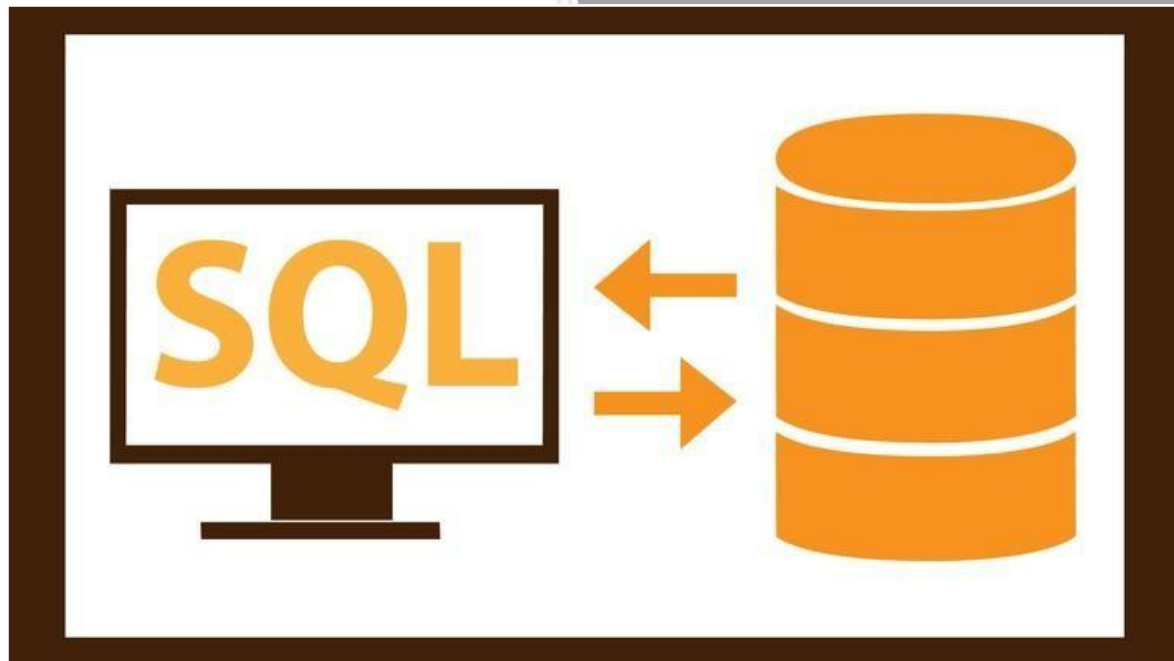


Databases

DB Design



Juan Martin

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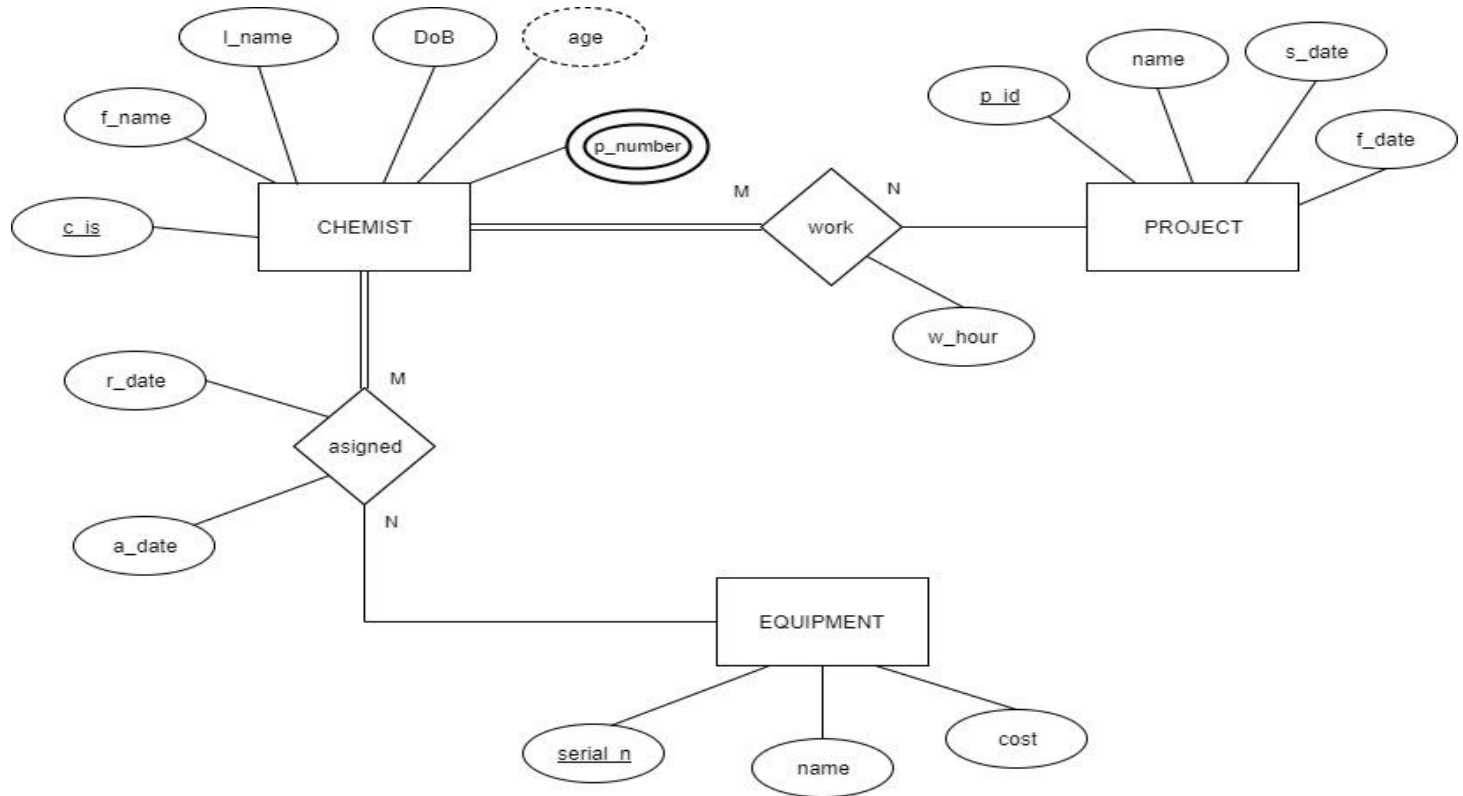
Faculty of IT

Contents

Databases.....	1
ER Diagram.....	4
Relational Model.....	5
Strong entities.....	5
M:N relations.....	6
Multivalued fields.....	6
Full relational model.....	8
Normalization check:.....	9
1NF:.....	9
2NF.....	9
3NF.....	9
Creating Database.....	10
Creating Tables.....	11
Inserting information.....	12
Chemist.....	12
Project.....	13
Equipment.....	14
Work.....	15

Assigned.	16
Contact.	17
Testing.	18
Chemist names	18
Projects started after 2017-01-01.	19
Phone numbers of a chemist.	20
Total of chemist.	21
Dictionary for labdb:.....	23

ER Diagram.



Relational Model.

Strong entities.

chemist
<u>c_id</u>
f_name
l_name
DoB

chemist
<u>serial_n</u>
name
cost

project
<u>p_id</u>
name
s_date
f_date

M:N relations.

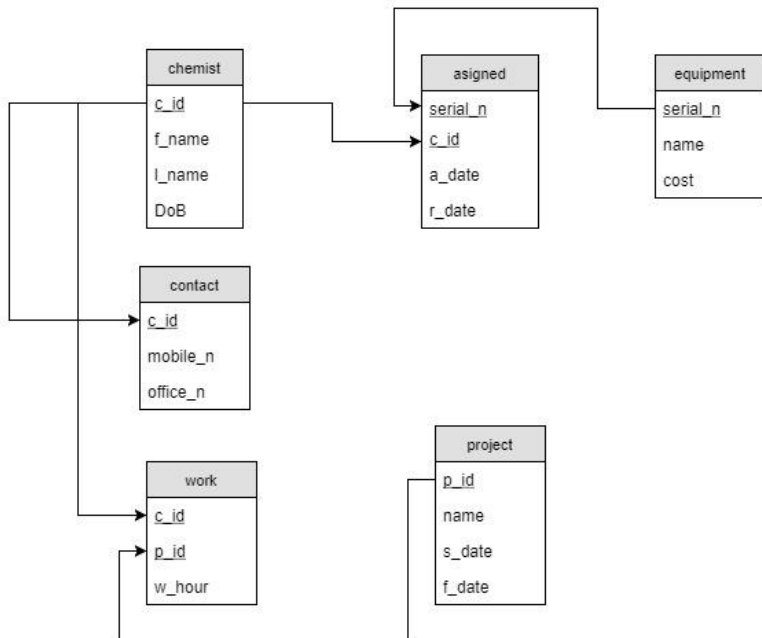
work
<u>c_id</u>
<u>p_id</u>
w_hour

assigned
<u>serial_n</u>
<u>c_id</u>
a_date
r_date

Multivalued fields.

contact
<u>c_id</u>
mobile_n
office_n

Full relational model.



Normalization check:

1NF:

- All tables have a defined Primary key.
- There are no repeating groups.
- Atomic values.

2NF for tables "work" and "assigned".

- 1NF.
- There are no partial functional dependencies.

3NF for tables "work" and "assigned".

- All of the non-key columns are fully functionally dependent.

Creating Database.

```
Juan Martin 2016435 - mysql -u root -p
# mysql -u root -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 3
Server version: 10.1.28-MariaDB mariadb.org binary distribution

Copyright (c) 2000, 2017, Oracle, MariaDB Corporation Ab and others.

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

MariaDB [(none)]> CREATE DATABASE labdb;
Query OK, 1 row affected (0.01 sec)

MariaDB [(none)]> show databases;
+-----+
| Database |
+-----+
| booksdb  |
| information_schema |
| labdb    |
| library  |
| mysql    |
| performance_schema |
| phpmyadmin |
| test     |
| ticketssystem |
+-----+
9 rows in set (0.01 sec)

MariaDB [(none)]>
```

Creating Tables.

```
Juan Martin 2016435 - mysql -u root -p
MariaDB [labdb]>
MariaDB [labdb]>
MariaDB [labdb]>
MariaDB [labdb]> CREATE TABLE chemist (c_id INT(5) AUTO_INCREMENT PRIMARY KEY, f_name VARCHAR(10), l_name VARCHAR(10) NOT NULL, DoB date NOT NULL);
Query OK, 0 rows affected (0.02 sec)

MariaDB [labdb]> CREATE TABLE PROJECT (p_id INT(5) AUTO_INCREMENT PRIMARY KEY, name VARCHAR(10) NOT NULL, s_date date NOT NULL, f_date date);
Query OK, 0 rows affected (0.02 sec)

MariaDB [labdb]> CREATE TABLE equipment (serial_n VARCHAR(20) PRIMARY KEY, name VARCHAR(20), cost DECIMAL(6,2));
Query OK, 0 rows affected (0.02 sec)

MariaDB [labdb]> CREATE TABLE work (c_id INT(5), p_id INT(5), w_hour DECIMAL(5,2), FOREIGN KEY(c_id) REFERENCES chemist(c_id), FOREIGN KEY(p_id) REFERENCES project(p_id));
Query OK, 0 rows affected (0.02 sec)

MariaDB [labdb]> CREATE TABLE assigned (serial_n VARCHAR(20), c_id INT(5), a_date date, r_date date, FOREIGN KEY(serial_n) REFERENCES equipment(serial_n));
Query OK, 0 rows affected (0.02 sec)

MariaDB [labdb]> CREATE DATABASE contact (c_id INT(5), mobile_n VARCHAR(20), office_num VARCHAR(20) NOT NULL, FOREIGN KEY(c_id) REFERENCES chemist(c_id));
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MariaDB server version for the right syntax to use near '(c_id INT(5), mobile_n VARCHAR(20), office_num VARCHAR(20) NOT NULL, FOREIGN KEY' at line 1
MariaDB [labdb]> CREATE TABLE contact (c_id INT(5), mobile_n VARCHAR(20), office_num VARCHAR(20) NOT NULL, FOREIGN KEY(c_id) REFERENCES chemist(c_id));
Query OK, 0 rows affected (0.02 sec)

MariaDB [labdb]>
```

Inserting information.

Chemist.

```
Juan Martin 2016435 - mysql -u root -p
| work
+-----+
6 rows in set (0.00 sec)

MariaDB [labdb]> INSERT INTO chemist (f_name, l_name, DoB) VALUES('Juan', 'Martin', '1984-04-30');
Query OK, 1 row affected (0.01 sec)

MariaDB [labdb]> INSERT INTO chemist (f_name, l_name, DoB) VALUES('Johan', 'Quiroz', '1993-08-21');
Query OK, 1 row affected (0.01 sec)

MariaDB [labdb]> INSERT INTO chemist (f_name, l_name, DoB) VALUES('Johan', 'Martin', '1991-07-09');
Query OK, 1 row affected (0.01 sec)

MariaDB [labdb]> INSERT INTO chemist (f_name, l_name, DoB) VALUES('Carmen', 'Castillo', '1960-04-12');
Query OK, 1 row affected (0.01 sec)

MariaDB [labdb]> INSERT INTO chemist (f_name, l_name, DoB) VALUES('Robert', 'Flores', '1985-05-26');
Query OK, 1 row affected (0.01 sec)

MariaDB [labdb]> SELECT * FROM chemist;
+-----+
| c_id | f_name | l_name | DoB      |
+-----+
| 1    | Juan   | Martin | 1984-04-30 |
| 2    | Johan  | Quiroz | 1993-08-21 |
| 3    | Johan  | Martin | 1991-07-09 |
| 4    | Carmen | Castillo | 1960-04-12 |
| 5    | Robert | Flores  | 1985-05-26 |
+-----+
5 rows in set (0.00 sec)

MariaDB [labdb]>
```

Project.

```
Juan Martin 2016435 - mysql -u root -p

+-----+
| chemist |
| contact |
| equipment |
| project |
| work    |
+-----+
6 rows in set (0.00 sec)

MariaDB [labdb]> INSERT INTO project (name, s_date, f_date) VALUES('Production of Synthetic Fiber', '2014-01-21', '2016-04-15');
Query OK, 1 row affected, 1 warning (0.01 sec)

MariaDB [labdb]> INSERT INTO project (name, s_date) VALUES('Catalysis Using Enzymes in Pineapple ', '2017-01-21');
Query OK, 1 row affected, 1 warning (0.01 sec)

MariaDB [labdb]> INSERT INTO project (name, s_date, f_date) VALUES('Electrolysis of Potassium Iodide', '2015-11-27', '2017-06-15');
Query OK, 1 row affected, 1 warning (0.01 sec)

MariaDB [labdb]> INSERT INTO project (name, s_date, f_date) VALUES('Chromatography', '2013-08-16', '2017-03-18');
Query OK, 1 row affected (0.01 sec)

MariaDB [labdb]> INSERT INTO project (name, s_date, f_date) VALUES('Ion Exchangers (Natural and synthetic) ', '2014-04-30', '2016-03-26');
Query OK, 1 row affected, 1 warning (0.01 sec)

MariaDB [labdb]> SELECT * FROM project;
+-----+-----+-----+-----+
| p_id | name                               | s_date   | f_date   |
+-----+-----+-----+-----+
| 1    | Production of Synthe               | 2014-01-21 | 2016-04-15 |
| 2    | Catalysis Using Enzy              | 2017-01-21 | NULL      |
| 3    | Electrolysis of Pota              | 2015-11-27 | 2017-06-15 |
| 4    | Chromatography                    | 2013-08-16 | 2017-03-18 |
| 5    | Ion Exchangers (Natu              | 2014-04-30 | 2016-03-26 |
+-----+-----+-----+-----+
5 rows in set (0.00 sec)

MariaDB [labdb]>
```

Equipment.

Juan Martin 2016435 - mysql -u root -p

```
| 5 | Ion Exchangers (Natu | 2014-04-30 | 2016-03-26 |  
+-----+-----+-----+  
5 rows in set (0.00 sec)
```

```
MariaDB [labdb]> INSERT INTO equipment VALUES('pN4QozN8', 'Distillation Glass', 100.65);  
Query OK, 1 row affected (0.01 sec)
```

```
MariaDB [labdb]> INSERT INTO equipment VALUES('XXiwyDMg13', 'Vacuum Filtering Set', 109.05);  
Query OK, 1 row affected (0.01 sec)
```

```
MariaDB [labdb]> INSERT INTO equipment VALUES('wkQaWLqs', 'Plate w Magnetic Stirrer', 146.05);  
Query OK, 1 row affected, 1 warning (0.00 sec)
```

```
MariaDB [labdb]> INSERT INTO equipment VALUES('sczffmyY', 'Neulog Wifi Module', 179.95);  
Query OK, 1 row affected (0.00 sec)
```

```
MariaDB [labdb]> INSERT INTO equipment VALUES('ttEBGsSY', 'Rock Tumbler Kit', 113.95);  
Query OK, 1 row affected (0.00 sec)
```

```
MariaDB [labdb]> SELECT * FROM equipment;
```

```
+-----+-----+-----+  
| serial_n | name | cost |  
+-----+-----+-----+  
| pN4QozN8 | Distillation Glass | 100.65 |  
| sczffmyY | Neulog Wifi Module | 179.95 |  
| ttEBGsSY | Rock Tumbler Kit | 113.95 |  
| wkQaWLqs | Plate w Magnetic Sti | 146.05 |  
| XXiwyDMg13 | Vacuum Filtering Set | 109.05 |  
+-----+-----+-----+  
5 rows in set (0.00 sec)
```

```
MariaDB [labdb]>
```

Work.

Juan Martin 2016435 - mysql -u root -p

```
| XXivyDMg13 | Vacuum Filtering Set | 109.05 |
+-----+
5 rows in set (0.00 sec)
```

```
MariaDB [labdb]> INSERT INTO work VALUES('1', '2', 235);
Query OK, 1 row affected (0.01 sec)
```

```
MariaDB [labdb]> INSERT INTO work VALUES('1', '1', 400);
Query OK, 1 row affected (0.00 sec)
```

```
MariaDB [labdb]> INSERT INTO work VALUES('3', '4', 520);
Query OK, 1 row affected (0.00 sec)
```

```
MariaDB [labdb]> INSERT INTO work VALUES('5', '4', 365);
Query OK, 1 row affected (0.01 sec)
```

```
MariaDB [labdb]> INSERT INTO work VALUES('2', '5', 630);
Query OK, 1 row affected (0.01 sec)
```

```
MariaDB [labdb]> SELECT * FROM work;
```

```
+-----+
| c_id | p_id | w_hour |
+-----+
| 1    | 1    | 400    |
| 1    | 2    | 235    |
| 2    | 5    | 630    |
| 3    | 4    | 520    |
| 5    | 4    | 365    |
+-----+
5 rows in set (0.00 sec)
```

```
MariaDB [labdb]>
```

Assigned.

```
Juan Martin 2016435 - mysql -u root -p
+-----+
| project |
| work    |
+-----+
6 rows in set (0.00 sec)

MariaDB [labdb]> INSERT INTO assigned VALUES('ttEBGssY', '1', '2004-01-23', '2016-04-16');
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MariaDB server version for the right syntax to use near ''', '2016-04-16')' at line 1
MariaDB [labdb]> INSERT INTO assigned VALUES('ttEBGssY', '1', '2004-01-23', '2016-04-16');
Query OK, 1 row affected (0.01 sec)

MariaDB [labdb]> INSERT INTO assigned VALUES('pN4QozN8', '1', '2004-02-26', '2016-04-16');
Query OK, 1 row affected (0.01 sec)

MariaDB [labdb]> INSERT INTO assigned VALUES('XXiwyDMg13', '3', '2013-08-18', '2017-03-19');
Query OK, 1 row affected (0.01 sec)

MariaDB [labdb]> INSERT INTO assigned VALUES('sczffmyY', '2', '2014-04-30');
ERROR 1136 (21S01): Column count doesn't match value count at row 1
MariaDB [labdb]> INSERT INTO assigned VALUES('sczffmyY', '2', '2014-04-30', '2016-06-27');
Query OK, 1 row affected (0.01 sec)

MariaDB [labdb]> INSERT INTO assigned VALUES('wkQaWLqs', '5', '2013-08-18', '2017-04-28');
Query OK, 1 row affected (0.01 sec)

MariaDB [labdb]> SELECT * FROM assigned;
+-----+
| serial_n | c_id | a_date   | r_date   |
+-----+
| pN4QozN8 | 1    | 2004-02-26 | 2016-04-16 |
| sczffmyY | 2    | 2014-04-30 | 2016-06-27 |
| ttEBGssY | 1    | 2004-01-23 | 2016-04-16 |
| wkQaWLqs | 5    | 2013-08-18 | 2017-04-28 |
| XXiwyDMg13 | 3    | 2013-08-18 | 2017-03-19 |
+-----+
5 rows in set (0.00 sec)

MariaDB [labdb]>
```


Contact.

```

Juan Martin 2016435 - mysql -u root -p
MariaDB [labdb]> SELECT * FROM contact;
+-----+-----+-----+
| c_id | mobile_num | office_num |
+-----+-----+-----+
| 1    | 0831968725 |            |
+-----+-----+-----+
1 row in set (0.00 sec)

MariaDB [labdb]> INSERT INTO contact VALUES('2', '0899854714','014869325');
^
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MariaDB server version for the right syntax to use near '' at line 1
MariaDB [labdb]> INSERT INTO contact VALUES('2', '0899854714','014869325');
Query OK, 1 row affected (0.01 sec)

MariaDB [labdb]> INSERT INTO contact (c_id, mobile_num) VALUES('1', '0839568712');
ERROR 1062 (23000): Duplicate entry '1' for key 'PRIMARY'
MariaDB [labdb]> INSERT INTO contact (c_id, mobile_num) VALUES('3', '0839568712');
Query OK, 1 row affected, 1 warning (0.01 sec)

MariaDB [labdb]> INSERT INTO contact VALUES('4', '0834567891','019785365');
Query OK, 1 row affected (0.01 sec)

MariaDB [labdb]> INSERT INTO contact VALUES('5', '085987452','019785365');
Query OK, 1 row affected (0.01 sec)

MariaDB [labdb]>
MariaDB [labdb]> SELECT * FROM contact;
+-----+-----+-----+
| c_id | mobile_num | office_num |
+-----+-----+-----+
| 1    | 0831968725 |            |
| 2    | 0899854714 | 014869325  |
| 3    | 0839568712 |            |
| 4    | 0834567891 | 019785365  |
| 5    | 085987452  | 019785365  |
+-----+-----+-----+
5 rows in set (0.00 sec)

MariaDB [labdb]>
```

Testing.

Chemist names

```

Juan Martin 2016435 - mysql -u root -p
+-----+
| 1 | Juan | Martin | 1984-04-30 |
| 2 | Johan | Quiroz | 1993-08-21 |
| 3 | Johan | Martin | 1991-07-09 |
| 4 | Carmen | Castillo | 1960-04-12 |
| 5 | Robert | Flores | 1985-05-26 |
+-----+
5 rows in set (0.00 sec)

MariaDB [labdb]>
MariaDB [labdb]>
MariaDB [labdb]>
MariaDB [labdb]>
MariaDB [labdb]>
MariaDB [labdb]> SELECT f_name AS NAME, l_name AS LAST NAME FROM chemist;
ERROR 1064 (42000): You have an error in your SQL syntax; check the manual that corresponds to your MariaDB server version for the right syntax to use near 'NAME FROM chemist' at line 1
MariaDB [labdb]> SELECT f_name AS 'NAME', l_name AS 'LAST NAME' FROM chemist;
+-----+
| NAME | LAST NAME |
+-----+
| Juan | Martin |
| Johan | Quiroz |
| Johan | Martin |
| Carmen | Castillo |
| Robert | Flores |
+-----+
5 rows in set (0.00 sec)

MariaDB [labdb]>
```

Projects started after 2017-01-01.

```
Juan Martin 2016435 - mysql -u root -p

MariaDB [labdb]> SELECT * FROM project;
+-----+-----+-----+-----+
| p_id | name                | s_date   | f_date   |
+-----+-----+-----+-----+
| 1    | Production of Synthe | 2014-01-21 | 2016-04-15 |
| 2    | Catalysis Using Enzy | 2017-01-21 | NULL      |
| 3    | Electrolysis of Pota | 2015-11-27 | 2017-06-15 |
| 4    | Chromatography       | 2013-08-16 | 2017-03-18 |
| 5    | Ion Exchangers (Natu | 2014-04-30 | 2016-03-26 |
+-----+-----+-----+-----+
5 rows in set (0.00 sec)

MariaDB [labdb]> SELECT * FROM project WHERE s_date > '2017-01-01';
+-----+-----+-----+-----+
| p_id | name                | s_date   | f_date   |
+-----+-----+-----+-----+
| 2    | Catalysis Using Enzy | 2017-01-21 | NULL      |
+-----+-----+-----+-----+
1 row in set (0.00 sec)

MariaDB [labdb]>
```

Phone numbers of a chemist.

GNU Juan Martin 2016435 - mysql -u root -p

```
MariaDB [labdb]> SELECT * FROM contact WHERE c_id = 5;
```

c_id	mobile_num	office_num
5	085987452	019785365

```
1 row in set (0.00 sec)
```

```
MariaDB [labdb]>
```

Total of chemist.

Juan Martin 2016435 - mysql -u root -p

```
MariaDB [labdb]> SELECT COUNT(c_id) FROM chemist;
```

```
+-----+  
| COUNT(c_id) |
```

```
+-----+  
|          5 |
```

```
+-----+  
1 row in set (0.00 sec)
```

```
MariaDB [labdb]>
```

Amount of equipment per chemist. (When the database was created there was no dates for equipment checked out after 2017, therefore the data has been modified and changed for 2004, however the sql command is essentially the same).

```
Juan Martin 2016435 - mysql -u root -p
MariaDB [labdb]> SELECT DISTINCT c_id AS 'Chemist ID', COUNT(c_id) AS 'Number of Items' FROM assigned WHERE a_date > '2004-01-01' GROUP BY c_id;
+-----+-----+
| Chemist ID | Number of Items |
+-----+-----+
| 1          | 2               |
| 2          | 1               |
| 3          | 1               |
| 4          | 1               |
| 5          | 1               |
+-----+-----+
5 rows in set (0.00 sec)

MariaDB [labdb]>
```

Dictionary for labdb:

Table Name	Attribute Name	Content	Type	Format	Range	Required	PK or FK	FK reference
chemist								
	c_id	Chemist ID	INT(5)	#####	1-99999	yes	PK	
	f_name	Chemist First Name	VARCHAR(10)	XXXXXXXXXX	N/A			
	l_name	Chemist Last Name	VARCHAR(10)	XXXXXXXXXX	N/A	yes		
	DoB	Chemist Date of Birthd	DATE	YYYY-MM-DD	N/A	yes		
project								
	p_id	Project ID	INT(5)	#####	1-99999	yes	PK	
	name	Project Name	VARCHAR(20)	XXXXXXXXXX	N/A	yes		
	s_date	Project Start Date	DATE	YYYY-MM-DD	N/A	yes		
	f_date	Project Finish Date	DATE	YYYY-MM-DD	N/A			
equipment								
	serial_n	Equipment Serial	VARCHAR(20)	xxxxxxxxxx	N/A	yes	PK	
	name	Equipment Name	VARCHAR(20)	xxxxxxxxxx	N/A			
	Cost	Equipment Price	DECIMAL(6,2)	#####.##	0,000,000.00			
work								
	c_id	Chemist ID	INT(5)	#####	1-99999	yes	FK	chemist
	p_id	Project ID	INT(5)	#####	1-99999	yes	FK	project
	w_hour	Ammount of hours worked by a chemist on project	DECIMAL(5,2)	#####.##	00,000.00			
assigned								
	serial_n	Equipment Serial	VARCHAR(20)	xxxxxxxxxx	N/A	yes	FK	equipment
	c_id	Chemist ID	INT(5)	#####	1-99999	yes	FK	chemist
	a_date	Assigned Date	DATE	YYYY-MM-DD	N/A			
	r_date	Returned Date	DATE	YYYY-MM-DD	N/A			
contact								
	c_id	Chemist ID	INT(5)	#####	1-99999	yes	FK	chemist
	mobile_n	Chemist Mobile Number	VARCHAR(20)	#####	N/A			
	office_n	Chemist Office Phone Number	VARCHAR(20)	#####	N/A	yes		

