COMP1007 Assignment Specification:
The FIA F1 Team Statistics

Assignment Outcomes

Upon successful completion of this assignment, you will be able to:

- Design a solution to a given problem using pseudocode (ULO 2,3,4);
- Identify the datatypes required within the designed solution (ULO 1,2,4);
- Create simple classes to aid in the designed solution (ULO 2,4);
- Use programming skills to implement your design in Java (ULO 1,2,3,4); and
- Construct well-structured and documented Java code (ULO 1,2,3,4,5).

Overview
This is assignment forms a major part of your assessment (30%) within the Programming Design and Implementation unit. Please keep up to date with announcements to ensure all requirements are submitted at the appropriate time.

The Big Picture
The FIA with F1 have hired you to develop a software system made up of two components, to manage and analyse the performance of teams in the 2024 F1 season. You will build two software systems. One system will allow the user to input team data and write it out to a CSV file. The second system will read the data into a program and perform various analyses on it.

Objective:
Develop two individual software systems, to manage and analyse the performance of F1 teams in the 2024 season.

Description:
In this assignment, you will build two software systems. One system will allow the user to input team data and write it out to a CSV file. The second system will read the data in and perform various analyses on it.

Tasks:
Program One:
Team Input Program:
- Prompt the user to enter the following details for each team:
  - Team Name (e.g., "Red Bull Racing")
  - Car Code (e.g., "RB20")
  - Driver Name (e.g., "Max Verstappen")
  - Grand Prix (e.g. "Melbourne")
  - Position Finished (e.g. -1,1,2,3)
  - Fastest Lap in seconds (e.g. 78.813)
- Implement error checking to ensure that:
  - Team Name, Team Code, Driver Name, Grand Prix are non-empty strings.
  - Position Finished is an integer.
  - Fastest Lap is a non-negative double (e.g., 84.222).

Data Storage System:

- Using the `PrintWriter` class, store the input data in a CSV file with appropriate headers, such that it complies with the CSV format as follows:

  ```
  TeamName, CarCode, DriverName, GrandPrix, PositionFinished,
  FastestLap
  Red Bull Racing, RB20, Max Verstappen, Melbourne, -1, 75.915
  ```

Program Two:

Data Retrieval Program:

- Read the data from the CSV file and store it into an array of objects;
  - Each object should represent a team and its associated details;
  - As such, the class that is instantiated to create the object should have the six details described in Program One (Team Name etc.) as class fields;
  - The class fields should be of an appropriate data type.

Data Analysis System:

- List each of the teams that competed with at least one driver completing the race.
- List each of the teams that had no driver complete the race.
- Calculate the fastest team of the race. Each team has 2 drivers. Add their fastest time together and the lowest time is the fastest team. If a driver did not finish the race, their time for the calculation is set to 205.50 seconds. Display this to the user.
- Sort the teams according to which was fastest and display to the user in descending order.
- Sort the drivers according to who was fastest and display to the user in descending order.
- Sort the drivers according to who was fastest and display to the user in ascending order.

Team Analysis:

- Allow the user to filter teams based on Car Code and display the driver names to the user, fastest driver listed first.

Submission Guidelines:

- Ensure your code is well-commented and follows the coding practices emphasised in this Unit.
- Include a 2-minute (maximum) screen capture with audio recording demonstrating your working program, which is playable in VLC.
- If your system does not completely fulfill the above specification, please include a brief report describing what has not been implemented and the challenges you had not implementing them.
- All submitted work is considered to be your work. If you received assistance from anyone, anything or from anywhere, this MUST be cited in the comments with that code.
- Submit:
  - Your pseudocode;
  - Your Java source code;
  - Your screen recording; and
  - The report (if needed).

Please note, ArrayLists are NOT permitted, you must manually create and iterate over the arrays.

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What the first program might look like when run:

```
Welcome to the FIA F1 Data Entry Program

How many F1 Teams are there? <user input>
Enter the data:
Team Name:
Car Code:
Driver Name:
Grand Prix:
Position Finished:
Fastest Lap:

Enter the data:
Team Name:
Car Code:
Driver Name:
Grand Prix:
Position Finished:
Fastest Lap:

Would you like to enter more data (Y or N)? <user input>

The current data looks like this:
<list all of the data that has been entered in the appropriate
format>

What would you like to name your csv file? <user input>
```

```
Welcome to the FIA F1 Analysis Program

Enter the name of the file containing the data: <user input>

An All Teams analysis or a Single Team analysis? <user input >

All Teams Analysis:
<Required analysis displayed here>

Would you like to exit? <user input>

An All Teams analysis or a Single Team analysis? <user input>

Which Team? <user input>

<Requested Teams' analysis>
```

Appendix

A Table of the 2024 F1 Teams, Drivers and Car Codes:

Team	Driver 1	Driver 2	Car
Red Bull Racing	Max Verstappen	Sergio Perez	RB20
Ferrari	Charles Leclerc	Carlos Sainz	SF-24
McLaren	Oscar Piastri	Lando Norris	MCL38
Mercedes	George Russell	Lewis Hamilton	W15
Aston Martin	Lance Stroll	Fernando Alonso	AMR24
RB	Daniel Ricciardo	Yuki Tsunoda	VCARB 01
Haas F1 Team	Nico Hulkenberg	Kevin Magnussen	VF-24
Williams	Alexander Albon	Logan Sargeant	FW46
Kick Sauber	Guanyu Zhou	Valtteri Bottas	C44
Alpine	Pierre Gasly	Esteban Ocon	A524

Here is the list of the 2024 F1 races:

1. Bahrain Grand Prix
2. Saudi Arabian Grand Prix
3. Australian Grand Prix
4. Japanese Grand Prix
5. Chinese Grand Prix
6. Miami Grand Prix
7. Emilia Romagna Grand Prix
8. Monaco Grand Prix
9. Canadian Grand Prix
10. Spanish Grand Prix
11. Austrian Grand Prix
12. British Grand Prix
13. Hungarian Grand Prix
14. Belgian Grand Prix
15. Dutch Grand Prix
16. Italian Grand Prix
17. Azerbaijan Grand Prix
18. Singapore Grand Prix
19. United States Grand Prix
20. Mexican Grand Prix
21. Brazilian Grand Prix
22. Silver Las Vegas Grand Prix
23. Qatar Grand Prix
24. Abu Dhabi Grand Prix