



**Kampus
Merdeka**
INDONESIA JAYA

BIG DATA (TFC303)

Pertemuan 4 – NoSQL

ALIFIA REVAN PRANANDA

Department of Information Technology
Faculty of Engineering
Universitas Tidar

TODAY'S MATERIALS

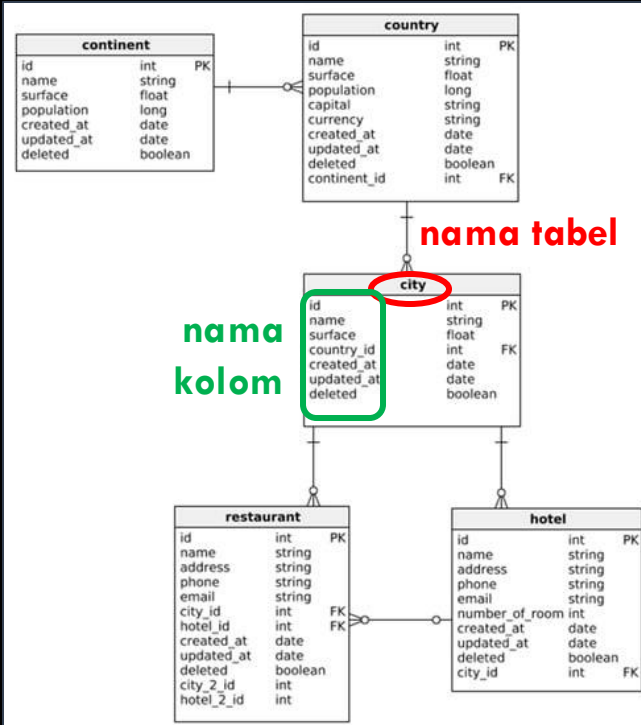
- ✓ Definition of NoSQL
- ✓ Type of NoSQL
- ✓ How to try NoSQL



DEFINITION OF NOSQL

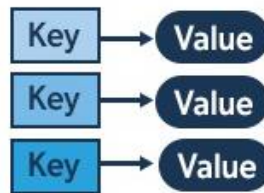
WHAT IS NOSQL?

NoSQL databases ("non SQL" or "not only SQL") are non-tabular databases and store data differently than relational tables. NoSQL databases come in a variety of types based on their data model. They provide flexible schemas and scale easily with large amounts of data and high user loads

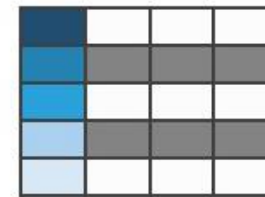


SQL

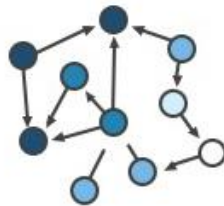
Key-Value



Column-Family



Graph



Document



contoh



```
{
  id:"1" .
  name:"Tom" .
  surname:"Smith" .
  office:{
    id:"41" .
    building:"A4" .
    telephone:"45798"
  }
}

{
  id:"41" .
  building:"A4" .
  telephone:"45798"
}
```

NOSQL

NOSQL VS SQL

Type of Database	Differences Criteria			
	Data Storage Model	Development History	Examples	Primary Purpose
SQL	<ul style="list-style-type: none">Tables with fixed rows and columnsRigid	Developed in the 1970s with a focus on reducing data duplication	Oracle, MySQL, Microsoft SQL Server, and PostgreSQL	General purpose
NoSQL	<ul style="list-style-type: none">JSON documents, key-value pairs, tables with rows and dynamic columns, nodes and edges (depends on the type of NoSQL database)Flexible	Developed in the late 2000s with a focus on scaling and allowing for rapid application change driven by agile and DevOps practices.	MongoDB and CouchDB, Redis and DynamoDB, Cassandra and HBase, Neo4j and Amazon Neptune	Depends on the type of NoSQL database: <ul style="list-style-type: none">Document: general purposeKey-value: large simplify the queriesColumn-oriented: creating predictable functionGraph: analyzing the relationships between connected data

BENEFITS OF NOSQL

NoSQL databases offer many benefits over relational databases, such as:

✓ Flexible data models

A flexible schema allows you to **easily make changes** to your database as requirements change. You can iterate quickly and continuously integrate new application features to provide value to your users faster.

✓ Horizontal scaling

NoSQL databases allow you to scale-out horizontally, meaning you **can add cheaper commodity servers** whenever you need to.

✓ Fast queries

NoSQL databases is typically stored in a way that is **optimized for queries**. Queries typically do not require joins, so the queries are very fast.

✓ Easy for developers

Some NoSQL databases like MongoDB map their data structures to those of popular programming languages.



TYPE OF NOSQL

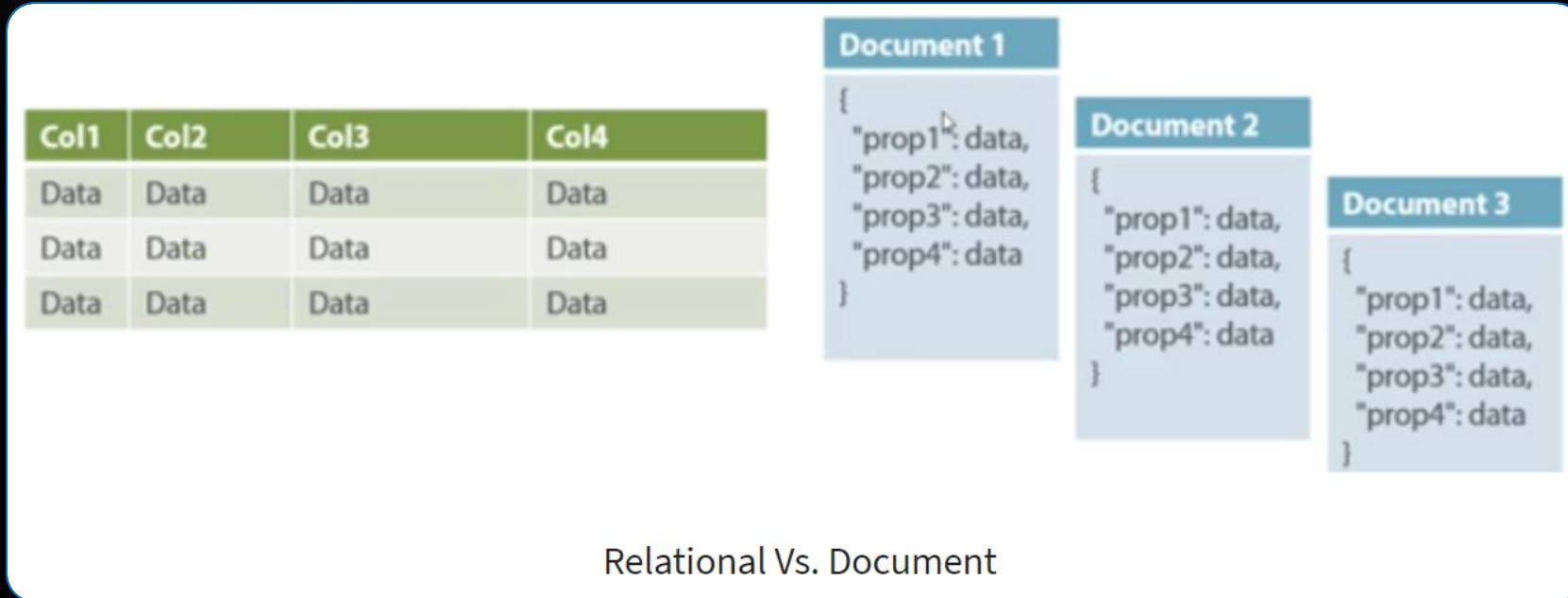
TYPE OF NOSQL

Here are the four main types of NoSQL databases:

- 1) Document databases
- 2) Key-value stores
- 3) Column-oriented databases
- 4) Graph databases

DOCUMENT DATABASES

Document Database stores and retrieves data as a key value pair but the value part is stored as a document. The document is stored in JSON or XML formats. The value is understood by the DB and can be queried.



- In this diagram on your left you can see we have rows and columns, and in the right, we have a document database which has a similar structure to JSON.
- Now for the relational database (SQL), you have to know what columns you have and so on.
- However, for a document database, you have data store like JSON object.

Notes:

- ✓ The document type is **mostly used for** CMS systems, blogging platforms, real-time analytics & e-commerce applications.
- ✓ It **should not use for** complex transactions which require multiple operations or queries against varying aggregate structures.
- ✓ Amazon SimpleDB, CouchDB, MongoDB, Riak, Lotus Notes, MongoDB, are popular Document originated DBMS systems.

KEY-VALUE STORES

Data is stored in key/value pairs. It is designed in such a way to handle lots of data and heavy load. Key-value pair storage databases store data as a hash table where each key is unique, and the value can be a JSON, BLOB(Binary Large Objects), string, etc.

For example: a key-value pair may contain a key like “Website” associated with a value like “google.com”.

Key	Value
Name	Joe Bloggs
Age	42
Occupation	Stunt Double
Height	175cm
Weight	77kg

- It is one of the most basic NoSQL database example. This kind of NoSQL database is used as a collection, dictionaries, associative arrays, etc.
- Key value stores help the developer to store schema-less data. They work best for shopping cart contents.
- Redis, Dynamo, Riak are some NoSQL examples of key-value store DataBases. They are all based on Amazon’s Dynamo paper.

COLUMN-ORIENTED DATABASES

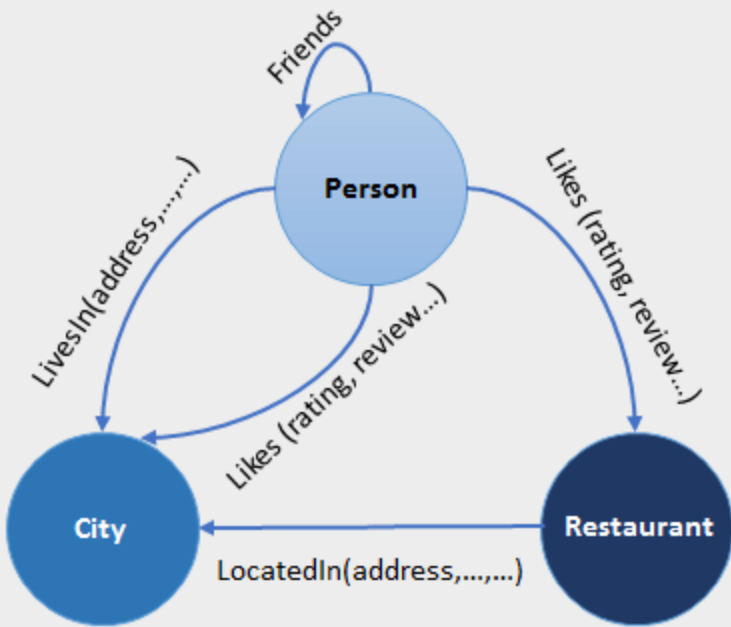
Column-oriented databases work on columns and are based on BigTable paper by Google. Every column is treated separately. Values of single column databases are stored contiguously.

ColumnFamily			
Row Key	Column Name		
	Key	Key	Key
	Value	Value	Value
	Column Name		
	Key	Key	Key
	Value	Value	Value

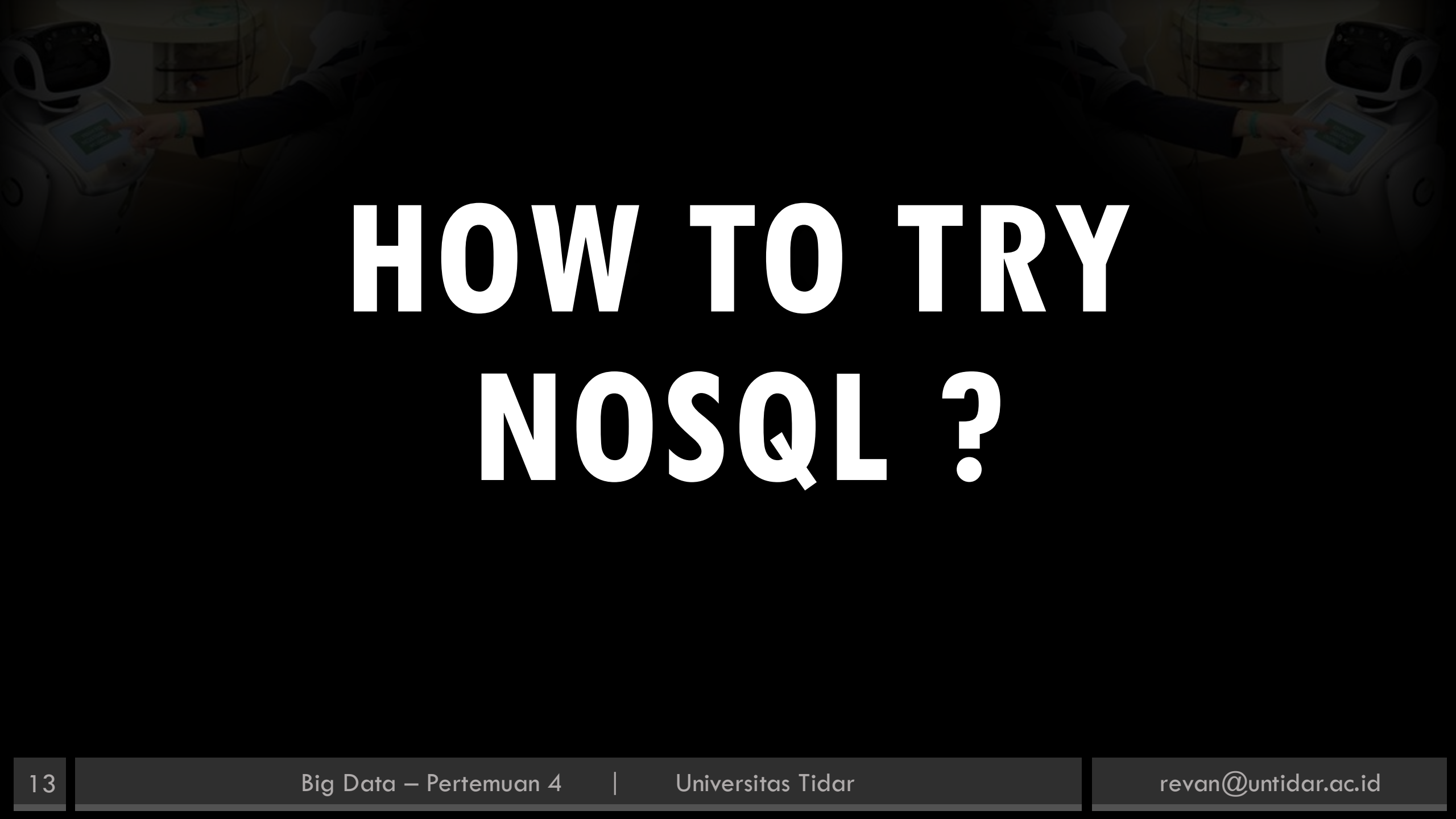
- ✓ They deliver high performance on aggregation queries like SUM, COUNT, AVG, MIN etc. as the data is readily available in a column.
- ✓ Column-based NoSQL databases are **widely used to** manage data warehouses, business intelligence, CRM, Library card catalog.
- ✓ HBase, Cassandra, HBase, Hypertable are NoSQL query examples of column based database.

GRAPH DATABASES

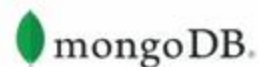
A graph type database stores entities as well the relations amongst those entities. The entity is stored as a node with the relationship as edges. An edge gives a relationship between nodes. Every node and edge has a unique identifier.



- ✓ Compared to a relational database where tables are loosely connected, a Graph database is a multi-relational in nature. Traversing relationship is fast as they are already captured into the DB, and there is no need to calculate them.
- ✓ Graph base database **mostly used for** social networks, logistics, spatial data.
- ✓ Neo4J, Infinite Graph, OrientDB, FlockDB are some popular graph-based databases.



HOW TO TRY NOSQL ?



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MONGODB ATLAS

Global multi-cloud database

The most advanced cloud database service on the market, with unmatched data distribution and mobility across AWS, Azure, and Google Cloud, built-in automation for resource and workload optimization, and so much more.

Get started now



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SERVICES

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Data API

Data Federation

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SECURITY

Quickstart

Database Access

Network Access

Advanced

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Goto

LEE'S ORG - 2023-02-26 > PROJECT 0

Database Deployments

Find a database deployment...

+ Create

Sample dataset successfully loaded. Access it in Data Explorer by clicking the Collections button, or with the MongoDB Shell.

[VIEW DATA TUTORIAL](#)

Coba Connect View Monitoring Browse Collections ...

FREE SHARED

Enhance Your Experience

For production throughput and richer metrics, upgrade to a dedicated cluster now!

Upgrade

R 0.02

W 0

Last 2 hours

292.0/s

Connections 9.0

Last 2 hours

12.0

In 148.1 B/s

Out 4.7 KB/s

Last 2 hours

417.7 KB/s

Data Size 339.2 MB

Last 2 hours

512.0 MB

VERSION	REGION	CLUSTER TIER	TYPE	BACKUPS	LINKED APP SERVICES	ATLAS SEARCH
5.0.14	AWS / Singapore (ap-southeast-1)	M0 Sandbox (General)	Replica Set - 3 nodes	Inactive	None Linked	Create Index

System Status: All Good Last Login: 180.254.109.71

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cloud.mongodb.com/v2/63fb2660591acd5b40ccc2c9#/clusters/connect?clusterId=Coba

Atlas Lee's Org - 2... Access Manager Billing

Project 0 Data Services App Services Charts

DEPLOYMENT Database Database Deployments

Data Lake PREVIEW Find a database deployment...

SERVICES Triggers Data API Data Federation Search

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VERSION REGION 5.0.14 AWS / Singapore (ap-southeast-1)

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Connect to Coba

✓ 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
- Connect using VS Code
Connect to a MongoDB host in Visual Studio Code

Go Back Close

Dapat memilih yang lain, misal VS Code

Data Size 339.2 MB Last 2 hours 512.0 MB

cloud.mongodb.com/v2/63fb2660591acd5b40ccc2c9#/clusters/connect?clusterId=Coba

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App Services

Charts

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All Clusters

Get Help

Lee

Connect to Coba

Setup connection security

Choose a connection method

Connect

I do not have MongoDB Compass

I have MongoDB Compass

Select your operating system and download MongoDB Compass

Windows 64-bit (7+)

Sesuaikan dengan PC Anda

Selanjutnya klik "Download"

Download Compass (1.35.0)

Copy download URL

Copy the connection string, then open MongoDB Compass.

mongodb+srv://gheenieta:<password>@coba.rti0uei.mongodb.net/test

You will be prompted for the password for the gheenieta 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

VIEW DATA TUTORIAL

FREE

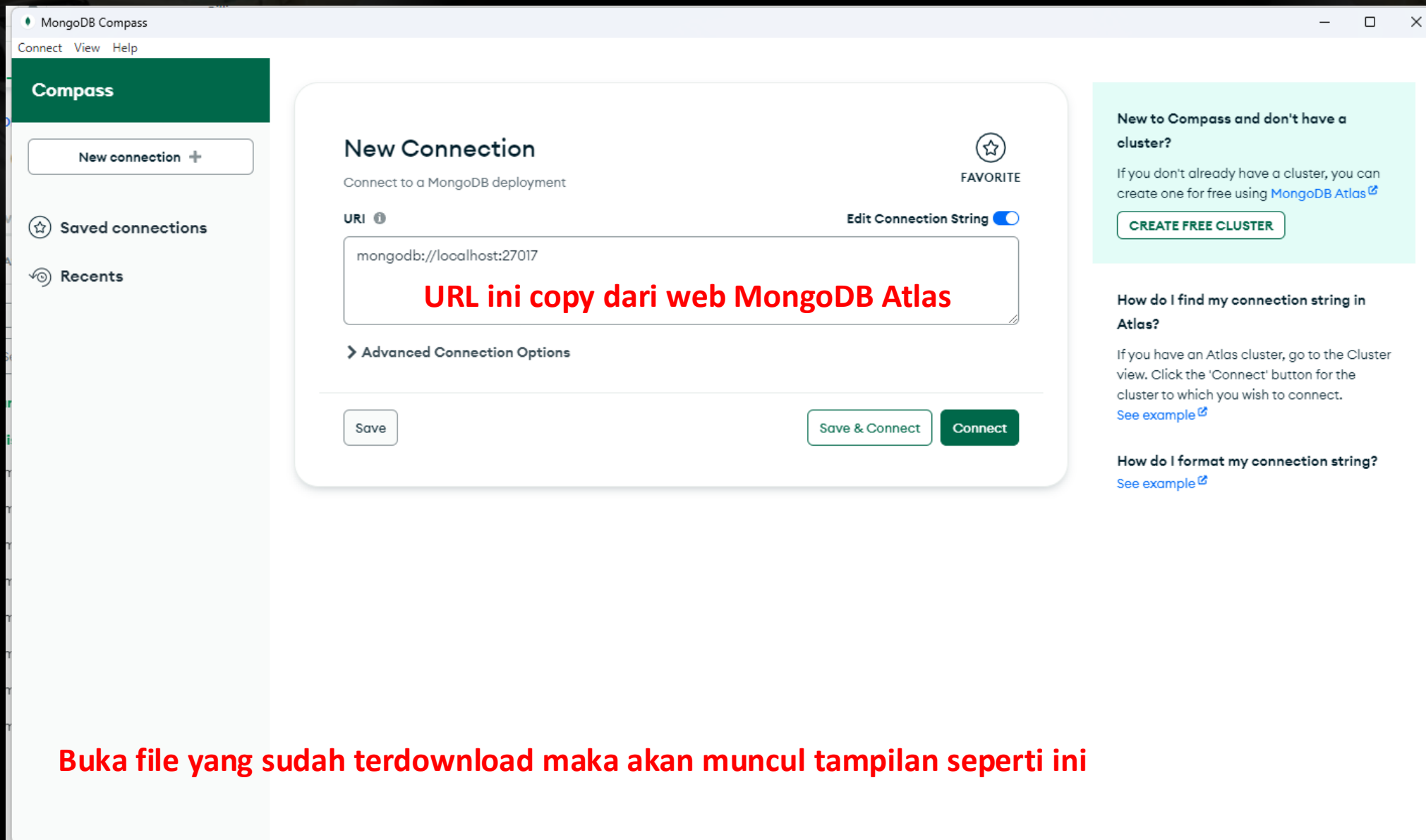
SHARED

Data Size

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Last 2 hours

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Buka file yang sudah terdownload maka akan muncul tampilan seperti ini

cloud.mongodb.com/v2/63fb2660591acd5b40ccc2c9#/clusters/connect?clusterId=Coba

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Connect to Coba

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

Windows 64-bit (7+)

Download Compass (1.35.0)

or

Copy download URL

2

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Go Back

Close

Copy url ini ke MongoDB Compass

MongoDB Compass

Connect View Help

Compass

New connection +

Saved connections

Recents

URI ⓘ Edit Connection String ☒

`mongodb+srv://gheenieta:<password>@coba.rti0uei.mongodb.net/test`

Advanced Connection Options

General Authentication TLS/SSL Proxy/SSH In-Use Encryption Advanced

Connection String Scheme

mongodb mongodb+srv

DNS Seed List Connection Format. The +srv indicates to the client that the hostname that follows corresponds to a DNS SRV record.

Hostname

coba.rti0uei.mongodb.net

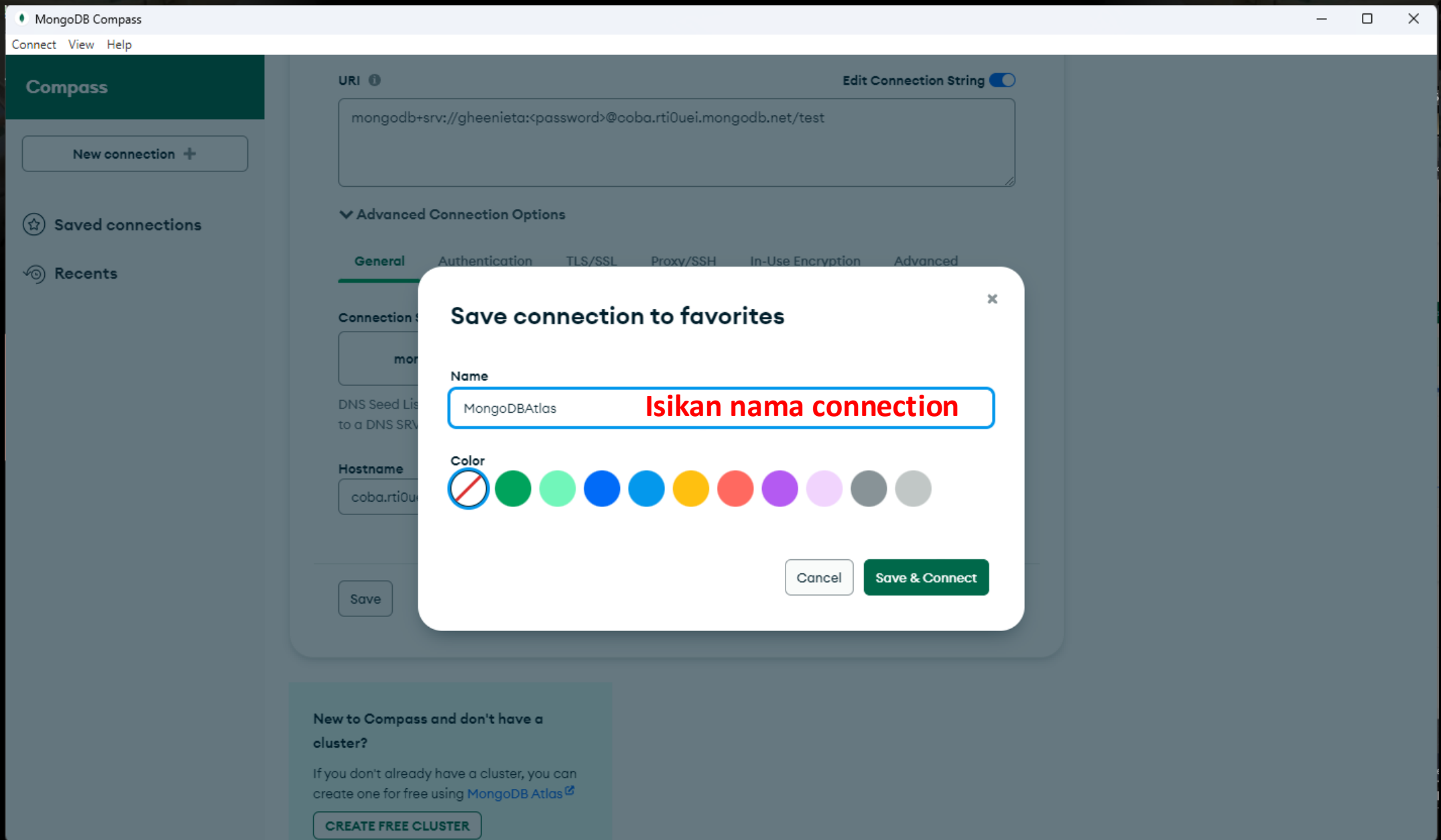
Save Save & Connect Connect

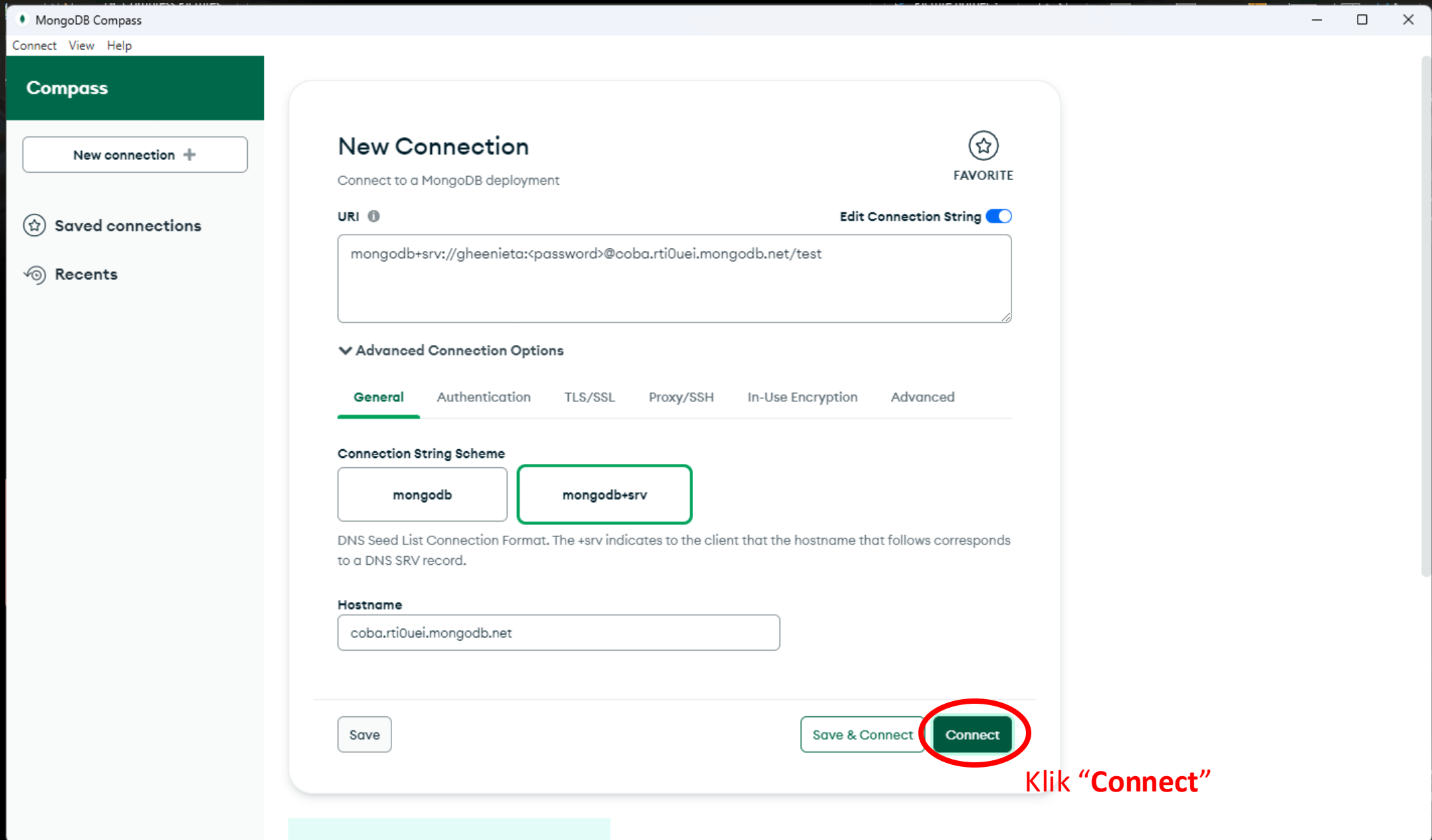
New to Compass and don't have a cluster?

If you don't already have a cluster, you can create one for free using [MongoDB Atlas](#)

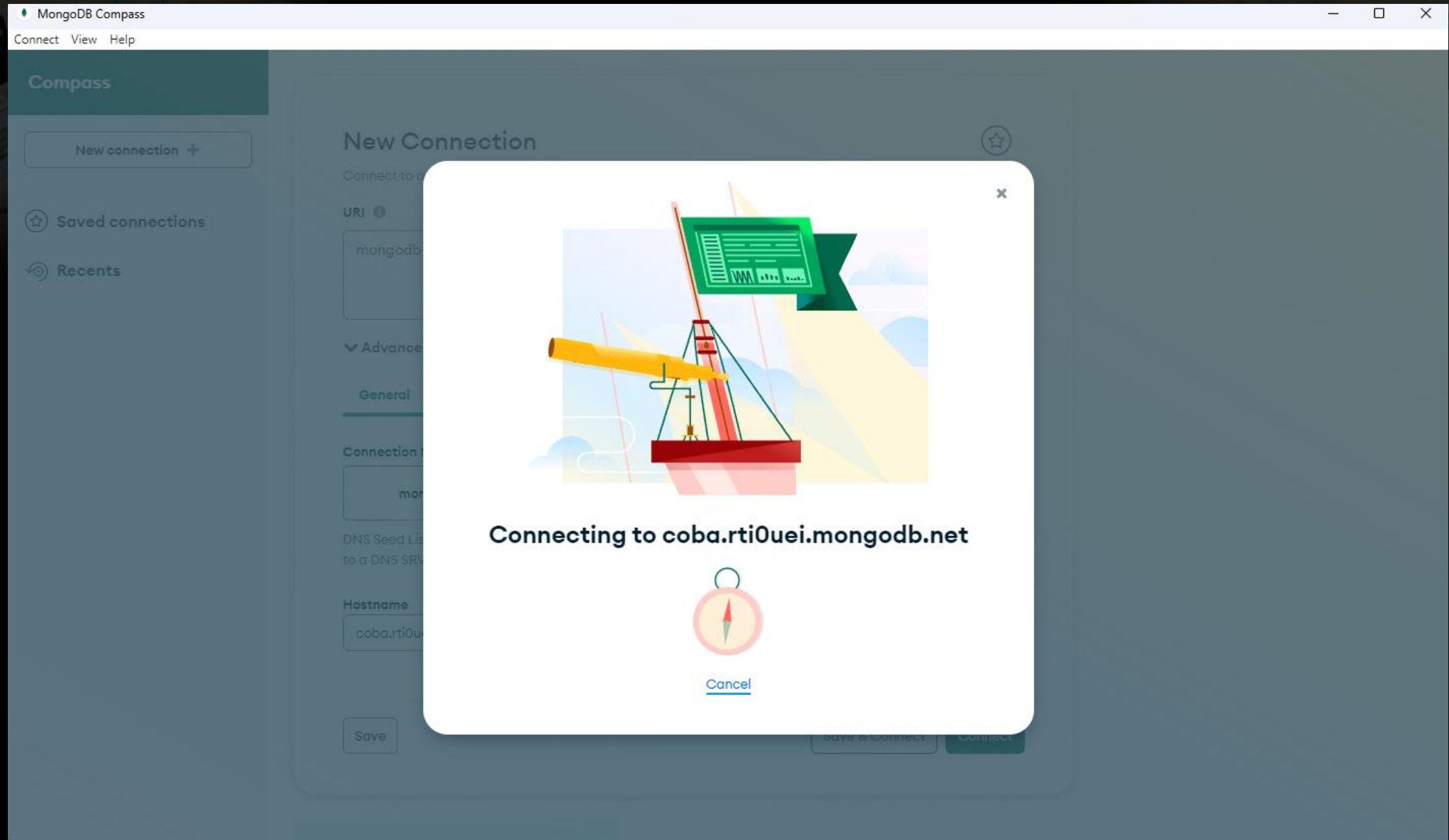
CREATE FREE CLUSTER

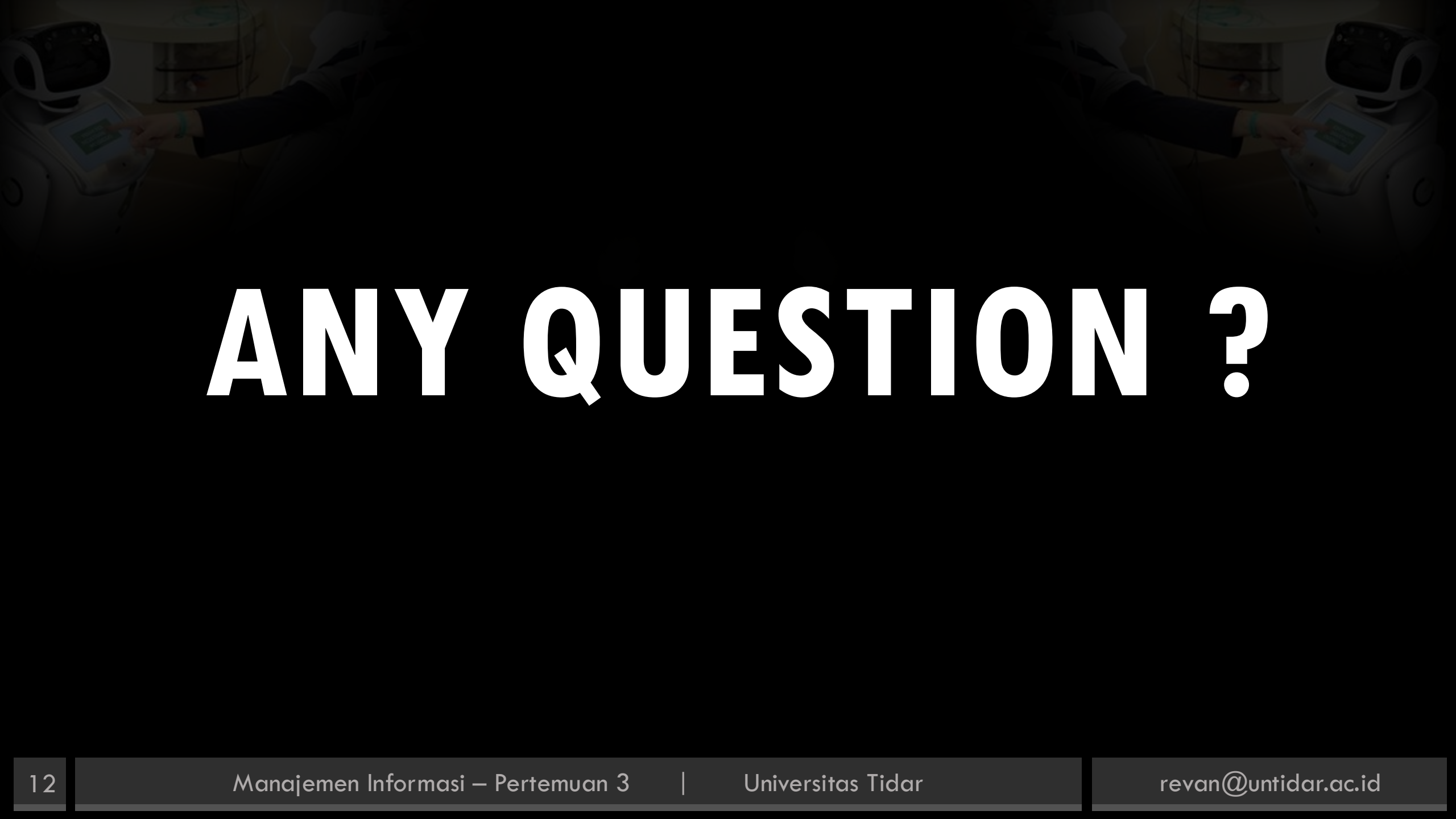
Copy url pada kolom tersebut, lalu klik "Save & Connect"





Klik "Connect"





ANY QUESTION ?

TUGAS

Kerjakan beberapa hal berikut:

1. Lakukan instalasi MongoDB Atlas melalui website : <https://www.mongodb.com/cloud/atlas/register>
2. Lakukan konfigurasi akun
3. Download sampel dataset
4. Buat konektivitas dengan IDE yang Anda inginkan (boleh menggunakan VS Code, Compass atau yang lain)
5. Lakukan konfigurasi hingga terkoneksi dengan server Anda.
6. Lakukan eksplorasi data dengan ketentuan berikut:
 - a) Load database "sample_airbnb"
 - b) Lakukan filter data untuk kriteria berikut: (tuliskan script dan hasil pada lembar jawaban Anda)
 - Tampilkan data dengan kriteria **room_type** : "Entire home/apt"
 - Tampilkan data dengan kriteria **property_type** : "House"
 - Tampilkan data dengan kriteria **bed_type** : "Real Bed"
 - Tampilkan data dengan kriteria **cancellation_policy** : "flexible"
 - Tampilkan data dengan kriteria minimum pemesanan 2 malam.

Tugas dikumpulkan maksimal hari Senin, 23 September 2024 pukul 23.59 melalui Elita.