Google Developer Student Clubs

Database Workshop

Discover the power of MongoDB: A beginner-friendly workshop

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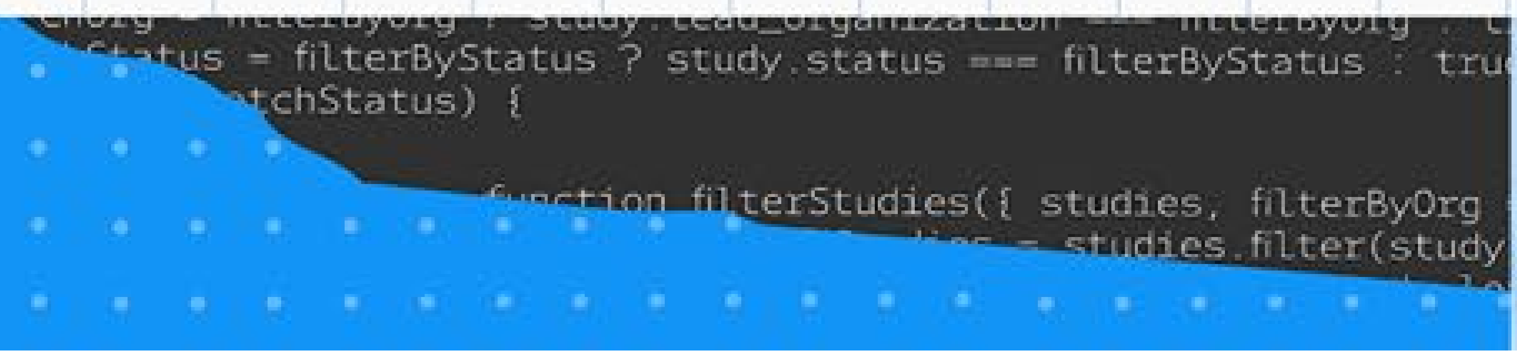
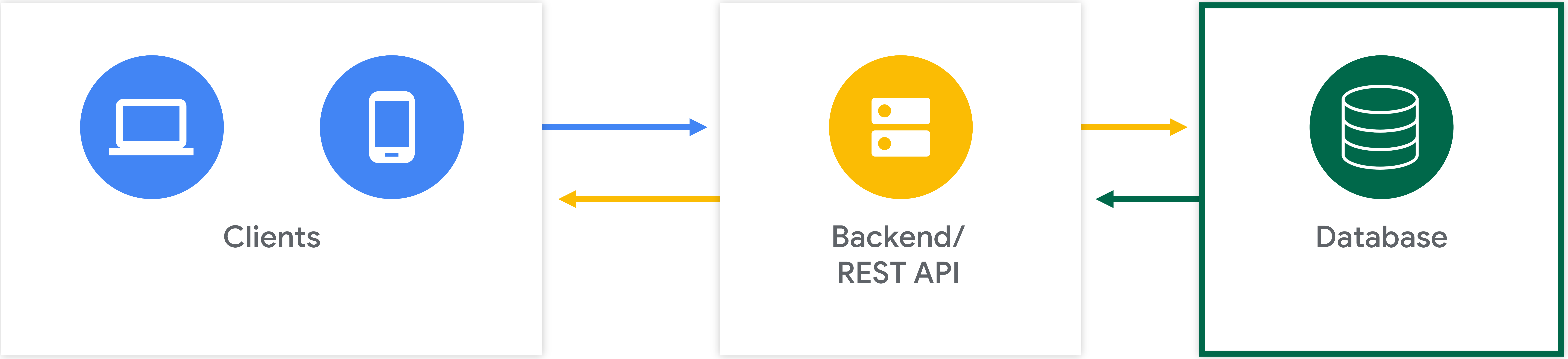


```
chOrg = filterByOrg ? study.lead_organization === filterByOrg : t
Status = filterByStatus ? study.status === filterByStatus : tru
atchStatus) {

        function filterStudies({ studies, filterByOrg
                       dies = studies.filter(study
```

What are Databases?

- Organized collection of information and data stored electronically
- Typically set up for efficient access and modification of the data
- Databases typically communicate with the application’s backend to store/get information which is then sent to the user



Why not store everything in files?

TL;DR: because speeeeeed

- Storing data in files can become messy and difficult to manage with large amounts of information
- Databases make it more efficient to access information and filter results
- Data can be stored in a structured way making it easier to manage and scale

Can we stop and get some DATABASE?

Mom: We have DATABASE at home

DATABASE at home:

The JSON format

`P.S JSON stands for JavaScript Object Notation`

- The JSON format is a way to store data in a key value manner.
- MongoDB uses the JSON format to store information in the form of documents (you’ll learn more about those later).

```
// example JSON file
{
    “username”: “cooluser123”,
    “password”: “TooC00lTOGu3ss”,
    “friends”: [“friendlyuser321”, “otheruser123”]
}
```

SQL vs NoSQL DBs

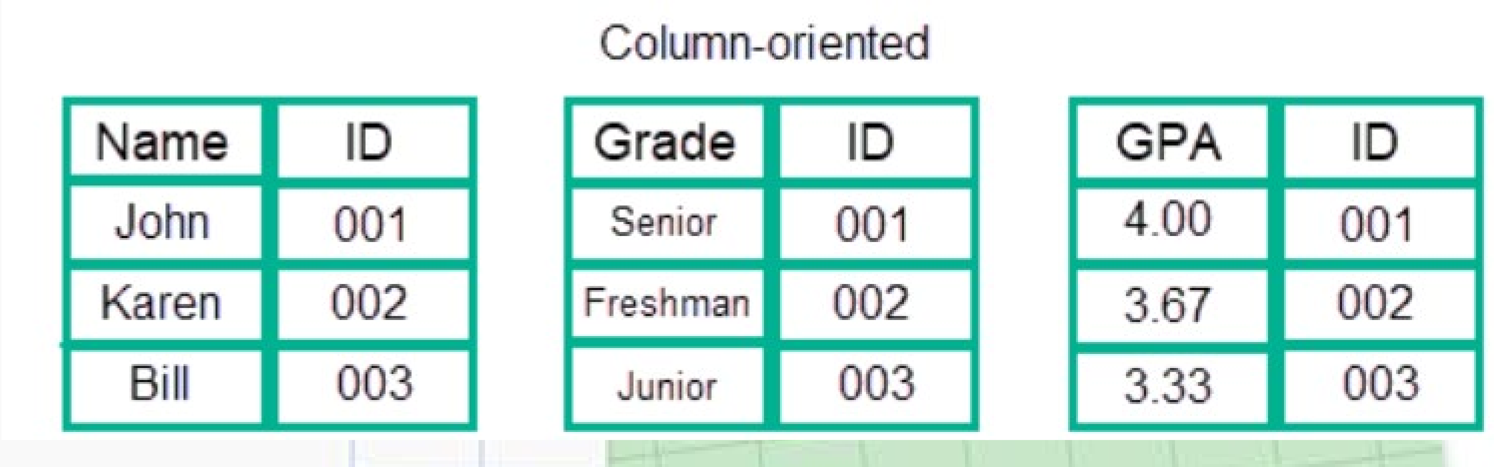
What's the difference?

- SQL databases store data in tables containing columns and rows, tables can be related to one another using keys, relational database management system (RDBMS)
- SQL databases are useful when data is organized and structured in specific ways
- SQL databases use Structured Query Language in order to access and manage data

SQL vs NoSQL DBs

What’s the difference?

- NoSQL databases store data in documents (JSON, BSON, etc), key-value storage, column-oriented storage, graph-databases
- NoSQL databases are useful for data that is unstructured, documents in the database can have different structures
- Have dynamic schemas

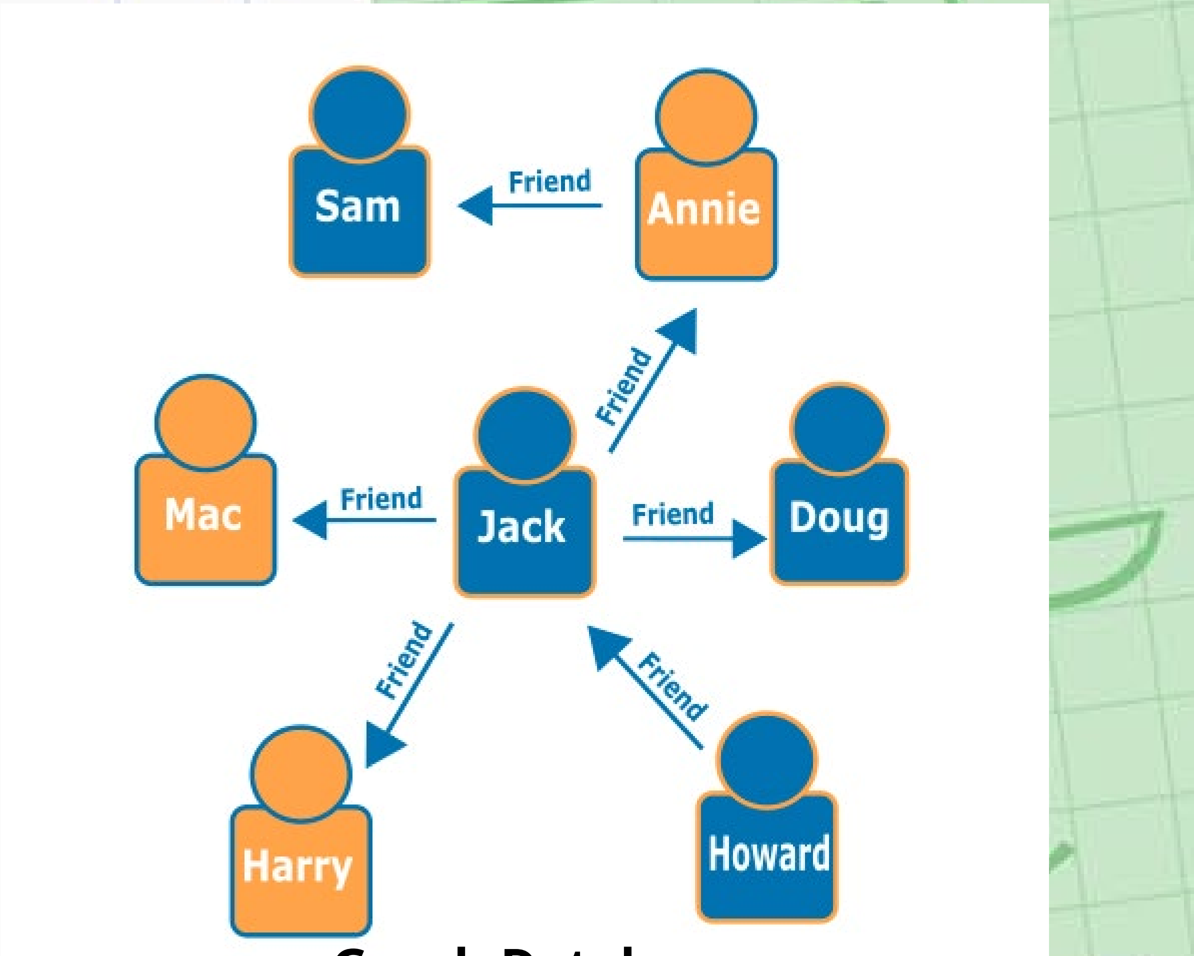


Column-oriented

Name	ID
John	001
Karen	002
Bill	003

Grade	ID
Senior	001
Freshman	002
Junior	003

GPA	ID
4.00	001
3.67	002
3.33	003



Graph Database

What is MongoDB

In short; a database server

- MongoDB is a NoSQL database service which lets developers store data in a flexible manner.
- MongoDB is free to use for anyone in the world
- MongoDB has gained popularity in recent years due to its ease of use, scalability, and performance.
- MongoDB can be used in a wide range of applications, including web applications, content management systems, mobile apps, and more.

MongoDB VS MySQL

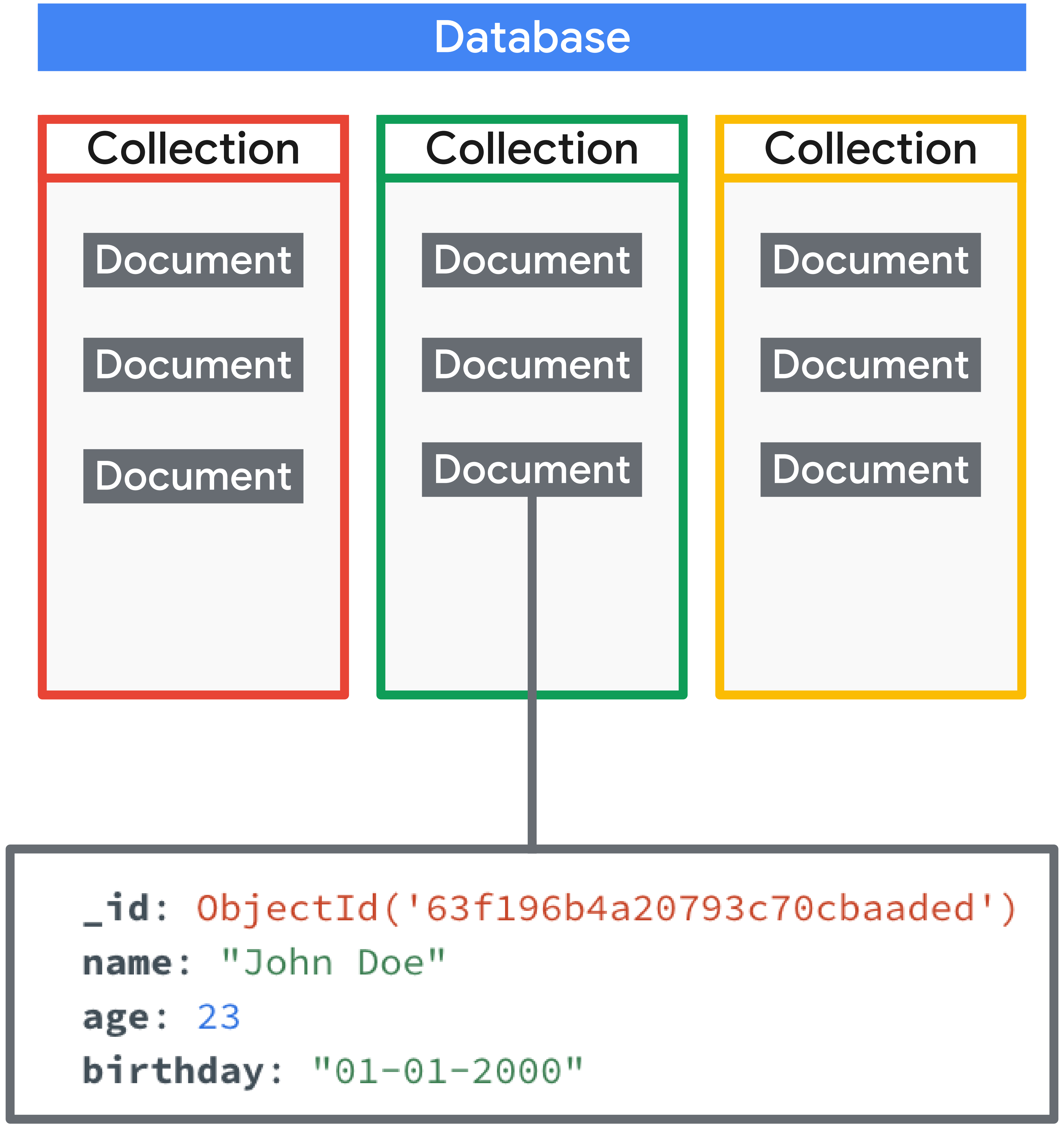
When to use which?

MongoDB®	MySQL®
MongoDB’s document layout allows you to store data which might not exist in documents within the same collection.	MySQL’s rigid data structures enforce uniformity and is less error-prone.
MongoDB allows you to index large documents, making it faster to search them	MySQL allows for storing data with complex relationships between one another (e.g friends on facebook)

MongoDB Basics

Databases, collections, and documents

- MongoDB databases contain collections of documents
- Collections store documents, which can each have different schemas
- Data is stored in BSON documents, a binary representation of JSON documents
- Documents store data in field-value pairs, each field-value pair has a unique ID

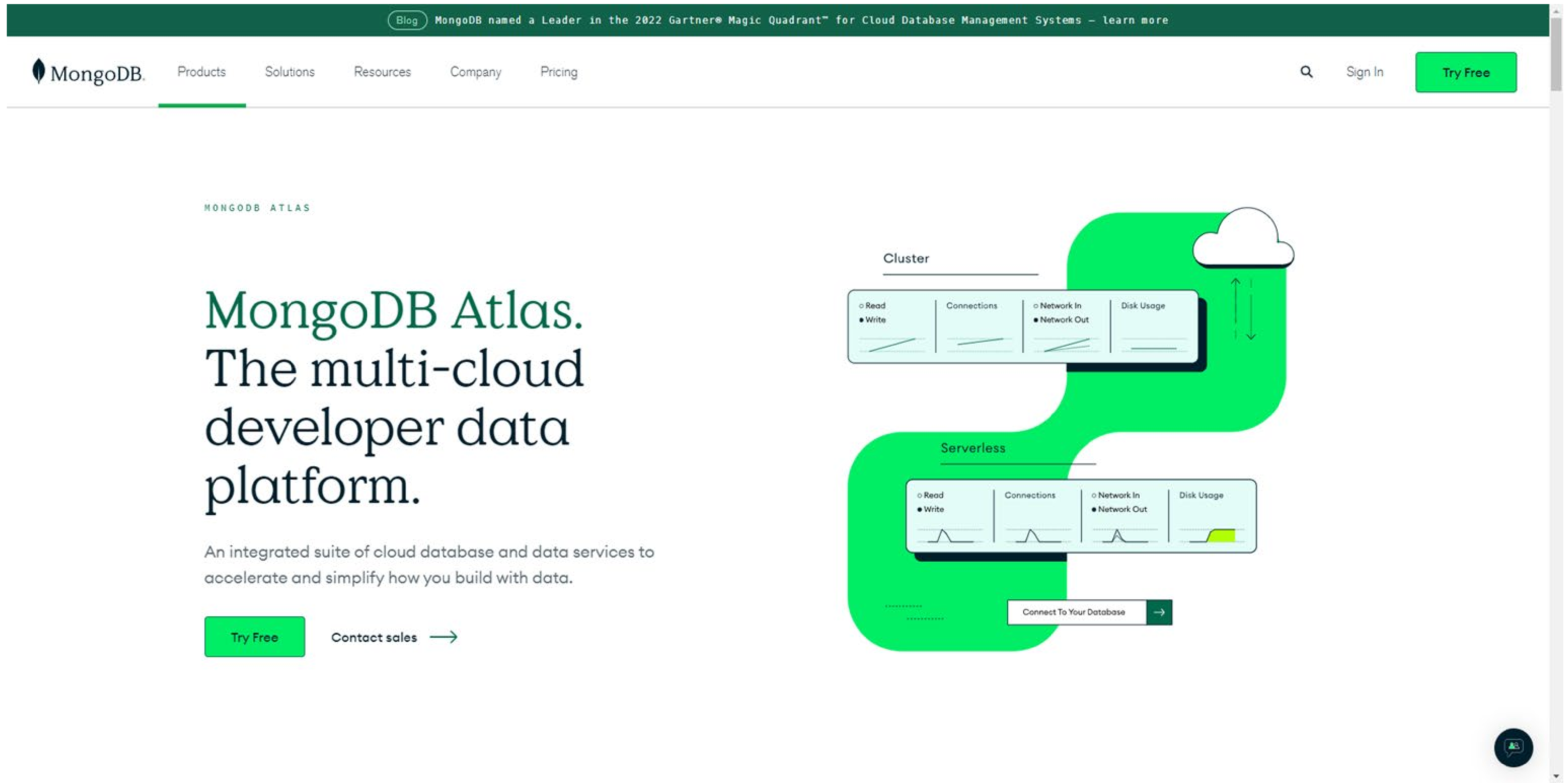


```
_id: ObjectId('63f196b4a20793c70cbaaded')
name: "John Doe"
age: 23
birthday: "01-01-2000"
```

Getting started with MongoDB Atlas

Its as simple as opening an account!

- MongoDB Atlas is a platform that allows you to host a MongoDB server for free (with some limitations)
- To get started go to https://www.mongodb.com/atlas/
- Click “Try Free”



Blog MongoDB named a Leader in the 2022 Gartner® Magic Quadrant™ for Cloud Database Management Systems – learn more

MONGODB ATLAS

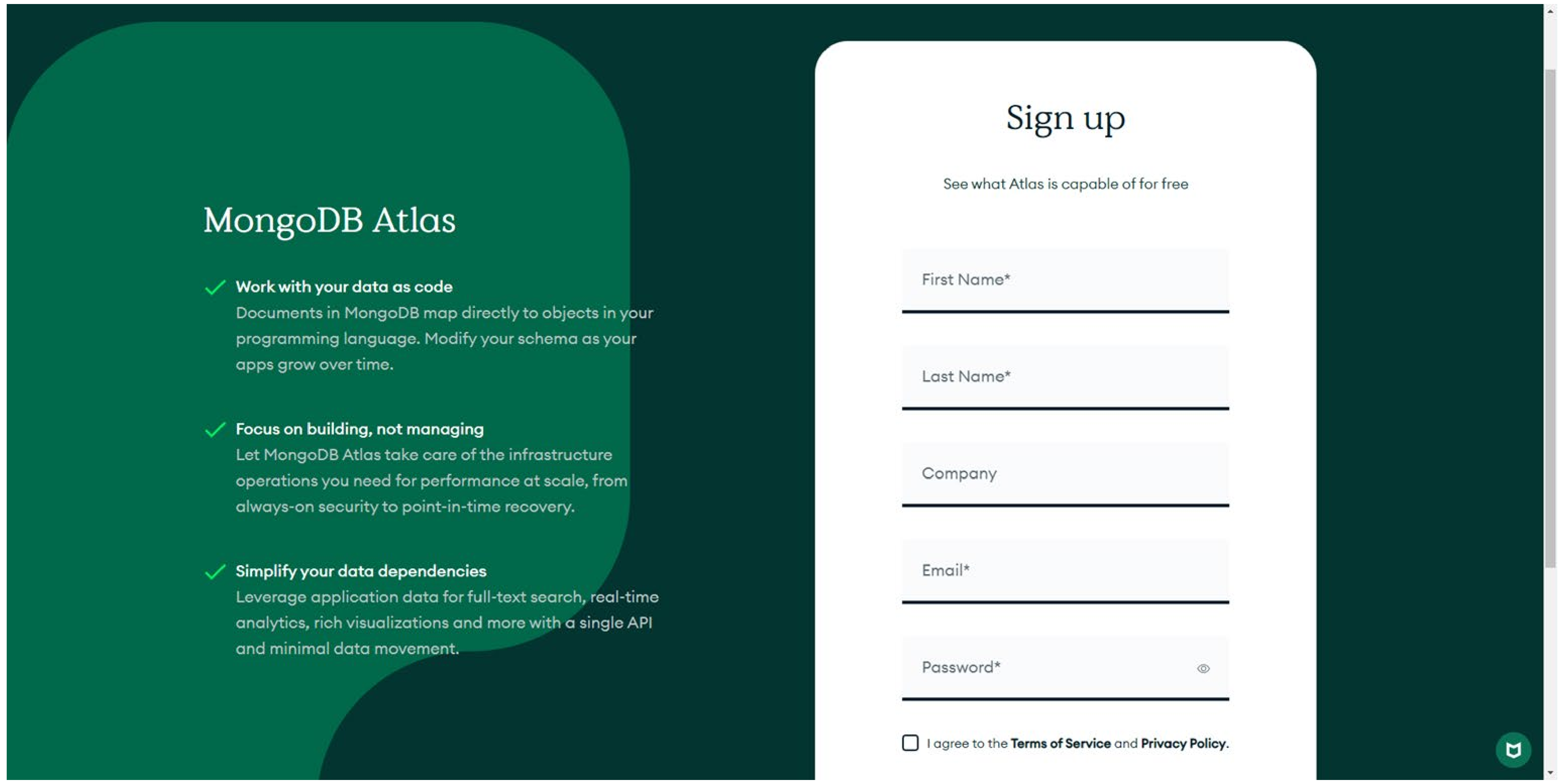
MongoDB Atlas. The multi-cloud developer data platform.

An integrated suite of cloud database and data services to accelerate and simplify how you build with data.

Getting started with MongoDB Atlas

Its as simple as opening an account!

- Sign Up by filling out the signup form
- Leave the company field blank, it is optional



MongoDB Atlas

✓ **Work with your data as code**
Documents in MongoDB map directly to objects in your programming language. Modify your schema as your apps grow over time.

✓ **Focus on building, not managing**
Let MongoDB Atlas take care of the infrastructure operations you need for performance at scale, from always-on security to point-in-time recovery.

✓ **Simplify your data dependencies**
Leverage application data for full-text search, real-time analytics, rich visualizations and more with a single API and minimal data movement.

Sign up

See what Atlas is capable of for free

First Name*

Last Name*

Company

Email*

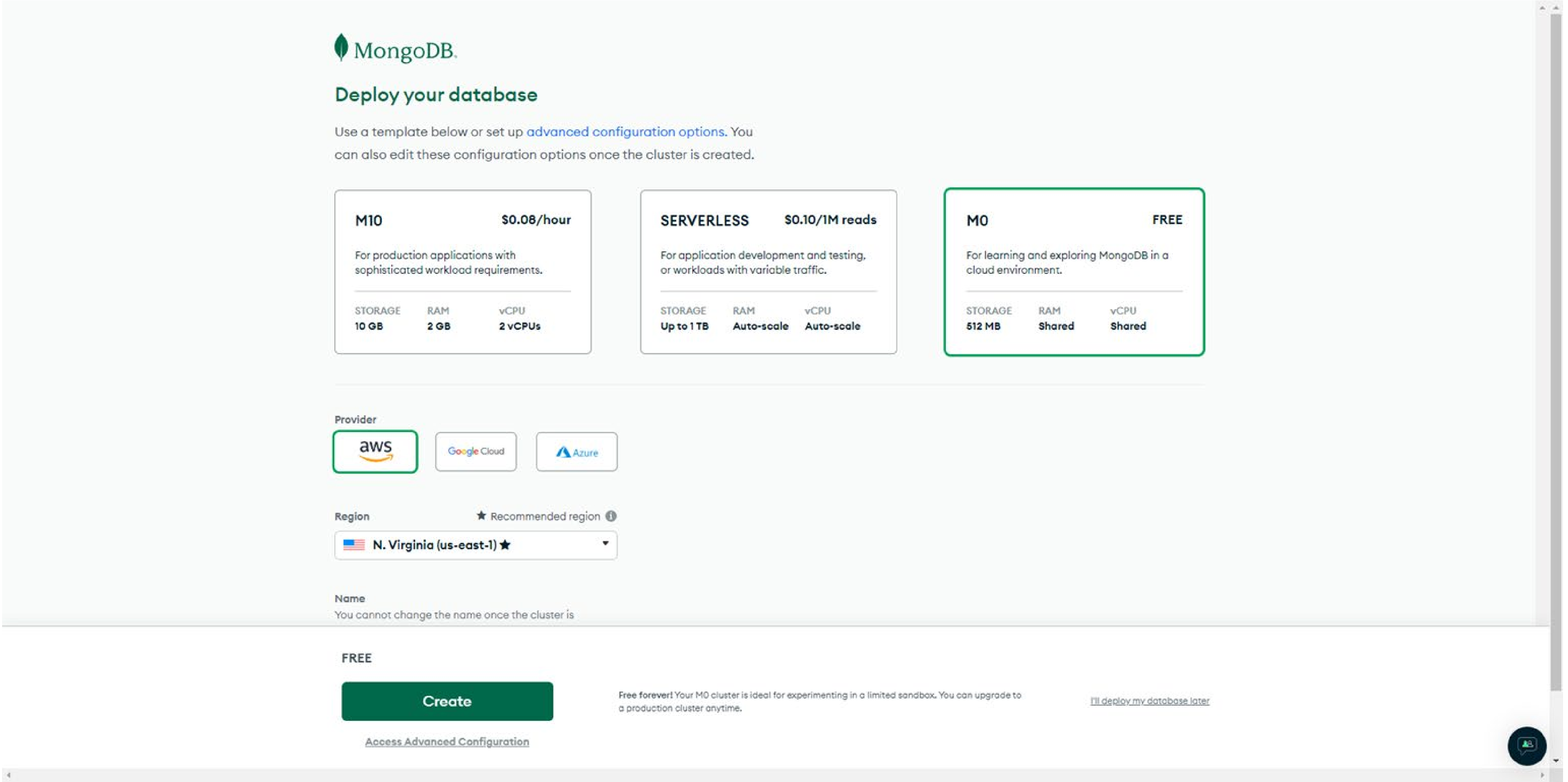
Password*

□ I agree to the **Terms of Service** and **Privacy Policy**.

Getting started with MongoDB Atlas

Its as simple as opening an account!

- Verify your email address
- After verifying your email address, you'll be prompted to deploy a database, just select the free option and give it a fitting name
- We'll name it "demo"



MongoDB.

Deploy your database

Use a template below or set up advanced configuration options. You can also edit these configuration options once the cluster is created.

M10 $0.08/hour
For production applications with sophisticated workload requirements.
STORAGE 10 GB · RAM 2 GB · vCPU 2 vCPUs

SERVERLESS $0.10/1M reads
For application development and testing, or workloads with variable traffic.
STORAGE Up to 1 TB · RAM Auto-scale · vCPU Auto-scale

M0 FREE
For learning and exploring MongoDB in a cloud environment.
STORAGE 512 MB · RAM Shared · vCPU Shared

Provider: aws

Region: N. Virginia (us-east-1) ★

Name
You cannot change the name once the cluster is

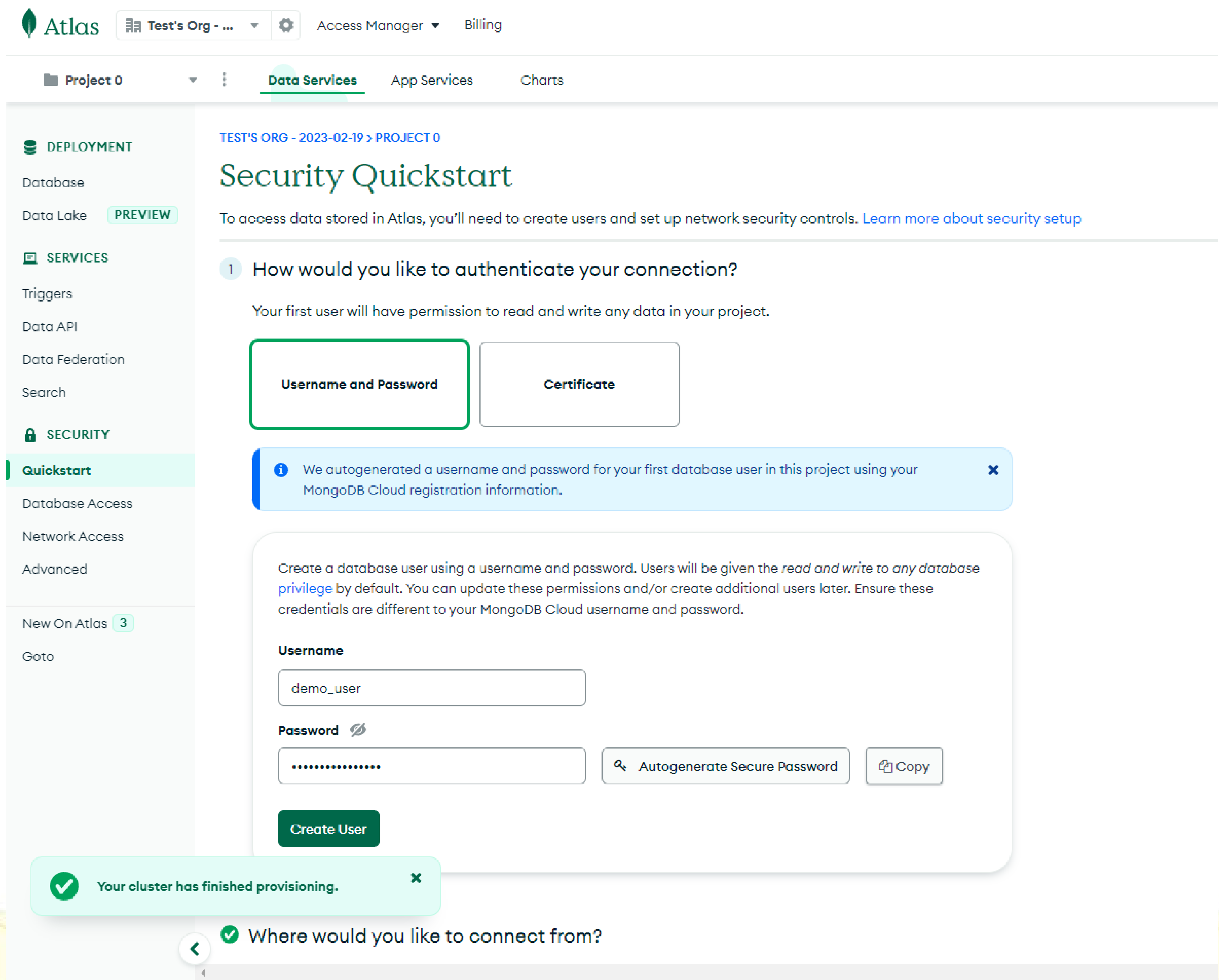
FREE

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

Getting started with MongoDB Atlas

Its as simple as opening an account!

- Once you have your database finish setting it up by making a database user



TEST'S ORG - 2023-02-19 > PROJECT 0

Security Quickstart

To access data stored in Atlas, you'll need to create users and set up network security controls. Learn more about security setup

1 How would you like to authenticate your connection?

Your first user will have permission to read and write any data in your project.

We autogenerated a username and password for your first database user in this project using your MongoDB Cloud registration information.

Create a database user using a username and password. Users will be given the *read and write to any database* privilege by default. You can update these permissions and/or create additional users later. Ensure these credentials are different to your MongoDB Cloud username and password.

Username: demo_user

Password: ••••••••••••••••

Your cluster has finished provisioning.

Where would you like to connect from?

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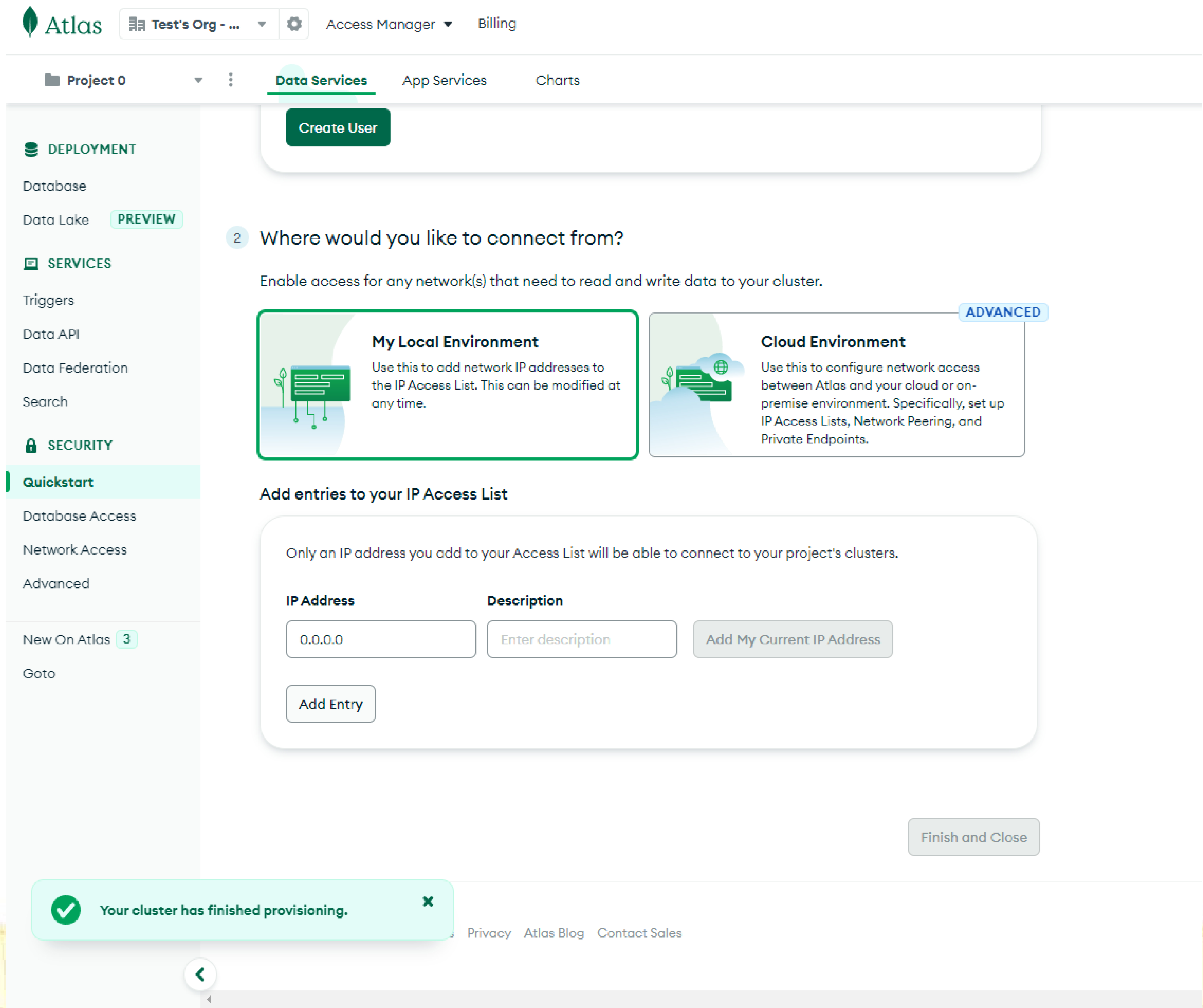
Getting started with MongoDB Atlas

Its as simple as opening an account!

- Make sure you allow access from anywhere by adding 0.0.0.0 as an allowed ip address



2 Where would you like to connect from?

Enable access for any network(s) that need to read and write data to your cluster.

My Local Environment
Use this to add network IP addresses to the IP Access List. This can be modified at any time.

Cloud Environment
Use this to configure network access between Atlas and your cloud or on-premise environment. Specifically, set up IP Access Lists, Network Peering, and Private Endpoints.

Add entries to your IP Access List

Only an IP address you add to your Access List will be able to connect to your project's clusters.

IP Address: 0.0.0.0
Description: Enter description

Your cluster has finished provisioning.

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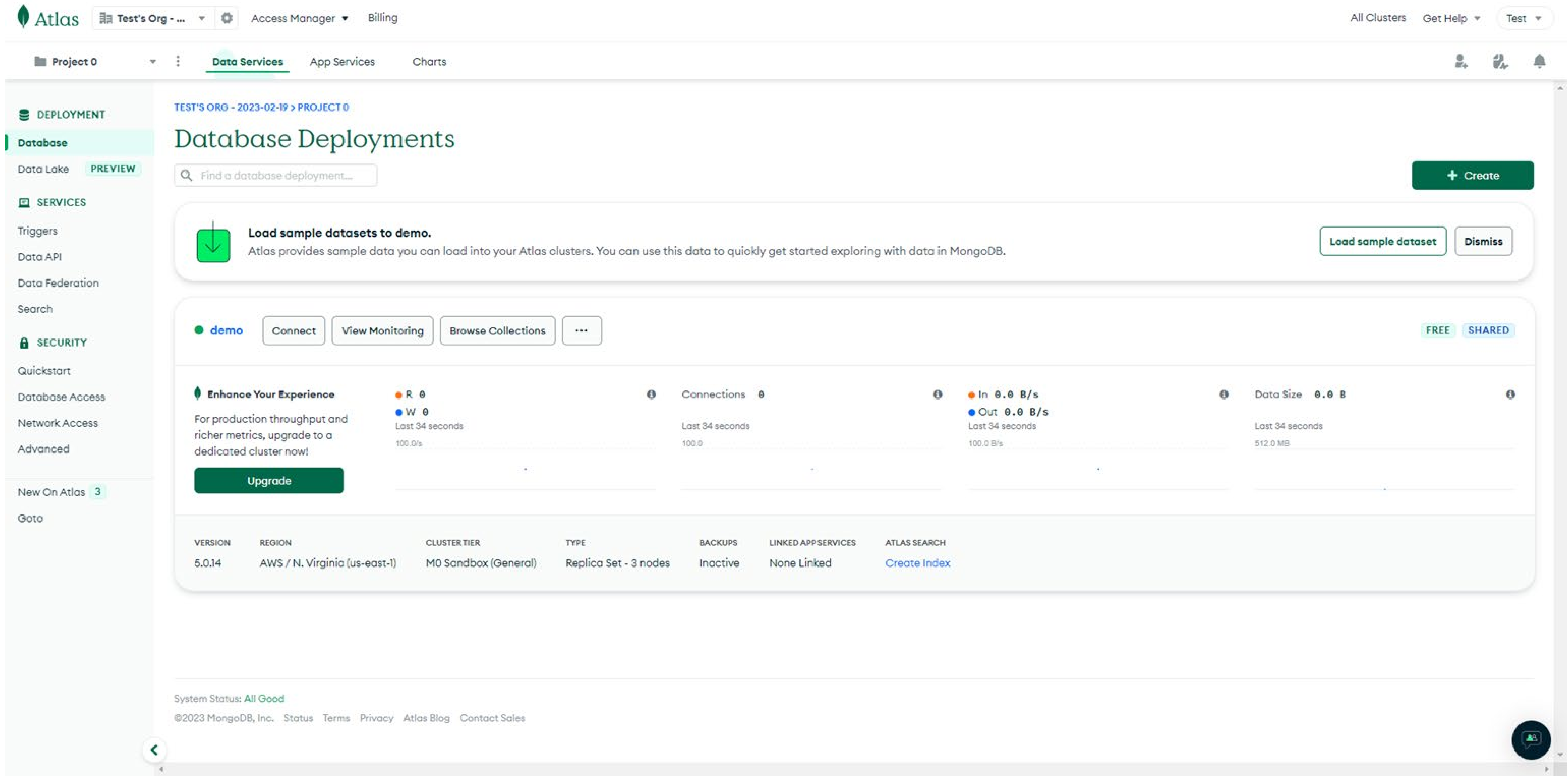

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Database Deployments

Load sample datasets to demo.
Atlas provides sample data you can load into your Atlas clusters. You can use this data to quickly get started exploring with data in MongoDB.

demo

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

R 0
W 0
Last 34 seconds
100.0/s

Connections 0
Last 34 seconds
100.0

In 0.0 B/s
Out 0.0 B/s
Last 34 seconds
100.0 B/s

Data Size 0.0 B
Last 34 seconds
512.0 MB

VERSION	REGION	CLUSTER TIER	TYPE	BACKUPS	LINKED APP SERVICES	ATLAS SEARCH
5.0.14	AWS / N. Virginia (us-east-1)	M0 Sandbox (General)	Replica Set - 3 nodes	Inactive	None Linked	Create Index

System Status: All Good

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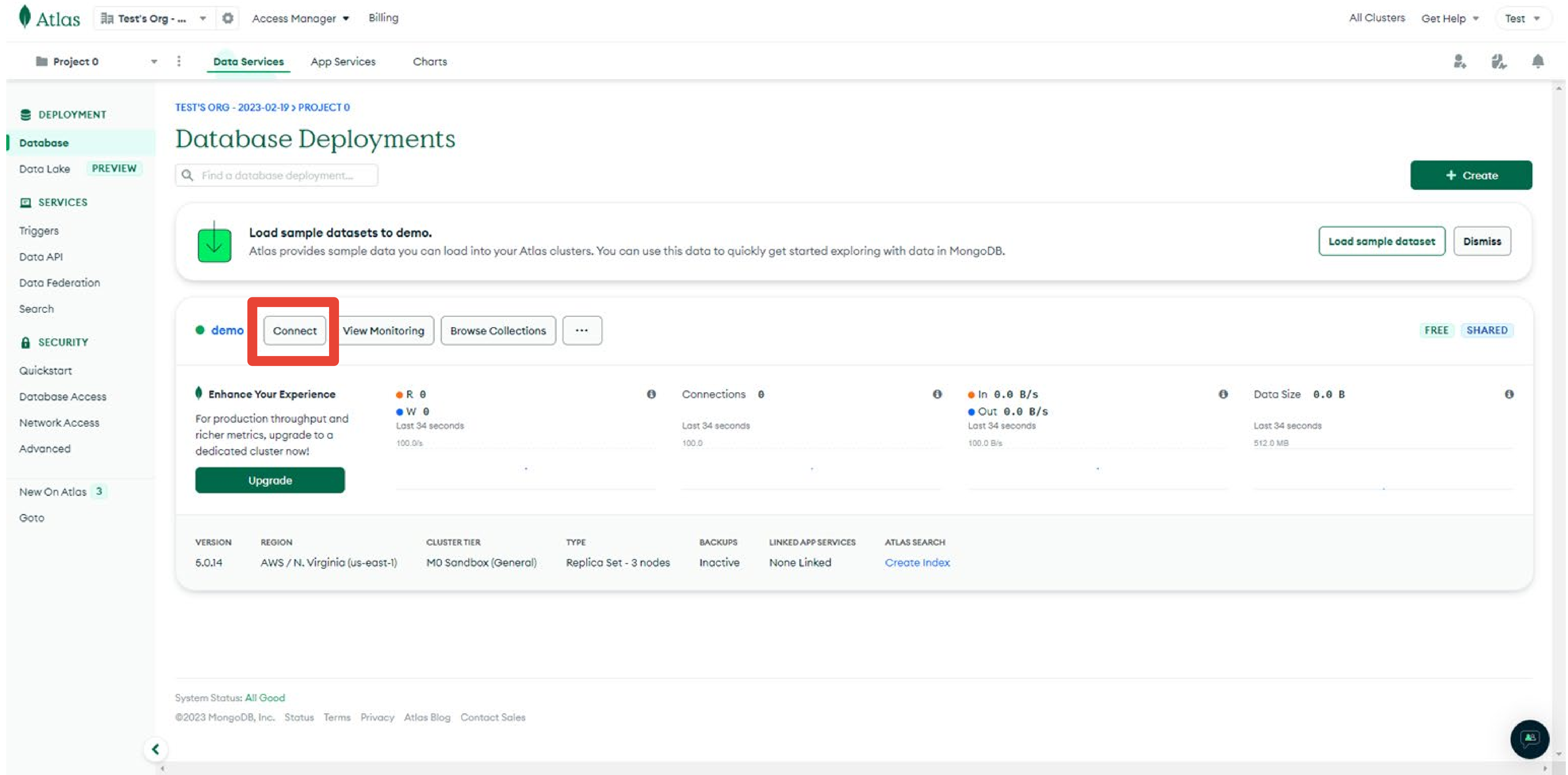
Connecting to your database

step-by-step

- Press on the "connect" button beside your demo deployment
- Press "connect to your application" > Set the driver to Python and choose your version > copy the connection string



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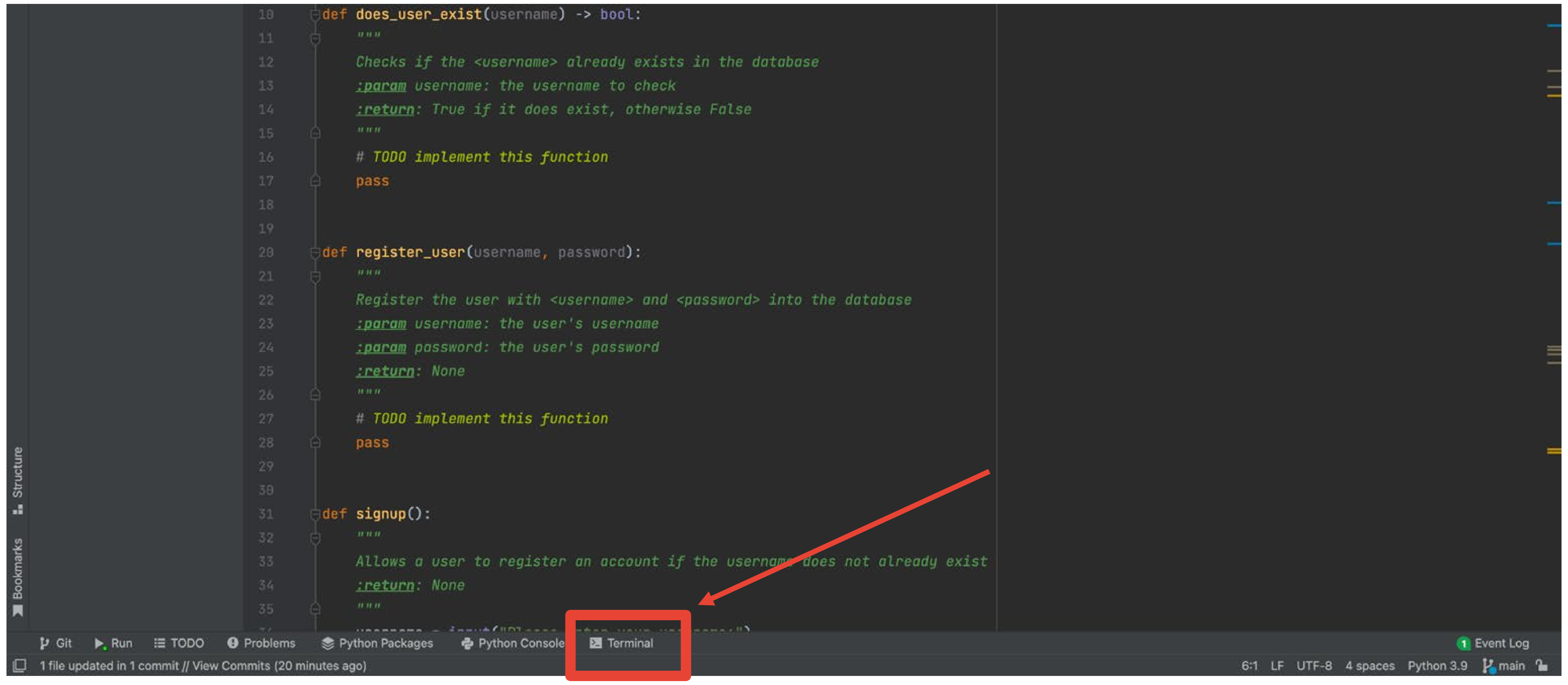
Connecting to your database

Step-by-step

- Open up the demo .py file shared to the chat
- In your terminal (VS Code terminal, Pycharm Terminal, command prompt) run the command `pip install pymongo` (make sure you have pip already installed)

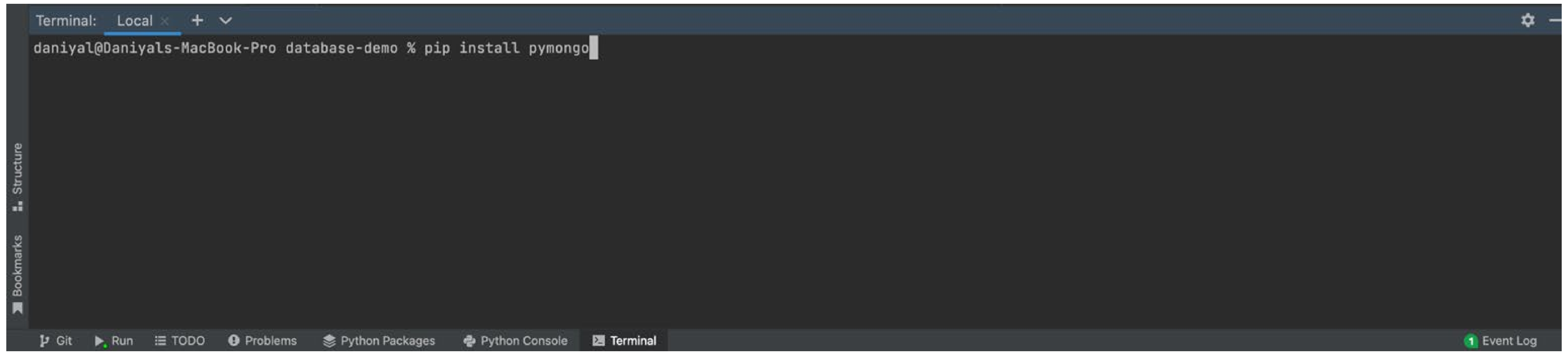


```
def does_user_exist(username) -> bool:
    """
    Checks if the <username> already exists in the database
    :param username: the username to check
    :return: True if it does exist, otherwise False
    """
    # TODO implement this function
    pass


def register_user(username, password):
    """
    Register the user with <username> and <password> into the database
    :param username: the user's username
    :param password: the user's password
    :return: None
    """
    # TODO implement this function
    pass


def signup():
    """
    Allows a user to register an account if the username does not already exist
    :return: None
    """
```

Structure
Bookmarks
Git
Run
TODO
Problems
Python Packages
Python Console
Terminal
Event Log
1 file updated in 1 commit // View Commits (20 minutes ago)
6:1 LF UTF-8 4 spaces Python 3.9 main



```
daniyal@Daniyals-MacBook-Pro database-demo % pip install pymongo
```

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Connecting to your database

step-by-step

- Create a connection to your database using MongoClient and the connection string you copied
  - Change the <password> field to the password you set for your database user
- On MacOS, you may need to include an additional argument, a certification to connect

```
client = MongoClient('<connection string>')


client = MongoClient('<connection string>',
tlsCAFile=certifi.where())
```