

Sharding Concept

Make sure u have MongoDB shell installed

Add Environment variable -> C:\Program Files\MongoDB\Server\8.0\bin

Create data folder inside C drive

Inside that create

Open PowerShell -> Run as Administrator

Config Server

mkdir C:\data\cfg1, C:\data\cfg2, C:\data\cfg3

Shard Servers (2 shards, 3 nodes each)

mkdir C:\data\shard1_1, C:\data\shard1_2, C:\data\shard1_3

mkdir C:\data\shard2_1, C:\data\shard2_2, C:\data\shard2_3

Mongos router

mkdir C:\data\mongos

Open 3 different powershells run commands -> configure servers

```
mongod --configsvr --replSet configReplSet --port 27019 --dbpath C:\data\cfg1 --bind_ip localhost
```

```
mongod --configsvr --replSet configReplSet --port 27020 --dbpath C:\data\cfg2 --bind_ip localhost
```

```
mongod --configsvr --replSet configReplSet --port 27021 --dbpath C:\data\cfg3 --bind_ip localhost
```

```
mongosh --port 27019
```

```
rs.initiate({  
  _id: "configReplSet",  
  configsvr: true,  
  members: [  
    { _id: 0, host: "localhost:27019" },  
    { _id: 1, host: "localhost:27020" },
```

```
{ _id: 2, host: "localhost:27021" }  
]  
})
```

rs.status()

Output:

```
Select mongosh mongodb://127.0.0.1:27019/?directConnection=true&serverSelectionTimeoutMS=2000
PS C:\WINDOWS\system32> mongosh --port 27019
>>
Current Mongosh Log ID: 684c271f1953ae640158eb66
Connecting to:      mongodb://127.0.0.1:27019/?directConnection=true&serverSelectionTimeoutMS=2000&appName=mongosh+2.5.2
Using MongoDB:      8.0.9
Using Mongosh:      2.5.2

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

-----
The server generated these startup warnings when booting
2025-06-13T18:55:14.559+05:30: Access control is not enabled for the database. Read and write access to data and configuration is unrestricted
-----

test> rs.initiate({
...   _id: "configReplSet",
...   configsvr: true,
...   members: [
...     { _id: 0, host: "localhost:27019" },
...     { _id: 1, host: "localhost:27020" },
...     { _id: 2, host: "localhost:27021" }
...   ]
... })
ok: 1,
{
  'clusterTime': {
    clusterTime: Timestamp({ t: 1749821237, i: 1 }),
    signature: {
      hash: Binary.createFromBase64('AAAAAAAAAAAAAAAAAAAA', 0),
      keyId: Long(0)
    }
  },
  operationTime: Timestamp({ t: 1749821237, i: 1 })
}
configReplSet [direct: secondary] test> rs.status()
{
  set: 'configReplSet',
  date: ISODate('2025-06-13T13:27:30.552Z'),
  myState: 1,
  term: Long(1),
  syncSourceHost: '',
  syncSourceId: -1,
  configsvr: true,
  heartbeatIntervalMillis: Long(2000),
  majorityVoteCount: 2,
  writeMajorityCount: 2,
  votingMembersCount: 3,
  writableVotingMembersCount: 3,
  optimes: {
    lastCommittedOpTime: { ts: Timestamp({ t: 1749821250, i: 1 }), t: Long(1) },
    lastCommittedWallTime: ISODate('2025-06-13T13:27:30.170Z'),
    readConcernMajorityOpTime: { ts: Timestamp({ t: 1749821250, i: 1 }), t: Long(1) },
    appliedOpTime: { ts: Timestamp({ t: 1749821250, i: 1 }), t: Long(1) },
  }
}
```

```
Select mongosh mongodb://127.0.0.1:27019/?directConnection=true&serverSelectionTimeoutMS=2000
lastWriteWallTime: ISODate('2025-06-13T13:27:30.170Z'),
lastHeartbeat: ISODate('2025-06-13T13:27:29.865Z'),
lastHeartbeatRecv: ISODate('2025-06-13T13:27:30.367Z'),
pingMs: Long('0'),
lastHeartbeatMessage: '',
syncSourceHost: 'localhost:27019',
syncSourceId: 0,
infoMessage: '',
configVersion: 1,
configTerm: 1
},
{
  _id: 2,
  name: 'localhost:27021',
  health: 1,
  state: 2,
  stateStr: 'SECONDARY',
  uptime: 13,
  optime: { ts: Timestamp({ t: 1749821248, i: 27 }), t: Long('1') },
  optimeDurable: { ts: Timestamp({ t: 1749821248, i: 27 }), t: Long('1') },
  optimeWritten: { ts: Timestamp({ t: 1749821248, i: 27 }), t: Long('1') },
  optimeDate: ISODate('2025-06-13T13:27:28.000Z'),
  optimeDurableDate: ISODate('2025-06-13T13:27:28.000Z'),
  optimeWrittenDate: ISODate('2025-06-13T13:27:28.000Z'),
  lastAppliedWallTime: ISODate('2025-06-13T13:27:30.170Z'),
  lastDurableWallTime: ISODate('2025-06-13T13:27:30.170Z'),
  lastWriteWallTime: ISODate('2025-06-13T13:27:30.170Z'),
  lastHeartbeat: ISODate('2025-06-13T13:27:29.897Z'),
  lastHeartbeatRecv: ISODate('2025-06-13T13:27:30.400Z'),
  pingMs: Long('0'),
  lastHeartbeatMessage: '',
  syncSourceHost: 'localhost:27019',
  syncSourceId: 0,
  infoMessage: '',
  configVersion: 1,
  configTerm: 1
}
],
ok: 1,
'$clusterTime': {
  clusterTime: Timestamp({ t: 1749821250, i: 1 }),
  signatures: {
    hash: Binary.createFromBase64('AAAAAAAAAAAAAAAAAAAAAAAAAAAA', 0),
    keyId: Long('0')
  }
},
operationTime: Timestamp({ t: 1749821250, i: 1 })
}
configReplSet [direct: primary] test> _
```

Start Shard 1 Replica Set (3 nodes)

open 3 new PowerShell windows and run

```
mongod --shardsvr --replSet shard1ReplSet --port 27022 --dbpath C:\data\shard1_1 --bind_ip localhost
```

```
mongod --shardsvr --replSet shard1ReplSet --port 27023 --dbpath C:\data\shard1_2 --bind_ip localhost
```

```
mongod --shardsvr --replSet shard1ReplSet --port 27024 --dbpath C:\data\shard1_3 --bind_ip localhost
```

```
mongosh --port 27022
```

```
rs.initiate({
```

```
  _id: "shard1ReplSet",
```

```
  members: [
```

```
    { _id: 0, host: "localhost:27022" },
```

```
    { _id: 1, host: "localhost:27023" },
```

```
    { _id: 2, host: "localhost:27024" }
```

```
]
})
```

Output:

```
mongosh mongodb://127.0.0.1:27022/?directConnection=true&serverSelectionTimeoutMS=2000
Windows PowerShell
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Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\WINDOWS\system32> mongosh --port 27022
>>
Current Mongosh Log ID: 684c29315fc89d579550eb66
Connecting to:      mongodb://127.0.0.1:27022/?directConnection=true&serverSelectionTimeoutMS=2000&appName=mongosh+2.5.2
Using MongoDB:      4.0.9
Using Mongosh:      2.5.2

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

-----
The server generated these startup warnings when booting
2025-06-13T19:04:37.585+05:30: Access control is not enabled for the database. Read and write access to data and configuration is unrestricted
-----

test> rs.initiate({
...   _id: "shard1ReplSet",
...   members: [
...     { _id: 0, host: "localhost:27022" },
...     { _id: 1, host: "localhost:27023" },
...     { _id: 2, host: "localhost:27024" }
...   ]
... })
...
ok: 1
  {
    $clusterTime: {
      clusterTime: Timestamp({ t: 1749821762, i: 1 }),
      signature: {
        hash: Binary.createFromBase64("AAAAAAAAAAAAAAAAAAAA=", 0),
        keyId: Long('0')
      }
    },
    operationTime: Timestamp({ t: 1749821762, i: 1 })
  }
shard1ReplSet [direct: secondary] test>
```

Start Shard 2 Replica Set (3 nodes)

Open 3 new PowerShell windows and run

```
mongod --shardsvr --replSet shard2ReplSet --port 27025 --dbpath C:\data\shard2_1 --bind_ip localhost
```

```
mongod --shardsvr --replSet shard2ReplSet --port 27026 --dbpath C:\data\shard2_2 --bind_ip localhost
```

```
mongod --shardsvr --replSet shard2ReplSet --port 27027 --dbpath C:\data\shard2_3 --bind_ip localhost
```

```
mongosh --port 27025
```

```
rs.initiate({
  _id: "shard2ReplSet",
  members: [
```

```

    { _id: 0, host: "localhost:27025" },
    { _id: 1, host: "localhost:27026" },
    { _id: 2, host: "localhost:27027" }
  ]
})

```

Output:

```

mongosh mongodb://127.0.0.1:27025/?directConnection=true&serverSelectionTimeoutMS=2000
Windows PowerShell
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PS C:\WINDOWS\system32> mongosh --port 27025
>>
Current Mongosh Log ID: 684c29d0d0d973e9fa50eb66
Connecting to:      mongodb://127.0.0.1:27025/?directConnection=true&serverSelectionTimeoutMS=2000&appName=mongosh+2.5.2
Using MongoDB:      4.0.9
Using Mongosh:      2.5.2

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

-----
The server generated these startup warnings when booting
2025-06-13T19:07:07.578+05:30: Access control is not enabled for the database. Read and write access to data and configuration is unrestricted
-----

test> rs.initiate({
...   _id: "shard2ReplSet",
...   members: [
...     { _id: 0, host: "localhost:27025" },
...     { _id: 1, host: "localhost:27026" },
...     { _id: 2, host: "localhost:27027" }
...   ]
... })
...
{
  ok: 1,
  $clusterTime: {
    clusterTime: Timestamp({ t: 1749821933, i: 1 }),
    signature: {
      hash: Binary.createFromBase64("AAAAAAAAAAAAAAAAAAAA", 0),
      keyId: Long(0)
    }
  },
  operationTime: Timestamp({ t: 1749821933, i: 1 })
}
shard2ReplSet [direct: secondary] test>

```

Open a new PowerShell window

```

mongos --configdb configReplSet/localhost:27019,localhost:27020,localhost:27021 --port 27018
--bind_ip localhost

```

```

mongosh --port 27018

```

```

sh.addShard("shard1ReplSet/localhost:27022,localhost:27023,localhost:27024")

```

```

sh.addShard("shard2ReplSet/localhost:27025,localhost:27026,localhost:27027")

```

```

sh.status()

```

Output:

```
mongosh mongodb://127.0.0.1:27018/?directConnection=true&serverSelectionTimeoutMS=2000
Windows PowerShell
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Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\WINDOWS\system32> mongosh --port 27018
>>
Current Mongosh Log ID: 684c2a57aec74c585550eb66
Connecting to:  mongodb://127.0.0.1:27018/?directConnection=true&serverSelectionTimeoutMS=2000&appName=mongosh+2.5.2
Using MongoDB:  4.0.9
Using Mongosh:  2.5.2

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

-----
The server generated these startup warnings when booting
2025-06-13T19:10:21.483+05:30: Access control is not enabled for the database. Read and write access to data and configuration is unrestricted
-----

[direct: mongos] test> sh.addShard("shard1Rep1Set/localhost:27022,localhost:27023,localhost:27024")
... sh.addShard("shard2Rep1Set/localhost:27025,localhost:27026,localhost:27027")
...
{
  shardAdded: 'shard2Rep1Set',
  ok: 1,
  '$clusterTime': {
    clusterTime: Timestamp({ t: 1749822092, i: 45 }),
    signature: {
      hash: Binary.createFromBase64('AAAAAAAAAAAAAAAAAAAAA=', 0),
      keyId: Long('0')
    }
  },
  operationTime: Timestamp({ t: 1749822092, i: 39 })
}
[direct: mongos] test> sh.status()
...
shardingVersion
{ _id: 1, clusterId: ObjectId('684c2740e1c9e6481e4e7b09') }
...
shards
[
  {
    _id: 'shard1Rep1Set',
    host: 'shard1Rep1Set/localhost:27022,localhost:27023,localhost:27024',
    state: 1,
    topologyTime: Timestamp({ t: 1749822092, i: 12 }),
    replSetConfigVersion: Long('1')
  },
  {
    _id: 'shard2Rep1Set',
    host: 'shard2Rep1Set/localhost:27025,localhost:27026,localhost:27027',
    state: 1,
    topologyTime: Timestamp({ t: 1749822092, i: 30 }),
    replSetConfigVersion: Long('1')
  }
]
```

```
sh.enableSharding("testDB")
```

```
sh.shardCollection("testDB.testCollection", { "_id": "hashed" })
```

```
for (let i = 0; i < 1000; i++) {
```

```
  db.testCollection.insert({
```

```
    userId: i,
```

```
    text: "hello " + i,
```

```
    time: new Date()
```

```
  })
```

```
}
```

```
db.testCollection.getShardDistribution()
```

Output:

```
mongosh mongodb://127.0.0.1:27018/?directConnection=true&serverSelectionTimeoutMS=2000
>
[direct: mongos] test> use testDB
switched to db testDB
[direct: mongos] testDB> for (let i = 0; i < 10000; i++) {
...   db.testCollection.insert({
...     userId: i,
...     data: "Sample data " + i,
...     timestamp: new Date()
...   })
... }
DeprecationWarning: Collection.insert() is deprecated. Use insertOne, insertMany, or bulkWrite.
Stopping execution...
[direct: mongos] testDB>

[direct: mongos]> db.testCollection.getShardDistribution()
Shard shard1ReplSet at shard1ReplSet/localhost:27022,localhost:27023,localhost:27024
{
  data: '333KiB',
  docs: 4277,
  chunks: 1,
  'estimated data per chunk': '333KiB',
  'estimated docs per chunk': 4277
}
---
Shard shard2ReplSet at shard2ReplSet/localhost:27025,localhost:27026,localhost:27027
{
  data: '341KiB',
  docs: 4378,
  chunks: 1,
  'estimated data per chunk': '341KiB',
  'estimated docs per chunk': 4378
}
---
Totals
{
  data: '675KiB',
  docs: 8655,
  chunks: 2,
  'Shard shard1ReplSet': [
    '49.41 % data',
    '49.41 % docs in cluster',
    '798 avg obj size on shard'
  ],
  'Shard shard2ReplSet': [
    '50.58 % data',
    '50.58 % docs in cluster',
    '798 avg obj size on shard'
  ]
}
[direct: mongos] testDB>
```

In MongoDB Compass:

Create a Connection using localhost:27018

```
Welcome | mongosh: dramaticme | mongosh: dramaticme | +
>_MONGOSH
> use testDB
< switched to db testDB
> db.testCollection.getShardDistribution()
<
Shard shard1ReplSet at shard1ReplSet/localhost:27022,localhost:27023,localhost:27024
{
  data: '333KiB',
  docs: 4277,
  chunks: 1,
  'estimated data per chunk': '333KiB',
  'estimated docs per chunk': 4277
}

Shard shard2ReplSet at shard2ReplSet/localhost:27025,localhost:27026,localhost:27027
{
  data: '341KiB',
  docs: 4378,
  chunks: 1,
  'estimated data per chunk': '341KiB',
  'estimated docs per chunk': 4378
}

Totals
{
  data: '675KiB',
  docs: 8655,
  chunks: 2,
```

