

SQL Exercises

The Company schema is shown below (primary keys underlined, foreign keys in italics).

DBEmployee (ssn:6 digits, lastname:text(20), firstnames:text(20),
dateOfBirth:date, gender:[M,F], salary:integer,
empdNum:integer(1..100), *supssn:6 digits*)

- 'ssn' is the primary key
- 'empdNum' is a foreign key referencing 'dNum' in Department
- 'supssn' is a foreign key referencing 'ssn' in Employee

DBDepartment (dNum:integer(1 .. 100), dName:text(15), *mgsSsn:6 digits*,
mgrStartDate:date)

- 'dNum' is the primary key
- 'mgrSsn' is a foreign key referencing 'ssn' in Employee

DBLocation (ldNum:integer(1..100), loc:text(15))

- 'ldNum' and 'loc' form a composite primary key.
- 'ldNum' is a foreign key referencing 'dNum' in Department

DBProject (pNum:integer(1..20), pName:text(20))

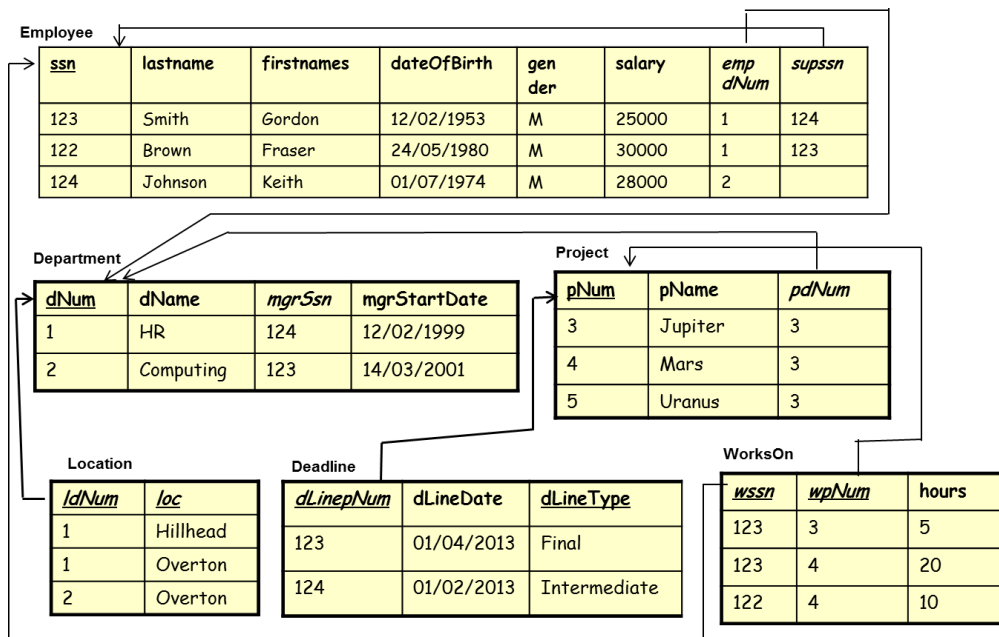
- 'pNum' is the primary key

DBWorksOn (*wssn:6 digits*, *wpNum:integer(1..20)*, hours:integer)

- 'wssn' and 'wpNum' together form a composite primary key
- 'wssn' is a foreign key referencing 'ssn' in Employee
- 'wpNum' is a foreign key referencing 'pNum' in Project

DBDeadline (*projPNum:integer(1..20)*, *dLineDate:date*, *dLineType*)

- 'dLinePNum' and 'dLineDate' together form a composite foreign key
- 'dLinePNum' is a foreign key referencing 'pNum' in Project



Server details

You can access the MariaDB server using any of these methods:

[Substitute `abc123` for your username]

- 1) mySQL Workbench - please install on your own laptop or use in the GRID PC lab
[<https://mariadb.com/docs/skysql-previous-release/connect/clients/mysql-workbench>]

```
host name: 132.145.18.222
port: 3306
username: {your username eg abc123}
password: {your mariadb password}
default schema: {your work username eg abc123}
```

- 2) phpMyAdmin <https://www.macs.hw.ac.uk/phpMyAdmin/index.php>
(IP address of server is 132.145.18.222, HWU username and MariaDB password)

- 3) Using Google Colab – make your own copy of this notebook
<https://colab.research.google.com/drive/1AFgg-U4Kni3aFTosNpBZCEFrR8reJMyW?usp=sharing>

- 4) HWU Linux server terminal (Edinburgh)

```
ssh abc123@jove.macs.ac.uk
password: your_hwu_macs_linux_password
```

(once logged into the Linux server)

```
mysql -u abc123 -p your_db_password -h 132.145.18.222 -D abc123
```

LOAD THE DATA

Load the database file to create the company DB.

This is available from Canvas learning materials, or from the command line using `wget` as follows.

```
wget www.macs.hw.ac.uk/~pb56/createcompanydb.sql
```

From a Linux terminal (not in MariaDB yet) – substitute `abc123` for your username:

```
mysql -u abc123 -p abc123 < createcompanydb.sql
```

[enter your MariaDB password when prompted]

[wait about 60 seconds for the data to load]

Note:

On MySQL Workbench you can download the .sql file then load it into a query window, and run it as any other set of SQL commands.

Once you have loaded the data take a look at the questions to answer on the database, using SQL. If you are happy with how this work then feel free to skip thru the questions and take samples from each section to try out. Try some from the top, middle, bottom as they increase in complexity.

(see next page for questions)

QUESTIONS TO ANSWER USING SQL

1. The ssn, last name and date of birth of all male employees, in name order
2. Find all the different types of deadline
3. Find the name of the department managed by David Lee.
4. Find the name of projects run by the Physics department
5. How many hours does Sanjay James work on the Jupiter project?
6. Investigate string functions LEFT and CONCAT to find the employee names in the format lastname comma space initial e.g. Smith, J. Don't put a space between the function name and the open bracket.
<http://dev.mysql.com/doc/refman/5.6/en/string-functions.html>
7. Create a view to summarise employee names and ssn, the number and name of their department and the locations that this department is based in. Use this in the next question, and afterwards if useful.
8. Use the view to find the locations that each employee might visit (i.e. where their department is located). Display employee names and their locations.
9. Find the number and name of all departments, except those managed by Lee or Kaur.
10. Find the name of each employee and the name of his or her supervisor
11. Find the ssn number and name of all the employees, including, for managers, the department number and name of the department that they manage. Put this in one query.
12. Find the names of employees who do not have a supervisor

AGGREGATE FUNCTIONS

13. Find the total number of different locations (make sure you are not counting the same location more than once – the DISTINCT keyword can be used within the COUNT function)
14. Find how many hours are worked on for each project. Show project number, name and total hours worked.
15. For each department, show the department name and the number of projects worked on, only for departments with more than one project.
16. Find the average number of employees associated with each department. You can use the string FORMAT function to show only 1 decimal place in the result.

UPDATING THE DATA.

If you make a mess, you can always recreate the tables. Or use transactions and rollback after changes if using the command line. Most solutions not given here – they are straightforward.

17. Increase the salary by 1000 for the employee David Lee. Display before/after
18. Jane Barr now works for 10 hours on project Jupiter, prove this worked.
19. Try to delete department 3. This delete should fail because there are employees and projects and locations with foreign keys pointing to the department
20. Add a new department 13. Then delete department number 13. This delete should work because there are no other rows in other tables with foreign keys pointing to the branch.
21. Use transactions here if using the command line. Change the department number from 1 to 10. This should cascade into employees and projects. Check this worked with a query, then revert using rollback.
22. Delete the employee with staff number 220 – should insert null for supervisor for Jane Barr.