

**Experiment No. 6**

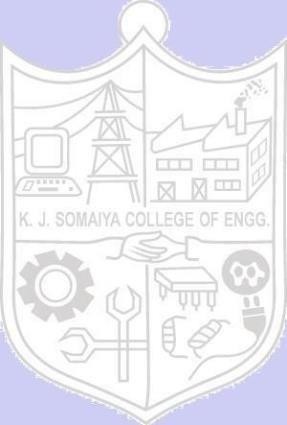
**Title:** Goal based agent for solving a murder mystery

# Batch: B4 Roll No.:16010421119 Experiment No.: 6

**Aim:** Write a program for implementation of solution of based a Murder Mystery using knowledge agent architecture.

**Resources needed:** PROLOG Suite

# Theory

Knowledge is vast, uncertain and continuously changing. These properties of knowledge make it difficult to arrive at a result. A murder mystery is a kind of situation which depicts the uncertain nature of knowledge and also emphasizes the need of choosing right clauses from entire knowledgebase to make a decision. The goal based agent architecture and some knowledge engineering can help in solution of such problems.

The logical agents are complex but they can reason and learn from the actions and new precepts. They are less like acting and think like humans but more like acting and thinking rational agents. Knowledge and reasoning play a crucial role in dealing with partially observable environments. A knowledge based agent can combine the general knowledge with current percept to infer the hidden aspects of the current state prior to selecting actions. The knowledge engineering process can be broadly described as:

1. Identify the task
2. Assemble the relevant knowledge
3. Decide on vocabulary of predicates, functions and constants
4. Encode general knowledge about the domain
5. Encode description of specific problem instance
6. Pose queries to the inference procedure and get answers
7. Debug the knowledgebase

# Procedure:

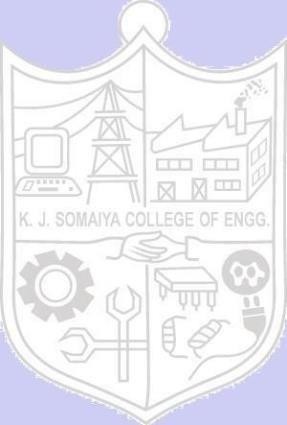
Define the contents of three sections of prolog program as follows-

1. Define Domain section: Define various variables and symbols needed for problem. (Similar to definition part of conventional programming )
2. Define Predicates: Different relation between symbols and variables are to be declared . (similar to defining function prototype in conventional programming)
3. Define Clauses: Various facts and rules supporting the predicates declared are to be defined.

**Predicates used in Program:**

**feud(person,person) affair(person,person) killedwith(object,person) negativity(vice,person) spouse(person,person) killed(person) objectsfound(object) workswith(occupation,person)**

**occupationrelated(object,occupation) killer(person,person) objectsuspect(person,object) revenge(person,person)**



**suspect(person,person)**

.

# Results: (Softcopy submission of Summary Document) Problem Statement:

**James Bond – Dr. No**

Everything starts when the British Agent John Strangways and his secretary go missing in Jamaica. James Bond is assigned by M to investigate with the agents. 007 teams-up with C.I.A. Agent Felix Leiter and the native Quarrel that works with him, and 007 learns that Strangways was investigating the Crab Key island that belongs to the mysterious Dr. No, and is very well protected by armed guards. Soon they learn that Dr. No is toppling the rockets launched N.A.S.A at Cape Canaveral, and 007 goes to Crab Key with Quarrel to seek evidence against Dr. No. They meet Honey Ryder collecting seashells in the island. They stay together, but soon they are found by security guards and arrested in Dr. No's facility, and James Bond learns the evil plan of Dr. No and S.P.E.C.T.R.E.

The following steps are to be followed:

Identify the task – The main goal is to find who killed agent John Strangways and his secretary. The facts are the evidences found by James Bond. The main tasks include –

* 1. Finding all the suspects.
  2. Finding all the prime suspects.
  3. Finding the killer.

1. Assemble the relevant knowledge – The relevant knowledge consists of the actors in the scene and the evidences. The actors in the scene are – James Bond, John Strangways, Felix Leiter, Quarrel, R. J. Dent, Doctor No, an anonymous assassin, Mary Trueblood, Honey Rider.

The evidences are:

1. Agent John Strangways and his secretary were killed.
2. The documents related to the Island named Crab Key were stolen.
3. The rock samples collected by R. J. Dent were radioactive.
4. Decide on the vocabulary of predicates, functions, and constants – The constants in the problem used are – male, female, location, evidence. The following predicates will be used: a. male(name)
5. female(name)
6. evidence()
7. location(place)
8. stole()
9. kills()
10. owner() **Implementation details: Code:**

***male****(james\_bond).* ***male****(john\_strangways).* ***male****(felix\_leiter).* ***male****(quarrel).* ***male****(r\_j\_dent).* ***male****(dr\_no).* ***male****(assassin).* ***female****(mary\_trueblood).* ***female****(honey\_rider).*

***evidence****(documents).* ***evidence****(rock\_samples).* ***radioactive****(rock\_samples).*

***location****(crab\_key).* ***tank****(dragon).* ***controls****(dr\_no, dragon).*

***stole****(assassin, documents).*

***kills****(assassin, john\_strangways).* ***kills****(assassin, mary\_trueblood).* ***owner****(crab\_key,dr\_no).* ***owner****(rock\_samples,r\_j\_dent).*

***assistant****(dr\_no, r\_j\_dent).* ***assistant****(dr\_no, assassin).*

***kills****(dragon, quarrel).*

***kidnapped****(dragon, james\_bond).*

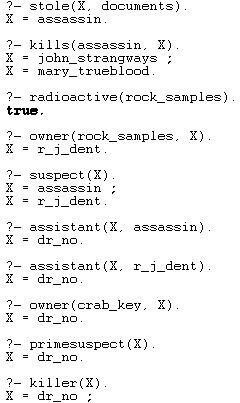
***kidnapped****(dragon, honey\_rider).*

***suspect****(X) :- evidence(Y),stole(X,Y);radioactive(Z),owner(Z,X).* ***primesuspect****(X)*

*:- owner(crab\_key,X).*

***killer****(X) :- suspect(Y),assistant(X,Y).*

# Output:



**Outcomes:**

CO3: Ability to formally state the problem and develop the appropriate proof for given a logical deduction problem.

# Conclusion:

Successfully implemented a program of a Murder Mystery in PROLOG using knowledge agent architecture.

# Grade: AA / AB / BB / BC / CC / CD /DD

**Signature of faculty in-charge with date**

# References:

* Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, Second Edition, Pearson Publication
* Luger, George F. Artificial Intelligence : Structures and strategies for complex problem solving , 2009 ,6th Edition, Pearson Education
* https:/[/www.101computing.net/solving-a-murder-mystery-using-prolog/](http://www.101computing.net/solving-a-murder-mystery-using-prolog/)