secret
For @HarrisonYang18

Keys & tokens let us know you who you are.

Specifically, keys are unique identifiers that authenticate your App's request, while tokens are a type of authorization for an App to gain specific access to data.

6. Create a Python Program to Collect Tweets.

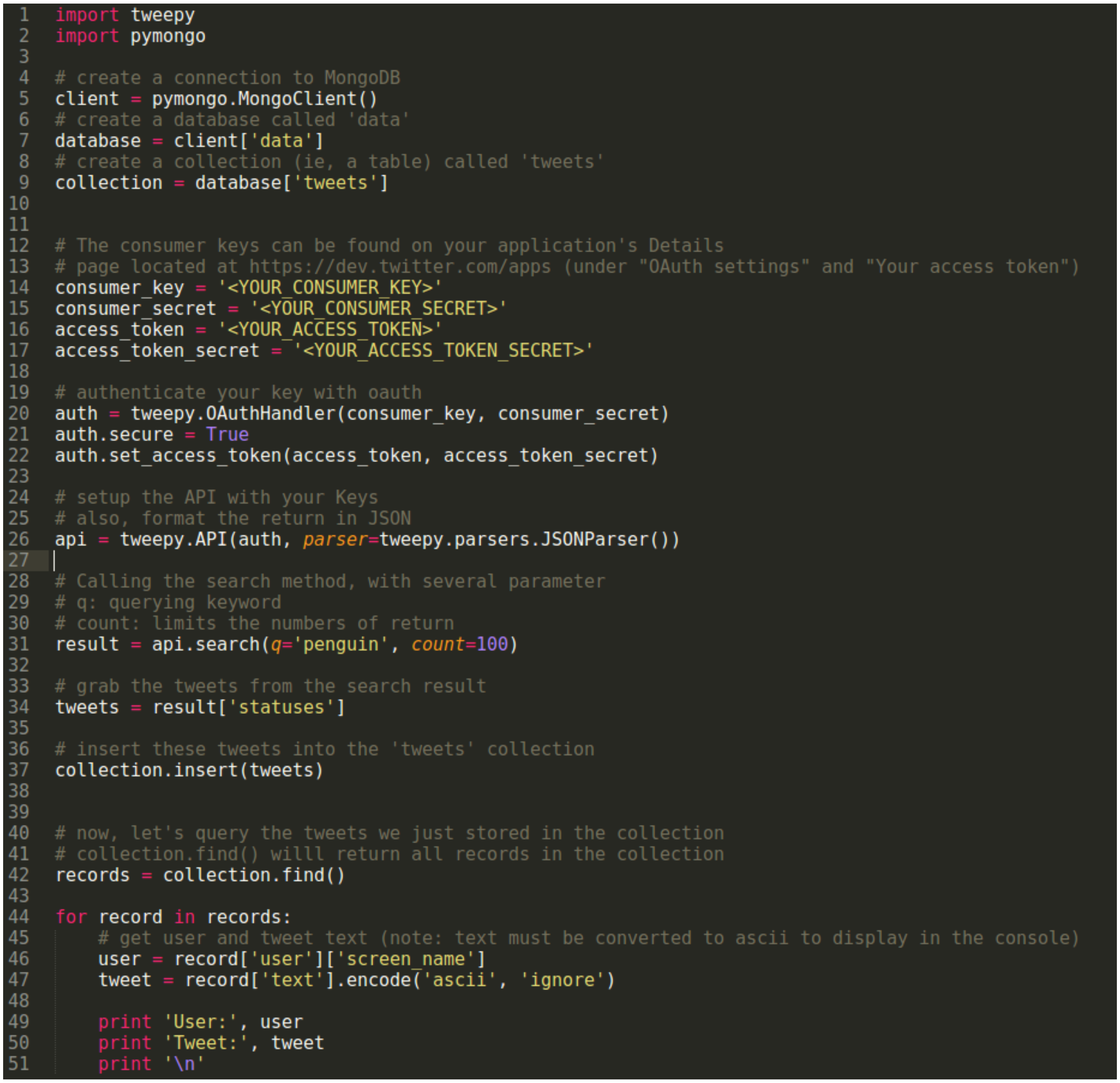
Next, we want to create a Python script, called “**get_tweets.py**”, which establishes a connection to the Twitter API, downloads tweets, and stores them in MongoDB:

Open a programing text editing tool, like **notepad++ (https://notepad-plus-plus.org/)** or **ATOM** (https://atom.io/). Create the python program (**see the next page**) and save it (as “**get_tweets-yourname.py**”) into your EC2 instance C:\Scripts folder (You will need to create this new folder first). Make sure to type the Twitter **API KEY, Secret, Token, and Token_Secret** into this python program.
This program will search 100 Twitter messages containing “penguin” and then save the results into the MongoDB database. **Please choose our own preferred search keyword (replacing “penguin” with your own keyword, such as “SDSU” or “iPhone”.**

To run this script, open a command prompt and navigate to the folder where you saved your script into a new folder “**C:\Scripts**” (you will create this new folder first). Assuming you have called your file “**get_tweets-yourname.py**”, you can run the following python command to download tweets related to your keyword and store them in MongoDB:

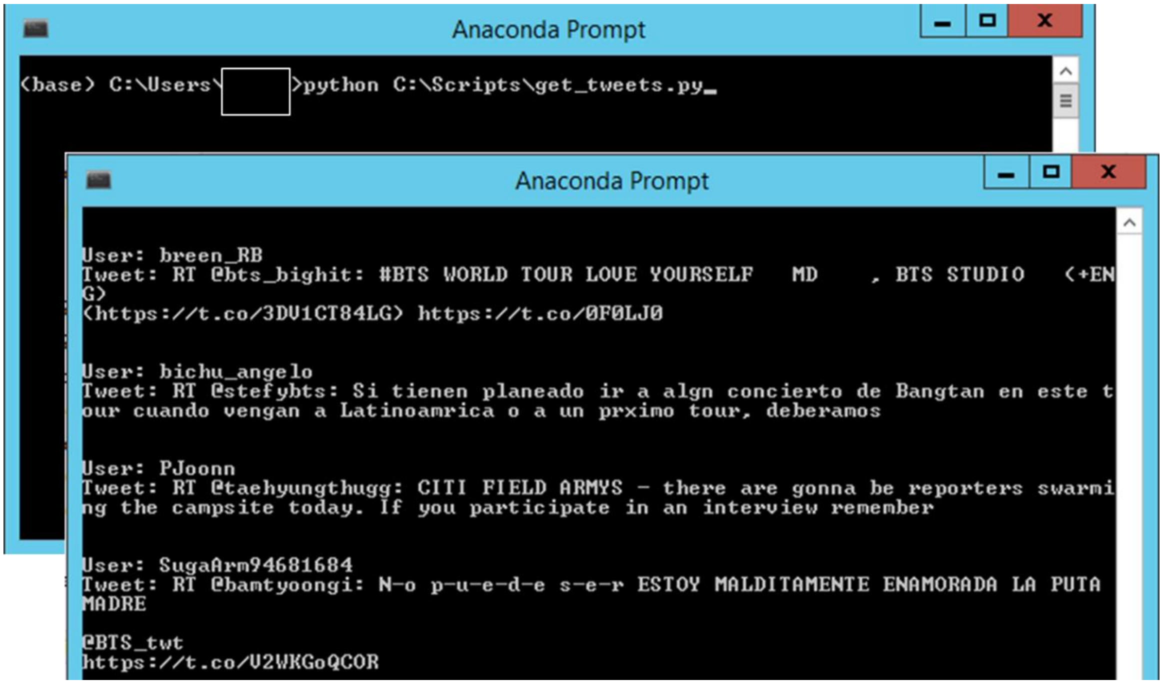
```
python C:\Scripts\get_tweets-yourname.py
```

“get_tweets.py”



```
import tweepy
import pymongo

# create a connection to MongoDB
client = pymongo.MongoClient()
# create a database called 'data'
database = client['data']
# create a collection (ie, a table) called 'tweets'
collection = database['tweets']


# The consumer keys can be found on your application's Details
# page located at https://dev.twitter.com/apps (under "OAuth settings" and "Your access token")
consumer_key = '<YOUR_CONSUMER_KEY>'
consumer_secret = '<YOUR_CONSUMER_SECRET>'
access_token = '<YOUR_ACCESS_TOKEN>'
access_token_secret = '<YOUR_ACCESS_TOKEN_SECRET>'

# authenticate your key with oauth
auth = tweepy.OAuthHandler(consumer_key, consumer_secret)
auth.secure = True
auth.set_access_token(access_token, access_token_secret)

# setup the API with your Keys
# also, format the return in JSON
api = tweepy.API(auth, parser=tweepy.parsers.JSONParser())

# Calling the search method, with several parameter
# q: querying keyword
# count: limits the numbers of return
result = api.search(q='penguin', count=100)

# grab the tweets from the search result
tweets = result['statuses']

# insert these tweets into the 'tweets' collection
collection.insert(tweets)


# now, let's query the tweets we just stored in the collection
# collection.find() willl return all records in the collection
records = collection.find()

for record in records:
    # get user and tweet text (note: text must be converted to ascii to display in the console)
    user = record['user']['screen_name']
    tweet = record['text'].encode('ascii', 'ignore')

    print 'User:', user
    print 'Tweet:', tweet
    print '\n'
```

Note: When you add your Twitter keys to your Python Program, do not include the <> and include single quotes only (' '). It must be a string. If you are using Python 3.7 version, the Tweepy codes may not work. You need to manually change the streaming.py file in Tweepy. See this link for more info: https://github.com/tweepy/tweepy/issues/1017

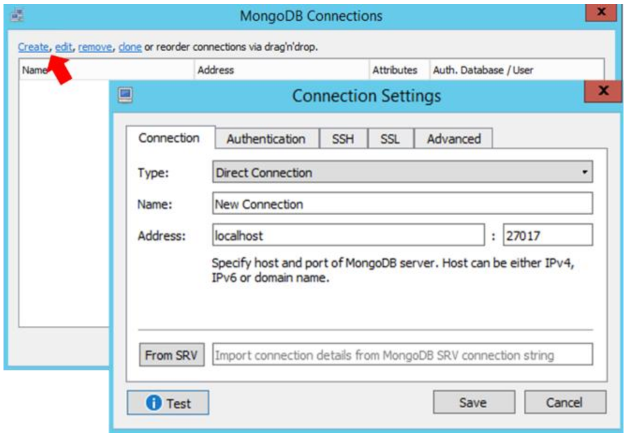


```
(base) C:\Users\[redacted]>python C:\Scripts\get_tweets.py_
```

```
User: breen_RB
Tweet: RT @bts_bighit: #BTS WORLD TOUR LOVE YOURSELF   MD    , BTS STUDIO   (+EN
G)
(https://t.co/3DV1CT84LG) https://t.co/0F0LJ0


User: bichu_angelo
Tweet: RT @stefybts: Si tienen planeado ir a algn concierto de Bangtan en este t
our cuando vengan a Latinoamrica o a un prximo tour, deberamos


User: PJoonn
Tweet: RT @taehyungthugg: CITI FIELD ARMYS - there are gonna be reporters swarmi
ng the campsite today. If you participate in an interview remember


User: SugaArm94681684
Tweet: RT @bamtyoongi: N-o p-u-e-d-e s-e-r ESTOY MALDITAMENTE ENAMORADA LA PUTA
MADRE

@BTS_twt
https://t.co/V2WKGoQCOR
```

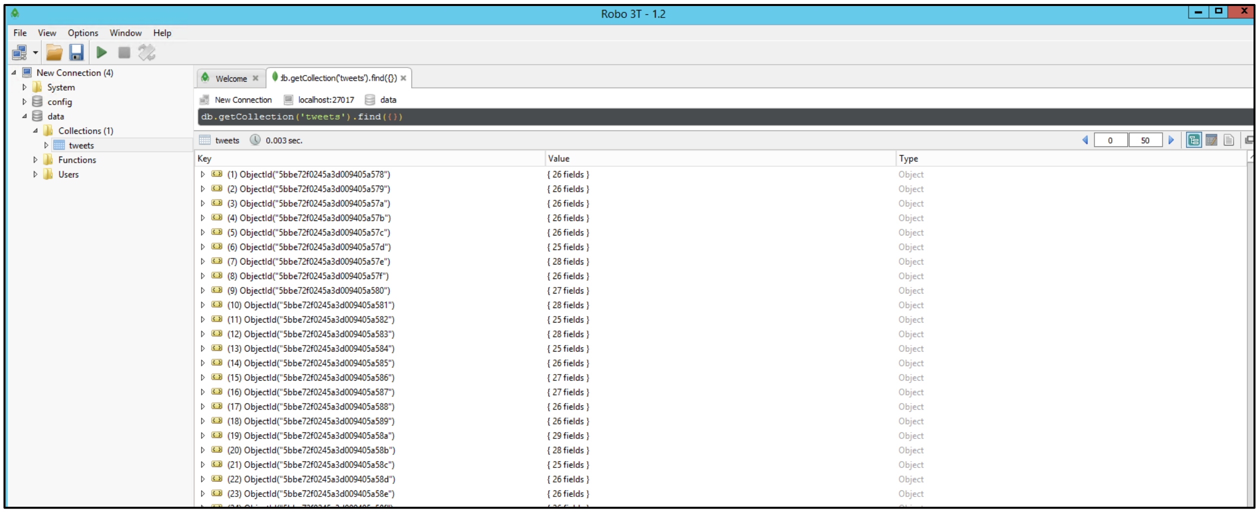
Note: Some of the tweets in the screenshot above do not have the selected keyword in the text. This is because the Twitter API will return tweets if the user's screen name also contains the keyword (even if the text does not).

Next, we can open up Robo 3T. The first time this program is opened it will ask you to create a MongoDB connection. Click the "**Create**" link (blue text) and enter a name for our connection. The default settings (localhost) should be fine to configure this connection. Click "**Save**" and then connect to your connection.



Type: Direct Connection
Name: New Connection
Address: localhost : 27017
Specify host and port of MongoDB server. Host can be either IPv4, IPv6 or domain name.

In the Python script we created above, we stored the tweets in the "tweets" collection within the "data" database. Navigate to this collection within Robo 3T. From here we can inspect the tweets we stored using the Python script: data → Collection(1) → tweets



```
db.getCollection('tweets').find({})
```

Key	Value	Type
(1) ObjectId("5bbe72f0245a3d009405a578")	{ 26 fields }	Object
(2) ObjectId("5bbe72f0245a3d009405a579")	{ 26 fields }	Object
(3) ObjectId("5bbe72f0245a3d009405a57a")	{ 26 fields }	Object
(4) ObjectId("5bbe72f0245a3d009405a57b")	{ 26 fields }	Object
(5) ObjectId("5bbe72f0245a3d009405a57c")	{ 26 fields }	Object
(6) ObjectId("5bbe72f0245a3d009405a57d")	{ 25 fields }	Object
(7) ObjectId("5bbe72f0245a3d009405a57e")	{ 28 fields }	Object
(8) ObjectId("5bbe72f0245a3d009405a57f")	{ 26 fields }	Object
(9) ObjectId("5bbe72f0245a3d009405a580")	{ 27 fields }	Object
(10) ObjectId("5bbe72f0245a3d009405a581")	{ 28 fields }	Object
(11) ObjectId("5bbe72f0245a3d009405a582")	{ 25 fields }	Object
(12) ObjectId("5bbe72f0245a3d009405a583")	{ 28 fields }	Object
(13) ObjectId("5bbe72f0245a3d009405a584")	{ 25 fields }	Object
(14) ObjectId("5bbe72f0245a3d009405a585")	{ 26 fields }	Object
(15) ObjectId("5bbe72f0245a3d009405a586")	{ 27 fields }	Object
(16) ObjectId("5bbe72f0245a3d009405a587")	{ 27 fields }	Object
(17) ObjectId("5bbe72f0245a3d009405a588")	{ 26 fields }	Object
(18) ObjectId("5bbe72f0245a3d009405a589")	{ 26 fields }	Object
(19) ObjectId("5bbe72f0245a3d009405a58a")	{ 29 fields }	Object
(20) ObjectId("5bbe72f0245a3d009405a58b")	{ 28 fields }	Object
(21) ObjectId("5bbe72f0245a3d009405a58c")	{ 25 fields }	Object
(22) ObjectId("5bbe72f0245a3d009405a58d")	{ 26 fields }	Object
(23) ObjectId("5bbe72f0245a3d009405a58e")	{ 26 fields }	Object

Take a close look at the content of one selected tweet inside the MongoDB. What are the KEYS in the databases? What are the Values associated with each KEY? What type of Value are they? Read the Data Model Introduction in MongoDB online document:

https://docs.mongodb.com/manual/core/data-modeling-introduction/

After finishing all steps and tasks, you can just keep your free EC2 Instance running, since it is a free-tier instance and we have $100 credits for our student AWS account. If you want to SAVE some credits, you can "STOP" the EC instance when you are not running the server to save money (similar to "shutdown" your server). When you need to re-use the Instance, you can "Start" the instance again.

If you select "STOP" for your instance, you will see a warning message that "Any data on the ephemeral storage of your instance will be lost". Since we are not using any ephemeral storage in this exercise. It is fine to STOP the instance if needed. (Note: you will need to "re-launch" the MongoDB database (see page 17) when you re-START this instance next time).

After finishing this Web Exercise, Please use your own words to answer the following questions (next page): (DO NOT COPY any web resources or Wikipedia texts. We will check your answers with Blackboard tools to verify that your responses are uniquely yours.) By submitting your answers (paper) to Blackboard, you agree: (1) that you are submitting your paper to be used and stored as part of the SafeAssign™ services in accordance with the Blackboard Privacy Policy; (2) that your institution may use your paper in accordance with your institution's policies; and (3) that your use of SafeAssign will be without recourse against Blackboard Inc. and its affiliates.

SafeAssign accepts files in .doc, .docx, .docm, .ppt, .pptx, .odt, .txt, .rtf, .pdf, and .html file formats only. Files of any other format will not be checked through SafeAssign.

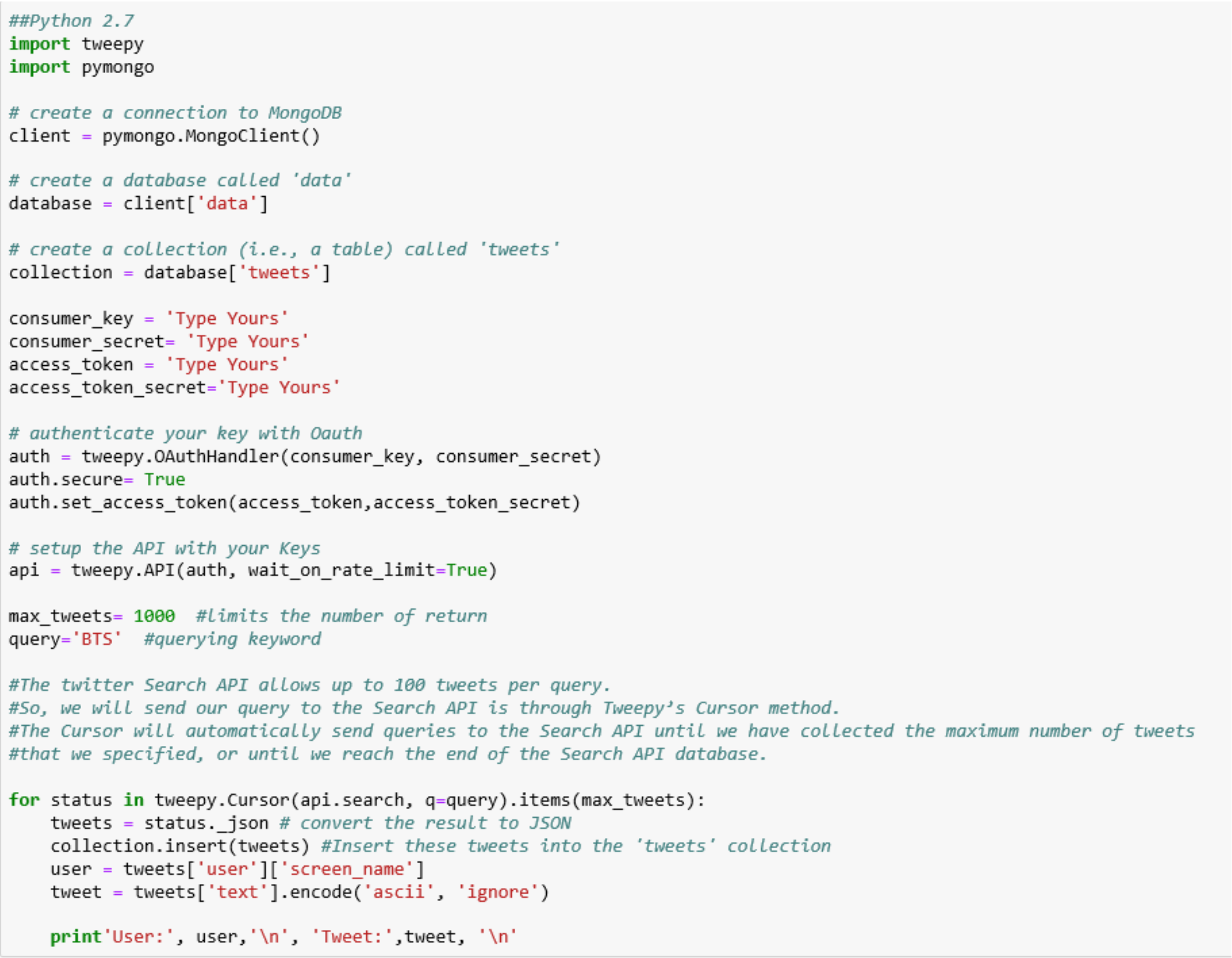
LAB-4 Additional Assignment:

1. What are the advantages and disadvantage of using Amazon EC2 for building a research project website?
2. Attached the screenshot of your EC2 Virtual Server.
3. What is "EBS" in Amazon's Cloud platform? What are the differences between EBS and S3? What are the advantages of create an additional EBS in your Virtual Machines?
4. What are the differences between traditional SQL databases and NoSQL databases?
5. What are the two Python libraries installed in this exercises? What are their major functions and features? Provide website links for each of them.
6. Provide a short summary of MongoDB and list THREE features which you like about MongoDB and the THREE items which you don't like about MongoDB.
7. What is your selected keyword in the **get_tweets-yourname.py** to collect tweets? How many tweets did you get? **List the content of first 3 tweets in your report. (Please include all metadata elements in the example, including ID, source, text, location, etc. Screenshots are fine.)** Discuss your search results and how to improve the keyword search for your future research projects.

Please submit your LAB-4 Answers (in a MS Word or a PDF file format only) to the Blackboard System BEFORE the DUE DATE/TIME.

Additional Step (Optional):

In the **get_tweets.py,** we only collected 100 tweets per keyword search. The twitter Search API only allows up to 100 tweets per query. To increase the number of search result tweets, we will send our query to the Search API is through Tweepy's **Cursor** method. The Cursor will automatically send queries to the Search API until we have collected the maximum number of tweets that we specified, or until we reach the end of the Search API database. You can try to modify your get_tweets.py to the next page codes and test if you can get 1000 tweets for your selected keywords.



```
##Python 2.7
import tweepy
import pymongo

# create a connection to MongoDB
client = pymongo.MongoClient()

# create a database called 'data'
database = client['data']

# create a collection (i.e., a table) called 'tweets'
collection = database['tweets']

consumer_key = 'Type Yours'
consumer_secret= 'Type Yours'
access_token = 'Type Yours'
access_token_secret='Type Yours'

# authenticate your key with Oauth
auth = tweepy.OAuthHandler(consumer_key, consumer_secret)
auth.secure= True
auth.set_access_token(access_token,access_token_secret)

# setup the API with your Keys
api = tweepy.API(auth, wait_on_rate_limit=True)

max_tweets= 1000  #limits the number of return
query='BTS'  #querying keyword

#The twitter Search API allows up to 100 tweets per query.
#So, we will send our query to the Search API is through Tweepy's Cursor method.
#The Cursor will automatically send queries to the Search API until we have collected the maximum number of tweets
#that we specified, or until we reach the end of the Search API database.

for status in tweepy.Cursor(api.search, q=query).items(max_tweets):
    tweets = status._json # convert the result to JSON
    collection.insert(tweets) #Insert these tweets into the 'tweets' collection
    user = tweets['user']['screen_name']
    tweet = tweets['text'].encode('ascii', 'ignore')

    print'User:', user,'\n', 'Tweet:',tweet, '\n'
```