


# Experiment Note: MongoDB Using YCSB Benchmarks

Group 8: Amjad Alqahtani, Caleb Alva, Nicholas Winkelmann  
Cloud Computing Final Project  
Course Professor: Dr. Glenn Brown  
University of Texas at San Antonio

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## Sign Up or Log In to MongoDB Atlas


1. Visit the MongoDB Atlas
  - a. <https://www.mongodb.com/cloud/atlas>
2. Create an account
3. Login



### Log in to your account

Don't have an account? [Sign Up](#)

 Google

 GitHub

Or with email and password

Email Address

amjad.alqahtani@my.utsa.edu


Next

### MongoDB 8.0 is here

Up to 32% higher throughput, improved horizontal scaling, expanded queryable encryption capabilities, and more.

[See everything that's new](#) →

4. Create a new cluster and a new project named YCSB

 UTSA Access Manager Billing

**ORGANIZATION**  
**Projects**  
Alerts  
Activity Feed  
Settings  
Integrations  
Access Manager  
Billing  
Support  
Live Migration

### Projects

Find a project...

Project Name	Clusters	Tags
YCSB	1 Cluster	<a href="#">+ Add Tags</a>

## Hardware and Environment

### Virtual Machine Specifications:

1. vCPUs:
  - a. Shared (no dedicated vCPUs; performance depends on the shared cluster environment).
  - b. RAM: Shared (memory resources are shared among multiple tenants on the same hardware).
  - c. Storage: 512 MB (allocated storage limit for the M0 Sandbox cluster).
  - d. Network Bandwidth: Shared bandwidth with no specific throughput guarantees.
2. Database Cluster Configuration Cluster
  - a. Tier: M0 Sandbox (Free Tier)
    - i. Designed for learning and exploration, with limited resources.
  - b. Replica Set: 3 nodes
    - i. Data is replicated across 3 nodes to ensure availability and fault tolerance.
  - c. Region: AWS / N. Virginia (us-east-1)
    - i. Hosted on Amazon Web Services in the Northern Virginia region.
  - d. Type: Replica Set (Single Cluster)
    - i. Supports a basic MongoDB deployment with replication for data redundancy.

# Upgrade ClusterO

Choose a template below to upgrade your cluster or edit additional configuration.  
Cluster configuration can be edited at any time.

M10

\$0.08/hour

RECOMMENDED

Dedicated Clusters for development environments and low-traffic applications.

STORAGE

10 GB

RAM

2 GB

vCPU

2 vCPUs

Features

✓ Flexible backups ⓘ

✓ Zero-downtime cluster scaling ⓘ

✓ Performance diagnostic tools ⓘ

✓ Additional search indexes

✓ Uptime SLA ⓘ

M2

\$0.012/hour

MINIMUM UPGRADE

Additional storage capacity for learning and exploring.

STORAGE

2 GB

RAM

Shared

vCPU

Shared

Features

✓ Limited backups ⓘ

✓ Upgradeable with downtime ⓘ

M0

Free

CURRENT

For learning and exploring MongoDB in a cloud environment.

STORAGE

512 MB

RAM

Shared

vCPU

Shared

Features

✓ Free forever

## Cluster Overview

UTSA > YCSB > DATABASES

# ClusterO

Overview

Real Time

Metrics

SANDBOX

NODES

REPLICA SET

TAGS

Use tags to efficiently label and categorize your clusters.  
[Learn more about tagging.](#)

REGION N. Virginia (us-east-1)

● cluster0-shard-00-00.k7tll...

SECONDARY

● cluster0-shard-00-01.k7tll...

SECONDARY

● cluster0-shard-00-02.k7tll.m...

PRIMARY

## Create Database

UTSA > YCSB

# Database Access

Database Users

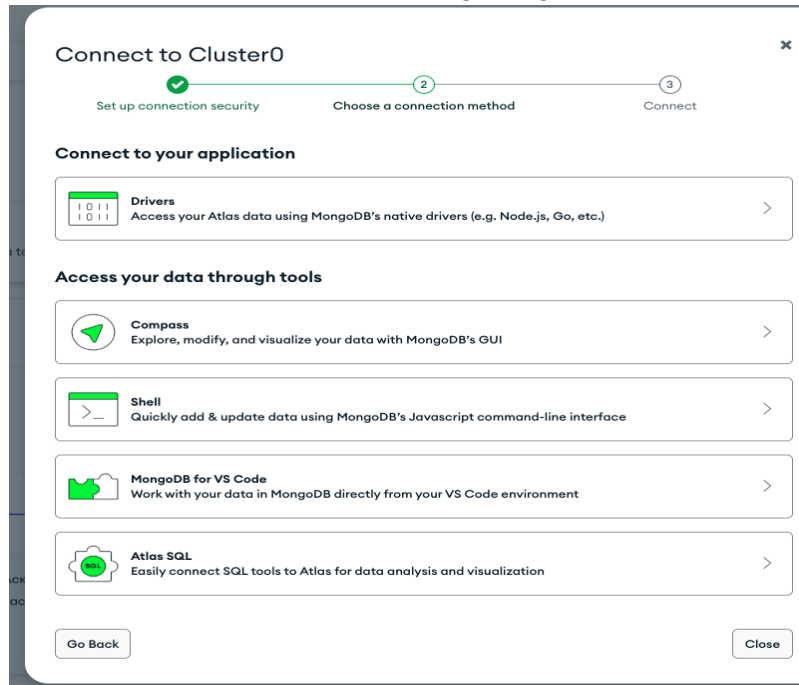
Custom Roles

User 

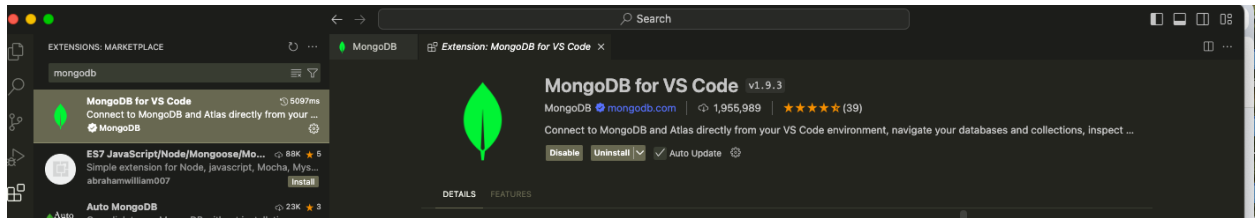
 amjadalqahtani

## Connect to Your Cluster

1. We connect to the cluster using MongoDB for VS Code



## 2. Install MongoDB extension



## 3. Press on view palette, MongoDB connection and place the connection link

### Connect to Cluster0

✓

✓

3

Set up connection securityChoose a connection methodConnect

### Connecting with MongoDB for VS Code

- 1. Install MongoDB for VS Code.**

In **VS Code**, open "Extensions" in the left navigation and search for "MongoDB for VS Code." Select the extension and click install.
- 2. In VS Code, open the Command Palette.**

Click on "View" and open "Command Palette."  
Search "MongoDB: Connect" on the Command Palette and click on "Connect with Connection String."
- 3. Connect to your MongoDB deployment.**

Paste your connection string into the Command Palette.

`mongodb+srv://amjadalqahtani:<db_password>@cluster0.k7tll.mongodb.net/`

Replace **<db\_password>** with the password for the **amjadalqahtani** user. Ensure any options are [URL encoded](#).  
You can edit your database user password in [Database Access](#).
- 4. Click "Create New Playground" in MongoDB for VS Code to get started.**

[Learn more about Playgrounds](#)

**RESOURCES**

[Connect to MongoDB through VSCode](#)[Access your Database Users](#)[Explore your data with playgrounds](#)[Troubleshoot Connections](#)

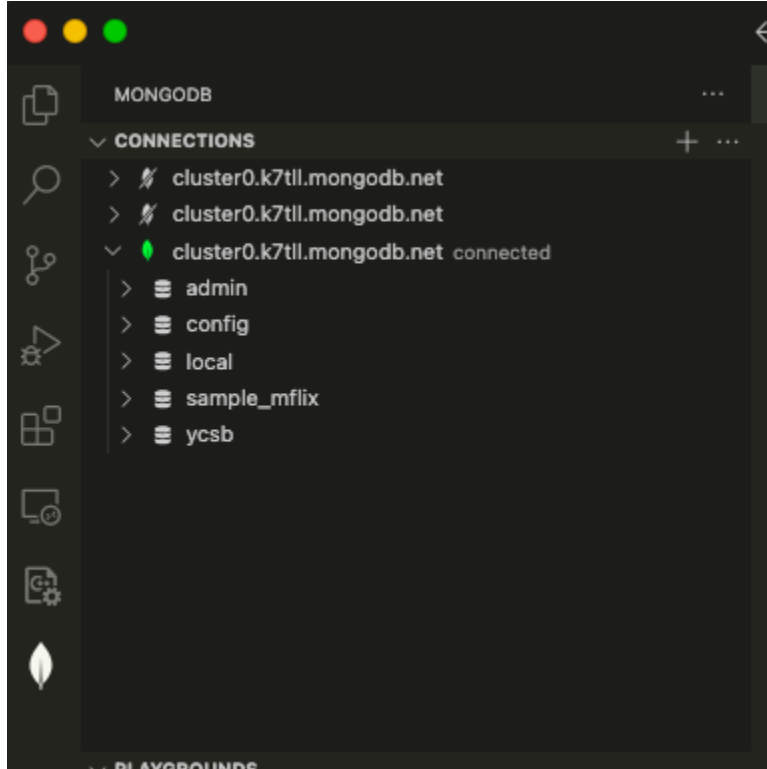
[Go Back](#)[Done](#)

This is the connection link for our project

mongodb+srv://amjadalqahtani:<db\_password>@cluster0.k7tll.mongodb.net/

Change the db\_password with Julia2017

You will be connected to the cluster at this point.



Steps and environment for reproducing our results:

Clone the YCSB on your local machine.

1. clone YCSB <https://github.com/mongodb-labs/YCSB/tree/main/ycsb-mongodb>
2. cd YCSB-Mongodb/ycsb-mongodb

Install MongoDB on local machine

1. <https://www.mongodb.com/docs/manual/installation/>
2. We have mac laptops
3. <https://www.mongodb.com/docs/manual/tutorial/install-mongodb-on-os-x/>
4. To verify the successful installation, we run the version mongod --version

```

MacBookPro:finalproject salemalqahtani$ mongod --version
db version v8.0.1
Build Info: {
  "version": "8.0.1",
  "gitVersion": "fcbe67d668fff5a370e2d87b9b1f74bc11bb7b94",
  "modules": [],
  "allocator": "system",
  "environment": {
    "distarch": "x86_64",
    "target_arch": "x86_64"
  }
}

```

5. Install Java and Maven

JAVA: <https://www.oracle.com/java/technologies/downloads/?er=221886>

Maven: brew install maven

6. To verify the successful installation, we run the version for java and maven.

```

MacBookPro:finalproject amjadalahtani$ java -version
java version "23.0.1" 2024-10-15
Java(TM) SE Runtime Environment (build 23.0.1+11-39)
Java HotSpot(TM) 64-Bit Server VM (build 23.0.1+11-39, mixed mode, sharing)
MacBookPro:finalproject amjadalahtani$ mvn -version
Apache Maven 3.9.9 (8e8579a9e76f7d015ee5ec7bfcdc97d260186937)
Maven home: /usr/local/Cellar/maven/3.9.9/libexec
Java version: 23.0.1, vendor: Homebrew, runtime:
/usr/local/Cellar/openjdk/23.0.1/libexec/openjdk.jdk/Contents/Home
Default locale: en_US, platform encoding: UTF-8
OS name: "mac os x", version: "15.1", arch: "x86_64", family: "mac"
MacBookPro:finalproject amjadalahtani$

```

7. Fix the path

- a. export M2\_HOME=/usr/local/maven
- b. export PATH=\${M2\_HOME}/bin:\${PATH}

## YCSB Load Workload on MongoDB Cluster

```
./bin/ycsb load mongodb -s -P workloads/workloada -p
```

```
"mongodb.url=mongodb+srv://amjadalahtani:Julia2017@cluster0.k7tll.mongodb.net/test"
```





Overview

Real Time

Me

DATABASES: 2 COLLECTIONS: 7

+ Create Database

Search Namespaces

sample\_mflix

ycsb

usertable

QUERY RESULTS: 1-20 OF MANY

```
_id: "user6284781860667377211"
field1: Binary.createFromBase64('PTR8MjB4K0JvJ0xlmjM60F9/KC5wLyF80yU8IDxwP0ojICZ2I0QpJDo2KzY20D80PU5rPyt+ODFgI1A7PFs1JF3rMSRyLjJg0EL5...', 0)
field0: Binary.createFromBase64('JiJ8P0czPis8PTL+Lyg8PC40Kk8pNTckM0E5MDt6Mj0sJFM3Mzc4LFNjKSo8ICVknCw00M5PVQ3IFRvNL570zM4MyduNiQqPik6...', 0)
field7: Binary.createFromBase64('JDwuKUxLIi5qN0V5KyJiPjRsNTs80CE0PEQ/KCs4L0QvKFhrIF9/ILp90UdjNyV8JDIdqPDt0P5duJkx3Mjt+KkJxMDwwPTZgIiEm...', 0)
field6: Binary.createFromBase64('LzE60VotKDNHmj8wN1t/Ki0sLUFPiKzJcCmJTUGJCc+LCLsJSok0UtvIiswPV9pLF8pIC4wNDUioCEgMTE80EJzLjJ0L1k1ISAi...', 0)
field9: Binary.createFromBase64('MiQgKUN5PEISLUNjKi0yPEI1IVNr0ld1PUAhLDxy0L1701hnPkArISR+PFs3IT4uIDEqKDF+KlsjPUE/NFM3MV5rLSpkLlc1J1Ej...', 0)
field8: Binary.createFromBase64('Jz5k3lhzi007LS18MDRuNkgxP0gtIV9nL08rLjx4PzFqI1N5LUJniYg+IEVz0Lkz0EwLTQyOFFrMjZ4Ki100yoiJ1IhMT820LFx...', 0)
field3: Binary.createFromBase64('MiNm0L5xMki3JScsL0JlNiR+JzR2L0d1K0E5PEw9P0dxP1N70TAmMURvILApNS5qPjp8PkUpMkR3Kytg0VYjNfx30jZkLzQ4Kj4i...', 0)
field2: Binary.createFromBase64('PVp5IkijMy4KkArPi10NLyPijtuN1xxMLljMiB8I18jOD860Lg7JCRuK1UtMCLgP0MhMVAx0iwwKSV8NDdkPiAy0FY9MD98IC5y...', 0)
field5: Binary.createFromBase64('JFdnMiU8Lid0NjwyJSc8NSMkKFcXJUNtNk13JzgyLFd7Pjg+JVYzJU8nIFpnP1splSJ00j10Li0wJSoW01MhMTwiPzhgJjBwJkZ9...', 0)
field4: Binary.createFromBase64('Nz8mNSA8NkM/ND46MzFuLkBljwsKF4vIDNi01VxLCVgLLo/NV4jKChyJ18vICM+NT0sMSJk0yppMLg7PDx8IzcyP1J7M1FLID4+...', 0)
```

## YCSB run Workload on MongoDB Cluster

### Command to run YCSB A:

```
./bin/ycsb run mongodb -s -P workloads/workloada -p
"mongodb.url=mongodb+srv://amjadalqahtani:Julia2017@cluster
0.k7tll.mongodb.net/ycsb" > outputWorkloadA.txt
```

### Command to run YCSB B:

```
./bin/ycsb run mongodb -s -P workloads/workloadb -p
"mongodb.url=mongodb+srv://amjadalqahtani:Julia2017@cluster
0.k7tll.mongodb.net/ycsb" > outputWorkloadB.txt
```

#### Command to run YCSB C:

```
./bin/ycsb run mongodb -s -P workloads/workloadc -p  
"mongodb.url=mongodb+srv://amjadalqahtani:Julia2017@cluster  
0.k7tll.mongodb.net/ycsb" > outputWorkloadC.txt
```

#### Command to run YCSB D:

```
./bin/ycsb run mongodb -s -P workloads/workloadd -p  
"mongodb.url=mongodb+srv://amjadalqahtani:Julia2017@cluster  
0.k7tll.mongodb.net/ycsb" > outputWorkloadD.txt
```

#### Command to run YCSB E:

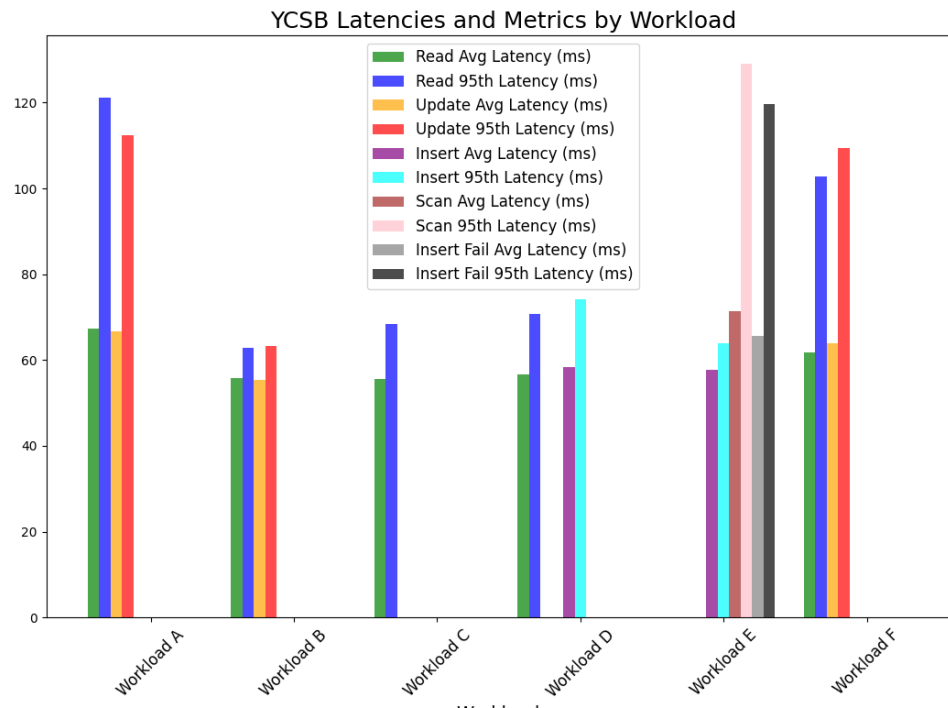
```
./bin/ycsb run mongodb -s -P workloads/workloade -p  
"mongodb.url=mongodb+srv://amjadalqahtani:Julia2017@cluster  
0.k7tll.mongodb.net/ycsb" > outputWorkloadE.txt
```

#### Command to run YCSB F:

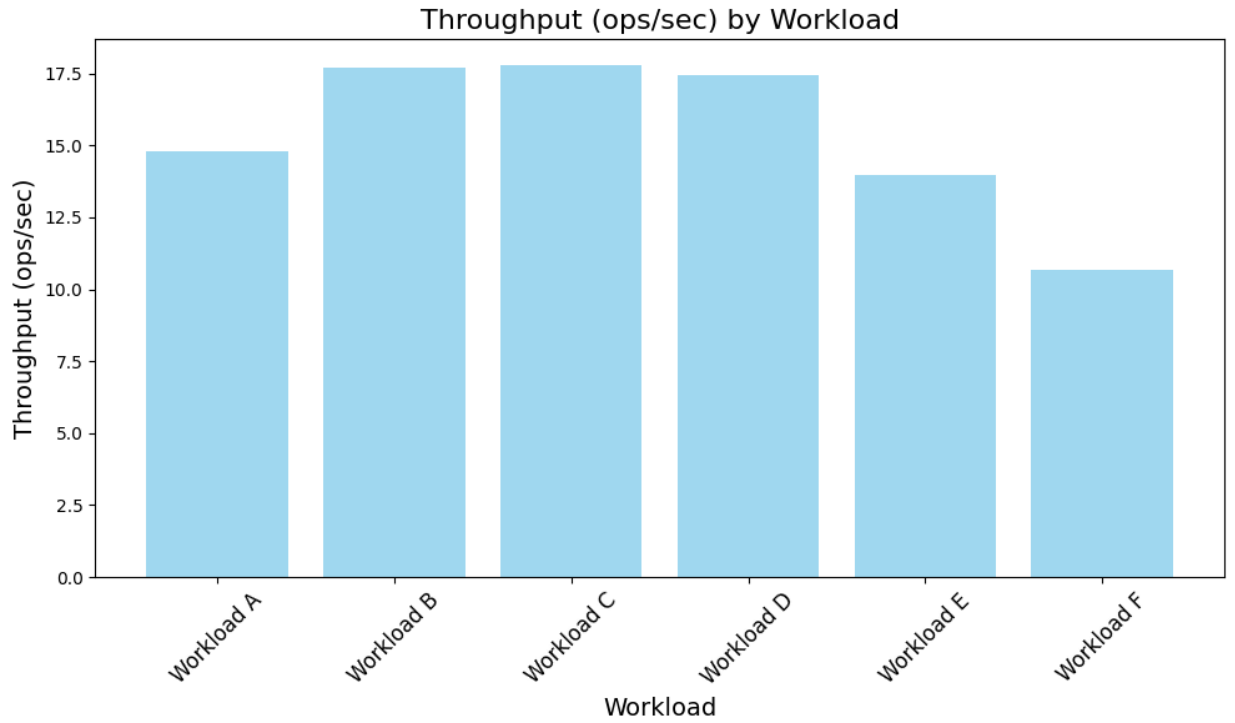
```
./bin/ycsb run mongodb -s -P workloads/workloadf -p  
"mongodb.url=mongodb+srv://amjadalqahtani:Julia2017@cluster  
0.k7tll.mongodb.net/ycsb" > outputWorkloadF.txt
```

## Results

### 1. Latency



## 2. Throughput



### Future Work:

Using different Workload like KV benchmark workload