

## CE153 – Introduction to Databases

### Queries

#### Objectives

By the end of the lab session the students should complete all the queries on this lab sheet, and therefore gain knowledge and experience in creating SQL queries. We will provide the students with a database specification, design, and implementation.

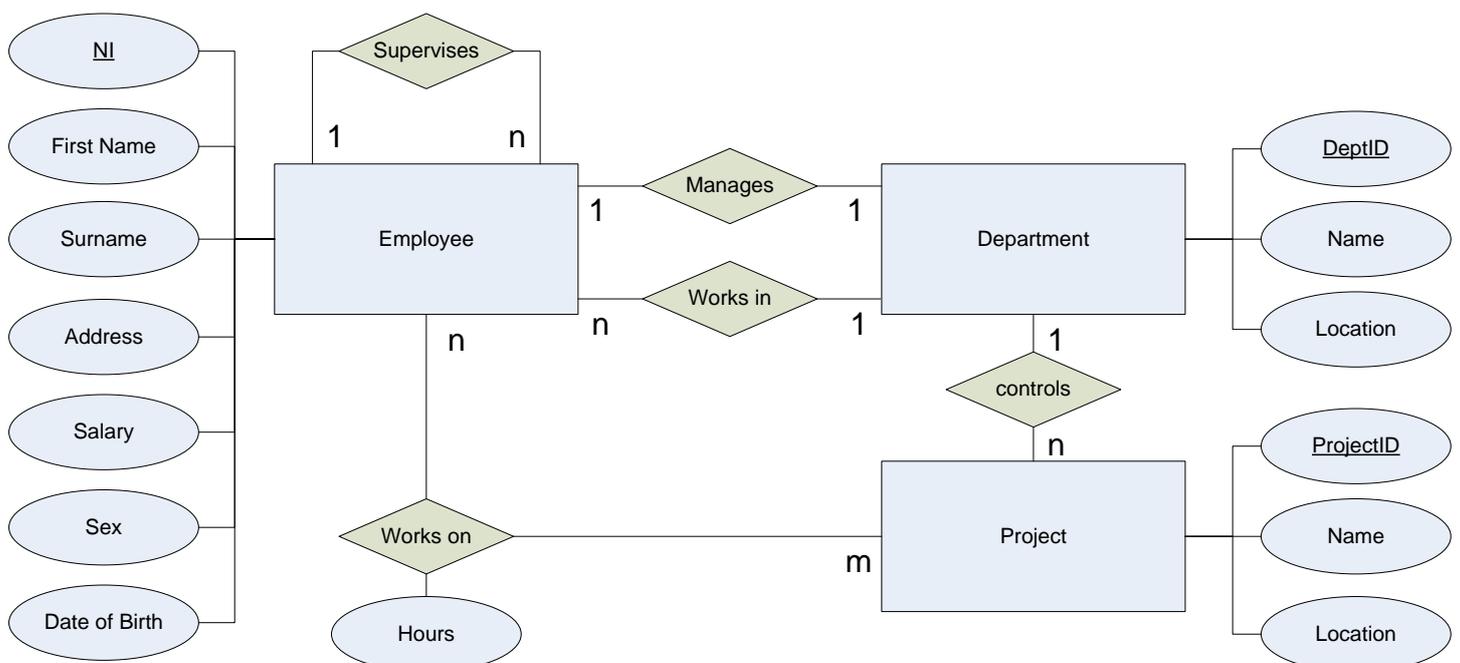
#### Specification

Consider the following specification for a database, named Company:

1. A given company is organised into departments, which are identified by a unique name, and have a single location (an address).
2. Each department controls a number of projects (a project does not belong to more than one department), which are identified by a unique name, and have a single location (an address).
3. The information stored for an employee is first and last name, national insurance number, address, salary, sex, and date of birth. An employee is assigned to one department, but may work on several projects, not necessarily controlled by the same department. The number of hours per week worked by an employee on a given project is also recorded. Additionally, the database should provide information on who is the supervisor of any given employee and vice versa.

#### Design

The above specification can be articulated in ER notation as follows



Take your time to familiarise yourself with this design and see how it relates to the specification.

## Implementation

This has been done for you, and is available from the course area<sup>1</sup>. You should first download the zip file containing the scripts, unzip them to a relevant location (such as `m:\ce153\lab3\`), and then familiarise yourself with them before proceeding further.

Running the `execute.cmd` will run the script (`CompanyDB.sql`) that will create the database, populate it with sample data, and produce a log file. After this the `execute.cmd` file will then execute the `Queries.sql` file, also creating a log file (showing the results of any queries).

You should now attempt all the following queries. You are not allowed to edit the `CompanyDB.sql` script. Feel free to use the MySQL client to develop your solutions, but eventually all your queries should be contained in the `Queries.sql` file.

## Queries

Write SQL queries for each of the following. You are advised to use the MySQL client to prototype your answers, and then copy them into the `queries.sql` file provided for future reference.

### Query 1 ★

Retrieve the date of birth and address of the employee(s) whose name is 'John Smith'.

### Query 2 ★

Select all employee national insurance numbers in the database.

### Query 3 ★

Select all combinations of employee national insurance numbers and department name in the database.

### Query 4 ★

Retrieve the name and address of all employees who work for the 'Research' department.

### Query 5 ★

Find the names of employees who work on all the projects controlled by department number 5.

### Query 6 ★

For every project located in 'Stafford', list the project number, the controlling department number, and the department manager's last name, address and date of birth.

### Query 7 ★

For each employee, retrieve the employee's first and last name and the first and last name of his or her immediate supervisor.

### Query 8 ★

Retrieve all distinct salary values.

### Query 9 ★

Retrieve all employees whose address is in Houston, Texas.

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<sup>1</sup> <http://courses.essex.ac.uk/ce/ce153/restricted/scripts/queries.zip>

**Query 10** ★

Find all employees who were born during the 1950s.

**Query 11** ★★

For each department, retrieve the department number, the number of employees in the department, and their average salary.

**Query 12** ★★

For each project, retrieve the project number, the project name, and the number of employees who work on that project.

**Query 13** ★★★

For each project, on which more than two employees work, retrieve the project number, the project name, and the number of employees who work on the project.

**Query 14** ★★★

For each department that has more than two employees, retrieve the department number and the number of its employees who are making more than £30,000.

Notes:

- ★ Relatively straightforward queries.
- ★★ Queries with elevated difficulty.
- ★★★ Difficult queries.