Report

i. Name and Student ID.

Name	ID
Chu Đức Khánh	1651049
Giảng Thanh Danh	1651009
Nguyễn Đặng Thế Quang	1651032
Lê Anh Quốc Duy	1751062

ii. Project Logic

1. Task01: Querying the family problem.
   a. Install swi-prolog
      - Using HomeBrew:
        brew install swi-prolog
        The latest git version of SWI-Prolog can be installed with this command: brew install swi-prolog –HEAD
      - To install swi-prolog in MacOs:
        Follow link: http://macappstore.org/swi-prolog/
      - To install swi-prolog in Window:
        Follow link: https://www.swi-prolog.org/download/stable
      - To use swi-prolog in vscode:
        Follow Link: https://stackoverflow.com/questions/65274513/how-add-swi-prolog-terminal-in-vscode.

   b. Run the program:
      cd Task01_Querying_The_Family
      swipl Project02_Logic_Task01.pl

   c. Firstly, to construct the database, using some predicates as:
   - Male:

```
male('Prince Phillip').                male('Prince Charles').
male('Captain Mark Phillips').         male('Timothy Laurence').
male('Prince Andrew').                 male('Prince Edward').
male('Prince William').                male('Prince Harry').
male('Peter Phillips').                male('Mike Tindall').
male('James Viscount Severn').         male('Prince George').
male('Mia Grance Tindall').
```

- Female:

```
female('Queen Elizabeth II').                female('Camilla Parker Bowles').
female('Princes Diana').                     female('Camilla Parker').
female('Princess Anne').                     female('Sarah Ferguson').
female('Sophie Ryhs-jones').                 female('Kate Middleton').
female('Autumn Kelly').                      female('Zara Phillips').
female('Princess Beatrice').                 female('Princess Eugenie').
female('Laddy Louise Mountbatten-Windsor').
female('Savannash Phillips').                female('Isla Phillips').
female('Sophie Ehys-jones').                 female('The new Princess').
female('Princess Diana').
```

- Born:

```
born('Queen Elizabeth II', '1926').
born('Prince Phillip', '1921').
born('Prince Diana', '1921').
born('Prince Charles', '1948').
born('Camilla Parker Bowles', '1947').
born('Captain Mark Phillips', '1948').
born('Prince Anne', '1950').
born('Timothy Laurence', '1955').
born('Sarah Ferguson', '1959').
born('Prince Andrew', '1960').
born('Sophie Ehys-jones', '1965').
born('Prince Edward', '1964').
born('Prince William', '1982').
born('Kate Middleton', '1982').
born('Prince Harry', '1984').
born('Autumn Kelly', '1978').
born('Peter Phillips', '1977').
born('Zara Phillips', '1981').
born('Mike Tindall', '1978').
born('Princess Beatrice', '1988').
born('Princess Eugenie', '1990').
born('James Viscount Severn', '2007').
born('Laddy Louise Mountbatten-William', '2003').
born('Prince George', '2013').
born('The new Princess', '2015').
born('Savannash Phillips', '2010').
born('Isla Phillips', '2012').
born('Mia Grance Tindall', '2014').
```

- Died: died('Princess Diana', '1997').
- Parent:

```
parent('Queen Elizabeth II', 'Princess Charles').
parent('Queen Elizabeth II', 'Princess Anne').
parent('Queen Elizabeth II', 'Princess Andrew').
parent('Queen Elizabeth II', 'Princess Edward').
parent('Prince Phillip', 'Princess Charles').
parent('Prince Phillip', 'Princess Anne').
parent('Prince Phillip', 'Princess Andrew').
parent('Prince Phillip', 'Princess Edward').
parent('Prince Charles', 'Prince William').
parent('Prince Charles', 'Prince Harry').
parent('Princess Diana', 'Prince William').
parent('Princess Diana', 'Prince Harry').
parent('Captain Mark Phillips', 'Peter Phillip').
parent('Captain Mark Phillips', 'Zara Phillips').
parent('Princess Anne', 'Peter Phillip').
parent('Princess Anne', 'Zara Phillips').
parent('Sarah Ferguson', 'Princess Beatrice').
parent('Sarah Ferguson', 'Princess Eugenie').
parent('Prince Andrew', 'Princess Beatrice').
parent('Prince Andrew', 'Princess Eugenie').
parent('Prince William', 'Prince George').
parent('Prince William', 'The new Princess').
parent('Kate Middleton', 'Prince George').
parent('Kate Middleton', 'The new Princess').
parent('Autumn Kelly', 'Savannash Phillips').
parent('Autumn Kelly', 'Isla Phillips').
parent('Peter Phillips', 'Savannash Phillips').
parent('Peter Phillips', 'Isla Phillips').
parent('Zara Phillips', 'Mia Grance').
parent('Mike Tindall', 'Mia Grance').
```

- divorced

```
divorced('Princess Charles', 'Camilla Parker Bowles').
divorced('Princess Anne', 'Timothy Laurence').
```

- married

```
married('Queen Elizabeth II', 'Prince Phillips').
married('Princess Diana', 'Prince Charles').
married('Captain Mark Phillips', 'Princess Anne').
married('Sarah Ferguson', 'Prince Andrew').
married('Sophie Ryhs-jones', 'Prince Edward').
married('Prince William', 'Kate Middleton').
married('Autumn Kelly', 'Peter Phillips').
married('Zara Phillips', 'Mike Tindall').
```

d. You have to define followed predicates:

- father(Parent,Child): Parent is a father of child if he is parent of Child, and if he is male
  father(Parent, Child):- parent(Parent, Child), male(Parent).
- mother(Parent, Child): Parent is a mother of child if she is parent of Child , and if she is famale
  mother*(Parent, Child):- parent(Parent, Child), female(Parent).*
- child(Child, Parent): all children of mother or father , narrowing case of `child`, but also taking into account gender
  child(Child, Parent):- parent(Parent, Child), Child\=Parent.
- son(Child, Parent): hild is a son of Parent *if* he is a child of Parent, and *if* he is male
  son(Child, Parent):- child(Child, Parent), male(Child).
- daughter(Child, Parent): Child is a daughter of Parent if she is a child of Parent, and if she is female
  daughter(Child, Parent):- child(Child, Parent), female(Child).
- grandparent(GP, GC): GC has a grand parent GP if and only if P has a child GP and Y has a child P.
  grandparent(GP, GC):- child(GP, P), child(P, GC).
- grandmother(GM, GC): Special case of grandparent, but this time, GM must be female
  grandmother(GM, GC):- child(GM, P), child(P, GC), female(GM).
- grandfather(GF, GC) Special case of grandparent, but this time, GF must be male
  grandfather(GF, GC):- child(GF, P), child(P, GC), male(GC).
- **grandchild(GC, GP):- grandparent(GP, GC).**
- **grandson(GS, GP):- grandchild(GS, GP), male(GS).**
- **granddaught(GD, GP):- grandchild(GD, GP), female(GD).**
- spouse(x, y) = spouse (y, x): therefore 2 people are spouses if and only if they are married to each other.
  spouse(Husband, Wife):- married(Husband, Wife); married(Wife, Husband).

- ***husband(Person, Wife):- spouse(Person, Wife), male(Person).***
- ***wife(Person, Husband):- spouse(Person, Husband), female(Person).***
- sibling(Person1, Person2): 2 can be siblings if they share a parent, and are not themselves to each other
  sibling(Person1, Person2):- child(Person1, P), child(Person2, P), Person1\=Person2.
- specialization of sibling, but narrowing on gender
  brother(Person, Sibling):- sibling(Person, Sibling), male(Sibling).
  sister(Person, Sibling):- sibling(Person, Sibling), female(Sibling).
- ***uncle(Person1, Person2):- child(Person1, P), brother(Person2, P).***
- ***uncle(Person1, Person2):- child(Person1, P), spouse(Person2, P), male(Person2).***
- Person2 has aunt Person1 if and only if Person1 has parent P, and Person2 is sister to P (which already takes into account for gender, or Person2 is spouse to P)
  aunt(Person1, Person2):- child(Person1, P), sister(Person2, P).
  aunt(Person1, Person2):- child(Person1, P), spouse(Person2, P), female(Person2).
- ***nephew(Person1, Person2):- sibling(Person2, P), son(P, Person1).***
- ***nice(Person1, Person2):- sibling(Person2, P), daughter(P, Person1).***
- ***firstCousin(Child1, Child2):- grandparent(GP, Child1), grandparent(GP, Child2), sibling(Child1, Child2).***

e. How many percentages of the project did your group finish? 21/22 (95.6%)
   Test 01: ?- mother(X, William).
   X = 'Queen Elizabeth II',
   William = 'Princess Charles' .
   Test 02: ?- father(X, William).
   X = 'Prince Phillip',
   William = 'Princess Charles'
   Test 03: ?- child(X, Prince).
   X = 'Princess Charles',
   Prince = 'Queen Elizabeth II'
   Test 04: ?- findall(X, child(X, 'Prince Phillip'), Z).
   Z = ['Princess Charles', 'Princess Anne', 'Princess Andrew', 'Princess Edward'].
   Test 05: ?- son(X, 'Prince William').
   X = 'Prince George'
   Test 06: ?- daughter(X, 'Peter Phillips').
   X = 'Savannash Phillips'
   Test 07: ?- findall(X, daughter(X, 'Peter Phillips'), Y).
   Y = ['Savannash Phillips', 'Isla Phillips'].
   Test 08: ?- grandparent('Queen Elizabeth II', X).
   X = 'Peter Phillip'

Test 09: ?- findall(X, grandparent('Queen Elizabeth II', X), Y).
Y = ['Peter Phillip', 'Zara Phillips'].
Test 10: ?- grandparent(X, 'Prince George').
X = 'Prince Charles'
Test 11: ?- findall(X, grandparent(X, 'Prince George'), Y).
Y = ['Prince Charles', 'Princess Diana'].
Test 12: ?-grandmother(X, 'Prince George').
X = 'Princess Diana'
Test 13: ?- grandfather(X, 'Prince George').
X = 'Prince Charles'
Test 14: ?- grandchild(X, 'Queen Elizabeth II').
X = 'Peter Phillip'
Test 15: ?- findall(X, grandchild(X, 'Queen Elizabeth II'), Z).
Z = ['Peter Phillip', 'Zara Phillips'].
Test 16: ?- grandson(X,'Prince Charles').
X = 'Prince George'
Test 17: ?- grandson('Prince George', X).
X = 'Prince Charles'
Test 18: ?- granddaught(X,'Prince Charles').
X = 'The new Princess'
Test 19: ?- spouse(Husband, 'Queen Elizabeth II').
Husband = 'Prince Phillips'.
Test 20: ?- spouse('Prince Phillips', X).
X = 'Queen Elizabeth II'.
Test 21: ?- wife(X, 'Prince Charles').
X = 'Princess Diana'
Test 22: ?- husband(X, 'Princess Diana').
X = 'Prince Charles'.
Test 23: ?- sibling(X, 'The new Princess').
X = 'Prince George'
Test 24: ?- sibling('Prince George', X).
X = 'The new Princess'
Test 25: ?- brother(Person,'Prince William').
Person = 'Prince Harry'
Test 26: ?- sister(X, 'Princess Eugenie').
X = 'Princess Beatrice'
Test 27: ?- sister('Princess Beatrice',X).
X = 'Princess Eugenie'
Test 28: ?- uncle('Prince George', X).
X = 'Prince Harry'
Test 29: ?- aunt('Prince George', X).
X = 'Kate Middleton'
Test 30: ?- findall(X, aunt('Prince George', X), Y).
Y = ['Kate Middleton'].

Test 31: ?- nephew('Kate Middleton', X).
X = 'The new Princess'
Test 32: ?- nephew(X, 'The new Princess').
X = 'Prince William'
Test 33: ?- niece('Kate Middleton', X).
X = 'Prince George'
Test 34: ?- firstCousin('Prince Phillip', X).
X = 'Queen Elizabeth II'

f. Assignment Plan – Logic

ID	1651009	1651032	1651049	1751062
Week 1	Research Task 1	Research Task 1	Research Task 1	Research Task 1
Week 2	Research Task 1	Research Task 1	Solve Task 1	Research Task 1
Week 3	Research Task 2	Research Task 2	Research Task 2	Research Task 2