Francesc
de Borja Moll
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P4: Using the MySQL WorkBench IDE

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INDEX

1. Explain what MySQL Workbench IDE does? Complete a review of the database design process, you will explore the MySQL Workbench user interface in preparation for future tasks.

MySQL Workbench is a unified visual tool for database architects, developers, and DBAs. MySQL Workbench provides data modeling, SQL development, and comprehensive administration tools for server configuration, user administration, backup, and much more.

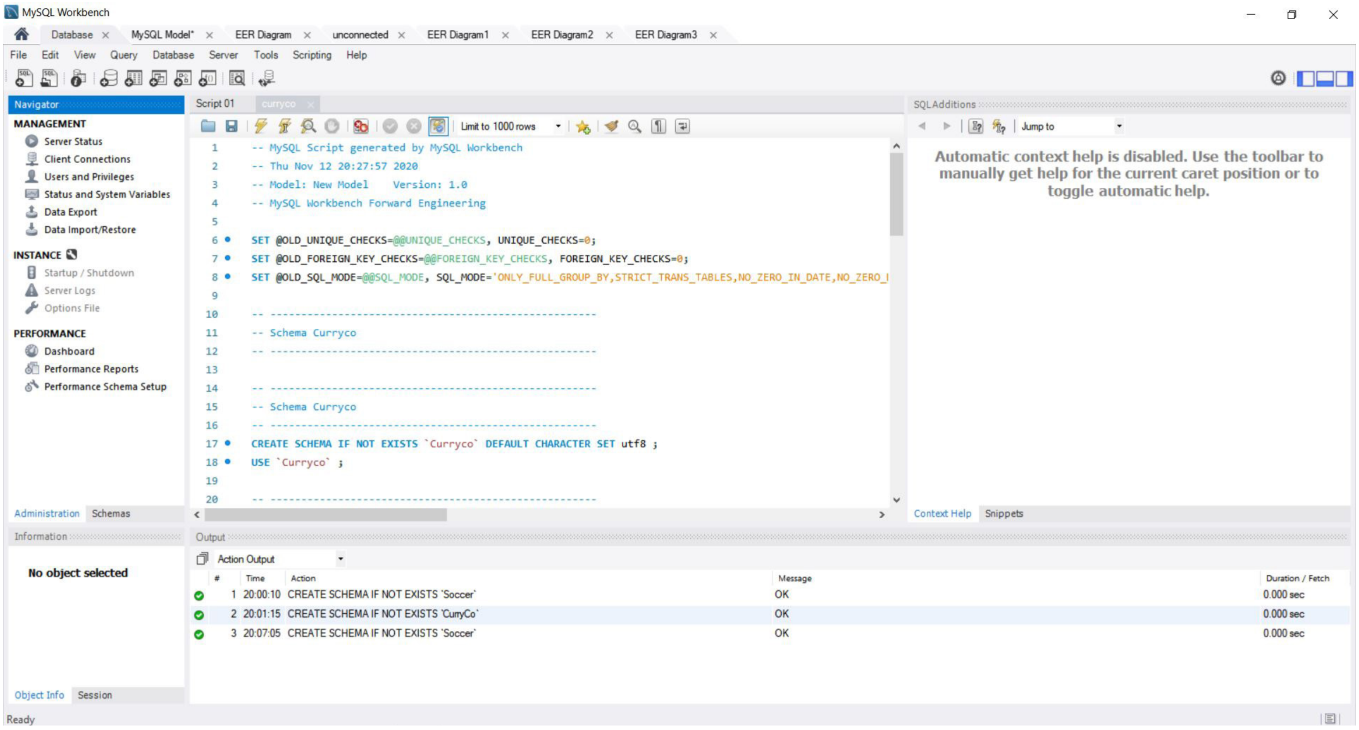
MySQL Workbench enables a DBA, developer, or data architect to visually design, model, generate, and manage databases. It includes everything a data modeler needs for creating complex ER models, forward and reverse engineering, and also delivers key features for performing difficult change management and documentation tasks that normally require much time and effort.

MySQL Workbench delivers visual tools for creating, executing, and optimizing SQL queries. The SQL Editor provides color syntax highlighting, auto-complete, reuse of SQL snippets, and execution history of SQL. The Database Connections Panel enables developers to easily manage standard database connections, including MySQL Fabric. The Object Browser provides instant access to database schema and objects.

MySQL Workbench provides a visual console to easily administer MySQL environments and gain better visibility into databases. Developers and DBAs can use the visual tools for configuring servers, administering users, performing backup and recovery, inspecting audit data, and viewing database health.

MySQL Workbench provides a suite of tools to improve the performance of MySQL applications. DBAs can quickly view key performance indicators using the Performance Dashboard. Performance Reports provide easy identification and access to IO hotspots, high cost SQL statements, and more. Plus, with 1 click, developers can see where to optimize their query with the improved and easy to use Visual Explain Plan.

MySQL Workbench now provides a complete, easy to use solution for migrating Microsoft SQL Server, Microsoft Access, Sybase ASE, PostreSQL, and other RDBMS tables, objects and data to MySQL. Developers and DBAs can quickly and easily convert existing applications to run on MySQL both on Windows and other platforms. Migration also supports migrating from earlier versions of MySQL to the latest releases.



```
-- MySQL Script generated by MySQL Workbench
-- Thu Nov 12 20:27:57 2020
-- Model: New Model    Version: 1.0
-- MySQL Workbench Forward Engineering

SET @OLD_UNIQUE_CHECKS=@@UNIQUE_CHECKS, UNIQUE_CHECKS=0;
SET @OLD_FOREIGN_KEY_CHECKS=@@FOREIGN_KEY_CHECKS, FOREIGN_KEY_CHECKS=0;
SET @OLD_SQL_MODE=@@SQL_MODE, SQL_MODE='ONLY_FULL_GROUP_BY,STRICT_TRANS_TABLES,NO_ZERO_IN_DATE,NO_ZERO_

-- -----------------------------------------------------
-- Schema Curryco
-- -----------------------------------------------------

-- -----------------------------------------------------
-- Schema Curryco
-- -----------------------------------------------------
CREATE SCHEMA IF NOT EXISTS `Curryco` DEFAULT CHARACTER SET utf8 ;
USE `Curryco` ;

-- -----------------------------------------------------
```

Automatic context help is disabled. Use the toolbar to manually get help for the current caret position or to toggle automatic help.

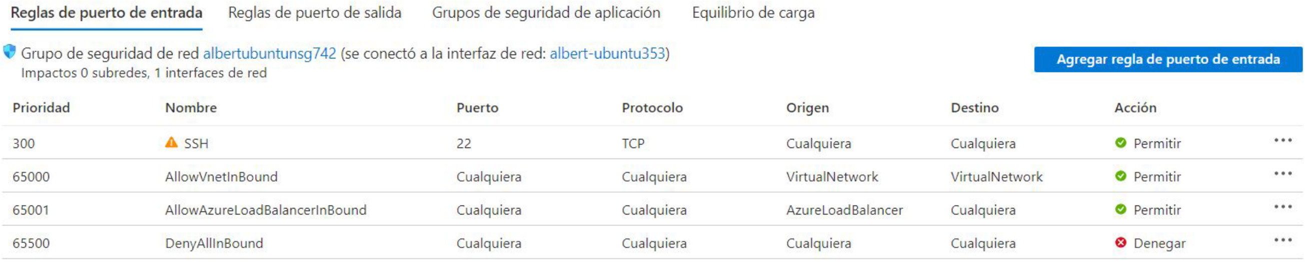
No object selected

#	Time	Action	Message	Duration / Fetch
1	20:00:10	CREATE SCHEMA IF NOT EXISTS `Soccer`	OK	0.000 sec
2	20:01:15	CREATE SCHEMA IF NOT EXISTS `CurryCo`	OK	0.000 sec
3	20:07:05	CREATE SCHEMA IF NOT EXISTS `Soccer`	OK	0.000 sec

2. Explain in detail how we make the connection and its configuration between our Microsoft Azure server and the Mysql Workbench IDE.

First of all we have to have MySQL WorkBench installed, docker in the Azure virtual machine and the SSH connection configured.

The first thing will be to allow traffic on port 3306 of our Azure machine. Entering our virtual machine and adding the input rule with the desired port.

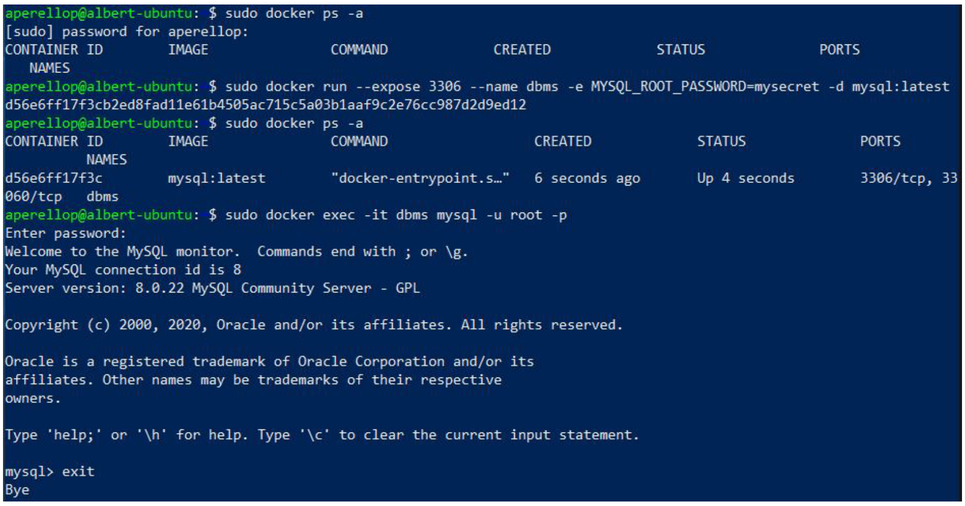


Reglas de puerto de entrada
Reglas de puerto de salida
Grupos de seguridad de aplicación
Equilibrio de carga
Agregar regla de puerto de entrada

Grupo de seguridad de red albertubuntunsg742 (se conectó a la interfaz de red: albert-ubuntu353)
Impactos 0 subredes, 1 interfaces de red

Prioridad	Nombre	Puerto	Protocolo	Origen	Destino	Acción
300	⚠ SSH	22	TCP	Cualquiera	Cualquiera	✓ Permitir
65000	AllowVnetInBound	Cualquiera	Cualquiera	VirtualNetwork	VirtualNetwork	✓ Permitir
65001	AllowAzureLoadBalancerInBound	Cualquiera	Cualquiera	AzureLoadBalancer	Cualquiera	✓ Permitir
65500	DenyAllInBound	Cualquiera	Cualquiera	Cualquiera	Cualquiera	✗ Denegar

Next, we start our virtual machine in Microsoft Azure and we will enter MySQL using, to verify that it works:



```
aperellop@albert-ubuntu:~$ sudo docker ps -a
[sudo] password for aperellop:
CONTAINER ID        IMAGE               COMMAND             CREATED             STATUS              PORTS
   NAMES
aperellop@albert-ubuntu:~$ sudo docker run --expose 3306 --name dbms -e MYSQL_ROOT_PASSWORD=mysecret -d mysql:latest
d56e6ff17f3cb2ed8fad11e61b4505ac715c5a03b1aaf9c2e76cc987d2d9ed12
aperellop@albert-ubuntu:~$ sudo docker ps -a
CONTAINER ID        IMAGE               COMMAND                  CREATED             STATUS              PORTS
          NAMES
d56e6ff17f3c        mysql:latest        "docker-entrypoint.s…"   6 seconds ago       Up 4 seconds        3306/tcp, 33
060/tcp   dbms
aperellop@albert-ubuntu:~$ sudo docker exec -it dbms mysql -u root -p
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 8
Server version: 8.0.22 MySQL Community Server - GPL

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affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> exit
Bye
```
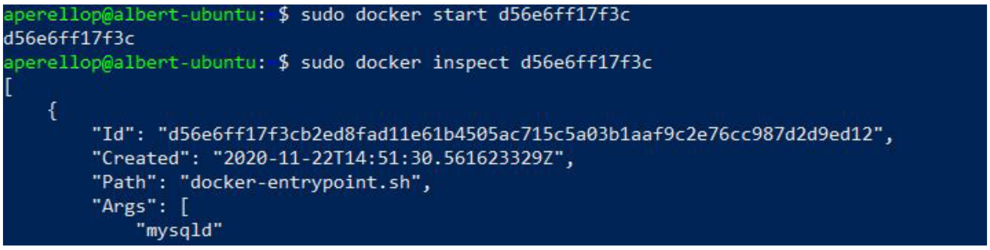
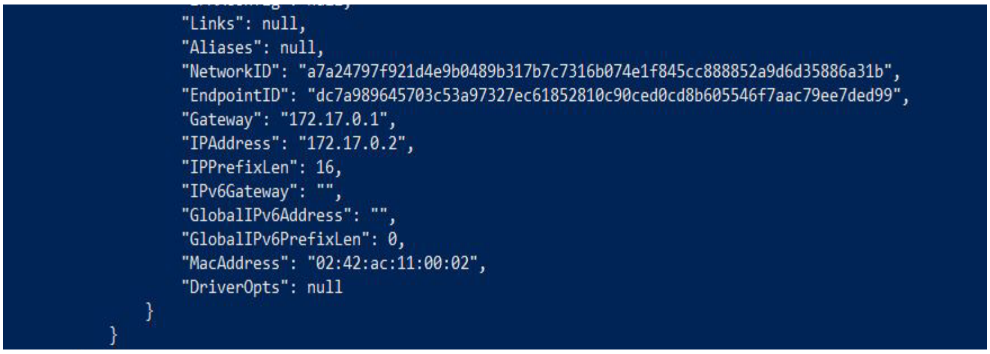

And now we inspect the container to find out the IP of our container (appears below).

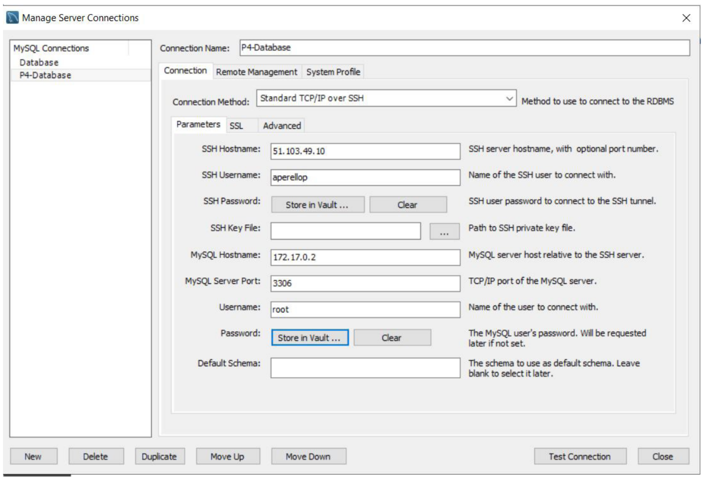


```
aperellop@albert-ubuntu:~$ sudo docker start d56e6ff17f3c
d56e6ff17f3c
aperellop@albert-ubuntu:~$ sudo docker inspect d56e6ff17f3c
[
    {
        "Id": "d56e6ff17f3cb2ed8fad11e61b4505ac715c5a03b1aaf9c2e76cc987d2d9ed12",
        "Created": "2020-11-22T14:51:30.561623329Z",
        "Path": "docker-entrypoint.sh",
        "Args": [
            "mysqld"
```



```
                    "Links": null,
                    "Aliases": null,
                    "NetworkID": "a7a24797f921d4e9b0489b317b7c7316b074e1f845cc888852a9d6d35886a31b",
                    "EndpointID": "dc7a989645703c53a97327ec61852810c90ced0cd8b605546f7aac79ee7ded99",
                    "Gateway": "172.17.0.1",
                    "IPAddress": "172.17.0.2",
                    "IPPrefixLen": 16,
                    "IPv6Gateway": "",
                    "GlobalIPv6Address": "",
                    "GlobalIPv6PrefixLen": 0,
                    "MacAddress": "02:42:ac:11:00:02",
                    "DriverOpts": null
                }
            }
```

Having verified that MySQL works, we open MySQL WorckBench and click Database> Manage Connections. A window will open and we will give New and we will name that connection, we will also edit the type of connection, we will enter the IP of our SSH connection and the user of our Virtual Machine, and in password we will press Store in Vault and write the SSH password. Then we will enter the IP that the Docker inspect has given us in MySQL Hostname, and in Password we will click Store in Vault and enter the password defined in the Docker run.


Manage Server Connections

MySQL Connections
Database
P4-Database

Connection Name: P4-Database

Connection | Remote Management | System Profile

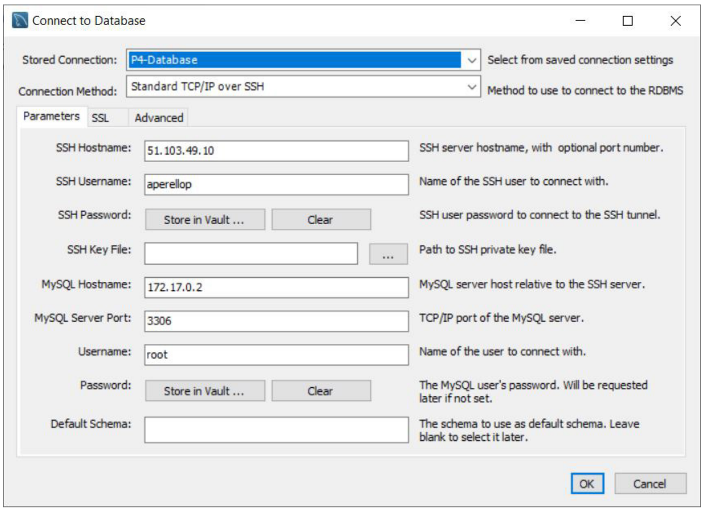
Connection Method: Standard TCP/IP over SSH — Method to use to connect to the RDBMS

Parameters | SSL | Advanced

SSH Hostname: 51.103.49.10 — SSH server hostname, with optional port number.
SSH Username: aperellop — Name of the SSH user to connect with.
SSH Password: Store in Vault ... Clear — SSH user password to connect to the SSH tunnel.
SSH Key File: ... — Path to SSH private key file.
MySQL Hostname: 172.17.0.2 — MySQL server host relative to the SSH server.
MySQL Server Port: 3306 — TCP/IP port of the MySQL server.
Username: root — Name of the user to connect with.
Password: Store in Vault ... Clear — The MySQL user's password. Will be requested later if not set.
Default Schema: — The schema to use as default schema. Leave blank to select it later.

When we have all these fields completed, we will do the Test Connection.

Once the virtual machine is paired with Microsoft Azure, click Database> Connect to database and fill in the necessary fields, which we can see in the image on the right.


Connect to Database

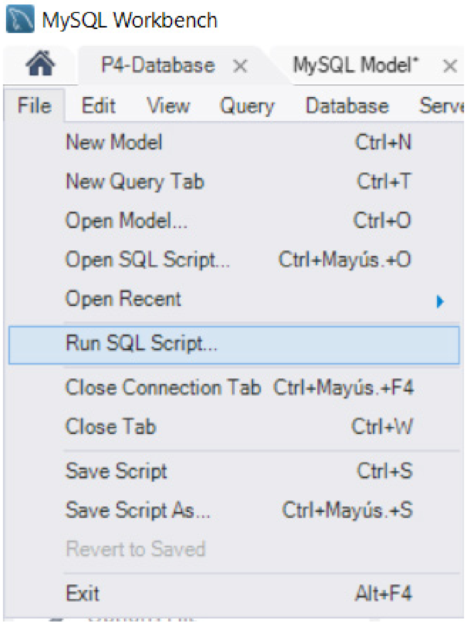
Stored Connection: P4-Database — Select from saved connection settings
Connection Method: Standard TCP/IP over SSH — Method to use to connect to the RDBMS

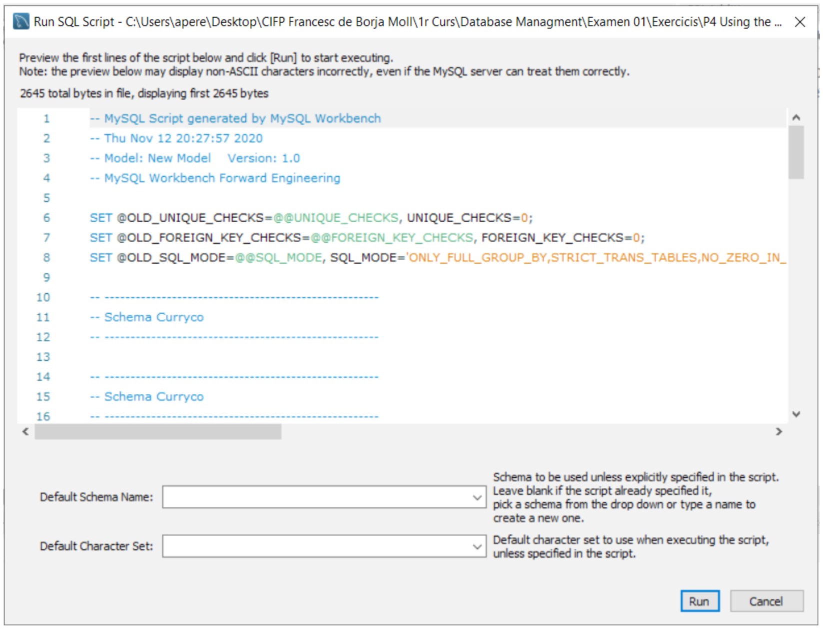
Parameters | SSL | Advanced

SSH Hostname: 51.103.49.10 — SSH server hostname, with optional port number.
SSH Username: aperellop — Name of the SSH user to connect with.
SSH Password: Store in Vault ... Clear — SSH user password to connect to the SSH tunnel.
SSH Key File: ... — Path to SSH private key file.
MySQL Hostname: 172.17.0.2 — MySQL server host relative to the SSH server.
MySQL Server Port: 3306 — TCP/IP port of the MySQL server.
Username: root — Name of the user to connect with.
Password: Store in Vault ... Clear — The MySQL user's password. Will be requested later if not set.
Default Schema: — The schema to use as default schema. Leave blank to select it later.

3. Looking at Databases from class exercise and its tables in MySQL Workbench, use the MySQL Workbench Navigator to review an existing database schema.

To load the Soccer database, first of all we will click File> Run SQL Scrip and we will choose the SQL file on which we want to work, we will complete the steps that it asks us to do.




Run SQL Script - C:\Users\apere\Desktop\CIFP Francesc de Borja Moll\1r Curs\Database Managment\Examen 01\Exercicis\P4 Using the ...

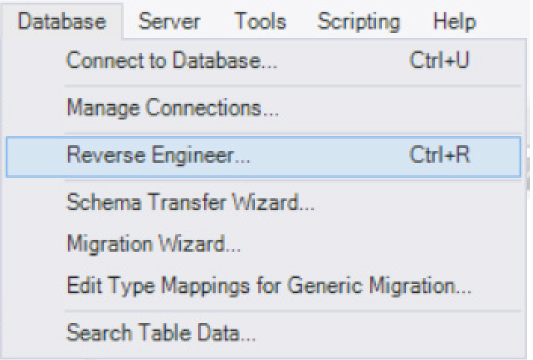
Preview the first lines of the script below and click [Run] to start executing.
Note: the preview below may display non-ASCII characters incorrectly, even if the MySQL server can treat them correctly.

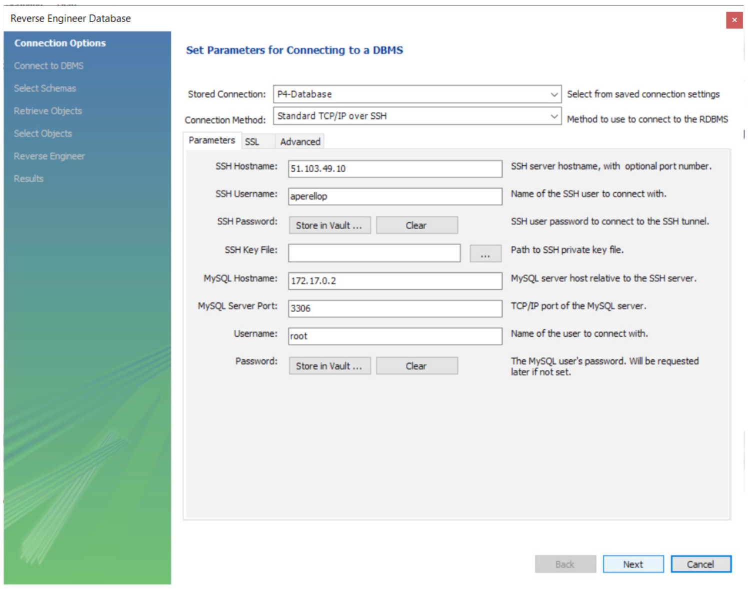
2645 total bytes in file, displaying first 2645 bytes

```
-- MySQL Script generated by MySQL Workbench
-- Thu Nov 12 20:27:57 2020
-- Model: New Model    Version: 1.0
-- MySQL Workbench Forward Engineering

SET @OLD_UNIQUE_CHECKS=@@UNIQUE_CHECKS, UNIQUE_CHECKS=0;
SET @OLD_FOREIGN_KEY_CHECKS=@@FOREIGN_KEY_CHECKS, FOREIGN_KEY_CHECKS=0;
SET @OLD_SQL_MODE=@@SQL_MODE, SQL_MODE='ONLY_FULL_GROUP_BY,STRICT_TRANS_TABLES,NO_ZERO_IN_

-- -----------------------------------------------------
-- Schema Curryco
-- -----------------------------------------------------

-- -----------------------------------------------------
-- Schema Curryco
-- -----------------------------------------------------
```

Default Schema Name: — Schema to be used unless explicitly specified in the script. Leave blank if the script already specified it, pick a schema from the drop down or type a name to create a new one.
Default Character Set: — Default character set to use when executing the script, unless specified in the script.

When we finish this step, we will click Database> Reverse Engineer to view the tables in our database.


Database
Server
Tools
Scripting
Help
Connect to Database... Ctrl+U
Manage Connections...
Reverse Engineer... Ctrl+R
Schema Transfer Wizard...
Migration Wizard...
Edit Type Mappings for Generic Migration...
Search Table Data...



Set Parameters for Connecting to a DBMS

Stored Connection: P4-Database — Select from saved connection settings

Connection Method: Standard TCP/IP over SSH — Method to use to connect to the RDBMS

SSH Hostname: 51.103.49.10 — SSH server hostname, with optional port number.

SSH Username: aperellop — Name of the SSH user to connect with.

SSH Password: Store in Vault ... Clear — SSH user password to connect to the SSH tunnel.

SSH Key File: ... — Path to SSH private key file.

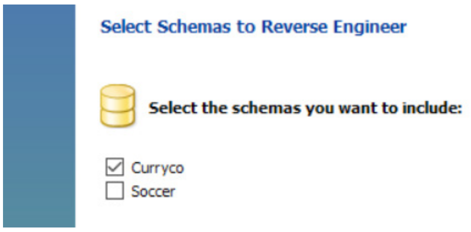
MySQL Hostname: 172.17.0.2 — MySQL server host relative to the SSH server.

MySQL Server Port: 3306 — TCP/IP port of the MySQL server.

Username: root — Name of the user to connect with.

Password: Store in Vault ... Clear — The MySQL user's password. Will be requested later if not set.

We select the desired database.



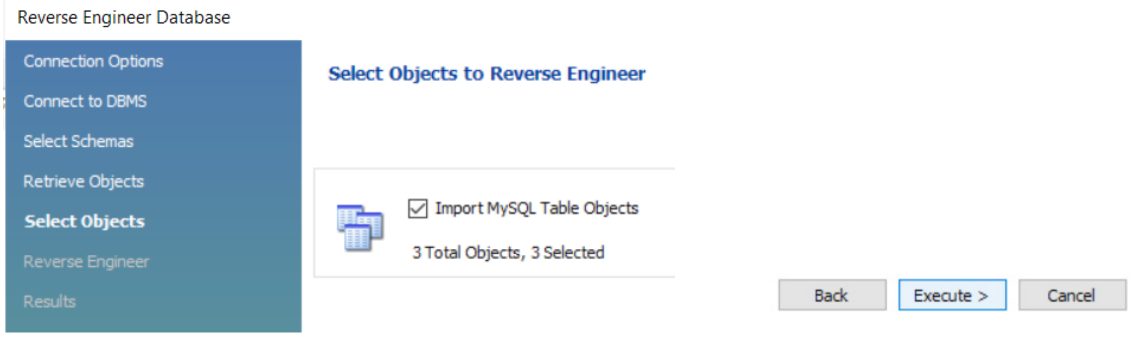
Select Schemas to Reverse Engineer

Select the schemas you want to include:

☑ Curryco

□ Soccer

And we click Run.

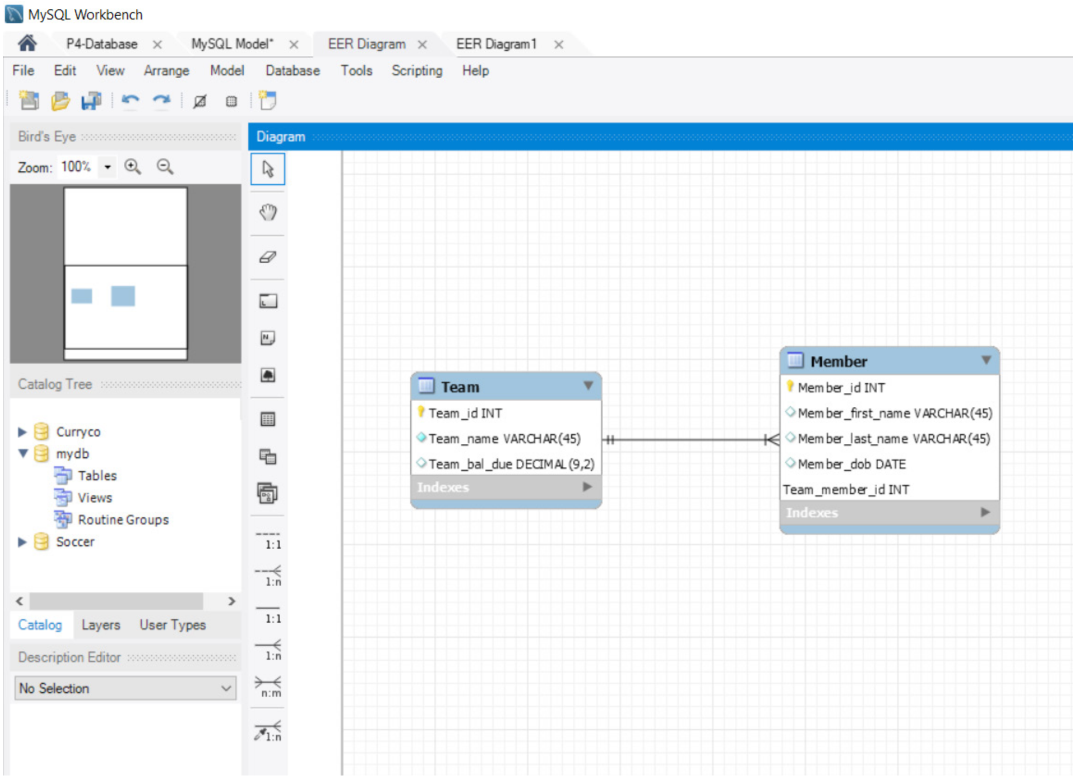


Select Objects to Reverse Engineer

☑ Import MySQL Table Objects

3 Total Objects, 3 Selected

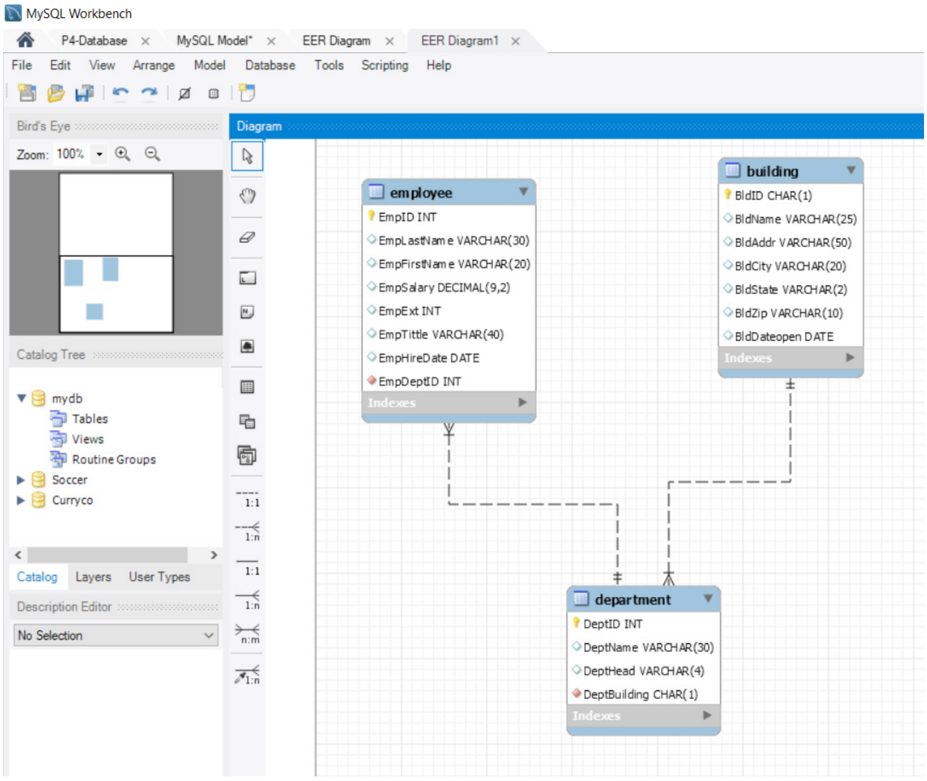
3.1. Soccer



Team
- Team_id INT
- Team_name VARCHAR(45)
- Team_bal_due DECIMAL(9,2)

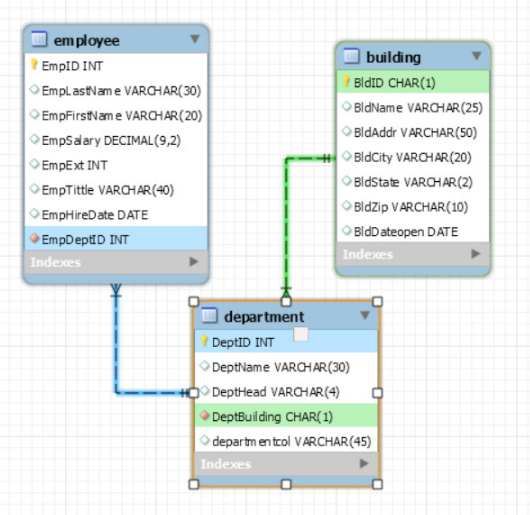
Member
- Member_id INT
- Member_first_name VARCHAR(45)
- Member_last_name VARCHAR(45)
- Member_dob DATE
- Team_member_id INT

3.2. CurryCo



4. Load Database Tables, using the different features within MySQL Workbench to load rows of data into the two tables in CurryCo database, describe the process.

By double-clicking on one of the entities in the diagram, a table appears where we can enter or modify the attributes that we already have associated with the entity, such as the one we have below.



In it we can attribute to it the type of attribute it is (Primarty Key, Not Null, Unique Index, Binary, Unsigned ...).

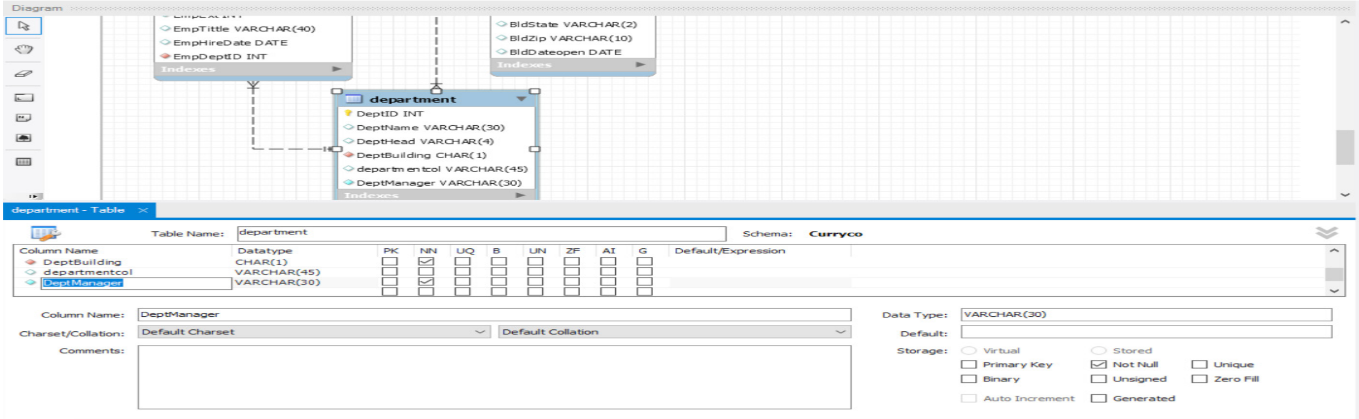


Table Name: department   Schema: Curryco

Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G	Default/Expression
DeptBuilding	CHAR(1)	□	☑	□	□	□	□	□	□	
departmentcol	VARCHAR(45)	□	□	□	□	□	□	□	□	
DeptManager	VARCHAR(30)	□	☑	□	□	□	□	□	□	

Column Name: DeptManager

Charset/Collation: Default Charset | Default Collation

Comments:

Data Type: VARCHAR(30)

Default:

Storage: ○ Virtual ○ Stored

□ Primary Key ☑ Not Null □ Unique

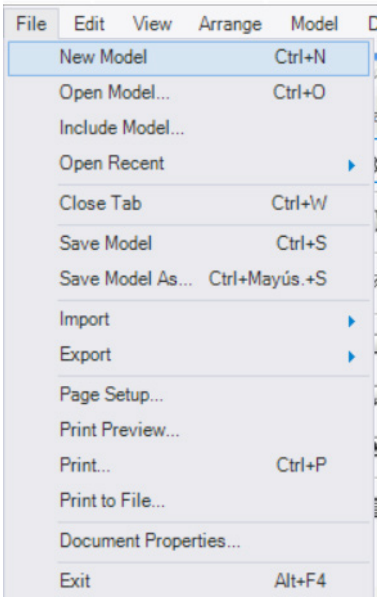
□ Binary □ Unsigned □ Zero Fill

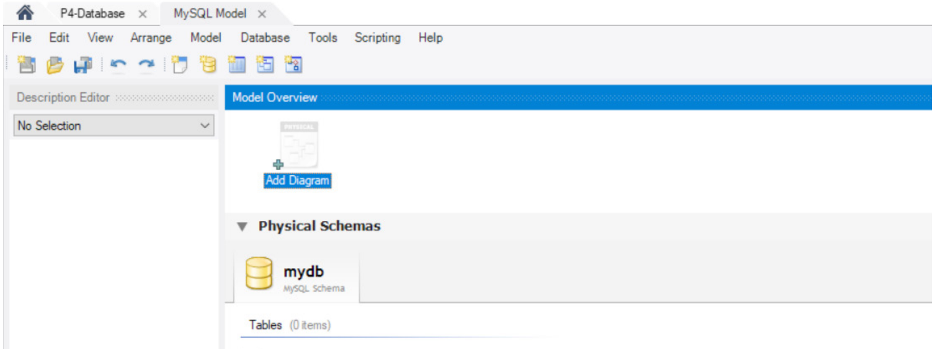
□ Auto Increment □ Generated

5. Using the Modeling and Design Tool and this document, that contains the requirements and the complete analysis, use tools in MySQL Workbench to draw a model of a database, and then generate a script to create the schema.

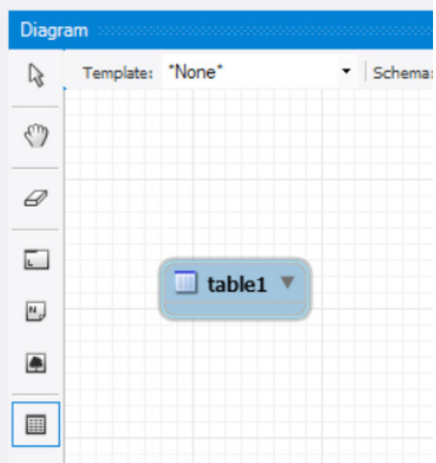
First of all, click File> New Model to create the document where we will make the entity-relationship diagram.

Once we have the document, click on Add Diagram and a blank space will appear for our diagram and several tools on the left to build it.





With the New Table tool we will place each of the Entities where we click. And within each one of them, by double clicking on them, we will enter the menu to add the attributes.



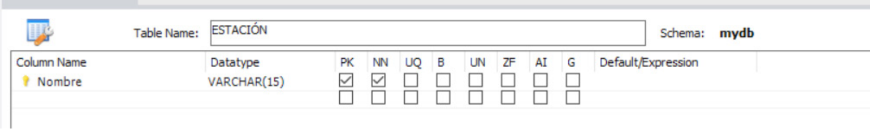
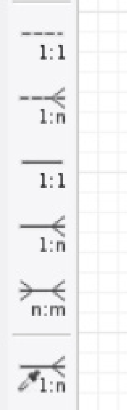
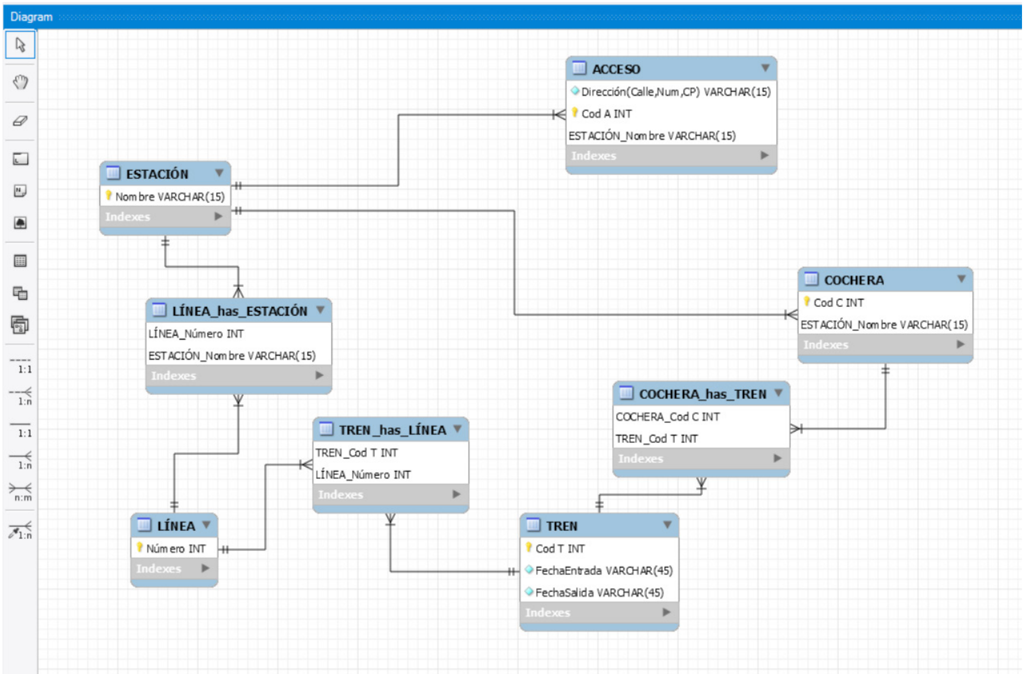


Table Name: ESTACIÓN Schema: mydb

Column Name	Datatype	PK	NN	UQ	B	UN	ZF	AI	G	Default/Expression
Nombre	VARCHAR(15)	☑	☑	□	□	□	□	□	□	
		□	□	□	□	□	□	□	□	



Finally, with the relationship tools we will create the relationship tables between each of the entities present.



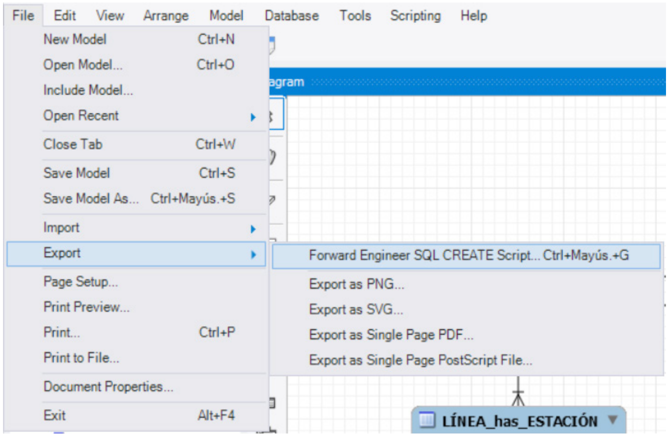
6. Translates the Entity-Relationship diagram to the relational model using the rules seen in class

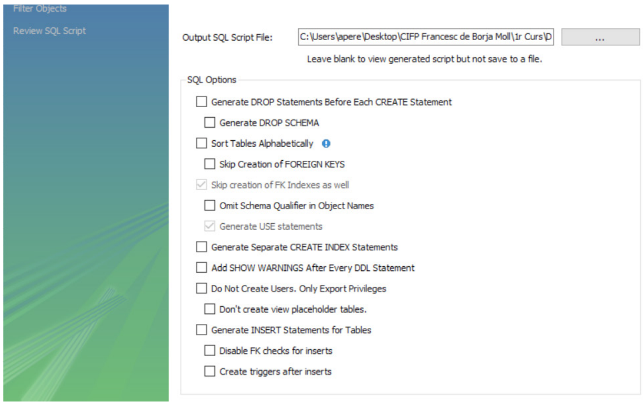
-Estación eNombre, <u>eCod</u>.
-Acceso: <u>aCod</u>, aDireccion(aNum, aCalle, aCP).
-Cocheria: <u>cCod</u>.
-Línea: <u>lNumero</u>, lAlta, lBaja.
-Tren: <u>tCod</u>, tFecSalida, tFecEntrada.

Entities	Relationship	Cardinality
Estación - Acceso	-Una estacón tiene un acceso. -Un acceso puede llevar a una o varias estaciones.	1,1 1,N **1:N**
Estación - Cocheria	-Una estación puede tener una o varias cocherias. -Una cocheria puede estar en ninguna o una estacion.	1,1 0,N **1:N**
Estación - Línea	-En una estacion puede estar compuesta por una o varias lineas. -Una líneas puede llevar a una o varias estaciones.	1,N 1,M **N:M**
Línea - Tren	-Una línea se compone de uno o varios trenes. -Un tren esta asignado a una o varias líneas.	1,N 1,M **N:M**
Tren - Cocheria	-Un tren puede dormir en ninguna varias cocheria. -Una cocheria puede contener uno o varios trenes	0,N 1,M **N:M**

7. Generate a Database from the previous Model, use the script created from the model created in the previous task, you have to generate a multi-table database schema.

With the entity-relationship diagram created, the first thing to do is click File> Export> Forward Engireer SQL CREATE Script.





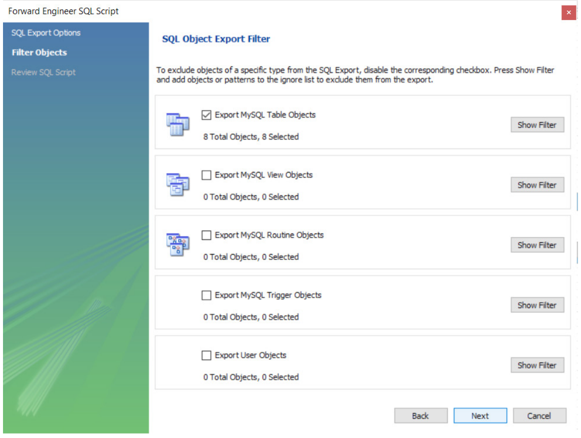
Output SQL Script File: C:\Users\apere\Desktop\CIFP Francesc de Borja Moll\1r Curs\D

Leave blank to view generated script but not save to a file.

SQL Options

- ☐ Generate DROP Statements Before Each CREATE Statement
  - ☐ Generate DROP SCHEMA
- ☐ Sort Tables Alphabetically
  - ☐ Skip Creation of FOREIGN KEYS
- ☑ Skip creation of FK Indexes as well
  - ☐ Omit Schema Qualifier in Object Names
  - ☑ Generate USE statements
- ☐ Generate Separate CREATE INDEX Statements
- ☐ Add SHOW WARNINGS After Every DDL Statement
- ☐ Do Not Create Users. Only Export Privileges
  - ☐ Don't create view placeholder tables.
- ☐ Generate INSERT Statements for Tables
  - ☐ Disable FK checks for inserts
  - ☐ Create triggers after inserts

We are following the steps of the process as they appear to us.



Forward Engineer SQL Script

SQL Export Options
Filter Objects
Review SQL Script

SQL Object Export Filter

To exclude objects of a specific type from the SQL Export, disable the corresponding checkbox. Press Show Filter and add objects or patterns to the ignore list to exclude them from the export.

☑ Export MySQL Table Objects — 8 Total Objects, 8 Selected — Show Filter

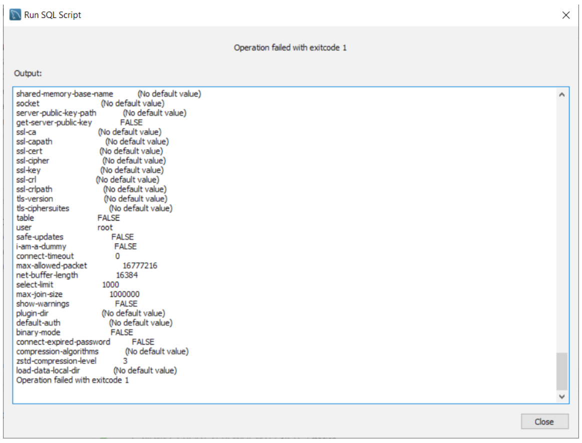
□ Export MySQL View Objects — 0 Total Objects, 0 Selected — Show Filter

□ Export MySQL Routine Objects — 0 Total Objects, 0 Selected — Show Filter

□ Export MySQL Trigger Objects — 0 Total Objects, 0 Selected — Show Filter

□ Export User Objects — 0 Total Objects, 0 Selected — Show Filter

Back | Next | Cancel



Run SQL Script

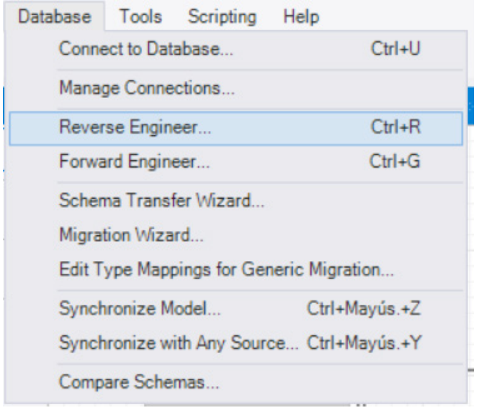
Operation failed with exitcode 1

Output:

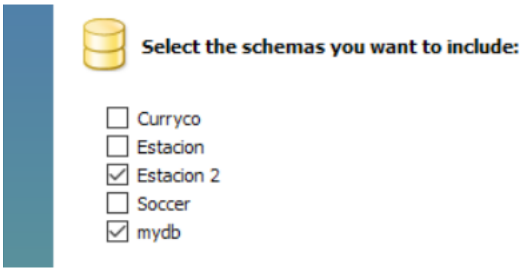
```
shared-memory-base-name        (No default value)
socket                     (No default value)
server-public-key-path         (No default value)
get-server-public-key          FALSE
ssl-ca                     (No default value)
ssl-capath                  (No default value)
ssl-cert                   (No default value)
ssl-cipher                  (No default value)
ssl-key                    (No default value)
ssl-crl                    (No default value)
ssl-crlpath                  (No default value)
tls-version                  (No default value)
tls-ciphersuites               (No default value)
table                      FALSE
user                       root
safe-updates                  FALSE
i-am-a-dummy                   FALSE
connect-timeout                0
max-allowed-packet               16777216
net-buffer-length               16384
select-limit                1000
max-join-size                  1000000
show-warnings                   FALSE
plugin-dir                  (No default value)
default-auth                   (No default value)
binary-mode                   FALSE
connect-expired-password         FALSE
compression-algorithms          (No default value)
zstd-compression-level          3
load-data-local-dir             (No default value)
Operation failed with exitcode 1
```

Close

Next we click Database> Reverse Engineer and we follow the steps up to where it asks us for the schemes that interest us, then we mark them and we click Next.

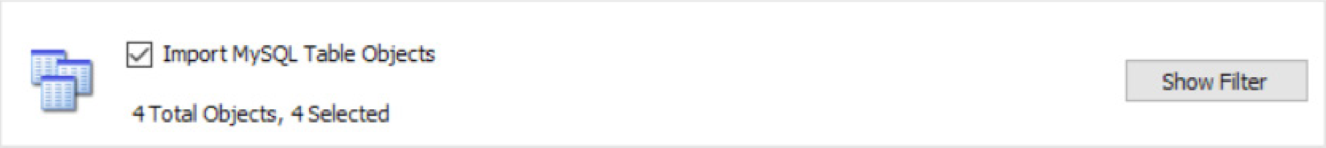


Database
Tools
Scripting
Help
Connect to Database... Ctrl+U
Manage Connections...
Reverse Engineer... Ctrl+R
Forward Engineer... Ctrl+G
Schema Transfer Wizard...
Migration Wizard...
Edit Type Mappings for Generic Migration...
Synchronize Model... Ctrl+Mayús.+Z
Synchronize with Any Source... Ctrl+Mayús.+Y
Compare Schemas...



Select the schemas you want to include:

□ Curryco
□ Estacion
☑ Estacion 2
□ Soccer
☑ mydb

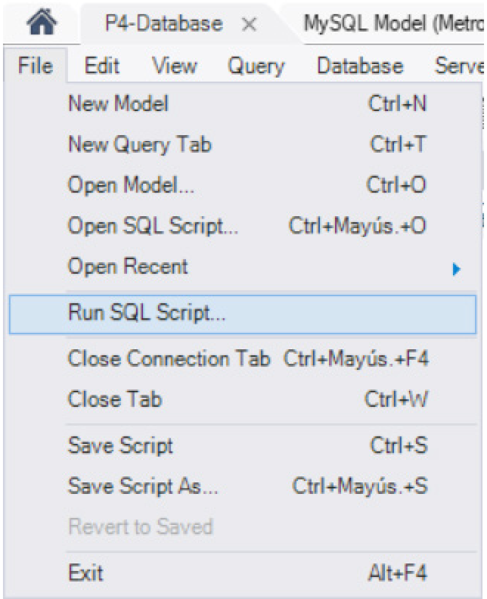


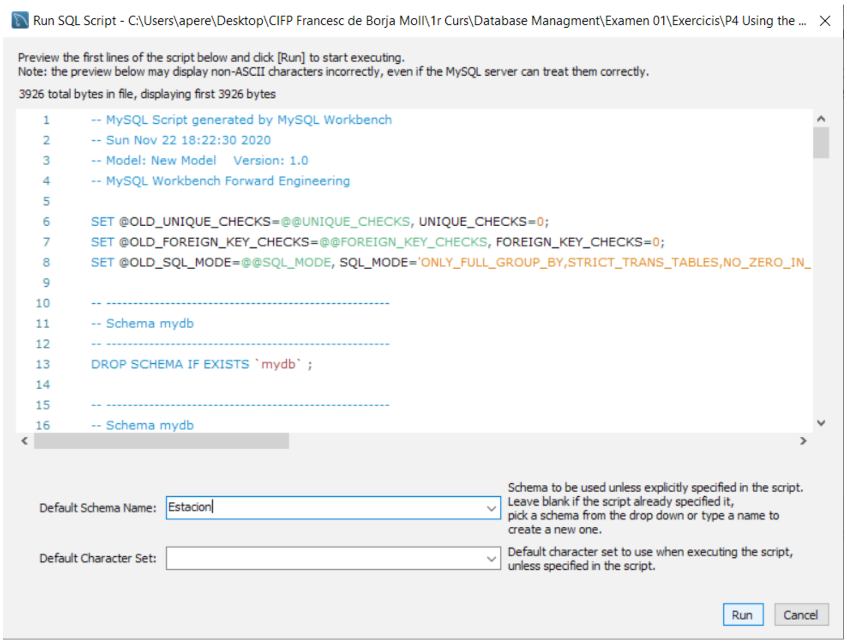
☑ Import MySQL Table Objects

4 Total Objects, 4 Selected

Show Filter

Now we must go to the File> Run SQL Script menu and follow the steps again until we obtain the Script from our table.





Run SQL Script - C:\Users\apere\Desktop\CIFP Francesc de Borja Moll\1r Curs\Database Managment\Examen 01\Exercicis\P4 Using the ...

Preview the first lines of the script below and click [Run] to start executing.
Note: the preview below may display non-ASCII characters incorrectly, even if the MySQL server can treat them correctly.

3926 total bytes in file, displaying first 3926 bytes

```
-- MySQL Script generated by MySQL Workbench
-- Sun Nov 22 18:22:30 2020
-- Model: New Model    Version: 1.0
-- MySQL Workbench Forward Engineering

SET @OLD_UNIQUE_CHECKS=@@UNIQUE_CHECKS, UNIQUE_CHECKS=0;
SET @OLD_FOREIGN_KEY_CHECKS=@@FOREIGN_KEY_CHECKS, FOREIGN_KEY_CHECKS=0;
SET @OLD_SQL_MODE=@@SQL_MODE, SQL_MODE='ONLY_FULL_GROUP_BY,STRICT_TRANS_TABLES,NO_ZERO_IN_

-- -----------------------------------------------------
-- Schema mydb
-- -----------------------------------------------------
DROP SCHEMA IF EXISTS `mydb` ;

-- -----------------------------------------------------
-- Schema mydb
```

Default Schema Name: Estacion

Schema to be used unless explicitly specified in the script. Leave blank if the script already specified it, pick a schema from the drop down or type a name to create a new one.

Default Character Set:

Default character set to use when executing the script, unless specified in the script.

Run | Cancel

Finally, we get the Script.

8. Finally use the Query Window to Retrieve Data, use MySQL Workbench's query window to write SQL code to display the contents of all tables from the previous task.

9. Bibliography

https://www.mysql.com/products/workbench/
https://es.wikipedia.org/wiki/MySQL_Workbench