# mongoDB®

A NoSQL database

# MongoDB

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# MongoDB

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# MongoDB

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# What is MongoDB?

MongoDB is a NoSQL cross-platform, open-source, document oriented database written in C++.

It is a document-based, general-purpose, distributed database with scalability and flexibility.

It doesn’t use tables and rows to store its data, but instead *collections* of *documents.*

MongoDB is a schema-less database, so we don’t need to specify the number or type of columns before inserting our data.

***MongoDb is a  NoSQL document database***

# Objects in Mongo Db

| SQL Server | Mongo Db |
|---|---|
| •**Data Base** | • **Data Base** |
| •**Table** | • **Collection** |
| •**Row** | • **Document** |
| •**Column** | • **Field** |

# Key Features of Mongo Db

1. Ad-hoc Queries - Queries which are not known while designing the structure
2. Aggregation – perform a operation on the grouped data
3. Schema Less Database – different documents can have different fields in the same collection
4. Document oriented – the data is stored in the form of documents which is identified with a unique ID.
5. Indexing - index the data to improve the search query performance
6. High Performance – Provides high availability, scalability & better query response
7. Grid FS – stores the large data in to different documents
8. Sharding – partition the very large data into smaller parts known as shards
9. Replication - creates a copy of the database on multiple machines which increases the availability & accessibility

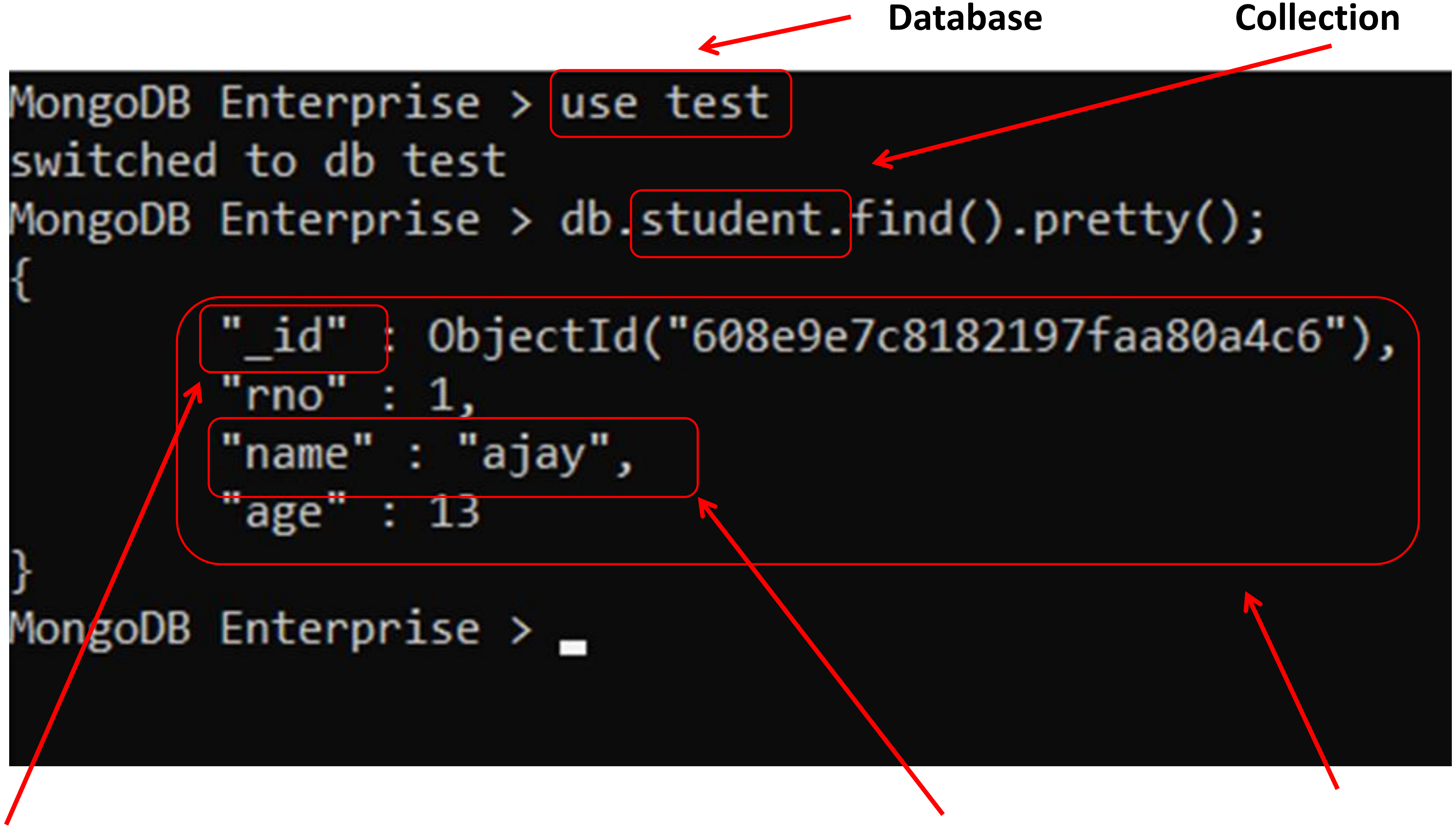
# SQL Vs NoSQL Db

| SQL | MongoDB |
|---|---|
| Matured or stable | Its new and updated frequently |
| It follows tabular structure | It follows document structure |
| It needs a proper schema | Its flexible in nature |
| Managing complex relations among different tables is easy | Its not that great in complex managing relationship |
| Its scales vertically | Horizontally scalable |
| Suggestible for structured data | Can be used for non structured data |

# Key Components of Mongo Db

- _id – this is a mandatory field in every document which represents a unique key (Primary Key). If we create a document without _id field MongoDb will automatically create it.
- Collection – A collection is just like table in SQL which contains a group of documents.
- Data Base – Just like in SQL we have database similarly we have database in MongoDb which is container for collections.
- Document – A record in MongoDb is created in a collection., which contains fields.
- Field – it is a pair of Name /key & value.

# Key Components of Mongo Db



```
MongoDB Enterprise > use test
switched to db test
MongoDB Enterprise > db.student.find().pretty();
{
        "_id" : ObjectId("608e9e7c8182197faa80a4c6"),
        "rno" : 1,
        "name" : "ajay",
        "age" : 13
}
MongoDB Enterprise > _
```

**Database**

**Collection**

**Auto ID field**

**Key : Value Pair**

**Document**

# Format to create a document

Start & End with curly braces { }

Separate Key & value with colon :

Separate Key & value pair with comma ,

“Keys” also referred to as “fields” must be given in quotation marks “”

```
db.books.insert({"name" : "Rajat Sharma","Addr":"Sector 5 Dwarka", "city" :"Delhi","DOB" : "13-Jan-1990"})
```

# Create a document

```
db.test.insert(
                    {"name" : "Rajat Sharma",
                     "Addr":"Sector 5 Dwarka",
                     "city" :"Delhi",
                     “Phone” : “99999003456”
                      "DOB" : "13-Jan-1990"}
                    )
```

Pros of JSON : Friendly, Readable, Familiar

Cons of JSON : Text Based, Space Consuming, Limited

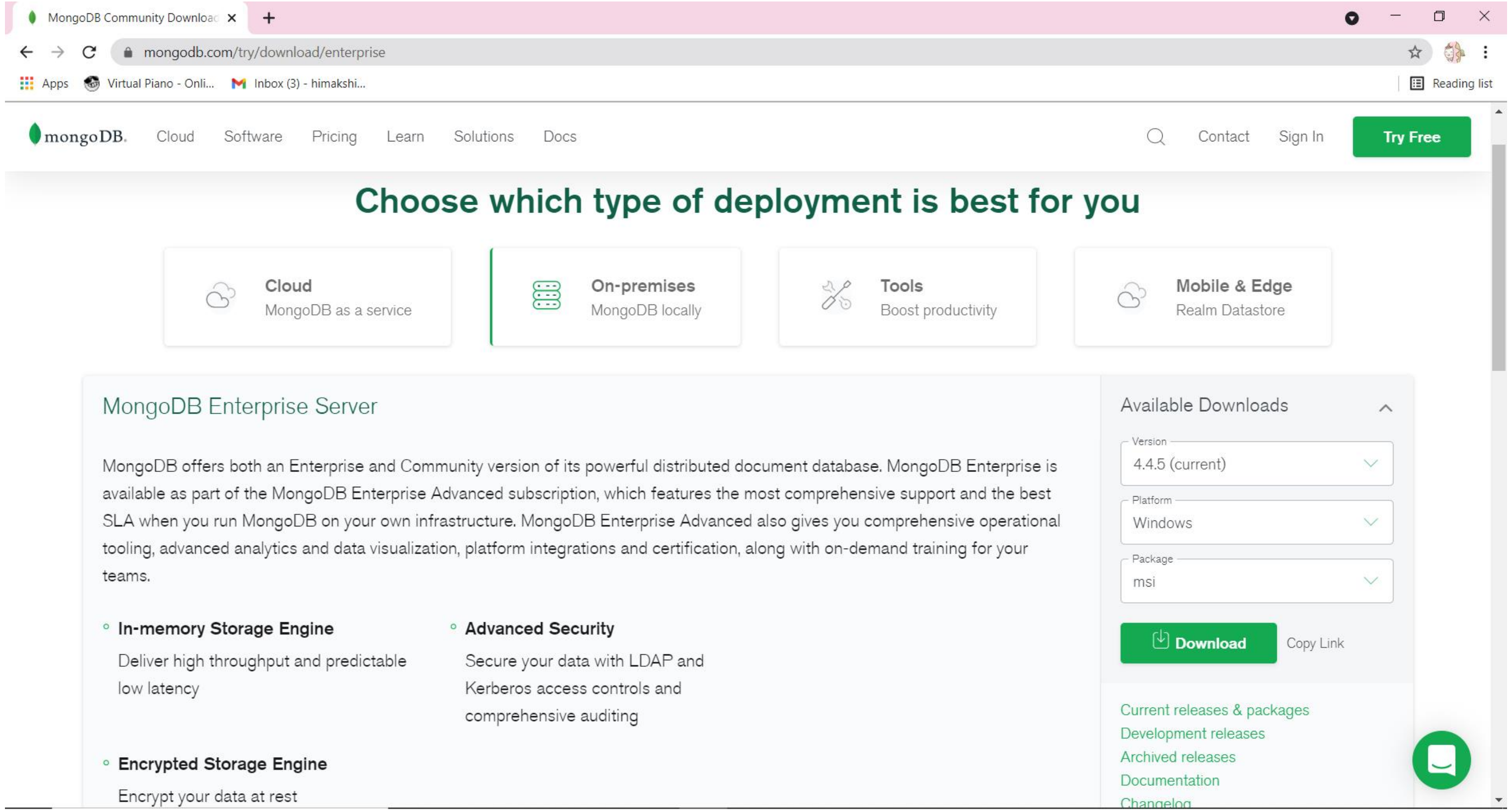
Data is stored in BSON format

# Installing Mongo Db

We need to install MongoDB EnterpriseServer.

The installation can be done using a ZIP or msi file.

https://www.mongodb.com/try/download/enterprise



## Choose which type of deployment is best for you

### MongoDB Enterprise Server

MongoDB offers both an Enterprise and Community version of its powerful distributed document database. MongoDB Enterprise is available as part of the MongoDB Enterprise Advanced subscription, which features the most comprehensive support and the best SLA when you run MongoDB on your own infrastructure. MongoDB Enterprise Advanced also gives you comprehensive operational tooling, advanced analytics and data visualization, platform integrations and certification, along with on-demand training for your teams.

- **In-memory Storage Engine**
  Deliver high throughput and predictable low latency
- **Advanced Security**
  Secure your data with LDAP and Kerberos access controls and comprehensive auditing
- **Encrypted Storage Engine**
  Encrypt your data at rest

Available Downloads

Version: 4.4.5 (current)

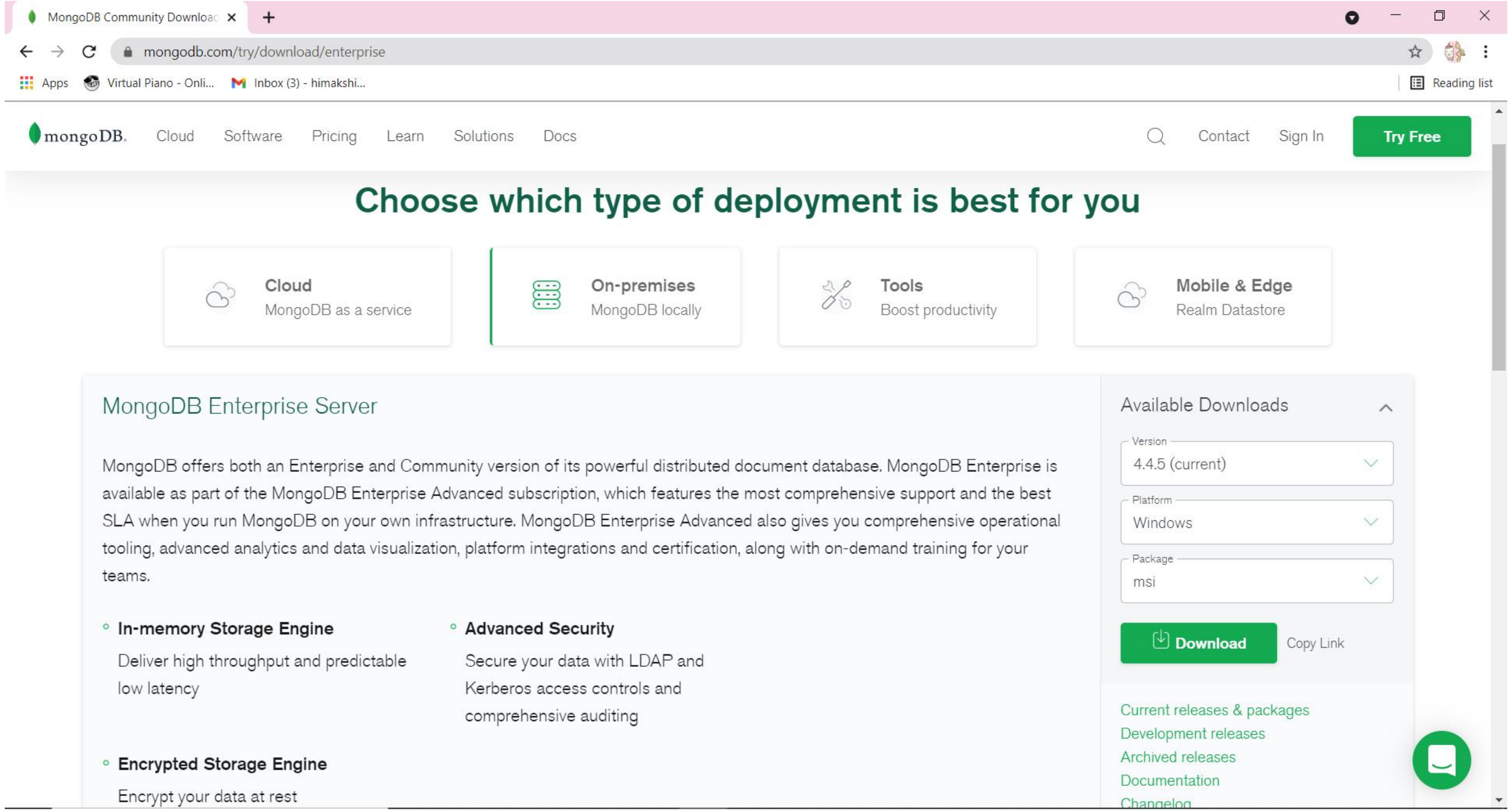
Platform: Windows

Package: msi

# Installing Mongo Db

## Installation through msi file.

**mongodb-windows-x86_64-enterprise-4.4.5-signed**



Choose which type of deployment is best for you

MongoDB Enterprise Server

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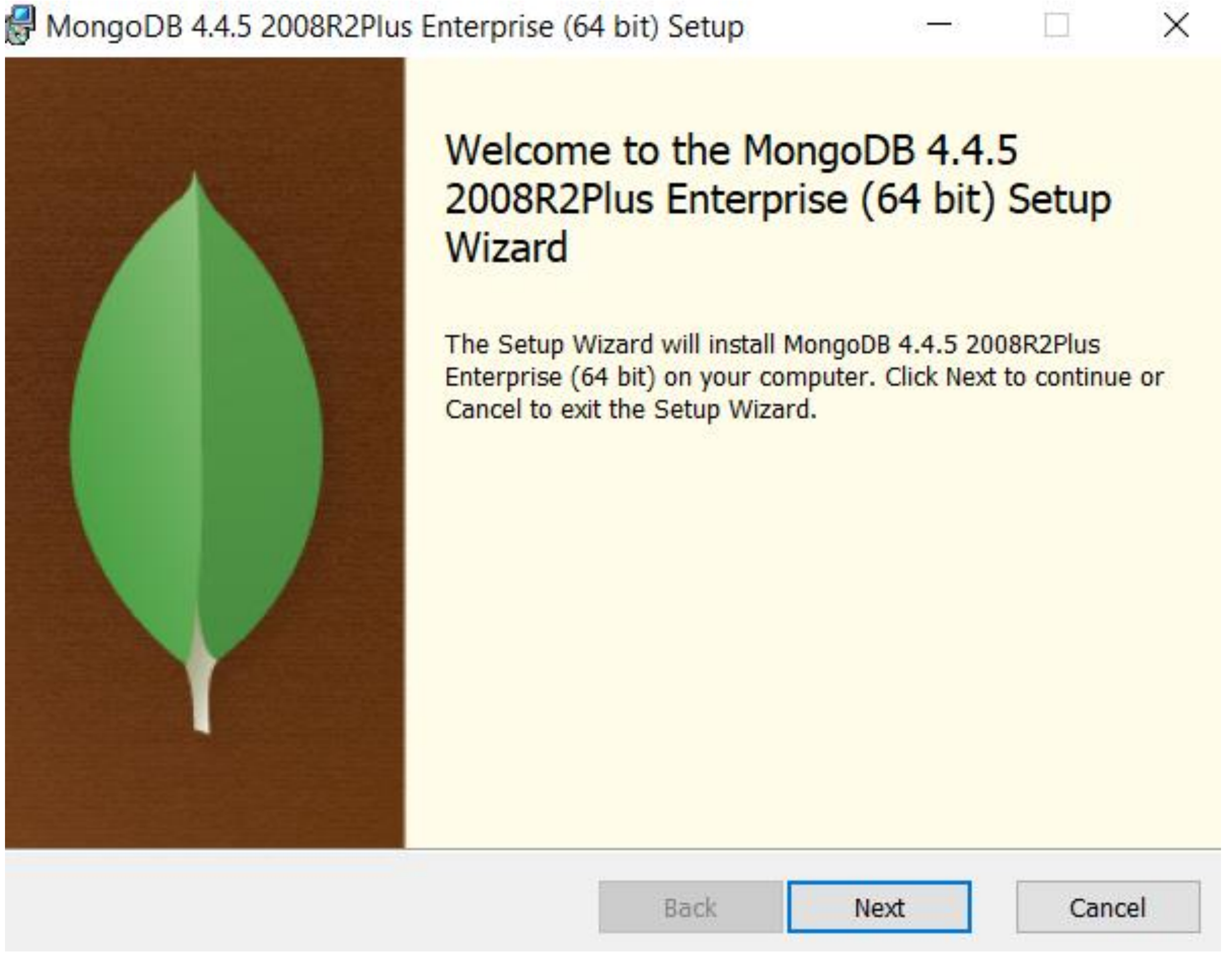
- **In-memory Storage Engine**
  Deliver high throughput and predictable low latency
- **Advanced Security**
  Secure your data with LDAP and Kerberos access controls and comprehensive auditing
- **Encrypted Storage Engine**
  Encrypt your data at rest

Available Downloads

Version: 4.4.5 (current)
Platform: Windows
Package: msi

# Installing Mongo Db

Double click on the downloaded file to initiate the installation.



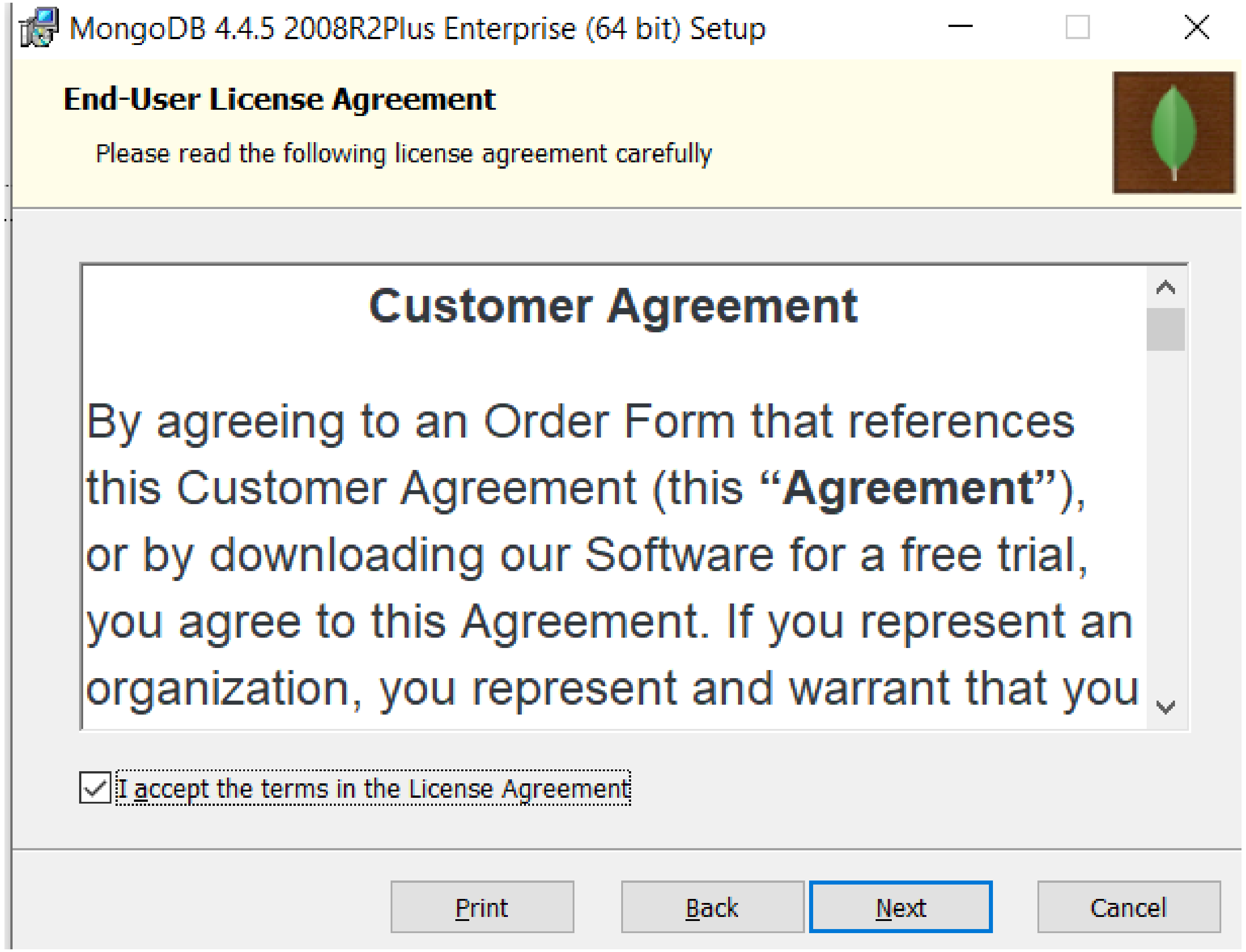
MongoDB 4.4.5 2008R2Plus Enterprise (64 bit) Setup

Welcome to the MongoDB 4.4.5 2008R2Plus Enterprise (64 bit) Setup Wizard

The Setup Wizard will install MongoDB 4.4.5 2008R2Plus Enterprise (64 bit) on your computer. Click Next to continue or Cancel to exit the Setup Wizard.

# Installing Mongo Db

Accept the license agreement



MongoDB 4.4.5 2008R2Plus Enterprise (64 bit) Setup

**End-User License Agreement**

Please read the following license agreement carefully

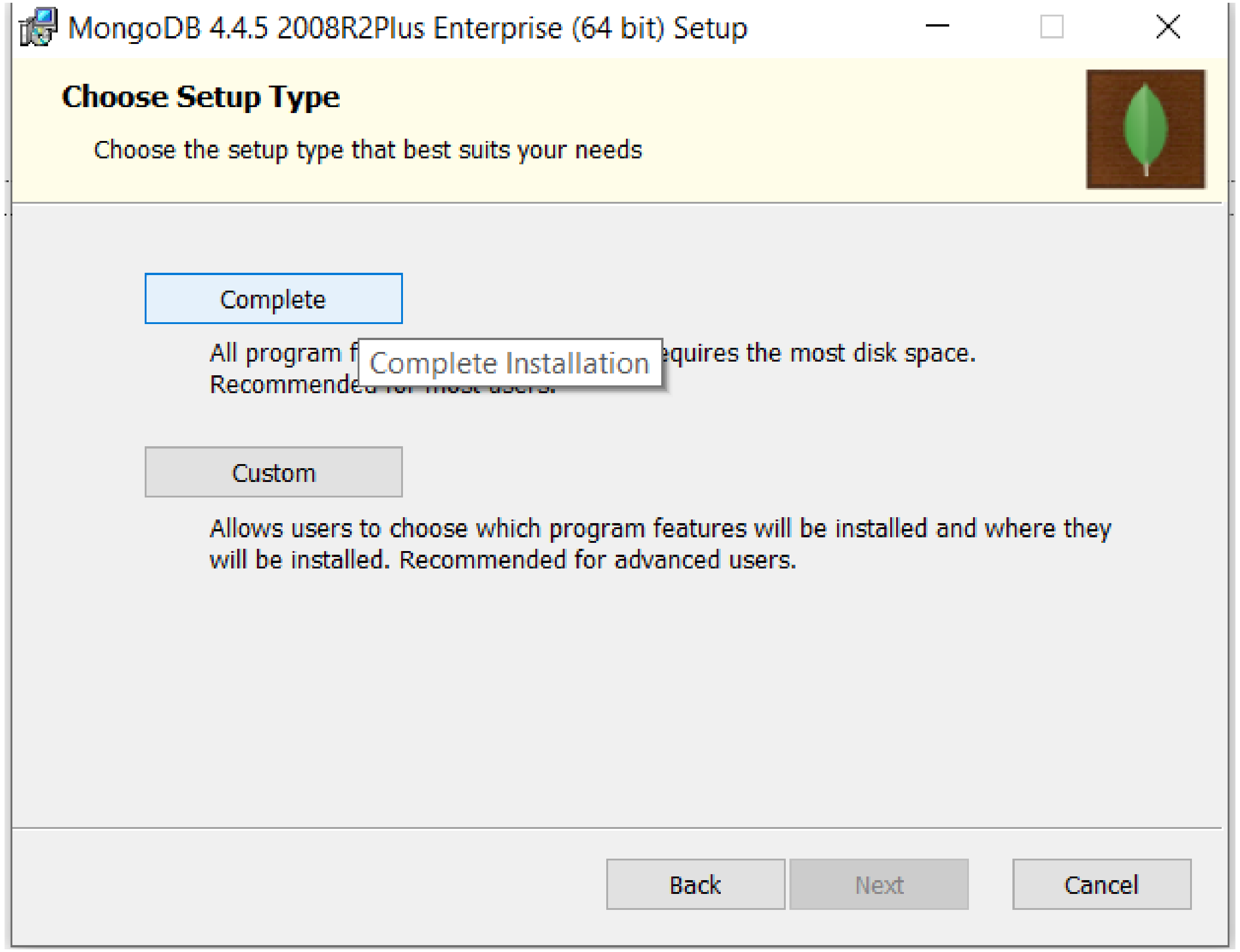
**Customer Agreement**

By agreeing to an Order Form that references this Customer Agreement (this "**Agreement**"), or by downloading our Software for a free trial, you agree to this Agreement. If you represent an organization, you represent and warrant that you

☑ I accept the terms in the License Agreement

# Installing Mongo Db

Choose Complete Installation



MongoDB 4.4.5 2008R2Plus Enterprise (64 bit) Setup

**Choose Setup Type**

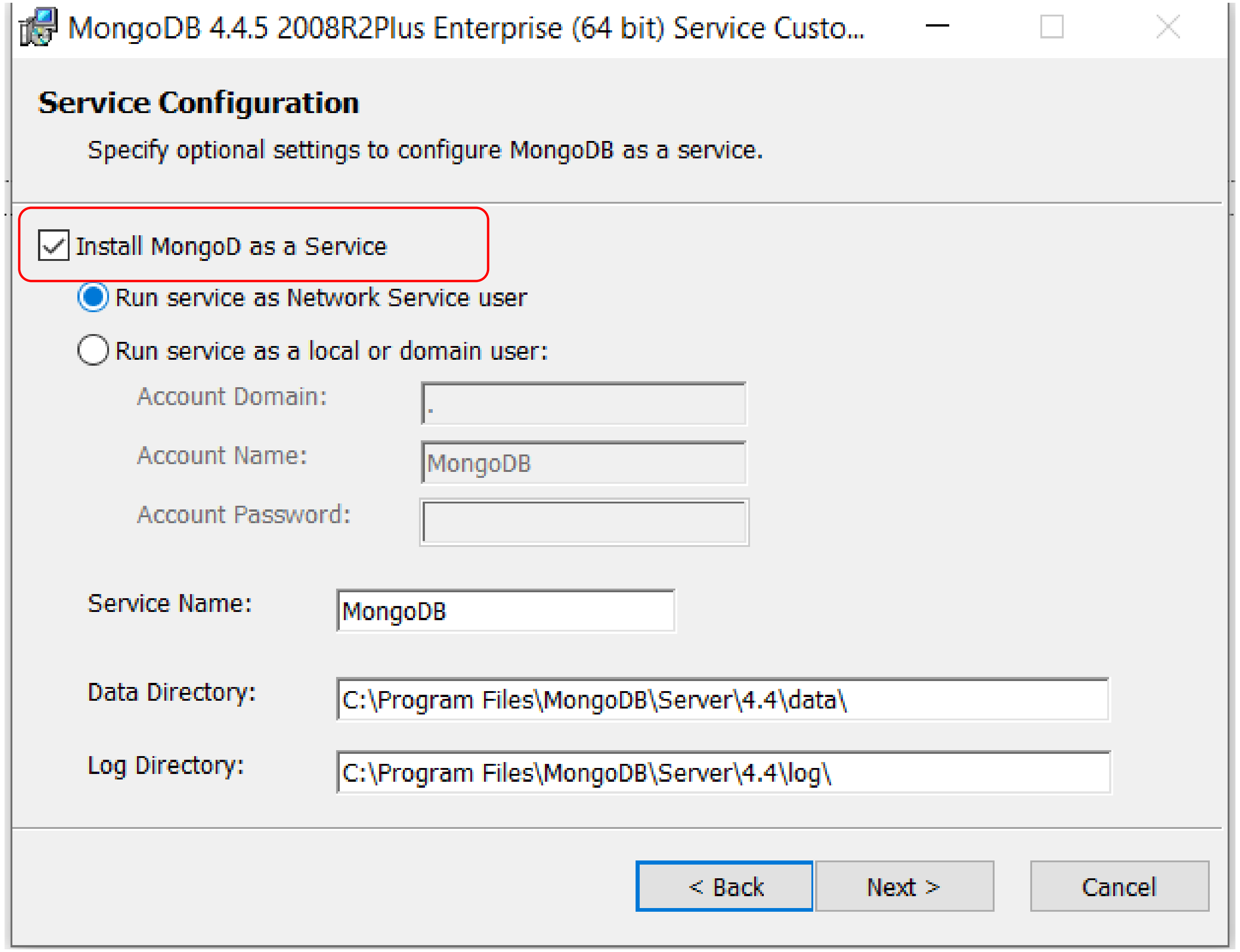
Choose the setup type that best suits your needs

All program f Complete Installation equires the most disk space.
Recommended for most users.

Allows users to choose which program features will be installed and where they will be installed. Recommended for advanced users.

# Installing Mongo Db

Select data location. Ensure Install MongoD as a service is checked



MongoDB 4.4.5 2008R2Plus Enterprise (64 bit) Service Custo...

**Service Configuration**

Specify optional settings to configure MongoDB as a service.

☑ Install MongoD as a Service

● Run service as Network Service user

○ Run service as a local or domain user:

Account Domain: .

Account Name: MongoDB

Account Password:

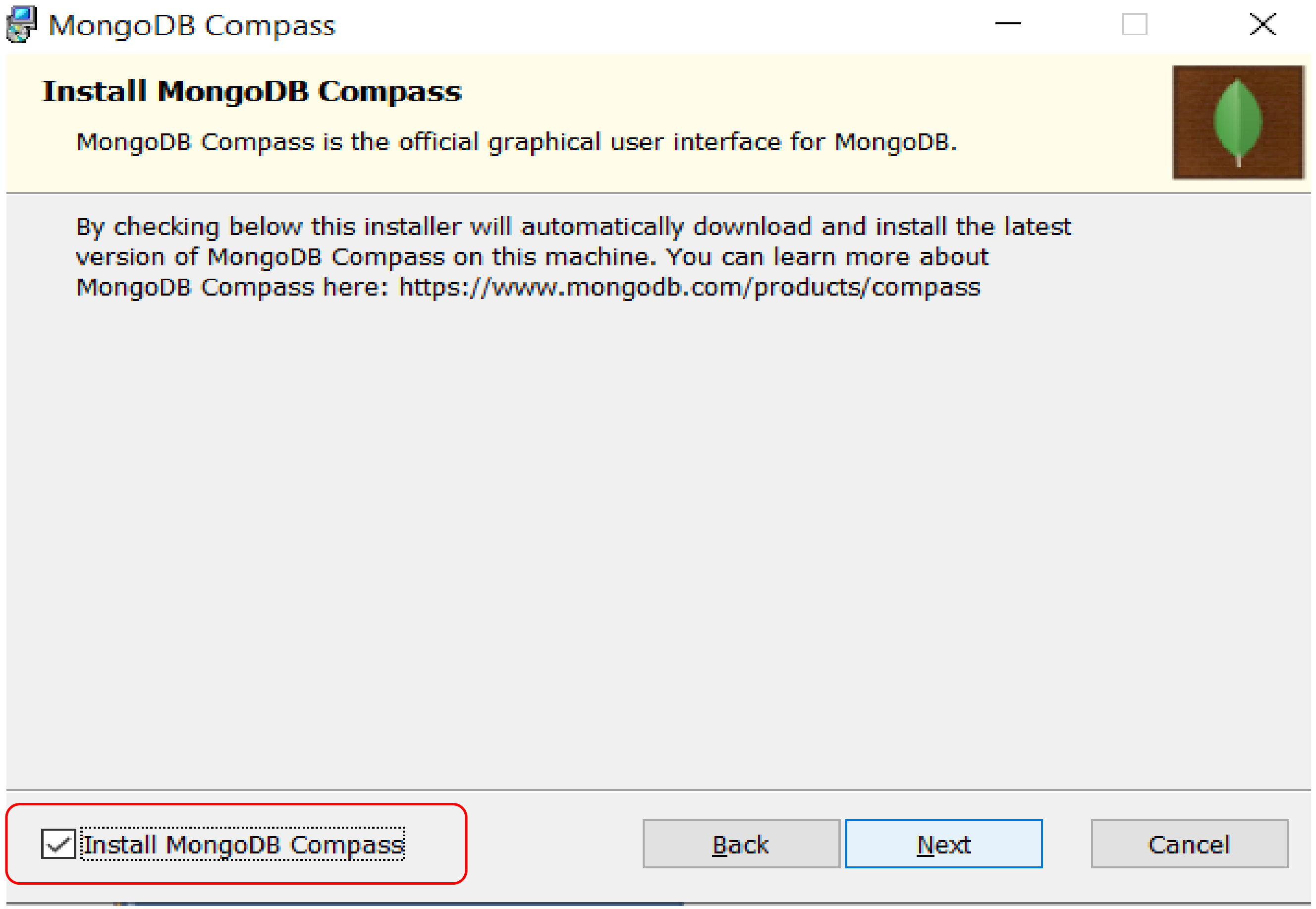
Service Name: MongoDB

Data Directory: C:\Program Files\MongoDB\Server\4.4\data\

Log Directory: C:\Program Files\MongoDB\Server\4.4\log\

# Installing Mongo Db

Clear checkbox for Install Compass



MongoDB Compass

**Install MongoDB Compass**

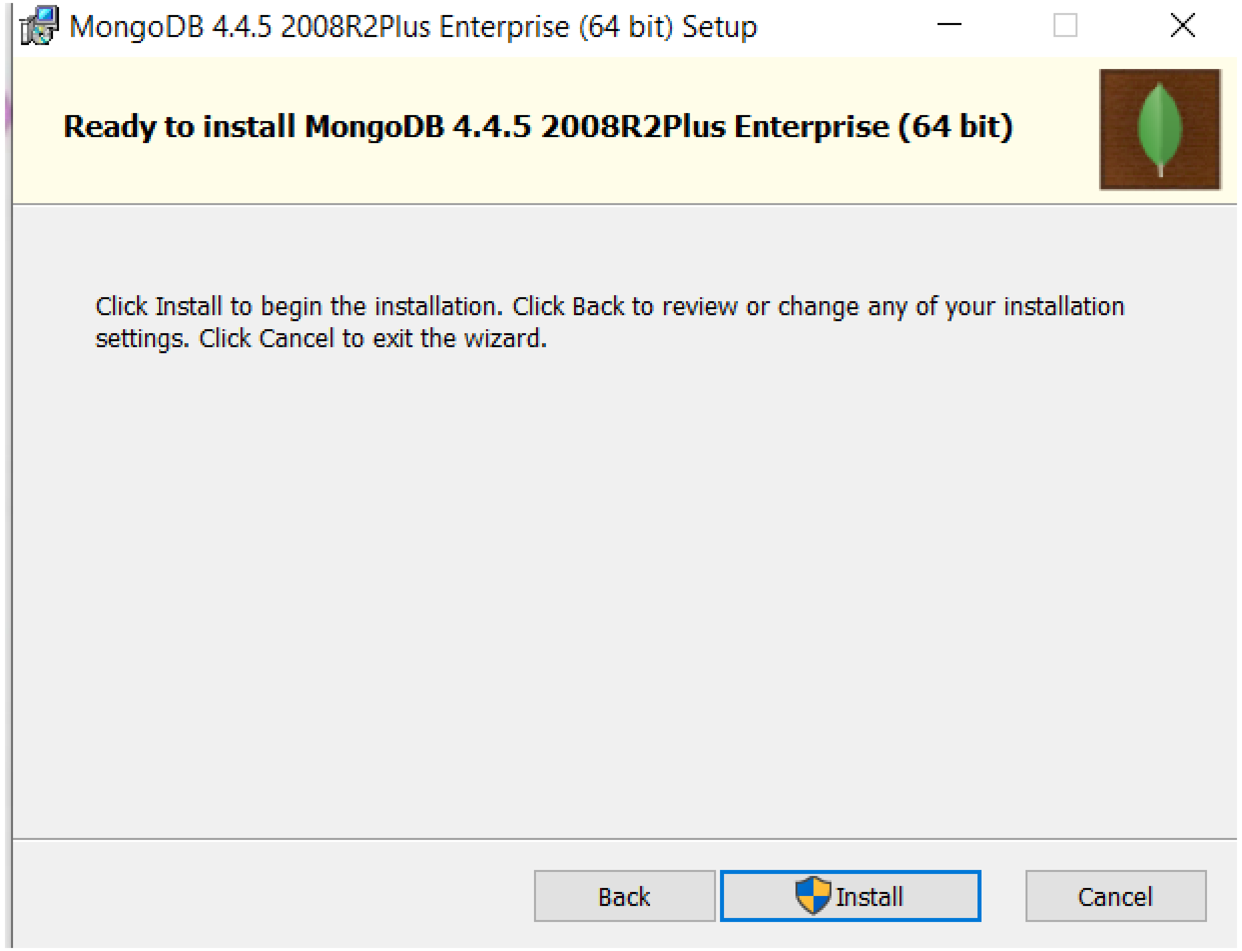
MongoDB Compass is the official graphical user interface for MongoDB.

By checking below this installer will automatically download and install the latest version of MongoDB Compass on this machine. You can learn more about MongoDB Compass here: https://www.mongodb.com/products/compass

☑ Install MongoDB Compass

# Installing Mongo Db

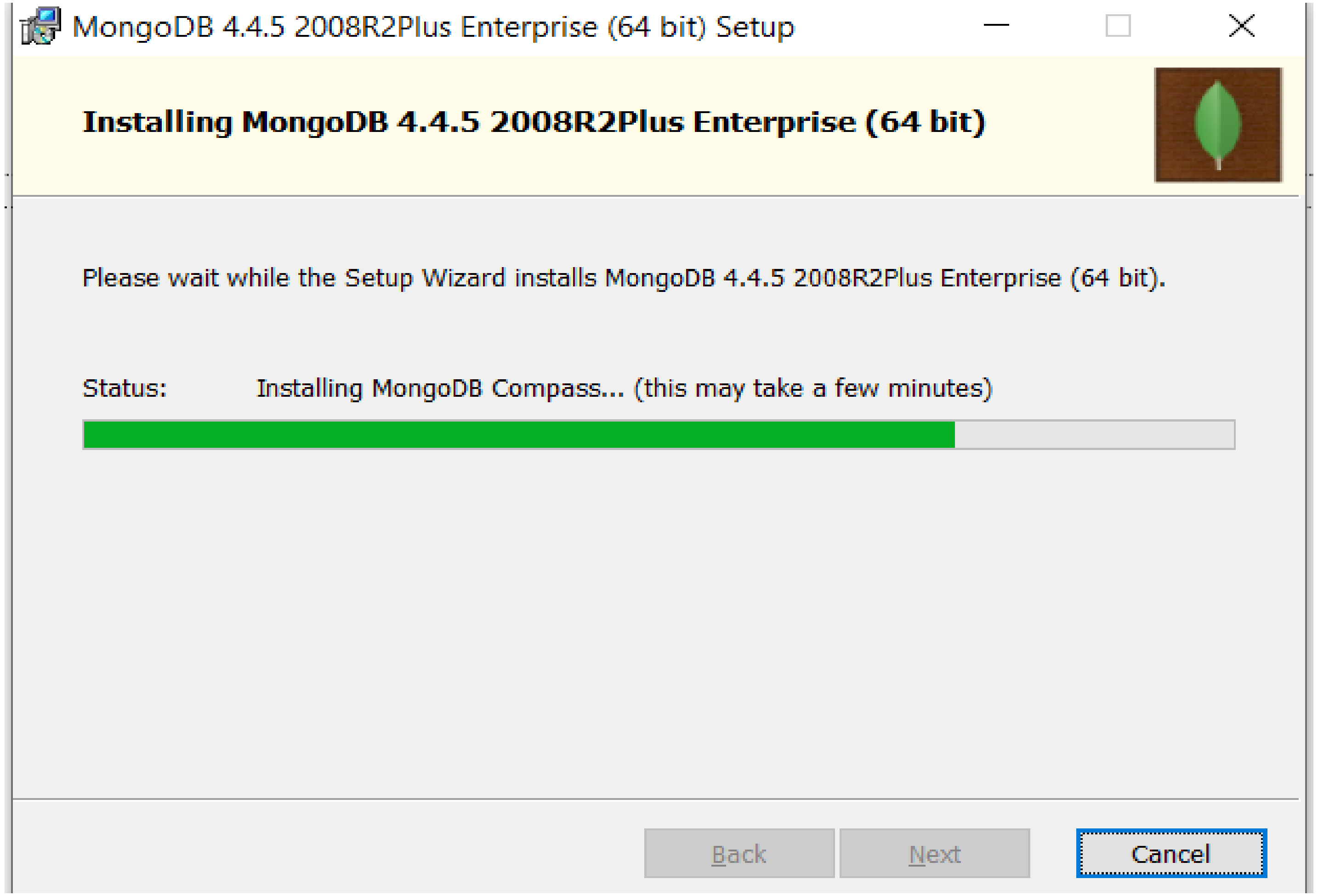
Click Install to begin the installation



**Ready to install MongoDB 4.4.5 2008R2Plus Enterprise (64 bit)**

Click Install to begin the installation. Click Back to review or change any of your installation settings. Click Cancel to exit the wizard.

# Installing Mongo Db



MongoDB 4.4.5 2008R2Plus Enterprise (64 bit) Setup

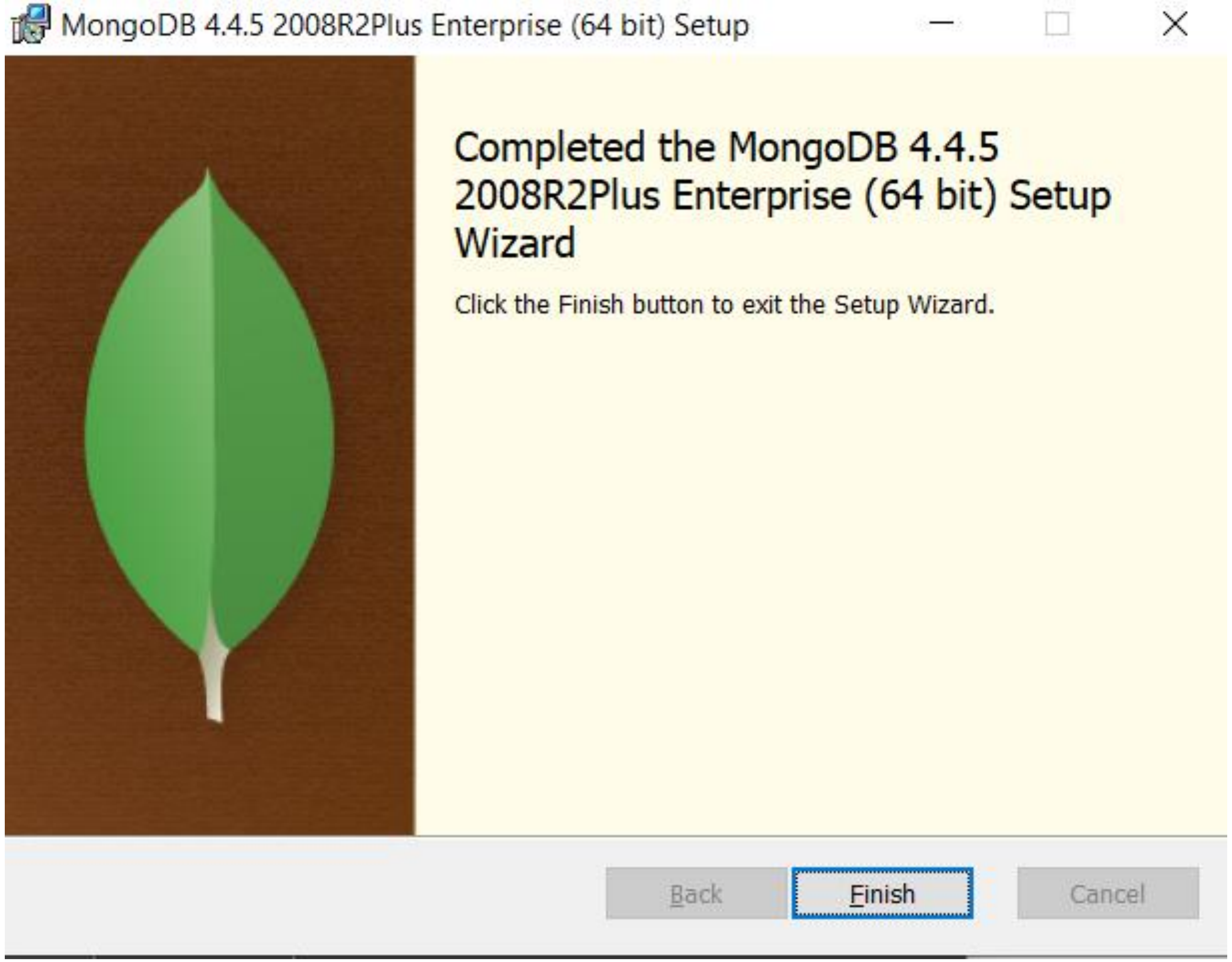
**Installing MongoDB 4.4.5 2008R2Plus Enterprise (64 bit)**

Please wait while the Setup Wizard installs MongoDB 4.4.5 2008R2Plus Enterprise (64 bit).

Status: Installing MongoDB Compass... (this may take a few minutes)

# Installing Mongo Db

Click Finish to complete the installation



MongoDB 4.4.5 2008R2Plus Enterprise (64 bit) Setup

Completed the MongoDB 4.4.5 2008R2Plus Enterprise (64 bit) Setup Wizard

Click the Finish button to exit the Setup Wizard.

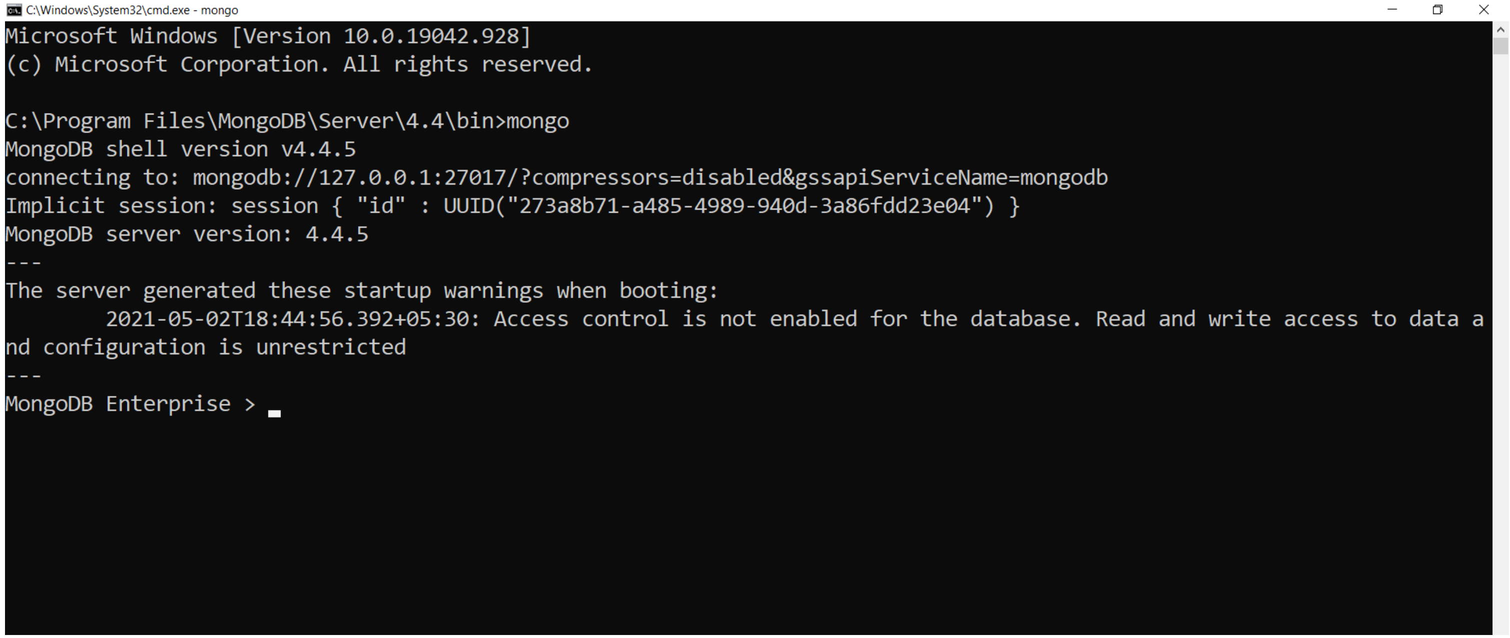
# Open Mongo Db

To run MongoDB shell browse to data location.

C:\Program Files\MongoDB\Server\4.4\bin

In the address bar run CMD command . It will take you to command prompt.

Type in mongo and press enter to get into MongoDb shell



```
Microsoft Windows [Version 10.0.19042.928]
(c) Microsoft Corporation. All rights reserved.

C:\Program Files\MongoDB\Server\4.4\bin>mongo
MongoDB shell version v4.4.5
connecting to: mongodb://127.0.0.1:27017/?compressors=disabled&gssapiServiceName=mongodb
Implicit session: session { "id" : UUID("273a8b71-a485-4989-940d-3a86fdd23e04") }
MongoDB server version: 4.4.5
---
The server generated these startup warnings when booting:
        2021-05-02T18:44:56.392+05:30: Access control is not enabled for the database. Read and write access to data a
nd configuration is unrestricted
---
MongoDB Enterprise > 
```

# Installing Mongo Db

Installation using a ZIP file.

Download MongoDb zip package

- Create Directory Structure for MongoDb Server

  C:\data\db

- Start MongoDb Server
- Start MongoDb Shell

# Installing Mongo Db

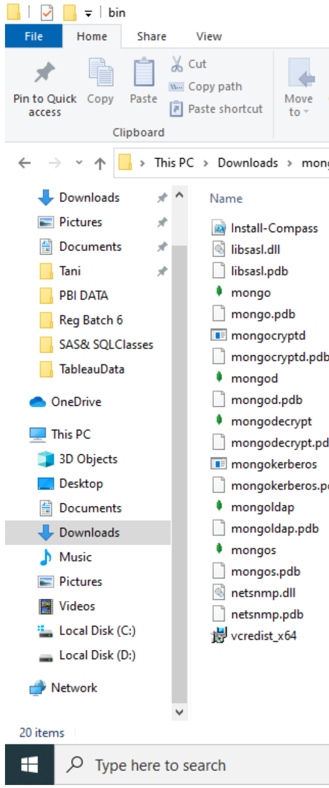
Unzip the downloaded folder

Under the bin folder we need to execute below application files from the command prompt:

Mongod – Server file

Mongo – Shell

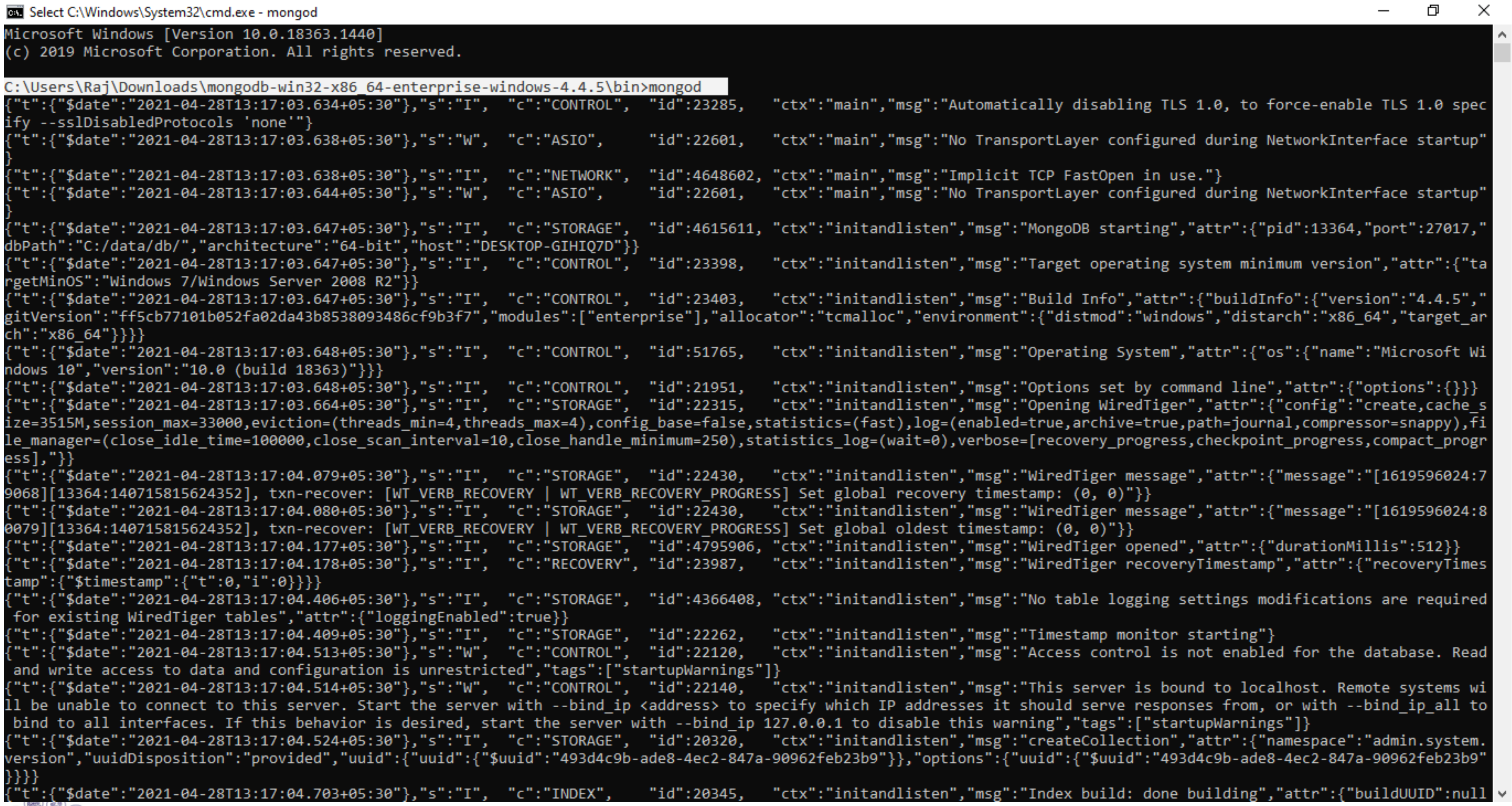
Note : the downloaded file should be in C: drive



Install-Compass
libsasl.dll
libsasl.pdb
mongo
mongo.pdb
mongocryptd
mongocryptd.pdb
mongod
mongod.pdb
mongodecrypt
mongodecrypt.pd
mongokerberos
mongokerberos.p
mongoldap
mongoldap.pdb
mongos
mongos.pdb
netsnmp.dll
netsnmp.pdb
vcredist_x64

# Installing Mongo Db

Go to the command prompt and execute the database file (mongod). This will run MongoDb server

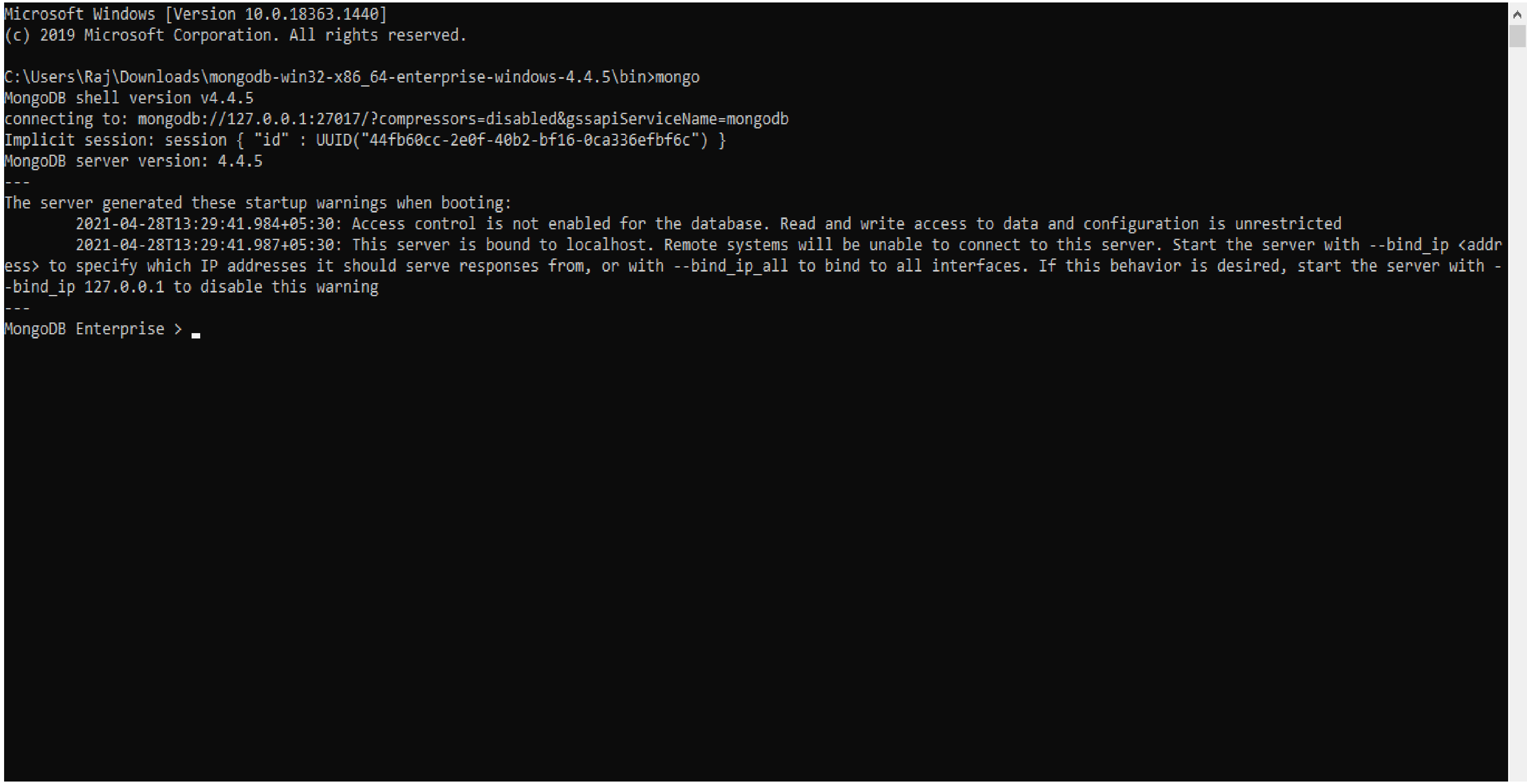


```
Microsoft Windows [Version 10.0.18363.1440]
(c) 2019 Microsoft Corporation. All rights reserved.

C:\Users\Raj\Downloads\mongodb-win32-x86_64-enterprise-windows-4.4.5\bin>mongod
{"t":{"$date":"2021-04-28T13:17:03.634+05:30"},"s":"I",  "c":"CONTROL",  "id":23285,   "ctx":"main","msg":"Automatically disabling TLS 1.0, to force-enable TLS 1.0 spec
ify --sslDisabledProtocols 'none'"}
{"t":{"$date":"2021-04-28T13:17:03.638+05:30"},"s":"W",  "c":"ASIO",     "id":22601,   "ctx":"main","msg":"No TransportLayer configured during NetworkInterface startup"
}
{"t":{"$date":"2021-04-28T13:17:03.638+05:30"},"s":"I",  "c":"NETWORK",  "id":4648602, "ctx":"main","msg":"Implicit TCP FastOpen in use."}
{"t":{"$date":"2021-04-28T13:17:03.644+05:30"},"s":"W",  "c":"ASIO",     "id":22601,   "ctx":"main","msg":"No TransportLayer configured during NetworkInterface startup"
}
{"t":{"$date":"2021-04-28T13:17:03.647+05:30"},"s":"I",  "c":"STORAGE",  "id":4615611, "ctx":"initandlisten","msg":"MongoDB starting","attr":{"pid":13364,"port":27017,"
dbPath":"C:/data/db/","architecture":"64-bit","host":"DESKTOP-GIHIQ7D"}}
{"t":{"$date":"2021-04-28T13:17:03.647+05:30"},"s":"I",  "c":"CONTROL",  "id":23398,   "ctx":"initandlisten","msg":"Target operating system minimum version","attr":{"ta
rgetMinOS":"Windows 7/Windows Server 2008 R2"}}
{"t":{"$date":"2021-04-28T13:17:03.647+05:30"},"s":"I",  "c":"CONTROL",  "id":23403,   "ctx":"initandlisten","msg":"Build Info","attr":{"buildInfo":{"version":"4.4.5","
gitVersion":"ff5cb77101b052fa02da43b8538093486cf9b3f7","modules":["enterprise"],"allocator":"tcmalloc","environment":{"distmod":"windows","distarch":"x86_64","target_ar
ch":"x86_64"}}}}
{"t":{"$date":"2021-04-28T13:17:03.648+05:30"},"s":"I",  "c":"CONTROL",  "id":51765,   "ctx":"initandlisten","msg":"Operating System","attr":{"os":{"name":"Microsoft Wi
ndows 10","version":"10.0 (build 18363)"}}}
{"t":{"$date":"2021-04-28T13:17:03.648+05:30"},"s":"I",  "c":"CONTROL",  "id":21951,   "ctx":"initandlisten","msg":"Options set by command line","attr":{"options":{}}}
{"t":{"$date":"2021-04-28T13:17:03.664+05:30"},"s":"I",  "c":"STORAGE",  "id":22315,   "ctx":"initandlisten","msg":"Opening WiredTiger","attr":{"config":"create,cache_s
ize=3515M,session_max=33000,eviction=(threads_min=4,threads_max=4),config_base=false,statistics=(fast),log=(enabled=true,archive=true,path=journal,compressor=snappy),fi
le_manager=(close_idle_time=100000,close_scan_interval=10,close_handle_minimum=250),statistics_log=(wait=0),verbose=[recovery_progress,checkpoint_progress,compact_progr
ess],"}}
{"t":{"$date":"2021-04-28T13:17:04.079+05:30"},"s":"I",  "c":"STORAGE",  "id":22430,   "ctx":"initandlisten","msg":"WiredTiger message","attr":{"message":"[1619596024:7
9068][13364:140715815624352], txn-recover: [WT_VERB_RECOVERY | WT_VERB_RECOVERY_PROGRESS] Set global recovery timestamp: (0, 0)"}}
{"t":{"$date":"2021-04-28T13:17:04.080+05:30"},"s":"I",  "c":"STORAGE",  "id":22430,   "ctx":"initandlisten","msg":"WiredTiger message","attr":{"message":"[1619596024:8
0079][13364:140715815624352], txn-recover: [WT_VERB_RECOVERY | WT_VERB_RECOVERY_PROGRESS] Set global oldest timestamp: (0, 0)"}}
{"t":{"$date":"2021-04-28T13:17:04.177+05:30"},"s":"I",  "c":"STORAGE",  "id":4795906, "ctx":"initandlisten","msg":"WiredTiger opened","attr":{"durationMillis":512}}
{"t":{"$date":"2021-04-28T13:17:04.178+05:30"},"s":"I",  "c":"RECOVERY", "id":23987,   "ctx":"initandlisten","msg":"WiredTiger recoveryTimestamp","attr":{"recoveryTimes
tamp":{"$timestamp":{"t":0,"i":0}}}}
{"t":{"$date":"2021-04-28T13:17:04.406+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":{"$date":"2021-04-28T13:17:04.409+05:30"},"s":"I",  "c":"STORAGE",  "id":22262,   "ctx":"initandlisten","msg":"Timestamp monitor starting"}
{"t":{"$date":"2021-04-28T13:17:04.513+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":{"$date":"2021-04-28T13:17:04.514+05:30"},"s":"W",  "c":"CONTROL",  "id":22140,   "ctx":"initandlisten","msg":"This server is bound to localhost. Remote systems wi
ll be unable to connect to this server. Start the server with --bind_ip <address> to specify which IP addresses it should serve responses from, or with --bind_ip_all to
 bind to all interfaces. If this behavior is desired, start the server with --bind_ip 127.0.0.1 to disable this warning","tags":["startupWarnings"]}
{"t":{"$date":"2021-04-28T13:17:04.524+05:30"},"s":"I",  "c":"STORAGE",  "id":20320,   "ctx":"initandlisten","msg":"createCollection","attr":{"namespace":"admin.system.
version","uuidDisposition":"provided","uuid":{"uuid":{"$uuid":"493d4c9b-ade8-4ec2-847a-90962feb23b9"}},"options":{"uuid":{"$uuid":"493d4c9b-ade8-4ec2-847a-90962feb23b9"
}}}}
{"t":{"$date":"2021-04-28T13:17:04.703+05:30"},"s":"I",  "c":"INDEX",    "id":20345,   "ctx":"initandlisten","msg":"Index build: done building","attr":{"buildUUID":null
```

# Installing Mongo Db

Open command prompt in another window and execute Shell file (**mongo**).



```
Microsoft Windows [Version 10.0.18363.1440]
(c) 2019 Microsoft Corporation. All rights reserved.

C:\Users\Raj\Downloads\mongodb-win32-x86_64-enterprise-windows-4.4.5\bin>mongo
MongoDB shell version v4.4.5
connecting to: mongodb://127.0.0.1:27017/?compressors=disabled&gssapiServiceName=mongodb
Implicit session: session { "id" : UUID("44fb60cc-2e0f-40b2-bf16-0ca336efbf6c") }
MongoDB server version: 4.4.5
---
The server generated these startup warnings when booting:
        2021-04-28T13:29:41.984+05:30: Access control is not enabled for the database. Read and write access to data and configuration is unrestricted
        2021-04-28T13:29:41.987+05:30: This server is bound to localhost. Remote systems will be unable to connect to this server. Start the server with --bind_ip <addr
ess> 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
---
MongoDB Enterprise >
```

Now you are in MongoDb shell.

# Using MongoDb commands

> show dbs – display list of available database ;

> use test – to create a database.

> db – to check the current database.

**Note: Newly created database will not be displayed until it has some collections.**

# Creating Database

> show dbs – display list of available database ;

> use test – to create a database
> db – display the name of current database

```
>db.stu.insertOne({
"rno" : 1,

"name" :  "amit" ,

"age" : 14});


>db.stu.find();
```

# Dropping Database

```
> db.dropDatabase(); - drop the current database
> show dbs;
```

# Create Collections

db.createCollection(name,options) method is used to create a collection

```
> use mydb;

> db.createCollection("stu");

> show collections;

> db.createCollection("stu2",{capped : true, size : 50000, max : 5});
```

# Create Collections

We do not need to create a collection, MongoDb creates a collection automatically.

```
> db.stu3.insertOne(
                        {"rno" : 1,
                          "name" : "ajay kumar",
                           "age" : 14}
                         );
> show collections;
```

# Drop Collections

db.collection.drop() is used to drop a collection.

```
> db.stu2.drop();
> show collections;
```

# Inserting Documents

db.collection.insertOne() is used to insert a single document into a collection.

```
>db.stu.insertOne(
                {"rno" : 1,
                 "name" : “kapil sharma",
                  "age" : 15}
                );
> db.stu.find();
```

# Inserting Documents

db.collection.insertMany() is used to insert multiple document into a collection.

```
> db.stu3.insertMany([
                    {"rno" : 2,
                    "name" : "aman sharma",
                    "age" : 16},
                    {"rno" : 3,
                    "name" : "gaurav kapoor",
                    "age" : 14}
                    ] );
```

# Query Documents

find() method is used to query the document. It displays the documents in non structured way.

db.collectionname.find({});

> db.stu3.find({}); - non formatted output

> db.stu3.find({}).pretty(); - formatted output

# Query Documents

Specifying the keys:

```
> db.salary.find({"DEPT" : "HR"});
```

$and: operator – used to specify multiple keys

```
>db.collectionname.find({
                                        $and: [
                                        {key : value1}, {key : value2}]
                                        });
```

# Query Documents

Specifying the keys:

```
>db.salary.find( {$and:
                   [ {"DEPT" : "HR"},
             {"DESI" : "ASSOCIATE"}]
             });
```

$or: operator

# Query Documents

Specifying the keys:
$or: operator

```
>db.collectionname.find({
                               $or: [
                               {key : value1}, {key : value2}]
                               });
>db.salary.find( {
                       $or: [
                       {"DEPT" : "HR"},
                       {"DESI" : "ASSOCIATE"}
                       ]
                        });
```

# Update Documents

```
>db.collectionname.updateOne(<filter>,<update>,<options>);
>db.collectionname.updateMany(<filter>,<update>,<options>);
>db.collectionname.replaceOne(<filter>,<update>,<options>);

> db.emp.updateOne({"EID" : 1025},
                              {$set: {"ADDRESS" : "B302 PRAGYA
APARTMENTS, DWARKA, DELHI", "PHONE" : 9899245970} }
                    );


> db.salary.updateMany({$and: [{"DEPT" :"HR"},{"DESI" :
"ASSOCIATE"}]},{$set:{"DESI" : "SR. ASSOCIATE"}});
```

# Update Documents

```
>db.collectionname.updateMany(<filter>,<update>,<options>);



> db.salary.updateMany(
                        {$and: [{"DEPT" :"HR"},
                                {"DESI" : "ASSOCIATE"}]},
                        {$set:{"DESI" : "SR. ASSOCIATE"}}
                        );
> db.stu2.updateMany(
                                {},
                                {"$set" : {"class" : "8th"}});
```

# Update Documents

```
>db.collectionname.replaceOne(<filter>,<update>,<options>);
```

```
> db.stu.replaceOne(
                    {"rno" : 2},
                    {"rno" : 3 ,"name" : "ajay kumar",
                    "age" : 16}
                    );
```

Note: _id remains same the document has been replaced

# ASSIGNMENT

- Create a database demo
- Create a EMP collection.
- Insert 8 documents containing in EMP collection containing eid, name, city, doj, dept, desi
- Display the documents in formatted manner.
- Show the documents containing “HR” dept.
- Show the documents for “OPS” managers.
- Promote all the associates as Sr.Associates