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COURSE	Java Programming

LAB ASSESSMENT #1

Jagged Arrays

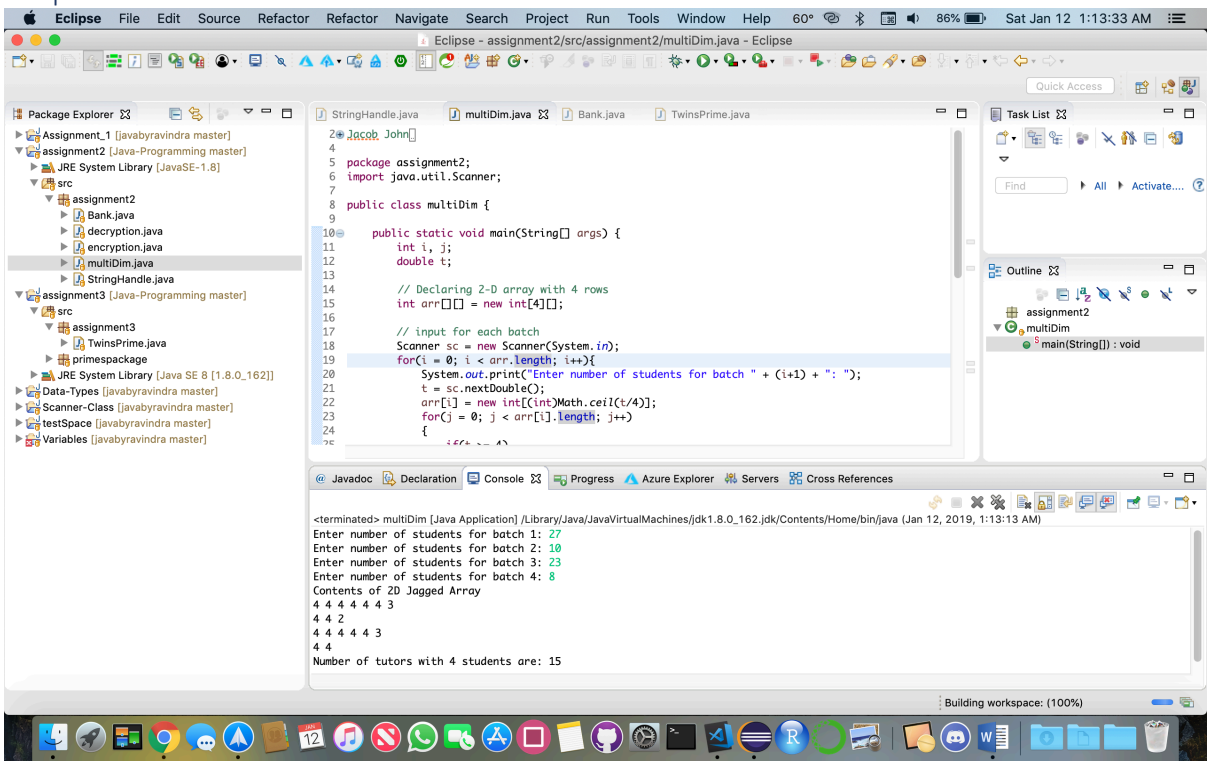
If there are 4 batches in BTech - “CSE1007” course, read the count of the slow learners (who have scored <25) in each batch. Tutors should be assigned in the ratio of 1:4 (For every 4 slow learners, there should be one tutor). Determine the number of tutors for each batch. Create a 2-D jagged array with 4 rows to store the count of slow learners in the 4 batches. The number of columns in each row should be equal to the number of groups formed for that particular batch (Eg., If there are 23 slow learners in a batch, then there should be 6 tutors and in the jagged array, the corresponding row should store 4, 4, 4, 4, 4,3). Use for-each loop to traverse the array and print the details. Also print the number of batches in which all tutors have exactly 4 students.

Code

```
/*
Jacob John
*/

package assignment2;
import java.util.Scanner;

public class multiDim {

    public static void main(String[] args) {
        int i, j;
        double t;

        // Declaring 2-D array with 4 rows
        int arr[][] = new int[4][];

        // input for each batch
        Scanner sc = new Scanner(System.in);
        for(i = 0; i < arr.length; i++){
            System.out.print("Enter number of students for batch " + (i+1) + ":
");
            t = sc.nextDouble();
            arr[i] = new int[(int)Math.ceil(t/4)];
            for(j = 0; j < arr[i].length; j++)
            {
                if(t >= 4)
```

```
                    arr[i][j] = 4;
                else
                    arr[i][j] = (int)t;
                t = t - 4;
            }
        }
        sc.close();

        // Displaying the values of 2D Jagged array
        int cfour = 0;
        System.out.println("Contents of 2D Jagged Array");
        for (i = 0; i < arr.length; i++) {
            for (j = 0; j < arr[i].length; j++) {
                    System.out.print(arr[i][j] + " ");
                    if(arr[i][j] == 4)
                        cfour++;
            }
            System.out.println();
        }

        System.out.println("Number of tutors with 4 students are: " + cfour );
    }
}
```

Output



String Handling

Eg., Write a program to read a chemical equation and find out the count of the reactants and the products. Also display the count of the number of molecules of each reactant and product.

Eg., For the equation, 2NaOH + H2SO4 -> Na2SO4+ 2H2O, the O/P should be as follows.

- Reactants are 2 moles of NaOH, 1 mole of H2SO4.
- Products are 1 mole of Na2SO4 and 2 moles of H2O.

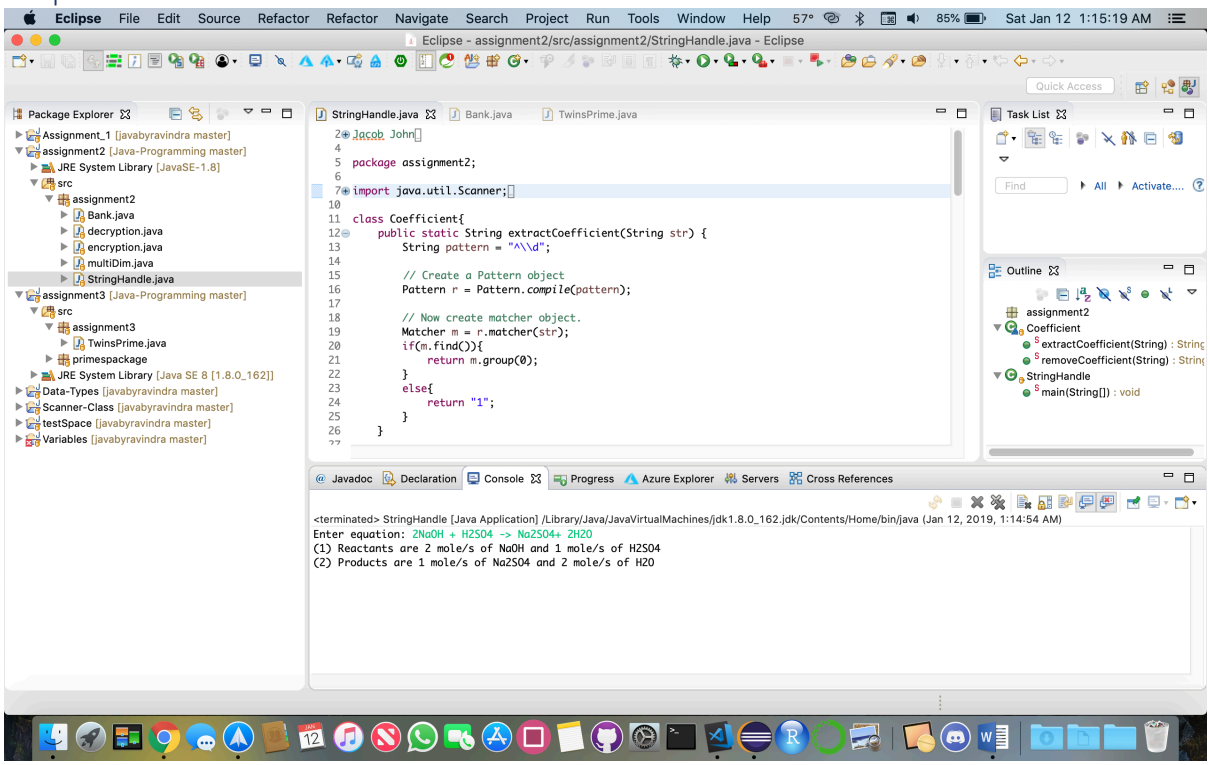
Code

```
/*
Jacob John
*/

package assignment2;

import java.util.Scanner;
import java.util.regex.Matcher;
import java.util.regex.Pattern;

class Coefficient{
    public static String extractCoefficient(String str) {
        String pattern = "^\\d";

        // Create a Pattern object
        Pattern r = Pattern.compile(pattern);

        // Now create matcher object.
        Matcher m = r.matcher(str);
        if(m.find()){
            return m.group(0);
        }
        else{
            return "1";
        }
    }

    public static String removeCoefficient(String str) {
        String pattern = "[^\\d](.*)";

        // Create a Pattern object
        Pattern r = Pattern.compile(pattern);

        // Now create matcher object.
        Matcher m = r.matcher(str);
        if (m.find()) {
            return m.group(0);
        }
        else {
            return str;
        }
```

```
    }
}

public class StringHandle {
    public static void main(String args[])
    {
        int i;
        //get input
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter equation: ");
        String eq = sc.nextLine();
        sc.close();

        //define re for splits
        String arrow = "(\\s->\\s)|(\\s->)|(->\\s)|(->)";

        // split into reactants and products
        String[] words  = eq.split(arrow);
        String[] reactant = words[0].split("\\+");
        String[] product = words[1].split("\\+");

        String[] rmoles = new String[10];
        String[] pmoles = new String[10];

        for(i = 0; i < reactant.length; i++) {
                reactant[i] = reactant[i].replaceAll("\\s+","");
                rmoles[i] = Coefficient.extractCoefficient(reactant[i]);
        }

        for (i = 0; i < product.length; i++) {
            product[i] = product[i].replaceAll("\\s+", "");
            pmoles[i] = Coefficient.extractCoefficient(product[i]);
        }

        System.out.print("(1) Reactants are ");
        if(reactant.length > 1) {
                for(i = 0; i < reactant.length; i++)
                {
                    if(i == 0)
                        System.out.print(rmoles[i] + " mole/s of " +
Coefficient.removeCoefficient(reactant[i]));
                    else if(i == reactant.length-1)
                        System.out.print(" and " + rmoles[i] + " mole/s of "
                                + Coefficient.removeCoefficient(reactant[i]));
                    else
                        System.out.print(", " + rmoles[i] + " mole/s of " +
Coefficient.removeCoefficient(reactant[i]));
                }
        }
        else {
                System.out.print(rmoles[0] + " mole/s of "
```

```
                        + Coefficient.removeCoefficient(reactant[0]));
        }
        System.out.println();
        System.out.print("(2) Products are ");
        if (product.length > 1) {
            for (i = 0; i < product.length; i++) {
                if (i == 0)
                    System.out.print(pmoles[i] + " mole/s of " +
Coefficient.removeCoefficient(product[i]));
                else if (i == product.length - 1)
                    System.out.print(" and " + pmoles[i] + " mole/s of " +
Coefficient.removeCoefficient(product[i]));
                else
                    System.out.print(", " + pmoles[i] + " mole/s of " +
Coefficient.removeCoefficient(product[i]));
            }
        } else {
            System.out.print(pmoles[0] + " mole/s of " +
Coefficient.removeCoefficient(product[0]));
        }
    }
}
```

Output



Inheritance

Eg: Assume that a bank maintains two kinds of accounts for customers, one called as savings account and the other as current account. The savings account provides compound interest and withdrawal facilities but no cheque book facility. The current account provides cheque book facility but no interest. Current account holders should maintain a minimum balance and if the balance falls below this level, a service charge is imposed.

Create a class account that stores customer name, account number and type of account. From this derive the classes cur_acct and sav_acct to make them more specific to their requirements. Include necessary member functions in order to achieve the following tasks :

- Accept deposit from a customer and update the balance.
- Display the balance
- Compute and deposit interest.
- Permit withdrawal and update the balance.
- Check for the minimum balance, impose penalty, necessary, and update the balance.

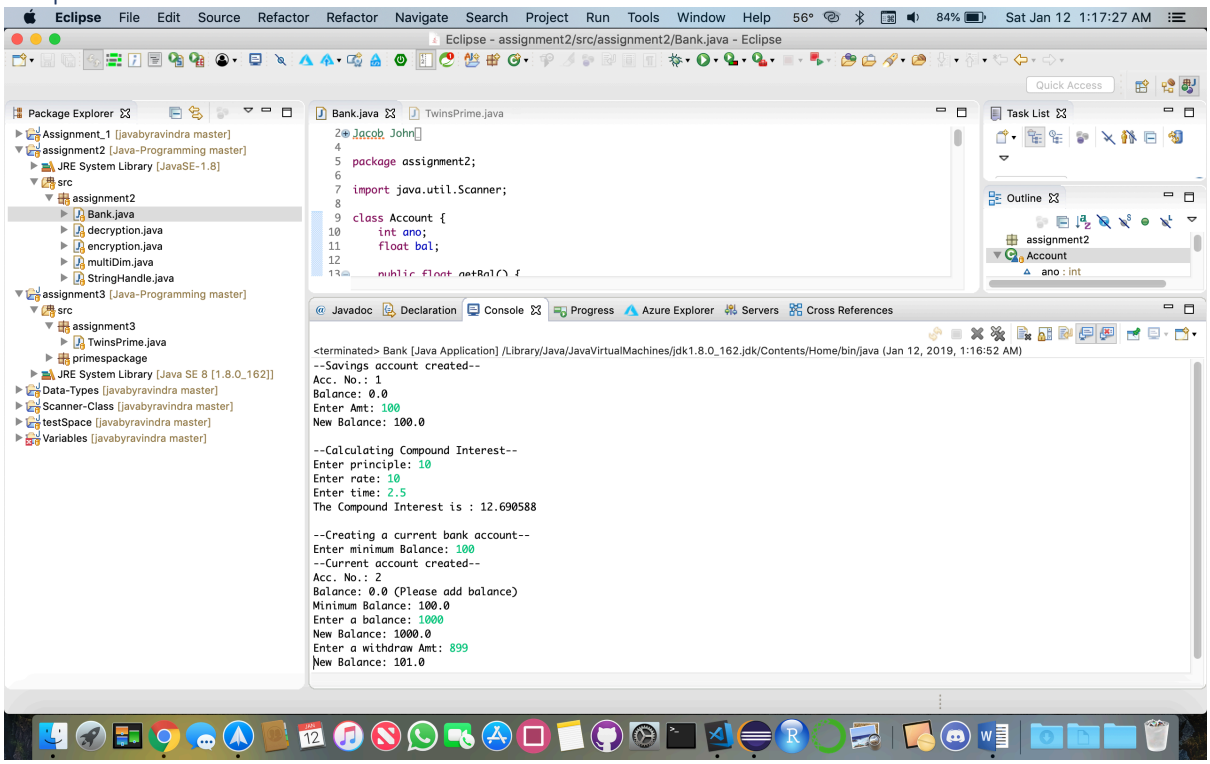
Code

```java
/*
Jacob John
*/

package assignment2;

import java.util.Scanner;

class Account {
    int ano;
    float bal;

    public float getBal() {
        return bal;
    }

    public void setBal(float balance) {
        bal = balance;
    }
}

class savings extends Account {

    savings(int accnum) {
        ano = accnum;
        bal = 0;
        System.out.println("--Savings account created--");
        System.out.println("Acc. No.: " + ano);
        System.out.println("Balance: " + bal);
    }
```

```
    public static void compound(float rate, float time, float principle) {

        float compoundInterest = (float) (principle * Math.pow((1 + rate / 100),
time));

        System.out.println("The Compound Interest is : " + compoundInterest);
    }
}

class current extends Account{

    float min;

    current(int accnum, float amt){
        ano = accnum;
        bal = 0;
        min = amt;
        System.out.println("--Current account created--");
        System.out.println("Acc. No.: " + ano);
        System.out.println("Balance: " + bal + " (Please add balance)");
        System.out.println("Minimum Balance: " + min);
    }

    public void withdraw(float amt) {
        if (bal < min)
            System.out.println("Below minimum balance!");
        else {
            bal = bal - amt;
            System.out.println("New Balance: " + this.getBal());
        }
    }

}

public class Bank {
    public static void main(String args[])
    {
        Scanner sc = new Scanner(System.in);

        savings s1 = new savings(1);
        System.out.print("Enter Amt: ");
        float amt = sc.nextFloat();
        s1.setBal(amt);
        System.out.println("New Balance: " + s1.getBal());

        System.out.println("\n" + "--Calculating Compound Interest--");
        System.out.print("Enter principle: ");
        float principle = sc.nextFloat();
        System.out.print("Enter rate: ");
        float rate = sc.nextFloat();
        System.out.print("Enter time: ");
```

```
        float time = sc.nextFloat();
        savings.compound(rate, time, principle);

        System.out.println("\n" + "--Creating a current bank account--");
        System.out.print("Enter minimum Balance: ");
        amt = sc.nextFloat();
        current c1 = new current(2, amt);
        System.out.print("Enter a balance: ");
        float b = sc.nextFloat();
        c1.setBal(b);
        System.out.println("New Balance: " + c1.getBal());
        System.out.print("Enter a withdraw Amt: ");
        amt = sc.nextFloat();
        c1.withdraw(amt);

        sc.close();
    }

}
```

Output



Packages and Sub packages

Write a program to demonstrate the knowledge of students in working with user-defined packages and sub-packages.

Eg., Within the package named ‘primespackage’, define a class Primes which includes a method checkForPrime() for checking if the given number is prime or not. Define another class named TwinPrimes outside of this package which will display all the pairs of prime numbers whose difference is 2. (Eg, within the range 1 to 10, all possible twin prime numbers are (3,5), (5,7)). The TwinPrimes class should make use of the checkForPrime() method in the Primes class.

Code

Prime.java

```java
/*
 * Jacob John
 */

package primespackage;

public class Prime {

    public static boolean checkPrime(int num) {
        int temp;
        boolean isPrime = true;

        for (int i = 2; i <= num / 2; i++) {
            temp = num % i;
            if (temp == 0) {
                isPrime = false;
                break;
            }
        }

        return isPrime;
    }
}
```

TwinsPrime.java

```java
/*
 * Jacob John
 */

package assignment3;

import java.util.Scanner;
import primespackage.Prime;

public class TwinsPrime {
```

```
    public static void main(String args[]) {
        int i;

        //take input
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter first number: ");
        int n1 = sc.nextInt();
        System.out.print("Enter second number: ");
        int n2 = sc.nextInt();
        sc.close();

        System.out.println("Twin prime numbers are: ");
        //checking twins prime
        for(i = n1; i <= n2; i++) {
            if(Prime.checkPrime(i) & Prime.checkPrime(i+2) & i > 1)
            {
                System.out.println("(" + i + "," + (i+2) + ")");
            }
        }
    }
}
```

Output