P9. Work in pairs. Index Importance

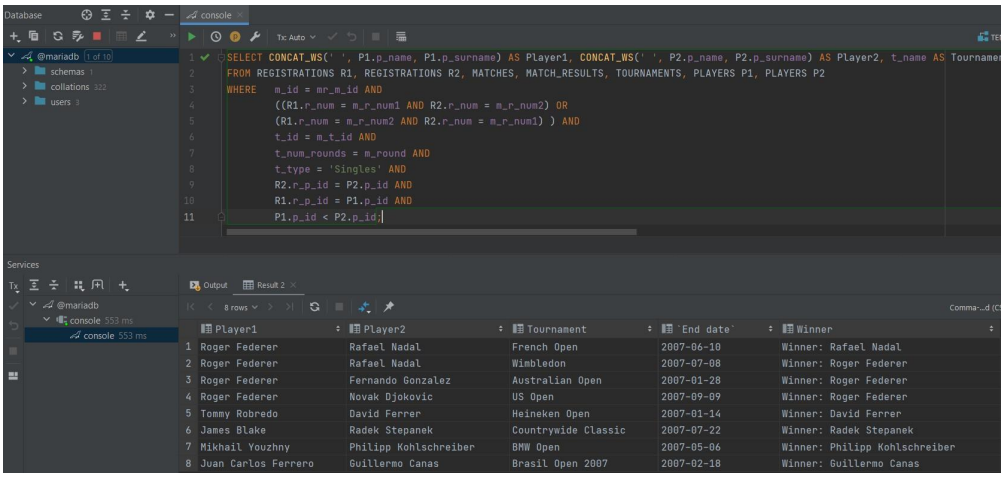
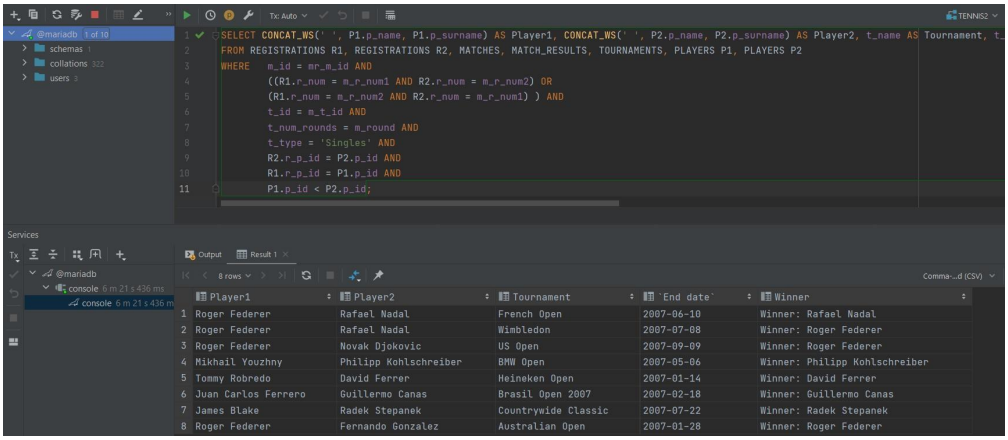
PART 1

Load the TENNIS.sql and TENNIS_NOPK_NOFK.sql . They are the same database but the second one has no primary keys and no foreign keys. As a consequence, the second has no indexes. Run the query you will find below in both databases and note how long it takes to produce a result.

```
SELECT CONCAT_WS(' ', P1.p_name, P1.p_surname) AS Player1,
CONCAT_WS(' ', P2.p_name, P2.p_surname) AS Player2, t_name AS Tournament, t_end_date
AS `End date`, IF (mr_winner = R1.r_num, CONCAT_WS(' ', 'Winner:', P1.p_name,
P1.p_surname), CONCAT_WS(' ', 'Winner:', P2.p_name, P2.p_surname)) AS Winner
FROM REGISTRATIONS R1, REGISTRATIONS R2, MATCHES, MATCH_RESULTS,
TOURNAMENTS, PLAYERS P1, PLAYERS P2
WHERE
m_id = mr_m_id AND
  ((R1.r_num = m_r_num1 AND R2.r_num = m_r_num2) OR
    (R1.r_num = m_r_num2 AND R2.r_num = m_r_num1) ) AND
       t_id = m_t_id AND
       t_num_rounds = m_round AND
       t_type = 'Singles' AND
       R2.r_p_id = P2.p_id AND
       R1.r_p_id = P1.p_id AND
       P1.p_id < P2.p_id;
```

Explain, as we saw in the Socratic video, and detail in your **conclusions** regarding the existence (or not) of the indexes in the previous database.

Indexing makes columns **faster** to query by creating pointers to where data is stored within a **database**. ... If the table was ordered alphabetically, searching for a name could happen a lot **faster** because we could skip looking for the data in certain rows.

TENNIS.sql 553ms	
TENNIS_NOPK_NOFK.sql 6m 21s 436 ms	

PART 2

Search in the internet for a database, preferably from an open source, including indexes (and not including it, in order to compare its behaviour) in any of its tables and implement some advanced queries like in the previous part. Then expose and defend your work in front of your colleagues. You can find some database samples here:

https://dataedo.com/kb/databases/mariadb/sample-databases
https://dataedo.com/kb/databases/mysql/sample-databases
https://www.w3resource.com/sql/sql-table.php
https://www.sqltutorial.org/sql-sample-database/

With PK and FK(P09):

```sql
CREATE DATABASE P09;

CREATE TABLE IF NOT EXISTS `customer` (
  `CUST_CODE` varchar(6) NOT NULL,
  `CUST_NAME` varchar(40) NOT NULL,
  `CUST_CITY` varchar(35) DEFAULT NULL,
  `WORKING_AREA` varchar(35) NOT NULL,
  `CUST_COUNTRY` varchar(20) NOT NULL,
  `GRADE` decimal(10,0) DEFAULT NULL,
  `OPENING_AMT` decimal(12,2) NOT NULL,
  `RECEIVE_AMT` decimal(12,2) NOT NULL,
  `PAYMENT_AMT` decimal(12,2) NOT NULL,
  `OUTSTANDING_AMT` decimal(12,2) NOT NULL,
  `PHONE_NO` varchar(17) NOT NULL,
  `AGENT_CODE` varchar(6) DEFAULT NULL,
  KEY `CUSTCITY` (`CUST_CITY`),
  KEY `CUSTCITY_COUNTRY` (`CUST_CITY`,`CUST_COUNTRY`)
) ENGINE=MyISAM DEFAULT CHARSET=latin1;

CREATE TABLE IF NOT EXISTS `orders` (
  `ORD_NUM` decimal(6,0) NOT NULL,
  `ORD_AMOUNT` decimal(12,2) NOT NULL,
  `ADVANCE_AMOUNT` decimal(12,2) NOT NULL,
  `ORD_DATE` date NOT NULL,
  `CUST_CODE` varchar(6) NOT NULL,
  `AGENT_CODE` varchar(6) NOT NULL,
  `ORD_DESCRIPTION` varchar(60) NOT NULL
) ENGINE=MyISAM DEFAULT CHARSET=latin1;
```

```sql
CREATE TABLE IF NOT EXISTS `agents` (
  `AGENT_CODE` varchar(6) NOT NULL DEFAULT '',
  `AGENT_NAME` varchar(40) DEFAULT NULL,
  `WORKING_AREA` varchar(35) DEFAULT NULL,
  `COMMISSION` decimal(10,2) DEFAULT NULL,
  `PHONE_NO` varchar(15) DEFAULT NULL,
  `COUNTRY` varchar(25) DEFAULT NULL,
  PRIMARY KEY (`AGENT_CODE`)
) ENGINE=MyISAM DEFAULT CHARSET=latin1;

CREATE TABLE IF NOT EXISTS `daysorder` (
  `ORD_NUM` decimal(6,0) NOT NULL,
  `ORD_AMOUNT` decimal(12,2) NOT NULL,
  `ADVANCE_AMOUNT` decimal(12,2) NOT NULL,
  `ORD_DATE` date NOT NULL,
  `CUST_CODE` varchar(6) NOT NULL,
  `AGENT_CODE` varchar(6) NOT NULL,
  `ORD_DESCRIPTION` varchar(60) NOT NULL
) ENGINE=MyISAM DEFAULT CHARSET=latin1;
```

Without PK and FK(P09_2):

```sql
CREATE DATABASE P09_2;

CREATE TABLE IF NOT EXISTS `customer` (
  `CUST_CODE` varchar(6) NOT NULL,
  `CUST_NAME` varchar(40) NOT NULL,
  `CUST_CITY` varchar(35) DEFAULT NULL,
  `WORKING_AREA` varchar(35) NOT NULL,
  `CUST_COUNTRY` varchar(20) NOT NULL,
  `GRADE` decimal(10,0) DEFAULT NULL,
  `OPENING_AMT` decimal(12,2) NOT NULL,
  `RECEIVE_AMT` decimal(12,2) NOT NULL,
  `PAYMENT_AMT` decimal(12,2) NOT NULL,
  `OUTSTANDING_AMT` decimal(12,2) NOT NULL,
  `PHONE_NO` varchar(17) NOT NULL,
  `AGENT_CODE` varchar(6) DEFAULT NULL
) ENGINE=MyISAM DEFAULT CHARSET=latin1;

CREATE TABLE IF NOT EXISTS `orders` (
  `ORD_NUM` decimal(6,0) NOT NULL,
  `ORD_AMOUNT` decimal(12,2) NOT NULL,
  `ADVANCE_AMOUNT` decimal(12,2) NOT NULL,
  `ORD_DATE` date NOT NULL,
  `CUST_CODE` varchar(6) NOT NULL,
  `AGENT_CODE` varchar(6) NOT NULL,
  `ORD_DESCRIPTION` varchar(60) NOT NULL
) ENGINE=MyISAM DEFAULT CHARSET=latin1;
```

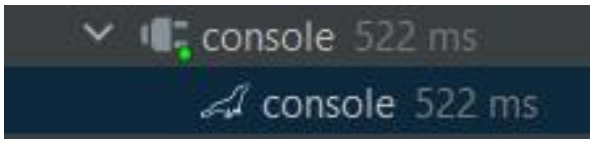
```sql
CREATE TABLE IF NOT EXISTS `agents` (
  `AGENT_CODE` varchar(6) NOT NULL DEFAULT '',
  `AGENT_NAME` varchar(40) DEFAULT NULL,
  `WORKING_AREA` varchar(35) DEFAULT NULL,
  `COMMISSION` decimal(10,2) DEFAULT NULL,
  `PHONE_NO` varchar(15) DEFAULT NULL,
  `COUNTRY` varchar(25) DEFAULT NULL
) ENGINE=MyISAM DEFAULT CHARSET=latin1;

CREATE TABLE IF NOT EXISTS `daysorder` (
  `ORD_NUM` decimal(6,0) NOT NULL,
  `ORD_AMOUNT` decimal(12,2) NOT NULL,
  `ADVANCE_AMOUNT` decimal(12,2) NOT NULL,
  `ORD_DATE` date NOT NULL,
  `CUST_CODE` varchar(6) NOT NULL,
  `AGENT_CODE` varchar(6) NOT NULL,
  `ORD_DESCRIPTION` varchar(60) NOT NULL
) ENGINE=MyISAM DEFAULT CHARSET=latin1;
```

Advanced query:

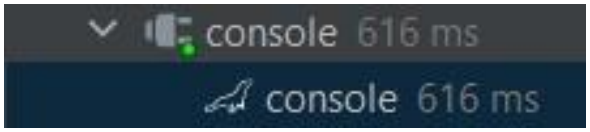
```sql
SELECT CONCAT_WS('  /',C.CUST_CODE, C.CUST_NAME) as Client,

    CONCAT(O.ORD_NUM, '  /', (DATE_FORMAT(O.ORD_DATE, '%W %D %M %Y'))) as
    Comanda,

    CONCAT(SUBSTRING(O.ORD_AMOUNT, 1, 4), ' $') as Preu,

    CONCAT_WS('/', A.AGENT_CODE, A.AGENT_NAME)  as Agent

FROM customer C, orders O, agents A

WHERE C.CUST_CODE = O.CUST_CODE AND

    C.AGENT_CODE = A.AGENT_CODE AND

    O.ORD_AMOUNT between 1000 and 3000

ORDER BY O.ORD_DATE;
```

	Client	Comanda	Preu	Agent
1	C00015 /Stuart	200100 /Tuesday 8th January 2008	1000 $	A003 /Alex
2	C00013 /Holmes	200115 /Friday 8th February 2008	2000 $	A003 /Alex
3	C00006 /Shilton	200104 /Thursday 13th March 2008	1500 $	A004 /Ivan
4	C00019 /Yearannaidu	200110 /Tuesday 15th April 2008	3000 $	A010 /Santakumar
5	C00005 /Sasikant	200106 /Sunday 20th April 2008	2500 $	A002 /Mukesh
6	C00021 /Jacks	200103 /Thursday 15th May 2008	1500 $	A005 /Anderson
7	C00012 /Steven	200102 /Sunday 25th May 2008	2000 $	A012 /Lucida
8	C00016 /Venkatpati	200112 /Friday 30th May 2008	2000 $	A007 /Ramasundar
9	C00009 /Ramesh	200133 /Sunday 29th June 2008	1200 $	A002 /Mukesh
10	C00020 /Albert	200111 /Thursday 10th July 2008	1000 $	A008 /Alford
11	C00001 /Micheal	200101 /Tuesday 15th July 2008	3000 $	A008 /Alford
12	C00025 /Ravindran	200105 /Friday 18th July 2008	2500 $	A011 /Ravi Kumar
13	C00015 /Stuart	200127 /Sunday 20th July 2008	2500 $	A003 /Alex
14	C00024 /Cook	200129 /Sunday 20th July 2008	2500 $	A006 /McDen
15	C00025 /Ravindran	200130 /Wednesday 30th July 2008	2500 $	A011 /Ravi Kumar
16	C00007 /Ramanathan	200135 /Tuesday 16th September 2008	2000 $	A010 /Santakumar
17	C00003 /Martin	200122 /Tuesday 16th September 2008	2500 $	A004 /Ivan
18	C00008 /Karolina	200121 /Tuesday 23rd September 2008	1500 $	A004 /Ivan
19	C00018 /Fleming	200125 /Friday 10th October 2008	2000 $	A005 /Anderson

With PK and FK(P09):



WithOUT PK and FK(P09):



Note that you can use any database from the internet compatible with our relational technologies.

Indications for the activity submission

Take in mind that you have to:

• Use the corresponding task of our classroom to do the submission.
• Formatting: PDF.
• File name: GDB_YourColorGroup_YourSurname1_YourSurname2_YourName
• Recommended extension: 6-12 pages (without index).
• Bibliography is mandatory.
• Typography and font size: Arial 11.

Scoring rubric

The defence, the documentation and the answer (part 1) to the question is OK	10 points
The defence, the documentation and the answer (part 1) to the question has a few errors or is not complete, but it has many things OK.	5 points
The defence, the documentation and the answer (part 1) is not OK or it has many mistakes	0 points