



جامعة عفت
EFFAT UNIVERSITY

OOP - Spring 2022

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1 Objectives

- Using ArrayList class
- Practicing polymorphism concepts

2 Questions

2.1 Question 1

- Account class

```
import java.time.LocalDate;
public class Account
{
    protected int id;
    protected double balance;
    protected static double annualInterestRate;
    protected LocalDate dateCreated;
    public Account()
    {
        id = 0;
        balance = 0;
        annualInterestRate = 0;
        dateCreated = LocalDate.now();
    }
    public Account(int id, double balance)
    {
        this.id = id;
        this.balance = balance;
        dateCreated = LocalDate.now();
    }
    public void setId(int id)
    {
        this.id = id;
    }
    public void setBalance(double balance)
    {
        this.balance = balance;
    }
    public void setAnnualInterestRate(double annualInterestRate)
    {
        this.annualInterestRate = annualInterestRate;
    }
    public int getId()
    {
        return id;
    }
    public double getBalance()
    {
        return balance;
    }
    public double getAnnualInterestRate()
    {
        return annualInterestRate;
    }
    public LocalDate getDateCreated()
    {

```

```
        return dateCreated;
    }
    public double getMonthlyInterestRate()
    {
        return (annualInterestRate/12)/100;
    }
    public double getMonthlyInterest()
    {
        return balance*getMonthlyInterestRate();
    }
    public double withdraw(double amount)
    {
        balance-=amount;
        return amount;
    }
    public void deposit(double amount)
    {
        balance += amount;
    }
    @Override
    public String toString()
    {
        return this.getClass() + "\nID: " + id + "\nBalance: " + balance + "\nDate Created: " +
            dateCreated;
    }
}
```

- Circle Class

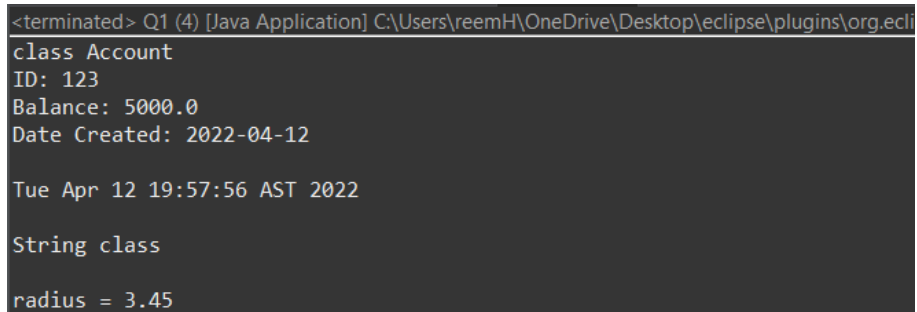
```
class Circle
{
    double radius = 1.0;
    Circle(){
    Circle(double newRadius)
    {
        radius = newRadius;
    }
    double getArea()
    {
        return radius * radius * 3.14159;
    }
    @Override
    public String toString()
    {
        return "radius = " + radius;
    }
}
```

- Main

```
import java.util.ArrayList;
import java.util.Date;
public class Q1
{
    public static void main(String[] args)
    {
        ArrayList<Object> arr = new ArrayList<Object>();
        arr.add(new Account(123, 5000)); //from lab6
        arr.add(new Date());
        arr.add(new String("String class"));
        arr.add(new Circle(3.45)); //from chapter 9

        for (int i=0; i<arr.size(); i++)
            System.out.println(arr.get(i).toString() + "\n");
    }
}
```

- Output



```
<terminated> Q1 (4) [Java Application] C:\Users\reemH\OneDrive\Desktop\eclipse\plugins\org.ecl
class Account
ID: 123
Balance: 5000.0
Date Created: 2022-04-12

Tue Apr 12 19:57:56 AST 2022

String class

radius = 3.45
```

2.2 Question 2

- Account class

```
import java.time.LocalDate;
import java.util.ArrayList;
public class Account
{
    protected int id;
    protected ArrayList<Transaction> transactions;
    protected double balance;
    protected static double annualInterestRate;
    protected LocalDate dateCreated;
    protected String name;
    public Account()
    {
        id = 0;
        balance = 0;
        annualInterestRate = 0;
        dateCreated = LocalDate.now();
        transactions = new ArrayList<Transaction>();
    }
    public Account(int id, double balance)
    {
        this.id = id;
        this.balance = balance;
        dateCreated = LocalDate.now();
        transactions = new ArrayList<Transaction>();
    }
    public Account(String name, int id, double balance)
    {
        this.name = name;
        this.id = id;
        this.balance = balance;
        dateCreated = LocalDate.now();
        transactions = new ArrayList<Transaction>();
    }
    public void setId(int id)
    {
        this.id = id;
    }
    public void setName(String name)
    {
        this.name = name;
    }
    public void setBalance(double balance)
    {
        this.balance = balance;
    }
    public void setAnnualInterestRate(double annualInterestRate)
    {
        this.annualInterestRate = annualInterestRate;
    }
    public String getName()
    {
        return name;
    }
    public int getId()
    {

```

```
        return id;
    }
    public double getBalance()
    {
        return balance;
    }
    public double getAnnualInterestRate()
    {
        return annualInterestRate;
    }
    public LocalDate getDateCreated()
    {
        return dateCreated;
    }
    public double getMonthlyInterestRate()
    {
        return (annualInterestRate/12)/100;
    }
    public double getMonthlyInterest()
    {
        return balance*getMonthlyInterestRate();
    }
    public double withdraw(double amount)
    {
        balance -= amount;
        transactions.add(new Transaction('W', amount, balance, "withdraw"));
        return amount;
    }
    public void deposit(double amount)
    {
        balance += amount;
        transactions.add(new Transaction('D', amount, balance, "deposit"));
    }
    public ArrayList<Transaction> getTransactions()
    {
        return transactions;
    }
    @Override
    public String toString()
    {
        return this.getClass() + "\nID: " + id + "\nBalance: " + balance + "\nDate Created: " +
            dateCreated;
    }
}
```

- Transaction

```
import java.time.LocalDate;
public class Transaction
{
    private LocalDate date;
    private char type;
    private double amount;
    private double balance;
    private String description;
    public Transaction(char type, double amount, double balance, String description)
    {
        this.type = type;
        this.amount = amount;
        this.balance = balance;
        this.description = description;
        date = LocalDate.now();
    }
    public void setType(char type)
    {
        this.type = type;
    }
    public void setAmount(double amount)
    {
        this.amount = amount;
    }
    public void setBalance(double balance)
    {
        this.balance = balance;
    }
    public void setDescription(String description)
    {
        this.description = description;
    }
    public char getType()
    {
        return type;
    }
    public double getAmount()
    {
        return amount;
    }
    public double getBalance()
    {
        return balance;
    }
    public String getDescription()
    {
        return description;
    }
    public LocalDate getDate()
    {
        return date;
    }
}
```

- Main

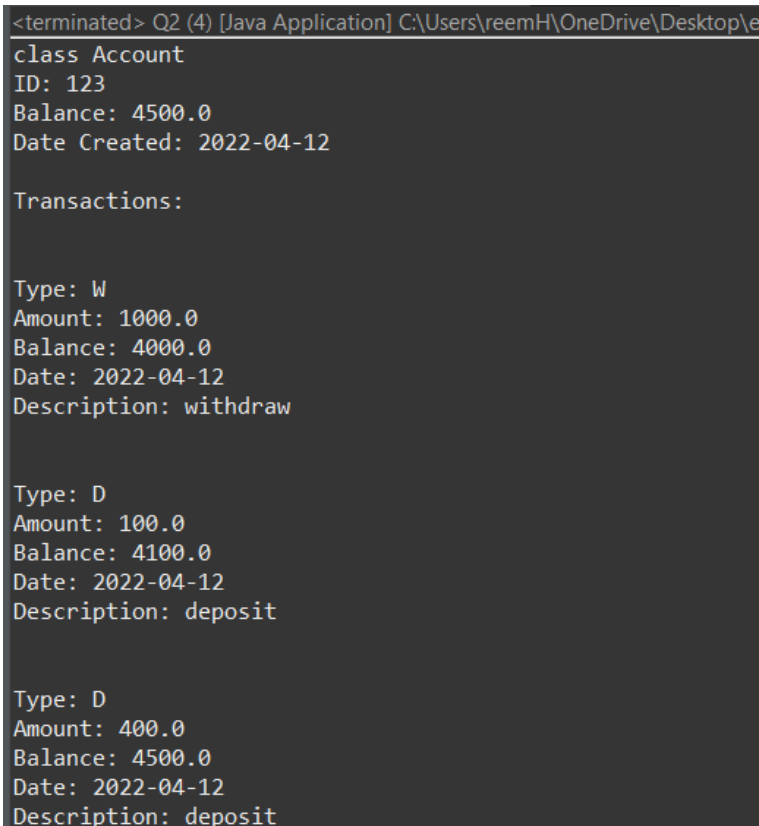
```
public class Q2
{
    public static void main(String[] args)
    {
        Account a = new Account("Reem", 123, 5000);

        a.withdraw(1000);

        a.deposit(100);
        a.deposit(400);

        System.out.println(a.toString());
        System.out.println("\nTransactions:");
        for (int i = 0; i < a.getTransactions().size(); i++) {
            System.out.println();
            System.out.println("\nType: " + (a.getTransactions()).get(i).getType()
                + "\nAmount: " + (a.getTransactions()).get(i).getAmount()
                + "\nBalance: " + (a.getTransactions()).get(i).getBalance()
                + "\nDate: " + (a.getTransactions()).get(i).getDate()
                + "\nDescription: " + (a.getTransactions()).get(i).getDescription());
        }
    }
}
```

- Output



```
<terminated> Q2 (4) [Java Application] C:\Users\reemH\OneDrive\Desktop\p
class Account
ID: 123
Balance: 4500.0
Date Created: 2022-04-12

Transactions:

Type: W
Amount: 1000.0
Balance: 4000.0
Date: 2022-04-12
Description: withdraw

Type: D
Amount: 100.0
Balance: 4100.0
Date: 2022-04-12
Description: deposit

Type: D
Amount: 400.0
Balance: 4500.0
Date: 2022-04-12
Description: deposit
```

3 Conclusion

This lab was very clear and helpful.