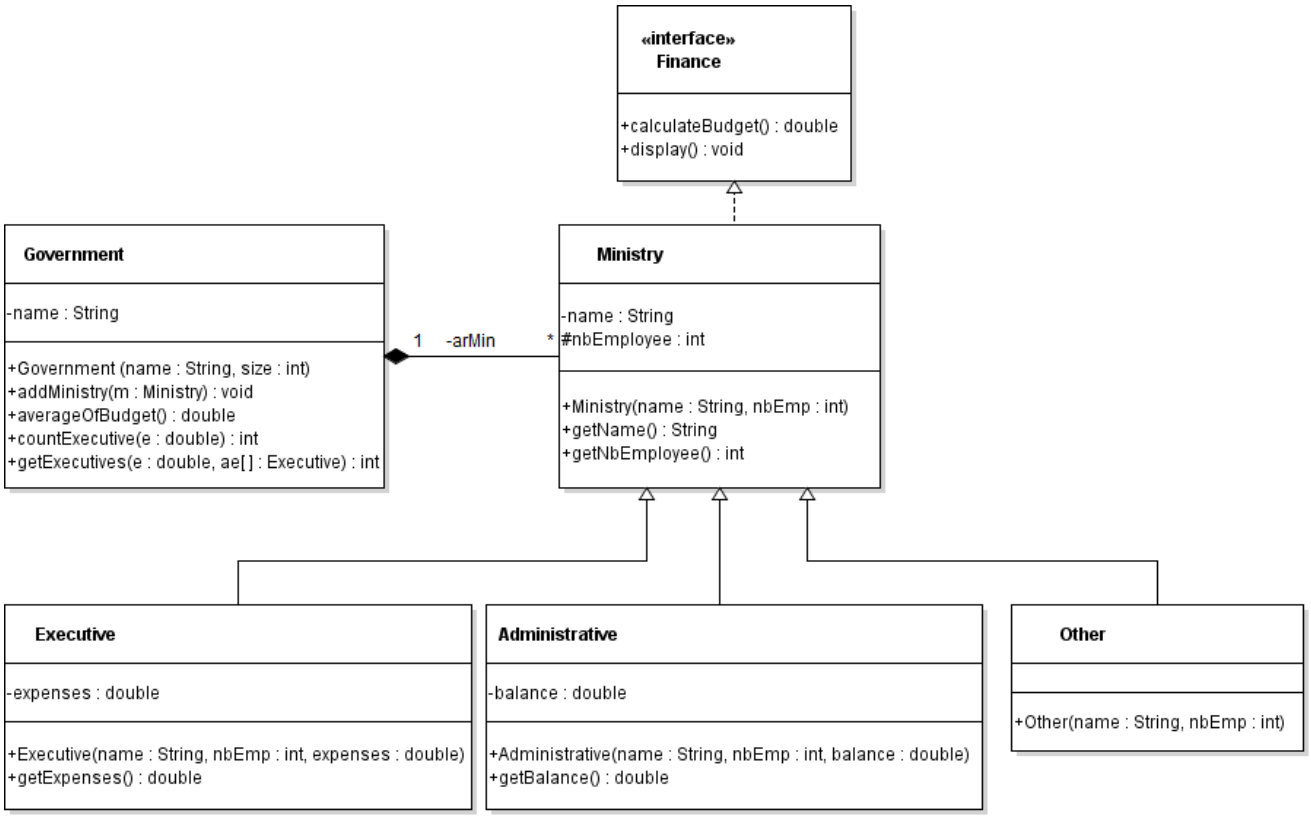
King Saud University
College of Computer and Information Sciences
Department of Computer Science
CSC113 – Computer Programming II – Midterm 2 Exam – Spring 2015

Exercise1:



Finance interface:

- Methods:
  - ***calculateBudget ()***:This method calculates and returns the budget of a Ministry. The budget of a Ministry is calculated as follows:
    - ***Executive***:
      *Budget = expenses + nbEmployee * 1.5*
    - ***Administrative***:
      *Budget = nbEmployee * 10000 - balance.*
  - ***display()*:** display all the attributes

Ministry class:

- Attributes:
  - ***name***: the name of the ministry.
  - ***nbEmployee:*** number of employees in the ministry
- Methods:
  - ***Ministry(name: String, nbEmp: int)***: constructor
  - ***getName ()*:** this method returns the name of the ministry.
  - ***getNbEmployee ()*:** this method returns the number of employees of the ministry.

Executive class
- Attributes:
  - ***expenses***: the expenses of the ministry.
- Methods:
  - ***Executive(name: String, nbEmp : int, expenses : double)***: constructor.
  - ***getExpenses()***: this method returns the amount of expenses.

Administrative class:
- Attributes:
  - ***balance***: the basic salary allocated for the role.
- Methods:
  - ***Administrative (name: String , nbEmp : int, balance : double):*** constructor.
  - ***getBalance ():*** This method returns the balance of the administrative ministry.

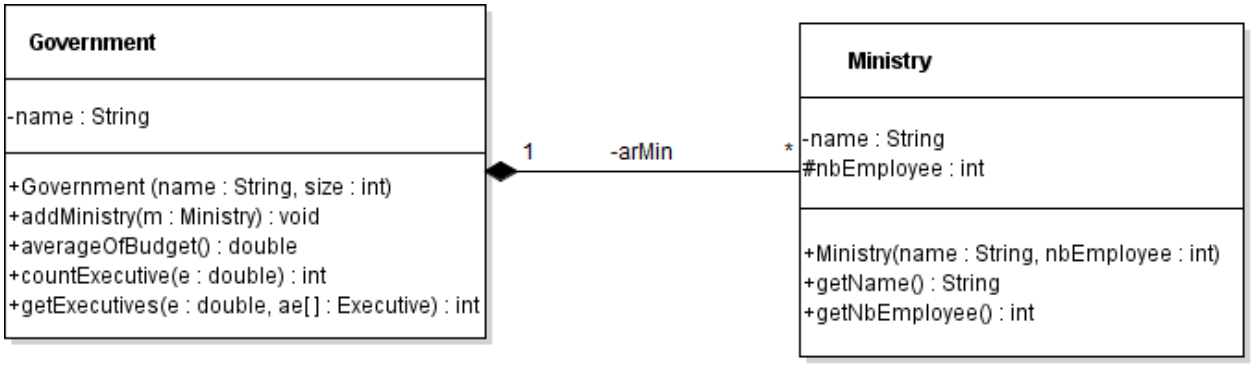
Other class:
- Methods:
  - ***Other (name: String , nbEmp : int):*** constructor.

QUESTION: Translate into Java code the following:

- The interface ***Finance.***
- The class ***Ministry.***
- The class ***Executive.***

Exercise 2:

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



Government class

- Attributes:
  - ***name***: the name of the Government.
- Methods:
  - ***Goverment (name: String, size: int)***: constructor.
  - ***addMinistry(m: Ministry*)**:* this method adds the *Ministry* ***m*** to the Government.
  - ***averageOfBudget ():*** this method calculates and returns the average budget of all ministries of the government.
  - ***countExecutive(e: double):*** this method returns the number of **Executive** ministries with **expenses** greater than **e**.
  - ***getExecutives(e : double, ae[ ]: Executive):*** This method inserts into the array **ae** all ***Executive*** ministries having expenses greater than **e** and budget greater than the average budget. Also this method returns the number of ***Executive*** ministries added to **ae**.

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

King Saud University
College of Computer and Information Sciences
Department of Computer Science
CSC113 – Computer Programming II – Midterm 2 Exam – Spring 2015

Exercise1:

```
public interface Finance {

	public double calculateBudget();----------1
	public void display();----------1
}
```

- The class ***Ministry.*** /3

```
public abstract class Ministry implements Finance{----------1

	protected int nbEmployee;
	private String name;

	Ministry(String name, int nbEmployee)
	{
		this.name = name;
		this.nbEmployee = nbEmployee;
	}

	Ministry(Ministry m) ----------1
	{
		name = m.name;
		nbEmployee = m.nbEmployee;
	}

	public int getNbEmployee() {
		return nbEmployee;
	}

	public String getName() {
		return name;
	}

	public void display() {----------1
		System.out.print(name + nbEmployee);
	}

}
```

- The class ***Executive.*** /5

```
public class Executive extends Ministry{----------1

	private double expenses;
```

```
	Executive(String name, int nbEmployee, double expenses)
	{
		super(name,nbEmployee); ----------1
		this.expenses = expenses;
	}

	Executive(Executive e) {----------1
		super(e); ----------1
		expenses = e.expenses;
	}

	public double calculateBudget() {----------1
		return expenses + nbEmployee * 1.5;
	}

	public double getExpenses() {
		return expenses;
	}


}
```

Exercise 2:

```
public class Government { /30

	private String name;
	private Ministry arMin[];
	private int nb;

	Government(String name, int size) /2
	{
		this.name = name;
		arMin = new Ministry[size]; ----------1
		nb = 0; ----------1
	}


	public void addMinistry(Ministry m) /7
	{
		if(nb >= arMin.length) ----------1
			return;

		if(m instanceof Executive) ----------1
			arMin[nb] = new Executive( (Executive)m ); ----------1
		else if(m instanceof Administrative) ----------1
			arMin[nb] = new Administrative( (Administrative)m ); ----------1
		else
			arMin[nb] = new Other( (Other)m ); ----------1
		nb++;----------1
	}

	public double averageOfBudget() /5
	{
		if(nb == 0) ----------1
			return 0;

		double sum =0; ----------1
		for(int i=0; i<nb; i++)----------1

		{
			sum+=arMin[i].calculateBudget();----------1
		}

		return sum/nb; ----------1
	}

	public int countExecutive(double e) /6
	{
		int count = 0; ----------1
		for(int i=0;i<nb;i++)----------1
			if(arMin[i] instanceof Executive) ----------1
```

```
                {       //alt: if(((Executive) arMin[i]).getExpenses > e)
                        Executive x = (Executive) arMin[i]; ----------1
                        if(x.getExpenses() > e) ----------1
                                count++;
                }

        return count; ----------1
    }









    public int getExecutives(double e, Executive ae[]) /10
    {
        double avg = averageOfBudget();----------1
        int j=0; ----------1


        for(int i=0; i<nb; i++)----------1

        {
            if(arMin[i] instanceof Executive) ----------1
                if(arMin[i].calculateBudget() > avg) ----------1
                {
                    Executive x = (Executive) arMin[i]; ----------1
                    if(x.getExpenses() > e) ----------1
                    {
                        ae[j]=x; ----------1
                        j++;----------1
                    }

                }
        }

        return j; ----------1
    }


}
```