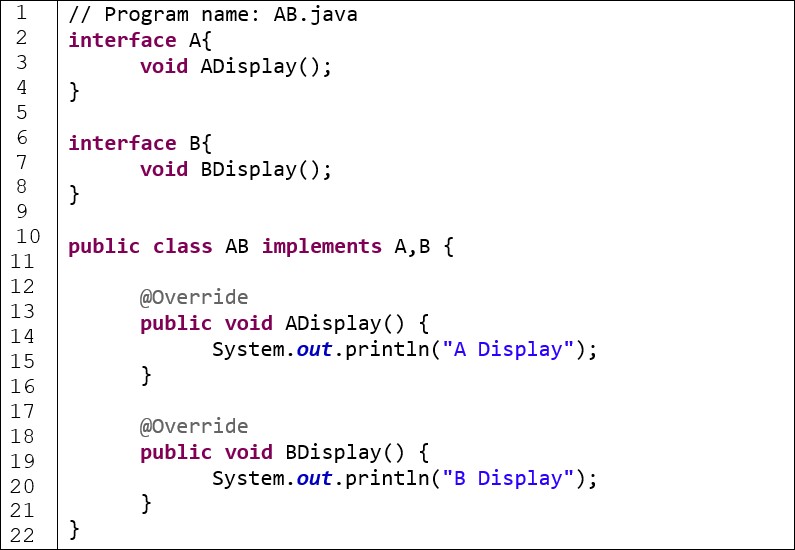
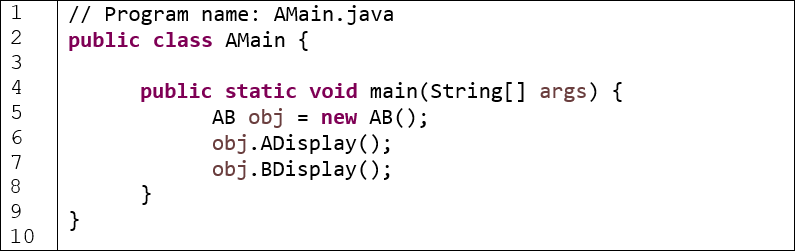
# Section A:

*Interface Concept*

**TK1143 - Tutorial 4 Polymorphism Using Interface**

1. What is the output of the codes below?



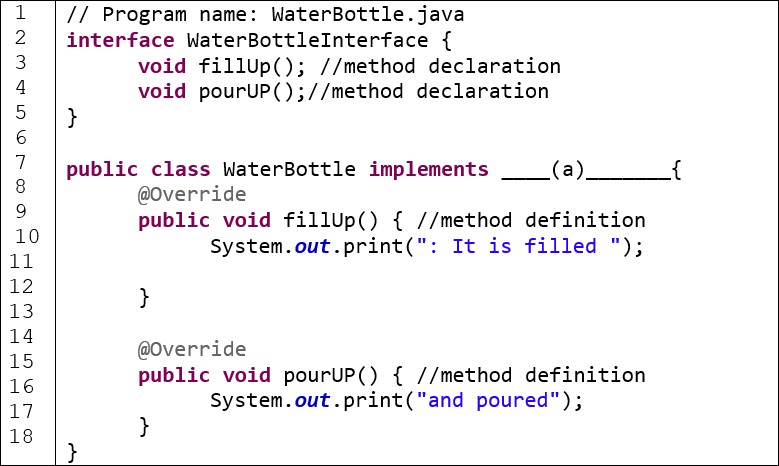


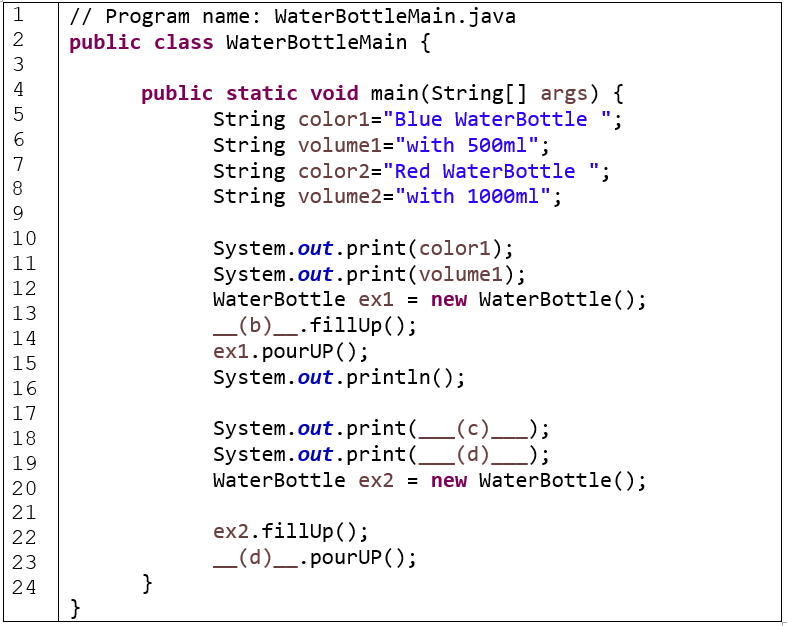
Answer:

A Display

B Display

1. Answer the following questions based on the code below:
2. Fill in the blank of the codes:





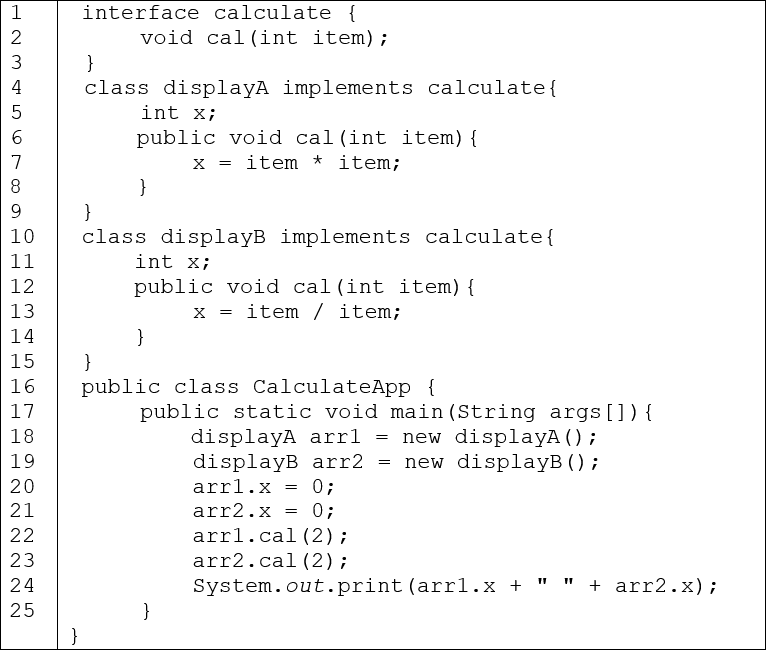
Answer:

1. WaterBottleInterface
2. ex1
3. color2
4. volume2 , ex2
5. What is the output of the code above? Answer:

Blue WaterBottle with 500ml: It is filledand poured

Red WaterBottle with 1000ml: It is filledand poured

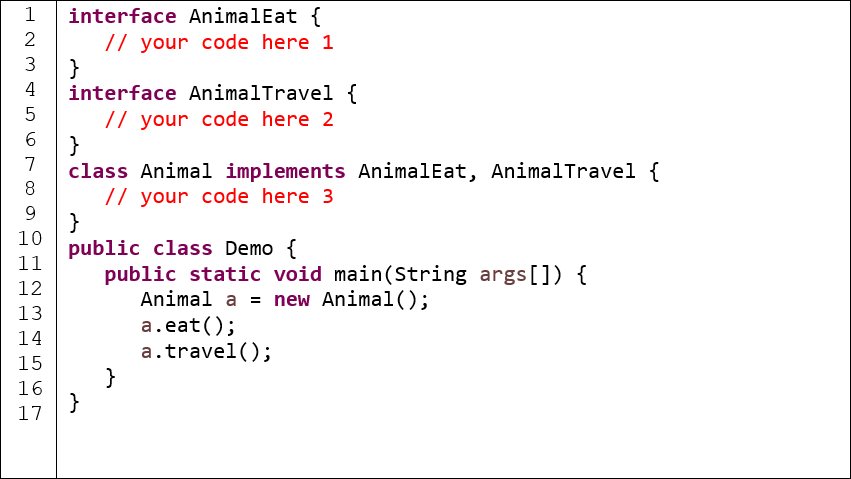
1. What is the output of the following code?



Answer:

4 1

1. Write the codes to achieve the output below?



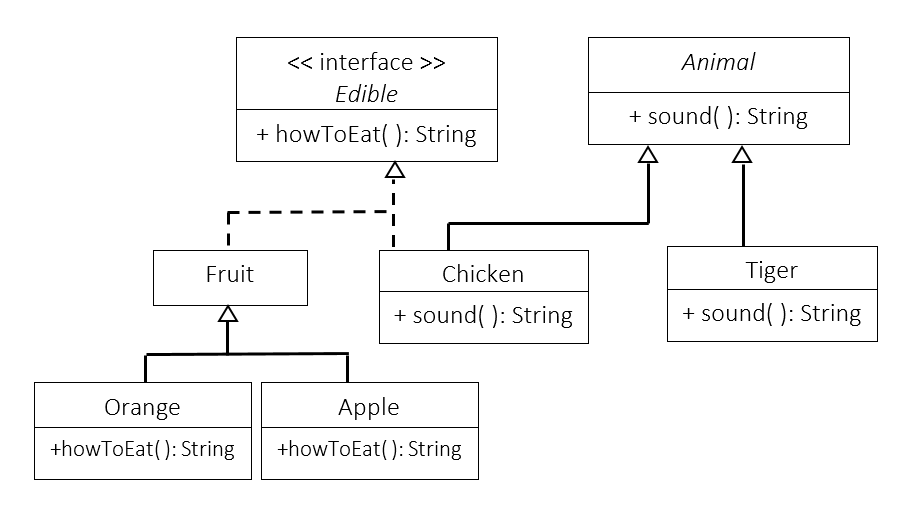
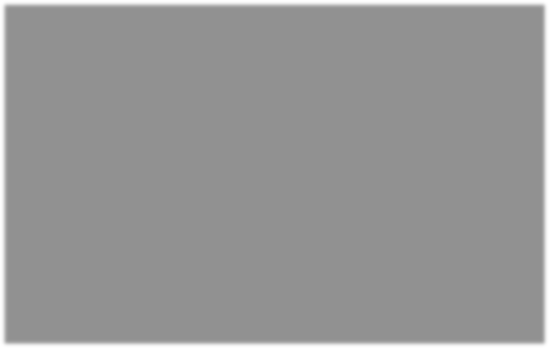
**Output:**

Animal is eating Animal is travelling

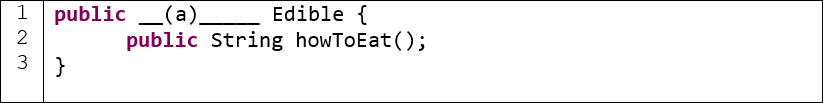
Answer:

*Polymorphism Using Interface*

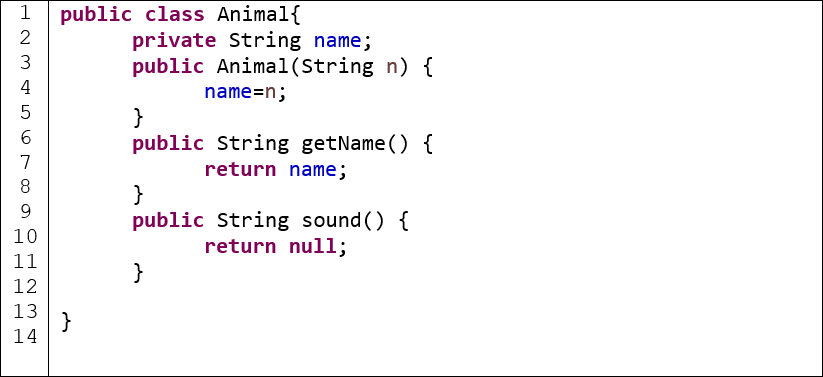
Based on the diagram below, answer the questions follow:



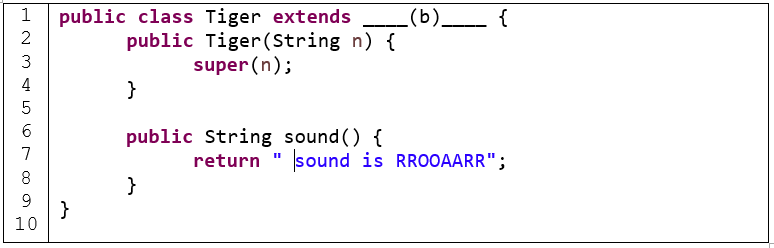
1. Fill in the blanks:
2. Interface **Edible** (*Edible.java*)



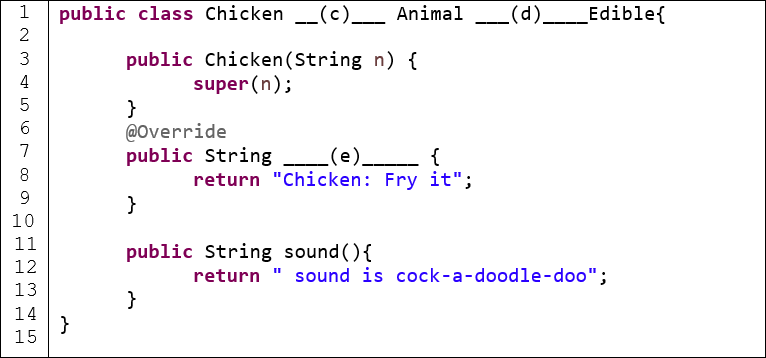
1. Class **Animal** (*Animal.java*)



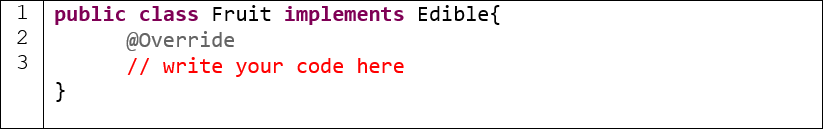
1. Class **Tiger** (*Tiger.java*)



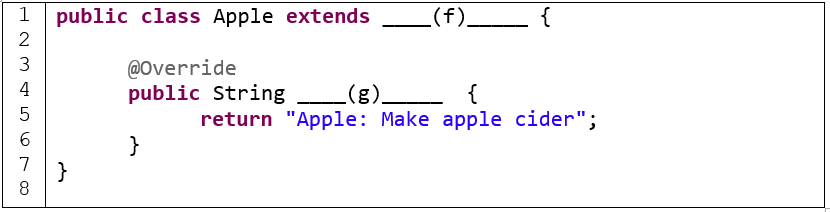
1. Class **Chicken** (*Chicken.java)*



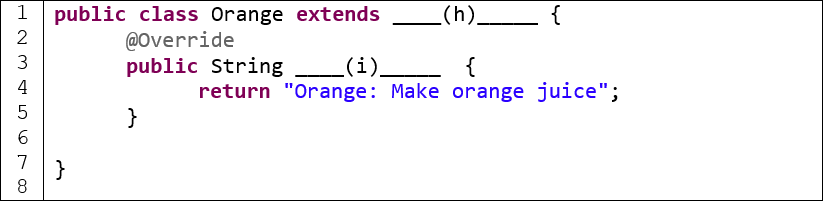
1. Class **Fruit** (*Fruit.java*)



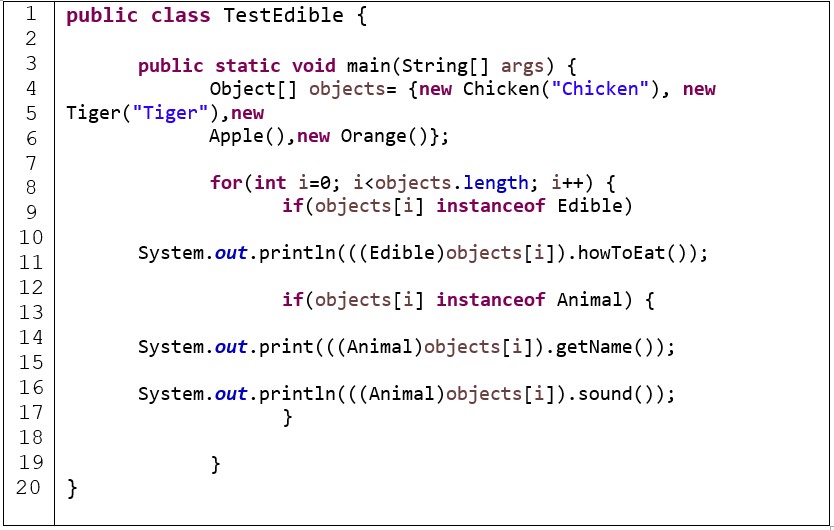
1. Class **Apple** (*Apple.java*)



1. Class **Orange** (*Orange.java*)



1. Class Application (*TestEdible.java*)



Answer:

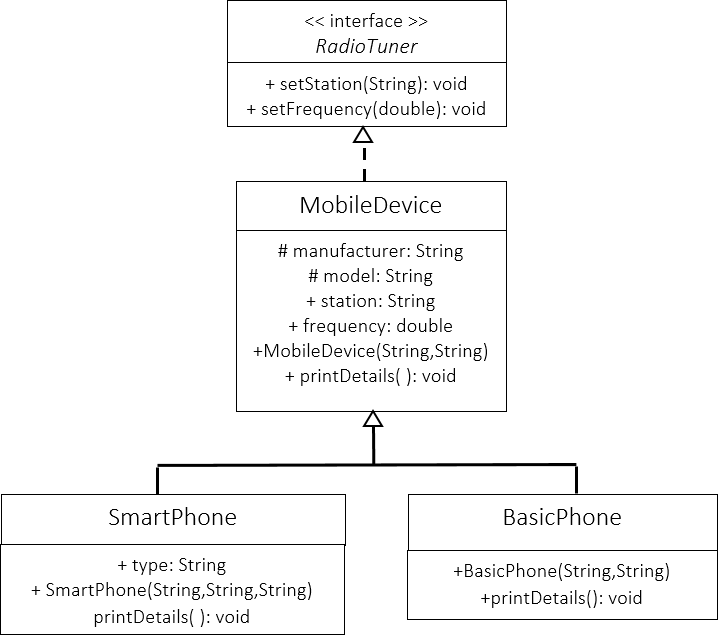
1. Write the override method in class Fruit that implements interface Edible. Answer:
2. What is the output for the codes above? Answer:

**Section B:**

The UML diagram and description are provided for each case. Your task is to write the program to implement the concept of polymorphism using interface for each case. You have to write a program of classes based on the question given.

## CASE 1: MOBILE DEVICE

The following UML diagram shows the two types of Mobile Device- SmartPhone, and Basic Phone, which implements interface RadioTuner. Please create an Interface RadioTuner and each of the class MobilePhone, SmartPhone, and BasicPhone. The class for mobile application is given.



1. Interface **RadioTuner**
   * method setStation() consist one paramater of the station name
   * method setFrequency() consist one paramater of the frequency of an FM radio station
2. Class **MobileDevice** implements interface RadioTuner
   * variable to store the manufacturer of mobile device
   * variable to store the model of mobile device
   * variable to store station name
   * variable to store freuquency of an FM radio station
   * constructor to set the manufacturer and model
   * method printDetails() to display MobileDevice ‘s information
   * the definition method that ovverride from Interface RadioTuner to set station and frequency
3. Class **SmartPhone**
   * variable to store the type of smart phone
   * constructor to set manufacturer, model and type
   * method printDetails() to display MobileDevice and SmartPhone’s information
4. Class **BasicPhone**
   * constructor to set manufacturer and model
   * method printDetails() to display MobileDevice and BasicPhone’s information

**public class** MobileApplication {

**public static void** main(String[] args) {

MobileDevice m1 = **new** SmartPhone("Samsung","S20","Galaxy"); MobileDevice m2 = **new** BasicPhone("Sonny Ericson","Walkman"); m1.setStation("Hot FM");

m1.setFrequency(97.60); m2.setStation("Fly FM"); m2.setFrequency(109.8); m1.printDetails();

System.***out***.println("Station:"+m1.station); System.***out***.println("Frqeuency:"+m1.frequency); m2.printDetails(); System.***out***.println("Station:"+m2.station); System.***out***.println("Frequency:"+m2.frequency);

}

}

**Input:** None

## Output:

SmartPhone Detail: Manufacturer: Samsung Model: S20

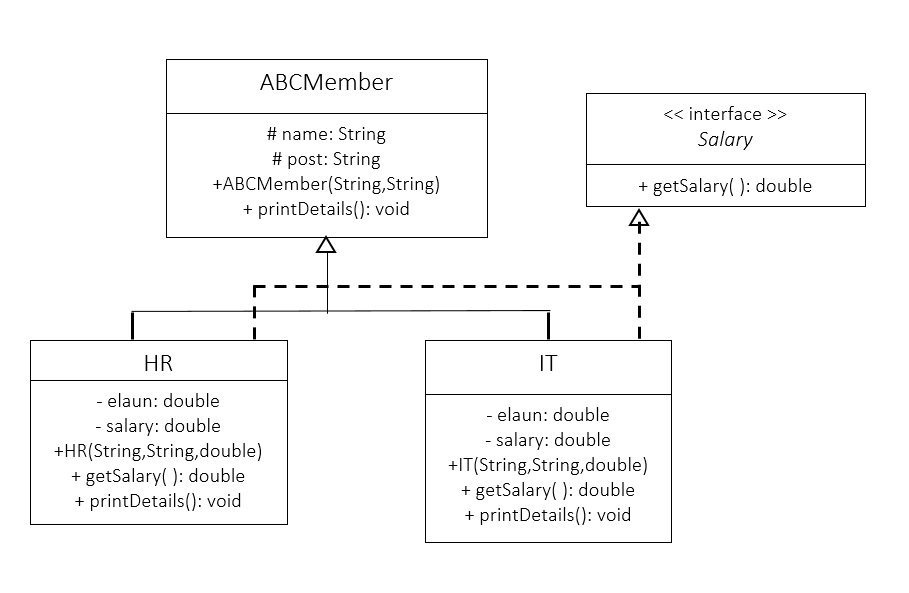
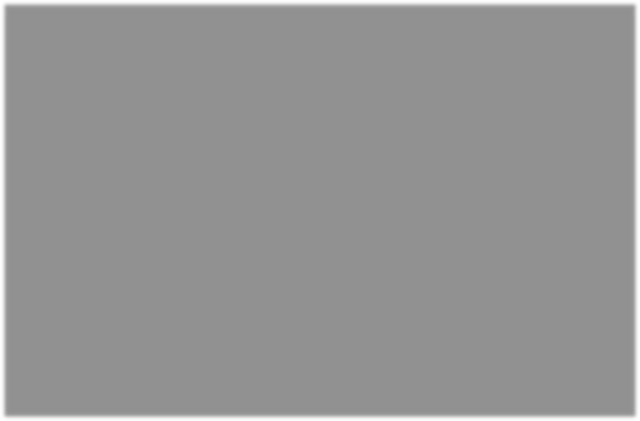
Type: Galaxy Station:Hot FM Frqeuency:97.6 Basic Phone Detail:

Manufacturer: Sonny Ericson Model: Walkman

Station:Fly FM Frequency:109.8

## CASE 2: ABC MEMBER

The following UML diagram shows the class of ABCMember with two sub-class names as Human Resource (HR) and Information Technology (IT) as their department. Each deparment has members with Software Enginner and Programmer position under IT department and Manager and Executive under HR department. Each of the positions will receive their basic salary but different elaun based on their position. Create a program for each class in which both of the sub-class will implement the interface Salary. The class for the ABC member application is given.



1. Interface **Salary**
   * method getSalary()
2. Class **ABCMember**
   * variable to store the name of member
   * variable to store the position of member
   * constructor to set the name and position
   * method that display the name of member
3. Class **HR**
   * implements interface **Salary**
   * variable to store the elaun of the member
   * variable to initial salary for HR member with value 6000.00
   * constructor to set name, position and elaun
   * the definition method that ovverride from Interface Salary and calculate the new salary after added the elaun
   * printDetails() to display name, position and current salary of member
4. Class **IT**
   * implements interface **Salary**
   * variable to store the elaun of the member
   * variable to initial salary for IT member with value 4000.00
   * constructor to set name, position and elaun
   * the definition method that ovverride from Interface Salary and calculate the new salary after added the elaun
   * printDetails() to display name, position and current salary of member

**Note:** \*value for salary in two decimal format

**public class** ABCMemberApp {

**public static void** main(String[] args) {

IT p1=**new** IT("Siti","Software Engineer",950.50); HR p2=**new** HR("Nabila","Manager",1500.00);

IT p3=**new** IT("Fattah","Senior Programmer",790.00); HR p4=**new** HR("Zul Ariffin","Executive",750.50);

ABCMember[] list = **new** ABCMember[4]; list[0] = p1;

list[1] = p2; list[2] = p3; list[3] = p4;

**for** (**int** i=0; i<list.length; i++) { ABCMember member = list[i]; **if** (member **instanceof** IT) {

((IT) member).getSalary();

((IT) member).printDetails();}

**else**

**if** (member **instanceof** HR) { ((HR) member).getSalary();

((HR) member).printDetails();}

}

}

}

**Input:** None

## Output:

Siti is a Software Engineer with salary: RM 4950.50 Nabila is a Manager with salary: RM 7500.00

Fattah is a Senior Programmer with salary: RM 4790.00 Zul Ariffin is a Executive with salary: RM 6750.50