Course: Database management
Unit: Intermediate SQL 1
Material: Join

In order to have the same database, please import this database:

```
CREATE DATABASE IF NOT EXISTS `P04_queries01` DEFAULT CHARACTER SET utf8mb4 COLLATE
utf8mb4_general_ci;
USE `P04_queries01`;

DROP TABLE IF EXISTS `DEPARTMENTS`;
CREATE TABLE `DEPARTMENTS` (
  `num` int(11) NOT NULL,
  `name` varchar(30) NOT NULL,
  `town_code` varchar(3) DEFAULT NULL
) ENGINE=InnoDB DEFAULT CHARSET=latin1;

INSERT INTO `DEPARTMENTS` (`num`, `name`, `town_code`) VALUES
(10, 'ACCOUNTING', 'SVQ'),
(20, 'RESEARCH', 'MAD'),
(30, 'SALES', 'BCN'),
(40, 'PRODUCTION', 'BIO');

DROP TABLE IF EXISTS `EMPLOYEES`;
CREATE TABLE `EMPLOYEES` (
  `num` int(11) NOT NULL,
  `surname` varchar(50) NOT NULL,
  `name` varchar(50) NOT NULL,
  `manager` int(11) DEFAULT NULL,
  `start_date` date DEFAULT NULL,
  `salary` int(11) DEFAULT NULL,
  `commission` int(11) DEFAULT NULL,
  `dept_num` int(11) DEFAULT NULL,
  `occu_code` varchar(3) DEFAULT NULL
) ENGINE=InnoDB DEFAULT CHARSET=latin1;

INSERT INTO `EMPLOYEES` (`num`, `surname`, `name`, `manager`, `start_date`, `salary`,
`commission`, `dept_num`, `occu_code`) VALUES
(800, 'BANDERAS', 'ANTONIO', NULL, '1991-01-09', 2885, NULL, 20, NULL),
(7369, 'SÁNCHEZ', 'SERGIO', 7902, '1990-12-17', 1040, NULL, NULL, NULL),
(7499, 'ARROYO', 'MARTA', 7698, '1990-02-20', 1500, 390, 30, 'SAL'),
(7521, 'AGUILO', 'JOSEP', 7698, '1991-02-22', 1625, 650, 30, 'SAL'),
(7566, 'AROCA', 'JUDIT', 7839, '1991-04-02', 2900, NULL, 20, 'MAN'),
(7654, 'MARTÍN', 'MONICA', 7698, '1991-09-29', 1600, 1020, 30, 'SAL'),
(7698, 'AMER', 'BARTOLOME', 7839, '1991-05-01', 3005, NULL, 30, NULL),
(7782, 'COLOM', 'ENRIQUE', 7839, '1991-06-09', 2885, NULL, 10, 'MAN'),
(7788, 'GIL', 'JAVIER', 7566, '1991-11-09', 3000, NULL, 20, 'ANA'),
(7844, 'TOVAR', 'LUIS', 7698, '1991-09-08', 1350, 0, 30, 'SAL'),
(7876, 'ALONSO', 'FERNANDO', 7788, '1991-09-23', 1430, NULL, 20, 'EMP'),
(7900, 'JIMENO', 'XAVIER', 7698, '1991-12-03', 1335, NULL, 30, 'EMP'),
(7902, 'FERNÁNDEZ', 'ANA', 7566, '1991-12-03', 3000, NULL, NULL, 'ANA'),
(7934, 'MUÑOZ', 'ANTONIA', 7782, '1992-01-23', 1690, NULL, 10, 'EMP'),
(8001, 'RUIZ', 'FERNANDA', 7839, '1992-06-10', 2885, NULL, 20, 'MAN');

DROP TABLE IF EXISTS `OCCUPATIONS`;
CREATE TABLE `OCCUPATIONS` (
  `code` varchar(3) NOT NULL,
  `name` varchar(30) NOT NULL
) ENGINE=InnoDB DEFAULT CHARSET=latin1;

INSERT INTO `OCCUPATIONS` (`code`, `name`) VALUES
```

```sql
('ANA', 'ANALYST'),
('EMP', 'EMPLOYEE'),
('MAN', 'MANAGER'),
('PRE', 'PRESIDENT'),
('SAL', 'SALESMAN');

DROP TABLE IF EXISTS `TOWNS`;
CREATE TABLE `TOWNS` (
  `code` varchar(3) NOT NULL,
  `name` varchar(30) NOT NULL
) ENGINE=InnoDB DEFAULT CHARSET=latin1;

INSERT INTO `TOWNS` (`code`, `name`) VALUES
('BCN', 'BARCELONA'),
('BIO', 'BILBAO'),
('MAD', 'MADRID'),
('SVQ', 'SEVILLA');

ALTER TABLE `DEPARTMENTS`
  ADD PRIMARY KEY (`num`),
  ADD KEY `town_code` (`town_code`);

ALTER TABLE `EMPLOYEES`
  ADD PRIMARY KEY (`num`),
  ADD KEY `dept_num` (`dept_num`),
  ADD KEY `occu_code` (`occu_code`);

ALTER TABLE `OCCUPATIONS`
  ADD PRIMARY KEY (`code`);

ALTER TABLE `TOWNS`
  ADD PRIMARY KEY (`code`);

ALTER TABLE `DEPARTMENTS`
  ADD CONSTRAINT `DEPARTMENTS_ibfk_1` FOREIGN KEY (`town_code`) REFERENCES `TOWNS`
(`code`);

ALTER TABLE `EMPLOYEES`
  ADD CONSTRAINT `EMPLOYEES_ibfk_1` FOREIGN KEY (`dept_num`) REFERENCES `DEPARTMENTS`
(`num`),
  ADD CONSTRAINT `EMPLOYEES_ibfk_2` FOREIGN KEY (`occu_code`) REFERENCES `OCCUPATIONS`
(`code`);
COMMIT;
```
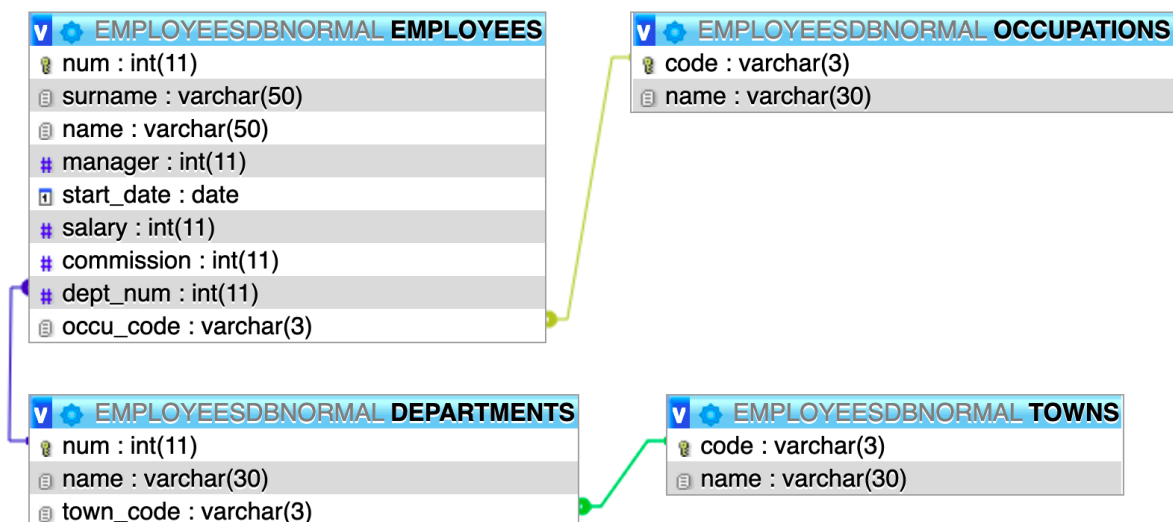
EMPLOYEESDBNORMAL EMPLOYEES

- num : int(11)
- surname : varchar(50)
- name : varchar(50)
- manager : int(11)
- start_date : date
- salary : int(11)
- commission : int(11)
- dept_num : int(11)
- occu_code : varchar(3)

EMPLOYEESDBNORMAL OCCUPATIONS

- code : varchar(3)
- name : varchar(30)

EMPLOYEESDBNORMAL DEPARTMENTS

- num : int(11)
- name : varchar(30)
- town_code : varchar(3)

EMPLOYEESDBNORMAL TOWNS

- code : varchar(3)
- name : varchar(30)

```
+------+------------+-----------+---------+------------+--------+------------+----------+-----------+
| num  | surname    | name      | manager | start_date | salary | commission | dept_num | occu_code |
+------+------------+-----------+---------+------------+--------+------------+----------+-----------+
|  800 | BANDERAS   | ANTONIO   |    NULL | 1991-01-09 |   2885 |       NULL |       20 | NULL      |
| 7369 | SÁNCHEZ    | SERGIO    |    7902 | 1990-12-17 |   1040 |       NULL |     NULL | NULL      |
| 7499 | ARROYO     | MARTA     |    7698 | 1990-02-20 |   1500 |        390 |       30 | SAL       |
| 7521 | AGUILO     | JOSEP     |    7698 | 1991-02-22 |   1625 |        650 |       30 | SAL       |
| 7566 | AROCA      | JUDIT     |    7839 | 1991-04-02 |   2900 |       NULL |       20 | MAN       |
| 7654 | MARTÍN     | MONICA    |    7698 | 1991-09-29 |   1600 |       1020 |       30 | SAL       |
| 7698 | AMER       | BARTOLOME |    7839 | 1991-05-01 |   3005 |       NULL |       30 | NULL      |
| 7782 | COLOM      | ENRIQUE   |    7839 | 1991-06-09 |   2885 |       NULL |       10 | MAN       |
| 7788 | GIL        | JAVIER    |    7566 | 1991-11-09 |   3000 |       NULL |       20 | ANA       |
| 7844 | TOVAR      | LUIS      |    7698 | 1991-09-08 |   1350 |          0 |       30 | SAL       |
| 7876 | ALONSO     | FERNANDO  |    7788 | 1991-09-23 |   1430 |       NULL |       20 | EMP       |
| 7900 | JIMENO     | XAVIER    |    7698 | 1991-12-03 |   1335 |       NULL |       30 | EMP       |
| 7902 | FERNÁNDEZ  | ANA       |    7566 | 1991-12-03 |   3000 |       NULL |     NULL | ANA       |
| 7934 | MUÑOZ      | ANTONIA   |    7782 | 1992-01-23 |   1690 |       NULL |       10 | EMP       |
| 8001 | RUIZ       | FERNANDA  |    7839 | 1992-06-10 |   2885 |       NULL |       20 | MAN       |
+------+------------+-----------+---------+------------+--------+------------+----------+-----------+
15 rows in set (0.001 sec)


[MariaDB [EMPLOYEESDBNORMAL]> select * from DEPARTMENTS;
+-----+------------+-----------+
| num | name       | town_code |
+-----+------------+-----------+
|  10 | ACCOUNTING | SVQ       |
|  20 | RESEARCH   | MAD       |
|  30 | SALES      | BCN       |
|  40 | PRODUCTION | BIO       |
+-----+------------+-----------+
4 rows in set (0.002 sec)


[MariaDB [EMPLOYEESDBNORMAL]> select * from OCCUPATIONS;     [MariaDB [EMPLOYEESDBNORMAL]> select * from TOWNS;
+------+-----------+                                         +------+-----------+
| code | name      |                                         | code | name      |
+------+-----------+                                         +------+-----------+
| ANA  | ANALYST   |                                         | BCN  | BARCELONA |
| EMP  | EMPLOYEE  |                                         | BIO  | BILBAO    |
| MAN  | MANAGER   |                                         | MAD  | MADRID    |
| PRE  | PRESIDENT |                                         | SVQ  | SEVILLA   |
| SAL  | SALESMAN  |                                         +------+-----------+
+------+-----------+                                         4 rows in set (0.003 sec)
5 rows in set (0.003 sec)
```

1. Show the full name of employees, salary and occupation name whose salary is not between 1100 and 2000. Sort the results by full name. Make four versions:

- Using an explicit inner join,
- using an implicit inner join,
- using a left outer join,
- and using a right outer join.

explicit inner join	implicit inner join	left outer join	right outer join
`` +--------------+--------+---------+	fullname	salary	name	+--------------+--------+---------+	ANA FERNÁNDEZ	3000	ANALYST		ENRIQUE COLOM	2885	MANAGER		FERNANDA RUIZ	2885	MANAGER		JAVIER GIL	3000	ANALYST		JUDIT AROCA	2900	MANAGER	+--------------+--------+---------+ 5 rows in set (0.003 sec) ```	``` +--------------+--------+---------+	fullname	salary	name	+--------------+--------+---------+	ANA FERNÁNDEZ	3000	ANALYST		ENRIQUE COLOM	2885	MANAGER		FERNANDA RUIZ	2885	MANAGER		JAVIER GIL	3000	ANALYST		JUDIT AROCA	2900	MANAGER	+--------------+--------+---------+ 5 rows in set (0.003 sec) ```	``` +-----------------+--------+---------+	fullname	salary	name	+-----------------+--------+---------+	ANA FERNÁNDEZ	3000	ANALYST		ANTONIO BANDERAS	2885	NULL		BARTOLOME AMER	3005	NULL		ENRIQUE COLOM	2885	MANAGER		FERNANDA RUIZ	2885	MANAGER		JAVIER GIL	3000	ANALYST		JUDIT AROCA	2900	MANAGER		SERGIO SÁNCHEZ	1040	NULL	+-----------------+--------+---------+ 8 rows in set (0.001 sec) ```	``` +-----------------+--------+---------+	fullname	salary	name	+-----------------+--------+---------+	ANA FERNÁNDEZ	3000	ANALYST		ANTONIO BANDERAS	2885	NULL		BARTOLOME AMER	3005	NULL		ENRIQUE COLOM	2885	MANAGER		FERNANDA RUIZ	2885	MANAGER		JAVIER GIL	3000	ANALYST		JUDIT AROCA	2900	MANAGER		SERGIO SÁNCHEZ	1040	NULL	+-----------------+--------+---------+ 8 rows in set (0.001 sec) ```

2. Select the surname and occupation of the employees of department number 20 (show occupation name instead occupation code). Make four versions:

- Using an explicit inner join,
- using an implicit inner join,
- using a left outer join,

explicit inner join	implicit inner join	left outer join	right outer join
| ```
+---------+----------+
| surname | name     |
+---------+----------+
| GIL     | ANALYST  |
| ALONSO  | EMPLOYEE |
| AROCA   | MANAGER  |
| RUIZ    | MANAGER  |
+---------+----------+
4 rows in set (0.004 sec)
``` | ```
+---------+----------+
| surname | name     |
+---------+----------+
| GIL     | ANALYST  |
| ALONSO  | EMPLOYEE |
| AROCA   | MANAGER  |
| RUIZ    | MANAGER  |
+---------+----------+
4 rows in set (0.001 sec)
``` | ```
+----------+----------+
| surname  | name     |
+----------+----------+
| BANDERAS | NULL     |
| AROCA    | MANAGER  |
| GIL      | ANALYST  |
| ALONSO   | EMPLOYEE |
| RUIZ     | MANAGER  |
+----------+----------+
5 rows in set (0.001 sec)
``` | ```
+----------+----------+
| surname  | name     |
+----------+----------+
| BANDERAS | NULL     |
| AROCA    | MANAGER  |
| GIL      | ANALYST  |
| ALONSO   | EMPLOYEE |
| RUIZ     | MANAGER  |
+----------+----------+
5 rows in set (0.002 sec)
``` |

3. Show employee full name of the employees with no occupation and no department (sorted by full name).

```
+-----------------+
| fullname        |
+-----------------+
| SERGIO SÁNCHEZ  |
+-----------------+
1 row in set (0.001 sec)
```

4. Show employee full name of the employees with no occupation or no department (sorted by full name).

```
+------------------+
| fullname         |
+------------------+
| ANA FERNÁNDEZ    |
| ANTONIO BANDERAS |
| BARTOLOME AMER   |
| SERGIO SÁNCHEZ   |
+------------------+
4 rows in set (0.003 sec)
```

5. Show the full names of the employees amb occupation name whose occupation is neither "MANAGER" nor "EMPLOYEE" (="occupation is not manager and is not employee") and also have a salary higher than 2000.

```
+------------------+------------+
| fullname         | occupation |
+------------------+------------+
| ANTONIO BANDERAS | NULL       |
| BARTOLOME AMER   | NULL       |
| ANA FERNÁNDEZ    | ANALYST    |
| JAVIER GIL       | ANALYST    |
+------------------+------------+
4 rows in set (0.004 sec)
```

6. Show all the data of all the employees (show department name instead department code, occupation name instead occupation code and manager surname instead manager num). Make two versions:
1. Using INNER JOIN.
2. Using LEFT OUTER JOIN.

INNER JOIN	OUTER JOIN

```
+------+---------+----------+---------+------------+--------+------------+------------+----------+
| num  | surname | name     | manager | start_date | salary | commission | name       | name     |
+------+---------+----------+---------+------------+--------+------------+------------+----------+
| 7934 | MUÑOZ   | ANTONIA  | COLOM   | 1992-01-23 | 1690   |       NULL | ACCOUNTING | EMPLOYEE |
| 7788 | GIL     | JAVIER   | AROCA   | 1991-11-09 | 3000   |       NULL | RESEARCH   | ANALYST  |
| 7876 | ALONSO  | FERNANDO | GIL     | 1991-09-23 | 1430   |       NULL | RESEARCH   | EMPLOYEE |
| 7499 | ARROYO  | MARTA    | AMER    | 1990-02-20 | 1500   |        390 | SALES      | SALESMAN |
| 7521 | AGUILO  | JOSEP    | AMER    | 1991-02-22 | 1625   |        650 | SALES      | SALESMAN |
| 7654 | MARTÍN  | MONICA   | AMER    | 1991-09-29 | 1600   |       1020 | SALES      | SALESMAN |
| 7844 | TOVAR   | LUIS     | AMER    | 1991-09-08 | 1350   |          0 | SALES      | SALESMAN |
| 7900 | JIMENO  | XAVIER   | AMER    | 1991-12-03 | 1335   |       NULL | SALES      | EMPLOYEE |
+------+---------+----------+---------+------------+--------+------------+------------+----------+
8 rows in set (0.004 sec)
```

```
+------+----------+----------+-----------+------------+--------+------------+------------+----------+
| num  | surname  | name     | manager   | start_date | salary | commission | name       | name     |
+------+----------+----------+-----------+------------+--------+------------+------------+----------+
|  800 | BANDERAS | ANTONIO  | NULL      | 1991-01-09 | 2885   |       NULL | RESEARCH   | NULL     |
| 7369 | SÁNCHEZ  | SERGIO   | FERNÁNDEZ | 1990-12-17 | 1040   |       NULL | NULL       | NULL     |
| 7499 | ARROYO   | MARTA    | AMER      | 1990-02-20 | 1500   |        390 | SALES      | SALESMAN |
| 7521 | AGUILO   | JOSEP    | AMER      | 1991-02-22 | 1625   |        650 | SALES      | SALESMAN |
| 7566 | AROCA    | JUDIT    | NULL      | 1991-04-02 | 2900   |       NULL | RESEARCH   | MANAGER  |
| 7654 | MARTÍN   | MONICA   | AMER      | 1991-09-29 | 1600   |       1020 | SALES      | SALESMAN |
| 7698 | AMER     | BARTOLOME| NULL      | 1991-05-01 | 3005   |       NULL | SALES      | NULL     |
| 7782 | COLOM    | ENRIQUE  | NULL      | 1991-06-09 | 2885   |       NULL | ACCOUNTING | MANAGER  |
| 7788 | GIL      | JAVIER   | AROCA     | 1991-11-09 | 3000   |       NULL | RESEARCH   | ANALYST  |
| 7844 | TOVAR    | LUIS     | AMER      | 1991-09-08 | 1350   |          0 | SALES      | SALESMAN |
| 7876 | ALONSO   | FERNANDO | GIL       | 1991-09-23 | 1430   |       NULL | RESEARCH   | EMPLOYEE |
| 7900 | JIMENO   | XAVIER   | AMER      | 1991-12-03 | 1335   |       NULL | SALES      | EMPLOYEE |
| 7902 | FERNÁNDEZ| ANA      | AROCA     | 1991-12-03 | 3000   |       NULL | NULL       | ANALYST  |
| 7934 | MUÑOZ    | ANTONIA  | COLOM     | 1992-01-23 | 1690   |       NULL | ACCOUNTING | EMPLOYEE |
| 8001 | RUIZ     | FERNANDA | NULL      | 1992-06-10 | 2885   |       NULL | RESEARCH   | MANAGER  |
+------+----------+----------+-----------+------------+--------+------------+------------+----------+
15 rows in set (0.003 sec)
```

7. Show the data of the employees whose salary is greater than 2000 (show department name instead department code, occupation name instead occupation code and manager surname instead manager num). Make two versions:
1. Using INNER JOIN.
2. Using LEFT OUTER JOIN.

If you think about how to do a third version using RIGHT OUTER JOIN you'll see that it's not possible...

INNER JOIN	OUTER JOIN
`` +------+---------+--------+---------+------------+--------+------------+----------+---------+	num	surname	name	manager	start_date	salary	commission	name	name	+------+---------+--------+---------+------------+--------+------------+----------+---------+	7788	GIL	JAVIER	AROCA	1991-11-09	3000	NULL	RESEARCH	ANALYST	+------+---------+--------+---------+------------+--------+------------+----------+---------+ 1 row in set (0.003 sec) ```	``` +------+----------+-----------+---------+------------+--------+------------+------------+---------+	num	surname	name	manager	start_date	salary	commission	name	name	+------+----------+-----------+---------+------------+--------+------------+------------+---------+	800	BANDERAS	ANTONIO	NULL	1991-01-09	2885	NULL	RESEARCH	NULL		7566	AROCA	JUDIT	NULL	1991-04-02	2900	NULL	RESEARCH	MANAGER		7698	AMER	BARTOLOME	NULL	1991-05-01	3005	NULL	SALES	NULL		7782	COLOM	ENRIQUE	NULL	1991-06-09	2885	NULL	ACCOUNTING	MANAGER		7788	GIL	JAVIER	AROCA	1991-11-09	3000	NULL	RESEARCH	ANALYST		7902	FERNÁNDEZ| ANA	AROCA	1991-12-03	3000	NULL	NULL	ANALYST		8001	RUIZ	FERNANDA	NULL	1992-06-10	2885	NULL	RESEARCH	MANAGER	+------+----------+-----------+---------+------------+--------+------------+------------+---------+ 7 rows in set (0.002 sec) ```

8.- Show number of employees per department considering employees with no department (clue: two queries with UNION).

```
+------------+---------------+
| name       | num_employees |
+------------+---------------+
| ACCOUNTING |             2 |
| PRODUCTION |             0 |
| RESEARCH   |             5 |
| SALES      |             6 |
| NULL       |             2 |
+------------+---------------+
5 rows in set (0.002 sec)
```