VIETNAM NATIONAL UNIVERSITY – HO CHI MINH CITY

UNIVERSITY OF SCIENCE

FACULTY OF INFORMATION TECHNOLOGY

-o0o-

REPORT

PROJECT 2 – LOGIC

Students: Nguyễn Trung Nguyên – 20127404

Lê Đặng Minh Khôi – 20127213

Phạm Huy Cường Thịnh – 20127335

Lecturers: Bùi Tiến Lên

Nguyễn Ngọc Đức

CONTENTS

I. GROUP INFORMATION....3
II. PROJECT INFORMATION AND CONTRIBUTIONS....3
III. TASKS....3
1. Source Code....3
a. FACTS....3
b. RULES....4
2. Different examples to query the relationships in British Royal Family....5
Question 1: Who is Harry's mother?....5
Question 2: Who is Harry's brother?....5
Question 3: Who is the husband of Autumn?....5
Question 4: Is Eugenie a man?....5
Question 5: Who is William's wife?....5
Question 6: Who is Charles's wife?....5
Question 7: Who are Elizabeth II children?....5
Question 8: Who are William's aunts?....6
Question 9: Who are Andrew's nieces?....6
Question 10: Who are Lady's first cousins?....6
Question 11: Who is Peter's father?....6
Question 12: Is Charles William's father?....6
Question 13: Are Eugenie and Beatrice siblings?....6
Question 14: Who are Peter's uncles?....6
Question 15: Is Meghan Charlotte's mother?....6
Question 16: Are Louis and George siblings?....7
Question 17: Who are Charlotte's uncles?....7
Question 18: Who is Anne's uncle?....7
Question 19: Who are Archie's first cousins?....7
Question 20: Who is Archie's grandparent?....7
IV. NOTE....7
1. About the compiler....7
2. How to compile our code?....7
V. REFERENCES....8

I. GROUP INFORMATION

No	Fullname	Student's ID
1	Phạm Huy Cường Thịnh	20127335
2	Nguyễn Trung Nguyên	20127404
3	Lê Đặng Minh Khôi	20127213

II. PROJECT INFORMATION AND CONTRIBUTIONS

Our projects have been done 100%.

Contributors	Tasks	Percentages
Phạm Huy Cường Thịnh	Write the report, and check all the program's source code.	100%
Nguyễn Trung Nguyên	Give 20 queries and run to check if it's true or not.	100%
Lê Đặng Minh Khôi	Write all of the predicates and facts.	100%

III. TASKS

1. Source Code

a. FACTS

```
/*FACT*/
/*gender*/
female(elizabethii).

female(diana).
female(camillia).
female(sarah).
female(anne).
female(sophie).

female(kate).
female(meghan).
female(eugenie).
female(beatrice).
female(autumn).
female(zara).
female(lady).

female(charlotte).
/*----------------------------*/
male(philip).

male(charles).
male(andrew).
male(mark).
male(timothy).
male(edward).

male(william).
male(harry).
male(peter).
male(mike).
male(james).
```

```
34.
35. male(george).
36. male(louis).
37. male(archie).
38. /*relationship*/
39. married(elizabethii,philip).
40.
41. married(charles,camillia).
42. married(andrew,sarah).
43. married(timothy,anne).
44. married(edward,sophie).
45.
46. married(william,kate).
47. married(harry,meghan).
48. married(peter,autumn).
49. married(zara,mike).
50. /*----------------------------*/
51. divorced(charles,diana).
52. divorced(mark, anne).
53. /*----------------------------*/
54. parent(philip,charles).
55. parent(elizabethii,charles).
56. parent(philip,andrew).
57. parent(elizabethii,andrew).
58. parent(philip, anne).
59. parent(elizabethii,anne).
60. parent(philip,edward).
61. parent(elizabethii,edward).
62.
63. parent(charles,william).
64. parent(diana,william).
65. parent(charles,harry).
66. parent(diana,harry).
67. parent(andrew,eugenie).
68. parent(sarah,eugenie).
69. parent(andrew,beatrice).
70. parent(sarah,beatrice).
71. parent(mark,peter).
72. parent(anne,peter).
73. parent(mark,zara).
74. parent(anne,zara).
75. parent(edward,lady).
76. parent(sophie,lady).
77. parent(edward,james).
78. parent(sophie,james).
79.
80. parent(william,george).
81. parent(kate,george).
82. parent(william,charlotte).
83. parent(kate,charlotte).
84. parent(william,louis).
85. parent(kate,louis).
86. parent(harry,archie).
87. parent(meghan,archie).
```

b. RULES

```
1. /*RULES*/
2. father(X,Y) :- parent(X,Y), male(X).
3. mother(X,Y) :- parent(X,Y), female(X).
4. child(X,Y) :- parent(Y,X).
5. son(X,Y) :- parent(Y,X), male(X).
6. daughter(X,Y) :- parent(Y,X), female(X).
7. grandparent(X,Y) :- parent(X,Z), parent(Z,Y).
8. grandmother(X,Y) :- parent(X,Z), parent(Z,Y), female(X).
```

```
9.  grandfather(X,Y) :- parent(X,Z), parent(Z,Y), male(X).
10. grandchild(X,Y) :- parent(Y,Z), parent(Z,X).
11. granddaughter(X,Y) :- parent(Y,Z), parent(Z,X), female(X).
12. grandson(X,Y) :- parent(Y,Z), parent(Z,X), male(X).
13. spouce(X,Y) :- married(X,Y); married(Y,X).
14. husband(X,Y) :- male(X), spouce(X,Y).
15. wife(X,Y) :- female(X), spouce(Y,X).
16. sibling(X,Y) :- child(X,Z), child(Y,Z).
17. brother(X,Y) :- child(X,Z), child(Y,Z), male(X), dif(X,Y).
18. sister(X,Y) :- child(X,Z), child(Y,Z), female(X).
19. uncle(X,Y) :-  parent(Z,Y), (brother(X,Z) ; (sibling(Z,H), married(X,H), male
    (X))).
20. aunt(X,Y) :- parent(Z,Y), (sister(X,Z); (sibling(Z,H), married(H,X), female(X
    ))).
21. nephew(X,Y) :- sibling(Z,Y), child(X,Z), male(X).
22. niece(X,Y) :- sibling(Z,Y), child(X,Z), female(X).
23. firstcousin(X,Y) :- sibling(Z,H), child(X,Z), child(Y,H), dif(Y,X).
```

2. Different examples to query the relationships in British Royal Family

Question 1: Who is Harry's mother?

```
?- mother(X,harry).
X = diana.
```

Question 2: Who is Harry's brother?

```
?- brother(X,harry).
X = william ;
```

Question 3: Who is the husband of Autumn?

```
?- husband(X, autumn).
X = peter ;
```

Question 4: Is Eugenie a man?

```
?- male(eugenie).
false.
```

Question 5: Who is William's wife?

```
?- wife(X, william).
X = kate ;
```

Question 6: Who is Charles's wife?

```
?- wife(X, charles).
X = camillia ;
```

Question 7: Who are Elizabeth II children?

```
?- child(X,elizabethii).
X = charles ;
X = andrew ;
X = anne ;
X = edward.
```

Question 8: Who are William's aunts?

```
?- aunt(X,william).
X = anne ;
X = anne ;
X = camillia ;
X = sarah ;
X = sophie ;
X = camillia ;
X = sarah ;
X = sophie ;
false.
```

Question 9: Who are Andrew's nieces?

```
?- niece(X,andrew).
X = eugenie ;
X = beatrice ;
X = eugenie ;
X = beatrice ;
X = zara ;
X = zara ;
X = lady ;
X = lady ;
false.
```

Question 10: Who are Lady's first cousins?

```
?- firstcousin(X,lady).
X = william ;
X = harry ;
X = william ;
X = harry ;
X = eugenie ;
X = beatrice ;
X = eugenie ;
X = beatrice ;
X = peter ;
X = zara ;
X = peter ;
X = zara ;
X = james ;
X = james ;
false.
```

Question 11: Who is Peter's father?

```
?- father(X,peter).
X = mark .
```

Question 12: Is Charles William's father?

```
?- father(charles,william).
true .
```

Question 13: Are Eugenie and Beatrice siblings?

```
?- sibling(eugenie,beatrice).
true .
```

Question 14: Who are Peter's uncles?

```
?- uncle(X, peter).
X = charles ;
X = charles ;
X = andrew ;
X = andrew ;
X = edward ;
X = edward ;
X = timothy ;
X = timothy ;
false.
```

Question 15: Is Meghan Charlotte's mother?

```
?- mother(meghan,charlotte).
false.
```

Question 16: Are Louis and George siblings?

```
?- sibling(louis,george).
true .
```

Question 17: Who are Charlotte's uncles?

```
?- uncle(X,charlotte).
X = harry .
```

Question 18: Who is Anne's uncle?

```
?- uncle(X,anne).
false.
```

Question 19: Who are Archie's first cousins?

```
?- firstcousin(X,archie).
X = george ;
X = charlotte ;
X = louis ;
X = george ;
X = charlotte ;
X = louis ;
false.
```

Question 20: Who is Archie's grandparent?

```
?- grandparent(X,archie).
X = charles ;
X = diana .
```

IV. NOTE

1. About the compiler

- Name: SWI-Prolog
- Version: 8.4.2-1
- Operating System: Windows 10
- Website link: SWI-Prolog downloads

2. How to compile our code?

First, move the current folder location to the folder that contains the source code to be executed. We can use `pwd.` command to check the current location.

```
?- pwd.
% d:/onedrive - vnu-hcmus/documents - t570/prolog/
true.
```

Then, we move to the folder that has the code. For instance, we save the code in `D:/Downloads` so we type `working_directory(CWD,'D:/Downloads').`.

```
?- working_directory(CWD,'D:/Downloads').
CWD = 'd:/onedrive - vnu-hcmus/documents - t570/prolog/'.
```

Next, we enter the name of the source code file to execute with the syntax `[filename].`.

```
?- [task1].
true.
```

Finally, we can type some questions into the program (The questions depend on how we write the code).

V. REFERENCES

[1] L. H. BẮC and T. H. VIỆT, CƠ SỞ TRÍ TUỆ NHÂN TẠO, HỒ CHÍ MINH: NHÀ XUẤT BẢN KHOA HỌC KỸ THUẬT, 2014.

[2] N. T. Thành, "YouTube," 22 12 2021. [Online]. Available: https://youtu.be/QzK9inYNOMQ. [Accessed 20 04 2022].

[3] N. G. T. L. T. Logic, "Hướng dẫn SWI-Prolog," Ho Chi Minh, 2007.