ST0244 - Programming Languages Programming

Practice II

School of Applied Sciences and Engineering - EAFIT University

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PRACTICE II - VALUE: 12% OF THE FINAL GRADE OF THE COURSE.

PROLOG PRACTICE: VEHICLE SALES MANAGEMENT SYSTEM.

Objectives:

1. Implement a system in Prolog to manage a vehicle catalog, filtering by key attributes.
2. Generate structured reports using predicates such as findall/3 or bagof/3.
3. Apply constraints to ensure consistency in the results (e.g. maximum budget).

Problem description:

A dealership needs a system to query and analyze its vehicle inventory. The rules are:

- **Vehicle categories:** Sedan, SUV, Pickup, Sport.
- **Key attributes:** Brand (e.g., Toyota, Ford, BMW), reference, type, price, and year.
- **Restriction:** If the total value of the inventory exceeds a predefined limit, the selection must be adjusted by prioritizing lower priced vehicles.

Part 1: Define the vehicle catalog

Define in Prolog the following predicates to represent the inventory:

```
vehicle(Brand, Reference, Type, Price, Year).
```

Task:

- Define at least 10 vehicles with brands such as Toyota, Ford, BMW, etc., and valid types (SUV, Sedan, etc.).

Part 2: Basic queries and filters

Implement the following functionalities:

Filter by type and budget:

```
meet_budget(Reference, BudgetMax) :-
vehicle(_, Reference, _, Price, _),
Price =< BudgetMax.
```

2. List of vehicles by brand:

- Use **findall/3** or **bagof/3** to group references by brand.

Part 3: Report generation Implement
the predicate:

```
generate_report(Brand, Type, Budget, Result).
```

Return:

- A list of vehicles of a specific make and type that do not exceed a budget.
- The total value of the filtered inventory, ensuring that it does not exceed a limit (e.g. $1,000,000).

Part 4: Test Cases

1. **Case 1:** List all Toyota SUV references priced under $30,000.
2. **Case 2:** Show Ford brand vehicles using bagof/3, grouped by type and year.
3. **Case 3:** Calculate the total value of an inventory filtered by type “Sedan” without exceeding $500,000.

Example of initial code:

```
%Vehicle catalog   vehicle(toyota, rav4, suv, 28000, 2022).
vehicle(ford, mustang, sport, 45000, 2023).
vehicle(bmw, x5, suv, 60000, 2021).

% Query: Toyota SUV vehicles under $30k
findall(Ref, (vehicle(toyota, Ref, suv, Price, _), Price < 30000), Result).

% Report grouped by brand and type
bagof((Brand, Type, Ref), vehicle(Make, Ref, Type, _, _),  Inventory).
```

Delivery:

- **Prolog code**: Implement predicates and test cases.
- **Queries and results:** Include screenshots or execution examples.
- **GitHub repository:** With README.md explaining the project and members.
- **Explanatory video (max 5 min):** Show how the system works.
  Evaluation:
- Correct implementation of filters and grouping (30%).
- Clarity in the video and documentation (70%).
- **Note**: This practice should be done in **groups of two students**.