Dharmsinh Desai University, Nadiad
Faculty of Technology
Department of Information Technology
Laboratory Manual
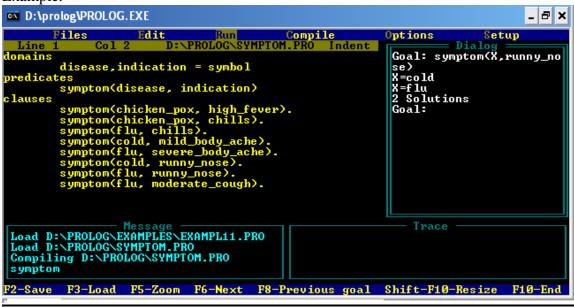## BE – IT , Sem :VII   Subject Name: Knowledge systems

Tools / Apparatus: Turbo Prolog GUI software .

EXPERIMENT1

Aim:- Study of Turbo Prolog features and format.

Procedure:-

- Write a simple prolog program to study fact, verification, domain, predicate and clauses section.(see program on pg 41 of book)

Example:-

EXPERIMENT2

Aim:- WAP Using variables in Prolog
Procedure:-

- Write a Prolog program containing facts related to following predicates

a) Location (city, state)
b) Stays (person, city) in clauses section.

Display:

    (i) list of person, state and city

       Example:-

            Output:- Person= ram   City=anand   State=Gujarat
                      Person= Lakshman City=anand State=Gujarat
                      Person= Seeta   City=Baroda State=Gujarat
                      Person= Ravan City=Columbo State=Srilanka

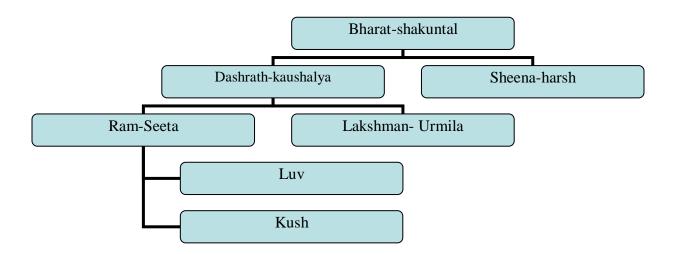   (ii) Given person staying in which state.

       Example:-

            Output:- Person= ram State=Gujarat

Aim:- WAP for Usage of rules in Prolog
Procedure:-
> Create a family tree program (of EXP2) to include following rules –

* M is the mother of P *if* she is a parent of P and is female
* F is the father of P *if* he is a parent of P and is male
* X is a sibling of Y *if* they both have the same parent.
* Then add rules for grandparents,uncle-aunt,sister and brother .

Based on the facts, define goals to answer questions related to family tree.

Example:- Suppose family tree is as follows-

Output:- goal :-grandfather(Luv,X)   goal:-uncle(luv,X)

            X=Dashrath   X=lakshman

      Goal:-father(Luv,X)

            X=Ram

      Goal:-sibling(luv,X)

            X=kush

      Goal:-aunt(luv,X)

            X=Urmila

EXPERIMENT4

Aim:- WAP for using Input, Output and fail predicates in prolog -

Procedure:-

Write program using *write, writef, readint,readchar,readln* and *readreal* predicates

- Store facts of employee name, age, job location, marital status and gender.

  Display: (i) List of married & unmarried employees

  (ii) List of male & female employees

  (iii) List of employees for given job location

  Example:-   Output :-

                *********OPTIONS**********

  1. Display list of married employees
  2. Display list of unmarried employees
  3. Display list of male employees
  4. Display list of female employees
  5. Display list of employees at a given location

  Enter your choice:-

      5

  Enter location :-

  Anand

  List of employees staying at "anand" are

  1. Ram
  2. Lakshman

  ………

- Create a small set of facts and rules on who is the ancestor of whom.

  Display i) who is ancestor of given person.

  ii) Complete list i.e who is ancestor of whom.

  Example:-[with reference to above given family tree in experiment3)

  i) Input person's name-Luv

  Output :- Ancestors of "luv" is-

          Ram ,Lakshman

  ii) Output:- person   Ancestor

          Luv   Ram ,Lakshman

          Ram   Dashrath   ,Sheena

          Lakshman   Dashrath,Sheena

          Dashrath   Bharat

EXPERIMENT5

Aim:- Write programs for studying Usage of arithmetic operators in Prolog

Procedure:-Write programs to-

- Accept name of the student, rollno, his subject name ,maximum marks and obtained marks in the subject. (Take marks of atleast 6 subjects) . Compute the percentage of a student. Display his result with other information. Use variables, arithmetic operators, I/O predicates appropriately.

Example:-

Output:- Enter name of student:- "ram"
   Enter roll number of student-IT1
   Enter subject information for 6 subjects :-
    Subject name- "daa" Max marks:-150 Obtained marks:-120
    Subject name- " oopd"   Max marks:-150 Obtained marks:-110
    Subject name- " cn"   Max marks:-150 Obtained marks:-100
    Subject name- " dc"   Max marks:-100 Obtained marks:-60
    Subject name- " amp"   Max marks:-150 Obtained marks:-140
    Subject name- " cpi"   Max marks:-150 Obtained marks:-30
   **********RESULT***************
    Student name:-"ram" Roll no-"IT1"
    Subject names-"daa" ,"oopd", "cn","dc","amp","cpi"
   Total max marks-….   Total Obtained marks- ….
   % percentage - ……

- Accept department, designation, name, age, basic salary, house rent allowance(HRA) of an employee . Compute dearness allowance (DA) which is 15% of basic salary . Determine the gross salary(basic salary+HRA+DA) of the employee. Display all information of the employee.
   (Use variables, rules, I/O predicates, arithmetic operators as per needed).

Example:-

Output:- Enter employee name:- xyz
   Enter department :-IT
   Enter age:-43
   Enter basic salary-50,000
  Enter HRA:- 2000

  PAYSLIP
  Employee Name is –xyz
  Department-IT
  BA-50,000
  DA - 7500
  HRA-2000
  Gross salary- 59500/-

EXPERIMENT6

Aim :- Write program to study usage of cut(!),not,fail predicates in prolog.

Procedure:-

Write a prolog program having facts in clauses section for predicate
 student(studentname,branchname).

Use cut !, fail and not predicates to:
- Display list of all students
- Display list of students for given specific branch.
- Display list of students excluding specific branch

Example:- Output:- ***********MENU*********************
    1) Display list of all students
    2) Display list of students for given specific branch.
    3) Display list of students excluding specific branch
    Enter your choice-
    3
    Enter branch name to be excluded from result –
    CE
    List of all students except from CE branch are ->
        Harsh – IT
        Deep-EC
        Heena-IC
  Do you want to continue?
  "y"
    ***********MENU*********************
    1) Display list of all students
    2) Display list of students for given specific branch.
    3) Display list of students excluding specific branch

    Enter your choice-2
    Enter name of branch for which student list needed –
    CE
    List of all students in CE branch are ->
        Amardeep – CE
        Anand-CE

    Do you want to continue?
  "y"
    ***********MENU*********************
    1) Display list of all students
    2) Display list of students for given specific branch.
    3) Display list of students excluding specific branch
    Enter your choice-1
        Harsh – IT
        Deep-EC
        Heena-IC
        Amardeep – CE
        Anand-CE

EXPERIMENT 7

Aim:-Write a program to study usage of recursion in prolog

Procedure:-

- Write predicate fact(n) ,which finds and display factorial of a given number .
  Example:- Output:-
   Goal :- fact(5)
        5 != 5*4*3*2*1= 120 .

- Write predicate fibbonacci (n) ,which finds the series for first "n" values .
   Example:- Output:-
  Total number of numbers needed in output?
        6
  Fibonacci series of first '6' numbers:-
        "1,1,2,3,5,8"

EXPERIMENT 8

Aim:-Write programs to study usage of logical , arithmetic ,string operators in Prolog .

Procedure:-

- Write a predicate max(num1,num2,num3) which finds and displays maximum number from three given numbers and min(num1,num2,num3) which finds and displays minimum number of three given numbers ,use logical operators.
  Example : Output

  > Enter three numbers : 1 2 3
  > maximum is "3" , minimum is "1"

- Write a predicate which accepts integer number as an input and displays its square .It should also find its positive square root value ,if its sqrt is integer, otherwise display 'NA' .Use arithmetic operators /in-built conversion predicates to achieve this.
  Example1 :- Output:-

  > Enter no. : 3
  > 3(number) , 9 (square) ,NA(square root not
  > > possible)

  Example1 :- Output:- Enter no. 4

  > > 4 (number),   16 (square) ,   2(square root)

- Write a program to find substring from a given string. The substring should start from 1st location of source string and should contain the entered number of characters from the source string.
  Example:-

  > Output:-Enter source string:
  > > "tested"
  > > Enter number of charcthers needed in substring:
  > > "4"
  > > Original String is : "tested"
  > > Substring is "test"

EXPERIMENT 9

Aim:- Write programs for studying usage of 1) compound object and 2) list   in prolog

Procedure**:-**

1) Write a program to maintain inventory items using a **compound object.**

The format of compound object should be

      (item type, item (no, description, qty, cost))

      Item-type can be fg-finish good, sf-semi finish good, rm-raw material,

Write appropriate predicates to

i) Accept from user the details of atleast 10 such objects

ii) Display the details of objects entered by user.

Example:-

    Output:- enter information of 10 items

        Enter item type …..

        Enter item number …..

        Enter item description…..

        Enter quantity of item….

        Enter cost of item…..

      ………………………..

      ………………………………

    The details of objects entered are as follows-→

Item type	Item number	description	quantity	cost
Fg	1	keyboard	10	2000
Rm	2	plasticbox	10	300
Sf	3	keypad	10	500

2) Find and display odd and even numbers from a given input list of integers

  Example:-

    Output:- Enter list of 10 integer numbers

      1 2 3 4 5 6 7 8 9 10

      Even numbers ->   2,4,6,8,10

      Odd numbers-> 1,3,5,7,9

EXPERIMENT10

Aim:- WAP for studying usage of dynamic database in prolog

Procedure:-
- Store facts of student(name, branch, semester , percentage) dynamically.
- Use asserta predicate to enter new data in dynamic database.
- Use retract predicate to delete a given data from dynamic db.
- Create appropriate predicate to search and display some specified students details.
- Create appropriate predicate to list all the students having percentage greater than some specified value.

Example :- Output:-

```
*****************MENU***********************
                1)  enter new student details
                2)  delete a student data
                3)  display specific student details
                4)  list of students having % greater then specified %
                5) Exit
                Enter your choice:-
                 4
                Enter minimum % -
                 60
                The student details having % greater than "60 " are
                 Std name  std branch  semester      %
                 Ram      IT            7          61
                 Lakshman  CE           7          69
                ……………….
                Do you want to continue? (y/n)
                y
*****************MENU***********************
                1)  enter new student details
                2)  delete a student data
                3)  display specific student details
                4)  list of students having % greater then specified %
                5)  Exit
                Enter your choice:-
                   2
                Enter student name to be deleted:-
                  Ram
                Record  deleted  successfully .
                Do you want to continue? (y/n)
                y
*****************MENU***********************
                1)  enter new student details
                2)   delete a student data
                3)  display specific student details
                4)  list of students having % greater then specified %
                5)  Exit
                Enter your choice:- 5
                Thankyou …have a good day
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LABWORK BEYOND CURRICULA

EXPERIMENT 1-
Write a prolog program to solve a murder mystery problem. Design a system which stores rules to judge a person as culprit. Rules can be like- the person should have access to weapon by which murder was done, he should be at the crime site at the occurrence of crime, and he had a motive to conduct the crime and so on. Then based on facts and rules, the culprit should be identified.

EXPERIMENT 2-
Expert system for household appliances. The problems can be related to any house hold appliance like refrigerator. The problems can be like led not glowing, not cooling properly, not defrosting etc. The system should store a set of symptoms related to a particular problem and its solution. Then it should ask a series of questions and attempt to diagnose the problem, based on the indications of problem reported by user.