

UCS1524 - LOGIC PROGRAMMING

ASSIGNMENT - 4

TITLE : DEVELOPING AN EXPERT SYSTEM

TEAM MEMBERS :

JENISHDA PUSHPA MARY S - 205001050

AAFREEN M - 205001301

SHAHUL HAMEED T - 205001307

DOMAIN NAME : PLANT IDENTIFICATION SYSTEM

1. KNOWLEDGE BASE :

S.No	Plant Name	Family	Uses	Type	Description
1	Tomato	Solanaceae	Sauce	Vegetable	Red color and round in shape
2	Climbing Brinjal	Solanaceae	Cough	Medicinal plant	Full of thorns
3	Rice	Poaceae	Major food	Grasses	Round and Hollow stems
4	Peanuts	Fabaceae	Cooking oil	Oleaginous Plant	Mitochondria Shape
5	Butterfly Pea	Fabaceae	Varnish	Flower	Purple color and lance shape
6	Pigeon Pea	Fabaceae	Proteins	Lentils	Elliptical in shape
7	Phormium tenax	Liliaceae	Rope	Fiber Crops	Sword shape
8	Peruvian Groundcherry	Solanaceae	Vitamins	Fruit	Yellow color and cherry shape

2.ASKABLES :

Plant Name : Plant variable specifies the plant that should be identified.

Family : Family indicates the corresponding plant belonging to which family.

Uses : This askable used to identify the uses of the plant.

Type : The users can specify the type of the plant - Medicinal plant, grasses etc.

Description : Using this askable the user can easily identify the properties of the plant.

3.PROLOG PROGRAM :

Operator:

op(100, xfx, [usedfor, comesfrom, has, isa, gives]).

Facts:

'Tomato' comesfrom 'Solanaceae'.

'Climbing Brinjal' comesfrom 'Solanaceae'.

'Rice' comesfrom 'Poaceae'.

'Peanuts' comesfrom 'Fabaceae'.

'Butterfly Pea' comesfrom 'Fabaceae'.

'Pigeon Pea' comesfrom 'Fabaceae'.

'Phormium Tenax' comesfrom 'Liliaceae'.

'Peruvian Groundcherry' comesfrom 'Solanaceae'.

'Tomato' usedfor 'Sauce'.

'Climbing Brinjal' usedfor 'Cough'.

'Rice' usedfor 'Major food'.

'Peanuts' usedfor 'Cooking oil'.

'Butterfly Pea' usedfor 'Varnish'.

'Pigeon Pea' usedfor 'Proteins'.

'Phormium Tenax' usedfor 'Rope'.

'Peruvian Groundcherry' usedfor 'Vitamins'.

'Tomato' isa 'Vegetable'.

'Climbing Brinjal' isa 'Medicinal plant'.

'Rice' isa 'Grasses'.
'Peanuts' isa 'Oleaginous Plant'.
'Butterfly Pea' isa 'Flower'.
'Pigeon Pea' isa 'Lentils'.
'Phormium Tenax' isa 'Fiber Crops'.
'Peruvian Groundcherry' isa 'Fruit'.

'Tomato' has 'Red color and round in shape'.
'Climbing Brinjal' has 'Full of thorns'.
'Rice' has 'Round and Hollow stems'.
'Peanuts' has 'Mitochondria shape'.
'Butterfly Pea' has 'Purple color and lance shape'.
'Pigeon Pea' has 'Elliptical in shape'.
'Phormium Tenax' has 'Sword shape'.
'Peruvian Groundcherry' has 'Yellow color and cherry shape'.

'Tomato' gives 'Food'.
'Climbing Brinjal' gives 'No Food'.
'Rice' gives 'Food'.
'Peanuts' gives 'Food'.
'Butterfly Pea' gives 'No Food'.
'Pigeon Pea' gives 'Food'.
'Phormium Tenax' gives 'No Food'.
'Peruvian Groundcherry' gives 'Food'.

Rules:

plant('Tomato', Family, Uses, Type, Description, EatablePart) :-

'Tomato' comesfrom Family,
'Tomato' usedfor Uses,
'Tomato' isa Type,
'Tomato' has Description,
'Tomato' gives EatablePart.

plant('Climbing Brinjal', Family, Uses, Type, Description, EatablePart) :-

'Climbing Brinjal' comesfrom Family,
'Climbing Brinjal' usedfor Uses,
'Climbing Brinjal' isa Type,
'Climbing Brinjal' has Description,
'Climbing Brinjal' gives EatablePart.

plant('Rice', Family, Uses, Type, Description, EatablePart) :-

'Rice' comesfrom Family,

'Rice' usedfor Uses,

'Rice' isa Type,

'Rice' has Description,

'Rice' gives EatablePart.

plant('Peanuts', Family, Uses, Type, Description, EatablePart) :-

'Peanuts' comesfrom Family,

'Peanuts' usedfor Uses,

'Peanuts' isa Type,

'Peanuts' has Description,

'Peanuts' gives EatablePart.

plant('Butterfly Pea', Family, Uses, Type, Description, EatablePart) :-

'Butterfly Pea' comesfrom Family,

'Butterfly Pea' usedfor Uses,

'Butterfly Pea' isa Type,

'Butterfly Pea' has Description,

'Butterfly Pea' gives EatablePart.

plant('Pigeon Pea', Family, Uses, Type, Description, EatablePart) :-

'Pigeon Pea' comesfrom Family,

'Pigeon Pea' usedfor Uses,

'Pigeon Pea' isa Type,

'Pigeon Pea' has Description,

'Pigeon Pea' gives EatablePart.

plant('Phormium Tenax', Family, Uses, Type, Description, EatablePart) :-

'Phormium Tenax' comesfrom Family,

'Phormium Tenax' usedfor Uses,

'Phormium Tenax' isa Type,

'Phormium Tenax' has Description,

'Phormium Tenax' gives EatablePart.

plant('Peruvian Groundcherry', Family, Uses, Type, Description, EatablePart) :-

'Peruvian Groundcherry' comesfrom Family,

'Peruvian Groundcherry' usedfor Uses,
'Peruvian Groundcherry' isa Type,
'Peruvian Groundcherry' has Description,
'Peruvian Groundcherry' gives EatablePart.

User interface:

```
phytologist(Name) :-  
write("\nWhat is your target family ? '),  
read(Family),  
write("\nWhat type of uses you want ? '),  
read(Uses),  
write("\nWhat Type of plant you want ? '),  
read(Type),  
write("\nWhat are descriptions the plant should have? '),  
read(Description),  
write("\nWhat is your EatablePart preference? '),  
read(EatablePart),  
plant(Name, Family, Uses, Type, Description, EatablePart).
```

4.TESTING

GNU Prolog 1.5.0 (64 bits)

Compiled Jul 8 2021, 12:33:56 with cl

Copyright (C) 1999-2021 Daniel Diaz

```
| ?- op(100, xfx, [usedfor, comesfrom, has, isa, gives]).
```

```
yes
```

```
| ?- [user].
```

```
compiling user for byte code...
```

```
'Tomato' comesfrom 'Solanaceae'.
```

```
'Climbing Brinjal' comesfrom 'Solanaceae'.
```

```
'Rice' comesfrom 'Poaceae'.
```

```
'Peanuts' comesfrom 'Fabaceae'.
```

```
'Butterfly Pea' comesfrom 'Fabaceae'.
```

```
'Pigeon Pea' comesfrom 'Fabaceae'.
```

```
'Phormium Tenax' comesfrom 'Liliaceae'.
```

```
'Peruvian Groundcherry' comesfrom 'Solanaceae'.
```

```
'Tomato' usedfor 'Sauce'.
```

```
'Climbing Brinjal' usedfor 'Cough'.
```

```
'Rice' usedfor 'Major food'.
```

```
'Peanuts' usedfor 'Cooking oil'.
```

```
'Butterfly Pea' usedfor 'Varnish'.
```

```
'Pigeon Pea' usedfor 'Proteins'.
```

```
'Phormium Tenax' usedfor 'Rope'.
```

```
'Peruvian Groundcherry' usedfor 'Vitamins'.
```

```
'Tomato' isa 'Vegetable'.
'Climbing Brinjal' isa 'Medicinal plant'.
'Rice' isa 'Grasses'.
'Peanuts' isa 'Oleaginous Plant'.
'Butterfly Pea' isa 'Flower'.
'Pigeon Pea' isa 'Lentils'.
'Phormium Tenax' isa 'Fiber Crops'.
'Peruvian Groundcherry' isa 'Fruit'.

'Tomato' has 'Red color and round in shape'.
'Climbing Brinjal' has 'Full of thorns'.
'Rice' has 'Round and Hollow stems'.
'Peanuts' has 'Mitochondria shape'.
'Butterfly Pea' has 'Purple color and lance shape'.
'Pigeon Pea' has 'Elliptical in shape'.
'Phormium Tenax' has 'Sword shape'.
'Peruvian Groundcherry' has 'Yellow color and cherry shape'.

'Tomato' gives 'Food'.
'Climbing Brinjal' gives 'No Food'.
'Rice' gives 'Food'.
'Peanuts' gives 'Food'.
'Butterfly Pea' gives 'No Food'.
'Pigeon Pea' gives 'Food'.
'Phormium Tenax' gives 'No Food'.
'Peruvian Groundcherry' gives 'Food'.
```

user compiled, 45 lines read - 5278 bytes written, 789329 ms

```
(157 ms) yes
| ?- [user].
compiling user for byte code...
plant('Tomato', Family, Uses, Type, Description, EatablePart) :-
'Tomato' comesfrom Family,
'Tomato' usedfor Uses,
'Tomato' isa Type,
'Tomato' has Description,
'Tomato' gives EatablePart.

plant('Climbing Brinjal', Family, Uses, Type, Description, EatablePart) :-
'Climbing Brinjal' comesfrom Family,
'Climbing Brinjal' usedfor Uses,
'Climbing Brinjal' isa Type,
'Climbing Brinjal' has Description,
'Climbing Brinjal' gives EatablePart.

plant('Rice', Family, Uses, Type, Description, EatablePart) :-
'Rice' comesfrom Family,
'Rice' usedfor Uses,
'Rice' isa Type, 'Rice' has Description,
'Rice' gives EatablePart.

plant('Peanuts', Family, Uses, Type, Description, EatablePart) :-
'Peanuts' comesfrom Family,
'Peanuts' usedfor Uses,
'Peanuts' isa Type,
'Peanuts' has Description,
'Peanuts' gives EatablePart.
```



```
plant('Butterfly Pea', Family, Uses, Type, Description, EatablePart) :-
'Butterfly Pea' comesfrom Family,
'Butterfly Pea' usedfor Uses,
'Butterfly Pea' isa Type,
'Butterfly Pea' has Description,
'Butterfly Pea' gives EatablePart.

plant('Pigeon Pea', Family, Uses, Type, Description, EatablePart) :-
'Pigeon Pea' comesfrom Family,
'Pigeon Pea' usedfor Uses,
'Pigeon Pea' isa Type,
'Pigeon Pea' has Description,
'Pigeon Pea' gives EatablePart.

plant('Phormium Tenax', Family, Uses, Type, Description, EatablePart) :-
'Phormium Tenax' comesfrom Family,
'Phormium Tenax' usedfor Uses,
'Phormium Tenax' isa Type,
'Phormium Tenax' has Description,
'Phormium Tenax' gives EatablePart.

plant('Peruvian Groundcherry', Family, Uses, Type, Description, EatablePart) :-
'Peruvian Groundcherry' comesfrom Family,
'Peruvian Groundcherry' usedfor Uses,
'Peruvian Groundcherry' isa Type,
'Peruvian Groundcherry' has Description,
'Peruvian Groundcherry' gives EatablePart.
```

```
user compiled, 56 lines read - 5838 bytes written, 479406 ms
```

```
(734 ms) yes
| ?- [user].
compiling user for byte code...
phytologist(Name) :-
write('\nWhat is your target family? '),
read(Family),
write('\nWhat type of uses you want? '),
read(Uses), |
write('\nWhat Type of plant you want ? '),
read(Type),
write('\nWhat are descriptions the plant should have? '),
read(Description),
write('\nWhat is your EatablePart preference? '),
read(EatablePart),
plant(Name, Family, Uses, Type, Description, EatablePart).
```

```
user compiled, 13 lines read - 1366 bytes written, 14804 ms
```

```
(31 ms) yes
| ?-
```

(47 ms) yes
| ?- phytologist(Name).

What is your target family? Solanaceae.

What type of uses you want? Sauce.

What Type of plant you want ? Vegetable.

What are descriptions the plant should have? 'Red color and round in shape'.

What is your EatablePart preference? Food
.

Name = 'Tomato' ?

(79 ms) yes
| ?-

\ ~~~~~ / ~~~~
| ?- phytologist(Name).

What is your target family? Solanaceae.

What type of uses you want? Cough.

What Type of plant you want ? 'Medicinal plant'.

What are descriptions the plant should have? 'Full of thorns'.

What is your EatablePart preference? Food.

(47 ms) no
| ?-

\ ~~~~~ / ~~~~
| ?- phytologist(Name).

What is your target family? Poaceae.

What type of uses you want? 'Major food'.

What Type of plant you want ? Grasses.

What are descriptions the plant should have? 'Round and Hollow stems'.

What is your EatablePart preference? Food.

Name = 'Rice' ?

(125 ms) yes
| ?- |

| ?- phytologist(Name).

What is your target family? Fabaceae.

What type of uses you want? 'Cooking oil'.

What Type of plant you want ? 'Oleaginous Plant'.

What are descriptions the plant should have? 'Mitochondria shape'.

What is your EatablePart preference? Food.

Name = 'Peanuts' ?

(125 ms) yes

| ?-

| ?- phytologist(Name).

What is your target family? Fabaceae.

What type of uses you want? Varnish.

What Type of plant you want ? Flower.

What are descriptions the plant should have? 'Purple color and lance shape'.

What is your EatablePart preference? 'No Food'.

Name = 'Butterfly Pea' ?

(281 ms) yes

| ?-

```
| ?- phytologist(Name).
```

What is your target family? Fabaceae.

What type of uses you want? Proteins.

What Type of plant you want ? Lentils.

What are descriptions the plant should have? 'Elliptical in shape'.

What is your EatablePart preference? Food.

Name = 'Pigeon Pea' ?

(47 ms) yes

```
| ?-
```

```
| ?- phytologist(Name).
```

What is your target family? Liliaceae.

What type of uses you want? Rope.

What Type of plant you want ? 'Fiber Crops'.

What are descriptions the plant should have? 'Sword shape'.

What is your EatablePart preference? 'No Food'.

Name = 'Phormium Tenax' ?

(140 ms) yes

```
| ?- |
```

```
| ?- phytologist(Name).
```

What is your target family? Solanaceae.

What type of uses you want? Vitamins.

What Type of plant you want ? Fruit.

What are descriptions the plant should have? 'Yellow color and cherry shape'.

What is your EatablePart preference? Food.

Name = 'Peruvian Groundcherry'

(79 ms) yes

```
| ?-
```

5. TRACING :

| ?- trace.

The debugger will first creep -- showing everything (trace)

(16 ms) yes

{trace}

| ?- phytologist(Name).

1 1 Call: phytologist(_23) ?

2 2 Call: write("\nWhat is your target family? ") ?

What is your target family?

2 2 Exit: write("\nWhat is your target family? ") ?

3 2 Call: read(_114) ?

Solanaceae.

3 2 Exit: read(_100) ?

4 2 Call: write("\nWhat type of uses you want? ") ?

What type of uses you want?

4 2 Exit: write("\nWhat type of uses you want? ") ?

5 2 Call: read(_163) ?

Sauce.

5 2 Exit: read(_150) ?

6 2 Call: write("\nWhat Type of plant you want? ") ?

What Type of plant you want?

6 2 Exit: write("\nWhat Type of plant you want? ") ?

7 2 Call: read(_211) ?

Vegetable.

7 2 Exit: read(_215) ?

8 2 Call: write("\nWhat are descriptions the plant should have? ") ?

What are descriptions the plant should have?

8 2 Exit: write("\nWhat are descriptions the plant should have? ") ?

9 2 Call: read(_259) ?

'Red color and round in shape'.

9 2 Exit: read('Red color and round in shape') ?

10 2 Call: write("\nWhat is your EatablePart preference? ") ?

What is your EatablePart preference?

```
10 2 Exit: write("\nWhat is your EatablePart preference? ") ?
11 2 Call: read(_307) ?
Food.
11 2 Exit: read('Food') ?
12 2 Call: plant(_23,_100,195,300000,'Red color and round in shape','Food') ?
13 3 Call: 'Tomato' comesfrom _100 ?
13 3 Exit: 'Tomato' comesfrom 'Solanaceae' ?
14 3 Call: ?'Tomato' usedfor _150 ?
14 3 Exit: 'Tomato' usedfor 'Sauce' ?
15 3 Call: 'Tomato' isa _200 ?
15 3 Exit: 'Tomato' isa 'Vegetable' ?
16 3 Call: 'Tomato' has 'Red color and round in shape' ?
16 3 Exit: 'Tomato' has 'Red color and round in shape' ?
17 3 Call: 'Tomato' gives 'Food' ?
17 3 Exit: 'Tomato' gives 'Food' ?
12 2 Exit: plant('Tomato','Solanaceae','Sauce','Vegetable','Red color and round in shape','Food') ?
1 1 Exit: phytologist('Tomato') ?
```

Name = 'Tomato' ?

(62 ms) yes

{trace}

| ?- notrace.

The debugger is switched off

yes

| ?-

```
| ?- trace.
The debugger will first creep -- showing everything (trace)

yes
{trace}
| ?- phytologist(Name).
    1      1 Call: phytologist(_23) ?
    2      2 Call: write('\nWhat is your target family? ') ?

What is your target family?
    2      2 Exit: write('\nWhat is your target family? ') ?
    3      2 Call: read(_114) ?
Solanaceae.
    3      2 Exit: read(_100) ?
    4      2 Call: write('\nWhat type of uses you want? ') ?

What type of uses you want?
    4      2 Exit: write('\nWhat type of uses you want? ') ?
    5      2 Call: read(_163) ?
Sauce.
    5      2 Exit: read(_149) ?
    6      2 Call: write('\nWhat Type of plant you want ? ') ?

What Type of plant you want ?
    6      2 Exit: write('\nWhat Type of plant you want ? ') ?
    7      2 Call: read(_212) ?
Vegetable.
    7      2 Exit: read(_198) ?
    8      2 Call: write('\nWhat are descriptions the plant should have? ') ?

What are descriptions the plant should have?
    8      2 Exit: write('\nWhat are descriptions the plant should have? ') ?
    9      2 Call: read(_261) ?
'Red color and round in shape'.
    9      2 Exit: read('Red color and round in shape') ?
   10      2 Call: write('\nWhat is your EatablePart preference? ') ?

What is your EatablePart preference?
   10      2 Exit: write('\nWhat is your EatablePart preference? ') ?
   11      2 Call: read(_309) ?
'Food'.
   11      2 Exit: read('Food') ?
   12      2 Call: plant(_23,_100,_149,_198,'Red color and round in shape','Food') ?
   13      3 Call: 'Tomato' comesfrom _100 ?
   13      3 Exit: 'Tomato' comesfrom 'Solanaceae' ?
   14      3 Call: 'Tomato' usedfor _149 ?
   14      3 Exit: 'Tomato' usedfor 'Sauce' ?

-----
   15      3 Call: 'Tomato' isa _198 ?
   15      3 Exit: 'Tomato' isa 'Vegetable' ?
   16      3 Call: 'Tomato' has 'Red color and round in shape' ?
   16      3 Exit: 'Tomato' has 'Red color and round in shape' ?
   17      3 Call: 'Tomato' gives 'Food' ?
   17      3 Exit: 'Tomato' gives 'Food' ?
   12      2 Exit: plant('Tomato','Solanaceae','Sauce','Vegetable','Red color and round in shape','Food') ?
    1      1 Exit: phytologist('Tomato') ?

Name = 'Tomato' ?

(110 ms) yes
{trace}
| ?-
```