

# IS 497 Final Project Presentation

MongoDB & Amazon Web  
Services

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# Introduction & Overview

1. Setting up of MongoDB engine using Amazon Web Services and MongoDB Compass.
2. Performing rudimentary configurational changes basis, the requirements of the targeted database and project goal.
3. Implementing security policies for database.
4. Loading of dataset and querying records.
5. Running backup and recovery procedures.



# Technology

1. Database Engine - MongoDB Engine
2. Cloud Platform – Amazon Web Services (EC2)
3. MongoDB Compass (Visual tool/ Client for MongoDB)



# Dataset

1. Name – food-inspections.csv (222.08 MB)
2. Link – <https://www.kaggle.com/chicago/chicago-food-inspections/activity>
3. Description – This data is derived from inspections of restaurants and other food establishments in Chicago from January 1, 2010 to the present. Inspections are performed by staff from the Chicago Department of Public Health's Food Protection Program using a standardized procedure. The results of the inspection are inputted into a database, then reviewed and approved by a State of Illinois Licensed Environmental Health Practitioner (LEHP).
4. Metadata – There are 196825 rows and 22 columns. Column names – Inspection ID, DBA Name, AKA Name, License#, Facility Type, Risk, Address, City, State, Zip, Inspection Date, Inspection Type, Results, Violations Longitude, Latitude, Location, Historical Wards 2003-2015, Zip codes, Community Areas, Census and Wards.

# Deployment and Configuration



# Amazon EC2 Windows Server Instance

1. Created a MS Windows Server 2019 Base Instance in Amazon EC2
2. Instance type - T2.micro (free tier eligible)
3. Configured security group
4. Created Key Pair to access Amazon Machine Image (.pem)

Services

1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Add Tags 6. Configure Security Group 7. Review

### Step 7: Review Instance Launch

AMI Details [Edit AMI](#)

**Microsoft Windows Server 2019 Base**

**Free tier eligible** Microsoft Windows Server 2019 with Desktop Experience Locale English AMI provided by Amazon

Root Device Type: x86 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

**Hourly Software Fees: \$0.00 per hour** on t1.micro instance. Additional taxes or fees may apply. Software charges will begin once you launch this AMI and continue until you terminate the instance.

If you have an existing license entitlement to use this software, then you can launch this software without creating a new subscription. If you do not have an existing entitlement, then by launching this software, you will be subscribed to this software and agree that your use of this software is subject to the pricing terms and the seller's [End User License Agreement](#)

Instance Type [Edit instance type](#)

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

# Connect RDP to Instance

**New EC2 Experience**

EC2 Dashboard **New**

Events **New**

Tags

Limits

▼ Instances

Instances **New**

Instance Types

Launch Templates

Successfully started i-08005be1598ca611c

Instances (1/1) Info

Filter instances

Name	Instance ID	Instance state	Instance type	Status check
MongoDB	i-08005be1598ca611c	Stopped	t2.micro	-

Session Manager **RDP client**

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: ec2-34-238-151-49.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.

Services

EC2 > Instances > i-08005be1598ca611c > Password Decryption Successful

The password for instance i-08005be1598ca611c was successfully decrypted.

Get Windows password info

Retrieve and decrypt the initial Windows administrator password.

To decrypt the password, you will need your key pair.

Key pair associated with this instance: mongodb\_key

Browse to your key pair:

Browse

Or copy and paste the contents of the key pair below:

Remote Desktop Connection

Windows Security

Enter your credentials

These credentials will be used to connect to ec2-34-238-151-49.compute-1.amazonaws.com.

Administrator

Password

Remember me

OK Cancel

More choices

Enter Options Connect Cancel

Service	Path	Status	LocalSystemName
MixedRealityOpenVRService	Windows Mixed Reality OpenVR Service	Stopped	LocalSystemName
ModuleCoreService	McAfee Module Core Service	Running	
MongoDB	MongoDB Server (MongoDB)	Running	
MozillaMaintenance	Mozilla Maintenance Service	Stopped	
mpssvc	Windows Defender Firewall	Running	LocalSystemName
MSDTC	Distributed Transaction Coordinator	Stopped	
MSISCSI	Microsoft iSCSI Initiator Service	Stopped	netvcs
msiserver	Windows Installer	Stopped	netvcs
NaturalAuthentication	Natural Authentication	Stopped	netvcs



# Deploy MongoDB server (mongo shell, CMD)

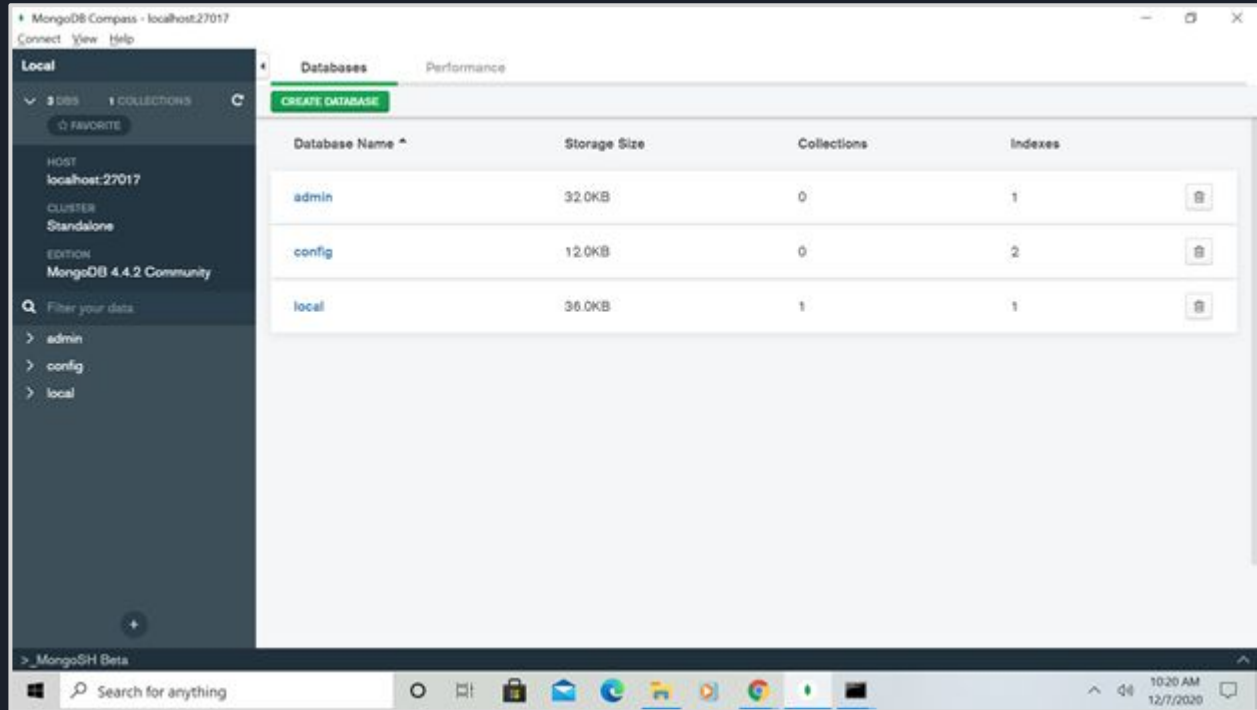
```
Command Prompt - mongod
C:\Program Files\MongoDB\Server\4.4\bin>mongo
MongoDB shell version v4.4.2
connecting to: mongodb://127.0.0.1:27017/?compressors=disabled&gssapiServiceName=mongodb
Implicit session: session { "id" : UUID("63c7667e-2b12-461a-a76a-7fa7b1d9f9d7") }
MongoDB server version: 4.4.2
...
The server generated these startup warnings when booting:
  2020-12-06T13:51:27.847+05:30: Access control is not enabled for the database. Read and write access to data and
configuration is unrestricted
...
  Enable MongoDB's free cloud-based monitoring service, which will then receive and display
metrics about your deployment (disk utilization, CPU, operation statistics, etc).

  The monitoring data will be available on a MongoDB website with a unique URL accessible to you
and anyone you share the URL with. MongoDB may use this information to make product
improvements and to suggest MongoDB products and deployment options to you.

  To enable free monitoring, run the following command: db.enableFreeMonitoring()
  To permanently disable this reminder, run the following command: db.disableFreeMonitoring()
...
> show databases
admin    0.000GB
config  0.000GB
local   0.000GB
> use admin
switched to db admin
> show collections
system.version
>
```

```
Command Prompt - mongod
Tiger message", "attr": {"message": "[1607340482:919695][20780:140715801924944], txn-recover: [WT_VERB_RECOVERY | WT_VERB
RECOVERY_PROGRESS] Set global recovery timestamp: (0, 0)"}
{"t":{"$date":"2020-12-07T16:58:02.920+05:30"},"s":"I",  "c":"STORAGE",  "id":22430,   "ctx":"initandlisten","msg":"WiredTiger message", "attr":{"message":"[1607340482:920747][20780:140715801924944], txn-recover: [WT_VERB_RECOVERY | WT_VERB
RECOVERY_PROGRESS] Set global oldest timestamp: (0, 0)"}
{"t":{"$date":"2020-12-07T16:58:02.992+05:30"},"s":"I",  "c":"STORAGE",  "id":4795906, "ctx":"initandlisten","msg":"WiredTiger opened", "attr":{"durationMillis":772}}
{"t":{"$date":"2020-12-07T16:58:02.992+05:30"},"s":"I",  "c":"RECOVERY",  "id":23987,   "ctx":"initandlisten","msg":"WiredTiger recoveryTimestamp", "attr":{"recoveryTimestamp":{"$timestamp":{"t":0,"i":0}}}}
{"t":{"$date":"2020-12-07T16:58:02.995+05:30"},"s":"I",  "c":"STORAGE",  "id":4366408,   "ctx":"initandlisten","msg":"No table logging settings modifications are required for existing WiredTiger tables", "attr":{"loggingEnabled":true}}
{"t":{"$date":"2020-12-07T16:58:02.999+05:30"},"s":"I",  "c":"STORAGE",  "id":22262,   "ctx":"initandlisten","msg":"Timestamp monitor starting"}
{"t":{"$date":"2020-12-07T16:58:03.001+05:30"},"s":"W",  "c":"CONTROL",  "id":22120,   "ctx":"initandlisten","msg":"Access control is not enabled for the database. Read and write access to data and configuration is unrestricted", "tags":["startupWarnings"]}
{"t":{"$date":"2020-12-07T16:58:03.001+05:30"},"s":"W",  "c":"CONTROL",  "id":22140,   "ctx":"initandlisten","msg":"This server is bound to localhost. Remote systems will be unable to connect to this server. Start the server with --bind_ip address> to specify which IP addresses it should serve responses from, or with --bind_ip_all to bind to all interfaces. If this behavior is desired, start the server with --bind_ip 127.0.0.1 to disable this warning", "tags":["startupWarnings"]}
{"t":{"$date":"2020-12-07T16:58:03.004+05:30"},"s":"I",  "c":"STORAGE",  "id":20536,   "ctx":"initandlisten","msg":"File Control is enabled on this deployment"}
{"t":{"$date":"2020-12-07T16:58:03.274+05:30"},"s":"I",  "c":"FTDC",      "id":20625,   "ctx":"initandlisten","msg":"Initializing full-time diagnostic data capture", "attr":{"dataDirectory":"C:/data/db/diagnostic.data"}}
{"t":{"$date":"2020-12-07T16:58:03.283+05:30"},"s":"I",  "c":"NETWORK",  "id":23015,   "ctx":"listener","msg":"Listener on", "attr":{"address":"127.0.0.1"}}
{"t":{"$date":"2020-12-07T16:58:03.283+05:30"},"s":"I",  "c":"NETWORK",  "id":23016,   "ctx":"listener","msg":"Waiting for connections", "attr":{"port":27017,"ssl":"off"}}
```

# Connect to MongoDB using MongoDB Compass



# Import Data

MongoDB Compass - localhost:27017/inspection.foodreview

Connect View Collection Help

Local

3 DBS 1 COLLECTIONS

Filter your data

admin

config

inspection

foodreview

local

Inspect

Docu

Options

Select Input File Type

JSON CSV

Select delimiter: COMMA

☒ Ignore empty strings

☐ Stop on errors

Specify Fields and Types

Inspection ID	DBA Name	JSA Name
2152683	CHOPOTLE MEXICAN GRILL	CHOPOTLE MEXICAN GRILL
2152734	CHELLI'S T-2	CHELLI'S (T1-B34)
2152713	NICK'S FIRE GRILL STEAK & LEMONADE INC.	NICK'S FIRE GRILL STEAK & LEMONADE
2152785	TAQUERIA BLUE LINE INC.	empty string
2152727	PORTAGE PARK DAY NURSERY	MOSAIC EARLY CHILDHOOD ACADEMY
2152738	AWARIT RESTAURANT	AWARIT RESTAURANT
2152684	CHOPOTLE MEXICAN GRILL	CHOPOTLE MEXICAN GRILL
2152782	NABORA LATIN STORE	NABORA LATIN STORE
2152718	JAMPESON	JAMPESON PUBLIC SCHOOLS
2152696	GATEWAY MONTESSORI SCHOOL	GATEWAY MONTESSORI

CANCEL IMPORT

10:37 AM 12/7/2020

MongoDB Compass - localhost:27017

Connect View Collection Help

Local

3 DBS 1 COLLECTIONS

Filter your data

admin

config

inspection

foodreview

local

Inspect

Docu

Options

Select Input File Type

JSON CSV

Select delimiter: COMMA

☒ Ignore empty strings

☐ Stop on errors

Specify Fields and Types

Inspection ID	DBA Name	JSA Name
2152683	CHOPOTLE MEXICAN GRILL	CHOPOTLE MEXICAN GRILL
2152734	CHELLI'S T-2	CHELLI'S (T1-B34)
2152713	NICK'S FIRE GRILL STEAK & LEMONADE INC.	NICK'S FIRE GRILL STEAK & LEMONADE
2152785	TAQUERIA BLUE LINE INC.	empty string
2152727	PORTAGE PARK DAY NURSERY	MOSAIC EARLY CHILDHOOD ACADEMY
2152738	AWARIT RESTAURANT	AWARIT RESTAURANT
2152684	CHOPOTLE MEXICAN GRILL	CHOPOTLE MEXICAN GRILL
2152782	NABORA LATIN STORE	NABORA LATIN STORE
2152718	JAMPESON	JAMPESON PUBLIC SCHOOLS
2152696	GATEWAY MONTESSORI SCHOOL	GATEWAY MONTESSORI

Import completed 10,000 (100%)

DONE

10:37 AM 12/7/2020

# Query Data

The screenshot shows the MongoDB Compass interface. The left sidebar displays the database structure: Local > Collections > inspection > foodreview. The main panel shows the 'inspection.foodreview' collection with 10.0k documents, 16.1MB total size, and 1 index. The 'Documents' tab is active, showing a list of documents. The first document is expanded, displaying its JSON structure:

```
{ "_id": ObjectId("5f4b8b4e9b1345b0e0d1"), "Inspection ID": "2352683", "DBA Name": "CHOPOTLE MEXICAN GRILL", "ASA Name": "CHOPOTLE MEXICAN GRILL", "License #": "2678642", "Facility Type": "Restaurant", "Risk": "Risk 3 (High)", "Address": "7855 W ADDISON ST", "City": "CHICAGO", "State": "IL", "Zip": "60637", "Inspection Date": "2019-12-04T00:00:00.000", "Inspection Type": "License Re-Inspection", "Results": "Pass w/ Conditions", "Violations": "3. MANAGEMENT, FOOD EMPLOYEE AND CONDITIONAL EMPLOYEE, KNOWLEDGE, RESP...", "Latitude": "41.8471775", "Longitude": "-87.6553815", "Location": {"lat": 41.8471775, "lon": -87.655381522224}, "3mghide": "41.847177522224" }
```

The screenshot shows the MongoDB Compass interface with a filter applied: Risk: "Risk 3 (High)". The main panel shows the 'inspection.foodreview' collection with 10.0k documents, 16.1MB total size, and 1 index. The 'Documents' tab is active, showing a list of documents. The first document is expanded, displaying its JSON structure:

```
{ "_id": ObjectId("5f4b8b4e9b1345b0e0d1"), "Inspection ID": "2352683", "DBA Name": "CHOPOTLE MEXICAN GRILL", "ASA Name": "CHOPOTLE MEXICAN GRILL", "License #": "2678642", "Facility Type": "Restaurant", "Risk": "Risk 3 (High)", "Address": "7855 W ADDISON ST", "City": "CHICAGO", "State": "IL", "Zip": "60637", "Inspection Date": "2019-12-04T00:00:00.000", "Inspection Type": "License Re-Inspection", "Results": "Pass w/ Conditions", "Violations": "3. MANAGEMENT, FOOD EMPLOYEE AND CONDITIONAL EMPLOYEE, KNOWLEDGE, RESP...", "Latitude": "41.8471775", "Longitude": "-87.6553815", "Location": {"lat": 41.8471775, "lon": -87.655381522224}, "3mghide": "41.847177522224" }
```

# Database Security

Administrator: Command Prompt - mongo

```
connecting to: mongodb://127.0.0.1:27017/?compressors=disabled&gssapiServiceName=mongodb
Implicit session: session { "id" : UUID("b100afb0-e419-43be-98d5-85487b481434") }
MongoDB server version: 4.4.2
...
The server generated these startup warnings when booting:
  2020-12-07T09:46:24.319+05:30: Access control is not enabled for the database. Read and write
...
...
  Enable MongoDB's free cloud-based monitoring service, which will then receive and display
  metrics about your deployment (disk utilization, CPU, operation statistics, etc).

  The monitoring data will be available on a MongoDB website with a unique URL accessible to you
  and anyone you share the URL with. MongoDB may use this information to make product
  improvements and to suggest MongoDB products and deployment options to you.

  To enable free monitoring, run the following command: db.enableFreeMonitoring()
  To permanently disable this reminder, run the following command: db.disableFreeMonitoring()
...
> use admin
switched to db admin
> db.createUser(
... {
...   user: "admin",
...   pwd: "pass123",
...   roles: [ "readwrite" ]
... }
... }
Successfully added user: { "user" : "admin", "roles" : [ "readwrite" ] }
>
```

Administrator: Command Prompt - mongo

```
... }
... }
Successfully added user: { "user" : "admin", "roles" : [ "readwrite" ] }
> show users
{
  "_id" : "admin.admin",
  "userId" : UUID("d5f74a41-5e7c-45b2-b714-3acced2283d"),
  "user" : "admin",
  "db" : "admin",
  "roles" : [
    {
      "role" : "readwrite",
      "db" : "admin"
    }
  ],
  "mechanisms" : [
    "SCRAM-SHA-1",
    "SCRAM-SHA-256"
  ]
}
> db.shutdownServer()
server should be down...
> exit
```

# Database Security

```
***
    Enable MongoDB's free cloud-based monitoring service, which will then receive and display
    metrics about your deployment (disk utilization, CPU, operation statistics, etc).

    The monitoring data will be available on a MongoDB website with a unique URL accessible to you
    and anyone you share the URL with. MongoDB may use this information to make product
    improvements and to suggest MongoDB products and deployment options to you.

    To enable free monitoring, run the following command: db.enableFreeMonitoring()
    To permanently disable this reminder, run the following command: db.disableFreeMonitoring()
***
> mongo.exe --host localhost --port 27017
uncaught exception: SyntaxError: unexpected token: identifier :
@(shell):1:12
> use admin
switched to db admin
> db.create({user: "admin", pwd: "pass@1234.", roles: ["root"]})
uncaught exception: TypeError: db.create is not a function :
@(shell):1:1
> db.create(
... {
... user: "admin",
... pwd: "pass@1234.",
... roles: ["root"]
... }
... )
uncaught exception: TypeError: db.create is not a function :
@(shell):1:1
```

# Database Security

```
Command Prompt - mongo
to specify which IP addresses it should serve responses from, or with --bind_ip_all to bind to all interfaces. If this behavior is desired, start the server with --bind_ip
127.0.0.1 to disable this warning
...
...
  Enable MongoDB's free cloud-based monitoring service, which will then receive and display
  metrics about your deployment (disk utilization, CPU, operation statistics, etc).

  The monitoring data will be available on a MongoDB website with a unique URL accessible to you
  and anyone you share the URL with. MongoDB may use this information to make product
  improvements and to suggest MongoDB products and deployment options to you.

  To enable free monitoring, run the following command: db.enableFreeMonitoring()
  To permanently disable this reminder, run the following command: db.disableFreeMonitoring()
...
> --dbpath "C:\Program Files\MongoDB\Server\4.4\data\db" --auth
uncaught exception: SyntaxError: unexpected token: string literal :
@shell):1:9
> use admin
switched to db admin
> use inspection
switched to db inspection
> db.createUser(
... {
...   user: "admin",
...   pwd: "pass123",
...   roles: [ "read-write", "dbAdmin" ]
... }
... )
Successfully added user: { "user" : "admin", "roles" : [ "readWrite", "dbAdmin" ] }
>
```

# Backup & Restore

```
Program Files\MongoDB\Server\4.4\bin>mongodump
-11-28T16:11:27.462+0530    writing company.system.indexes to dump\company\s
a.indexes.bson
-11-28T16:11:27.463+0530    writing company.employees to dump\company\employ
bson
-11-28T16:11:27.463+0530    writing newdatabase.system.indexes to dump\newda
e\system.indexes.bson
-11-28T16:11:27.463+0530    writing newdatabase.newcollection to dump\newdat
\newcollection.bson
-11-28T16:11:27.465+0530    writing company.employees metadata to dump\compa
employees.metadata.json
-11-28T16:11:27.467+0530    done dumping company.employees <8 doc
-11-28T16:11:27.467+0530    writing newdatabase.newcollection met
newdatabase\newcollection.metadata.json
-11-28T16:11:27.468+0530    done dumping newdatabase.newcollectio
```

<input type="checkbox"/>	Name	Date modified
<input checked="" type="checkbox"/>	foodreview.bson	12/6/2020 1:5
<input type="checkbox"/>	foodreview_metadata	11/21/2020 5:
<input type="checkbox"/>	system.indexes.bson	12/6/2020 1:5

```
Program Files\MongoDB\Server\4.4\bin>mongorestore
-11-28T16:12:26.666+0530    using default 'dump' directory
-11-28T16:12:26.678+0530    building a list of dbs and collections to rest
on dump dir
-11-28T16:12:26.684+0530    reading metadata file from dump\company\employ
metadata.json
-11-28T16:12:26.685+0530    reading metadata file from dump\newdatabase\ne
ction.metadata.json
-11-28T16:12:26.705+0530    restoring company.employees from file dump\com
employees.bson
-11-28T16:12:26.707+0530    restoring newdatabase.newcollection from file
newdatabase\newcollection.bson
-11-28T16:12:28.158+0530    restoring indexes for collection company.emplo
rom metadata
-11-28T16:12:28.175+0530    finished restoring company.employees <8 docume
-11-28T16:12:28.487+0530    restoring indexes for collection newdatabase.n
ection from metadata
-11-28T16:12:28.504+0530    finished restoring newdatabase.newcollection <
ment>
-11-28T16:12:28.505+0530    done
```





# Cost

Estimated annual costs for running the system in a production-grade configuration-

1. T2.micro free eligible tier costs \$0.02 per hour on usage.
2. EC2 charges for Micro instances are free for up to 750 hours a month if you qualify for the AWS Free Tier.
3. \$ 172.8 per year inclusive of data transfer, usage, etc.
4. MongoDB Atlas offers a perpetual free tier and usage-based pricing for as little as \$9/mo which is \$108.



# References

1. <https://docs.mongodb.com/>
2. <https://www.tutorialspoint.com/mongodb/>
3. [https://docs.aws.amazon.com/AWSEC2/latest/WindowsGuide/connecting\\_to\\_windows\\_instance.html?icmpid=docs\\_ec2\\_console](https://docs.aws.amazon.com/AWSEC2/latest/WindowsGuide/connecting_to_windows_instance.html?icmpid=docs_ec2_console)
4. <https://aws.amazon.com/premiumsupport/knowledge-center/rds-connect-ec2-bastion-host/>
5. <https://mongodb-documentation.readthedocs.io/en/latest/ecosystem/tutorial/install-mongodb-on-amazon-ec2.html#gsc.tab=0>
6. <https://treehouse.github.io/installation-guides/windows/mongo-windows.html>
7. <https://medium.com/@setu677/how-to-install-mongodb-on-aws-ec2-instance-935c3df6375e>
8. <https://docs.mongodb.com/compass/master/import-export>
9. <https://docs.mongodb.com/compass/master/query/filter>
10. <https://www.youtube.com/watch?v=uglIriTacbw>



Thank You!

