

Mithibai College

Department of Computer Science

M.Sc. Data Science and AI

Practical No 07: Sharding using MongoDB

Date: 21/02/2025

Submission Date: 28/02/2025

Write-up: -

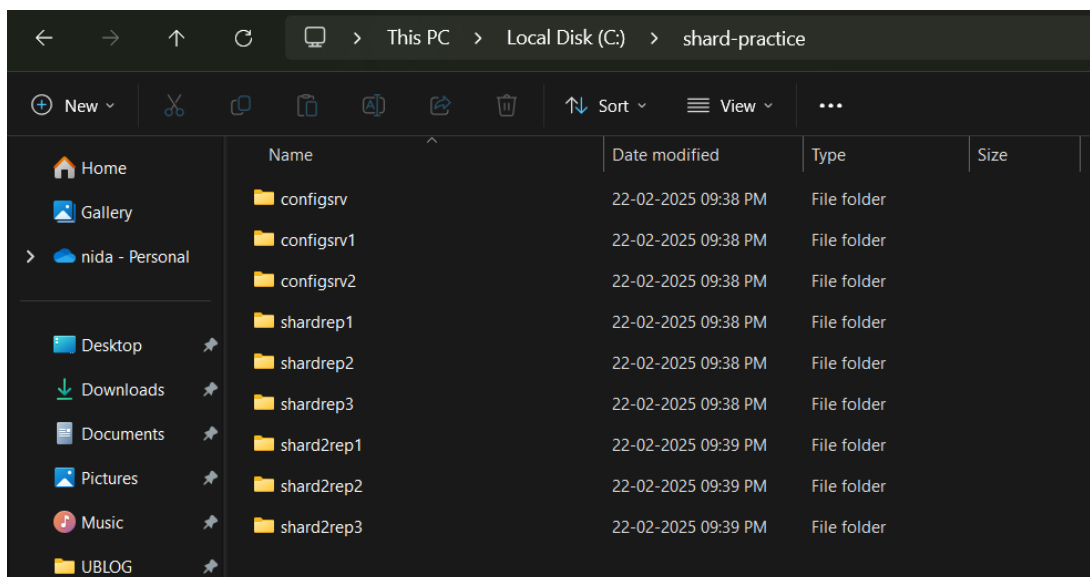
- Sharding
- Sharding Architecture
- Sharding Types, benefits and limitations

You are a database administrator tasked with setting up MongoDB sharding to handle a growing dataset. You need to configure a MongoDB sharded cluster with the following requirements:

- **One Config Server** (Replica set)
- **Two Shard Servers**
- **One Mongos Router**
- **Sharding enabled for a database and collection**

<https://gist.github.com/DGamer007/0864c6aeebf27e3821602d9dd5ca7375>

create respective folders for config server, shard (replica set)



mongod --configsvr --port=1040 --replSet="config-repl" --dbpath="C:\shard-practice\configsrv1"

```

Windows PowerShell
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PS C:\Users\khann> mongod --configsvr --port=1040 --replSet="config-repl" --dbpath="C:\shard-practice\configsrv1"
{"t":{"$date":"2025-02-22T22:34:28.632+05:30"},"s":"I", "c":"NETWORK", "id":4915701, "ctx":"thread1", "msg":"Initialized wire specification", "attr":{"spec":
{"incomingExternalClient":{"minWireVersion":0,"maxWireVersion":21},"incomingInternalClient":{"minWireVersion":0,"maxWireVersion":21},"outgoing":{"minWireVe
rsion":6,"maxWireVersion":21},"isInternalClient":true}}}
{"t":{"$date":"2025-02-22T22:34:28.633+05:30"},"s":"I", "c":"CONTROL", "id":23285, "ctx":"thread1", "msg":"Automatically disabling TLS 1.0, to force-enab
le TLS 1.0 specify --sslDisabledProtocols 'none'"
{"t":{"$date":"2025-02-22T22:34:28.636+05:30"},"s":"I", "c":"NETWORK", "id":4648602, "ctx":"thread1", "msg":"Implicit TCP FastOpen in use."}
{"t":{"$date":"2025-02-22T22:34:28.638+05:30"},"s":"I", "c":"REPL", "id":5123008, "ctx":"thread1", "msg":"Successfully registered PrimaryOnlyService", "a
ttr":{"service":"ReshardingCoordinatorService", "namespace":"config.reshardingOperations"}}
{"t":{"$date":"2025-02-22T22:34:28.638+05:30"},"s":"I", "c":"REPL", "id":5123008, "ctx":"thread1", "msg":"Successfully registered PrimaryOnlyService", "a
ttr":{"service":"ConfigsvrCoordinatorService", "namespace":"config.sharding_configsvr_coordinators"}}
{"t":{"$date":"2025-02-22T22:34:28.638+05:30"},"s":"I", "c":"REPL", "id":5123008, "ctx":"thread1", "msg":"Successfully registered PrimaryOnlyService", "a
ttr":{"service":"RenameCollectionParticipantService", "namespace":"config.localRenameParticipants"}}
{"t":{"$date":"2025-02-22T22:34:28.638+05:30"},"s":"I", "c":"REPL", "id":5123008, "ctx":"thread1", "msg":"Successfully registered PrimaryOnlyService", "a
ttr":{"service":"ShardingDDLCoordinator", "namespace":"config.system.sharding_ddl_coordinators"}}
{"t":{"$date":"2025-02-22T22:34:28.638+05:30"},"s":"I", "c":"REPL", "id":5123008, "ctx":"thread1", "msg":"Successfully registered PrimaryOnlyService", "a
ttr":{"service":"ReshardingDonorService", "namespace":"config.localReshardingOperations.donor"}}
{"t":{"$date":"2025-02-22T22:34:28.638+05:30"},"s":"I", "c":"REPL", "id":5123008, "ctx":"thread1", "msg":"Successfully registered PrimaryOnlyService", "a
ttr":{"service":"ReshardingRecipientService", "namespace":"config.localReshardingOperations.recipient"}}
{"t":{"$date":"2025-02-22T22:34:28.638+05:30"},"s":"I", "c":"REPL", "id":5123008, "ctx":"thread1", "msg":"Successfully registered PrimaryOnlyService", "a
ttr":{"service":"TenantMigrationDonorService", "namespace":"config.tenantMigrationDonors"}}
{"t":{"$date":"2025-02-22T22:34:28.638+05:30"},"s":"I", "c":"REPL", "id":5123008, "ctx":"thread1", "msg":"Successfully registered PrimaryOnlyService", "a
ttr":{"service":"TenantMigrationRecipientService", "namespace":"config.tenantMigrationRecipients"}}
{"t":{"$date":"2025-02-22T22:34:28.639+05:30"},"s":"I", "c":"CONTROL", "id":5945603, "ctx":"thread1", "msg":"Multi threading initialized"}
{"t":{"$date":"2025-02-22T22:34:28.639+05:30"},"s":"I", "c":"TENANT_M", "id":7091600, "ctx":"thread1", "msg":"Starting TenantMigrationAccessBlockerRegistry"
}
{"t":{"$date":"2025-02-22T22:34:28.641+05:30"},"s":"I", "c":"CONTROL", "id":4615611, "ctx":"initandlisten", "msg":"MongoDB starting", "attr":{"pid":2112,"po
rt":1040,"dbPath":"C:\shard-practice\configsrv1","architecture":"64-bit","host":"LAPTOP-KPJ609R"}}
{"t":{"$date":"2025-02-22T22:34:28.641+05:30"},"s":"I", "c":"CONTROL", "id":23398, "ctx":"initandlisten", "msg":"Target operating system minimum version"
,"attr":{"targetMinOS":"Windows 7/Windows Server 2008 R2"}}
{"t":{"$date":"2025-02-22T22:34:28.641+05:30"},"s":"I", "c":"CONTROL", "id":23403, "ctx":"initandlisten", "msg":"Build Info", "attr":{"buildInfo":{"versio
n":"7.0.16","gitVersion":"18b94944cfdaa88e30b0e10243bc18268251c1f","modules":[],"allocator":"tcmalloc","environment":{"distmod":"windows","distarch":"x86_6
4","target_arch":"x86_64"}}}}
{"t":{"$date":"2025-02-22T22:34:28.641+05:30"},"s":"I", "c":"CONTROL", "id":51765, "ctx":"initandlisten", "msg":"Operating System", "attr":{"os":{"name":"
Microsoft Windows 10","version":"10.0 (build 26100)"}}}
{"t":{"$date":"2025-02-22T22:34:28.641+05:30"},"s":"I", "c":"CONTROL", "id":21951, "ctx":"initandlisten", "msg":"Options set by command line", "attr":{"op

```

mongod --configsvr --port=1050 --replSet="config-repl" --dbpath="C:\shard-practice\configsrv2"

```

Windows PowerShell
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PS C:\Users\khann> mongod --configsvr --port=1050 --replSet="config-repl" --dbpath="C:\shard-practice\configsrv2"
{"t":{"$date":"2025-02-22T22:35:16.810+05:30"},"s":"I", "c":"NETWORK", "id":4915701, "ctx":"thread1", "msg":"Initialized wire specification", "attr":{"spec":
{"incomingExternalClient":{"minWireVersion":0,"maxWireVersion":21},"incomingInternalClient":{"minWireVersion":0,"maxWireVersion":21},"outgoing":{"minWireVe
rsion":6,"maxWireVersion":21},"isInternalClient":true}}}
{"t":{"$date":"2025-02-22T22:35:16.817+05:30"},"s":"I", "c":"CONTROL", "id":23285, "ctx":"thread1", "msg":"Automatically disabling TLS 1.0, to force-enab
le TLS 1.0 specify --sslDisabledProtocols 'none'"
{"t":{"$date":"2025-02-22T22:35:18.572+05:30"},"s":"I", "c":"NETWORK", "id":4648602, "ctx":"thread1", "msg":"Implicit TCP FastOpen in use."}
{"t":{"$date":"2025-02-22T22:35:18.575+05:30"},"s":"I", "c":"REPL", "id":5123008, "ctx":"thread1", "msg":"Successfully registered PrimaryOnlyService", "a
ttr":{"service":"ReshardingCoordinatorService", "namespace":"config.reshardingOperations"}}
{"t":{"$date":"2025-02-22T22:35:18.575+05:30"},"s":"I", "c":"REPL", "id":5123008, "ctx":"thread1", "msg":"Successfully registered PrimaryOnlyService", "a
ttr":{"service":"ConfigsvrCoordinatorService", "namespace":"config.sharding_configsvr_coordinators"}}
{"t":{"$date":"2025-02-22T22:35:18.575+05:30"},"s":"I", "c":"REPL", "id":5123008, "ctx":"thread1", "msg":"Successfully registered PrimaryOnlyService", "a
ttr":{"service":"RenameCollectionParticipantService", "namespace":"config.localRenameParticipants"}}
{"t":{"$date":"2025-02-22T22:35:18.576+05:30"},"s":"I", "c":"REPL", "id":5123008, "ctx":"thread1", "msg":"Successfully registered PrimaryOnlyService", "a
ttr":{"service":"ShardingDDLCoordinator", "namespace":"config.system.sharding_ddl_coordinators"}}
{"t":{"$date":"2025-02-22T22:35:18.576+05:30"},"s":"I", "c":"REPL", "id":5123008, "ctx":"thread1", "msg":"Successfully registered PrimaryOnlyService", "a
ttr":{"service":"ReshardingDonorService", "namespace":"config.localReshardingOperations.donor"}}
{"t":{"$date":"2025-02-22T22:35:18.576+05:30"},"s":"I", "c":"REPL", "id":5123008, "ctx":"thread1", "msg":"Successfully registered PrimaryOnlyService", "a
ttr":{"service":"ReshardingRecipientService", "namespace":"config.localReshardingOperations.recipient"}}
{"t":{"$date":"2025-02-22T22:35:18.576+05:30"},"s":"I", "c":"REPL", "id":5123008, "ctx":"thread1", "msg":"Successfully registered PrimaryOnlyService", "a
ttr":{"service":"TenantMigrationDonorService", "namespace":"config.tenantMigrationDonors"}}
{"t":{"$date":"2025-02-22T22:35:18.576+05:30"},"s":"I", "c":"REPL", "id":5123008, "ctx":"thread1", "msg":"Successfully registered PrimaryOnlyService", "a
ttr":{"service":"TenantMigrationRecipientService", "namespace":"config.tenantMigrationRecipients"}}
{"t":{"$date":"2025-02-22T22:35:18.576+05:30"},"s":"I", "c":"CONTROL", "id":5945603, "ctx":"thread1", "msg":"Multi threading initialized"}
{"t":{"$date":"2025-02-22T22:35:18.576+05:30"},"s":"I", "c":"TENANT_M", "id":7091600, "ctx":"thread1", "msg":"Starting TenantMigrationAccessBlockerRegistry"
}
{"t":{"$date":"2025-02-22T22:35:18.578+05:30"},"s":"I", "c":"CONTROL", "id":4615611, "ctx":"initandlisten", "msg":"MongoDB starting", "attr":{"pid":15936,"p
ort":1050,"dbPath":"C:\shard-practice\configsrv2","architecture":"64-bit","host":"LAPTOP-KPJ609R"}}
{"t":{"$date":"2025-02-22T22:35:18.578+05:30"},"s":"I", "c":"CONTROL", "id":23398, "ctx":"initandlisten", "msg":"Target operating system minimum version"
,"attr":{"targetMinOS":"Windows 7/Windows Server 2008 R2"}}
{"t":{"$date":"2025-02-22T22:35:18.578+05:30"},"s":"I", "c":"CONTROL", "id":23403, "ctx":"initandlisten", "msg":"Build Info", "attr":{"buildInfo":{"versio
n":"7.0.16","gitVersion":"18b94944cfdaa88e30b0e10243bc18268251c1f","modules":[],"allocator":"tcmalloc","environment":{"distmod":"windows","distarch":"x86_6
4","target_arch":"x86_64"}}}}
{"t":{"$date":"2025-02-22T22:35:18.578+05:30"},"s":"I", "c":"CONTROL", "id":51765, "ctx":"initandlisten", "msg":"Operating System", "attr":{"os":{"name":"
Microsoft Windows 10","version":"10.0 (build 26100)"}}}
{"t":{"$date":"2025-02-22T22:35:18.578+05:30"},"s":"I", "c":"CONTROL", "id":21951, "ctx":"initandlisten", "msg":"Options set by command line", "attr":{"op

```

2] Connect to anyone of them using **mongosh** and Initiate Replica Set

mongosh --host="localhost:1030"

```

Command Prompt - mongod x Windows PowerShell x Windows PowerShell x mongosh mongodb://localho x + v
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PS C:\Users\khann> mongosh --host="localhost:1030"
Current Mongosh Log ID: 67ba0403cb204eeaf5f2a7e0
Connecting to:  mongodb://localhost:1030/?directConnection=true&serverSelectionTimeoutMS=2000&appName=mongosh+2.1.3
Using MongoDB:  7.0.16
Using Mongosh:  2.1.3
mongosh 2.4.0 is available for download: https://www.mongodb.com/try/download/shell

For mongosh info see: https://docs.mongodb.com/mongodb-shell/

-----
The server generated these startup warnings when booting
2025-02-22T22:33:34.153+05:30: Access control is not enabled for the database. Read and write access to data and configuration is unrestricted
2025-02-22T22:33:34.154+05:30: This server is bound to localhost. Remote systems will be unable to connect to this server. Start the server with --bind_i
p <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, star
t the server with --bind_ip 127.0.0.1 to disable this warning
-----

test>

```

rs.initiate({ _id: "config-repl", configsvr: true, members: [{ _id: 0, host: "localhost:1030" }, { _id: 1, host: "localhost:1040" }, { _id: 2, host: "localhost:1050" }] });

```

test> rs.initiate({ _id: "config-repl", configsvr: true, members: [ { _id: 0, host: "localhost:1030" }, { _id: 1, host: "localhost:1040" }, { _id: 2, host:
"localhost:1050" } ] });
{ ok: 1 }

```

```
config-repl [direct: primary] test> |
```

3] Check the status

rs.status();

```

members: [
  {
    _id: 0,
    name: 'localhost:1030',
    health: 1,
    state: 1,
    stateStr: 'PRIMARY',
    uptime: 530,
    optime: { ts: Timestamp({ t: 1740244341, i: 1 }), t: Long('1') },
    optimeDate: ISODate('2025-02-22T17:12:21.000Z'),
    lastAppliedWallTime: ISODate('2025-02-22T17:12:21.805Z'),
    lastDurableWallTime: ISODate('2025-02-22T17:12:21.805Z'),
    syncSourceHost: '',
    syncSourceId: -1,
    infoMessage: '',
    electionTime: Timestamp({ t: 1740244184, i: 1 }),
    electionDate: ISODate('2025-02-22T17:09:44.000Z'),
    configVersion: 1,
    configTerm: 1,
    self: true,
    lastHeartbeatMessage: ''
  },
  {
    _id: 1,
    name: 'localhost:1040',
    health: 1,
    state: 2,
    stateStr: 'SECONDARY',
    uptime: 169,
    optime: { ts: Timestamp({ t: 1740244341, i: 1 }), t: Long('1') },
    optimeDurable: { ts: Timestamp({ t: 1740244341, i: 1 }), t: Long('1') },
    optimeDate: ISODate('2025-02-22T17:12:21.000Z'),
    optimeDurableDate: ISODate('2025-02-22T17:12:21.000Z'),
    lastAppliedWallTime: ISODate('2025-02-22T17:12:21.805Z'),
    lastDurableWallTime: ISODate('2025-02-22T17:12:21.805Z'),
    lastHeartbeat: ISODate('2025-02-22T17:12:22.168Z'),

```

```

},
{
  _id: 2,
  name: 'localhost:1050',
  health: 1,
  state: 2,
  stateStr: 'SECONDARY',
  uptime: 169,
  optime: { ts: Timestamp({ t: 1740244341, i: 1 }), t: Long('1') },
  optimeDurable: { ts: Timestamp({ t: 1740244341, i: 1 }), t: Long('1') },
  optimeDate: ISODate('2025-02-22T17:12:21.000Z'),
  optimeDurableDate: ISODate('2025-02-22T17:12:21.000Z'),
  lastAppliedWallTime: ISODate('2025-02-22T17:12:21.805Z'),
  lastDurableWallTime: ISODate('2025-02-22T17:12:21.805Z'),
  lastHeartbeat: ISODate('2025-02-22T17:12:22.168Z'),
  lastHeartbeatRecv: ISODate('2025-02-22T17:12:21.152Z'),
  pingMs: Long('0'),
  lastHeartbeatMessage: '',
  syncSourceHost: 'localhost:1030',
  syncSourceId: 0,
  infoMessage: '',
  configVersion: 1,
  configTerm: 1
}
],
ok: 1,

```

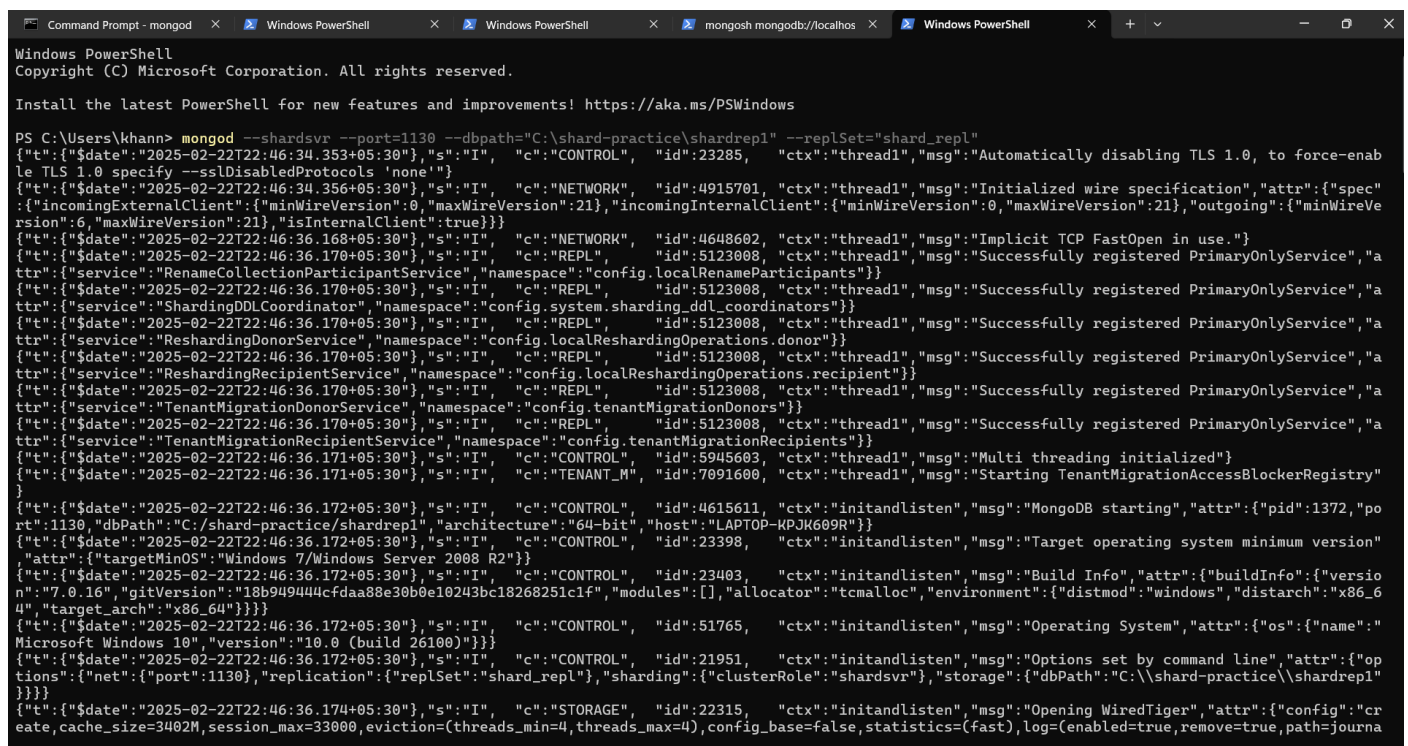
Config Server Replica Set - DONE

Shard server:

Now, we'll configure Shards which are responsible for storing actual data.

1] Initialize MongoDB Shards using **shardsvr** and **replSet** options to form a Replica Set of Shards

mongod --shardsvr --port=1130 --dbpath="C:\shard-practice\shardrep1" --replSet="shard_repl"



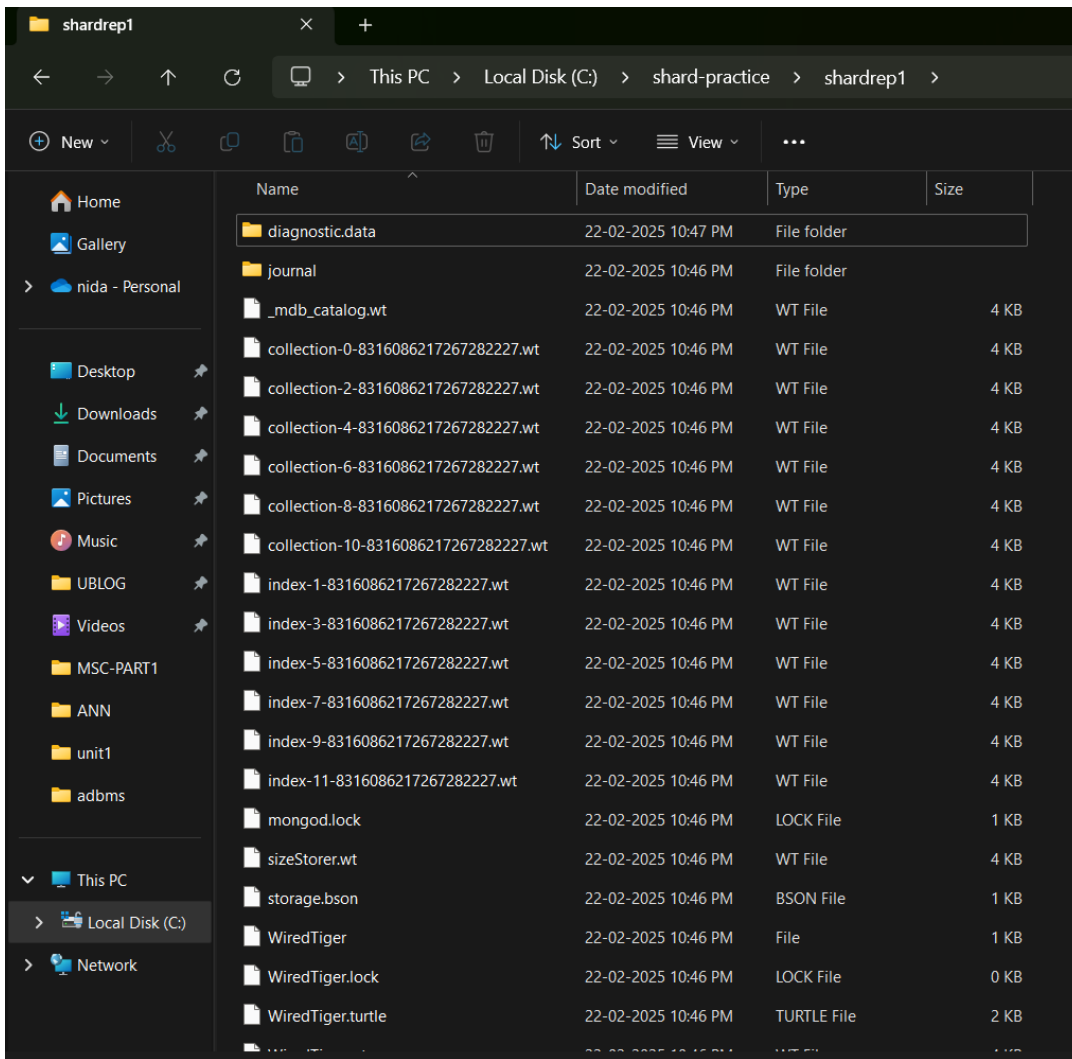
```

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PS C:\Users\khann> mongod --shardsvr --port=1130 --dbpath="C:\shard-practice\shardrep1" --replSet="shard_repl"
{"t":{"date":"2025-02-22T22:46:34.353+05:30"},"s":"I", "c":"CONTROL", "id":23285, "ctx":"thread1","msg":"Automatically disabling TLS 1.0, to force-enable TLS 1.0 specify --sslDisabledProtocols 'none'"}
{"t":{"date":"2025-02-22T22:46:34.356+05:30"},"s":"I", "c":"NETWORK", "id":4915701, "ctx":"thread1","msg":"Initialized wire specification","attr":{"spec":{"incomingExternalClient":{"minWireVersion":0,"maxWireVersion":21},"incomingInternalClient":{"minWireVersion":0,"maxWireVersion":21},"outgoing":{"minWireVersion":6,"maxWireVersion":21},"isInternalClient":true}}}
{"t":{"date":"2025-02-22T22:46:36.168+05:30"},"s":"I", "c":"NETWORK", "id":4648602, "ctx":"thread1","msg":"Implicit TCP FastOpen in use."}
{"t":{"date":"2025-02-22T22:46:36.170+05:30"},"s":"I", "c":"REPL", "id":5123008, "ctx":"thread1","msg":"Successfully registered PrimaryOnlyService","attr":{"service":"RenameCollectionParticipantService","namespace":"config.localRenameParticipants"}}
{"t":{"date":"2025-02-22T22:46:36.170+05:30"},"s":"I", "c":"REPL", "id":5123008, "ctx":"thread1","msg":"Successfully registered PrimaryOnlyService","attr":{"service":"ShardingDDLCoordinator","namespace":"config.system.sharding_ddl_coordinators"}}
{"t":{"date":"2025-02-22T22:46:36.170+05:30"},"s":"I", "c":"REPL", "id":5123008, "ctx":"thread1","msg":"Successfully registered PrimaryOnlyService","attr":{"service":"ReshardingDonorService","namespace":"config.localReshardingOperations.donor"}}
{"t":{"date":"2025-02-22T22:46:36.170+05:30"},"s":"I", "c":"REPL", "id":5123008, "ctx":"thread1","msg":"Successfully registered PrimaryOnlyService","attr":{"service":"ReshardingRecipientService","namespace":"config.localReshardingOperations.recipient"}}
{"t":{"date":"2025-02-22T22:46:36.170+05:30"},"s":"I", "c":"REPL", "id":5123008, "ctx":"thread1","msg":"Successfully registered PrimaryOnlyService","attr":{"service":"TenantMigrationDonorService","namespace":"config.tenantMigrationDonors"}}
{"t":{"date":"2025-02-22T22:46:36.170+05:30"},"s":"I", "c":"REPL", "id":5123008, "ctx":"thread1","msg":"Successfully registered PrimaryOnlyService","attr":{"service":"TenantMigrationRecipientService","namespace":"config.tenantMigrationRecipients"}}
{"t":{"date":"2025-02-22T22:46:36.171+05:30"},"s":"I", "c":"CONTROL", "id":5945603, "ctx":"thread1","msg":"Multi threading initialized"}
{"t":{"date":"2025-02-22T22:46:36.171+05:30"},"s":"I", "c":"TENANT_M", "id":7091600, "ctx":"thread1","msg":"Starting TenantMigrationAccessBlockerRegistry"}
{"t":{"date":"2025-02-22T22:46:36.172+05:30"},"s":"I", "c":"CONTROL", "id":4615611, "ctx":"initandlisten","msg":"MongoDB starting","attr":{"pid":1372,"port":1130,"dbPath":"C:\shard-practice\shardrep1","architecture":"64-bit","host":"LAPTOP-KPJ6G09R"}}
{"t":{"date":"2025-02-22T22:46:36.172+05:30"},"s":"I", "c":"CONTROL", "id":23398, "ctx":"initandlisten","msg":"Target operating system minimum version","attr":{"targetMinOS":"Windows 7/Windows Server 2008 R2"}}
{"t":{"date":"2025-02-22T22:46:36.172+05:30"},"s":"I", "c":"CONTROL", "id":23403, "ctx":"initandlisten","msg":"Build Info","attr":{"buildInfo":{"version":"7.0.16","gitVersion":"18b949444cfdaa88e30b0e10243bc18268251c1f","modules":[],"allocator":"tcmalloc","environment":{"distmod":"windows","distarch":"x86_64","target_arch":"x86_64"}}}}
{"t":{"date":"2025-02-22T22:46:36.172+05:30"},"s":"I", "c":"CONTROL", "id":51765, "ctx":"initandlisten","msg":"Operating System","attr":{"os":{"name":"Microsoft Windows 10","version":"10.0 (build 26100)}}}
{"t":{"date":"2025-02-22T22:46:36.172+05:30"},"s":"I", "c":"CONTROL", "id":21951, "ctx":"initandlisten","msg":"Options set by command line","attr":{"options":{"net":{"port":1130,"replication":{"replSet":"shard_repl"},"sharding":{"clusterRole":"shardsvr"},"storage":{"dbPath":"C:\shard-practice\shardrep1"}}}}
{"t":{"date":"2025-02-22T22:46:36.174+05:30"},"s":"I", "c":"STORAGE", "id":22315, "ctx":"initandlisten","msg":"Opening WiredTiger","attr":{"config":"create,cache_size=3402M,session_max=33000,eviction=(threads_min=4,threads_max=4),config_base=false,statistics=(fast),log=(enabled=true,remove=true,path=journal)"}

```

mongod --shardsvr --port=1140 --dbpath="C:\shard-practice\shardrep2" --replSet="shard_repl"

```

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PS C:\Users\khann> mongod --shardsvr --port=1140 --dbpath="C:\shard-practice\shardrep2" --replSet="shard_repl"
{"t":{"$date":"2025-02-22T22:48:29.425+05:30"},"s":"I", "c":"NETWORK", "id":4915701, "ctx":"thread1", "msg":"Initialized wire specification", "attr":{"spec":{"incomingExternalClient":{"minWireVersion":0,"maxWireVersion":21},"incomingInternalClient":{"minWireVersion":0,"maxWireVersion":21},"outgoing":{"minWireVersion":6,"maxWireVersion":21},"isInternalClient":true}}}}
{"t":{"$date":"2025-02-22T22:48:29.426+05:30"},"s":"I", "c":"CONTROL", "id":23285, "ctx":"thread1", "msg":"Automatically disabling TLS 1.0, to force-enable TLS 1.0 specify --sslDisabledProtocols 'none'"}
{"t":{"$date":"2025-02-22T22:48:29.428+05:30"},"s":"I", "c":"NETWORK", "id":4648602, "ctx":"thread1", "msg":"Implicit TCP FastOpen in use."}
{"t":{"$date":"2025-02-22T22:48:29.433+05:30"},"s":"I", "c":"REPL", "id":5123008, "ctx":"thread1", "msg":"Successfully registered PrimaryOnlyService", "attr":{"service":"RenameCollectionParticipantService", "namespace":"config.localRenameParticipants"}}
{"t":{"$date":"2025-02-22T22:48:29.433+05:30"},"s":"I", "c":"REPL", "id":5123008, "ctx":"thread1", "msg":"Successfully registered PrimaryOnlyService", "attr":{"service":"ShardingDDLCoordinator", "namespace":"config.system.sharding_ddl_coordinators"}}
{"t":{"$date":"2025-02-22T22:48:29.433+05:30"},"s":"I", "c":"REPL", "id":5123008, "ctx":"thread1", "msg":"Successfully registered PrimaryOnlyService", "attr":{"service":"ReshardingDonorService", "namespace":"config.localReshardingOperations.donor"}}
{"t":{"$date":"2025-02-22T22:48:29.433+05:30"},"s":"I", "c":"REPL", "id":5123008, "ctx":"thread1", "msg":"Successfully registered PrimaryOnlyService", "attr":{"service":"ReshardingRecipientService", "namespace":"config.localReshardingOperations.recipient"}}
{"t":{"$date":"2025-02-22T22:48:29.433+05:30"},"s":"I", "c":"REPL", "id":5123008, "ctx":"thread1", "msg":"Successfully registered PrimaryOnlyService", "attr":{"service":"TenantMigrationDonorService", "namespace":"config.tenantMigrationDonors"}}
{"t":{"$date":"2025-02-22T22:48:29.433+05:30"},"s":"I", "c":"REPL", "id":5123008, "ctx":"thread1", "msg":"Successfully registered PrimaryOnlyService", "attr":{"service":"TenantMigrationRecipientService", "namespace":"config.tenantMigrationRecipients"}}
{"t":{"$date":"2025-02-22T22:48:29.433+05:30"},"s":"I", "c":"CONTROL", "id":5945603, "ctx":"thread1", "msg":"Multi threading initialized"}
{"t":{"$date":"2025-02-22T22:48:29.433+05:30"},"s":"I", "c":"TENANT_M", "id":7091600, "ctx":"thread1", "msg":"Starting TenantMigrationAccessBlockerRegistry"}
{"t":{"$date":"2025-02-22T22:48:29.435+05:30"},"s":"I", "c":"CONTROL", "id":4615611, "ctx":"initandlisten", "msg":"MongoDB starting", "attr":{"pid":12980, "port":1140, "dbPath":"C:\shard-practice\shardrep2", "architecture":"64-bit", "host":"LAPTOP-KPJ609R"}}
{"t":{"$date":"2025-02-22T22:48:29.435+05:30"},"s":"I", "c":"CONTROL", "id":23398, "ctx":"initandlisten", "msg":"Target operating system minimum version", "attr":{"targetMinOS":"Windows 7/Windows Server 2008 R2"}}
{"t":{"$date":"2025-02-22T22:48:29.435+05:30"},"s":"I", "c":"CONTROL", "id":23403, "ctx":"initandlisten", "msg":"Build Info", "attr":{"buildInfo":{"version":"7.0.16", "gitVersion":"18b94944cfdaa88e30b0e10243bc18268251c1f", "modules":[], "allocator":"tcmalloc", "environment":{"distmod":"windows", "distarch":"x86_64", "target_arch":"x86_64"}}}}
{"t":{"$date":"2025-02-22T22:48:29.435+05:30"},"s":"I", "c":"CONTROL", "id":51765, "ctx":"initandlisten", "msg":"Operating System", "attr":{"os":{"name":"Microsoft Windows 10", "version":"10.0 (build 26100)}}}
{"t":{"$date":"2025-02-22T22:48:29.435+05:30"},"s":"I", "c":"CONTROL", "id":21951, "ctx":"initandlisten", "msg":"Options set by command line", "attr":{"options":{"net":{"port":1140, "replication":{"replSet":"shard_repl"}, "sharding":{"clusterRole":"shardsvr"}, "storage":{"dbPath":"C:\\shard-practice\\shardrep2"}}}}}
{"t":{"$date":"2025-02-22T22:48:29.439+05:30"},"s":"I", "c":"STORAGE", "id":22315, "ctx":"initandlisten", "msg":"Opening WiredTiger", "attr":{"config":"create,cache_size=3402M,session_max=33000,eviction=(threads_min=4,threads_max=4),config_base=false,statistics=(fast),log=(enabled=true,remove=true,path=journal,compressor=snappy)"}}

```

mongod --shardsvr --port=1150 --dbpath="C:\shard-practice\shardrep3" --replSet="shard_repl"

```
Windows PowerShell
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PS C:\Users\khann> mongod --shardsvr --port=1150 --dbpath="C:\shard-practice\shardrep3" --replSet="shard_repl"
{"t":{"$date":"2025-02-22T22:49:12.872+05:30"},"s":"I", "c":"CONTROL", "id":23285, "ctx":"thread1","msg":"Automatically disabling TLS 1.0, to force-enab
le TLS 1.0 specify --sslDisabledProtocols 'none'"}
{"t":{"$date":"2025-02-22T22:49:12.876+05:30"},"s":"I", "c":"NETWORK", "id":4915701, "ctx":"thread1","msg":"Initialized wire specification","attr":{"spec
":{"incomingExternalClient":{"minWireVersion":0,"maxWireVersion":21},"incomingInternalClient":{"minWireVersion":0,"maxWireVersion":21},"outgoing":{"minWireVe
rsion":6,"maxWireVersion":21},"isInternalClient":true}}}
{"t":{"$date":"2025-02-22T22:49:14.614+05:30"},"s":"I", "c":"NETWORK", "id":4648602, "ctx":"thread1","msg":"Implicit TCP FastOpen in use.}
{"t":{"$date":"2025-02-22T22:49:14.620+05:30"},"s":"I", "c":"REPL", "id":5123008, "ctx":"thread1","msg":"Successfully registered PrimaryOnlyService","a
tttr":{"service":"RenameCollectionParticipantService","namespace":"config.localRenameParticipants"}}
{"t":{"$date":"2025-02-22T22:49:14.620+05:30"},"s":"I", "c":"REPL", "id":5123008, "ctx":"thread1","msg":"Successfully registered PrimaryOnlyService","a
tttr":{"service":"ShardingDDLCoordinator","namespace":"config.system.sharding_ddl_coordinators"}}
{"t":{"$date":"2025-02-22T22:49:14.620+05:30"},"s":"I", "c":"REPL", "id":5123008, "ctx":"thread1","msg":"Successfully registered PrimaryOnlyService","a
tttr":{"service":"ReshardingDonorService","namespace":"config.localReshardingOperations.donor"}}
{"t":{"$date":"2025-02-22T22:49:14.620+05:30"},"s":"I", "c":"REPL", "id":5123008, "ctx":"thread1","msg":"Successfully registered PrimaryOnlyService","a
tttr":{"service":"ReshardingRecipientService","namespace":"config.localReshardingOperations.recipient"}}
{"t":{"$date":"2025-02-22T22:49:14.620+05:30"},"s":"I", "c":"REPL", "id":5123008, "ctx":"thread1","msg":"Successfully registered PrimaryOnlyService","a
tttr":{"service":"TenantMigrationDonorService","namespace":"config.tenantMigrationDonors"}}
{"t":{"$date":"2025-02-22T22:49:14.620+05:30"},"s":"I", "c":"REPL", "id":5123008, "ctx":"thread1","msg":"Successfully registered PrimaryOnlyService","a
tttr":{"service":"TenantMigrationRecipientService","namespace":"config.tenantMigrationRecipients"}}
{"t":{"$date":"2025-02-22T22:49:14.620+05:30"},"s":"I", "c":"CONTROL", "id":5945603, "ctx":"thread1","msg":"Multi threading initialized"}
{"t":{"$date":"2025-02-22T22:49:14.620+05:30"},"s":"I", "c":"TENANT_M", "id":7091600, "ctx":"thread1","msg":"Starting TenantMigrationAccessBlockerRegistry"}
}
{"t":{"$date":"2025-02-22T22:49:14.622+05:30"},"s":"I", "c":"CONTROL", "id":4615611, "ctx":"initandlisten","msg":"MongoDB starting","attr":{"pid":11704,"p
ort":1150,"dbPath":"C:/shard-practice/shardrep3","architecture":"64-bit","host":"LAPTOP-KPJW609R"}}
{"t":{"$date":"2025-02-22T22:49:14.622+05:30"},"s":"I", "c":"CONTROL", "id":23398, "ctx":"initandlisten","msg":"Target operating system minimum version
","attr":{"targetMinOS":"Windows 7/Windows Server 2008 R2"}}
{"t":{"$date":"2025-02-22T22:49:14.622+05:30"},"s":"I", "c":"CONTROL", "id":23403, "ctx":"initandlisten","msg":"Build Info","attr":{"buildInfo":{"versio
n":"7.0.16","gitVersion":"18b94944cfdaa8e30b0e10243bc18268251c1f","modules":[],"allocator":"tcmalloc","environment":{"distmod":"windows","distarch":"x86_6
4","target_arch":"x86_64"}}}}
{"t":{"$date":"2025-02-22T22:49:14.622+05:30"},"s":"I", "c":"CONTROL", "id":51765, "ctx":"initandlisten","msg":"Operating System","attr":{"os":{"name":"
Microsoft Windows 10","version":"10.0 (build 26100)"}}}
{"t":{"$date":"2025-02-22T22:49:14.622+05:30"},"s":"I", "c":"CONTROL", "id":21951, "ctx":"initandlisten","msg":"Options set by command line","attr":{"op
tions":{"net":{"port":1150},"replication":{"replSet":"shard_repl"},"sharding":{"clusterRole":"shardsvr"},"storage":{"dbPath":"C:\\shard-practice\\shardrep3"
}}}}
{"t":{"$date":"2025-02-22T22:49:14.628+05:30"},"s":"I", "c":"STORAGE", "id":22315, "ctx":"initandlisten","msg":"Opening WiredTiger","attr":{"config":"cr
eate,cache_size=3402M,session_max=33000,eviction=(threads_min=4,threads_max=4),config_base=false,statistics=(fast),log=(enabled=true,remove=true,path=journ
a"

```

2] Initiate that Replica Set by connecting it to mongosh

mongosh --host="localhost:1130"

```
Windows PowerShell
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PS C:\Users\khann> mongosh --host="localhost:1130"
Current Mongosh Log ID: 67ba074c490d2c182c68aefb
Connecting to: mongod://localhost:1130/?directConnection=true&serverSelectionTimeoutMS=2000&appName=mongosh+2.1.3
Using MongoDB: 7.0.16
Using Mongosh: 2.1.3
mongosh 2.4.0 is available for download: https://www.mongodb.com/try/download/shell

For mongosh info see: https://docs.mongodb.com/mongod-shell/

-----
The server generated these startup warnings when booting
2025-02-22T22:46:36.310+05:30: Access control is not enabled for the database. Read and write access to data and configuration is unrestricted
2025-02-22T22:46:36.310+05:30: This server is bound to localhost. Remote systems will be unable to connect to this server. Start the server with --bind_i
p <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, star
t the server with --bind_ip 127.0.0.1 to disable this warning
-----

test> |

```

```
rs.initiate({_id:"shard_repl", members:[{_id:0, host:"localhost:1130"}, {_id:1, host:"localhost:1140"},
{_id:2, host:"localhost:1150"}]});
```

```
test> rs.initiate({
... _id:"shard_repl",
... members:[
... {_id:0, host:"localhost:1130"},
... {_id:1, host:"localhost:1140"},
... {_id:2, host:"localhost:1150"}]
... });
{ ok: 1 }
```

```
shard_repl [direct: primary] test> |
```

3] Check the status

rs.status();

```

Command Prompt: Command Prompt - mongod --
configsvr --port=1030 --replSet="config-repl" --
dbpath="C:\shard-practice\configsvr"
members: [
  {
    _id: 0,
    name: 'localhost:1130',
    health: 1,
    state: 1,
    stateStr: 'PRIMARY',
    uptime: 457,
    optime: { ts: Timestamp({ t: 1740245042, i: 1 }), t: Long('1') },
    optimeDate: ISODate('2025-02-22T17:24:02.000Z'),
    lastAppliedWallTime: ISODate('2025-02-22T17:24:02.845Z'),
    lastDurableWallTime: ISODate('2025-02-22T17:24:02.845Z'),
    syncSourceHost: '',
    syncSourceId: -1,
    infoMessage: 'Could not find member to sync from',
    electionTime: Timestamp({ t: 1740244932, i: 1 }),
    electionDate: ISODate('2025-02-22T17:22:12.000Z'),
    configVersion: 1,
    configTerm: 1,
    self: true,
    lastHeartbeatMessage: ''
  },
  {
    _id: 1,
    name: 'localhost:1140',
    health: 1,
    state: 2,
    stateStr: 'SECONDARY',
    uptime: 129,
    optime: { ts: Timestamp({ t: 1740245042, i: 1 }), t: Long('1') },
    optimeDurable: { ts: Timestamp({ t: 1740245042, i: 1 }), t: Long('1') },
    optimeDate: ISODate('2025-02-22T17:24:02.000Z'),
    optimeDurableDate: ISODate('2025-02-22T17:24:02.000Z'),
    lastAppliedWallTime: ISODate('2025-02-22T17:24:02.845Z'),
    lastDurableWallTime: ISODate('2025-02-22T17:24:02.845Z'),
    lastHeartbeat: ISODate('2025-02-22T17:24:10.739Z'),
    lastHeartbeatRecv: ISODate('2025-02-22T17:24:11.269Z'),
    pingMs: Long('0'),
    lastHeartbeatMessage: '',
    syncSourceHost: 'localhost:1130',
    syncSourceId: 0,
    infoMessage: '',
    configVersion: 1,
    configTerm: 1
  },
  {
    _id: 2,
    name: 'localhost:1150',
    health: 1,
    state: 2,
    stateStr: 'SECONDARY',
    uptime: 129,
    optime: { ts: Timestamp({ t: 1740245042, i: 1 }), t: Long('1') },
    optimeDurable: { ts: Timestamp({ t: 1740245042, i: 1 }), t: Long('1') },
    optimeDate: ISODate('2025-02-22T17:24:02.000Z'),
    optimeDurableDate: ISODate('2025-02-22T17:24:02.000Z'),
    lastAppliedWallTime: ISODate('2025-02-22T17:24:02.845Z'),
    lastDurableWallTime: ISODate('2025-02-22T17:24:02.845Z'),
    lastHeartbeat: ISODate('2025-02-22T17:24:10.758Z'),
    lastHeartbeatRecv: ISODate('2025-02-22T17:24:11.249Z'),
    pingMs: Long('0'),
    lastHeartbeatMessage: '',
    syncSourceHost: 'localhost:1130',
    syncSourceId: 0,
    infoMessage: '',
    configVersion: 1,
    configTerm: 1
  }
],
ok: 1,

```



```
mongosh --host="localhost:1230"
```

```
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PS C:\Users\khann> mongosh --host="localhost:1230"
Current Mongosh Log ID: 67ba097c7759a523c76eea5e
Connecting to: mongodb://localhost:1230/?directConnection=true&serverSelectionTimeoutMS=2000&appName=mongosh+2.1.3
Using MongoDB: 7.0.16
Using Mongosh: 2.1.3
mongosh 2.4.0 is available for download: https://www.mongodb.com/try/download/shell

For mongosh info see: https://docs.mongodb.com/mongodb-shell/

-----
The server generated these startup warnings when booting
2025-02-22T22:56:35.414+05:30: Access control is not enabled for the database. Read and write access to data and configuration is unrestricted
2025-02-22T22:56:35.414+05:30: This server is bound to localhost. Remote systems will be unable to connect to this server. Start the server with --bind_i
p <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, star
t the server with --bind_ip 127.0.0.1 to disable this warning
-----
test> |
```

```
rs.initiate({_id:"shard2_repl", members:[{_id:0,
host:"localhost:1230"},{_id:1,host:"localhost:1240"},{_id:2, host:"localhost:1250"}]});
```

```
test> rs.initiate({_id:"shard2_repl", members:[{_id:0, host:"localhost:1230"},{_id:1,host:"localhost:1240"},{_id:2, host:"localhost:1250"}]});
{ ok: 1 }
```

```
shard2_repl [direct: primary] test> |
```

```
rs.status();
```

```
{
  members: [
    {
      _id: 0,
      name: 'localhost:1230',
      health: 1,
      state: 1,
      stateStr: 'PRIMARY',
      uptime: 382,
      optime: { ts: Timestamp({ t: 1740245572, i: 1 }), t: Long('1') },
      optimeDate: ISODate('2025-02-22T17:32:52.000Z'),
      lastAppliedWallTime: ISODate('2025-02-22T17:32:52.572Z'),
      lastDurableWallTime: ISODate('2025-02-22T17:32:52.572Z'),
      syncSourceHost: '',
      syncSourceId: -1,
      infoMessage: 'Could not find member to sync from',
      electionTime: Timestamp({ t: 1740245512, i: 1 }),
      electionDate: ISODate('2025-02-22T17:31:52.000Z'),
      configVersion: 1,
      configTerm: 1,
      self: true,
      lastHeartbeatMessage: ''
    },
    {
      _id: 1,
      name: 'localhost:1240',
      health: 1,
      state: 2,
      stateStr: 'SECONDARY',
      uptime: 74,
      optime: { ts: Timestamp({ t: 1740245572, i: 1 }), t: Long('1') },
      optimeDurable: { ts: Timestamp({ t: 1740245572, i: 1 }), t: Long('1') },
      optimeDate: ISODate('2025-02-22T17:32:52.000Z'),
      optimeDurableDate: ISODate('2025-02-22T17:32:52.000Z'),
      lastAppliedWallTime: ISODate('2025-02-22T17:32:52.572Z'),
      lastDurableWallTime: ISODate('2025-02-22T17:32:52.572Z'),
      lastHeartbeat: ISODate('2025-02-22T17:32:54.458Z'),
      lastHeartbeatRecv: ISODate('2025-02-22T17:32:55.463Z'),
      pingMs: Long('0'),
      lastHeartbeatMessage: '',
      syncSourceHost: 'localhost:1230',

```

MongoDB Shards – DONE

Now, initialize a Query Router which is a mongos process

mongos --port=1330 --configdb='config-repl/localhost:1030,localhost:1040,localhost:1050'

```
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PS C:\Users\khann> mongos --port=1330 --configdb='config-repl/localhost:1030,localhost:1040,localhost:1050'
{"t":{"$date":"2025-02-22T23:06:07.361+05:30"},"s":"I", "c":"NETWORK", "id":4915701, "ctx":"thread1","msg":"Initialized wire specification","attr":{"spec":{"incomingExternalClient":{"minWireVersion":0,"maxWireVersion":21},"incomingInternalClient":{"minWireVersion":0,"maxWireVersion":21},"outgoing":{"minWireVersion":21,"maxWireVersion":21},"isInternalClient":true}}}}
{"t":{"$date":"2025-02-22T23:06:07.373+05:30"},"s":"I", "c":"CONTROL", "id":23285, "ctx":"thread1","msg":"Automatically disabling TLS 1.0, to force-enable TLS 1.0 specify --sslDisabledProtocols 'none'"}
{"t":{"$date":"2025-02-22T23:06:08.602+05:30"},"s":"I", "c":"NETWORK", "id":4648602, "ctx":"thread1","msg":"Implicit TCP FastOpen in use."}
{"t":{"$date":"2025-02-22T23:06:08.603+05:30"},"s":"I", "c":"HEALTH", "id":5936503, "ctx":"thread1","msg":"Fault manager changed state ", "attr":{"state":"StartupCheck"}}
{"t":{"$date":"2025-02-22T23:06:08.609+05:30"},"s":"W", "c":"CONTROL", "id":22120, "ctx":"thread1","msg":"Access control is not enabled for the database. Read and write access to data and configuration is unrestricted","tags":{"startupWarnings"}}
{"t":{"$date":"2025-02-22T23:06:08.610+05:30"},"s":"W", "c":"CONTROL", "id":22140, "ctx":"thread1","msg":"This server is bound to localhost. Remote systems will 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":{"$date":"2025-02-22T23:06:08.613+05:30"},"s":"I", "c":"CONTROL", "id":23403, "ctx":"mongosMain","msg":"Build Info","attr":{"buildInfo":{"version":"7.0.16","gitVersion":"18b94944cfdaa8e30b0e10243bc18268251c1f","modules":[],"allocator":"tcmalloc","environment":{"distmod":"windows","distarch":"x86_64","target_arch":"x86_64"}}}}
{"t":{"$date":"2025-02-22T23:06:08.613+05:30"},"s":"I", "c":"CONTROL", "id":51765, "ctx":"mongosMain","msg":"Operating System","attr":{"os":{"name":"Microsoft Windows 10","version":"10.0 (build 26100)}}}}
{"t":{"$date":"2025-02-22T23:06:08.613+05:30"},"s":"I", "c":"CONTROL", "id":21951, "ctx":"mongosMain","msg":"Options set by command line","attr":{"options":{"net":{"port":1330},"sharding":{"configDB":"config-repl/localhost:1030,localhost:1040,localhost:1050"}}}}
{"t":{"$date":"2025-02-22T23:06:08.620+05:30"},"s":"I", "c":"NETWORK", "id":4603701, "ctx":"mongosMain","msg":"Starting Replica Set Monitor","attr":{"protocol":"streamable","uri":"config-repl/localhost:1030,localhost:1040,localhost:1050"}}
{"t":{"$date":"2025-02-22T23:06:08.622+05:30"},"s":"I", "c":"-", "id":4333223, "ctx":"mongosMain","msg":"RSM now monitoring replica set","attr":{"replicaSet":"config-repl","nReplicaSetMembers":3}}
{"t":{"$date":"2025-02-22T23:06:08.622+05:30"},"s":"I", "c":"-", "id":4333226, "ctx":"mongosMain","msg":"RSM host was added to the topology","attr":{"replicaSet":"config-repl","host":"localhost:1030"}}
{"t":{"$date":"2025-02-22T23:06:08.623+05:30"},"s":"I", "c":"-", "id":4333226, "ctx":"mongosMain","msg":"RSM host was added to the topology","attr":{"replicaSet":"config-repl","host":"localhost:1040"}}
{"t":{"$date":"2025-02-22T23:06:08.623+05:30"},"s":"I", "c":"-", "id":4333226, "ctx":"mongosMain","msg":"RSM host was added to the topology","attr":{"replicaSet":"config-repl","host":"localhost:1050"}}
{"t":{"$date":"2025-02-22T23:06:08.625+05:30"},"s":"I", "c":"-", "id":4333218, "ctx":"monitoring-keys-for-HMAC","msg":"Rescheduling the next replica set monitoring request","attr":{"replicaSet":"config-repl","host":"localhost:1040","delayMillis":0}}
{"t":{"$date":"2025-02-22T23:06:08.625+05:30"},"s":"I", "c":"-", "id":4333218, "ctx":"monitoring-keys-for-HMAC","msg":"Rescheduling the next replica set monitoring request","attr":{"replicaSet":"config-repl","host":"localhost:1050","delayMillis":0}}
```

Now, Connect Shards and Query Router (mongos)

1] Connect to 'mongos' using 'mongoosh'

mongoosh --host="localhost:1330"

```
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PS C:\Users\khann> mongoosh --host="localhost:1330"
Current Mongoosh Log ID: 67ba0b4b3ce3cee2d8dd87a2
Connecting to:      mongod://localhost:1330/?directConnection=true&serverSelectionTimeoutMS=2000&appName=mongoosh+2.1.3
Using MongoDB:      7.0.16
Using Mongoosh:      2.1.3
mongoosh 2.4.0 is available for download: https://www.mongodb.com/try/download/shell

For mongoosh info see: https://docs.mongodb.com/mongodb-shell/

-----
The server generated these startup warnings when booting
2025-02-22T23:06:08.609+05:30: Access control is not enabled for the database. Read and write access to data and configuration is unrestricted
2025-02-22T23:06:08.610+05:30: This server is bound to localhost. Remote systems will 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
-----

[direct: mongos] test>
```


2] Add Shard Replica Set to Sharded Cluster

This will be repeated for all the Shard ReplicaSets we have configured

```
sh.addShard("shard_repl/localhost:1130,localhost:1140,localhost:1150");
```

```
[direct: mongos] test> sh.addShard("shard_repl/localhost:1130,localhost:1140,localhost:1150");
{
  shardAdded: 'shard_repl',
  ok: 1,
  '$clusterTime': {
    clusterTime: Timestamp({ t: 1740246081, i: 2 }),
    signature: {
      hash: Binary.createFromBase64('AAAAAAAAAAAAAAAAAAAAAAAAAAAA=', 0),
      keyId: Long('0')
    }
  },
  operationTime: Timestamp({ t: 1740246081, i: 2 })
}
[direct: mongos] test> |
```

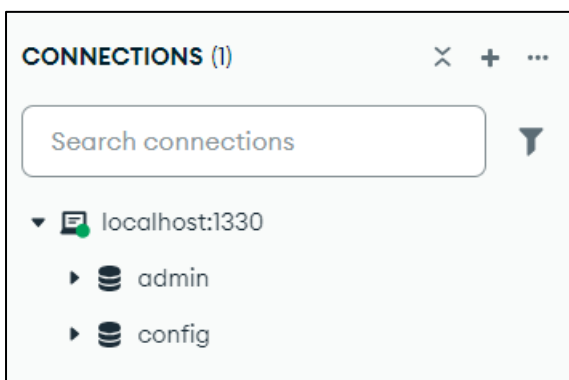
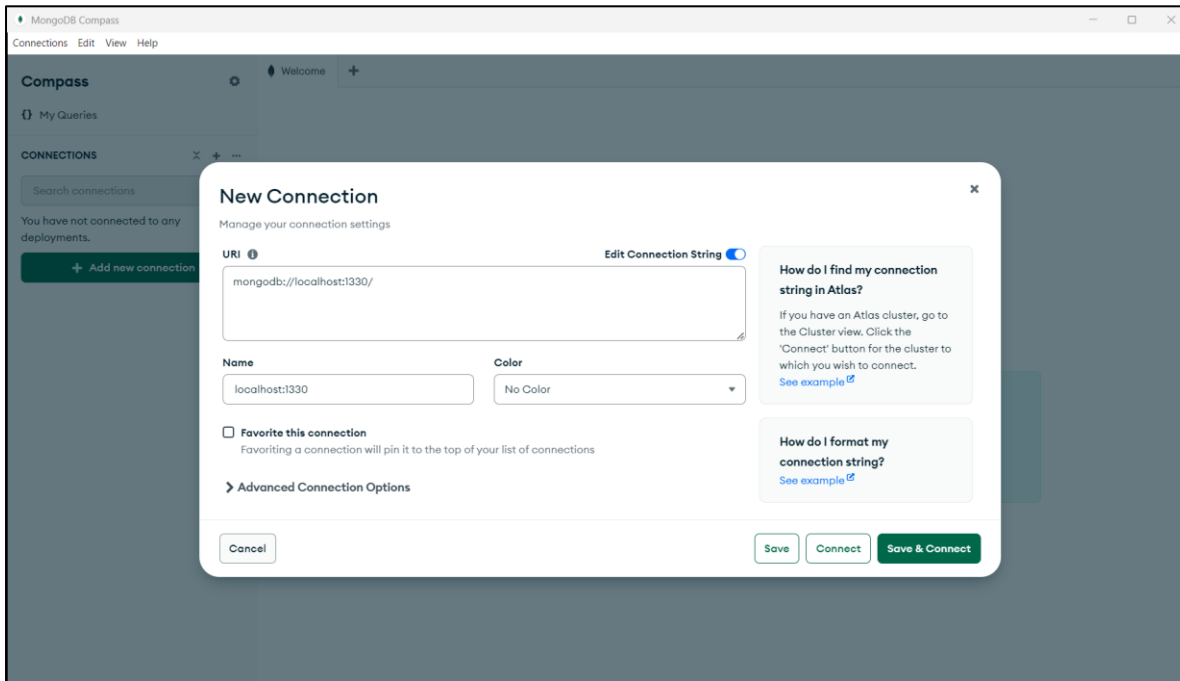
```
sh.addShard("shard2_repl/localhost:1230,localhost:1240,localhost:1250");
```

```
[direct: mongos] test> sh.addShard("shard2_repl/localhost:1230,localhost:1240,localhost:1250");
{
  shardAdded: 'shard2_repl',
  ok: 1,
  '$clusterTime': {
    clusterTime: Timestamp({ t: 1740246146, i: 9 }),
    signature: {
      hash: Binary.createFromBase64('AAAAAAAAAAAAAAAAAAAAAAAAAAAA=', 0),
      keyId: Long('0')
    }
  },
  operationTime: Timestamp({ t: 1740246145, i: 4 })
}
[direct: mongos] test> |
```

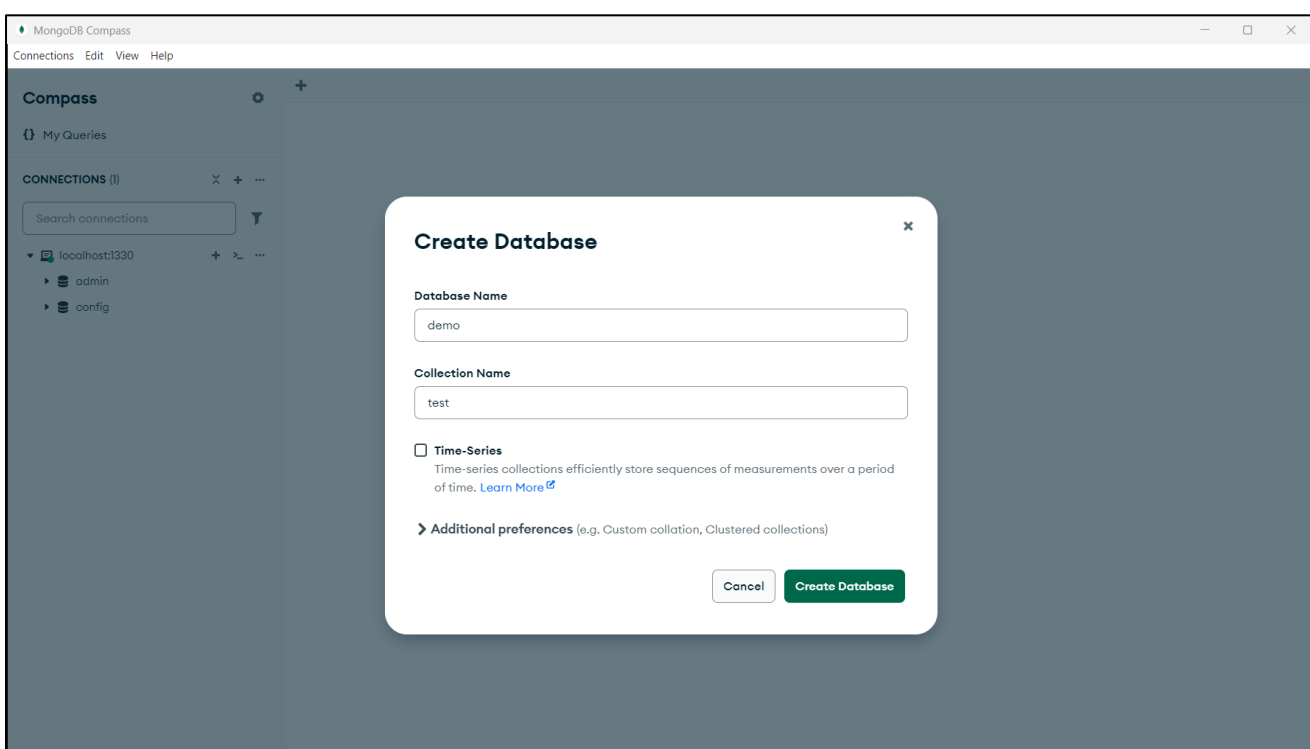
```
sh.status();
```

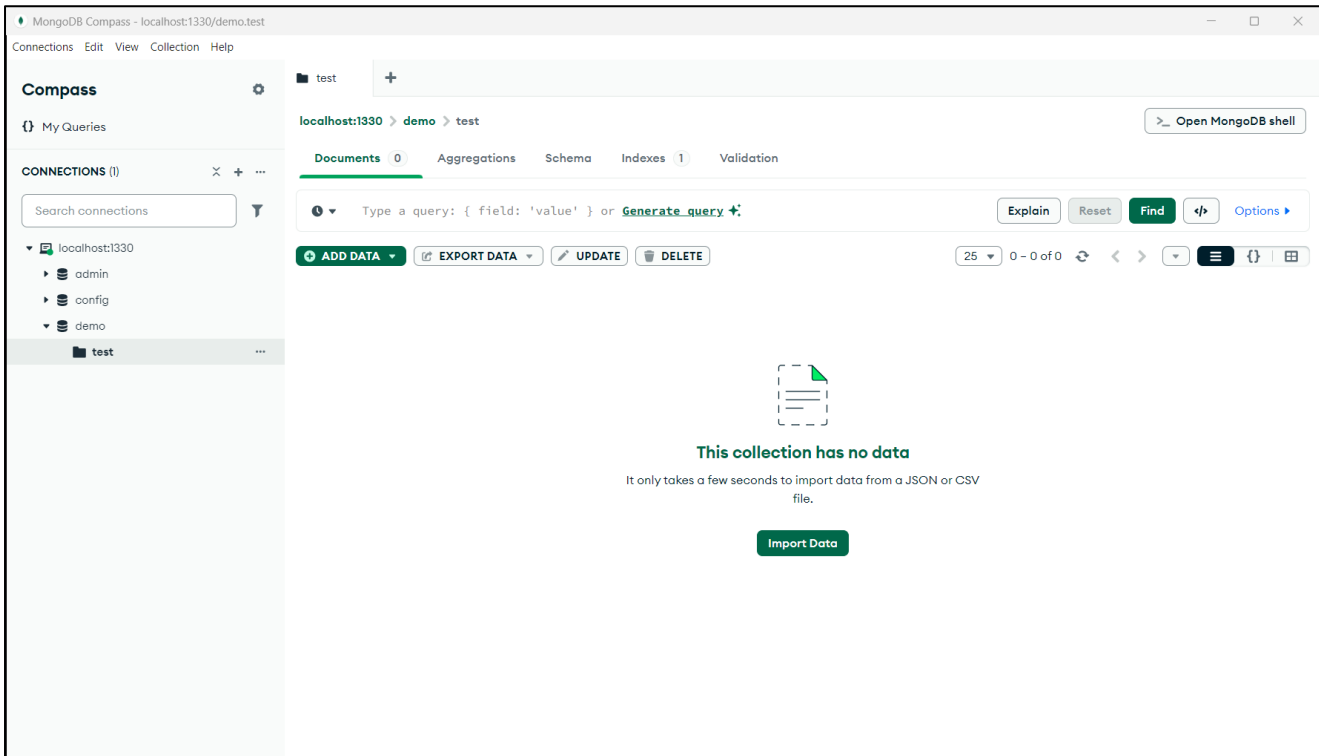
```
[direct: mongos] test> sh.status();
shardingVersion
{ _id: 1, clusterId: ObjectId('67ba04d8f57f52c1ba4ba10b') }
---
shards
[
  {
    _id: 'shard2_repl',
    host: 'shard2_repl/localhost:1230,localhost:1240,localhost:1250',
    state: 1,
    topologyTime: Timestamp({ t: 1740246145, i: 2 })
  },
  {
    _id: 'shard_repl',
    host: 'shard_repl/localhost:1130,localhost:1140,localhost:1150',
    state: 1,
    topologyTime: Timestamp({ t: 1740246080, i: 3 })
  }
]
---
active mongoses
[ { '7.0.16': 1 } ]
---
autosplit
{ 'Currently enabled': 'yes' }
---
balancer
{
  'Currently enabled': 'yes',
  'Currently running': 'no',
  'Failed balancer rounds in last 5 attempts': 0,
  'Migration Results for the last 24 hours': 'No recent migrations'
}
---
```


Open mongodb compass, edit -> mongodb://localhost:1330

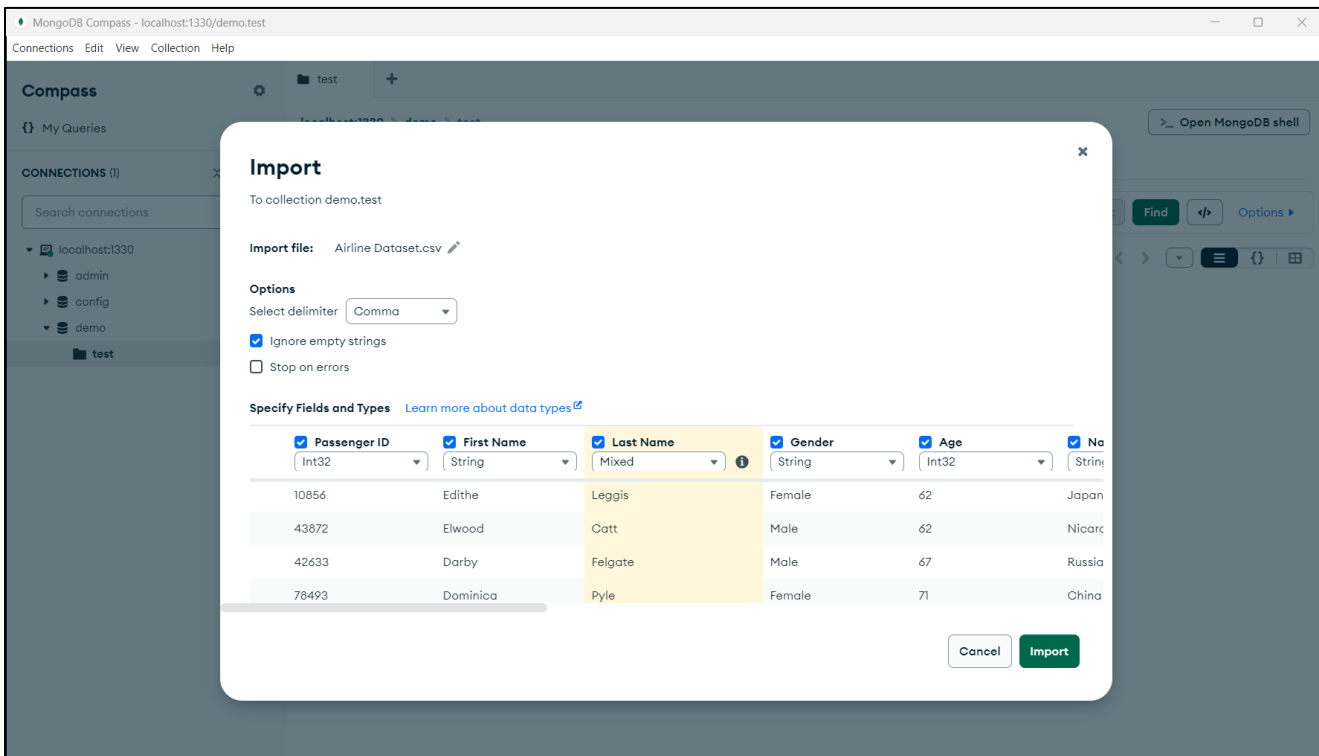


Now, create database “demo”, collection name-> “test”





import random dataset into it, I am taking a dataset called “airline”



MongoDB Compass - localhost:1330/demo.test

Connections Edit View Collection Help

Compass

My Queries

CONNECTIONS (1)

Search connections

localhost:1330

- admin
- config
- demo
- test

test

localhost:1330 > demo > test

Documents 98.6K Aggregations Schema Indexes 1 Validation

Type a query: { field: 'value' } or [Generate query](#)

Explain Reset Find Options

ADD DATA EXPORT DATA UPDATE DELETE

25 1 - 25 of 98619

```
{
  "_id": ObjectId('67ba8ee66a7bd9e104d4ff5e'),
  "Passenger ID": 18856,
  "First Name": "Edithe",
  "Last Name": "Leggis",
  "Gender": "Female",
  "Age": 62,
  "Nationality": "Japan",
  "Airport Name": "Coldfoot Airport",
  "Airport Country Code": "US",
  "Country Name": "United States",
  "Airport Continent": "NAM",
  "Continents": "North America",
  "Departure Date": "6/28/2022",
  "Arrival Airport": "CXF",
  "Pilot Name": "Edithe Leggis",
  "Flight Status": "On Time"
}
```

```
{
  "_id": ObjectId('67ba8ee66a7bd9e104d4ff5f'),
  "Passenger ID": 43872,
  "First Name": "Elwood",
  "Last Name": "Catt",
  "Gender": "Male",
  "Age": 62,
  "Nationality": "Nicaragua",
  "Airport Name": "Kugluktuk Airport",
  "Airport Country Code": "CA",
  "Country Name": "Canada",
  "Airport Continent": "NAM"
}
```

Import completed.
98619 documents imported.

Create index -> Age (asc: 1)

MongoDB Compass - localhost:1330/demo.test

Connections Edit View Collection Help

Compass

My Queries

CONNECTIONS (1)

Search connections

localhost:1330

- admin
- config
- demo
- test

test

localhost:1330 > demo > test

Documents 98.6K Aggregations Schema Indexes 1 Validation

Create Index Refresh

VIEWING INDEXES SEARCH INDEXES

Name & Definition Type Size Usage Properties Status

UNIQUE READY

Create Index

demo.test

Index fields

Age 1 (asc)

Options

Cancel Create Index

Import completed.
98619 documents imported.

| Name & Definition | Type | Size | Usage | Properties | Status |
|-------------------|---------|----------|---------------------------|------------|--------|
| > _id_ | REGULAR | 2.5 MB | 2 (since Sat Feb 22 2025) | UNIQUE | READY |
| > Age_1 | REGULAR | 462.8 KB | 0 (since Sat Feb 22 2025) | | READY |

Now, go to current cmd/powershell terminal (not a new one) and type

use demo

show collections

```
[direct: mongos] test> use demo
switched to db demo
[direct: mongos] demo> show collections
test
[direct: mongos] demo> |
```

sh.enableSharding("demo");

```
[direct: mongos] demo> sh.enableSharding("demo");
{
  ok: 1,
  '$clusterTime': {
    clusterTime: Timestamp({ t: 1740247896, i: 1 }),
    signature: {
      hash: Binary.createFromBase64('AAAAAAAAAAAAAAAAAAAAAAAAAAAAAA=', 0),
      keyId: Long('0')
    }
  },
  operationTime: Timestamp({ t: 1740247896, i: 1 })
}
[direct: mongos] demo> |
```

sh.shardCollection("demo.test", {Age:1});

```
[direct: mongos] demo> sh.shardCollection("demo.test", {Age:1});
{
  collectionsharded: 'demo.test',
  ok: 1,
  '$clusterTime': {
    clusterTime: Timestamp({ t: 1740247923, i: 31 }),
    signature: {
      hash: Binary.createFromBase64('AAAAAAAAAAAAAAAAAAAAAAAAAAAAAA=', 0),
      keyId: Long('0')
    }
  },
  operationTime: Timestamp({ t: 1740247923, i: 31 })
}
[direct: mongos] demo> |
```

```
sh.status();
```

```
[direct: mongos] demo> sh.status();
shardingVersion
{ _id: 1, clusterId: ObjectId('67ba04d8f57f52c1ba4ba10b') }
---
shards
[
  {
    _id: 'shard2_repl',
    host: 'shard2_repl/localhost:1230,localhost:1240,localhost:1250',
    state: 1,
    topologyTime: Timestamp({ t: 1740246145, i: 2 })
  },
  {
    _id: 'shard_repl',
    host: 'shard_repl/localhost:1130,localhost:1140,localhost:1150',
    state: 1,
    topologyTime: Timestamp({ t: 1740246080, i: 3 })
  }
]
---
active mongoses
[ { '7.0.16': 1 } ]
---
autosplit
{ 'Currently enabled': 'yes' }
---
```

```
db.test.getShardDistribution();
```

```
[direct: mongos] demo> db.test.getShardDistribution();
Shard shard2_repl at shard2_repl/localhost:1230,localhost:1240,localhost:1250
{
  data: '37.91MiB',
  docs: 98619,
  chunks: 1,
  'estimated data per chunk': '37.91MiB',
  'estimated docs per chunk': 98619
}
---
Totals
{
  data: '37.91MiB',
  docs: 98619,
  chunks: 1,
  'Shard shard2_repl': [
    '100 % data',
    '100 % docs in cluster',
    '403B avg obj size on shard'
  ]
}
[direct: mongos] demo> |
```

If the dataset was larger, we would be having chunks > 1. But, due to airlines only having 100,000 records approximately, we were unable to get chunks > 1 but our **sharding has been performed successfully**.