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Lab-13

**Prolog**

***Objective***

* Learn to define **facts** for family relationships.
* Use **rules** to infer relationships like siblings and grandparents.
* Execute **queries** to retrieve information based on defined facts and rules.

**Task 1: Family Relationships**

This task is designed to introduce Prolog's core concepts of **facts**, **rules**, and **queries** by modeling a simple family tree and defining relationships such as siblings and grandparents.

**Facts**: Define basic parent-child relationships using facts in the format:

* John is the parent of Mary.
* John is the parent of Tom.
* Mary is the parent of Susan.
* Tom is the parent of James.

**Rules**: Define relationships inferred from facts:

1. **Sibling Relationship**: Two people are siblings if they share the same parent, but they are not the same person.
2. **Grandparent Relationship**: A person is a grandparent of another if they are the parent of that person's parent.

**Queries:**

Ask questions to retrieve relationships:

* 1. Check if two individuals are siblings.
  2. Determine if someone is a grandparent of another.
  3. List all siblings of a person.

**Task 2: Employee Hierarchy**

Define an organizational hierarchy using facts. Create rules to infer relationships like subordinates and colleagues. Practice queries to extract information about the hierarchy.

The goal is to define relationships between employees, such as "boss," "subordinate," and "colleague," and use these definitions to query the hierarchy.

**Facts:** Facts define direct relationships in the organization. Use the format

*boss(<Boss>, <Employee>)*

* John is the boss of Mary.
* John is the boss of Tom.
* Mary is the boss of Susan.
* Tom is the boss of James*.*

**Rules:**

1. **Subordinate Relationship**  
   A person is a subordinate of another if the latter is their boss.
2. **Colleague Relationship**  
   Two people are colleagues if they share the same boss and are not the same person:

**Queries:**

1. Who are John's subordinates.
2. Are Mary and Tom colleagues?
3. Who is Susan's boss?

**Task 3: Animal Classification**

This task is designed to introduce students to classification systems using Prolog. Students will define the characteristics of animals and create rules to categorize them (e.g., mammals, birds, reptiles).

**Facts:**

* A dog is a mammal.
* A cat is a mammal.
* A parrot is a bird.
* An eagle is a bird.
* A parrot has feathers.
* An eagle has feathers.
* An eagle lays eggs.
* A parrot lays eggs.

**Rules:**

1. **Animal Classification Rule**  
   A creature is an animal if it is a mammal, bird, or belongs to another classification.
2. **Warm-Blooded Animals**
3. **Flying Animals**

**Queries:**

1. Is a parrot an animal?
2. Does an eagle have feathers?
3. Can a cat fly?