

**Batch: A1**

**Experiment Number: 5**

**Roll Number: 16010422013**

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**Aim of the Experiment:** Write a program for implementation of family tree in PROLOG using condition- action rules based agent.

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**Program/ Steps:**

**male(Sahil).**

**male(Shivam).**

**male(Shivabrata).**

**male(Debrata).**

**male(Pramod).**

**male(Subrata).**

**male(Raja).**

**male(Moon).**

**male(Pallab).**

**male(Siddhant).**

**female(Shrishti).**

**female(Rini).**

**female(Ranu).**

**female(Pranjali).**

**female(Savita).**

**female(Pratima).**

**female(Ruby).**

**female(Shilpa).**

**female(Krishna).**

**parent\_of(Sahil,Shivam).**

**parent\_of(Shivabrata, Subrata).**

**parent\_of(Pranjali, Shilpa).**

**parent\_of(Ruby, Krishna).**

**parent\_of(Raja, Ranu).**

**parent\_of(Moon, Rini).**

**parent\_of(Siddhant, Shrishti).**

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**Output/Result:**

**mother\_of(Sahil, Shivam).**

**true**

**mother\_of(Rini, Sahil).**

**false**

**brother\_of(Sahil, Shivam).**

**false**

**father\_of(Siddhant, Shrishti).**

**true**

**aunt\_of(Sahil, Shivam).**

**true**

**grandfather\_of(Moon, Raja).**

true

father\_of(Moon, Shivabrata).

false

father\_of(Moon, Rini).

true

grandfather\_of(Sahil, Shivam).

true

ancestor\_of(Siddhant, Sahil).

true

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#### Post Lab Question-Answers:

1. The PROLOG suit is based on Interpreter.

2. There must be at least one fact pertaining to each predicate written in the PROLOG program. FALSE

3. In PROLOG program the variable declaration is a compulsory part. FALSE

4. Fact in AI:

- In AI, a fact is a piece of information that is considered to be true within a specific knowledge base.

- Facts in AI often correspond to the state of the world, and they are used to represent knowledge about entities and their relationships.

Example:

- In a knowledge base about animals: Fact - Dogs are mammals.

Predicate in AI:

- In AI, a predicate is a logical expression or function that takes one or more arguments and evaluates to either true or false.

- Predicates are used to express relationships or properties among entities in a knowledge base.

Example:

- In a knowledge base about relationships: Predicate - IsParentOf(John, Mary) represents the relationship "John is the parent of Mary."

In AI systems, the combination of facts and predicates is often used to build knowledge graphs, ontologies, or logical frameworks that enable machines to reason about and understand the world. Facts provide the foundational information, and predicates help express complex relationships and dependencies within the data.

#### 5. Knowledge Base Approach:

- A knowledge base is a repository or storehouse of information, facts, and data.
- In the knowledge base approach, information is stored in a structured format, often using a database or some other organized data structure.
- It is a passive repository that contains information but may not include explicit instructions on how to use that information.
- Retrieval and use of information from the knowledge base depend on the specific queries or requests made by the system.

Example:

- A medical knowledge base might contain information about various diseases, symptoms, and treatments without explicit instructions on how to diagnose or treat specific cases.

#### Rule-Based Approach:

- In a rule-based approach, explicit rules or conditional statements are used to represent knowledge.
- Rules are in the form of "if-then" statements, where conditions are specified, and corresponding actions or conclusions are derived when those conditions are met.
- Rule-based systems are often used for decision-making and can be implemented using inference engines that apply rules to reach conclusions.

Example:

- Rule: If it's raining, then take an umbrella.
- The system uses this rule to make a decision: If the condition (it's raining) is met, then the action (take an umbrella) is executed.

#### Comparison:

- Knowledge Base focuses on storing information in a structured manner.
- Rule-Based Approach focuses on using explicit rules for decision-making or problem-solving.
- Knowledge bases are typically used for information retrieval, while rule-based systems are used for automated reasoning and decision support.

In practice, these approaches are often used together, with a knowledge base providing foundational information and rule-based systems providing a mechanism for logical inference and decision-making based on that information.

**Outcomes: Ability to formally state the problem and develop the appropriate proof for a given logical problem.**

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**Conclusion (based on the Results and outcomes achieved):**

**Thus, we have successfully implemented and executed family tree queries in PROLOG.**

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**References:**

1. Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, Second Edition, Pearson Publication
2. Luger, George F. Artificial Intelligence : Structures and strategies for complex problem solving , 2009 ,6th Edition, Pearson Education
3. <https://www.101computing.net/prolog-family-tree/>