# LAB # 9

## Statement Purpose:

This lab will introduce students to complex knowledge bases in Prolog. Students will also get in depth of prolog syntax and the process of deducing facts from knowledge base.

## Activity Outcomes:

This lab teaches you the following topics:

How to use variables in Prolog How to create complex queries
How to create complex knowledge base and use it for deduction

## Instructor Note:

As pre-lab activity, read Chapter 1 from the book (Learn Prolog Now, Vol 7, by BlackBurn et. al.,) to know the basics of prolog programming.

## 1) Stage J (Journey)

## Introduction:

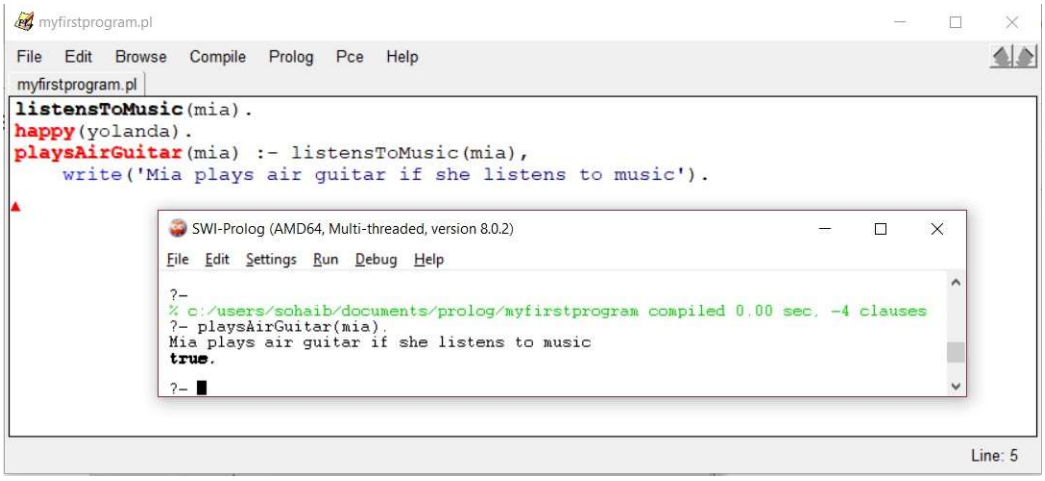
Creating complex knowledge bases poses a challenge in Prolog. It requires user to get familiar with notation and program flow which is quite different in prolog compared to other programming languages.

## 2) Stage a1 (apply)

## Lab Activities:

**Activity 1:**

**How to print text in prolog? Solution:**



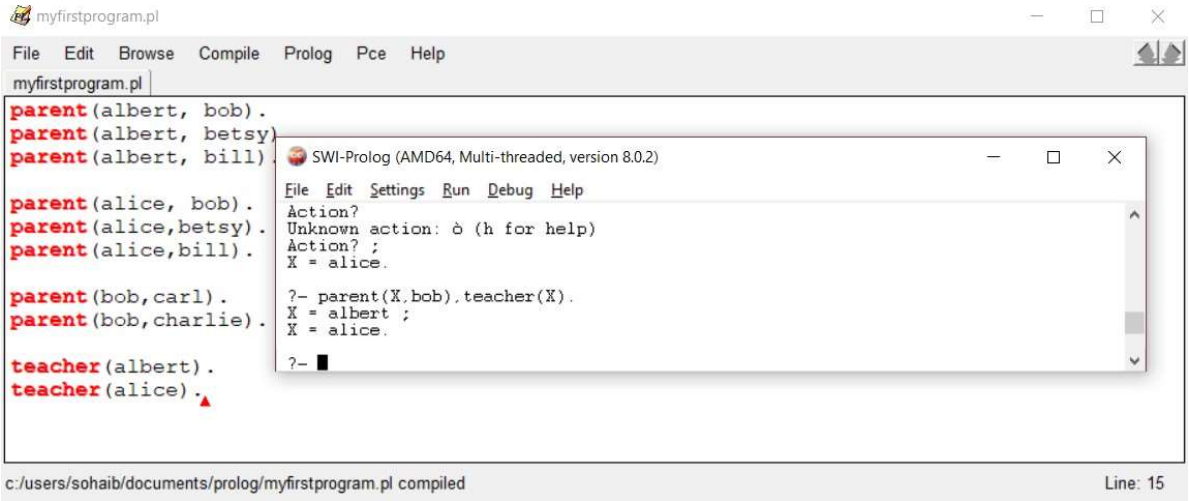

We can print custom text even within conditionals as shown above.

## Activity 3:

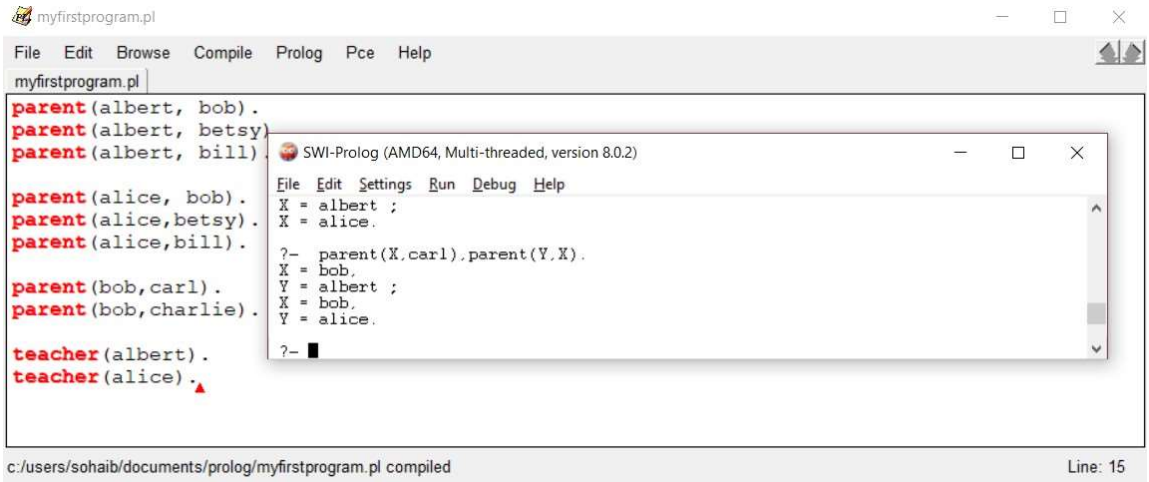
## How to ask complex queries?

## Solution:

Suppose that we define a knowledgebase containing parenthood relationship alongside the teaching relationship. WE then ask the question that "give me that person X which is a parent of bob and also a teacher". WE would do that as follows,

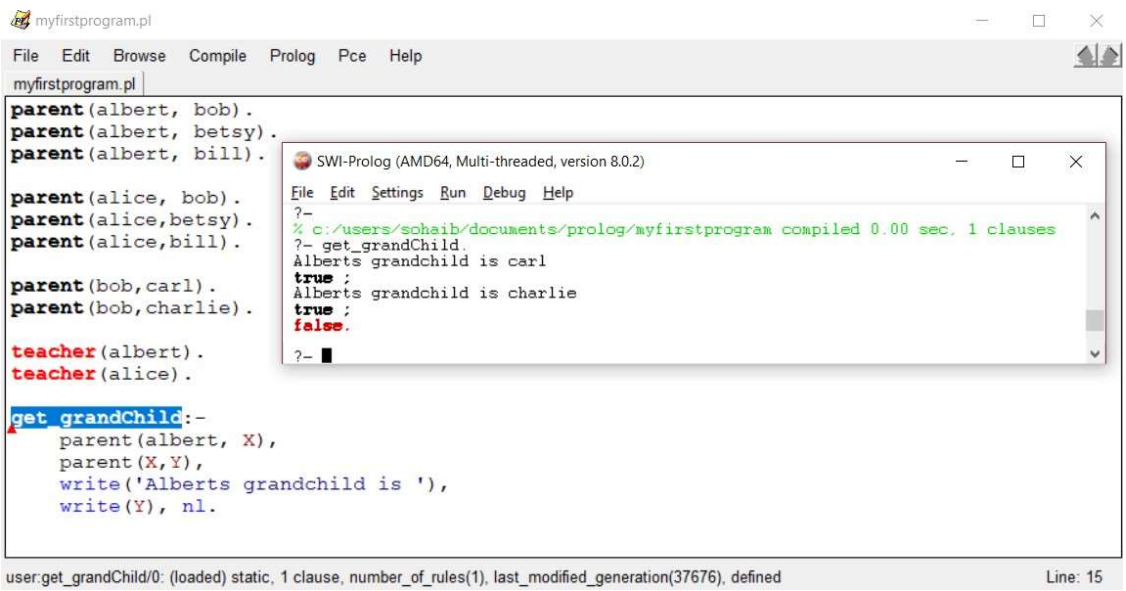



Suppose that we want to ask if Carl has a grandparent. We would do that as follows,




Question: Write a query in a similar fashion to determine grandchildren of Albert in above knowledgebase.

We can also define get_GrandChild as a rule in the knowledgebase,



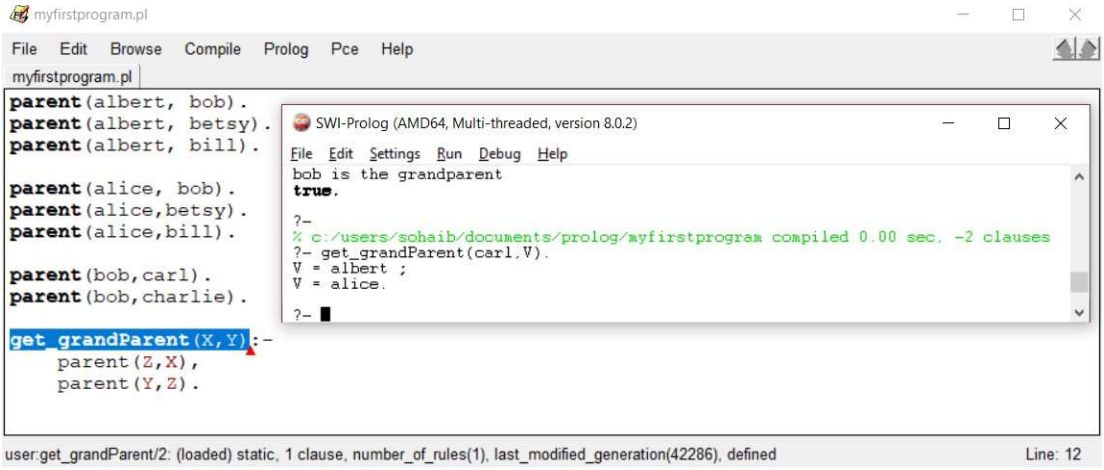

Let's see if Carl and Charlie share a parent,

?- parent(X,carl),parent(X,charlie). X = bob.

## Activity 4:

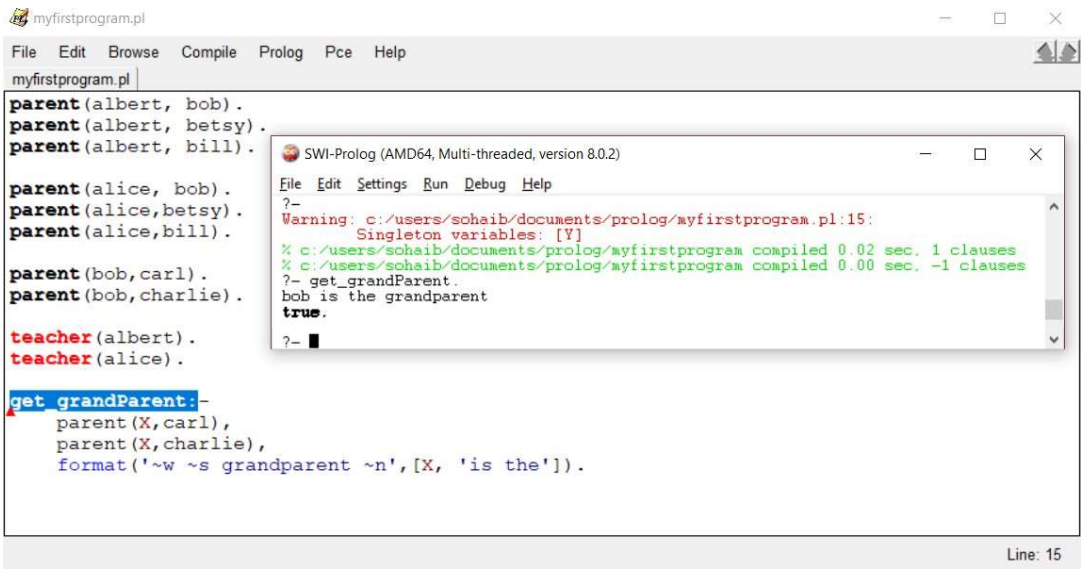
We can also define variables within a consequent of a predicate which helps us to find grandparent of any X.

## Solution:




## Activity 5:

## How to use format command to print inside a Knowledge Base? Solution:




## Submission requirement

## Activity 6:

## Utilizing what have learned in the previous labs, develop a working expert system for tourists based on numbers of holidays and cost:

For the coming New Year holidays a company is offering three tourist packages for visiting Pakistan, India and Bangladesh. They are called Indus, Ganges and Brahamaputra. The Indus package is for 7 days and costs $1000, the Ganges package is for 14 days and costs $ 1500 and the Brahamaputra package is for 5 days and costs $800.

When run, the program should ask for the budget and the time at the disposal of the client and then suggest a package based on the time and financial considerations.
Use the predicates write() and readint()

## Solution:

expsys.pl

File Edit Browse Compile Prolog Pce Help

expsys.pl

```
start:-
        write("Please Enter your Choice of Days and Cost:\n"),
        write("What is your Days Limit:\n"), read(Day),
        write("What is your Cost Limit:\n"),read(Cost),
        checkpackage(Day, Cost).
checkpackage(Day,Cost):-
        Day > 0, Day <6, Cost = 800, bahamaputra,!;
        Day > 5, Day <8, Cost = 1000, ganges,!;
        Day > 7, Day <15, Cost = 1500, indus,!.
bahamaputra:-
        write("Package Bahamaputra").
ganges:-
        write("Package Ganges").
indus:-
        write("Package indus").
```

The write("<string>") predicate displays the text on screen. Using the variables Day and Cost, the package is suggested.

## Activity 7:

## Utilizing what have learned in the previous labs, develop a working expert system for determining the horoscope based on date and month of birth:

Based on the date of birth and month of birth determine the zodiac sign, giving its basic information.
When run, the program should ask for the date of month and the month of the year for example if your birthday is 1st February 1900, then as Date of month you should enter "1" and as

month of the year value should be “2”. Based on this information inform the zodiac sign, that is one of the Aries, Taurus, Gemini, etc out of the 12 zodiac signs.
Use the predicates write() and readint()

## Solution:

expsys2.pl [modified]

File Edit Browse Compile Prolog Pce Help

expsys.pl | expsys2.pl [modified]

```
start:-
    write("What Date of the Month You were Born:\n"),read(Day),
    write("What Month of the Year You were Born:\n"),read(Month),
    check_day(Day),check_month(Month),check_sign(Day,Month).
check_day(Day):-
    Day < 0,write("date is incorrect\n");
    Day > 31,write("date is incorrect\n");
    !.
check_month(Month):-
    Month < 0,write("month is incorrect\n");
    Month > 12,write("month is incorrect\n");
    !.
check_sign(Day,Month):-
    Day =< 21, Month = 12, sagitarius.
check_sign(Day, Month):-
    Day >= 22, Month = 12, capricorn;
    Day =< 19, Month=1, capricorn.
check_sign(Day, Month):-
    Day =< 22, Month=1, acquarius;
    Day >= 19, Month=2, acquarius.

check_sign(Day, Month):-
    Day =< 22, Month=2, pisces;
    Day =< 19, Month=3, pisces.
aries:-
    write("Hello Aries\n").
sagitarius:-
    write("Hello Sagitarius\n").
capricorn:-
    write("Hello Capricorn\n").
acquarius:-
    write("Hello Acquarius\n").
pisces:-
    write("Hello pisces\n").
leo:-
```

Colourising buffer ... done, 0.02 seconds, 116 fragments

We can print custom text for each of the zodiac signs.