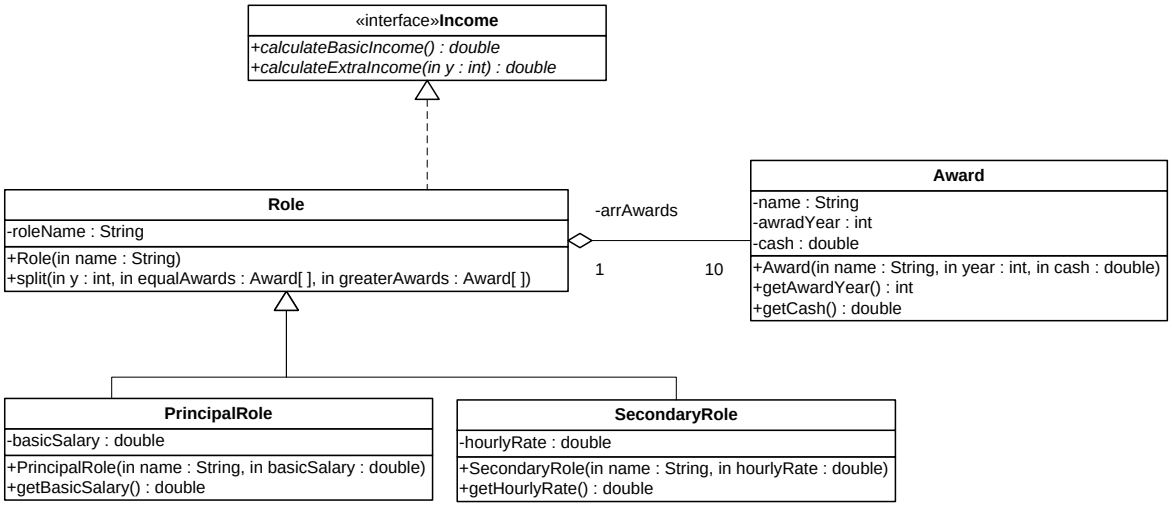
King Saud University
College of Computer and Information Sciences
Department of Computer Science
CSC113 – Computer Programming II – Final Exam – Spring 2014

Exercise1:



Income interface***:***

- Methods:
  - ***calculateBasicIncome ()***:This method calculates and returns the basic income of a Role. The basic income of a role is calculated as follows:
    - ***PrincipalRole***:
      Basic income = basic salary + 2000.
    - ***SecondaryRole***:
      *Basic income = hourly rate * 10.*
  - ***calculateExtraIncome(y: int*)*:** this method calculates and returns the extra income of a role. The extra income of a role is equal to the sum of cash of the *Awards* won by the role in the year ***y***.

Award class***:***

- Attributes:
  - ***name***: the name of the award.
  - ***awardYear:*** the year of the award.
  - ***cash:*** the amount of money obtained if the award is won.
- Methods:
  - ***Award (name: String, year: int, cash: double)***: constructor
  - ***getAwardYear()*:** this method returns the year of the award.
  - ***getCash()*:** this method returns the cash of the award.

Role class

- Attributes:
  - ***roleName***: the name of the role.
- Methods:
  - ***Role (name: String)***: constructor.
  - ***Split(y: int, equalAwards: Award[], greaterAwards: Award[])***: this method splits the awards obtained by the role into two arrays. The Awards obtained in the year ***y*** are stored into the array ***equalAwards***. The Awards obtained later than the year ***y*** are stored into the array ***greaterAwards***.

PrincipalRole class:

- Attributes:
  - ***basicSalary***: the basic salary allocated for the role.
- Methods:
  - ***PrincipalRole (name: String, basicSalary: double):*** constructor.
  - ***getBasicSalary():*** This method returns the basic salary of the Principal Role.

SecondaryRole class:

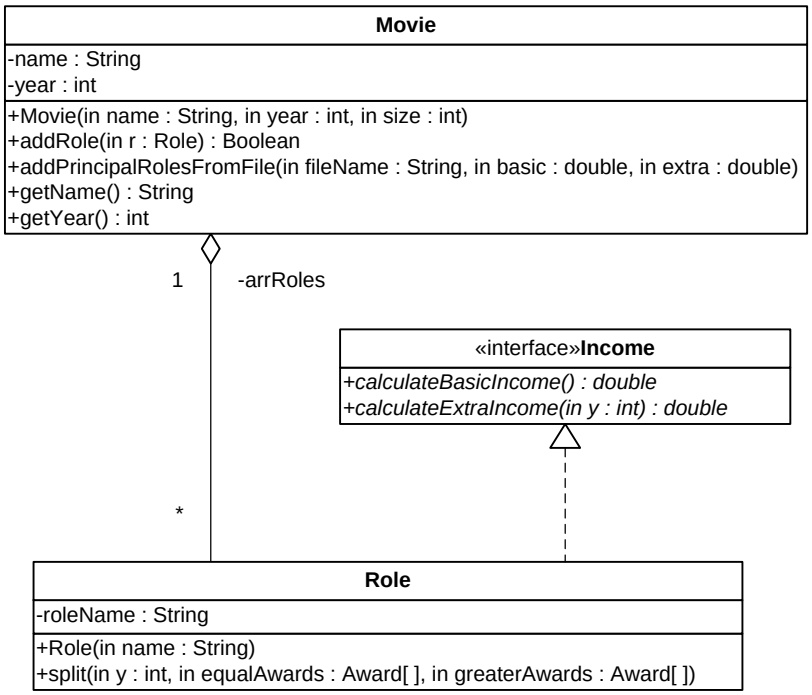
- Attributes:
  - ***hourlyRate***: the hourly rate allocated for the role.
- Methods:
  - ***SecondaryRole (name: String, hourlyRate: double):*** constructor.
  - ***getHourlyRate():*** This method returns the hourly rate of the Secondary Role.

QUESTION: Translate into Java code the following:

- The interface ***Income.***
- The class ***Role,***
- The class ***PrincipalRole*** *(**do not implement** the method **getBasicSalary**).*

Exercise 2:

Let's consider the same class ***Role*** described in exercise 1.



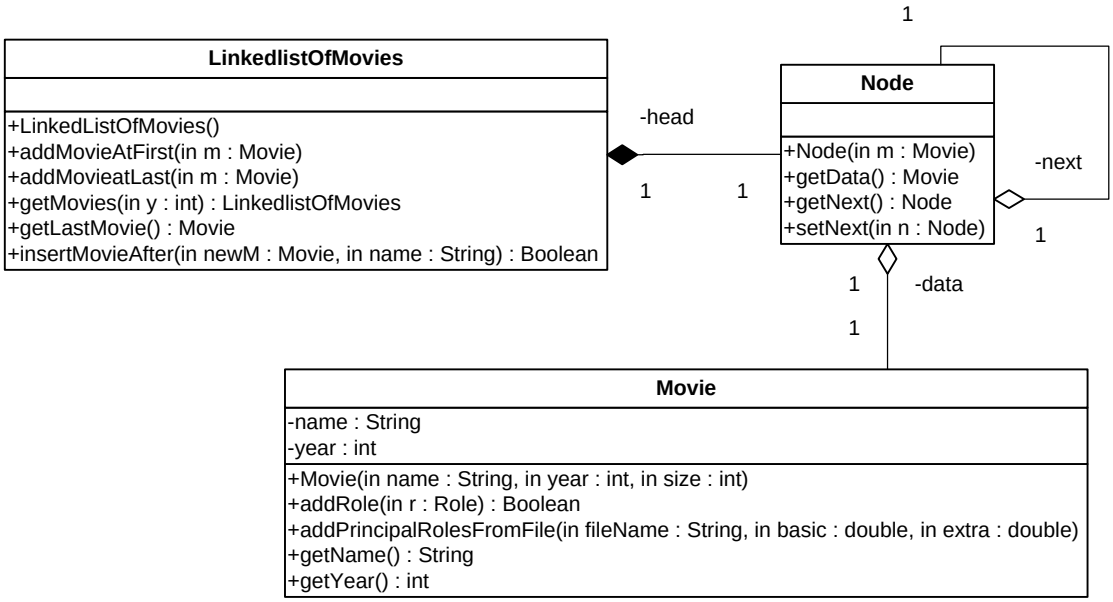
Movie class

- Attributes:
  - ***name***: the name of the movie.
  - ***year:*** the year of the movie.
- Methods:
  - ***Movie (name: String, year: int, size: int)***: constructor.
  - ***addRole(r: Role*)*:**this method adds the *Role* ***r*** to the Movie. It returns *true* if the *Role* ***r*** is successfully added. Otherwise, it returns *false*.
  - ***addPrincipalRolesFromFile(fileName: String, basic: double, extra: double):*** this method reads from the file ***fileName*** objects of type ***Role***. It adds into the array ***arrRoles*** the *PrincipalRole* objects having a basic salary equal to the parameter ***basic*** and having an extra income equal to the parameter ***extra***.

QUESTION: Translate into Java code the class ***Movie*** *(do not implement the getters)****.***

Exercise 3:

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



LinkedListOfMovies class

- Methods:
  - ***LinkedListOfMovies ()***: constructor.
  - ***addMovieAtFirst(m: Movie*)*:** this method adds the *Movie* ***m*** at the beginning of the linked list.
  - ***addMovieAtLast(m: Movie*)*:** this method adds the *Movie* ***m*** at the end of the linked list.
  - ***getMovies(y: int)***: This method returns a linked list containing the movies that were produced in the year y. The movies of the obtained linked list are ordered in the inverse order than their original order.
  - ***getLastMovie():*** this method returns the last movie in the linked list.
  - ***insertMovieAfter(newM: Movie, name: String)***: This method inserts the movie ***newM*** after the first movie called ***name***.

QUESTION: Translate into Java code the class ***LinkedListOfMovies*** *(**do not implement** the methods **addMovieAtFirst** and **addMovieAtLast**).*

```
public interface Income { ..... 1      ..... total = 3
      public double calculateBasicIncome();..... 1
      public double calculateExtraIncome(int y); ..... 1
}



public abstract  class Role implements Income { ..... 1 + 1      ..... total
= 20
      private String roleName;

      private Award arrAwards[];..... 1
      private int nbAwards; ..... 1

      public Role(String name) {  ..... total = 2
            roleName = name;

            arrAwards = new Award[10]; ..... 1
            nbAwards = 0; ..... 1
      }

      public double calculateExtraIncome(int y)   {  ..... total = 5
            double total = 0.0; ..... 1

            for (int i = 0; i < nbAwards; i++) ..... 1
                  if (arrAwards[i].getAwardYear() == y) ..... 1
                              total += arrAwards[i].getCash();..... 1

            return total; ..... 1
      }

      public void split(int y, Award equalAw[], Award greaterAw[]) {.....
total = 9
                  int j = 0, k = 0; ..... 1 + 1

                  for (int i =0; i < nbAwards; i++) { ..... 1
                        if (arrAwards[i].getAwardYear() == y) ..... 1{
                              equalAw[j] = arrAwards[i]; ..... 1
                              j++; ..... 1
                        }
                        else {
                              if (arrAwards[i].getAwardYear() > y) { ..... 1
                                    greaterAw[k] = arrAwards[i]; ..... 1
                                    k++; ..... 1
                              }
                        }
                  }
      }
}
```

```
public class PrincipalRole extends Role { ..... 1     ..... total = 5
      private double basicSalary;

      public PrincipalRole(String name, double bs) { ..... total = 2
                        super(name); ..... 1
                        basicSalary = bs; ..... 1
      }

      public double calculateBasicIncome() { ..... 1 ..... total = 2
            return (basicSalary + 2000); ..... 1
      }
}
```

```
public class Movie {  ..... total = 23
      private String name;
      private int year;
      private Role arrRoles[];..... 1
      private int nbRo; ..... 1

      public Movie(String s, int y, int size) {  ..... total = 2
            name = s;
            year = y;
            arrRoles = new Role[size]; ..... 1
            nbRo = 0; ..... 1
      }

      public boolean addRole(Role r) {  ..... total = 4
            if (nbRo < arrRoles.length) { ..... 1
                        arrRoles [nbRo] = r; ..... 1

                  nbRo ++; ..... 1
                  return true; ..... 0.5
            }
            else
                  return false; ..... 0.5
      }

      public void addPrincipalRolesFromFile(String fileName, double basic,
                  double extra) throws IOException {  ..... total = 13

            File f1 = new File(fileName); ..... 1
            FileInputStream fo1 = new FileInputStream(f1); ..... 1
            ObjectInputStream pf = new ObjectInputStream(fo1); ..... 1

            Role r;

            try { ..... 1
                  while (true) { ..... 1
                        if (r instanceof PrincipalRole) { ..... 1
                              if (((PrincipalRole)r).getBasicSalary()==basic
...1 + 1
                              && r.calculateExtraIncome(year) == extra ){ .....
                              1

                                    arrRoles[nbRo] = r; ..... 1
                                    nbRo ++; ..... 1
                              }
                        }

                  }
            }
            catch(EOFException eof) { ..... 1
            }
            catch(ArrayIndexOutOfBoundsException e) { ..... 1
            }
            catch (ClassNotFoundException e) {
            }
            pf.close();
      }
```

```
	public void addPrincipalRolesFromFileV2(String fileName, double basic,
				double extra) throws IOException { ……. total
			= 13

		File f1 = new File(fileName); …… 1
		FileInputStream fo1 = new FileInputStream(f1); …… 1
		ObjectInputStream pf = new ObjectInputStream(fo1); …… 1

		Role r;

		try { …… 1
			while (true) { …… 1
				if (r instanceof PrincipalRole) { …… 1

					if (((PrincipalRole)r).getBasicSalary()==basic
…1 + 1
					&& r.calculateExtraIncome(year) == extra ) { ……
1

						if (nbRo < arrRoles.length) { …… 1
							arrRoles[nbRo] = r; …… 1
							nbRo ++; …… 1
						}
					}
				}

			}
		}
		catch(EOFException eof) {	…… 1
		}
		catch (ClassNotFoundException e) {
		}
		pf.close();
	}

	public void addPrincipalRolesFromFileV3(String fileName, double basic,
				double extra) throws IOException { ……. total
			= 13
		File f1 = new File(fileName); …… 1
		FileInputStream fo1 = new FileInputStream(f1); …… 1
		ObjectInputStream pf = new ObjectInputStream(fo1); …… 1

		Role r;
		try { …… 1
			while (true) { …… 1
				if (r instanceof PrincipalRole) { …… 1

					if (((PrincipalRole)r).getBasicSalary()==basic
…1 + 1
					&& r.calculateExtraIncome(year) == extra ) { ……
					1
						addRole(r); …… 3
					}
				}
			}
```

```
            }
            catch(EOFException eof) { …… 1
            }
            catch (ClassNotFoundException e) {
            }
            pf.close();
      }
}
public class LinkedListOfMovies { …… total = 24
      private Node head; …… 1

      public LinkedListOfMovies() {
            head = null; …… 1
      }

      public LinkedListOfMovies getMovies(int y) { …… total = 6

            LinkedListOfMovies res = new LinkedListOfMovies();…… 1
            Node current = head; …… 1

            while ( current != null ) { …… 1
                  if (current.getData().getYear() == y) { …… 1
                        res.addMovieAtFirst(current.getData());…… 1
                  }
            }

            return res; …… 1
      }

      public Movie getLastMovie() { …… total = 7
            Node current = head; …… 1


            while (current != null && current.getNext() != null) { …… 1 + 1
                  current = current.getNext();…… 1
            }

            if (current != null) …… 1
                  return current.getData();…… 1

            return null;  …… 1
      }

      public Movie getLastMovieV2() {  …… total = 7
            Node current = head; …… 1

            if (head == null) return null; …… 1 + 1

            while (current.getNext() != null) { …… 1
                        current = current.getNext();  …… 1
            }
            return current.getData();…… 2
      }

      public boolean insertAfter(Movie newM, String name) { …… total = 9
            Node newNode = new Node(newM); …… 1
            Node current = head; …… 1
```

```
            while (current != null …… 1
                  && !current.getData().getName().equals(name)) { …… 1
                  current = current.getNext();…… 1
            }

            if (current == null) …… 1
                  return false; …… 0.5
            else {
                  newNode.setNext(current.getNext());…… 1
                  current.setNext(newNode); …… 1
                  return true; …… 0.5
            }
      }
}
```