

DATABASE SYSTEMS



Contents

1	General Description	2
2	Specific Tasks	3
2.1	User Roles	3
2.2	OLTP vs OLAP comparison	3
2.3	Queries	4
3	Mandatory Requirements	5
4	Assignment	5
5	Restrictions	7

1 General Description

Formula 1 is 70 years old, and wants to celebrate the milestone by upgrading their database and adapting current technologies. For the new decade, they want a system that can provide better analysis and search functionalities. They believe that the current database could no longer provide the functionalities it require, which is why they want to explore different paradigms like OLAP.

For the new system, they require new user policy and methods to transfer data between current database and the new database. All the necessary information are detailed in this document.

Because of the exemplary track record of the DBS students of La Salle in designing and implementing Database Systems, Formula 1 have commissioned us to carry out the project.

The general information of the project are as follows:

- The database is stored at La Salle Puigpedros server:
`puigpedros.salle.url.edu`
- To help with the development of the solution, they gave us access to the F1 database, where we can be found information of Formula 1 from 1950 until now. The credentials to connect are:
Username: `lsmotor_user`
Password: `lsmotor_bbdd`
- The remote database will be copied to a local computer through a Java/C Program using ODBC, Open Data Base Connectivity. The functionality of this program will be:
 - First connect to the remote databases using Java/C ODBC.
 - Then run queries in order to retrieve the information from the databases.
 - Update the local OLTP database.
- OLAP database will be synchronized with the local OLTP using techniques explained below.

2 Specific Tasks

2.1 User Roles

LSMotor has specified the following roles for users in the system as follows:

- **analytic_user**: Perform all kind of selects, view creations and view visualisation over OLAP database.
- **manager_user**: Responsible for keeping both databases up to date.
- **rrhh_user**: Creates new users.

This users need to be related with the local databases.

2.2 OLTP vs OLAP comparison

LSMotor wants to be truly confident with the investment they would commit in migrating to an OLAP structure, as such, they require us to provide them a detailed report and test analysis of both systems. You must, therefore, perform the following steps in both database:

- A simple query which involves only 1 table.
- A complex query which involves at least 5 tables.
- An insert into 1 table.
- An update into 1 field.
- A delete into 1 table.

(The table measurement is over OLTP database, which will be translated in fewer tables in the OLAP database). You will have to measure the difference of time between the same steps in both databases and explain why do you think this is due to. Please provide significant information, with more than one execution per step (to find the average), and be very detailed. Moreover, use pictures or plots to explain or show the different times.

2.3 Queries

The following queries have to be executed on the OLAP database.

- Find the statuses that never happened in the F1 history. Do this without using subqueries.
- Find the nationality and average time of those drivers whose teams have the lowest average pit stop time.
- Search for the drivers (complete name) who have beaten his own qualifying time for each successive round, that is, improving his time in each qualifying round, and that his fastest lap time on the race was faster than any of the qualifying time of any other driver for that race. Also, check that this achievement landed him in the podium after the race (any of the top three positions)
- Search for the drivers (complete name), the fastest speed and lap time and circuit name where the drivers have recorded the fastest lap in the race, but not the highest speed or the other way around.
Tip: Don't check the fastest time with the column fastestLapTime in results table, use another information.
- Check the biggest overtaking (specifying the driver's complete name, circuit, year and overtaking positions) in the F1 history, for the whole race (do not take into account the first lap), and in a lap period.

3 Mandatory Requirements

- Use of Java/C ODBC.
- Create mentioned users on 2.1.
- Copy remote puigpedros database to local OLTP using queries.
- Development of a relational model based on OLAP.
- Pass OLTP information to OLAP database by using Triggers.
- Verify that the purpose of OLTP and OLAP databases is accomplished, analysing the results of 2.2.
- Use an Event to check the correct importation to OLAP, via queries. Using an auxiliary table, compare rows of OLTP and OLAP tables, and also relevant queries to check the correct importation. Advise if an importation error (different queries result) is found or not, on a log table, specifying the current date and time too.
Optional: Also, if there is an error, recall the importation procedure.
- Do the queries of 2.3 on the OLAP database.

4 Assignment

The deadline of this assignment will be the 22nd of May. The name of the delivered assignment must be respected. This will follow the next format:

P2_login1_login2.zip

The .zip file must contain:

- Documentation of the project.
- Java/C program.
- .sql/.txt file with the import queries.
- .sql/.txt file with creation of stored procedures.
- .sql/.txt file with the Events and Triggers.
- .sql/.txt with the users creation commands.
- .sql/.txt with the queries mentioned on 2.3.

The documentation must contain:

- Cover with the name and login of the members of the team.
- Detailed table of contents.
- Introduction with a brief summary.
- OLAP and OLTP concepts explained.
- Explain how you find out the remote OLTP database structure, include screenshots and commands with it explanation attached. **YOU MUST USE COMMAND LINE TO FIND OUT.**
- Relational OLAP model diagram.
- Explain how your Java/C program works.
- Explain how you created the users (Grants granted...).
- Explain how your stored procedures work.
- Explain how your events and triggers works.
- Report about OLTP vs OLAP comparison.
- Time dedicated per part.
- Conclusions.
- References as ISO 690:2010.

5 Restrictions

- Each table must be justified. There must be a complete explanation of each table.
- The model must be represented in a digital manner. No scanned versions will be allowed.
- The presented document must be in a PDF format, written in a formal language with no spelling errors.
- The delivered .zip must contain all the mentioned aspects. If there is a missing document or a missing section in the written document, the student will **NOT** pass the assignment.
- If a copy is detected, all the members of the implied groups will fail the assignment, those who have copied and those who have been copied. Moreover, they will have to check with the university normative to take into consideration other consequences.