# Assignment No:7

Practical Exercise: Forward Chaining Algorithm

## 1) Problem Statement

Implement the Forward Chaining algorithm to infer new facts based on a given set of initial facts and a set of rules. Forward Chaining is a method used in inference engines to apply logical reasoning, where new facts are inferred by checking rules that match the known facts.

## 2) Libraries Used

Python:  
1. **Set Data Structure**: Used to store and manipulate facts in a unique collection.

## 3) Theory

Forward Chaining is a data-driven reasoning method in which inference starts with known facts and rules are applied to derive new facts. The algorithm checks if the conditions of a rule are met by the current facts, and if so, it adds the conclusion of the rule to the set of facts. This process continues until no new facts can be inferred.  
  
The algorithm is widely used in expert systems and reasoning engines, where it helps infer conclusions based on an initial set of data.

## 4) Methods

1. **Facts Representation**: Facts are represented as a list of known facts.  
2. **Rules Representation**: Rules are represented as pairs of conditions and conclusions. A condition is a list of facts that must be true for the conclusion to hold.  
3. **Forward Chaining Algorithm**:  
 - The algorithm begins with an initial set of facts.  
 - It iterates through the rules, checking if all conditions of a rule are satisfied by the known facts.  
 - If the conditions are satisfied, the conclusion is added to the set of facts.  
 - This process continues until no new facts can be added.

## 5) Advantages and Disadvantages

- **Advantages**: Forward Chaining is simple and easy to implement. It is ideal for systems where the facts are continuously updated, and it provides an efficient way to infer new facts based on current knowledge.  
- **Disadvantages**: The algorithm can be inefficient if there are too many rules, as it may need to repeatedly check all rules. Additionally, it may infer unnecessary conclusions if it doesn't have a stopping condition based on a specific goal.

## 6) Diagram

## A screenshot of a computer Description automatically generated

## 7) Conclusion

The Forward Chaining algorithm is an effective method for reasoning and inference in rule-based systems. By iteratively applying rules and adding new facts, the algorithm can infer conclusions from a given set of initial facts. It is especially useful in expert systems and domains requiring logical reasoning.