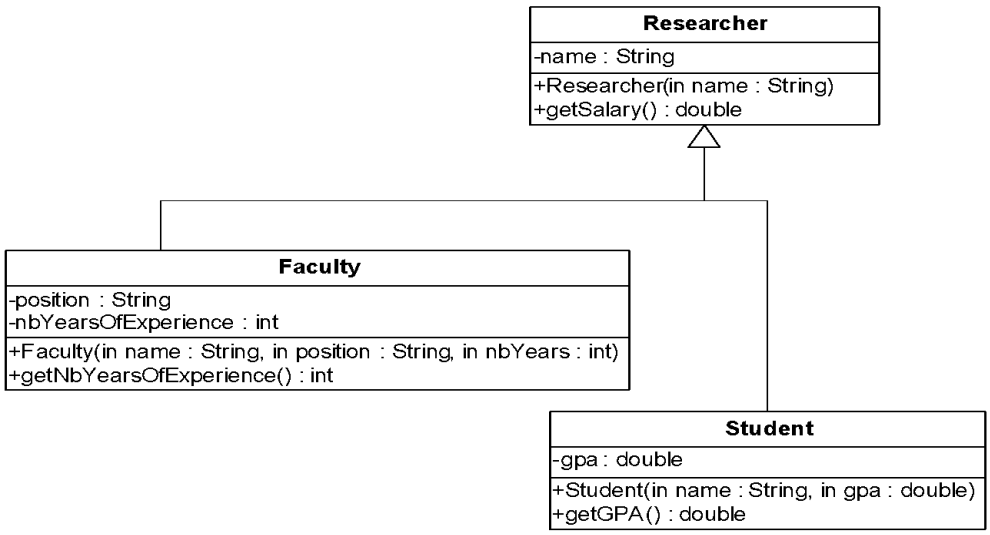
King Saud University
College of Computer and Information Sciences
Department of Computer Science
CSC113 – Computer Programming II – Final Exam – Fall 2017

Exercise 1:



Class ***Researcher***

- Attributes:
  - ***name***: the name of the researcher.
- Methods:
  - ***Researcher (name:** String**)***: constructor
  - ***getSalary()***: this method does the following:
    - ***For Faculty***: it returns the salary which is computed as follows:

    *salary = 5600 SAR + (500 * the number of years of experience).*
    - ***For Student***: it returns the salary which is computed as follows: *salary = 300 * gpa.*

Class ***Faculty***

- Attributes:
  - ***position***: the position of the faculty.
  - ***nbYearsOfExperience:*** the number of years of experience of the faculty.
- Methods:
  - ***Faculty (name:** String**, position:** String**, nbYears:** int**)***: constructor.
  - ***getNbYearsOfExperience ():*** returns the number of years of experience of the Faculty.

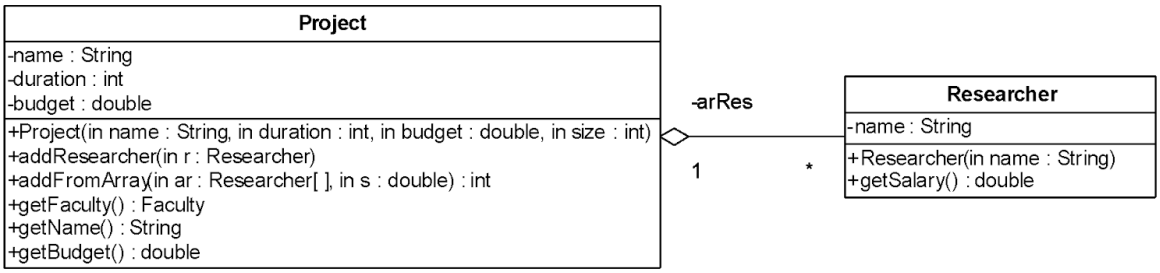
Class ***Student***

- Attributes:
  - ***gpa***: the gpa of the student.
- Methods:
  - ***Student (name:** String**, gpa:** double**):*** constructor.
  - ***getGPA():*** returns the gpa of the student.

QUESTION: Translate into Java code the classes ***Researcher*** and ***Faculty***.

Exercise 2:

Let's consider the same Researcher class and its subclasses described in exercise 1.



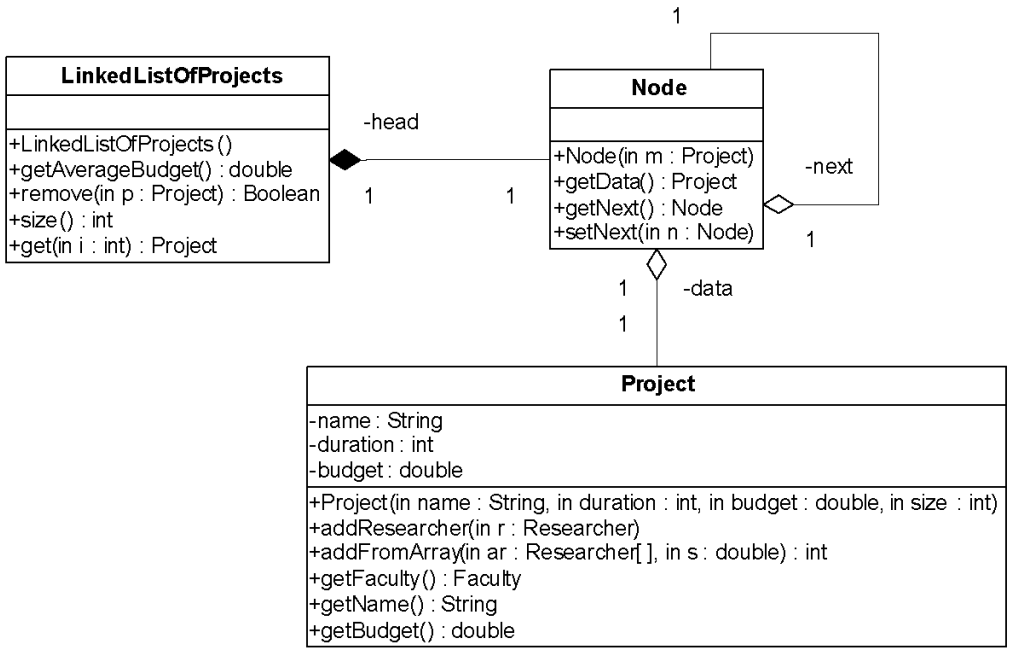
Class ***Project***

- Attributes:
  - ***name***: the name of the project.
  - ***duration***: the duration of the project.
  - ***budget***: the budget of the project
- Methods:
  - ***Project(name:*** *String****, duration:*** *int****, budget:*** *double****, size:*** *int****)***: constructor
  - ***addResearcher (r:*** *Researcher****):*** this method adds the researcher ***r*** to the project. It raises the following:
    - ***ArrayIndexOutOfBoundException*** if the array ***arRes*** is full.
    - ***Exception*** with the following message "*Not allowed to join a project.*" if ***r*** is a Student with a GPA less than 2.0.
  - ***addFromArray(ar:*** *Researcher[ ]****, s:*** *double****):*** this method reads researchers from the array ***ar*** and adds to the project the Faculty members having a salary greater than ***s***. It returns the number of Faculty members successfully added to the project.
  - ***getFaculty():*** this method returns the most experienced Faculty member (the Faculty having the highest number of years of experience).
  - ***getName()*** and ***getBudget():*** getters of the class Project.

QUESTION: Translate into Java code the class ***Project.***

Exercise 3:

Let's consider the same Project class described in exercise 2.



Class ***LinkedListOfProjects***

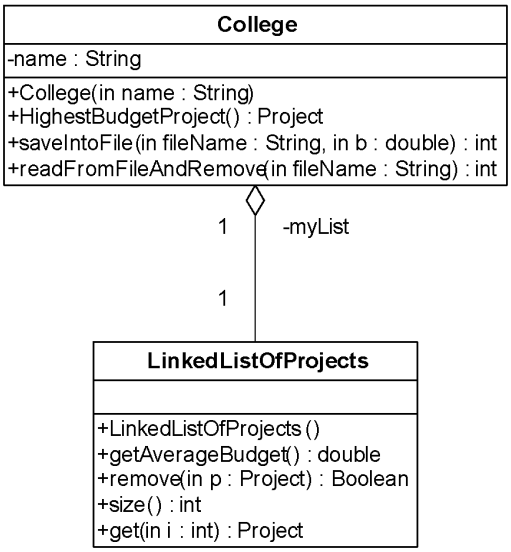
- Methods:
  - ***LinkedListOfProjects ( )***: constructor.
  - ***getAverageBudget ( )*:**this method returns the average budget of the Projects.
  - ***remove (p:** Project*)**:**this method removes the first Project having the same name as ***p***. If the project is successfully removed it returns true. Otherwise, it returns false.
  - ***size( ):***this method returns the number of projects of the list.
  - ***get (i:** int**):*** This method returns the Project that is at position ***i***.

Notice that the project in the first Node corresponds to position 0. The project in second Node corresponds to position 1 etc.

QUESTION: Translate into Java code the class ***LinkedListOfProjects.***

Exercise 4:

Let's consider the same ***LinkedListOfProjects*** class described in exercise 3.



Class ***College***

- Attributes:
  - ***name***: the name of the College.
- Methods:
  - ***College(name:*** *String)*: constructor
  - ***HighestBudgetProject ( ):*** this method returns the project having the maximum budget .
  - ***saveIntoFile(fileName:*** String, ***b***: double**):** this method saves into the file ***fileName*** all projects having a budget greater than ***b***. It returns the number of saved projects.
  - ***readFromFileAndRemove(fileName:*** String**):** this method reads projects from the file ***fileName*** and removes them from the list. It returns the number of removed projects.

QUESTION: Translate into Java code the class ***College.***