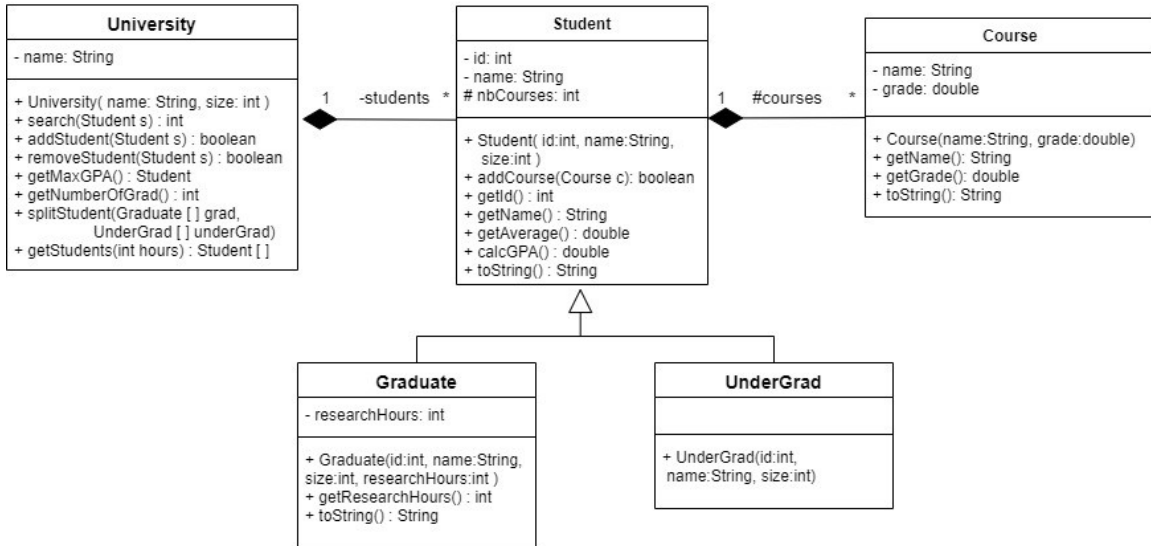


King Saud University
 College of Computer and Information Sciences
 Department of Computer Science
 CSC113 – Computer Programming II – Lab: Polymorphism – Spring 2020



Course class:

Attributes:

- name: the name of the course
- grade: the grade obtained by the student out of 100

Methods:

- Course(name: String, grade: int): constructor
- **Getters**
- toString(): returns the course info in the following format: “ name : grade “

Student class:

Attributes:

- id: student’s university id
- name: the name of the student
- nbCourses: the number of courses added to the student

Methods:

- Student(id: int, name: String, size: int): constructor
- addCourse(Course c): add the course c to the student. Return true if the course is successfully added, and returns false otherwise
- **Getters**
- getAverage(): return the average grade of all courses
- calcGPA(): returns the GPA of the student. The GPA is calculated as follows:
 - **UnderGrad:**
 - $GPA = \frac{\text{the average grade of all courses}}{20}$
 - **Graduate:**
 - $GPA = \frac{\text{the average grade of all courses}}{25} + \text{research hours} * 0.05$
- toString(): returns the object’s info in this format: ‘ID: id, Name: name’

UnderGrad class:

Methods:

- UnderGrad(id: int, name: String, size: int): constructor

Graduate class:

Attributes:

- researchHours: the research hours completed

Methods:

- Graduate(id: int, name: String, size: int, researchHours: int): constructor
- getResearchHours: getter
- toString(): returns the object's info in this format: 'ID: *id*, Name: *name*, Research hours completed: *reseachHours*'

University class:

Attributes:

- name: the name of the university

Methods:

- University(name: String, size: int): constructor
- search(Student s): returns the index of the student with the same id as *s*, or returns -1 if not found
- addStudent(Student s): add the student *s* if it's not already added and return true. This method returns false if the student is already added or the array is full
- removeStudent(Student s): remove the student *s* if found and replace it with the last student and return true, return false if not found
- getMaxGPA(): return the student that with the highest GPA.
- getNumberOfGrad(): returns the number of graduate students in the university
- splitStudents(Graduate [] grad, UnderGrad [] underGrad): add all graduate students into the array *grad*, and all undergraduate students into *undergrad*
- getStudents(hours: int): returns an array of students who are graduate students and have completed more research hours than *hours*.