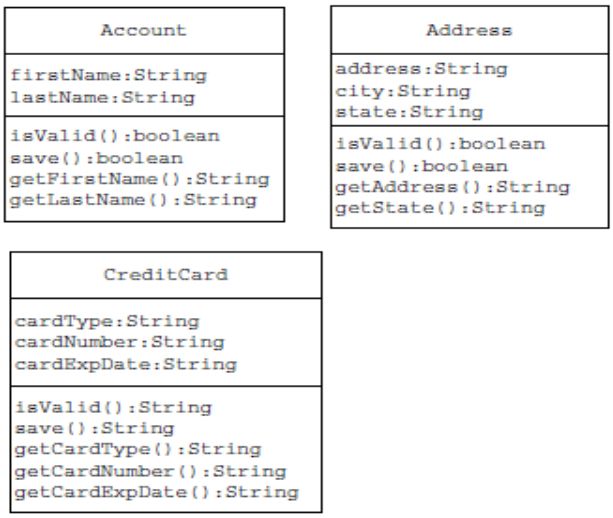
INSTRUCTION:
Design and implement a Java program for the following description of an application. You must apply *Facade* Design Pattern.

Let us build an application that:

- Accepts customer details (account, address and credit card details)
- Validates the input data
- Saves the input data to appropriate data files

The three classes — `Account`, `Address` and `CreditCard` are available in the system, each with its own methods for validating and saving the respective data. These 3 classes work together, as part of a subsystem, providing the features of an online customer.




```
public class Account {
  String firstName;
  String lastName;
  final String ACCOUNT_DATA_FILE = "AccountData.txt";

  public Account(String fname, String lname) {
    firstName = fname;
    lastName = lname;
  }
  public boolean isValid() {
    /*
        Let's go with simpler validation
        here to keep the example simpler.
     */

    if (getLastName().trim().length() < 2)
      return false;
    return true;
  }
  public boolean save() {
    FileUtility futil = new FileUtility();
    String dataLine = getLastName() + "," + getFirstName();
    return futil.writeToFile(ACCOUNT_DATA_FILE, dataLine);
  }
  public String getFirstName() {
    return firstName;
  }
  public String getLastName() {
    return lastName;
  }
}
```

```
public Address(String add, String cty, String st) {
  address = add;
  city = cty;
  state = st;
}
public boolean isValid() {
  /*
      The address validation algorithm could be complex in real-world
      applications. Let's go with simpler validation here to keep the example simpler.
   */
  if (getState().trim().length() < 2)
    return false;
  return true;
}
public boolean save() {
  FileUtility futil = new FileUtility();
  String dataLine = getAddress() + "," + getCity() + "," + getState();
  return futil.writeToFile(ADDRESS_DATA_FILE, dataLine);
}
public String getAddress() {
  return address;
}
public String getCity() {
  return city;
}
public String getState() {
  return state;
}
}
```

```
public class CreditCard {
  String cardType;
  String cardNumber;
  String cardExpDate;
  final String CC_DATA_FILE = "CC.txt";
  public static final String VISA = "Visa";
  public static final String MASTER = "Master";

  public CreditCard(String ccType, String ccNumber, String ccExpDate) {
    cardType = ccType;
    cardNumber = ccNumber;
    cardExpDate = ccExpDate;
  }
  public boolean isValid() {
    /*
        Let's go with simpler validation here to keep the example simpler.
     */
    if (getCardType().equals(VISA) || getCardType().equals(MASTER)) {
      return (getCardNumber().trim().length() == 16);
    }
    return false;
  }
  public boolean save() {
    FileUtility futil = new FileUtility();
    String dataLine = getCardType() + "," + getCardNumber() + "," + getCardExpDate();
    return futil.writeToFile(CC_DATA_FILE, dataLine);
  }
  public String getCardType() {
    return cardType;
  }
```

```
  public String getCardNumber() {
    return cardNumber;
  }
  public String getCardExpDate() {
    return cardExpDate;
  }
}
```

A client `AccountManager` class displays the user interface to a user to input the customer data. In order to validate and save the input data, the client `AccountManager` would:

- Create `Account`, `Address` and `CreditCard` objects
- Validate the input data using these objects
- Save the input data using these objects

However, this design creates high coupling between the client `AccountManager` and the subsystem components (`Address`, `Account` and `CreditCard` classes in this case).

1. The Façade pattern can be used to achieve low coupling between the client `AccountManager` and the subsystem components. Define a `Façade` class `CustomerFacade` that offers a higher level, simplified interface to the subsystem consisting of customer data processing classes (`Address`, `Account` and `CreditCard`). Draw a UML class diagram to show your design for the application.

2. Implement the application in Java based on your design above.
   Note: The `FileUtility` class provides the following method to write a message to a file.

```
public boolean writeToFile(String filename, String msg)
```

3. Write the statements in AccountManager.java to test your implementation. The output should be as shown below:

```
First customer:
First name = John, Last name = Smith
Address = 101 Jalan Bukit, City = Shah Alam, State = Selangor
Card type = Visa, Card number = 1111222233334444, Card expiry date = 01/09/2020
Valid FirstName/LastName
Valid Address/City/State
Valid CreditCard
==>Valid Customer Data: Data Saved Successfully

Second customer:
First name = Vijaya, Last name = K
Address = 1 Jalan University, City = Kuala Lumpur, State = Wilayah Persekutuan
Card type = Master, Card number = 9999888877776666, Card expiry date =
01/01/2022
Invalid FirstName/LastName
Valid Address/City/State
Valid CreditCard
==>Invalid Customer Data: Data Could Not Be Saved

Third customer:
First name = Aryati, Last name = Ahmad
Address = 35 Wisma Jaya, City = Petaling Jaya, State = Selangor
Card type = Master, Card number = 555566667777, Card expiry date = 01/05/2023
Valid FirstName/LastName
Valid Address/City/State
Invalid CreditCard Info
==>Invalid Customer Data: Data Could Not Be Saved
```