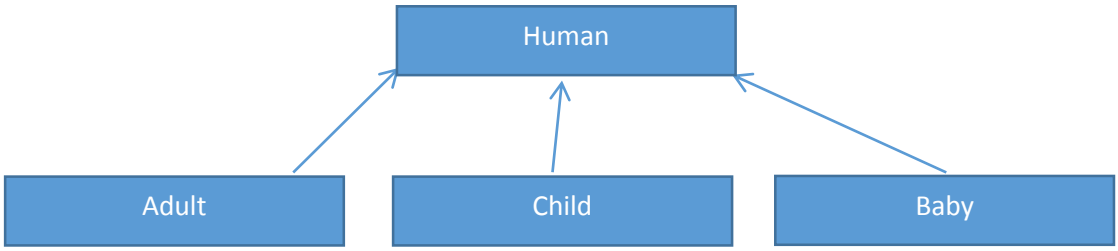
Object-Oriented Programming - Further Studies

Topic 11 – Exercise 1 - Inheritance

Question 1

Create a Java program to model the class relationships as depicted below.



The **Human** class should have the following instance variables. The scope of the variables should be private.

- name - String
- age - int
- gender - String
- height - float
- weight – float

Include setter and getter methods in the Human class.

The **Human** class should also contain the following methods or actions:

- sleep() to return a String, “Sleeping soundly….”.
- eat() to return a message, “Eating slowly and chewing carefully…”.
- swim() to return a message, “Arms rotating and pushing the body forward…”.

The **Adult** class should extend the Human class and in addition add the following instance variables (private scope):

- ppsNo - String
- occupation - String
- isMarried - boolean
- isCarOwner - boolean

Include setter and getter methods in the Adult class.

The Adult class should also contain the following methods:

- drive() to return a message, "Driving a car safely….".
- procreate() to return a message, "Procreating....".

The **Child** class should also extend the Human class and add the following instance variable (private scope):

- schoolCardNo – String (set default value as N/A)

Include setter and getter methods in the Child class.

A child of 5 years of age or younger will need to wear arm bands and requires parental supervision when swimming. The swim() method for a child under 5 must return the following message, "As the child is 5 years old or younger, armbands must be worn and parental supervision is required. Arms rotating and pushing the body forward…".

- For a child older than five years of age, the standard swim functionality as defined in the Human class should be used. In this regard, call the super class version of swim() by coding **super**.swim();

Therefore, you are required to **override** the implementation of the swim() method in the Child class. If a class overrides a method it overwrites or replaces the functionality of the inherited method (it replaces the inherited method with its own version of the method). It can still call the inherited version of the method by using the **super** keyword.

The **Baby** class should also extend the Human class and add the following instance variable (private scope):

- isTeething - boolean

A baby who is teething does not sleep soundly. Override the sleep() method and return an appropriate message.

A baby cannot swim (safely!). The **swim**() method must also be overridden to return the following message, "A baby cannot swim safely…".

Create a new folder named **JFT11Ex1** and include the following classes.

- Human
- Adult
- Child
- Baby
- Main

In the Main class, which is to hold the main method, create an object from each of the subclasses of Human.

Please turn over

Adult:

Create an Adult object and call its toString(), eat() and drive() methods.

```
Name: Billy White
Age: 30
Gender:male
Height: 6.5
Weight: 11.0
PPS No: 5645614F
Occupation: Software Developer
Marriage Status:true
Car Owner: true
Eating slowly and chewing carefully..
Driving a car safely..
```

Hint: The Adult class is a subclass of Human. Both classes should have a toString() method included to return the values of the instance variables declared in the respective classes. In the toString() method of the Adult class, include a call to the super class's toString() method by writing **super**.toString(). You will append the string returned by the super class's toString() method to **this** class's toString() method.

Child:

Create a Child object and call its toString(), eat() and swim() methods. The child is 3 years old.

```
Name: Frank Davis
Age: 3
Gender:male
Height: 1.5
Weight: 3.0
School Card No: N/A
Eating slowly and chewing carefully..
As the child is under 5 years old, armbands must be worn and parental supervisio
n is required.
Arms rotating and pushing the body forward..
```

Baby:

Create a Baby object and call its toString(), sleep() and swim() methods. The child is 1 year old.

```
Name: Gillian Taylor
Age: 1
Gender: female
Height: 0.6
Weight: 1.0
Teething: true
Baby having difficulty sleeping due to teething pain.
A baby cannot swim safely..
```