

Lab 5 NoSQL

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1. MongoDB

1.1. Setup

Install MongoDB Community Server:

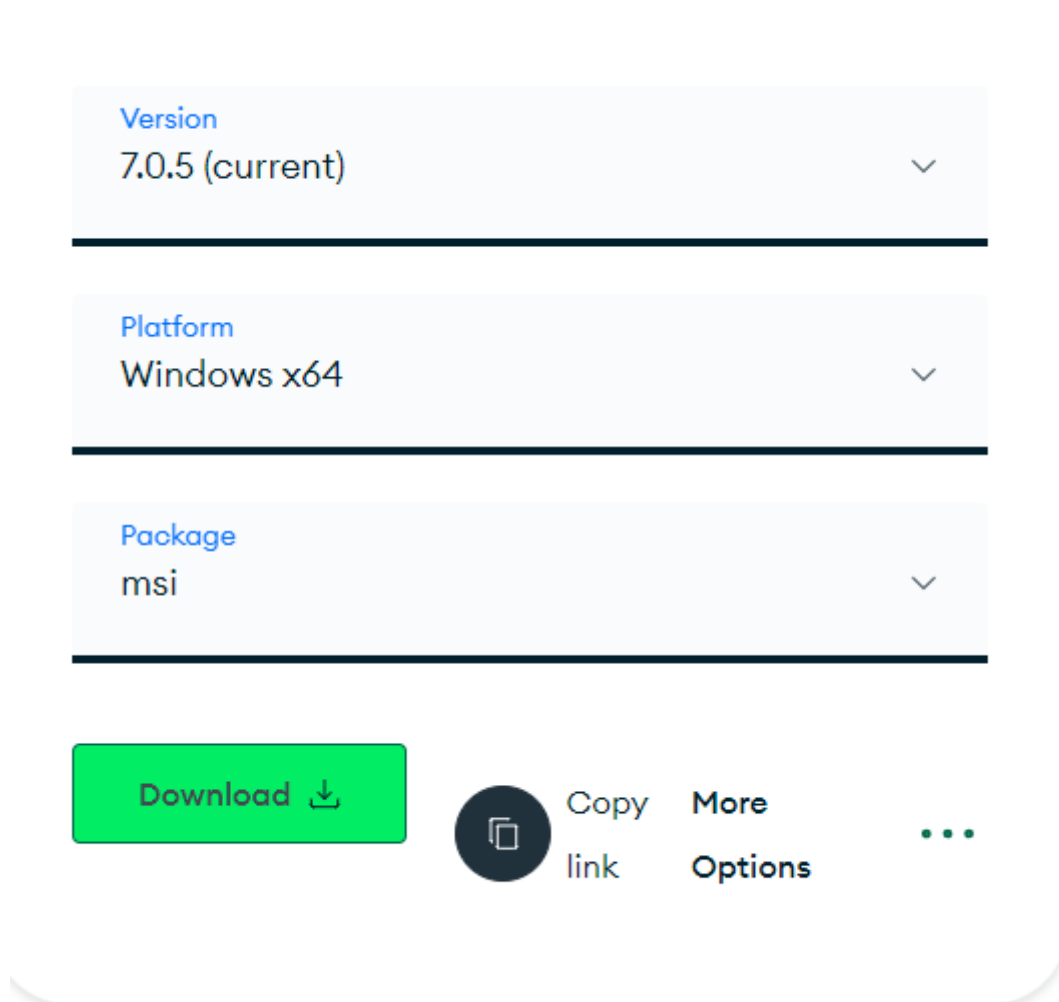


Figure 1. Install Community Server

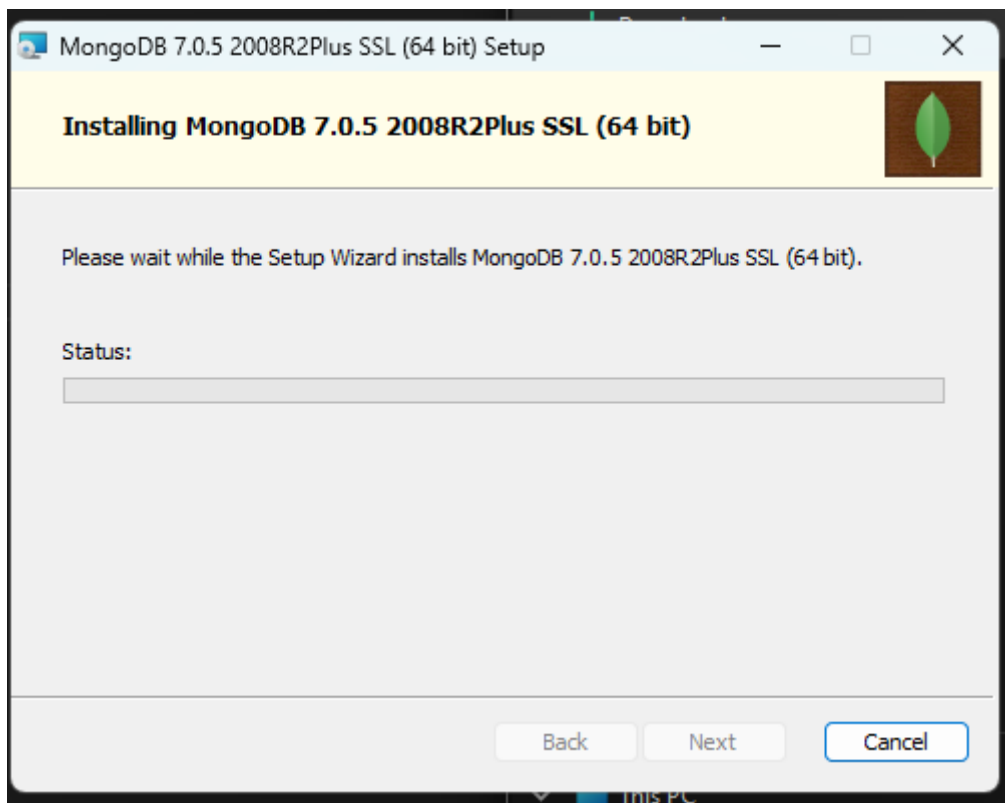


Figure 2. Installation

Install Database Tools with winget:

```
winget install -e --id MongoDB.DatabaseTools
```

Start database with following command from "C:\Program Files\MongoDB\Server\7.0\bin":

```
.\mongod.exe
```

After starting the database we connect via MongoDB Compass:

```
PS C:\Program Files\MongoDB\Server\7.0\bin> .\mongod.exe
{"t":{"$date":"2024-01-22T09:56:56.061+01:00"},"s":"I", "c":"NETWORK", "id":4915701, "ctx":"thread1", "msg":"Initia
ification", "attr":{"spec":{"incomingExternalClient":{"minWireVersion":0,"maxWireVersion":21},"incomingInternalClient
ion":0,"maxWireVersion":21},"outgoing":{"minWireVersion":6,"maxWireVersion":21},"isInternalClient":true}}}
{"t":{"$date":"2024-01-22T09:56:58.796+01:00"},"s":"I", "c":"CONTROL", "id":23285, "ctx":"thread1", "msg":"Automa
ing TLS 1.0, to force-enable TLS 1.0 specify --sslDisabledProtocols 'none'"}
{"t":{"$date":"2024-01-22T09:56:58.799+01:00"},"s":"I", "c":"NETWORK", "id":4648602, "ctx":"thread1", "msg":"Implic
in use."}
{"t":{"$date":"2024-01-22T09:56:58.804+01:00"},"s":"I", "c":"REPL", "id":5123008, "ctx":"thread1", "msg":"Succes
ed PrimaryOnlyService", "attr":{"service":"TenantMigrationDonorService", "namespace":"config.tenantMigrationDonors"}}
{"t":{"$date":"2024-01-22T09:56:58.804+01:00"},"s":"I", "c":"REPL", "id":5123008, "ctx":"thread1", "msg":"Succes
ed PrimaryOnlyService", "attr":{"service":"TenantMigrationRecipientService", "namespace":"config.tenantMigrationRecipi
entService"}}
{"t":{"$date":"2024-01-22T09:56:58.804+01:00"},"s":"I", "c":"CONTROL", "id":5945603, "ctx":"thread1", "msg":"Multi
alized"}
{"t":{"$date":"2024-01-22T09:56:58.805+01:00"},"s":"I", "c":"TENANT_M", "id":7091600, "ctx":"thread1", "msg":"Starti
ng AccessBlockerRegistry"}
```

Figure 3. Starting the Database

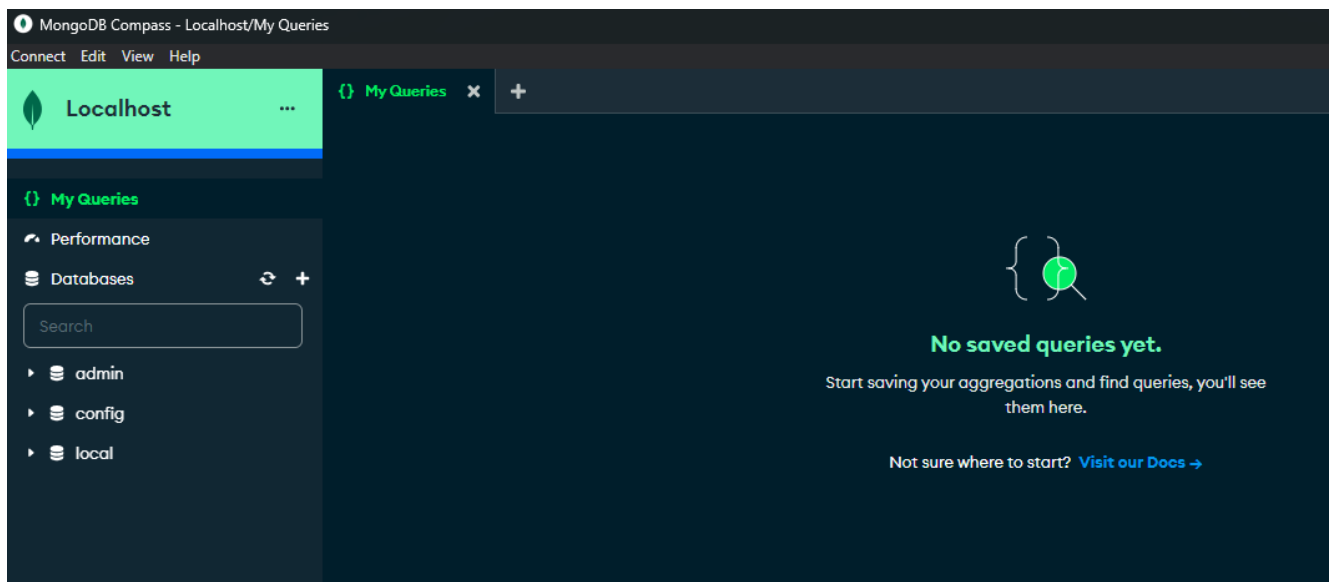


Figure 4. Connected Database

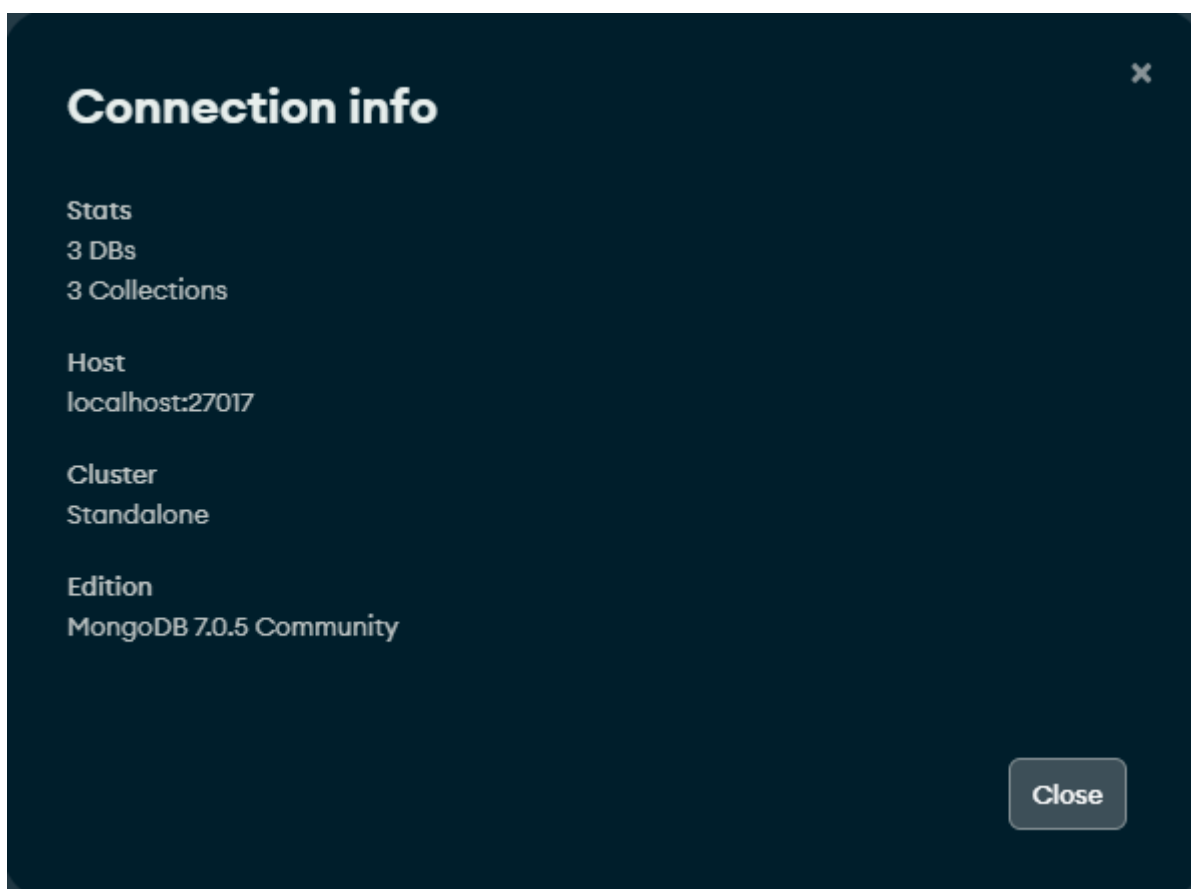


Figure 5. Default connection settings for localhost

Stopping the server is possible with:

```
net stop MongoDB
```

```
PS C:\Users\Andi> net stop MongoDB
The MongoDB Server (MongoDB) service is stopping.
The MongoDB Server (MongoDB) service was stopped successfully.

PS C:\Users\Andi> |
```

Figure 6. Stopping the Database

1.2. Import Data

Create new database and collection

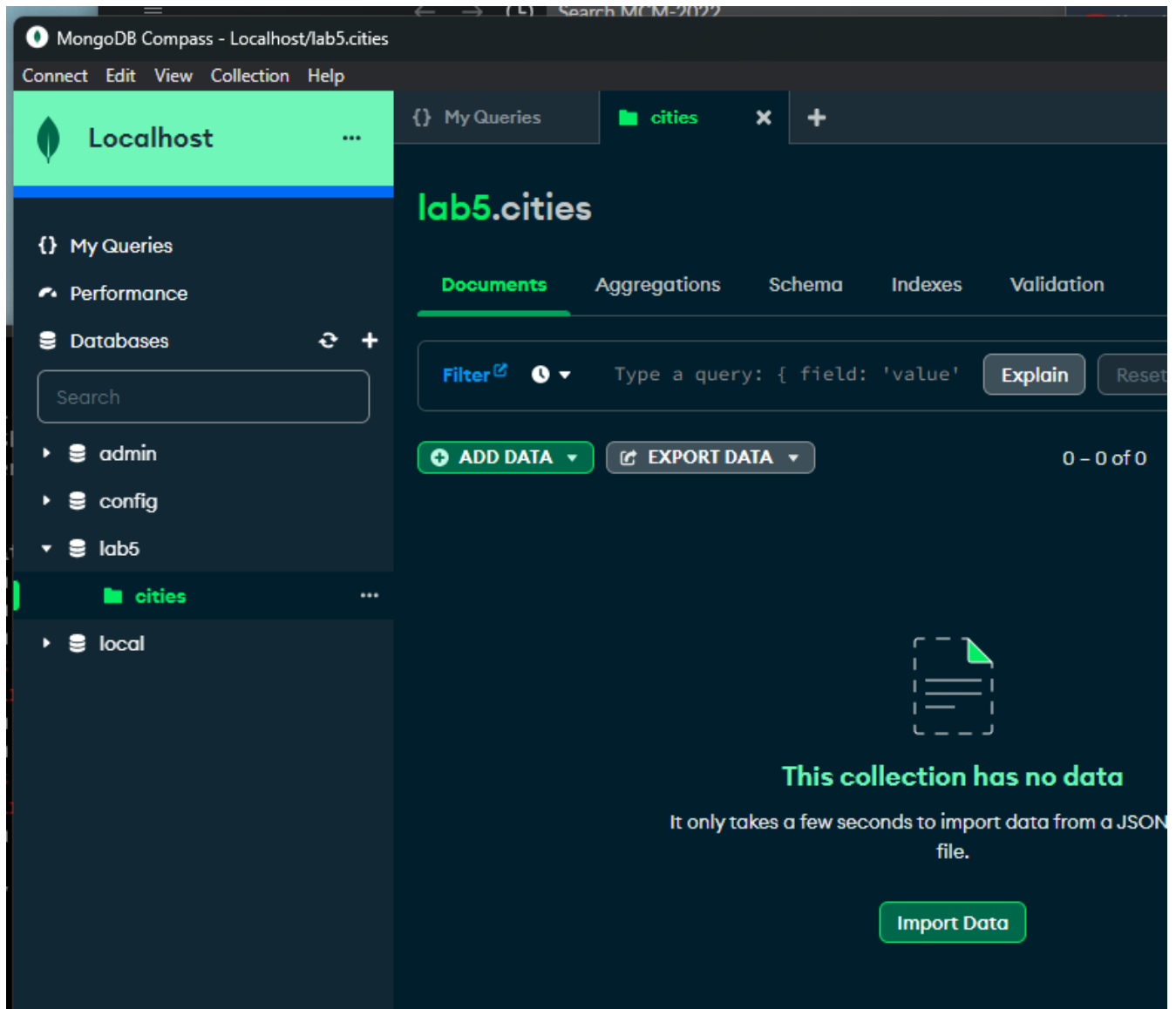


Figure 7. Database

Create missing collections and add corresponding data from "dataset.zip".

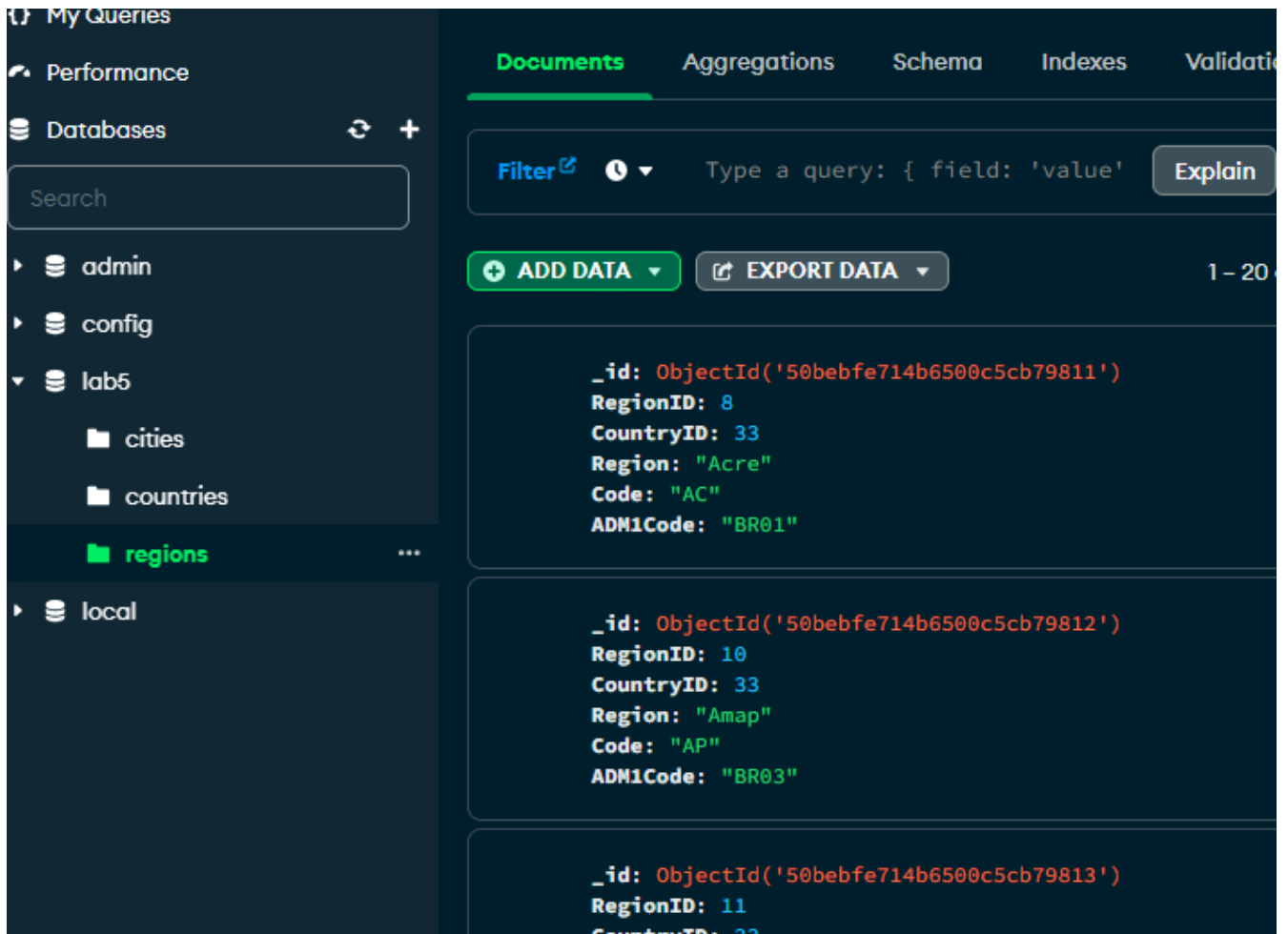


Figure 8. Imported data

1.3. Query Data

Connect via `mongosh`. Switch database with `use lab5`.

1.3.1. Select all Austrian cities (countryID = 15)!

```
lab5> db.cities.find({CountryID: 15})
[
  {
    _id: ObjectId("50bebc7714b6500c5cb78ffe"),
    CityId: 3352,
    CountryID: 15,
    RegionID: 1083,
    City: 'Abtenau',
    Latitude: 47.54999923706055,
    Longitude: 13.35000038146973,
```

Figure 9. All Austrian cities

1.3.2. Select all Austrian cities in ascending order!

```

]
Type "it" for more
lab5> db.cities.find({CountryID: 15}).sort({City: 1})
[
  {
    _id: ObjectId("50bebc7714b6500c5cb78ffe"),
    CityId: 3352,
    CountryID: 15,
    RegionID: 1083,
    City: 'Abtenau',
    Latitude: 47.54999923706055,
    Longitude: 13.35000038146973,
    TimeZone: '+01:00',
    DmaId: 0,
    Code: 'ABTE'
  },
  {

```

Figure 10. Ascending

1.3.3. Select all Austrian cities in descending order!

```

Type "it" for more
lab5> db.cities.find({CountryID: 15}).sort({City: -1})
[
  {
    _id: ObjectId("50bebe6014b6500c5cb79482"),
    CityId: 13801,
    CountryID: 15,
    RegionID: 1077,
    City: 'Zwettl ',
    Latitude: 48.61700057983398,
    Longitude: 15.16699981689453,
    TimeZone: '+01:00',
    DmaId: 0,
    Code: 'ZWET'
  },
  {
    _id: ObjectId("50bebe3314b6500c5cb79414"),
    CityId: 12867,
    CountryID: 15,

```

Figure 11. Descending

1.3.4. Select the number of Austrian cities that are included in the dataset!

```

Type "it" for more
lab5> db.cities.find({CountryID: 15}).count()
54

```

Figure 12. Count

1.3.5. Select solely the city names of all Austrian cities!

```
lab5> db.cities.find({CountryID: 15}, {City: 1})
[
  { _id: ObjectId("50bebc7714b6500c5cb78ffe"), City: 'Abtenau' },
  { _id: ObjectId("50bebc7714b6500c5cb78fff"), City: 'Graz' },
  { _id: ObjectId("50bebc7814b6500c5cb79000"), City: 'Kitzbuhel' },
  { _id: ObjectId("50bebc7814b6500c5cb79001"), City: 'Lilienfeld' },
  { _id: ObjectId("50bebc7814b6500c5cb79002"), City: 'Linz' },
  { _id: ObjectId("50bebc7914b6500c5cb79003"), City: 'Salzburg' },
  { _id: ObjectId("50bebc7914b6500c5cb79004"), City: 'Solden' },
  { _id: ObjectId("50bebc7914b6500c5cb79005"), City: 'Stegersbach' },
  { _id: ObjectId("50bebc7a14b6500c5cb79006"), City: 'Steyr' },
  { _id: ObjectId("50bebd014b6500c5cb79340"), City: 'Innsbruck' },
  { _id: ObjectId("50bebd014b6500c5cb79341"), City: 'Vienna' },
  { _id: ObjectId("50bebe1d14b6500c5cb793db"), City: 'Hohenems' },
  { _id: ObjectId("50bebe1f14b6500c5cb793e1"), City: 'Bregenz' },
  { _id: ObjectId("50bebe2314b6500c5cb793e9"), City: 'Baden' },
  { _id: ObjectId("50bebe2414b6500c5cb793ea"), City: 'D' },
  { _id: ObjectId("50bebe3314b6500c5cb79414"), City: 'Zirl' },
  { _id: ObjectId("50bebe3914b6500c5cb79422"), City: 'W' },
  { _id: ObjectId("50bebe4b14b6500c5cb79451"), City: 'Korneuburg' },
  { _id: ObjectId("50bebe4d14b6500c5cb79457"), City: 'Wieselburg' },
  { _id: ObjectId("50bebe4f14b6500c5cb7945d"), City: 'Pinkafeld' }
]
```

Figure 13. City names

1.3.6. Select all countries, which exhibit a population between 15 and 20 millions of people!

1.4. Update Data

1.4.1. Increase the population of Austria (countryID = 15) by 3 persons.

```
]
lab5> db.countries.updateOne({CountryId: 15}, {$inc: {Population: 3}})
{
  acknowledged: true,
  insertedId: null,
  matchedCount: 1,
  modifiedCount: 1,
  upsertedCount: 0
}
lab5>
```

Figure 15. Increased population

1.4.2. Decrease the population of Austria by 3 persons.

```
]
lab5> db.countries.updateOne({CountryId: 15}, {$inc: {Population: -3}})
{
  acknowledged: true,
  insertedId: null,
  matchedCount: 1,
  modifiedCount: 1,
  upsertedCount: 0
}
lab5>
```

Figure 16. Decreased population

2. Azure Cosmos DB

2.1. Setup Cosmos DB

Select Azure Cosmos DB for MongoDB.

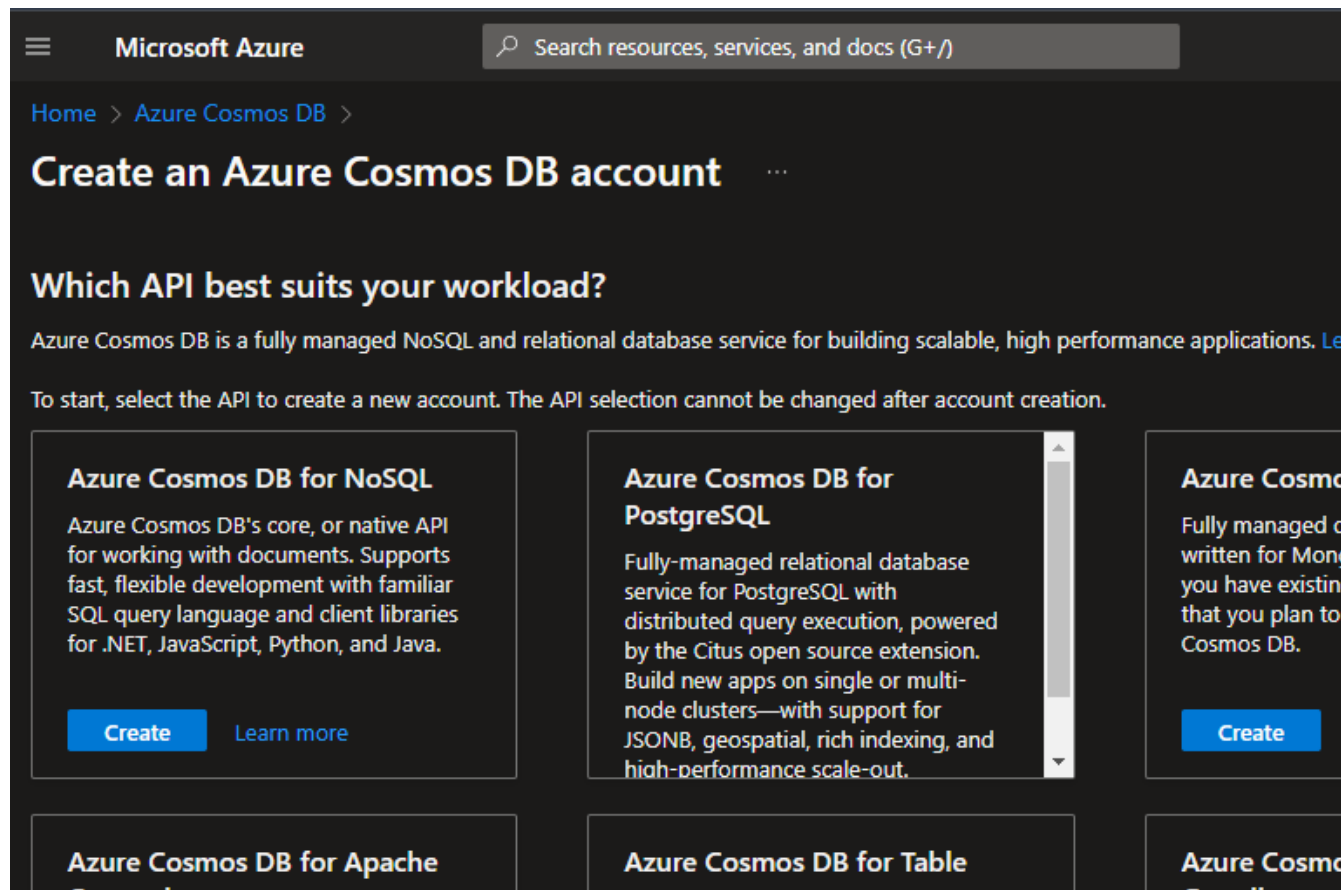


Figure 17. Select database

Home >

Create Azure Cosmos DB Account - Azure Cosmos DB for MongoDB

Basics Global Distribution Networking Backup Policy Encryption Tags Review + create

Azure Cosmos DB is a fully managed NoSQL and relational database service for building scalable, high performance applications. [Try it for free](#), for 30 days with unlimited renewals. Go to production starting at \$24/month per database, multiple containers included. [Learn more](#)

Project Details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription * cc-subscription

Resource Group * (New) lab5
[Create new](#)

Instance Details

Account Name * andi

Location * (US) West US

Capacity mode ☒ Provisioned throughput ☐ Serverless
[Learn more about capacity mode](#)

With Azure Cosmos DB free tier, you will get the first 1000 RU/s and 25 GB of storage for free in an account. You can enable free tier on up to one account per subscription. Estimated \$64/month discount per account.

Apply Free Tier Discount ☒ Apply ☐ Do Not Apply

Limit total account throughput ☒ Limit the total amount of throughput that can be provisioned on this account

This limit will prevent unexpected charges related to provisioned throughput. You can update or remove this limit after your account is created.

Version 4.2

Figure 18. Azure Cosmos DB Configuration

Microsoft Azure Search resources, services, and docs (G+/)

Home >

Microsoft.Azure.CosmosDB-20240123120130 | Overview

Deployment

Search << Delete Cancel Redeploy Download Refresh

Overview Inputs Outputs Template

Deployment is in progress

Deployment name : Microsoft.Azure.CosmosDB-20240123120130 Start time
Subscription : cc-subscription Correlation ID
Resource group : lab5

Deployment details

Resource	Type
There are no resources to display.	

Figure 19. Created Azure Cosmos DB

2.2. Migrate Data

2.2.1. Export Data from MongoDB

```
PS C:\Users\Andi> cd .\Documents\Github\fh-mc-cc\e05
PS C:\Users\Andi\Documents\Github\fh-mc-cc\e05> mongodump.exe
2024-01-23T12:00:34.706+0100    writing admin.system.version to dump\admin\system.version.bson
2024-01-23T12:00:34.710+0100    done dumping admin.system.version (1 document)
2024-01-23T12:00:34.712+0100    writing lab5.countries to dump\lab5\countries.bson
2024-01-23T12:00:34.712+0100    writing lab5.regions to dump\lab5\regions.bson
2024-01-23T12:00:34.713+0100    writing lab5.cities to dump\lab5\cities.bson
2024-01-23T12:00:34.719+0100    done dumping lab5.countries (115 documents)
2024-01-23T12:00:34.730+0100    done dumping lab5.regions (1548 documents)
2024-01-23T12:00:34.739+0100    done dumping lab5.cities (2000 documents)
PS C:\Users\Andi\Documents\Github\fh-mc-cc\e05>
```

Figure 20. Dump

2.2.2. Upload all the files to a Storage Account

Create storage account and upload dump. Change access and find storage url.

Home >

Create a storage account

Basics Advanced Networking Data protection Encryption Tags Review

Azure Storage is a Microsoft-managed service providing cloud storage that is highly available, secure, durable, scalable, and redundant. Azure Storage includes Azure Blobs (objects), Azure Data Lake Storage Gen2, Azure Files, Azure Queues, and Azure Tables. The cost of your storage account depends on the usage and the options you choose below. [Learn more about Azure storage accounts](#)

Project details

Select the subscription in which to create the new storage account. Choose a new or existing resource group to organize and manage your storage account together with other resources.

Subscription * cc-subscription

Resource group * lab5 [Create new](#)

Instance details

Storage account name ⓘ * awenzelhuemer

Region ⓘ * (US) West Central US [Deploy to an edge zone](#)

Performance ⓘ *

☒ Standard: Recommended for most scenarios (general-purpose v2 account)

☐ Premium: Recommended for scenarios that require low latency.

Redundancy ⓘ *

Geo-redundant storage (GRS)

☒ Make read access to data available in the event of regional unavailability.

Figure 21. Create Storage account

ome > awenzelhuemer

awenzelhuemer | Storage browser

Storage account

blob

Storage browser

Storage account

Containers

Blob containers

Showing all 1 items

Name

Slogs

Last modified

1/23/2024, 12

New container

Name * migration-mongodb

Anonymous access level ⓘ Private (no anonymous access)

The access level is set to private because anonymous access is disabled on this storage account.

Advanced

Figure 22. Add blob storage container

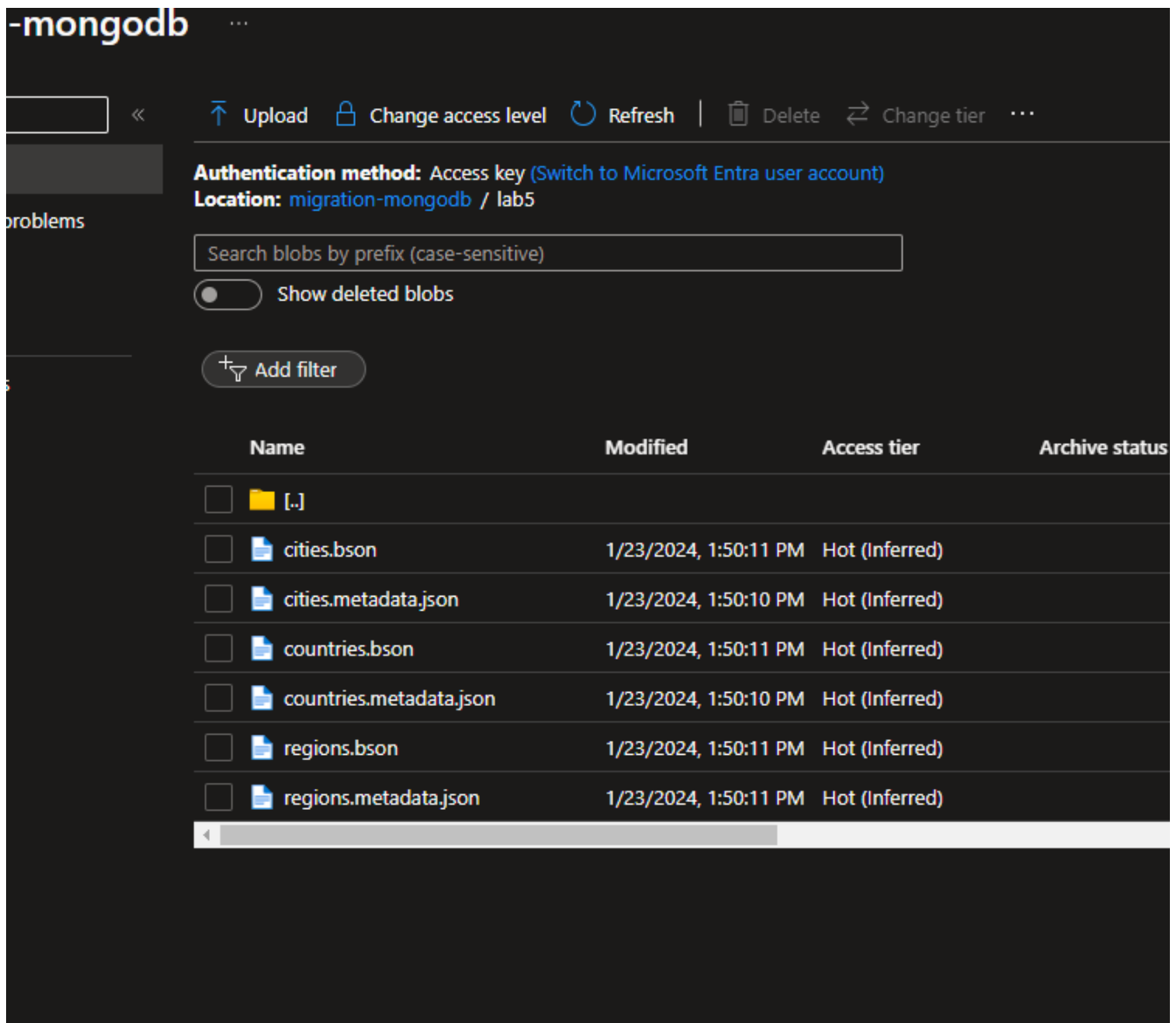


Figure 23. Upload dump

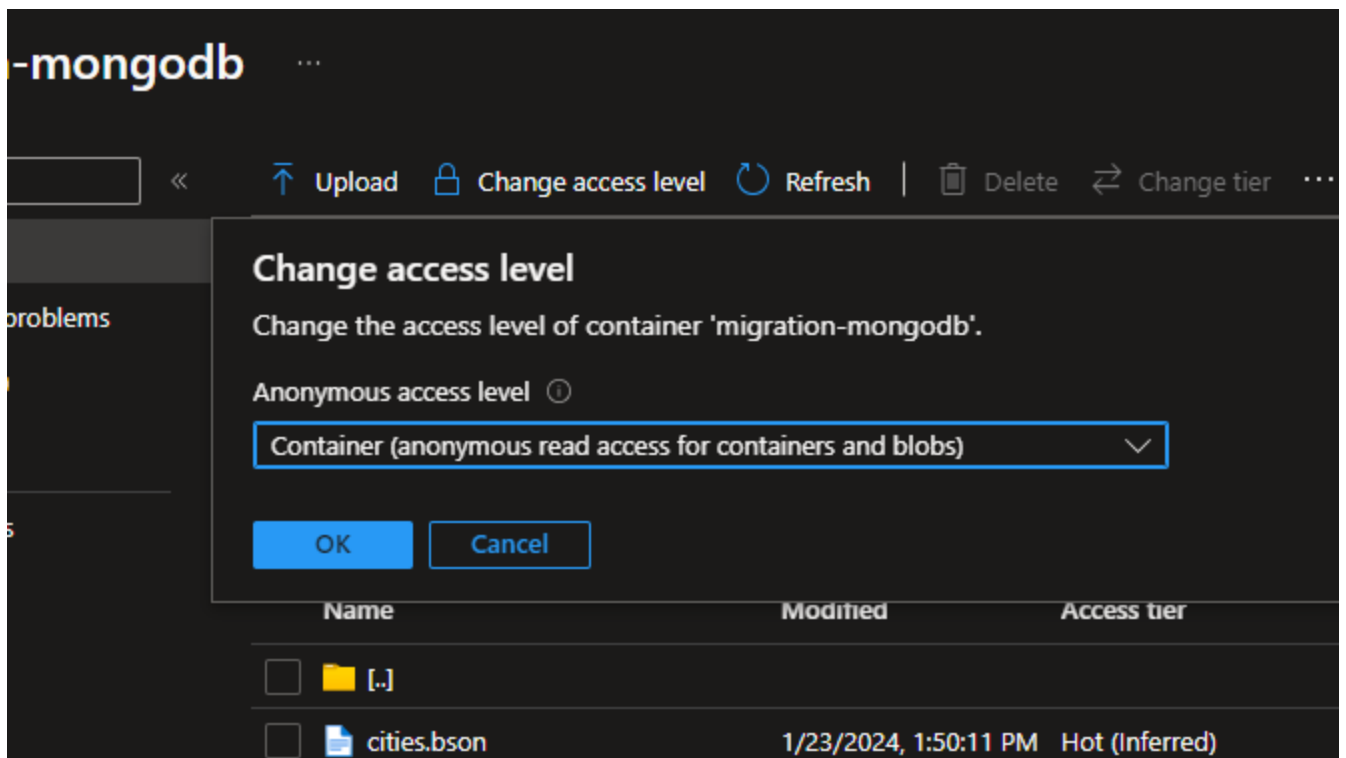


Figure 24. Enable public access

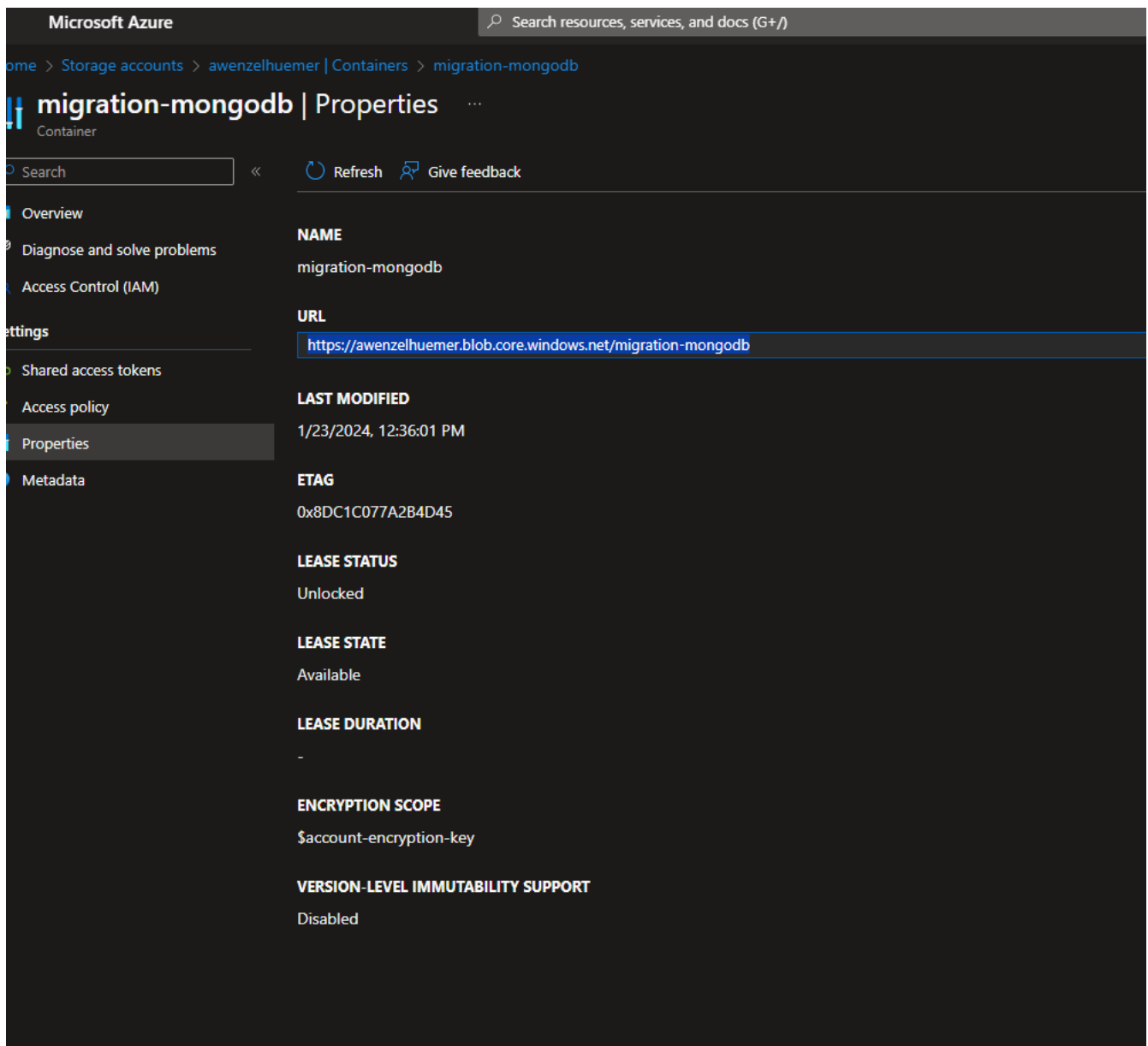


Figure 25. Find storage url

2.2.3. Azure Database Migration Service (offline)

Create migration service, add a new project and upload the dump from the storage account.

Microsoft Azure

Search resources, services, and docs (G+/)

[Home](#) > [Azure Cosmos DB](#) > [andi | Data Migration](#) >

Create Migration Service

Basics

Networking

Tags

Review + create

Azure Database Migration Service is designed to streamline the process of migrating on-premises databases to Azure. [Learn more.](#)

Project details

Select the subscription to manage deployed resources and costs. Use resource groups as you would use folders, to organize and manage all of your resources.

Subscription *

cc-subscription

Resource group *

lab5

[Create new](#)

Instance details

Migration service name *

Enter service name

Location *

West Central US

Service mode *

Azure

Hybrid (Preview)

Pricing tier *

Standard

1 vCores

[Configure tier](#)

Use an Azure Database Migration Service quick start template with pre-created source and targets. [Learn more.](#)

Figure 26. Create Azure Database Migration Service

Microsoft Azure / Search resources, services, and docs (0/1)

Home > Azure Database Migration Services > lab5-migration >

New migration project ...

A database migration project is a group of database activities that you can migrate together.

Migration project name

Project name * ⓘ ✓

Choose your source and target server type.

Source server type * ⓘ ▼

Target server type * ⓘ ▼

Choose your migration activity type.

Migration activity type * ⓘ ▼

Use this option to migrate databases that won't be updated during migration.

i To successfully migrate from MongoDB, please:

[Create a Cosmos DB account with support of MongoDB API](#) ↗

Figure 27. Create Azure Database Migration Project

Microsoft Azure

Search resources, services, and docs (Ctrl+K)

Home > Azure Database Migration Services > lab5-migration >

MongoDB to Azure Database for CosmosDB Offline Migration Wizard

i Using the connection string mode is not recommended as it might reveal sensitive information

Select source Select target Database setting Collection setting Migration summary

Mode Data from azure storage

☒ Blob contains BSON dumps

The data within the blob container must be in **bsondump** format, where data files are placed into folders named after the containing databases and are named like *collection.bson*. Metadata files (if any) should be named like *collection.metadata.json*

Connection string *

`https://awenzelhuemer.blob.core.windows.net/migration-mongodb`

i DMS requires **TLS 1.2 security protocol** enabled to establish an encrypted connection to the source MongoDB instance. Follow these steps to enable TLS support: [TLS 1.2 support for MongoDB](#)

[Or, enable TLS 1.0/1.1 from service configuration.](#)

Figure 28. Offline Migration

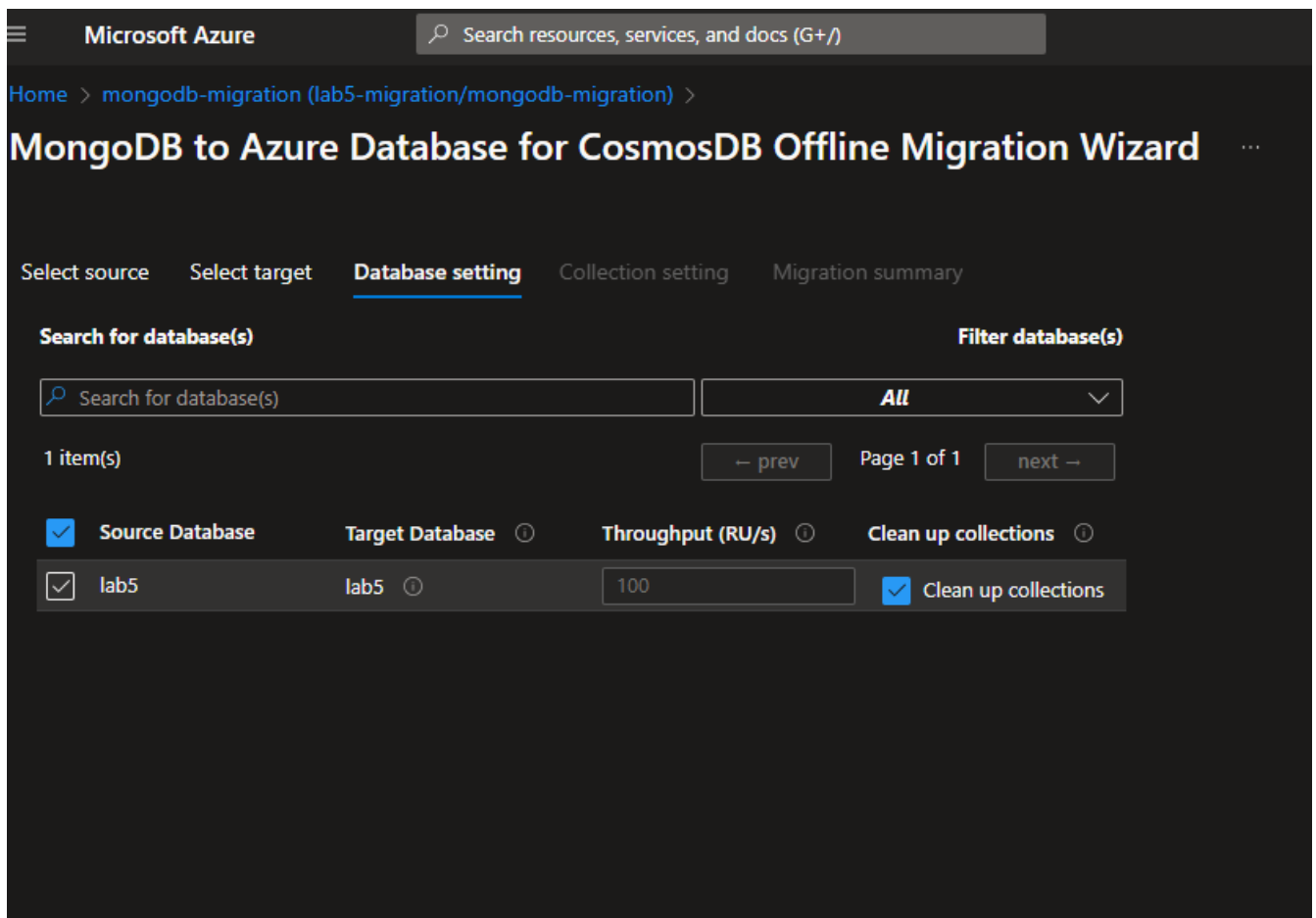


Figure 29. Database Selection

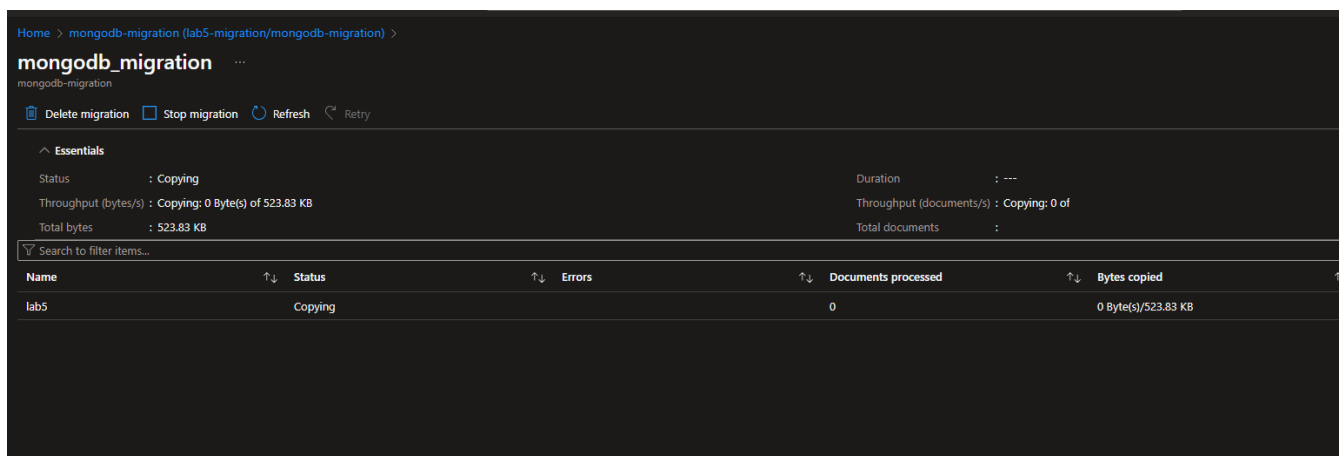


Figure 30. Running Migration

The screenshot shows the MongoDB API interface. On the left, a sidebar lists the database structure: 'lab5' (Scale) contains 'cities' (Documents), which in turn contains 'countries' and 'regions'. The 'cities' collection is selected, and a document is highlighted in the list. The document's JSON representation is displayed on the right side of the interface.

Document List:

_id	/_id
50bebc6114b...	50bebc6114b...
50bebc6214b...	50bebc6214b...
50bebc6214b...	50bebc6214b...
50bebc6214b...	50bebc6214b...
50bebc6314b...	50bebc6314b...
50bebc6314b...	50bebc6314b...
50bebc6414b...	50bebc6414b...
50bebc6414b...	50bebc6414b...
50bebc6414b...	50bebc6414b...
50bebc6514b...	50bebc6514b...
50bebc6514b...	50bebc6514b...
50bebc6614b...	50bebc6614b...

Document JSON:

```
{
  "_id" : ObjectId("50bebc6214b6500c5cb78fcf"),
  "CityId" : 1166,
  "CountryID" : 33,
  "RegionID" : 1219,
  "City" : "Bel",
  "Latitude" : -1.450000047683716,
  "Longitude" : -48.48300170898438,
  "TimeZone" : "-04:00",
  "DmaId" : 0,
  "Code" : "BEL"
}
```

Figure 31. Imported Data

2.2.4. Query/Update Data

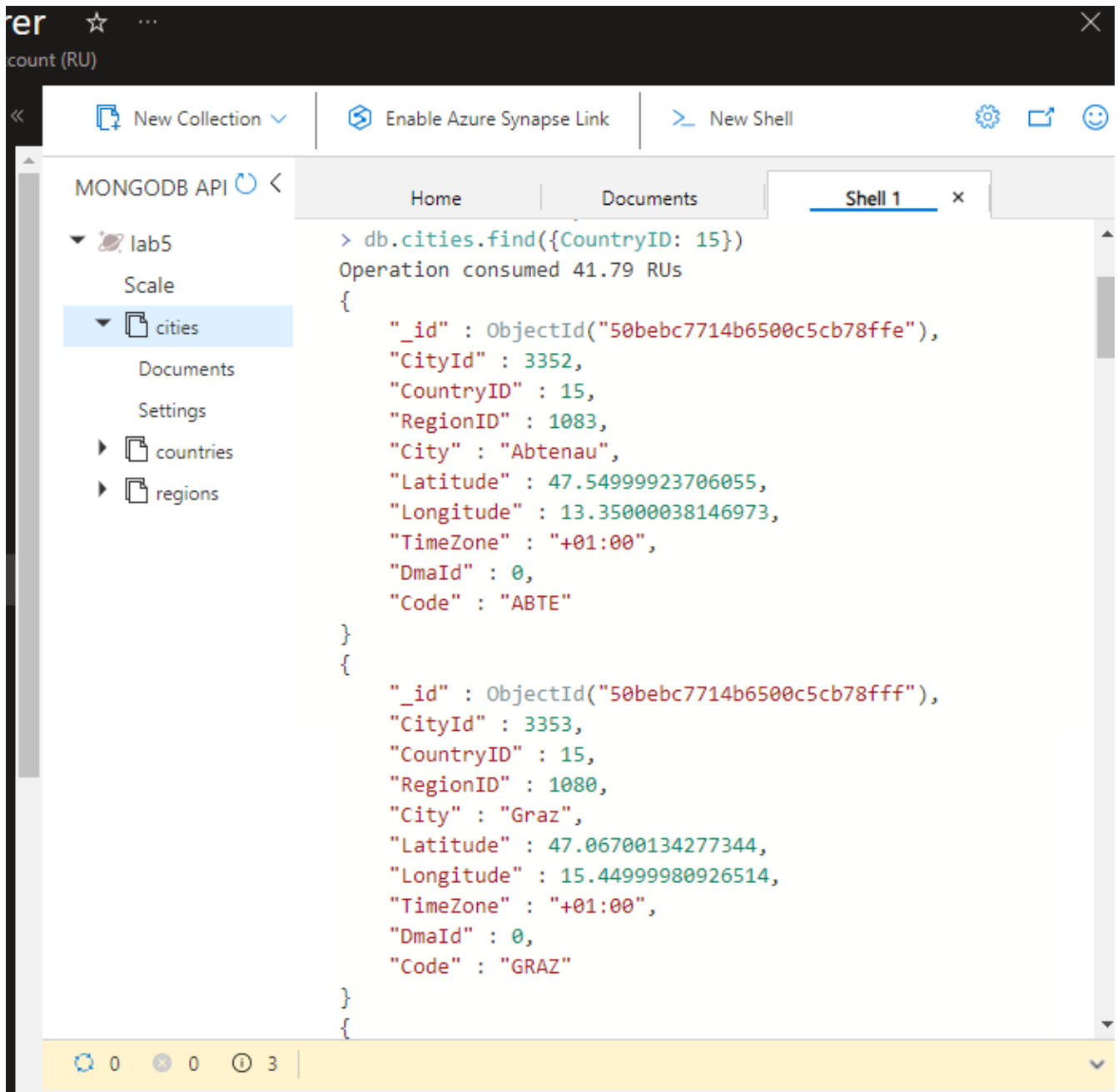


Figure 32. Query for all Austrian cities

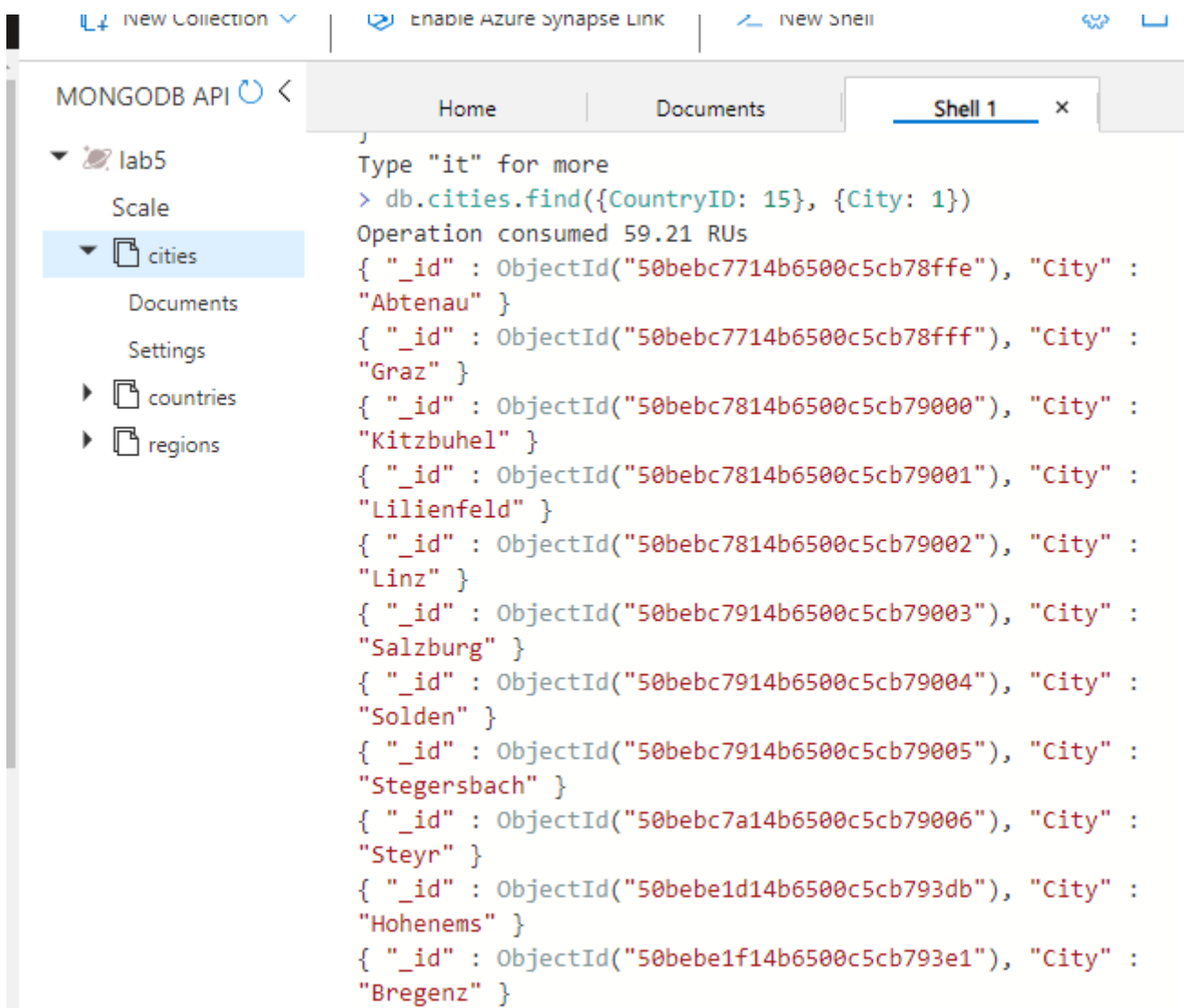


Figure 33. List cities

Executing a couple times

```
Operation consumed 27.59 RUs
> db.countries.updateOne({CountryId: 15}, {$inc: {Population: 3}})
Operation consumed 17.59 RUs
```

Figure 34. Update population