Database creation for Idea-case

idea-case-backend – Juhani Välimäki

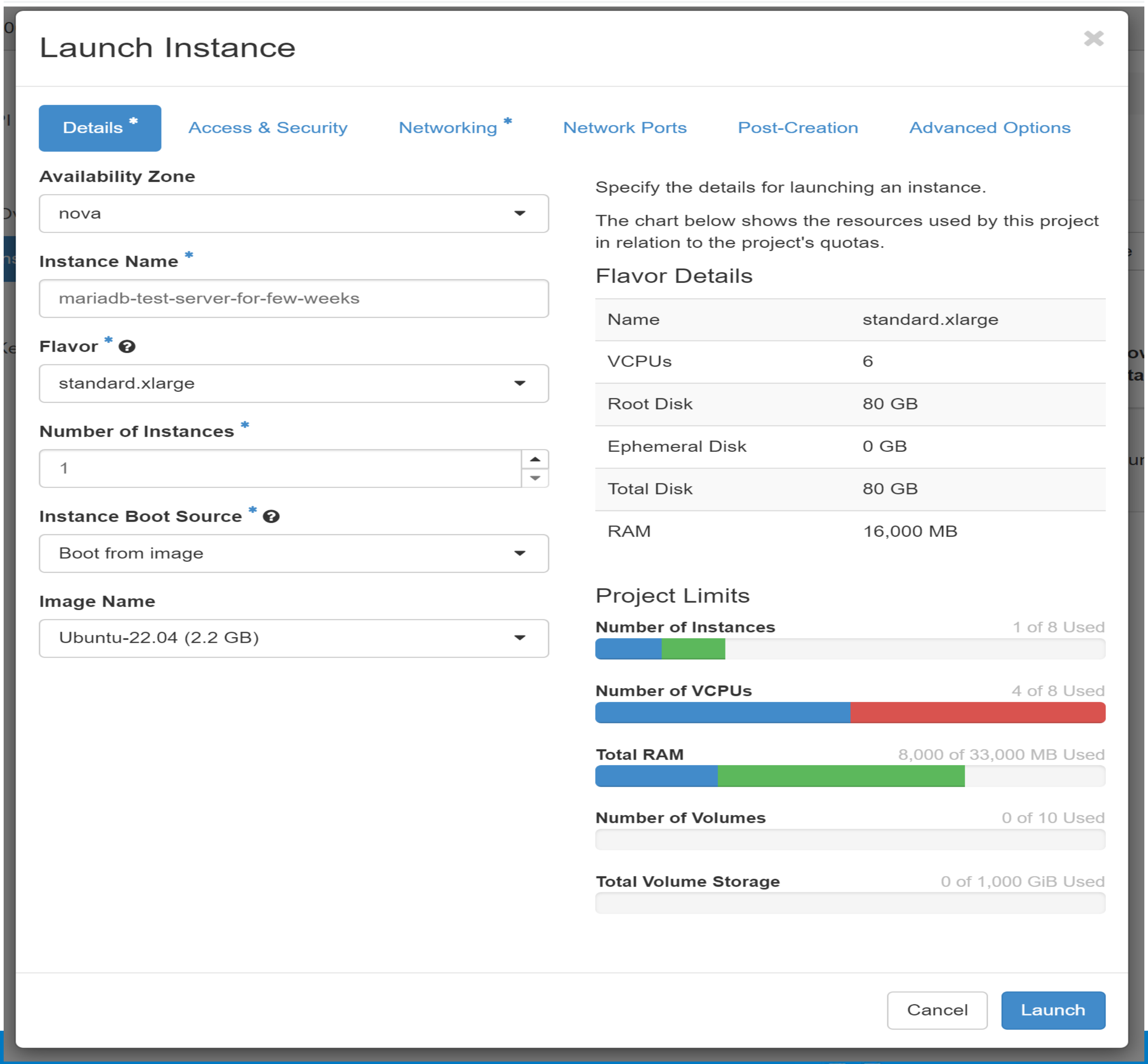
5.2.2023

Haaga-Helia

1. Teacher created a Virtual machine, database and there sandboxes (=schemas) for 70 DB users

- To the Finnish CSC cloud, cPouta machines. Here are the installation notes / steps **if** someone interested:
  - https://github.com/haagahelia/linux-servers-etc/
  - https://github.com/haagahelia/linux-servers-etc/blob/main/CSC_virtual_machine_and_user_creation.md (Linux and its 2 users)
- And here are the steps used to create the 70 schemas and 70 users to database.
  - https://github.com/haagahelia/linux-servers-etc/blob/main/mariadb_installation.md

View to some of the creation steps in the cloud…



Launch Instance

Details * | Access & Security | Networking * | Network Ports | Post-Creation | Advanced Options

Availability Zone
nova

Instance Name *
mariadb-test-server-for-few-weeks

Flavor *
standard.xlarge

Number of Instances *
1

Instance Boot Source *
Boot from image

Image Name
Ubuntu-22.04 (2.2 GB)

Specify the details for launching an instance.

The chart below shows the resources used by this project in relation to the project's quotas.

Flavor Details

Name	standard.xlarge
VCPUs	6
Root Disk	80 GB
Ephemeral Disk	0 GB
Total Disk	80 GB
RAM	16,000 MB

Project Limits

Number of Instances 1 of 8 Used

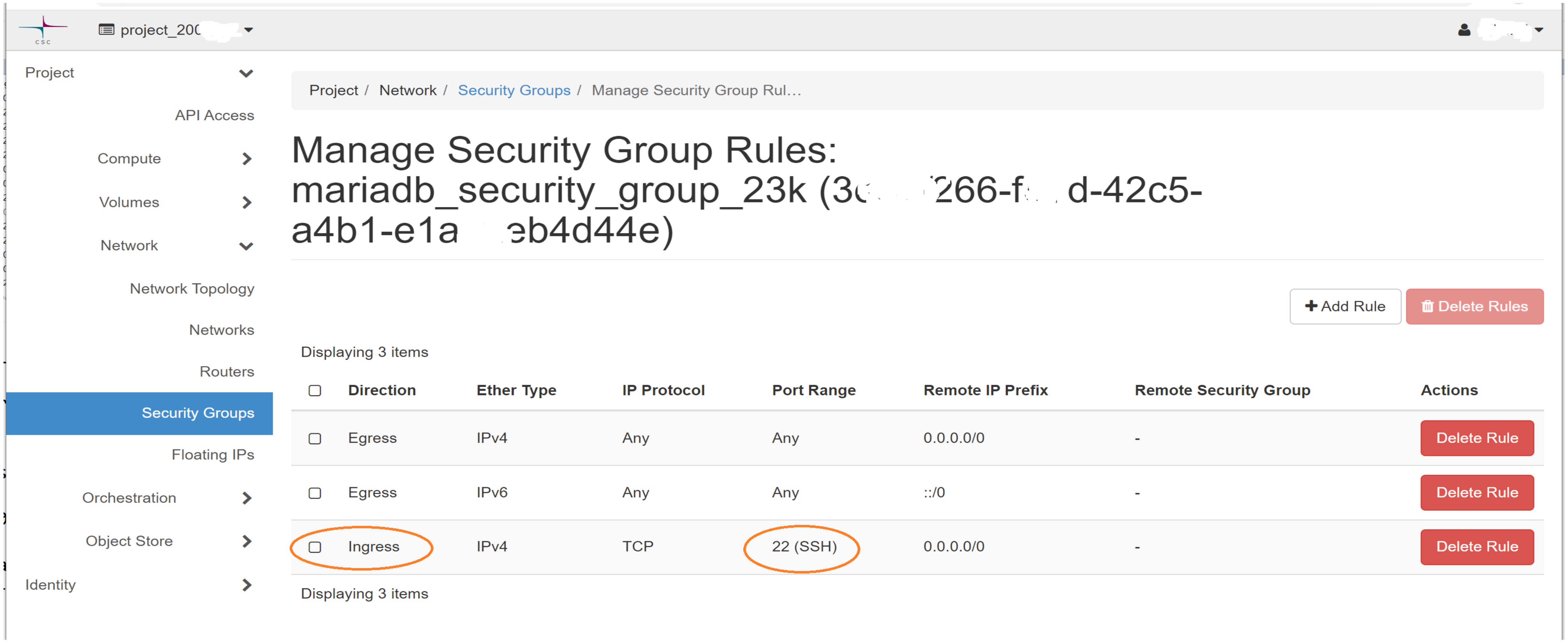
Number of VCPUs 4 of 8 Used

Total RAM 8,000 of 33,000 MB Used

Number of Volumes 0 of 10 Used

Total Volume Storage 0 of 1,000 GiB Used

View to some of the creation steps in the cloud…



Manage Security Group Rules: mariadb_security_group_23k (3c 266-f d-42c5-a4b1-e1a eb4d44e)

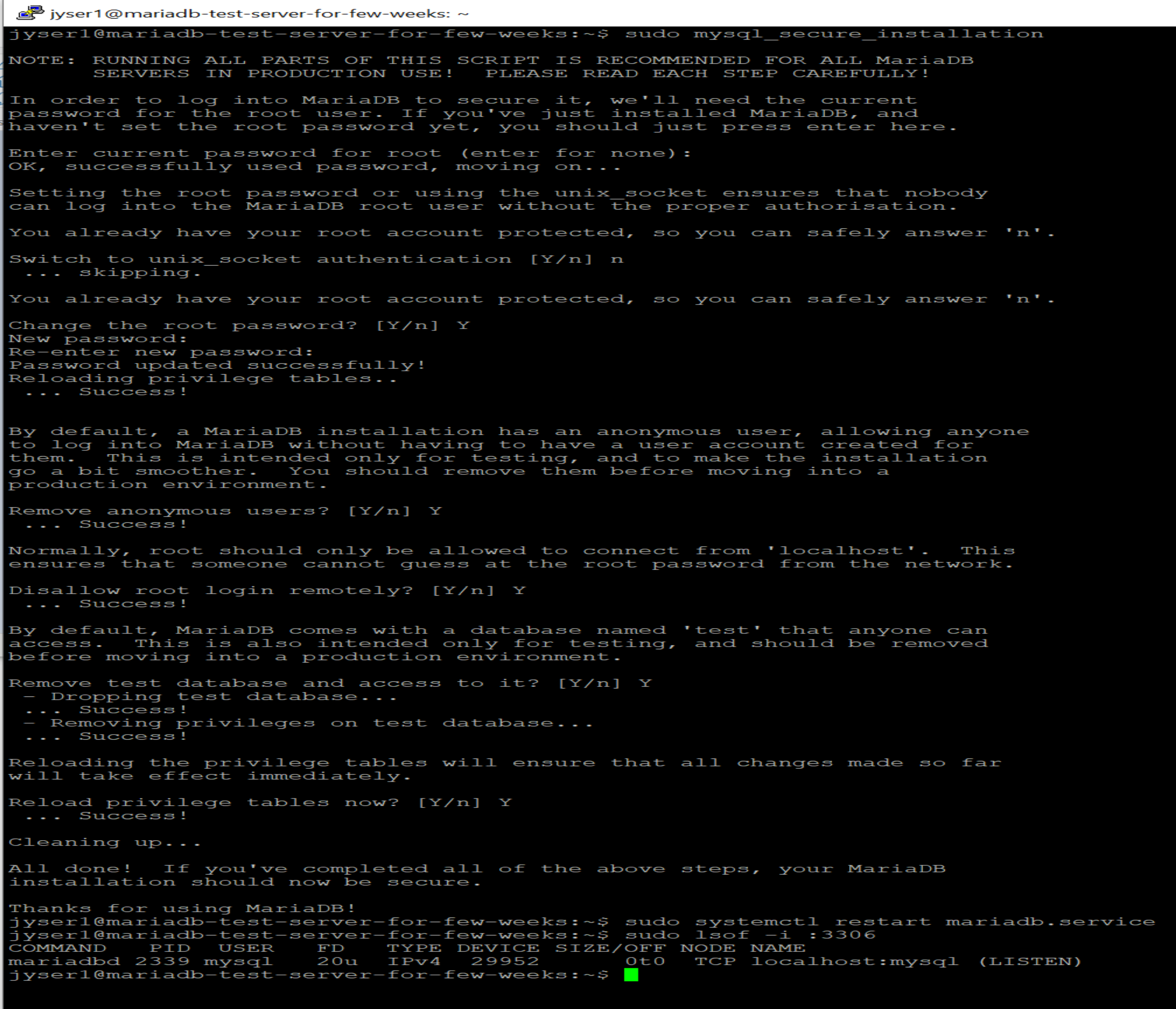
Displaying 3 items

	Direction	Ether Type	IP Protocol	Port Range	Remote IP Prefix	Remote Security Group	Actions
☐	Egress	IPv4	Any	Any	0.0.0.0/0	-	Delete Rule
☐	Egress	IPv6	Any	Any	::/0	-	Delete Rule
☐	Ingress	IPv4	TCP	22 (SSH)	0.0.0.0/0	-	Delete Rule

Displaying 3 items

View to some of the creation steps in the cloud…

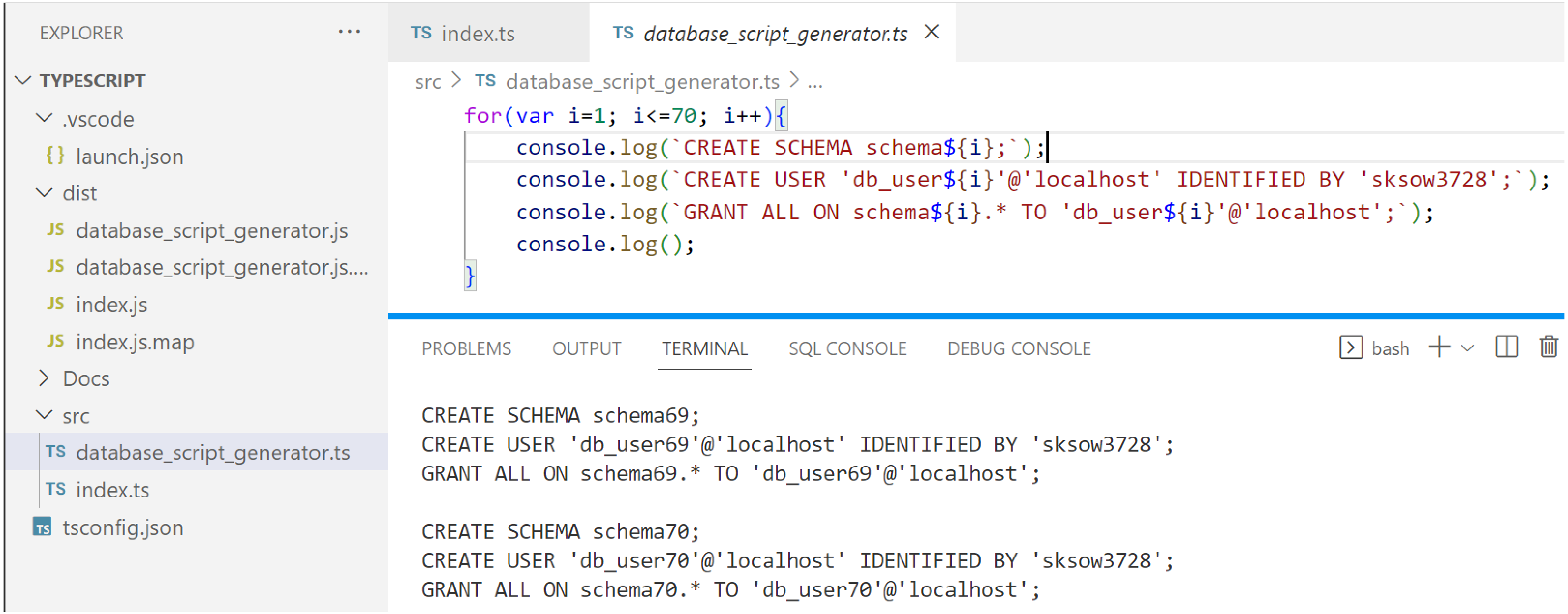
Here running the mysql_secure_installation hardening script or wizard against installed and started MariaDB server



jyser1@mariadb-test-server-for-few-weeks: ~

```
jyser1@mariadb-test-server-for-few-weeks:~$ sudo mysql_secure_installation

NOTE: RUNNING ALL PARTS OF THIS SCRIPT IS RECOMMENDED FOR ALL MariaDB
      SERVERS IN PRODUCTION USE!  PLEASE READ EACH STEP CAREFULLY!

In order to log into MariaDB to secure it, we'll need the current
password for the root user. If you've just installed MariaDB, and
haven't set the root password yet, you should just press enter here.

Enter current password for root (enter for none):
OK, successfully used password, moving on...

Setting the root password or using the unix_socket ensures that nobody
can log into the MariaDB root user without the proper authorisation.

You already have your root account protected, so you can safely answer 'n'.

Switch to unix_socket authentication [Y/n] n
 ... skipping.

You already have your root account protected, so you can safely answer 'n'.

Change the root password? [Y/n] Y
New password:
Re-enter new password:
Password updated successfully!
Reloading privilege tables..
 ... Success!


By default, a MariaDB installation has an anonymous user, allowing anyone
to log into MariaDB without having to have a user account created for
them.  This is intended only for testing, and to make the installation
go a bit smoother.  You should remove them before moving into a
production environment.

Remove anonymous users? [Y/n] Y
 ... Success!

Normally, root should only be allowed to connect from 'localhost'.  This
ensures that someone cannot guess at the root password from the network.

Disallow root login remotely? [Y/n] Y
 ... Success!

By default, MariaDB comes with a database named 'test' that anyone can
access.  This is also intended only for testing, and should be removed
before moving into a production environment.

Remove test database and access to it? [Y/n] Y
 - Dropping test database...
 ... Success!
 - Removing privileges on test database...
 ... Success!

Reloading the privilege tables will ensure that all changes made so far
will take effect immediately.

Reload privilege tables now? [Y/n] Y
 ... Success!

Cleaning up...

All done!  If you've completed all of the above steps, your MariaDB
installation should now be secure.

Thanks for using MariaDB!
jyser1@mariadb-test-server-for-few-weeks:~$ sudo systemctl restart mariadb.service
jyser1@mariadb-test-server-for-few-weeks:~$ sudo lsof -i :3306
COMMAND    PID  USER   FD   TYPE DEVICE SIZE/OFF NODE NAME
mariadbd 2339 mysql   20u  IPv4  29952      0t0  TCP localhost:mysql (LISTEN)
jyser1@mariadb-test-server-for-few-weeks:~$
```

View to some of the creation steps in the cloud…


EXPLORER
TYPESCRIPT
.vscode
launch.json
dist
database_script_generator.js
database_script_generator.js....
index.js
index.js.map
Docs
src
database_script_generator.ts
index.ts
tsconfig.json
index.ts
database_script_generator.ts
src > database_script_generator.ts > ...
PROBLEMS
OUTPUT
TERMINAL
SQL CONSOLE
DEBUG CONSOLE
bash

```
for(var i=1; i<=70; i++){
    console.log(`CREATE SCHEMA schema${i};`);
    console.log(`CREATE USER 'db_user${i}'@'localhost' IDENTIFIED BY 'sksow3728';`);
    console.log(`GRANT ALL ON schema${i}.* TO 'db_user${i}'@'localhost';`);
    console.log();
}
```

```
CREATE SCHEMA schema69;
CREATE USER 'db_user69'@'localhost' IDENTIFIED BY 'sksow3728';
GRANT ALL ON schema69.* TO 'db_user69'@'localhost';

CREATE SCHEMA schema70;
CREATE USER 'db_user70'@'localhost' IDENTIFIED BY 'sksow3728';
GRANT ALL ON schema70.* TO 'db_user70'@'localhost';
```

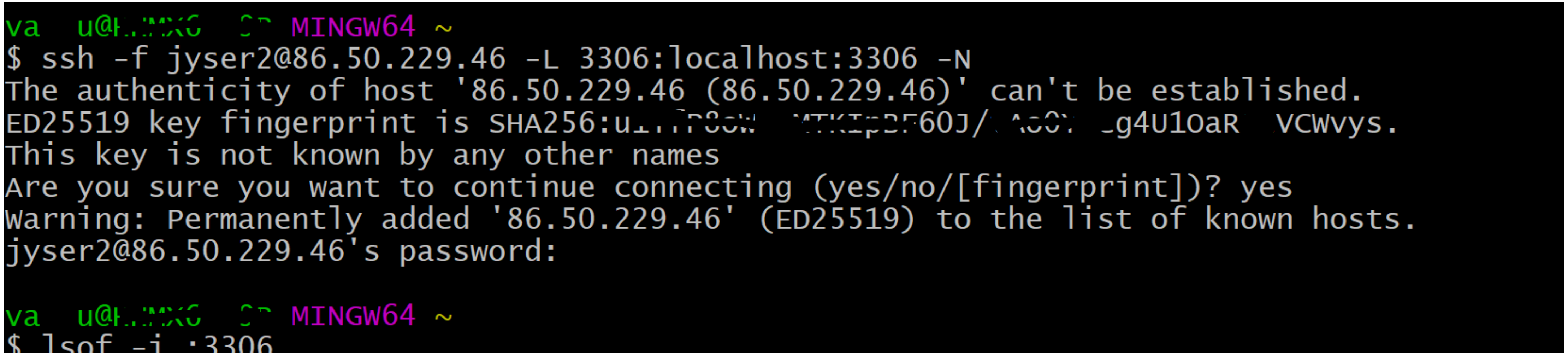
2. You need to install the needed tools…

- For database connection etc. these are needed:
- (MariaDB or MySQL, if you want to install your own, instead of using my cloud DB)
- **ssh** – for tunnel creation. E.g. GitBash should have this. Maybe Powershell too
- **DBeaver** – Community Edition. testing the tunnel connection, creating and filling the tables, and possibly creating ER diagrams, looking at the table data while testing, etc.

2. … and use ssh to create the tunnel (SSH port forwarding)

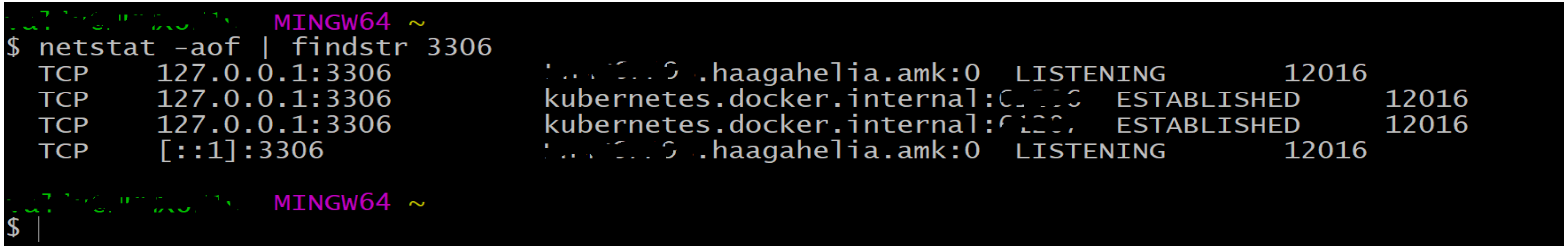
- The server only has 2 Linux users. You are going to use the normal user who has just normal rights
- Only port 22 open, thus you need to use the tunnel to connect to this MariaDB,
  - cannot access 3306 directly
- **ssh -f jyser2@86.50.229.46 -L 3306:localhost:3306 -N** (Password given by teacher in Teams>Files)
- Red- and blue-marked parts change from case to case. E.g. If some other process has already taken port 3306 in your computer, you can use 3308 as the first number.
- Note! Your project .env and such setting must match with the created tunnel. In this case tunnel starts at localhost:3306 (or 3308)
- In a true Linux tool style the tunnel creation doesn't show anything if no problems ☺
- **lsof -i :3306** (Linux) or **netstat -aof | findstr :3306** (Windows) might help you check if tunnel process stil there

2. … and use ssh to create the tunnel



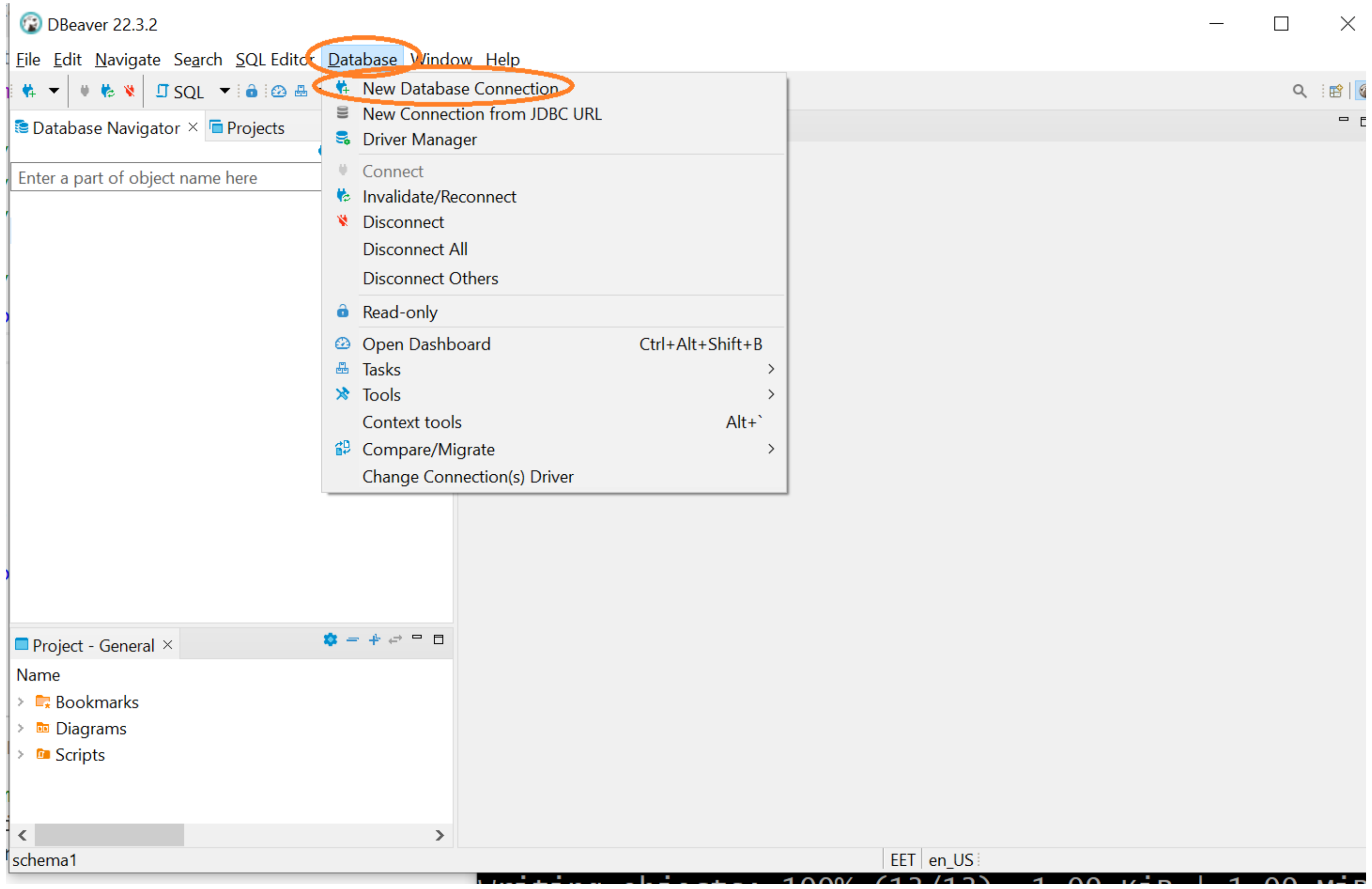
```
va [redacted] u@[redacted] MINGW64 ~
$ ssh -f jyser2@86.50.229.46 -L 3306:localhost:3306 -N
The authenticity of host '86.50.229.46 (86.50.229.46)' can't be established.
ED25519 key fingerprint is SHA256:u[redacted]MTKIp[redacted]60J/[redacted]g4U1OaR[redacted]VCWvys.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '86.50.229.46' (ED25519) to the list of known hosts.
jyser2@86.50.229.46's password:

va [redacted] u@[redacted] MINGW64 ~
$ lsof -i :3306
```

netstat -aof in Windows might take some time to produce results. Reason unknown.

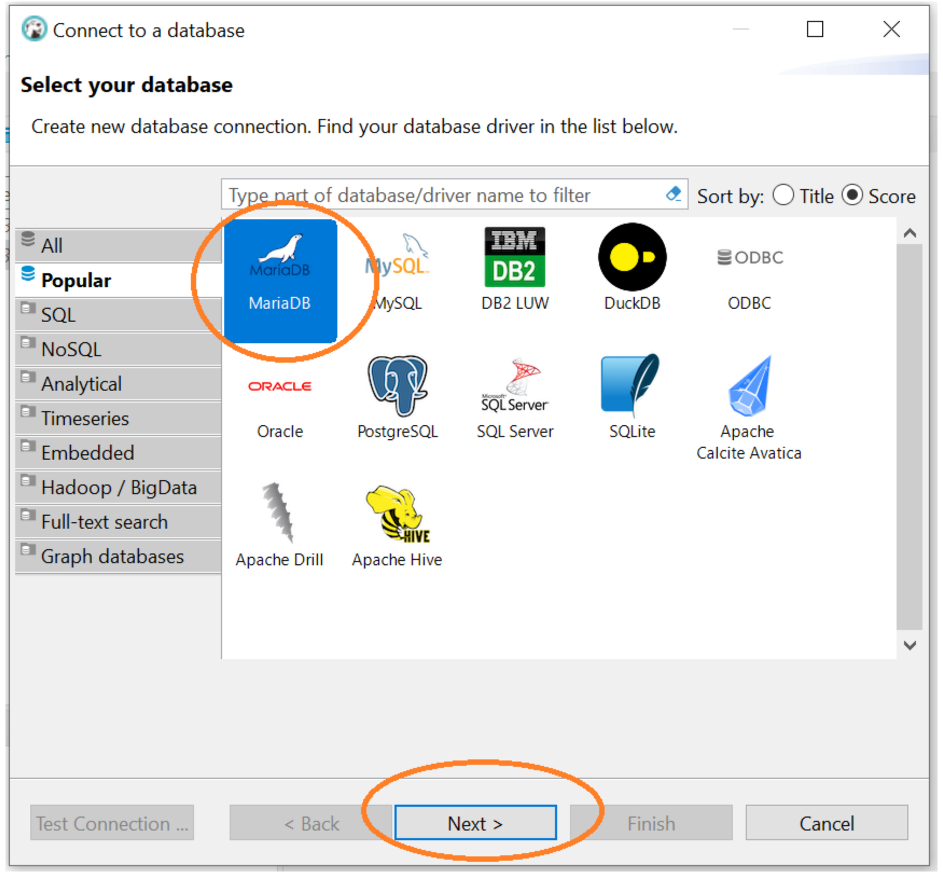


```
[redacted] MINGW64 ~
$ netstat -aof | findstr 3306
  TCP    127.0.0.1:3306         [redacted].haagahelia.amk:0  LISTENING       12016
  TCP    127.0.0.1:3306         kubernetes.docker.internal:[redacted]  ESTABLISHED     12016
  TCP    127.0.0.1:3306         kubernetes.docker.internal:[redacted]  ESTABLISHED     12016
  TCP    [::1]:3306             [redacted].haagahelia.amk:0  LISTENING       12016

[redacted] MINGW64 ~
$ 
```

3.1.1 Use DBeaver according to the pictures to create and test the connection



3.1.2 Use DBeaver according to the pictures to create and test the connection


Connect to a database

Select your database

Create new database connection. Find your database driver in the list below.

Type part of database/driver name to filter

Sort by: Title [✓ Score]

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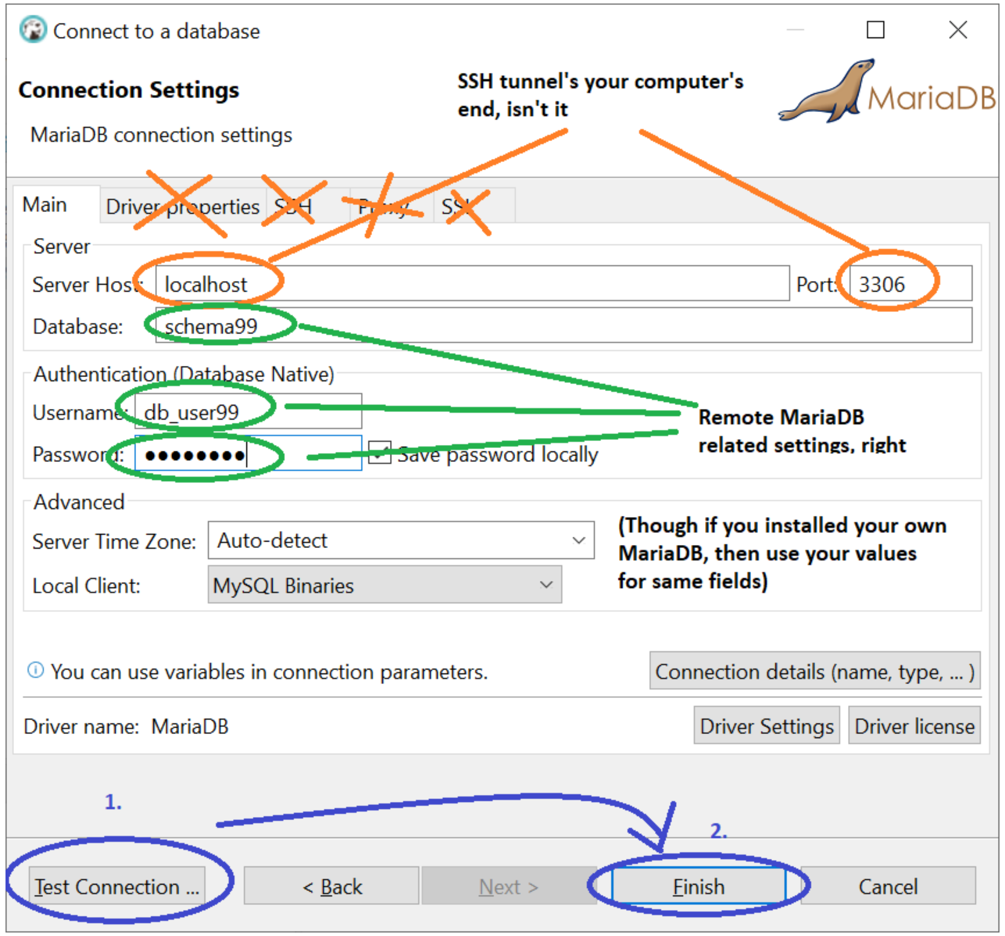
3.1.3 Use DBeaver according to the pictures to create and test the connection


Connect to a database

Connection Settings

MariaDB connection settings

SSH tunnel's your computer's end, isn't it

Main | Driver properties | SSH | Proxy | SSL

Server

Server Host: localhost Port: 3306

Database: schema99

Authentication (Database Native)

Username: db_user99

Password: ●●●●●●●●● ☑ Save password locally

Remote MariaDB related settings, right

Advanced

Server Time Zone: Auto-detect

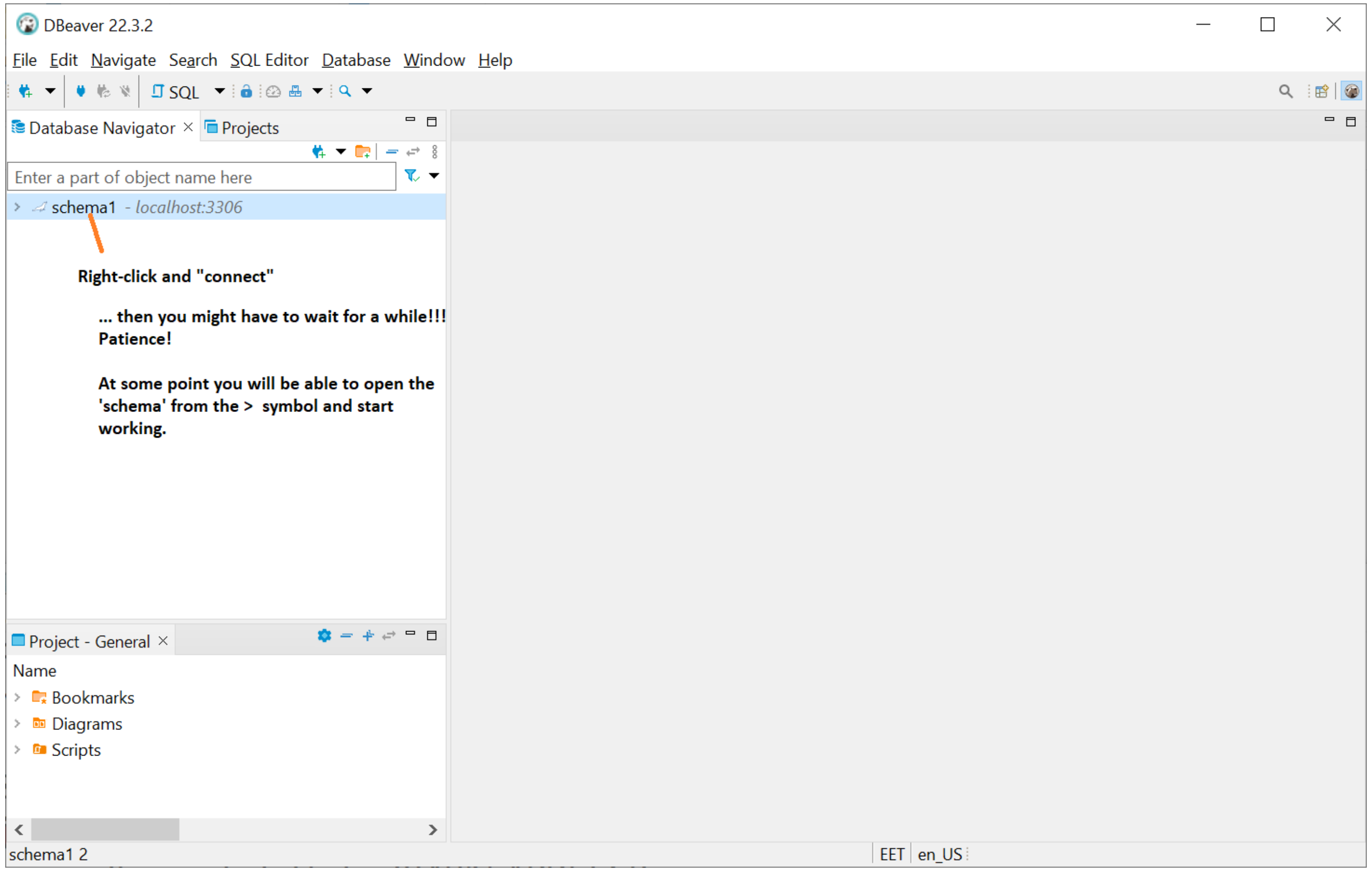
Local Client: MySQL Binaries

(Though if you installed your own MariaDB, then use your values for same fields)

ⓘ You can use variables in connection parameters.

Driver name: MariaDB

3.1.4 Use DBeaver according to the pictures to create and test the connection

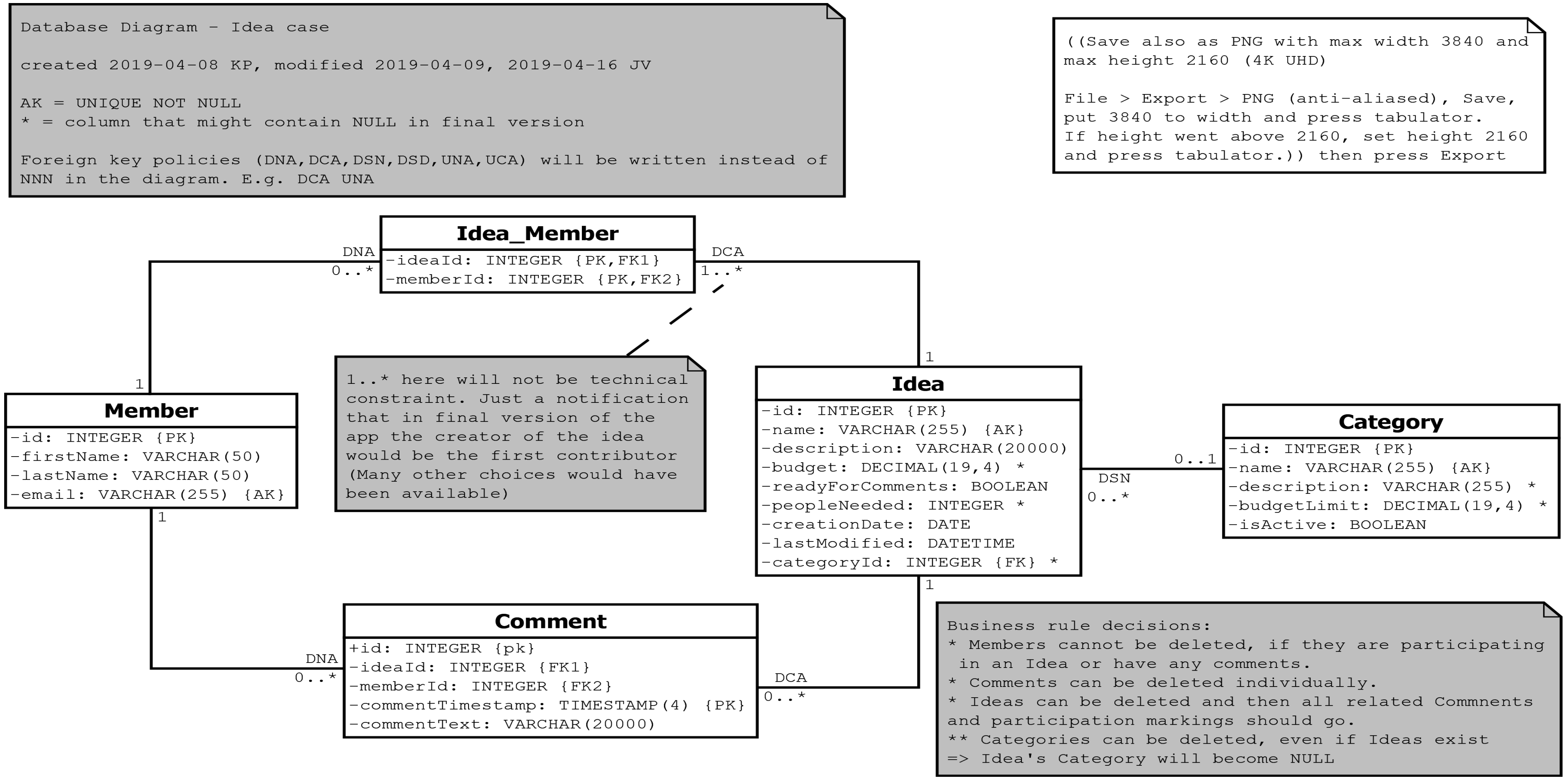


Right-click and "connect"

... then you might have to wait for a while!!! Patience!

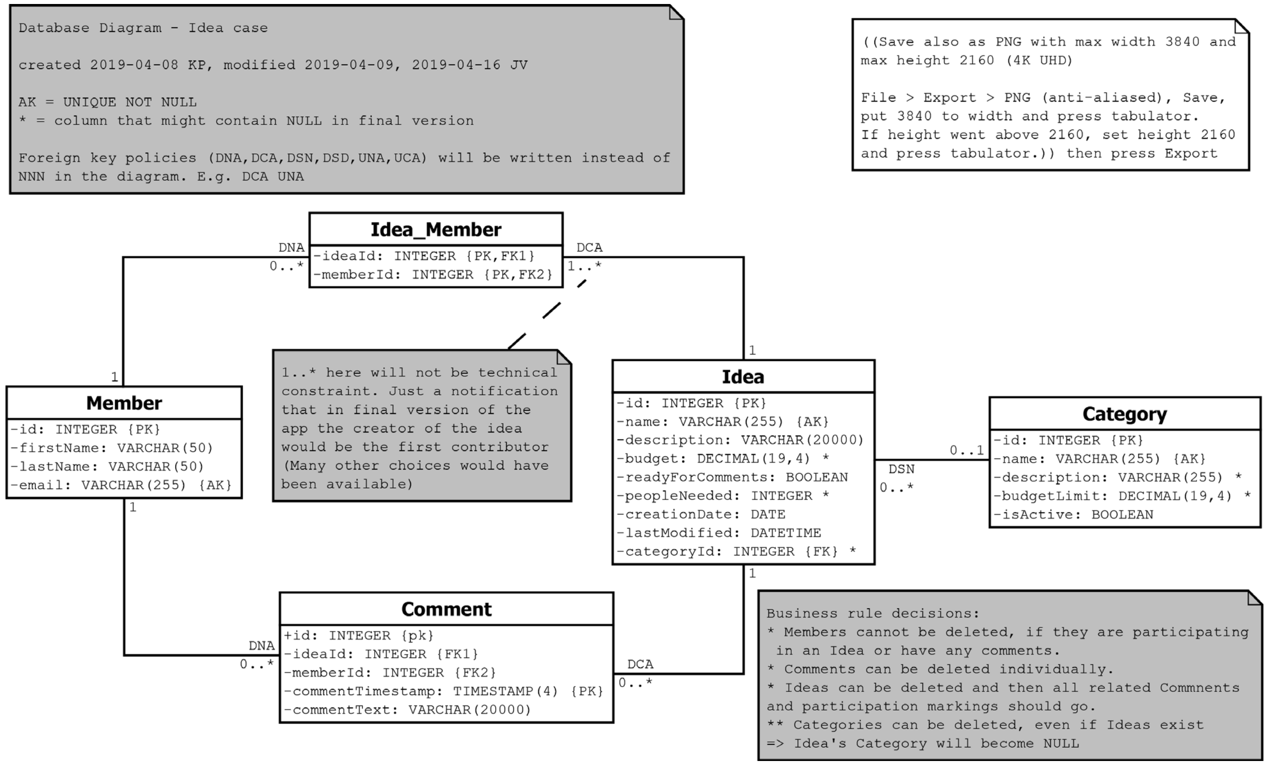
At some point you will be able to open the 'schema' from the > symbol and start working.

Here is how the database will look like:


Database Diagram - Idea case
created 2019-04-08 KP, modified 2019-04-09, 2019-04-16 JV
AK = UNIQUE NOT NULL
* = column that might contain NULL in final version
Foreign key policies (DNA,DCA,DSN,DSD,UNA,UCA) will be written instead of NNN in the diagram. E.g. DCA UNA
((Save also as PNG with max width 3840 and max height 2160 (4K UHD)
File > Export > PNG (anti-aliased), Save, put 3840 to width and press tabulator. If height went above 2160, set height 2160 and press tabulator.)) then press Export
Idea_Member
-ideaId: INTEGER {PK,FK1}
-memberId: INTEGER {PK,FK2}
DNA
0..*
DCA
1..*
1
1
Member
-id: INTEGER {PK}
-firstName: VARCHAR(50)
-lastName: VARCHAR(50)
-email: VARCHAR(255) {AK}
1..* here will not be technical constraint. Just a notification that in final version of the app the creator of the idea would be the first contributor (Many other choices would have been available)
Idea
-id: INTEGER {PK}
-name: VARCHAR(255) {AK}
-description: VARCHAR(20000)
-budget: DECIMAL(19,4) *
-readyForComments: BOOLEAN
-peopleNeeded: INTEGER *
-creationDate: DATE
-lastModified: DATETIME
-categoryId: INTEGER {FK} *
DSN
0..*
0..1
Category
-id: INTEGER {PK}
-name: VARCHAR(255) {AK}
-description: VARCHAR(255) *
-budgetLimit: DECIMAL(19,4) *
-isActive: BOOLEAN
1
1
Comment
+id: INTEGER {pk}
-ideaId: INTEGER {FK1}
-memberId: INTEGER {FK2}
-commentTimestamp: TIMESTAMP(4) {PK}
-commentText: VARCHAR(20000)
DNA
0..*
DCA
0..*
Business rule decisions:
* Members cannot be deleted, if they are participating in an Idea or have any comments.
* Comments can be deleted individually.
* Ideas can be deleted and then all related Comnnents and participation markings should go.
** Categories can be deleted, even if Ideas exist => Idea's Category will become NULL

Download the SQL script for creating the database

- Now download at least the https://github.com/valju/idea-case-backend/blob/master/Database/SQL_Scripts/000_drop_create_insert.sql this file to some known folder.
- Or just clone the repo
- It drops, creates and populates the needed tables.


Database Diagram - Idea case

created 2019-04-08 KP, modified 2019-04-09, 2019-04-16 JV

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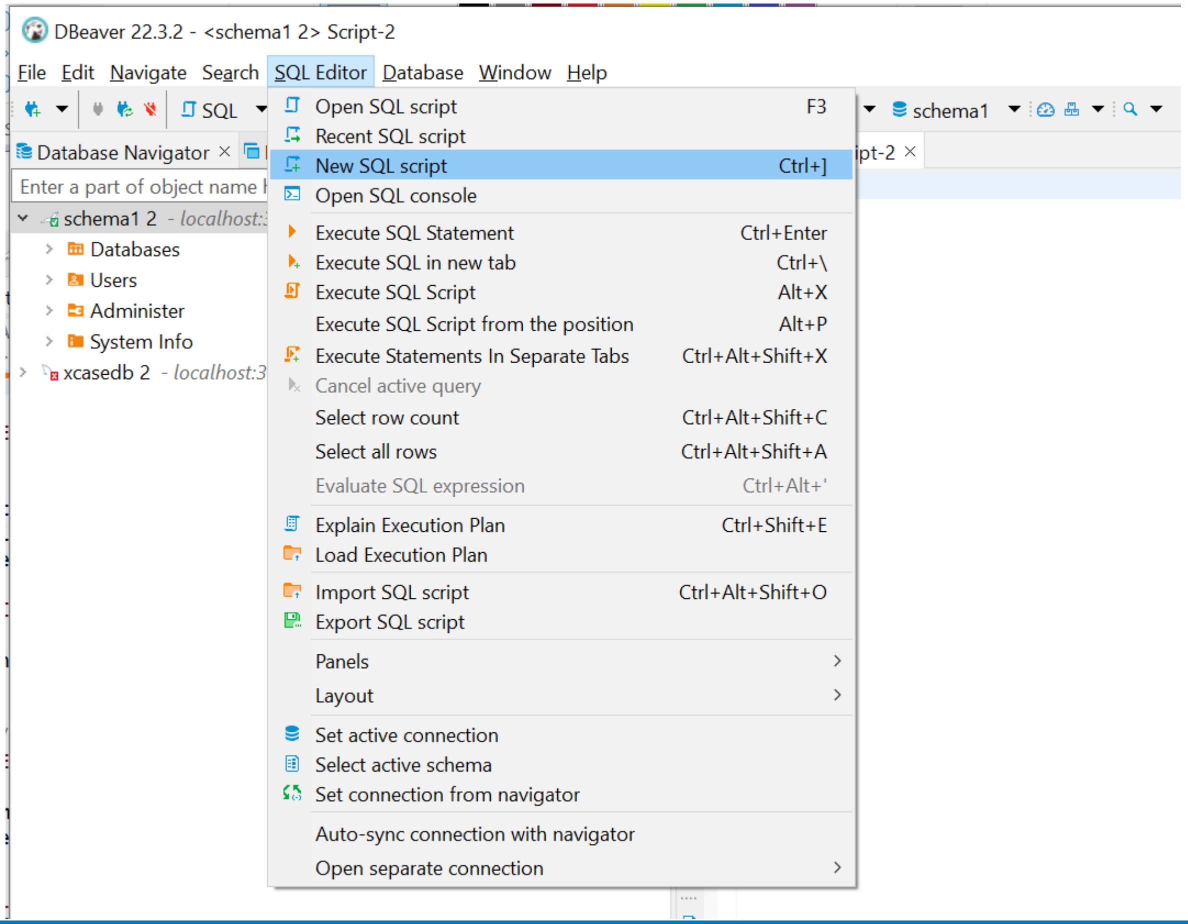
File > Export > PNG (anti-aliased), Save, put 3840 to width and press tabulator. If height went above 2160, set height 2160 and press tabulator.)) then press Export

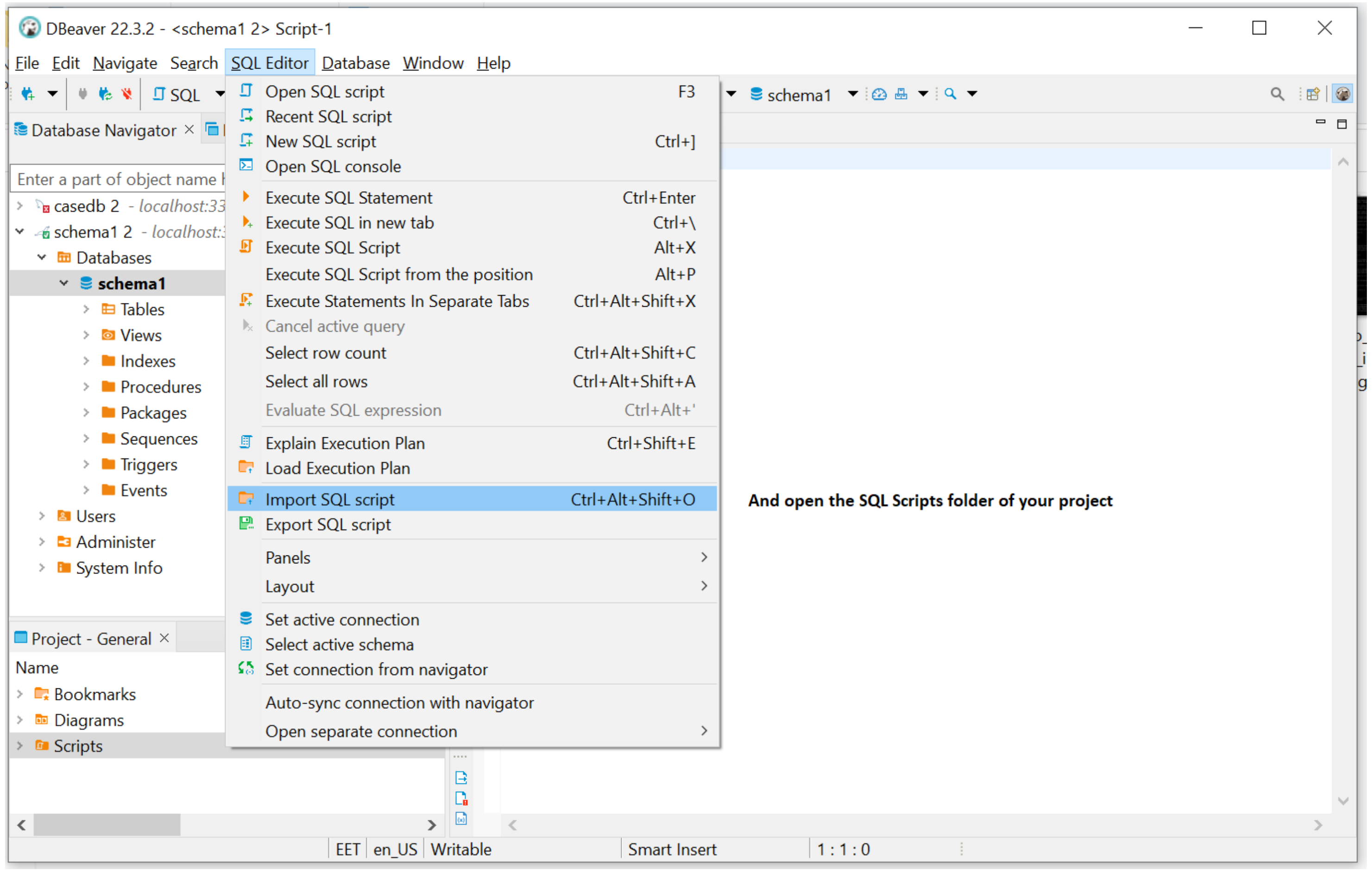
1..* here will not be technical constraint. Just a notification that in final version of the app the creator of the idea would be the first contributor (Many other choices would have been available)

Business rule decisions:
* Members cannot be deleted, if they are participating in an Idea or have any comments.
* Comments can be deleted individually.
* Ideas can be deleted and then all related Commnents and participation markings should go.
** Categories can be deleted, even if Ideas exist
=> Idea's Category will become NULL

3.2.1 Use DBeaver to run SQL to create the tables and populate with test data

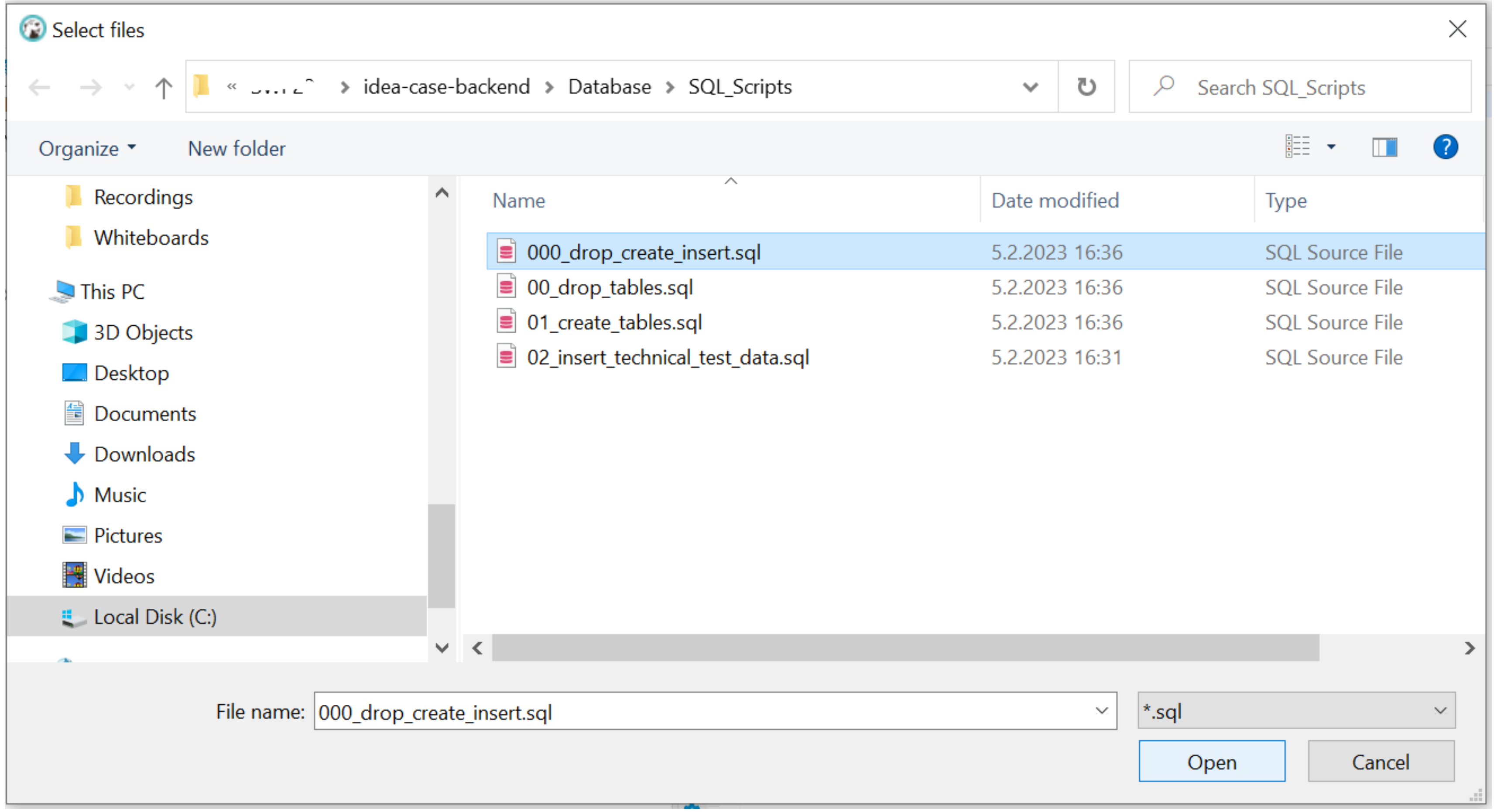

DBeaver 22.3.2 - <schema1 2> Script-2
File Edit Navigate Search SQL Editor Database Window Help
SQL
schema1
Database Navigator
ipt-2
Enter a part of object name
schema1 2 - localhost:
Databases
Users
Administer
System Info
xcasedb 2 - localhost:3
Open SQL script F3
Recent SQL script
New SQL script Ctrl+]
Open SQL console
Execute SQL Statement Ctrl+Enter
Execute SQL in new tab Ctrl+\
Execute SQL Script Alt+X
Execute SQL Script from the position Alt+P
Execute Statements In Separate Tabs Ctrl+Alt+Shift+X
Cancel active query
Select row count Ctrl+Alt+Shift+C
Select all rows Ctrl+Alt+Shift+A
Evaluate SQL expression Ctrl+Alt+'
Explain Execution Plan Ctrl+Shift+E
Load Execution Plan
Import SQL script Ctrl+Alt+Shift+O
Export SQL script
Panels
Layout
Set active connection
Select active schema
Set connection from navigator
Auto-sync connection with navigator
Open separate connection

3.2.2 Use DBeaver to run SQL to create the tables and populate with test data


DBeaver 22.3.2 - <schema1 2> Script-1
File Edit Navigate Search SQL Editor Database Window Help
SQL
schema1
Database Navigator
Enter a part of object name
casedb 2 - localhost:33
schema1 2 - localhost:
Databases
schema1
Tables
Views
Indexes
Procedures
Packages
Sequences
Triggers
Events
Users
Administer
System Info
Project - General
Name
Bookmarks
Diagrams
Scripts
Open SQL script F3
Recent SQL script
New SQL script Ctrl+]
Open SQL console
Execute SQL Statement Ctrl+Enter
Execute SQL in new tab Ctrl+\
Execute SQL Script Alt+X
Execute SQL Script from the position Alt+P
Execute Statements In Separate Tabs Ctrl+Alt+Shift+X
Cancel active query
Select row count Ctrl+Alt+Shift+C
Select all rows Ctrl+Alt+Shift+A
Evaluate SQL expression Ctrl+Alt+'
Explain Execution Plan Ctrl+Shift+E
Load Execution Plan
Import SQL script Ctrl+Alt+Shift+O
Export SQL script
Panels
Layout
Set active connection
Select active schema
Set connection from navigator
Auto-sync connection with navigator
Open separate connection
EET en_US Writable Smart Insert 1 : 1 : 0

And open the SQL Scripts folder of your project

3.2.3 Use DBeaver to run SQL to create the tables and populate with test data



Name	Date modified	Type
000_drop_create_insert.sql	5.2.2023 16:36	SQL Source File
00_drop_tables.sql	5.2.2023 16:36	SQL Source File
01_create_tables.sql	5.2.2023 16:36	SQL Source File
02_insert_technical_test_data.sql	5.2.2023 16:31	SQL Source File

File name: 000_drop_create_insert.sql

*.sql

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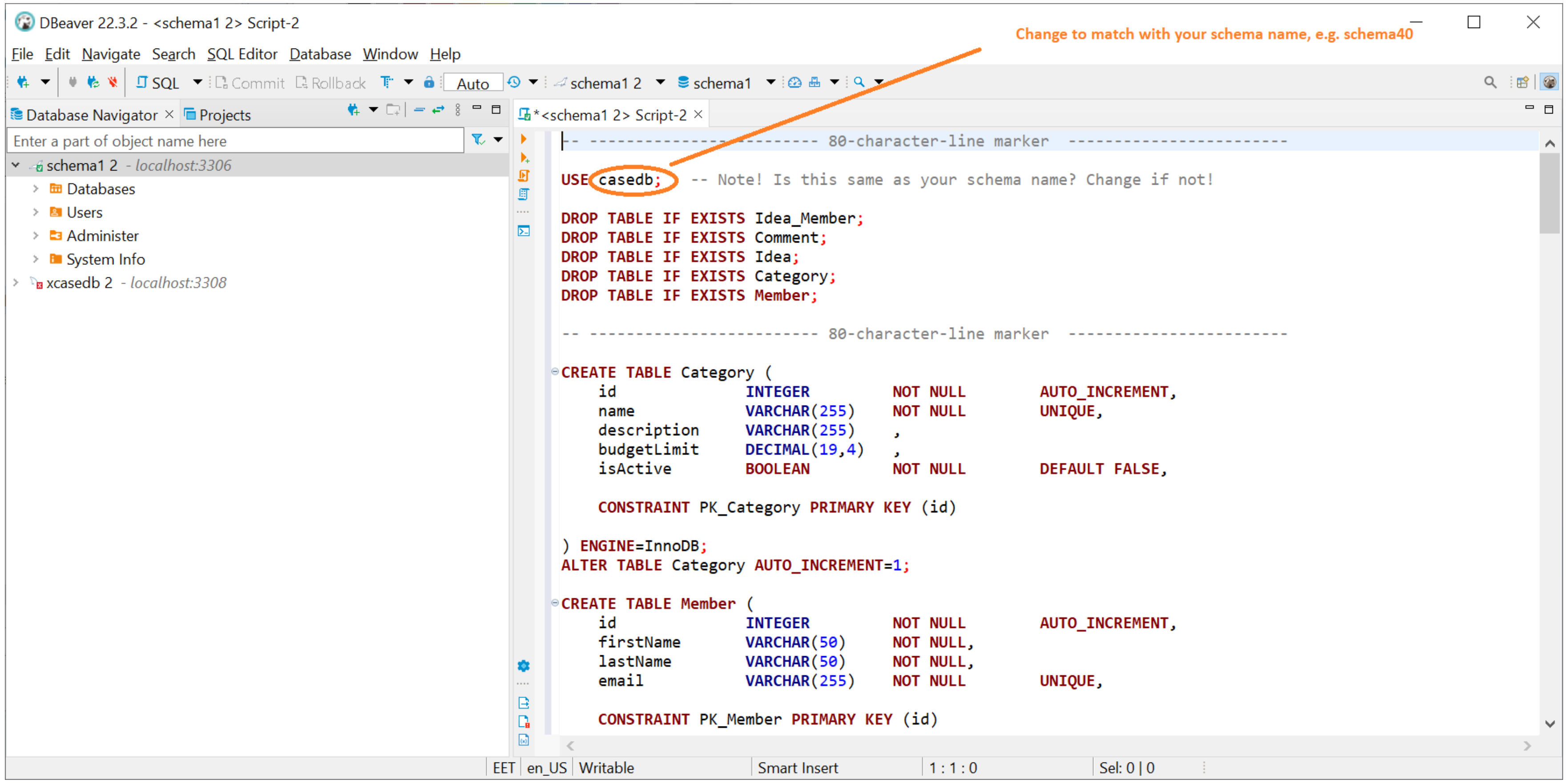
3.2.4 Use DBeaver to run SQL to create the tables and populate with test data


DBeaver 22.3.2 - <schema1 2> Script-2
File Edit Navigate Search SQL Editor Database Window Help
SQL
Commit
Rollback
Auto
schema1 2
schema1
Database Navigator
Projects
Enter a part of object name here
schema1 2 - localhost:3306
Databases
Users
Administer
System Info
xcasedb 2 - localhost:3308
*<schema1 2> Script-2
EET en_US Writable Smart Insert 1 : 1 : 0 Sel: 0 | 0

Change to match with your schema name, e.g. schema40

```
-- ----------------------- 80-character-line marker  -----------------------

USE casedb;   -- Note! Is this same as your schema name? Change if not!

DROP TABLE IF EXISTS Idea_Member;
DROP TABLE IF EXISTS Comment;
DROP TABLE IF EXISTS Idea;
DROP TABLE IF EXISTS Category;
DROP TABLE IF EXISTS Member;

-- ----------------------- 80-character-line marker  -----------------------

CREATE TABLE Category (
    id              INTEGER         NOT NULL        AUTO_INCREMENT,
    name            VARCHAR(255)    NOT NULL        UNIQUE,
    description     VARCHAR(255)    ,
    budgetLimit     DECIMAL(19,4)   ,
    isActive        BOOLEAN         NOT NULL        DEFAULT FALSE,

    CONSTRAINT PK_Category PRIMARY KEY (id)

) ENGINE=InnoDB;
ALTER TABLE Category AUTO_INCREMENT=1;

CREATE TABLE Member (
    id              INTEGER         NOT NULL        AUTO_INCREMENT,
    firstName       VARCHAR(50)     NOT NULL,
    lastName        VARCHAR(50)     NOT NULL,
    email           VARCHAR(255)    NOT NULL        UNIQUE,

    CONSTRAINT PK_Member PRIMARY KEY (id)
```

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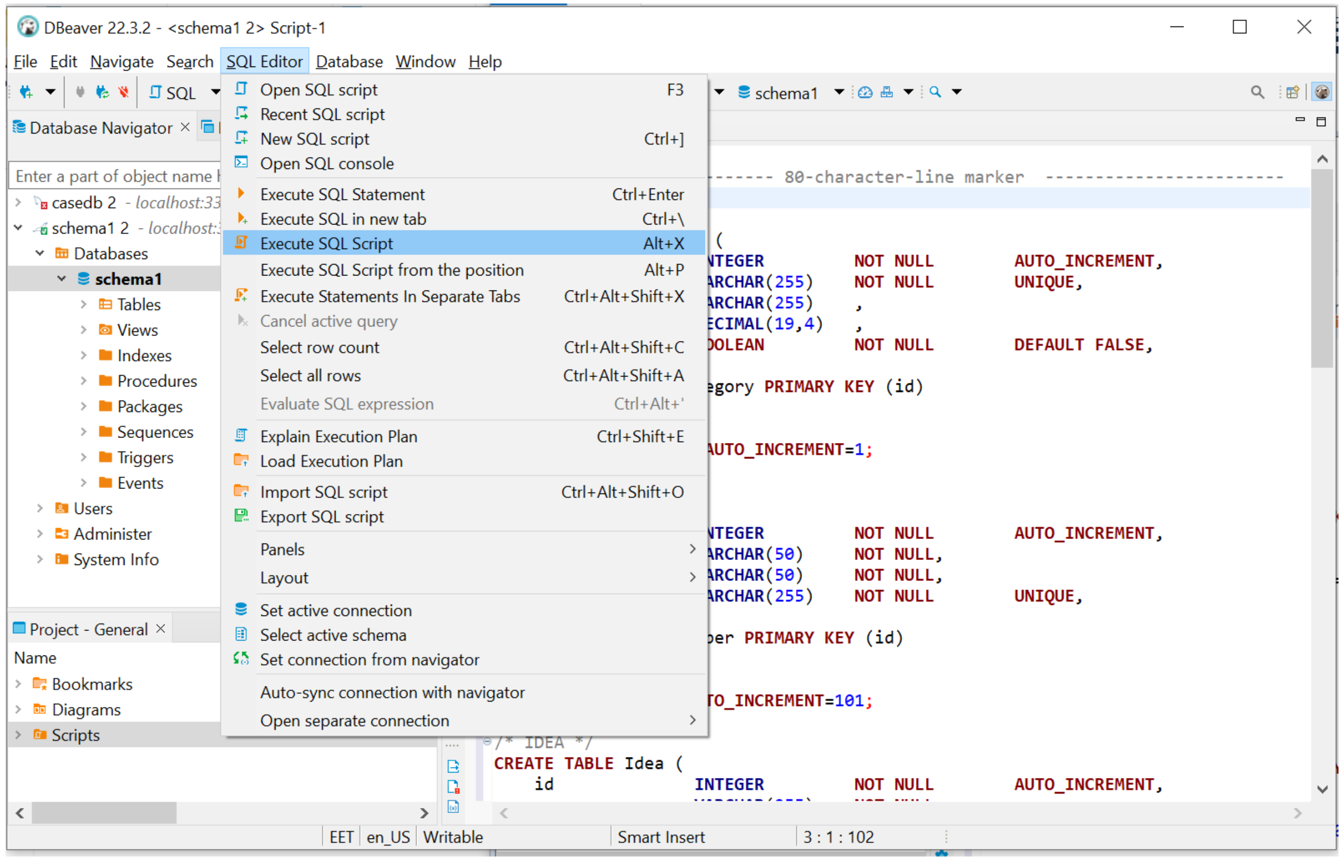
3.2.5 Use DBeaver to run SQL to create the tables and populate with test data



```
------- 80-character-line marker -----------------------
(
NTEGER          NOT NULL        AUTO_INCREMENT,
ARCHAR(255)     NOT NULL        UNIQUE,
ARCHAR(255)     ,
ECIMAL(19,4)    ,
OOLEAN          NOT NULL        DEFAULT FALSE,

egory PRIMARY KEY (id)

AUTO_INCREMENT=1;

NTEGER          NOT NULL        AUTO_INCREMENT,
ARCHAR(50)      NOT NULL,
ARCHAR(50)      NOT NULL,
ARCHAR(255)     NOT NULL        UNIQUE,

oer PRIMARY KEY (id)

TO_INCREMENT=101;

/* IDEA */
CREATE TABLE Idea (
    id              INTEGER         NOT NULL        AUTO_INCREMENT,
```

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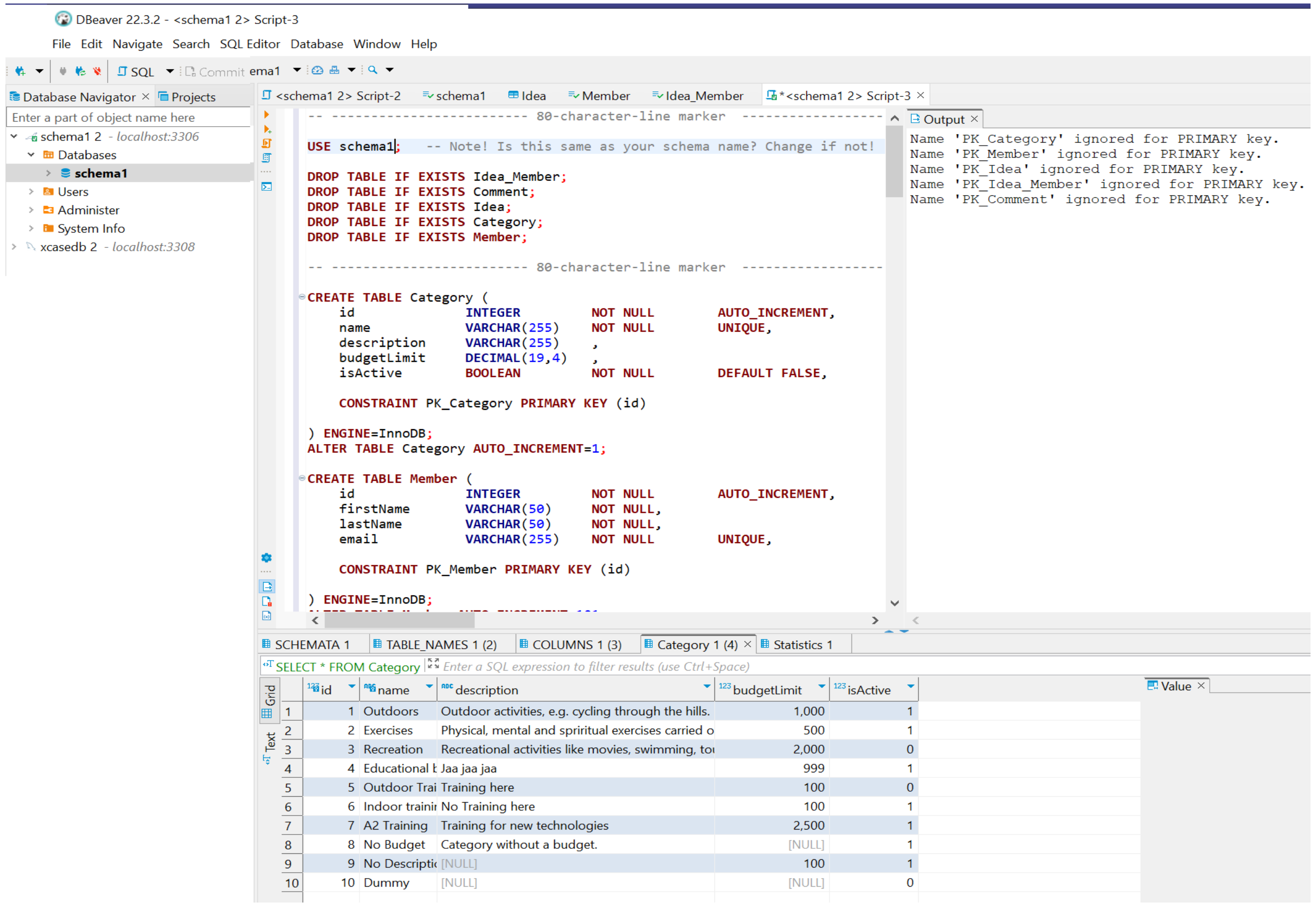
3.2.6 Use DBeaver to run SQL to create the tables and populate with test data – Success?



```sql
-- ------------------------ 80-character-line marker  -----------------

USE schema1;    -- Note! Is this same as your schema name? Change if not!

DROP TABLE IF EXISTS Idea_Member;
DROP TABLE IF EXISTS Comment;
DROP TABLE IF EXISTS Idea;
DROP TABLE IF EXISTS Category;
DROP TABLE IF EXISTS Member;

-- ------------------------ 80-character-line marker  -----------------

CREATE TABLE Category (
    id              INTEGER         NOT NULL        AUTO_INCREMENT,
    name            VARCHAR(255)    NOT NULL        UNIQUE,
    description     VARCHAR(255)    ,
    budgetLimit     DECIMAL(19,4)   ,
    isActive        BOOLEAN         NOT NULL        DEFAULT FALSE,

    CONSTRAINT PK_Category PRIMARY KEY (id)

) ENGINE=InnoDB;
ALTER TABLE Category AUTO_INCREMENT=1;

CREATE TABLE Member (
    id              INTEGER         NOT NULL        AUTO_INCREMENT,
    firstName       VARCHAR(50)     NOT NULL,
    lastName        VARCHAR(50)     NOT NULL,
    email           VARCHAR(255)    NOT NULL        UNIQUE,

    CONSTRAINT PK_Member PRIMARY KEY (id)

) ENGINE=InnoDB;
```

```
Name 'PK_Category' ignored for PRIMARY key.
Name 'PK_Member' ignored for PRIMARY key.
Name 'PK_Idea' ignored for PRIMARY key.
Name 'PK_Idea_Member' ignored for PRIMARY key.
Name 'PK_Comment' ignored for PRIMARY key.
```

SELECT * FROM Category | Enter a SQL expression to filter results (use Ctrl+Space)

	id	name	description	budgetLimit	isActive
1	1	Outdoors	Outdoor activities, e.g. cycling through the hills.	1,000	1
2	2	Exercises	Physical, mental and spriritual exercises carried o	500	1
3	3	Recreation	Recreational activities like movies, swimming, tou	2,000	0
4	4	Educational t	Jaa jaa jaa	999	1
5	5	Outdoor Trai	Training here	100	0
6	6	Indoor trainii	No Training here	100	1
7	7	A2 Training	Training for new technologies	2,500	1
8	8	No Budget	Category without a budget.	[NULL]	1
9	9	No Descriptic	[NULL]	100	1
10	10	Dummy	[NULL]	[NULL]	0