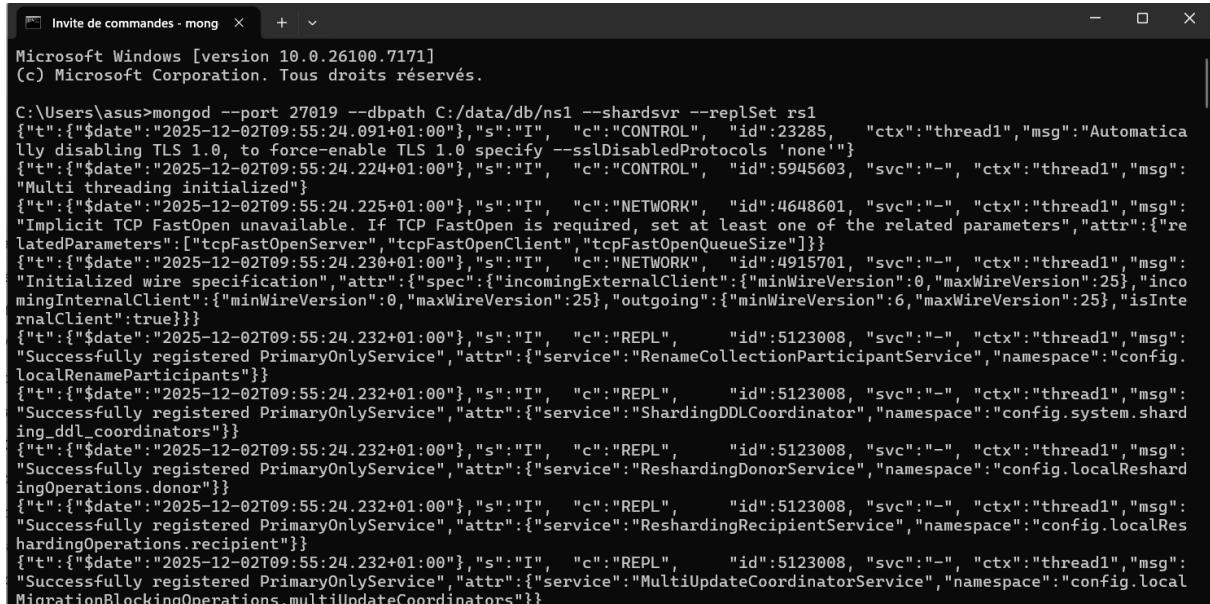


Correction TP4

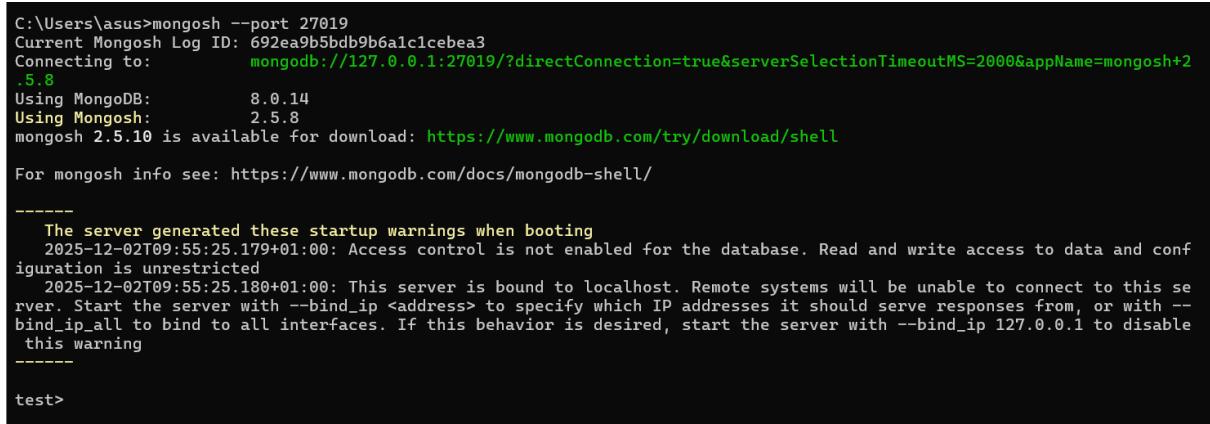
ÉTAPE 1 : SHARD 1 (Port 27019) :

1.1 - Démarrage du serveur Shard 1 :



```
C:\Users\asus>mongod --port 27019 --dbpath C:/data/db/ns1 --shardsvr --replSet rs1
{"t": {"$date": "2025-12-02T09:55:24.091+01:00"}, "s": "I", "c": "CONTROL", "id": 23285, "ctx": "thread1", "msg": "Automatically disabling TLS 1.0, to force-enable TLS 1.0 specify --sslDisabledProtocols 'none'"}
{"t": {"$date": "2025-12-02T09:55:24.224+01:00"}, "s": "I", "c": "CONTROL", "id": 5945603, "svc": "-", "ctx": "thread1", "msg": "Multi threading initialized"}
{"t": {"$date": "2025-12-02T09:55:24.225+01:00"}, "s": "I", "c": "NETWORK", "id": 4648601, "svc": "-", "ctx": "thread1", "msg": "Implicit TCP FastOpen unavailable. If TCP FastOpen is required, set at least one of the related parameters", "attr": {"relatedParameters": ["tcpFastOpenServer", "tcpFastOpenClient", "tcpFastOpenQueueSize"]}}
{"t": {"$date": "2025-12-02T09:55:24.230+01:00"}, "s": "I", "c": "NETWORK", "id": 4915701, "svc": "-", "ctx": "thread1", "msg": "Initialized wire specification", "attr": {"spec": {"incomingExternalClient": {"minWireVersion": 0, "maxWireVersion": 25}, "incomingInternalClient": {"minWireVersion": 0, "maxWireVersion": 25}, "outgoing": {"minWireVersion": 6, "maxWireVersion": 25}, "isInternalClient": true}}}
{"t": {"$date": "2025-12-02T09:55:24.232+01:00"}, "s": "I", "c": "REPL", "id": 5123008, "svc": "-", "ctx": "thread1", "msg": "Successfully registered PrimaryOnlyService", "attr": {"service": "RenameCollectionParticipantService", "namespace": "config.localRenameParticipants"}}
{"t": {"$date": "2025-12-02T09:55:24.232+01:00"}, "s": "I", "c": "REPL", "id": 5123008, "svc": "-", "ctx": "thread1", "msg": "Successfully registered PrimaryOnlyService", "attr": {"service": "ShardingDDLCoordinator", "namespace": "config.system.sharding_ddl_coordinators"}}
{"t": {"$date": "2025-12-02T09:55:24.232+01:00"}, "s": "I", "c": "REPL", "id": 5123008, "svc": "-", "ctx": "thread1", "msg": "Successfully registered PrimaryOnlyService", "attr": {"service": "ReshardingDonorService", "namespace": "config.localReshardingOperations.donor"}}
{"t": {"$date": "2025-12-02T09:55:24.232+01:00"}, "s": "I", "c": "REPL", "id": 5123008, "svc": "-", "ctx": "thread1", "msg": "Successfully registered PrimaryOnlyService", "attr": {"service": "ReshardingRecipientService", "namespace": "config.localReshardingOperations.recipient"}}
{"t": {"$date": "2025-12-02T09:55:24.232+01:00"}, "s": "I", "c": "REPL", "id": 5123008, "svc": "-", "ctx": "thread1", "msg": "Successfully registered PrimaryOnlyService", "attr": {"service": "MultiUpdateCoordinatorService", "namespace": "config.localMigrationBlockingOperations.multiUpdateCoordinators"}}
```

1.2 - Initialisation du Replica Set de Shard 1 :

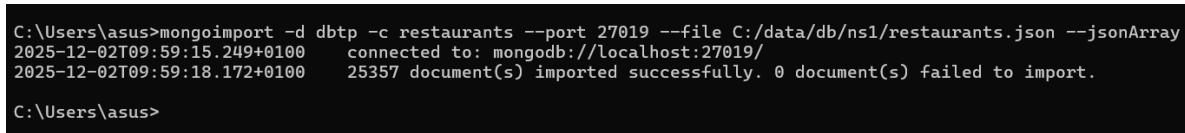


```
C:\Users\asus>mongosh --port 27019
Current Mongosh Log ID: 692ea9b5bdb9b6a1c1cebea3
Connecting to: mongodb://127.0.0.1:27019/?directConnection=true&serverSelectionTimeoutMS=2000&appName=mongosh+2.5.8
Using MongoDB: 8.0.14
Using Mongosh: 2.5.8
mongosh 2.5.10 is available for download: https://www.mongodb.com/try/download/shell
For mongosh info see: https://www.mongodb.com/docs/mongodb-shell/
-----
The server generated these startup warnings when booting
2025-12-02T09:55:25.179+01:00: Access control is not enabled for the database. Read and write access to data and configuration is unrestricted
2025-12-02T09:55:25.180+01:00: 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
-----
test>
```

ÉTAPE 2 : IMPORTER LES DONNÉES :

Remarque: Télécharger <https://www.mongodb.com/try/download/database-tools>

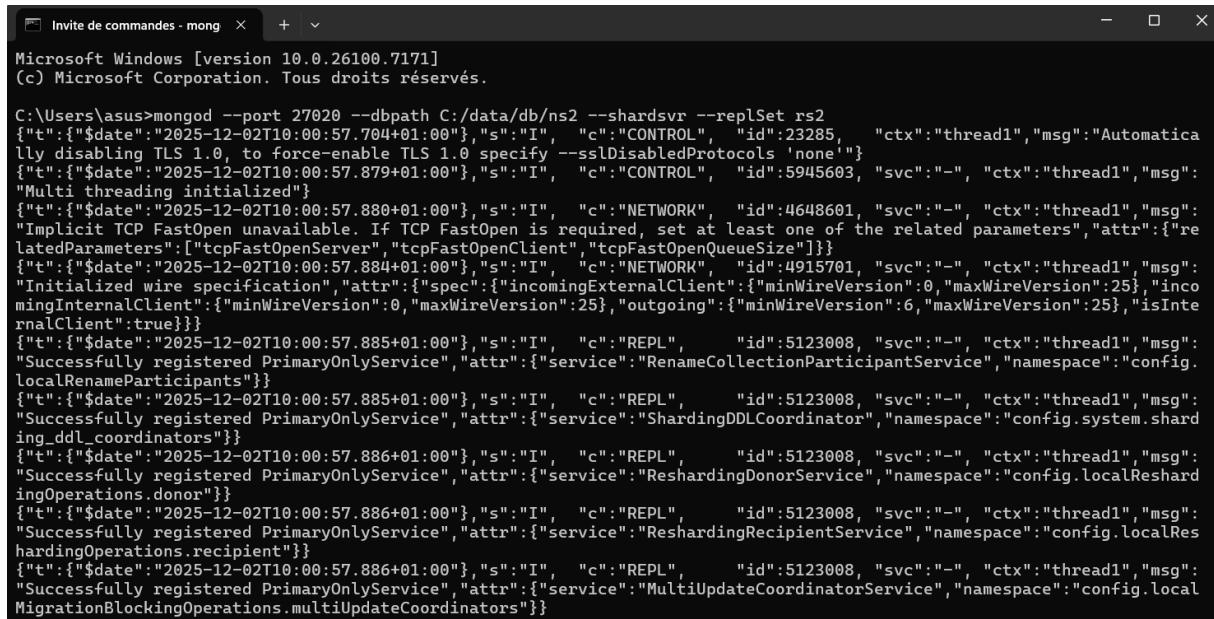
Extraire le dossier le mettre dans c :programme entrer dans le dossier bin copier le path de mongoimport.exe entrer dans variable d'environnement dans path cliquer sur modifier ajouter le path et taper OK



```
C:\Users\asus>mongoimport -d dbtp -c restaurants --port 27019 --file C:/data/db/ns1/restaurants.json --jsonArray
2025-12-02T09:59:15.249+0100      connected to: mongodb://localhost:27019/
2025-12-02T09:59:18.172+0100      25357 document(s) imported successfully. 0 document(s) failed to import.
C:\Users\asus>
```

ÉTAPE 3 : SHARD 2 (Port 27020) :

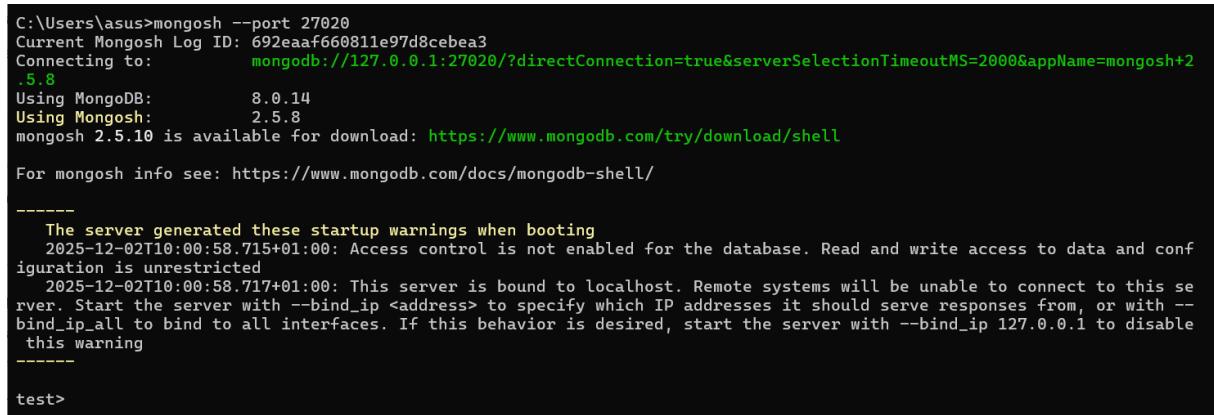
3.1 – Démarrage du serveur Shard 2 :



```
C:\Users\asus>mongod --port 27020 --dbpath C:/data/db/ns2 --shardsvr --replSet rs2
Microsoft Windows [version 10.0.26100.7171]
(c) Microsoft Corporation. Tous droits réservés.

C:\Users\asus>mongod --port 27020 --dbpath C:/data/db/ns2 --shardsvr --replSet rs2
{"t":{"$date":"2025-12-02T10:00:57.704+01:00"},"s":"I", "c":"CONTROL", "id":23285, "ctx":"thread1","msg":"Automatically disabling TLS 1.0, to force-enable TLS 1.0 specify --sslDisabledProtocols 'none'"}
{"t":{"$date":"2025-12-02T10:00:57.879+01:00"},"s":"I", "c":"CONTROL", "id":5945603, "svc":"-", "ctx":"thread1","msg":"Multi threading initialized"}
{"t":{"$date":"2025-12-02T10:00:57.880+01:00"},"s":"I", "c":"NETWORK", "id":4648601, "svc":"-", "ctx":"thread1","msg":"Implicit TCP FastOpen unavailable. If TCP FastOpen is required, set at least one of the related parameters", "attr":{"relatedParameters":["tcpFastOpenServer","tcpFastOpenClient","tcpFastOpenQueueSize"]}}
{"t":{"$date":"2025-12-02T10:00:57.884+01:00"},"s":"I", "c":"NETWORK", "id":4915701, "svc":"-", "ctx":"thread1","msg":"Initialized wire specification", "attr":{"spec":{"incomingExternalClient":{"minWireVersion":0,"maxWireVersion":25}, "incomingInternalClient":{"minWireVersion":0,"maxWireVersion":25}, "outgoing":{"minWireVersion":6,"maxWireVersion":25}, "isInternalClient":true}}}
{"t":{"$date":"2025-12-02T10:00:57.885+01:00"},"s":"I", "c":"REPL", "id":5123008, "svc":"-", "ctx":"thread1","msg":"Successfully registered PrimaryOnlyService", "attr":{"service":"RenameCollectionParticipantService", "namespace":"config.localRenameParticipants"}}
{"t":{"$date":"2025-12-02T10:00:57.885+01:00"},"s":"I", "c":"REPL", "id":5123008, "svc":"-", "ctx":"thread1","msg":"Successfully registered PrimaryOnlyService", "attr":{"service":"ShardingDDLCoordinator", "namespace":"config.system.shardring_ddl_coordinators"}}
{"t":{"$date":"2025-12-02T10:00:57.886+01:00"},"s":"I", "c":"REPL", "id":5123008, "svc":"-", "ctx":"thread1","msg":"Successfully registered PrimaryOnlyService", "attr":{"service":"ReshardingDonorService", "namespace":"config.localReshardingOperations.donor"}}
{"t":{"$date":"2025-12-02T10:00:57.886+01:00"},"s":"I", "c":"REPL", "id":5123008, "svc":"-", "ctx":"thread1","msg":"Successfully registered PrimaryOnlyService", "attr":{"service":"ReshardingRecipientService", "namespace":"config.localReshardingOperations.recipient"}}
{"t":{"$date":"2025-12-02T10:00:57.886+01:00"},"s":"I", "c":"REPL", "id":5123008, "svc":"-", "ctx":"thread1","msg":"Successfully registered PrimaryOnlyService", "attr":{"service":"MultiUpdateCoordinatorService", "namespace":"config.localMigrationBlockingOperations.multiUpdateCoordinators"}}
```

3.2 – Initialisation du Replica Set de Shard 2 :



```
C:\Users\asus>mongosh --port 27020
Current Mongosh Log ID: 692eaaaf660811e97d8cebea3
Connecting to:      mongodb://127.0.0.1:27020/?directConnection=true&serverSelectionTimeoutMS=2000&appName=mongosh+2.5.8
Using MongoDB:     8.0.14
Using Mongosh:    2.5.8
mongosh 2.5.10 is available for download: https://www.mongodb.com/try/download/shell
For mongosh info see: https://www.mongodb.com/docs/mongodb-shell/

-----
The server generated these startup warnings when booting
2025-12-02T10:00:58.715+01:00: Access control is not enabled for the database. Read and write access to data and configuration is unrestricted
2025-12-02T10:00:58.717+01:00: 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
-----
test>
```

ÉTAPE 4 : SERVEUR DE CONFIGURATION (Port 27021) :

4.1 – Démarrage du serveur de configuration :

```

Microsoft Windows [version 10.0.26100.7171]
(c) Microsoft Corporation. Tous droits réservés.

C:\Users\asus>mongod --port 27021 --dbpath C:/data/db/confdb --configsvr --replSet configRS
{"t":{"$date":"2025-12-02T10:02:49.508+01:00"},"s":"I", "c":"CONTROL", "id":23285, "svc": "-", "ctx":"thread1", "msg":"Automatically disabling TLS 1.0, to force-enable TLS 1.0 specify --sslDisabledProtocols 'none'"}
{"t":{"$date":"2025-12-02T10:02:49.612+01:00"},"s":"I", "c":"CONTROL", "id":5945603, "svc": "-", "ctx":"thread1", "msg":"Multi threading initialized"}
{"t":{"$date":"2025-12-02T10:02:49.613+01:00"},"s":"I", "c":"NETWORK", "id":4648601, "svc": "-", "ctx":"thread1", "msg":"Implicit TCP FastOpen unavailable. If TCP FastOpen is required, set at least one of the related parameters", "attr":{"relatedParameters":["tcpFastOpenServer", "tcpFastOpenClient", "tcpFastOpenQueueSize"]}}
{"t":{"$date":"2025-12-02T10:02:49.616+01:00"},"s":"I", "c":"NETWORK", "id":4915701, "svc": "-", "ctx":"thread1", "msg":"Initialized wire specification", "attr":{"spec":{"incomingExternalClient":{"minWireVersion":0, "maxWireVersion":25}, "incomingInternalClient":{"minWireVersion":0, "maxWireVersion":25}, "outgoing":{"minWireVersion":6, "maxWireVersion":25}, "isInternalClient":true}}}
{"t":{"$date":"2025-12-02T10:02:49.617+01:00"},"s":"I", "c":"REPL", "id":5123008, "svc": "-", "ctx":"thread1", "msg":"Successfully registered PrimaryOnlyService", "attr":{"service":"ReshardingCoordinatorService", "namespace":"config.reshardingOperations"}}
{"t":{"$date":"2025-12-02T10:02:49.618+01:00"},"s":"I", "c":"REPL", "id":5123008, "svc": "-", "ctx":"thread1", "msg":"Successfully registered PrimaryOnlyService", "attr":{"service":"ConfigsvrCoordinatorService", "namespace":"config.sharding_configsrv_coordinators"}}
{"t":{"$date":"2025-12-02T10:02:49.618+01:00"},"s":"I", "c":"REPL", "id":5123008, "svc": "-", "ctx":"thread1", "msg":"Successfully registered PrimaryOnlyService", "attr":{"service":"RenameCollectionParticipantService", "namespace":"config.localRenameParticipants"}}
{"t":{"$date":"2025-12-02T10:02:49.618+01:00"},"s":"I", "c":"REPL", "id":5123008, "svc": "-", "ctx":"thread1", "msg":"Successfully registered PrimaryOnlyService", "attr":{"service":"ShardingDDLCoordinator", "namespace":"config.system.sharding_ddl_coordinators"}}
{"t":{"$date":"2025-12-02T10:02:49.618+01:00"},"s":"I", "c":"REPL", "id":5123008, "svc": "-", "ctx":"thread1", "msg":"Successfully registered PrimaryOnlyService", "attr":{"service":"ReshardingDonorService", "namespace":"config.localReshardingOperations.donor"}}

```

4.2 – Initialisation du Replica Set de configuration :

```

C:\Users\asus>mongosh --port 27021
Current Mongosh Log ID: 692eab5dd7a82d9591cebea3
Connecting to: mongodb://127.0.0.1:27021/?directConnection=true&serverSelectionTimeoutMS=2000&appName=mongosh+2.5.8
Using MongoDB: 8.0.14
Using Mongosh: 2.5.8
mongosh 2.5.10 is available for download: https://www.mongodb.com/try/download/shell

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

-----
The server generated these startup warnings when booting
2025-12-02T10:02:50.476+01:00: Access control is not enabled for the database. Read and write access to data and configuration is unrestricted
2025-12-02T10:02:50.477+01:00: 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
-----
```

ÉTAPE 5 : ROUTEUR MONGOS (Port 27022) :

```

Microsoft Windows [version 10.0.26100.7171]
(c) Microsoft Corporation. Tous droits réservés.

C:\Users\asus>mongos --port 27022 --configdb configRS/localhost:27021 --bind_ip localhost
{"t":{"$date":"2025-12-02T09:05:31.246Z"},"s":"W", "c":"SHARDING", "id":24132, "ctx":"thread1", "msg":"Running a sharded cluster with fewer than 3 config servers should only be done for testing purposes and is not recommended for production."}
{"t":{"$date":"2025-12-02T10:05:31.260+01:00"},"s":"I", "c":"CONTROL", "id":23285, "ctx":"thread1", "msg":"Automatically disabling TLS 1.0, to force-enable TLS 1.0 specify --sslDisabledProtocols 'none'"}
{"t":{"$date":"2025-12-02T10:05:31.412+01:00"},"s":"I", "c":"NETWORK", "id":4648601, "svc": "-", "ctx":"thread1", "msg":"Implicit TCP FastOpen unavailable. If TCP FastOpen is required, set at least one of the related parameters", "attr":{"relatedParameters":["tcpFastOpenServer", "tcpFastOpenClient", "tcpFastOpenQueueSize"]}}
{"t":{"$date":"2025-12-02T10:05:31.413+01:00"},"s":"I", "c":"HEALTH", "id":5936503, "svc": "-", "ctx":"thread1", "msg":"Fault manager changed state", "attr":{"state":"StartupCheck"}}
{"t":{"$date":"2025-12-02T10:05:31.413+01:00"},"s":"I", "c":"NETWORK", "id":4915701, "svc": "-", "ctx":"thread1", "msg":"Initialized wire specification", "attr":{"spec":{"incomingExternalClient":{"minWireVersion":0, "maxWireVersion":25}, "incomingInternalClient":{"minWireVersion":0, "maxWireVersion":25}, "outgoing":{"minWireVersion":25, "maxWireVersion":25}, "isInternalClient":true}}}
{"t":{"$date":"2025-12-02T10:05:31.417+01:00"},"s":"W", "c":"CONTROL", "id":22120, "svc": "-", "ctx":"thread1", "msg":"Access control is not enabled for the database. Read and write access to data and configuration is unrestricted", "tags":["startupWarnings"]}
{"t":{"$date":"2025-12-02T10:05:31.417+01:00"},"s":"I", "c":"CONTROL", "id":23403, "svc": "R", "ctx":"mongosMain", "msg": "Build Info", "attr":{"buildInfo":{"version": "8.0.14", "gitVersion": "bbdb887c2ac94424af0ee8fcfaad39203bdf98671", "modules": [], "allocator": "tcmalloc-gperf", "environment": {"distmod": "windows"}}}
{"t":{"$date":"2025-12-02T10:05:31.418+01:00"},"s":"I", "c":"CONTROL", "id":51765, "svc": "R", "ctx":"mongosMain", "msg": "Operating System", "attr":{"os": {"name": "Microsoft Windows 8", "version": "6.2 (build 9200)"}}, "tags": ["configRS/localhost:27021"]}
{"t":{"$date":"2025-12-02T10:05:31.418+01:00"},"s":"I", "c":"CONTROL", "id":21951, "svc": "R", "ctx":"mongosMain", "msg": "Options set by command line", "attr":{"options": {"net": {"bindIp": "localhost", "port": 27022}, "sharding": {"configDB": "configRS/localhost:27021"}}, "tags": ["configRS/localhost:27021"]}}
{"t":{"$date":"2025-12-02T10:05:31.424+01:00"},"s":"I", "c":"NETWORK", "id":4603701, "svc": "R", "ctx": "mongosMain", "msg": "Sharding initialized", "tags": ["configRS/localhost:27021"]}
```

ÉTAPE 6 : CONFIGURATION DU SHARDING :

```
C:\Users\asus>mongosh --port 27022
Current Mongosh Log ID: 692eac1a5a42e570aecebea3
Connecting to:      mongodb://127.0.0.1:27022/?directConnection=true&serverSelectionTimeoutMS=2000&appName=mongosh+2.5.8
Using MongoDB:     8.0.14
Using Mongosh:    2.5.8
mongosh 2.5.10 is available for download: https://www.mongodb.com/try/download/shell
For mongosh info see: https://www.mongodb.com/docs/mongodb-shell/

-----
The server generated these startup warnings when booting
2025-12-02T10:05:31.417+01:00: Access control is not enabled for the database. Read and write access to data and configuration is unrestricted
-----
```

L'ajout du Shard 1 :

```
-----
[direct: mongos] test> sh.addShard("rs1/localhost:27019")
{
  shardAdded: 'rs1',
  ok: 1,
  '$clusterTime': {
    clusterTime: Timestamp({ t: 1764666440, i: 21 }),
    signature: {
      hash: Binary.createFromBase64('AAAAAAAAAAAAAAAAAAAAAAA='), 0),
      keyId: Long('0')
    }
  },
  operationTime: Timestamp({ t: 1764666440, i: 21 })
}
[direct: mongos] test>
```

L'ajout du Shard 2 :

```
[direct: mongos] test> sh.addShard("rs2/localhost:27020")
{
  shardAdded: 'rs2',
  ok: 1,
  '$clusterTime': {
    clusterTime: Timestamp({ t: 1764666522, i: 25 }),
    signature: {
      hash: Binary.createFromBase64('AAAAAAAAAAAAAAAAAAAAAAA='), 0),
      keyId: Long('0')
    }
  },
  operationTime: Timestamp({ t: 1764666522, i: 19 })
}
[direct: mongos] test>
```

Activation du sharding sur la base dbtp :

```
[direct: mongos] test> sh.enableSharding("dbtp")
{
  ok: 1,
  '$clusterTime': {
    clusterTime: Timestamp({ t: 1764666560, i: 1 }),
    signature: {
      hash: Binary.createFromBase64('AAAAAAAAAAAAAAAAAAAAAAA='),
      keyId: Long('0')
    }
  },
  operationTime: Timestamp({ t: 1764666560, i: 1 })
}
[direct: mongos] test>
```

Partitionner la collection restaurants avec _id comme clé :

```
[direct: mongos] test> sh.shardCollection("dbtp.restaurants", {"_id": 1})
{
  collectionssharded: 'dbtp.restaurants',
  ok: 1,
  '$clusterTime': {
    clusterTime: Timestamp({ t: 1764666627, i: 15 }),
    signature: {
      hash: Binary.createFromBase64('AAAAAAAAAAAAAAAAAAAAAAA='),
      keyId: Long('0')
    }
  },
  operationTime: Timestamp({ t: 1764666627, i: 15 })
}
[direct: mongos] test>
```

ÉTAPE 7 : AFFICHER LES INFORMATIONS DU SHARDING :

```
[direct: mongos] test> sh.status()
shardingVersion
{ _id: 1, clusterId: ObjectId('692ea7a60ec8245c305d5976') }

---
shards
[
  {
    _id: 'rs1',
    host: 'rs1/localhost:27019',
    state: 1,
    topologyTime: Timestamp({ t: 1764666440, i: 11 }),
    replSetConfigVersion: Long('-1')
  },
  {
    _id: 'rs2',
    host: 'rs2/localhost:27020',
    state: 1,
    topologyTime: Timestamp({ t: 1764666522, i: 10 }),
    replSetConfigVersion: Long('-1')
  }
]
---
active mongoses
[ { '8.0.14': 1 } ]

---
autosplit
{ 'Currently enabled': 'yes' }

---
balancer
{
```

```

---  

balancer  

{  

    'Currently enabled': 'yes',  

    'Failed balancer rounds in last 5 attempts': 0,  

    'Currently running': 'no',  

    'Migration Results for the last 24 hours': 'No recent migrations'  

}  

---  

shardedDataDistribution  

[  

    {  

        ns: 'dbtp.restaurants',  

        shards: [  

            {  

                shardName: 'rs1',  

                numOrphanedDocs: 0,  

                numOwnedDocuments: 50714,  

                ownedSizeBytes: 22973442,  

                orphanedSizeBytes: 0  

            }  

        ]  

    },  

    {  

        ns: 'config.system.sessions',  

        shards: [  

            {  

                shardName: 'rs1',  

                numOrphanedDocs: 0,  

                numOwnedDocuments: 7,  

                ownedSizeBytes: 693,  

                orphanedSizeBytes: 0  

            }  

        ]  

    }  

]

```

```

    shardName: 'rs1',  

    numOrphanedDocs: 0,  

    numOwnedDocuments: 7,  

    ownedSizeBytes: 693,  

    orphanedSizeBytes: 0  

        }  

    ]  

}  

]  

---  

databases  

[  

    {  

        database: { _id: 'config', primary: 'config', partitioned: true },  

        collections: {  

            'config.system.sessions': {  

                shardKey: { _id: 1 },  

                unique: false,  

                balancing: true,  

                chunkMetadata: [ { shard: 'rs1', nChunks: 1 } ],  

                chunks: [  

                    { min: { _id: MinKey() }, max: { _id: MaxKey() }, 'on shard': 'rs1', 'last modified': Timestamp({ t: 1, i: 0 } ) }  

                ],  

                tags: []  

            }  

        }  

    }  

]

```

Activer Windows
Accédez aux paramètres pour

```
        tags: []
    }
}
{
  database: {
    _id: 'dbtp',
    primary: 'rs1',
    version: {
      uuid: UUID('1aa7b4ff-bd6f-4d83-af69-6caedaa5b08f'),
      timestamp: Timestamp({ t: 1764666440, i: 11 }),
      lastMod: 1
    }
  },
  collections: {
    'dbtp.restaurants': {
      shardKey: { _id: 1 },
      unique: false,
      balancing: true,
      chunkMetadata: [ { shard: 'rs1', nChunks: 1 } ],
      chunks: [
        { min: { _id: MinKey() }, max: { _id: MaxKey() }, 'on shard': 'rs1', 'last modified': Timestamp({ t: 1, i: 0 })
      ]
    },
    tags: []
  }
}
]
[direct: mongos] test>
```

Activer Windows
Accédez aux paramètres po

ÉTAPE 8 : COMPTER LES RESTAURANTS :

Utilisation de la base dbtp :

```
] 
[direct: mongos] test> use dbtp
switched to db dbtp
[direct: mongos] dbtp> |
```

Compter tous les restaurants :

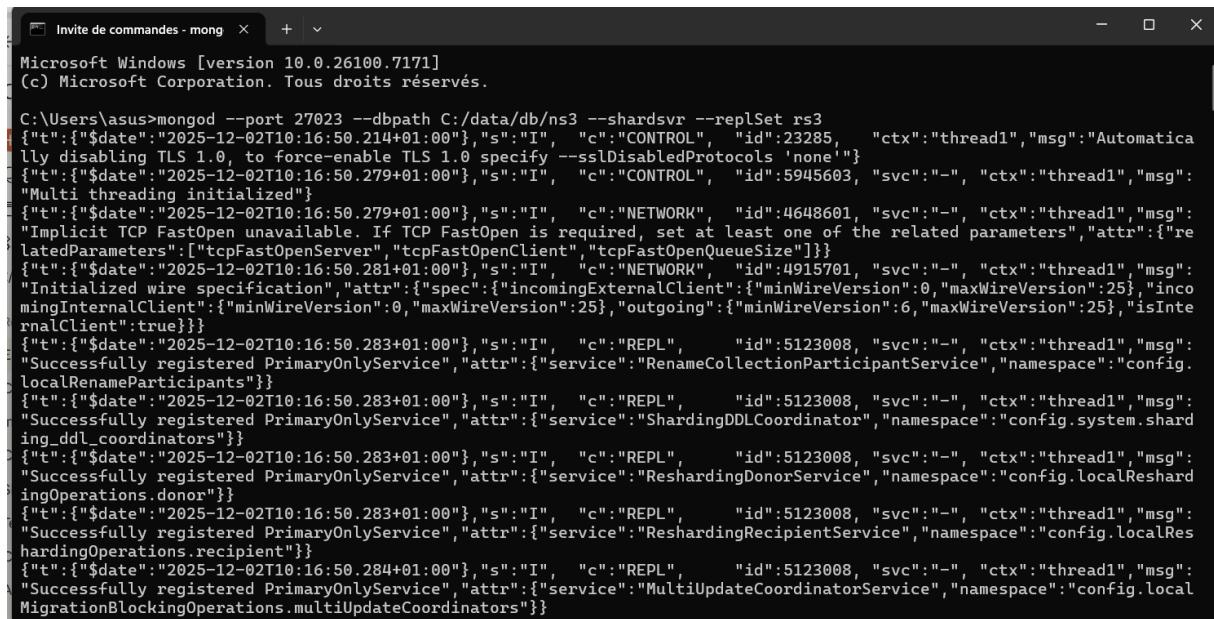
```
[direct: mongos] dbtp> db.restaurants.count()
DeprecationWarning: Collection.count() is deprecated. Use countDocuments or estimatedDocumentCount.
50714
[direct: mongos] dbtp>
```

La distribution dans les shards :

```
[direct: mongos] dbtp> db.restaurants.getShardDistribution()
Shard rs1 at rs1/localhost:27019
{
  data: '21.91MiB',
  docs: 50714,
  chunks: 1,
  'estimated data per chunk': '21.91MiB',
  'estimated docs per chunk': 50714
}
---
Totals
{
  data: '21.91MiB',
  docs: 50714,
  chunks: 1,
  'Shard rs1': [
    '100 % data',
    '100 % docs in cluster',
    '453B avg obj size on shard'
  ]
}
[direct: mongos] dbtp> |
```

ÉTAPE 9 : AJOUTER UN TROISIÈME SHARD (Port 27023) :

9.1 - Démarrage du serveur Shard 3 :



```
C:\Users\asus>mongod --port 27023 --dbpath C:/data/db/ns3 --shardsvr --replSet rs3
Microsoft Windows [version 10.0.26100.7171]
(c) Microsoft Corporation. Tous droits réservés.

C:\Users\asus>mongod --port 27023 --dbpath C:/data/db/ns3 --shardsvr --replSet rs3
{"t": {"$date": "2025-12-02T10:16:50.214+01:00"}, "s": "I", "c": "CONTROL", "id": 23285, "ctx": "thread1", "msg": "Automatically disabling TLS 1.0, to force-enable TLS 1.0 specify --sslDisabledProtocols 'none'"}
{"t": {"$date": "2025-12-02T10:16:50.279+01:00"}, "s": "I", "c": "CONTROL", "id": 5945603, "svc": "-", "ctx": "thread1", "msg": "Multi threading initialized"}
{"t": {"$date": "2025-12-02T10:16:50.279+01:00"}, "s": "I", "c": "NETWORK", "id": 4648601, "svc": "-", "ctx": "thread1", "msg": "Implicit TCP FastOpen unavailable. If TCP FastOpen is required, set at least one of the related parameters", "attr": {"relatedParameters": ["tcpFastOpenServer", "tcpFastOpenClient", "tcpFastOpenQueueSize"]}}
{"t": {"$date": "2025-12-02T10:16:50.281+01:00"}, "s": "I", "c": "NETWORK", "id": 4915701, "svc": "-", "ctx": "thread1", "msg": "Initialized wire specification", "attr": {"spec": {"incomingExternalClient": {"minWireVersion": 0, "maxWireVersion": 25}, "incomingInternalClient": {"minWireVersion": 0, "maxWireVersion": 25}, "outgoing": {"minWireVersion": 6, "maxWireVersion": 25}, "isInternalClient": true}}}
{"t": {"$date": "2025-12-02T10:16:50.283+01:00"}, "s": "I", "c": "REPL", "id": 5123008, "svc": "-", "ctx": "thread1", "msg": "Successfully registered PrimaryOnlyService", "attr": {"service": "RenameCollectionParticipantService", "namespace": "config.localRenameParticipants"}}
{"t": {"$date": "2025-12-02T10:16:50.283+01:00"}, "s": "I", "c": "REPL", "id": 5123008, "svc": "-", "ctx": "thread1", "msg": "Successfully registered PrimaryOnlyService", "attr": {"service": "ShardingDDLCoordinator", "namespace": "config.system.sharding_ddl_coordinators"}}
{"t": {"$date": "2025-12-02T10:16:50.283+01:00"}, "s": "I", "c": "REPL", "id": 5123008, "svc": "-", "ctx": "thread1", "msg": "Successfully registered PrimaryOnlyService", "attr": {"service": "ReshardingDonorService", "namespace": "config.localReshardingOperations.donor"}}
{"t": {"$date": "2025-12-02T10:16:50.283+01:00"}, "s": "I", "c": "REPL", "id": 5123008, "svc": "-", "ctx": "thread1", "msg": "Successfully registered PrimaryOnlyService", "attr": {"service": "ReshardingRecipientService", "namespace": "config.localReshardingOperations.recipient"}}
{"t": {"$date": "2025-12-02T10:16:50.284+01:00"}, "s": "I", "c": "REPL", "id": 5123008, "svc": "-", "ctx": "thread1", "msg": "Successfully registered PrimaryOnlyService", "attr": {"service": "MultiUpdateCoordinatorService", "namespace": "config.localMigrationBlockingOperations.multiUpdateCoordinators"}}
```

9.2 - Initialisation du Replica Set de Shard 3 :

```
C:\Users\asus>mongosh --port 27023
Current Mongosh Log ID: 692eaecc7c849d7ef7fcebea3
Connecting to:      mongodb://127.0.0.1:27023/?directConnection=true&serverSelectionTimeoutMS=2000&appName=mongosh+2
.5.8
Using MongoDB:      8.0.14
Using Mongosh:      2.5.8
mongosh 2.5.10 is available for download: https://www.mongodb.com/try/download/shell
For mongosh info see: https://www.mongodb.com/docs/mongodb-shell/

-----
The server generated these startup warnings when booting
2025-12-02T10:16:50.349+01:00: Access control is not enabled for the database. Read and write access to data and configuration is unrestricted
2025-12-02T10:16:50.349+01:00: 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
-----
test> |
```

```
test> rs.initiate({
...   _id: "rs3",
...   members: [{ _id: 0, host: "localhost:27023" }]
... })
{
  ok: 1,
  '$clusterTime': {
    clusterTime: Timestamp({ t: 1764667112, i: 1 }),
    signature: {
      hash: Binary.createFromBase64('AAAAAAAAAAAAAAAAAAAAAAA='), 0),
      keyId: Long('0')
    }
  },
  operationTime: Timestamp({ t: 1764667112, i: 1 })
}
rs3 [direct: secondary] test> |
```

9.3 - Ajouter le Shard 3 au cluster :

- L'ajout du troisième shard :

```
[direct: mongos] dbtp> sh.addShard("rs3/localhost:27023")
{
  shardAdded: 'rs3',
  ok: 1,
  '$clusterTime': {
    clusterTime: Timestamp({ t: 1764667226, i: 18 }),
    signature: {
      hash: Binary.createFromBase64('AAAAAAAAAAAAAAAAAAAAAAA='), 0),
      keyId: Long('0')
    }
  },
  operationTime: Timestamp({ t: 1764667226, i: 18 })
}
[direct: mongos] dbtp> |
```

- Vérification :

```
[direct: mongos] dbtp> sh.status()
shardingVersion
{ _id: 1, clusterId: ObjectId('692ea7a60ec8245c305d5976') }
---
shards
[
  {
    _id: 'rs1',
    host: 'rs1/localhost:27019',
    state: 1,
    topologyTime: Timestamp({ t: 1764666440, i: 11 }),
    replSetConfigVersion: Long('-1')
  },
  {
    _id: 'rs2',
    host: 'rs2/localhost:27020',
    state: 1,
    topologyTime: Timestamp({ t: 1764666522, i: 10 }),
    replSetConfigVersion: Long('-1')
  },
  {
    _id: 'rs3',
    host: 'rs3/localhost:27023',
    state: 1,
    topologyTime: Timestamp({ t: 1764667226, i: 9 }),
    replSetConfigVersion: Long('-1')
  }
]
```

Activer
Accédez au

```
---
active mongoses
[ { '8.0.14': 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'
}
---
shardedDataDistribution
[
  {
    ns: 'dbtp.restaurants',
    shards: [
      {
        shardName: 'rs1',
        numOrphanedDocs: 0,
        numOwnedDocuments: 50714,
        ownedSizeBytes: 22973442,
        orphanedSizeBytes: 0
      }
    ],
  },
  {
    ns: 'dbtp.dishes',
    shards: [
      {
        shardName: 'rs1',
        numOrphanedDocs: 0,
        numOwnedDocuments: 10142,
        ownedSizeBytes: 1024000,
        orphanedSizeBytes: 0
      }
    ],
  }
]
```

```
        ]
    },
    {
        ns: 'config.system.sessions',
        shards: [
            {
                shardName: 'rs1',
                numOrphanedDocs: 0,
                numOwnedDocuments: 9,
                ownedSizeBytes: 891,
                orphanedSizeBytes: 0
            }
        ]
    }
]
---  
databases
[
    {
        database: { _id: 'config', primary: 'config', partitioned: true },
        collections: {
            'config.system.sessions': {
                shardKey: { _id: 1 },
                unique: false,
                balancing: true,
                chunkMetadata: [ { shard: 'rs1', nChunks: 1 } ],
                chunks: [
                    { min: { _id: MinKey() }, max: { _id: MaxKey() }, 'on shard': 'rs1', 'last modified': Timestamp({ t: 1, i: 0 } )
                ]
            }
        }
    }
]
```

```
        tags: []
    }
},
{
    database: {
        _id: 'dbtp',
        primary: 'rs1',
        version: {
            uuid: UUID('1aa7b4ff-bd6f-4d83-af69-6caeda5b08f'),
            timestamp: Timestamp({ t: 1764666440, i: 11 }),
            lastMod: 1
        }
    },
    collections: {
        'dbtp.restaurants': {
            shardKey: { _id: 1 },
            unique: false,
            balancing: true,
            chunkMetadata: [ { shard: 'rs1', nChunks: 1 } ],
            chunks: [
                { min: { _id: MinKey() }, max: { _id: MaxKey() }, 'on shard': 'rs1', 'last modified': Timestamp({ t: 1, i: 0 } )
            ]
        },
        tags: []
    }
}
[direct: mongos] dbtp> |
```

```
[direct: mongos] dbtp> db.restaurants.getShardDistribution()
Shard rs1 at rs1/localhost:27019
{
  data: '21.91MiB',
  docs: 50714,
  chunks: 1,
  'estimated data per chunk': '21.91MiB',
  'estimated docs per chunk': 50714
}
---
Totals
{
  data: '21.91MiB',
  docs: 50714,
  chunks: 1,
  'Shard rs1': [
    '100 % data',
    '100 % docs in cluster',
    '453B avg obj size on shard'
  ]
}
[direct: mongos] dbtp> |
```

Bon travail !