**Exercise 1:**

Give the output of the following program.

|  |
| --- |
| **public** **abstract** **class** Vehicle {  **protected** String brand;  **protected** **double** price;    **public** Vehicle() {  brand = "Unknown"; price = 50.0;  System.*out*.println(" .... Brand : " + brand + " --- Price : " + price); }  **public** Vehicle(String b, **double** p) {  brand = b; price = p;  System.*out*.println(" .... Brand : " + brand + " --- Price : " + price); }  **public** **void** show() {  System.*out*.println(" .... Brand : " + brand + " --- Price : " + price); }  } |
| **public** **class** Bus **extends** Vehicle {  **private** String name;  **private** **int** nbOfSeats;    **public** Bus(){  name = "Hafeela";  nbOfSeats =11;  show();  }  **public** Bus(String s, String b, **double** p, **int** n) {  name = s; brand = b;  price = p; nbOfSeats = n;  show();  }  **public** **void** show() {  System.*out*.println(" \*\*\*\* Name : " + name + " .... Nb of Seats : " + nbOfSeats);  **super**.show();  }  **public** **void** addPassangers(**int** nb) **throws** Exception{  **if** (nb <= 0) **throw** **new** Exception ("Unaccepted parameter value");  **if** (nb > nbOfSeats) **throw** **new** Exception ("Parameter value exceeds available seats");    nbOfSeats -= nb ;  show();  }  } |
| **public** **class** Testing {  **public** **static** **void** main(String[] args) {  Bus m1 = **new** Bus();  System.*out*.println("+++++++++++++++++++++++++++++++++++++++++++");  Bus m2 = **new** Bus("m2", "Mercedes", 70.0, 5);  System.*out*.println("===========================================");  **try** {  m1.addPassangers(10);  System.*out*.println("--------------------------------");  m2.addPassangers(10);  }  **catch**(Exception e) {  System.*out*.println (e.getMessage());  }  }  } |

**Exercise 2:**



***MobileDevice*** class***:***

* + Attributes:
    - ***brand***: the brand of the mobile device.
    - ***speed:*** the speed of the mobile device.
    - ***storage***: the storage capacity of the mobile device.
    - ***price***: the price of the mobile device.
  + Methods:
* ***MobileDevice(brand: string, storage: int, speed: double)***: constructor
* ***calculatePrice(* ):** this method calculates and returns the price of the mobile device. The price is calculated as follows:
  + ***For Smart Phone****: price = 1300 + number of sim cards \* 150*
  + ***For Tablet:*** *price = 1300 \* storage+ screen size \* 50*
* ***getBrand():***this method returns the brand of the mobile device.

***SmartPhone*** class

* + Attributes:
    - ***nbSim***: the number of SIM cards.
  + Methods:
* ***SmartPhone (brand: string, storage: int, speed: double, nbSim: int)***: constructor.
* ***getNbSim():***this method returns the number of sim cards supported by the smart phone.

***Tablet*** class:

* + Attributes:
    - ***screenSize***: the screen size of the tablet.
  + Methods:
* ***Tablet (brand: string, storage: int, speed: double, screenSize: int)***: constructor.

***Company*** class***:***

* + Attributes:
    - ***name***: the name of the company.
  + Methods:
* ***Company(name: string, size: int)***: constructor
* ***addMobile(m:MobileDevice*):** this method adds the mobile device ***m*** to the company. It returns the string “Successfully added” if the mobile device ***m*** is added. Otherwise, it returns “Cannot be added”.
* ***countMobileDevices(b:string):*** this method counts and returns the number of mobile devices having the brand ***b***.
* ***averagePricesOfSmartPhones():*** this method calculates and returns the average price of the smart phones only.
* ***averagePricesOfSmartPhones(nbS:int, b:string):*** this method calculates and returns the average price of the smart phones of the brand ***b*** and having ***nbSim*** greater than ***nbS***.
* ***saveSmartPhones(filename:string, nbS:int):*** this method saves the smart phones having ***nbSim*** greater or equal to ***nbS*** into the object file “filename”, and returns the number of saved objects.

**QUESTION**: Translate into Java code the class ***MobileDevice***, the class ***SmartPhone,*** and the class ***Company.***

Answer Question 1:

.... Brand : Unknown --- Price : 50.0

\*\*\*\* Name : Hafeela .... Nb of Seats : 11

.... Brand : Unknown --- Price : 50.0

+++++++++++++++++++++++++++++++++++++++++++

.... Brand : Unknown --- Price : 50.0

\*\*\*\* Name : m2 .... Nb of Seats : 5

.... Brand : Mercedes --- Price : 70.0

===========================================

\*\*\*\* Name : Hafeela .... Nb of Seats : 1

.... Brand : Unknown --- Price : 50.0

--------------------------------

Parameter value exceeds available seats

Answer Question2:

**public** **abstract** **class** MobileDevice { **--------------- 1**

**private** String brand;

**private** **double** speed;

**protected** **int** storage;

**protected** **double** price;

**public** MobileDevice(String b, **int** st, **double** sp) { **--------------- 1**

brand = b;

storage = st;

speed = sp;

price = 0.0;

}

**public** MobileDevice(MobileDevice m) { **--------------- 2**

brand = m.brand;

storage = m.storage;

speed = m.speed;

price = m.price;

}

**public** **abstract** **double** calculatePrice();**--------------- 1**

**public** String getBrand() { **--------------- 1**

**return** brand;

}

}

**public** **class** SmartPhone **extends** MobileDevice { **--------------- 1**

**private** **int** nbSim;

**public** SmartPhone(String b, **int** st, **double** sp, **int** nbS) {

**super**(b, st, sp); **--------------- 1**

nbSim = nbS;

}

**public** SmartPhone(SmartPhone s) {

**super**(s); **--------------- 1**

nbSim = s.nbSim;

}

**public** **int** getNbSim() { **--------------- 1**

**return** nbSim;

}

**public** **double** calculatePrice() { **--------------- 1**

price = 1300 + nbSim \* 150.0;

**return** price;

}

}

**public** **class** Company {

**private** String name;

**private** MobileDevice arrMob[];

**private** **int** nbMD;

**public** Company(String name, **int** size) {

**this**.name = name;

arrMob = **new** MobileDevice[size]; **--------------- 1**

nbMD = 0; **--------------- 1**

}

**public** String addMobile(MobileDevice m) {

**if** (nbMD < arrMob.length) { **--------------- 1**

**if** (m **instanceof** SmartPhone) **--------------- 1**

arrMob[nbMD] = **new** SmartPhone( (SmartPhone) m); **----1**

**else**

arrMob[nbMD] = **new** Tablet( (Tablet) m); **----1**

nbMD ++; **----1**

**return** "Sucessfully added"; **----0.5**

}

**else**

**return** "Can not be added"; **----0.5**

}

**public** **int** countMobileDevices (String b) {

**int** count = 0; **--------------- 0.5**

**for** (**int** i = 0; i < nbMD; i++) { **--------------- 1**

**if** (arrMob[i].getBrand().equals(b)) **--------------- 1**

count ++; **--------------- 1**

}

**return** count; **--------------- 0.5**

}

**public** **double** averagePricesOfSmartPhones () {

**int** count = 0; **--------------- 0.5**

**double** sum = 0.0; **--------------- 0.5**

**double** avg = 0.0;

**for** (**int** i = 0; i < nbMD; i++) { **--------------- 1**

**if** (arrMob[i] **instanceof** SmartPhone ) { **--------------- 1**

count ++; **--------------- 1**

sum += arrMob[i].calculatePrice(); **--------------- 1**

}

}

**if** (count > 0)

avg = sum / count; **--------------- 0.5**

**return** avg; **--------------- 0.5**

}

**public** **double** averagePricesOfSmartPhones (**int** nbS, String b) {

**int** count = 0; **--------------- 0.5**

**double** sum = 0.0; **--------------- 0.5**

**double** avg = 0.0;

SmartPhone s;

**for** (**int** i = 0; i < nbMD; i++) { **--------------- 1**

**if** (arrMob[i] **instanceof** SmartPhone ) { **--------------- 1**

s = (SmartPhone) arrMob[i]; **--------------- 1**

**if** ( arrMob[i].getBrand().equals(b) && **---------- 1**

s.getNbSim() > nbS) { **--------------- 1**

count ++; **--------------- 1**

sum += arrMob[i].calculatePrice(); **------- 1**

}

}

}

**if** (count > 0)

avg = sum / count; **--------------- 0.5**

**return** avg; **--------------- 0.5**

}

**public** **int** saveSmartPhones(String fileName, **int** nbS) **throws** IOException {

File f = **new** File (fileName); **--------------- 0.5**

FileOutputStream fo = **new** FileOutputStream(f); **--------------- 1**

ObjectOutputStream objF = **new** ObjectOutputStream(fo); **--------- 1**

**int** count = 0; **--------------- 0.5**

SmartPhone s;

**for** (**int** i=0; i < nbMD; i++) { **--------------- 1**

**if** (arrMob[i] **instanceof** SmartPhone) { **--------------- 1**

s = (SmartPhone) arrMob[i]; **--------------- 1**

**if** (s.getNbSim() > nbS) { **--------------- 1**

objF.writeObject(arrMob[i]); **--------------- 1**

count ++; **--------------- 1**

}

}

}

objF.close(); **--------------- 0.5**

**return** count; **--------------- 0.5**

}

}