**OFFENDERS MANAGEMENT SYSTEM**

DNA, or deoxyribonucleic acid, is the hereditary material in humans and almost all other organisms.  In practice, DNA codes are complex patterns of combinations of chemical elements that allow a person to be uniquely identified by his/her DNA. This characteristic of DNA makes it useful for identifying persons who have committed crimes by comparing DNA information from the scene of a crime with DNA information stored in police databases.

This project will focus on developing software for managing DNA information for persons who have committed crimes. The software is named the Offenders Management System (OMS). We will use a simple code of 24 characters to represent a person’s DNA. The complexity involved is far from that for real DNA which many millions of codes. However, while our approach is vastly simpler than real genetic science, the codes we generate can be used to identify a person in a small society of up to 412 or 16.5 million persons. Not bad for a toy approach!

The OMS will be developed in several stages:

* Project 1 will develop the basic classes that will make up the application. These include a Person class a Name class, a DNA class and the class DNAFactory. Project 1 will be worth 5% of coursework marks.
* Project 2 will focus on creating the actual OMS application. This will involve creating the Offender class as a subclass of Person with the additional features of storing an offender id and other relevant data. The application will provide methods (functions) that can be used to create, retrieve, update, and delete offender data uses a simple text database. Project 2 will be worth 10% of coursework marks.
* Project 3 will focus on creating user interfaces (both a text based user interface and a Graphical User Interface (GUI)) for the application. Project 3 will be worth 10% of coursework marks.

Several OOP concepts will be demonstrated by these projects. These include:

1. Inheritance and Polymorphism
2. Collections (arrays and lists)
3. Basic design of an OOP application
4. Static methods and variables
5. GUI Programming

**Project #1 (Semester 1, 2016/17)**

**(Worth 5 coursework marks)**

**INSTRUCTIONS**

1. Download the file **project1.zip** from the course web site. The file contains interface specifications for the Name, Person and DNA, classes. Also download the file DNAFactory.zip which contains a partial implementation of the DNAFactory class.
2. Create the Name class and the DNA class in accordance with the specifications.
3. Complete the code for the static method createNewDNACode of the DNAFActory class so that this method creates a new DNA code as follows:
   1. A person’s DNA code is a string of 24 characters comprising the person’s genes and some combination of his/her parent’s genes.
4. Only the characters ‘A’,’C’,’T’ & ‘G’ are used in a DNA code
5. The last 8 characters of the code are unique to the person. This is the person’s gene. This part of the code is retrieved from the gene bank in the DNAFactory class.
   1. The first 16 characters of a DNA code characters (called the base) are generated by interleaving the parents’ genes.

Here is an example. Spaces are used between parts of the codes to aid readability

Given a person John with DNA code: ACTG ACTA GGGG TTTT CTAG

And a person Mary with DNA code: “ CCTG AAGG CCCC GGG GCAC

If Martha is the child of John and Mary, then Martha’s DNA is determined as follows:

Step 1: Get Martha’s gene from the gene bank. Let use assume this code is AACC TTGG.

Step 2: Get each person’ gene form his/her DNA. These are GGGG GCAC and TTTT CTAG, respectively.

Step 3: Create the base of the new DNA by interleaving parent’s genes to give GTGT GTGT GCCT AACG

Step 3: Combine the new base and suffix to create Martha’s DNA: GTGT GTGT GCCT AACG AACC TTGG

1. Write code for the Person class in accordance with the specifications. Please note the following:
   1. Use the codes ‘M’ for male, and ‘F’ for female for the sex attribute of a person.
   2. When coding for change to civil status please observe the following:
      1. No change of civil status for a male should result in a change of last name;
      2. Change of civil status for a female should only result in a name change when change is from ‘S’ingle to ‘M’arried or ‘M’arried to ‘D’ivorced.
2. Test your classes to make sure that you can create a Person object correctly.

**SUBMISSION**

Submit a jar file containing the classes Name, DNA, DNAFActory and Person by 4:00PM Monday October 31, 2016. Late submissions will be penalized. Remember to include source code in the jar file.