

# Tutorial 8: NoSQL and MongoDB

## Introduction

NoSQL offers wonderful advantages to web developers. MongoDB is one of the popular NoSQL database management systems.

## Install mongodb

For Windows users:

If you use Windows just download and install your MongoDB here:

[https://fastdl.mongodb.org/win32/mongodb-win32-x86\\_64-2008plus-ssl-4.0.9-signed.msi](https://fastdl.mongodb.org/win32/mongodb-win32-x86_64-2008plus-ssl-4.0.9-signed.msi)

Or you can download from my drive:

<https://drive.google.com/open?id=1NaZO359-hQueBWhefzlr618LcFa28VqR>

You can use GUI version to work with MongoDB.

After installing you can start what we call Compass:

The screenshot shows the MongoDB Compass interface. On the left, the sidebar displays 'My Cluster' with 4 DBs and 2 Collections. The 'mydb' database is selected, and its 'students' collection is shown. The main panel title is 'localhost:27017 STANDALONE'. It shows the 'mydb.students' collection with 1 document. The document details are: \_id: ObjectId("5cbe81a349efcb83bb9fb4e3") and name: "Thanh Ngoc". There are tabs for Documents, Aggregations, Schema, Explain Plan, Indexes, and Validation. Buttons for INSERT DOCUMENT, VIEW, LIST, and TABLE are at the bottom. A FIND button is highlighted in green. The status bar at the bottom right says 'Displaying documents 0 - 1 of 1'.

For Mac/Linux users:

In case you still want to use GUI client:

<https://www.mongodb.com/download-center/compass>

This tutorial guides you to install mongodb manually without using an installer

- Download the zip file from Mongodb webpage:  
<https://www.mongodb.com/download-center#community>
- After downloading, unzip the file in the same folder, i.e. Downloads, and rename the extracted folder to **mongo343**
- Congratulation: you have installed mongo db successfully

*\*All the following commands are assumed that the working directory is Downloads*

- Now you need to create a data folder so that mongodb can store db. Let's create it in the Downloads folder. Use terminal:

**sudo mkdir -p data/db**

Remember only 1 dash -

- Now you can start mongodb server:

**mongo343/bin/mongod --dbpath=data/db**

Remember 2 dashes --

If everything is fine you will see something like this:

- As this server is running as a console app, if you want to test a client connection to the server using the command line, you need to create a new terminal window.

Do it on Mac by using Command+T on the current Terminal

- In the new terminal, type: **mongo343/bin/mongo**

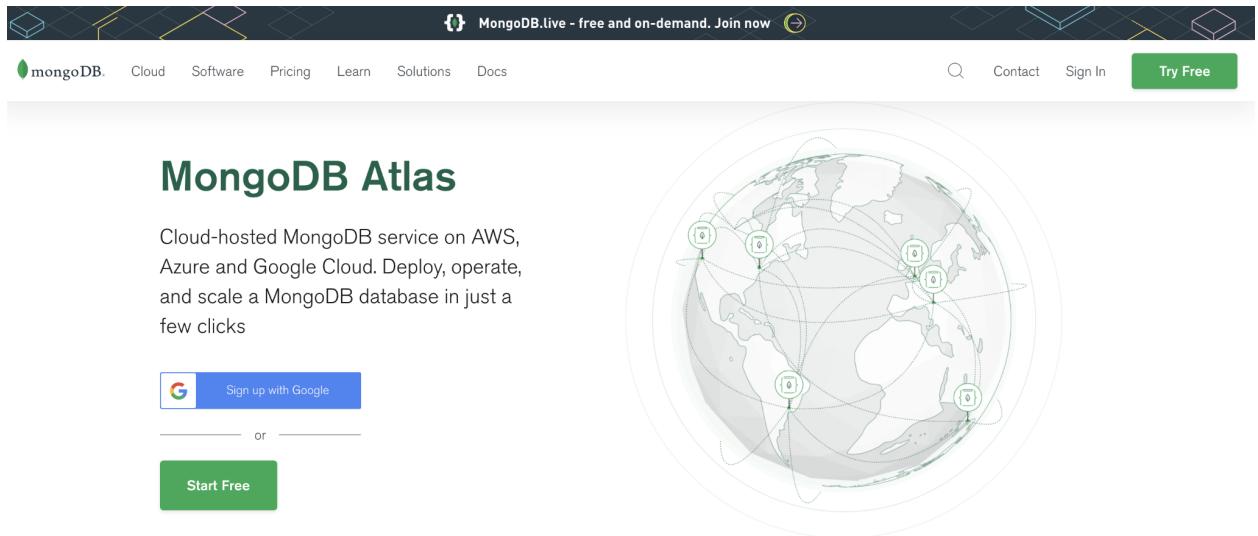
You will see something like this:

More info about installation:

<https://www.mkyong.com/mongodb/how-to-install-mongodb-on-mac-os-x/>

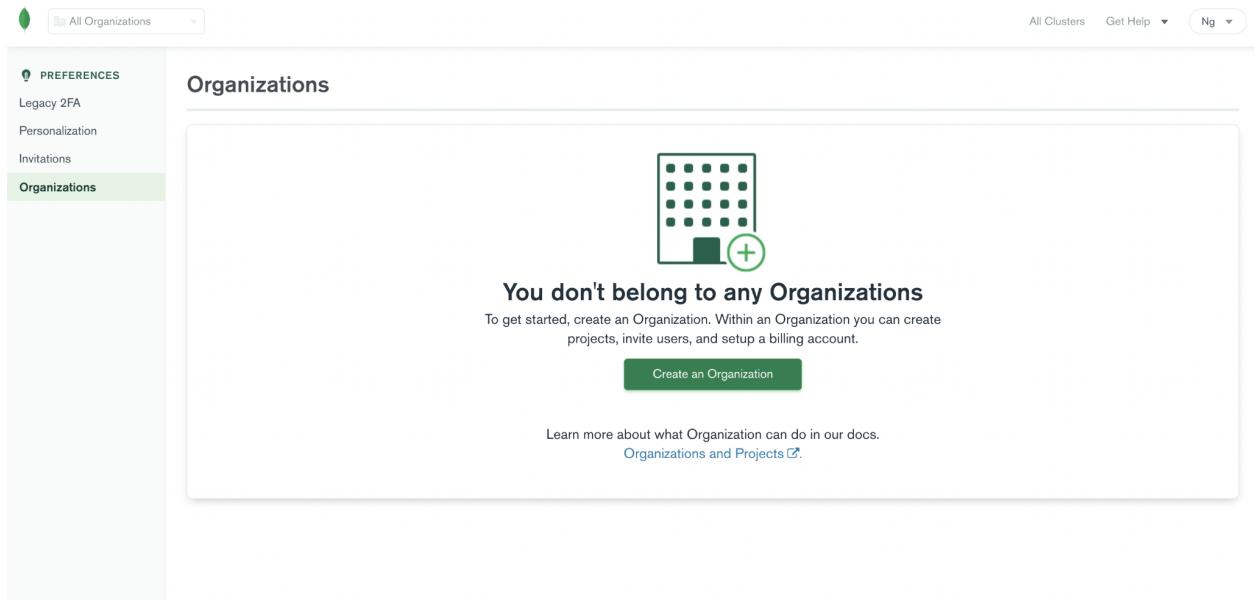
## Atlas

1. Go to Mongo website



The screenshot shows the MongoDB Atlas landing page. At the top, there's a banner with the text "MongoDB.live - free and on-demand. Join now" and a "Try Free" button. Below the banner, the navigation menu includes "Cloud", "Software", "Pricing", "Learn", "Solutions", and "Docs". To the right of the menu are "Contact" and "Sign In" links, along with a search icon. A large green "Try Free" button is prominently displayed. The main heading "MongoDB Atlas" is followed by a subtext: "Cloud-hosted MongoDB service on AWS, Azure and Google Cloud. Deploy, operate, and scale a MongoDB database in just a few clicks". Below this are two sign-up options: "Sign up with Google" and a "Start Free" button.

2. Sign up with Google
3. Create Organization:



The screenshot shows the MongoDB Organizations page. The left sidebar has a "PREFERENCES" section with "Legacy 2FA", "Personalization", "Invitations", and "Organizations" (which is highlighted). The main content area is titled "Organizations" and features a graphic of a grid with a plus sign. Below the graphic, the text "You don't belong to any Organizations" is displayed, followed by a subtext: "To get started, create an Organization. Within an Organization you can create projects, invite users, and setup a billing account." A green "Create an Organization" button is shown. At the bottom, there's a link: "Learn more about what Organization can do in our docs. [Organizations and Projects](#)".

Skip the default:

PREFERENCES

Legacy 2FA

Personalization

Invitations

Organizations

← Organizations

Create Organization

Name and Service Add Members

Go Back Create Organization

Add Members and Set Permissions

Invite new or existing users via email address...

Give your members access permissions below.

drnathan.nguyen1970@gmail.com (you)

Organization Owner

Cancel Go Back Create Organization

## Create Project:

MyNewOrg

Access Manager Billing

ORGANIZATION

Projects

Alerts 0

Activity Feed

Settings

Access Manager

Billing

Support

Live Migration

MYNEWORG > PROJECTS

Create a Project

Name Your Project Add Members Next

Cancel Access Manager Next

Name Your Project

Project names have to be unique within the organization (and other restrictions).

Project Name

Cancel Next

## Create a database:

The screenshot shows the MongoDB Atlas interface within a larger cloud provider's dashboard. The top navigation bar includes 'MyNewOrg', 'Access Manager', 'Billing', 'All Clusters', 'Get Help', and a user icon. Below this, the project 'MyProject' is selected, along with 'Atlas', 'Realm', and 'Charts'. On the left, a sidebar under 'DEPLOYMENT' shows 'Databases' (selected), 'Triggers', 'Data Lake', and sections for 'SECURITY' (Database Access, Network Access, Advanced). The main content area is titled 'Database Deployments' with a search bar 'Find a database deployment...'. It features a large green button labeled 'Create a database' with a stack of coins icon, followed by the text 'Choose your cloud provider, region, and specs.' and a 'Build a Database' button. A note at the bottom says 'Once your database is up and running, live migrate an existing MongoDB database into Atlas with our [Live Migration Service](#)'.

Select the Free option:

The screenshot shows the 'Deploy a cloud database' screen in MongoDB Atlas. The title is 'MONGODB ATLAS Deploy a cloud database'. Subtext reads: 'Experience the best of MongoDB on AWS, Azure, and Google Cloud. Choose a deployment option to get started.' Three deployment options are shown: 'Serverless' (minimal configuration, pay per operation), 'Dedicated' (advanced development environment, includes auto-scaling and metrics), and 'Basic' (highly available cluster, end-to-end encryption, role-based access control). The 'Basic' option is highlighted with a green border and labeled 'FREE'. Each option has a 'Create' button. A note at the bottom states 'Starting at \$0.08/hr\*' and 'estimated cost \$56.94/month'. A 'Dismiss' button is at the bottom left, and 'Advanced Configuration Options' is at the bottom right.

Create a Cluster: (group of database servers)

## Create a Basic Cluster

Welcome to MongoDB Atlas! We've recommended some of our most popular options, but feel free to customize your cluster to your needs. For more information, check our documentation.

**PREVIEW** Serverless      Dedicated      **FREE** Basic

For learning and exploring MongoDB in a sandbox environment. Basic configuration controls.  
No credit card required to start. Upgrade to dedicated clusters for full functionality.  
Explore with sample datasets. Limit of one free cluster per project.

**Cloud Provider & Region**      AWS, N. Virginia (us-east-1) ▾

AWS      Google Cloud      Azure

★ Recommended region ⓘ

NORTH AMERICA      EUROPE      ASIA

N. Virginia (us-east-1) ★      Frankfurt (eu-central-1) ★      Singapore (ap-southeast-1) ★  
Oregon (us-west-2) ★      Ireland (eu-west-1) ★      Mumbai (ap-south-1)

AUSTRALIA

**FREE**      Free forever! Your M0 cluster is ideal for experimenting in a limited sandbox. You can upgrade to a production cluster anytime.

Back      Create Cluster

Click Create Cluster: it will take 2-3 minutes to complete

MyNewOrg      Access Manager      Billing      All Clusters      Get Help      Ng

MyProject      Atlas      Realm      Charts

DEPLOYMENT      Databases      SECURITY

Data Lake      Database Access      Network Access      Advanced

We are deploying your changes  
MYNEWORG > MYPROJECT

Database Deployments

+ Create

Cluster      Connect      View Monitoring      Browse Collections      ...

Your cluster is being created  
New clusters take between 1-3 minutes to provision.

VERSION	REGION	CLUSTER TIER	TYPE	BACKUPS	LINKED REALM APP	ATLAS SEARCH
4.4.8	AWS / N. Virginia (us-east-1)	M0 Sandbox (General)	Replica Set - 3 nodes	Inactive	Unable to load application data	Create Index

4. Click Connect:

Connect to Cluster0

 **Setup connection security**    **Choose a connection method**    **Connect**

**Choose a connection method** [View documentation](#) 

Get your pre-formatted connection string by selecting your tool below.



**Connect with the MongoDB Shell**

Interact with your cluster using MongoDB's interactive Javascript interface



**Connect your application**

Connect your application to your cluster using MongoDB's native drivers

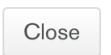


**Connect using MongoDB Compass**

Explore, modify, and visualize your data with MongoDB's GUI



 Go Back

 Close

Select Compass: make sure you add Allow all IP addresses

X

## Connect to Cluster0

Setup connection security > Choose a connection method > Connect

You need to secure your MongoDB Atlas cluster before you can use it. Set which users and IP addresses can access your cluster now. [Read more ↗](#)

You can't connect yet. Set up your firewall access and user security permission below.

### 1 Add a connection IP address

Add Your Current IP Address

Add a Different IP Address

Allow Access from Anywhere

### 2 Create a Database User

This first user will have [atlasAdmin ↗](#) permissions for this project.

Keep your credentials handy, you'll need them for the next step.

Username

ex. dbUser

Password

Autogenerate Secure Password

ex. dbUserPassword

SHOW

Create Database User

Close

Choose a connection method

Create users:

X

## Connect to Cluster0

Setup connection security > Choose a connection method > Connect

You need to secure your MongoDB Atlas cluster before you can use it. Set which users and IP addresses can access your cluster now. [Read more](#)

You can't connect yet. Set up your user security permission below.

### 1 Add a connection IP address

✓ An IP address has been added to the IP Access List. [Add another address in the IP Access List tab.](#)

### 2 Create a Database User

This first user will have [atlasAdmin](#) permissions for this project.

Keep your credentials handy, you'll need them for the next step.

Username

myuser

Password

\*\*\*\*\*

[Autogenerate Secure Password](#)

SHOW

[Create Database User](#)

[Close](#)

[Choose a connection method](#)

Choose connection Method: select Compass



## Connect to Cluster0

✓ Setup connection security    ✓ Choose a connection method    Connect

I do not have MongoDB Compass

I have MongoDB Compass

- 1 Select your operating system and download MongoDB Compass

OS X 64-bit (10.10+)

[Download Compass \(1.28.1\)](#)

or

[Copy download URL](#)

- 2 Copy the connection string, then open MongoDB Compass.

`mongodb+srv://myuser:<password>@cluster0.awqvh.mongodb.net/test`



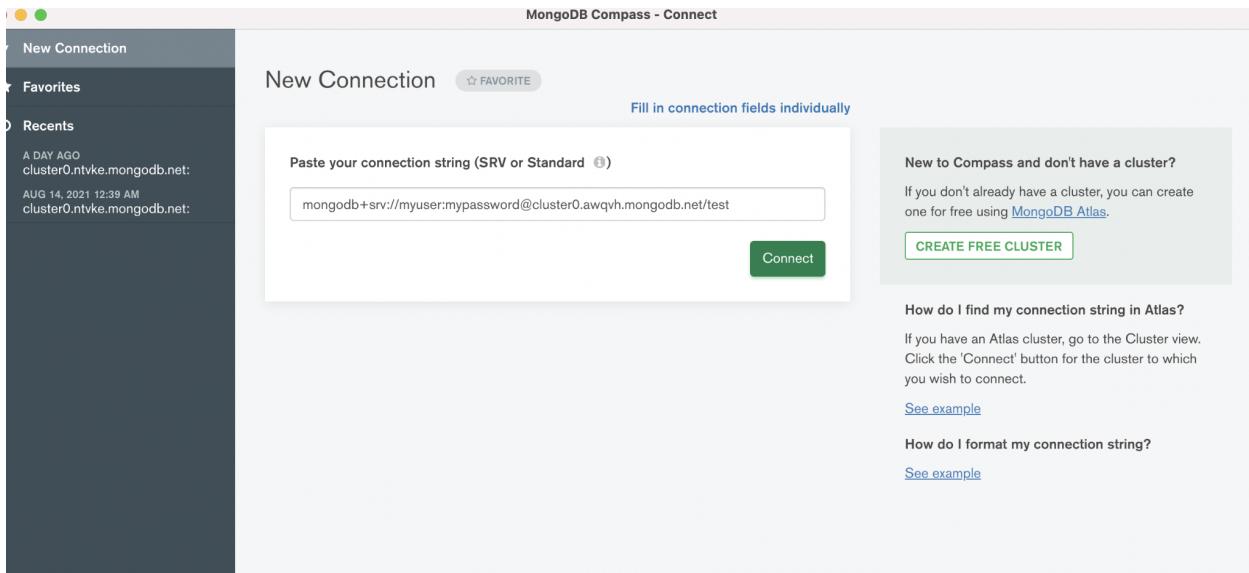
You will be prompted for the password for the **myuser** user's (Database User) username.  
When entering your password, make sure that any special characters are **URL encoded**.

Having trouble connecting? [View our troubleshooting documentation](#)

[Go Back](#)

[Close](#)

Copy the Connection String and paste into Compass:



## 5. Download the **Compass**: GUI client for MongoDB

<https://www.mongodb.com/try/download/compass>

A screenshot of the MongoDB Compass landing page. At the top, there's a navigation bar with the MongoDB logo, Cloud, Software, Pricing, Learn, Solutions, Docs, a search icon, Contact, Sign In, and a green "Try Free" button. The main heading is "MongoDB Compass" with the subtitle "The easiest way to explore and manipulate your MongoDB data". Below that is a green "Try it now" button. A large text block describes the product as "The GUI for MongoDB. Visually explore your data. Run ad hoc queries in seconds. Interact with your data with full CRUD functionality. View and optimize your query performance. Available on Linux, Mac, or Windows. Compass empowers you to make smarter decisions about indexing, document validation, and more." At the bottom, there are three icons: a file icon, a database icon, and a gear icon.

## 6. Connect from Compass:

Click connect and paste the connection string copied from Atlas

MongoDB Compass - cluster0.ntvke.mongodb.net/mydb.products

Local

HOSTS cluster0-shard-00-01.ntvke... cluster0-shard-00-02.ntvke... cluster0-shard-00-00.ntvke...

CLUSTER Replica Set (atlas-0a5dq1-...) 3 Nodes

EDITION MongoDB 4.4.8 Enterprise

Filter your data

- > admin
- > config
- > local
- > mydb
  - products
  - users

MONGOSH >

MongoDB Compass - Connect

New Connection ☆ FAVORITE

Fill in connection fields individually

Paste your connection string (SRV or Standard)  
e.g. mongodb+srv://username:password@cluster0.ntvke.mongodb.net:27017

Connect

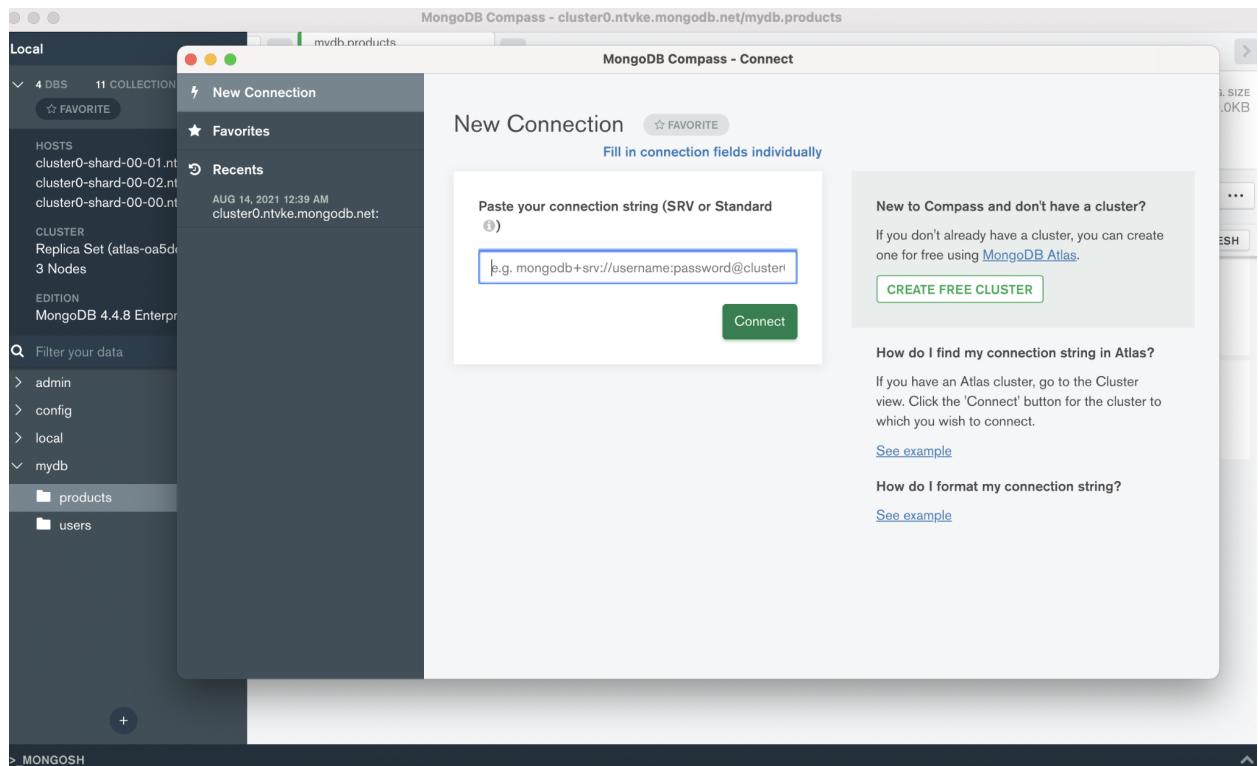
New to Compass and don't have a cluster?  
If you don't already have a cluster, you can create one for free using [MongoDB Atlas](#).

[CREATE FREE CLUSTER](#)

How do I find my connection string in Atlas?  
If you have an Atlas cluster, go to the Cluster view. Click the 'Connect' button for the cluster to which you wish to connect.

[See example](#)

How do I format my connection string?  
[See example](#)



MongoDB Compass - cluster0.ntvke.mongodb.net

Local

HOSTS cluster0-shard-00-02.ntvke... cluster0-shard-00-00.ntvke... cluster0-shard-00-01.ntvke...

CLUSTER Replica Set (atlas-0a5dq1-...) 3 Nodes

EDITION MongoDB 4.4.8 Enterprise

Filter your data

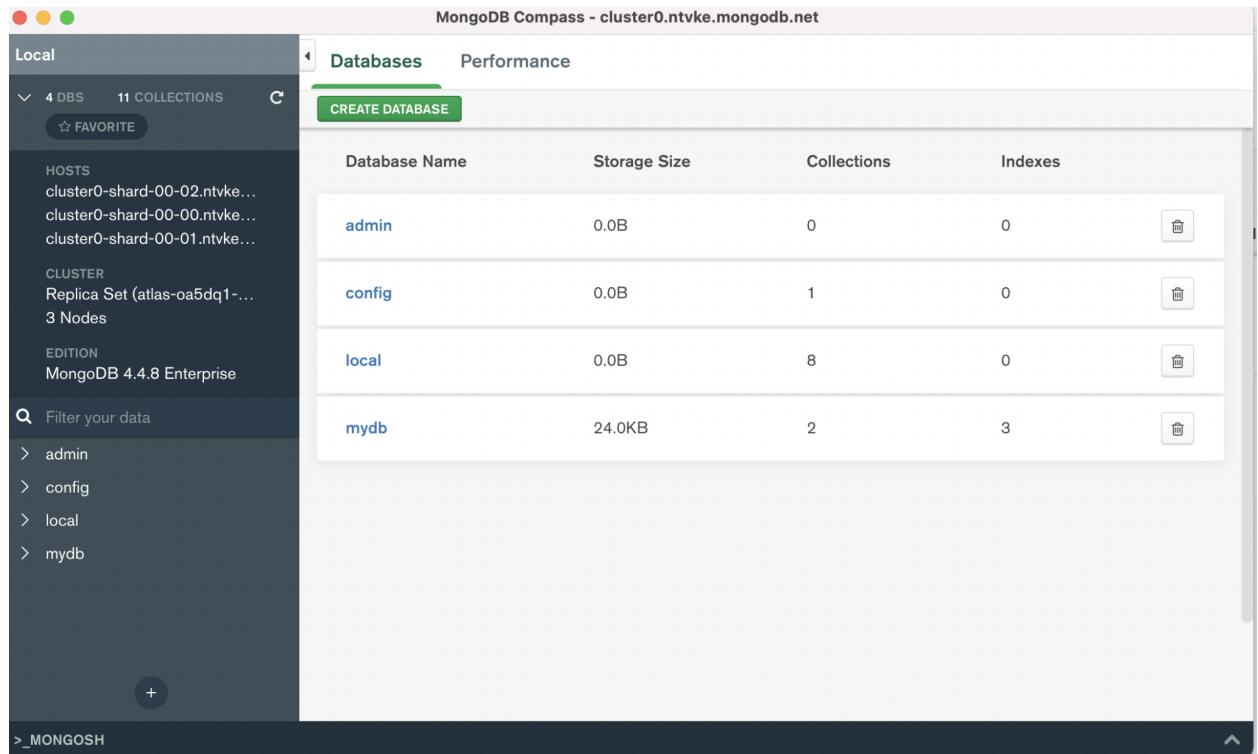
- > admin
- > config
- > local
- > mydb

MONGOSH >

Databases Performance

CREATE DATABASE

Database Name	Storage Size	Collections	Indexes
admin	0.0B	0	0
config	0.0B	1	0
local	0.0B	8	0
mydb	24.0KB	2	3



MongoDB Compass - cluster0.ntvke.mongodb.net/newdb.users

Local

4 DBS 11 COLLECTIONS

HOSTS cluster0-shard-00-02.ntvke... cluster0-shard-00-00.ntvke... cluster0-shard-00-01.ntvke...

CLUSTER Replica Set (atlas-0a5dq1... 3 Nodes

EDITION MongoDB 4.4.8 Enterprise

Filter your data

admin config local mydb newdb users ...

newdb.users

Documents Aggregations Schema Explain Plan Indexes Validation

FILTER { field: 'value' } OPTIONS FIND RESET ...

ADD DATA VIEW

DOCUMENTS 0 TOTAL SIZE 0B AVG. SIZE 0B INDEXES 1 TOTAL SIZE 4.0KB AVG. SIZE 4.0KB

Displaying documents 0 - 0 of N/A < > C REFRESH

This collection has no data

It only takes a few seconds to import data from a JSON or CSV file

Import Data

>\_MONGOSH

### Exercises:

1. Create student collection, user collection
2. Add at least 5 documents into them

**Students look at the Queries on Mongoose to prepare for next lectures:**

<https://mongoosejs.com/docs/queries.html>

**Debugs: in case you have problem with connection**

- Restart wifi
- Change wifi
- Or read this:

<https://www.mongodb.com/community/forums/t/queriesrv-erefused-mongodb-tcp-cluster0-tpvpc-mongodb-net/8549>

**Basic commands on mongodb**

- To create a database:  
**use db\_name**  
If the db\_name does not exist, mongodb will create a new one
  - To create a table (~ in Mongodb: collection)  
**db.createCollection("students");**
  - To insert a student into the table (~ into the collection)  
**db.students.insert({“studentId”: “s123456”, “name”: “Nguyen Phuong Toan”, “dob”: 1999});**  
  
**db.students.insert({“studentId”: “s123456”, “name”: “Le Phuong”, “dob”: 2000});**
- Try to insert few more students to practice
- To query a list of students based on certain criteria (~ write a query with where conditions)  
**db.students.find({“dob”: 2000});**  
**db.students.find({“dob”: {\$gt: 1995}});**
  - To delete a student whose dob is greater than 1995  
**db.students.remove({“dob”: {\$gt: 1995}});**

More about mongodb command can be found here  
[https://www.tutorialspoint.com/mongodb/mongodb\\_quick\\_guide.htm](https://www.tutorialspoint.com/mongodb/mongodb_quick_guide.htm)

## Advanced commands on mongodb

- To update a document:  

```
db.students.update({_id: ObjectId("5b7a28c4411244427a1b9f0d")},  
{$set: {name: 'Linh2'}})
```
- To search by multiple criteria  

```
db.students.find({$or: [{name: 'Linh2'}]})
```

```
db.students.find({$or: [{name: 'Linh2'}, {age:{$gt:20}}]})
```

```
db.students.find({$and:[{age: {$gte:20}}, {age: {$lte:20}}]})
```

```
db.students.find({$and:[{age: {$gte:20}}, {age: {$lte:25}}]},  
name: /^T/ )
```

- To count number of find result:

```
db.students.find().count()
```

```
db.students.find({$and:[{age: {$gte:20}}, {age: {$lte:25}}]}, name:/^T/).count()
```

- Get distinct value:

```
db.students.distinct('name')
```

- To sort result:

```
db.students.find().sort({age: 1})
```

- To limit a result:

```
db.students.find().limit(1)
```

- To limit and skip: for paging

```
db.students.find().skip(1).limit(5)
```

## Some common bugs

- Sometimes, Mongod processes can't be started due to a lock file. Logout your account would help