Rajshahi University of Engineering & Technology

Heaven's Light is Our Guide

LAB REPORT

Course No. ECE - 1204

Object Oriented Programming Sessional

Date: 25/10/2022

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Experiment 1: Find nth Tribonacci T(n) where T(n) = T(n-1) + T(n-2) + T(n-3). T(0) = 0, T(1) = 0, T(2) = 1

Theory:

In Java, Biginter class is for holding the integers that cannot be fit into a 4 byte memory. It can hold arbitrarily large and we need this because upto 1000, our elements would overflow easily.

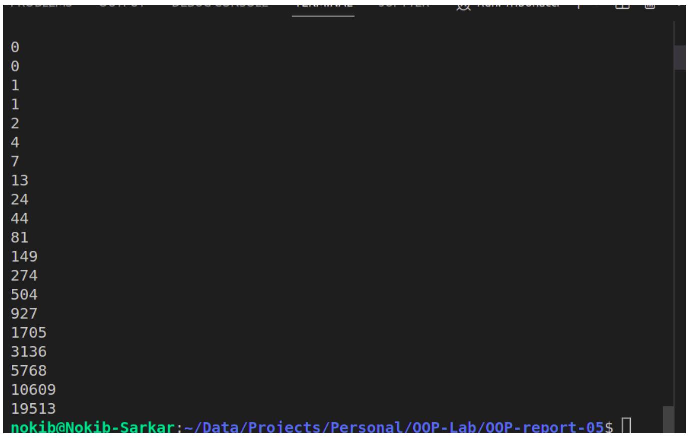
Pseudocode:

```
1. Let an array of 1000 biginters be arr
2. Set a[0] = 0, a[1] = 0, a[2] = 1
3. Repeat for i = 3 to 999
4. arr[i] = arr[i - 1] + arr[i - 2] + arr[i - 3]
5. Repeat for i = 0 to 99
6. Print arr[i]
```

Code:

```java
import java.math.BigInteger;
public class Tribonacci {
    public static void main(String[] args){
        BigInteger[] arr = new BigInteger[1000];
        arr[0] = BigInteger.valueOf(0);
        arr[1] = BigInteger.valueOf(0);
        arr[2] = BigInteger.valueOf(1);
        for(int i = 3; i < 1000; i++)
            arr[i] = arr[i-1].add(arr[i-2]).add(arr[i-3]);
        for(int i = 0; i < 100; i++)
            System.out.println(arr[i]);
    }
}
```

Output:



```
0
0
1
1
2
4
7
13
24
44
81
149
274
504
927
1705
3136
5768
10609
19513
nokib@Nokib-Sarkar:~/Data/Projects/Personal/OOP-Lab/OOP-report-05$
```

Experiment 2: Create a Footballer class with name, age, country, goals, matches, number of minutes played, and distance covered. Then show the fastest footballer and the footballer with the most goal per match.

Theory:

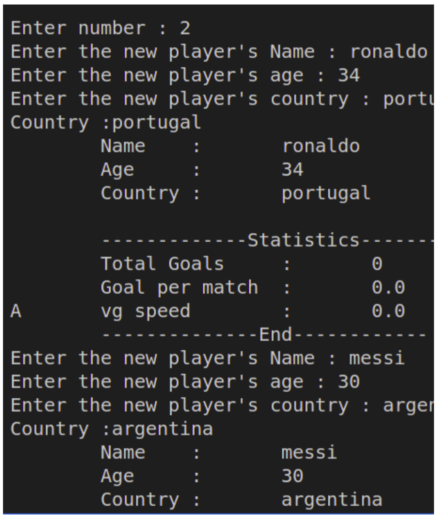
In this context, the class should have the fields name, age, country, goals, matches, number of minutes played, and distance covered should be private. The fields should not be accessed directly by any other classes outside this class. Instead, these should be accessed using getters and setters. There should be some more public methods such as get_goal_per_match which would return the value of total goals / total matches. To determine the best footballer, we should iterate through all the footballers and find the most goal_per_match footballer.

Pseudocode:

Code:

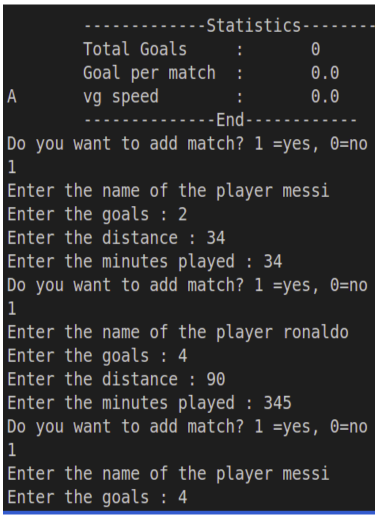
```
import java.util.Scanner;
import java.util.Arrays;
import java.util.Comparator;
public class Player {
    private String name;
    private int age;
    private String country;
    private int match = 0;
    private int goals = 0;
    private int distance = 0;
    private int min_played = 0;
    public void add_match(int goal, int min_played,  int distance){
        match++;
        goals += goal;
        this.distance += distance;
        this.min_played += min_played;
    }
    public float get_goal_per_match(){
        if(match == 0)
            return 0;
        else
            return (float) goals / match;
    }
    public float get_speed(){
        if(min_played == 0)
            return 0;
        else
            return  (float) distance / min_played;
    }
    Player(){}
    Player(String name, int age, String country){
        this.name = name;
        this.age = age;
        this.country = country;
    }
    public void show_stat(){
        System.out.println("\tName\t:\t" + name);
        System.out.println("\tAge\t:\t" + age);
        System.out.println("\tCountry\t:\t" + country);
        System.out.println("\n\t-------------Statistics----------");
        System.out.println("\tTotal Goals\t:\t" + goals);
        System.out.println("\tGoal per match\t:\t" +
get_goal_per_match());
        System.out.println("A\tvg speed\t:\t" + get_speed());
        System.out.println("\t--------------End------------");
    }
    public static void main(String[] args){
        System.out.print("Enter number : ");
        Scanner sc = new Scanner(System.in);
        int n = sc.nextInt();
        sc.nextLine();
        Player[] players = new Player[n];
        for(int i = 0; i < n; i++){
            System.out.print("Enter the new player's Name : ");
            String name = sc.nextLine();
            System.out.print("Enter the new player's age : ");
            int age = sc.nextInt();
            sc.nextLine();
            System.out.print("Enter the new player's country : ");
            String country = sc.nextLine();
            System.out.println("Country :" + country);
            players[i] = new Player(name, age, country);
            players[i].show_stat();
        }
        int choice = 1;
        while(choice == 1){
            System.out.println("Do you want to add match? 1 =yes,
0=no");
            choice = sc.nextInt();
            sc.nextLine();
            if(choice == 0)
                break;
            System.out.print("Enter the name of the player ");
            String name = sc.nextLine();
            System.out.print("Enter the goals : ");
            int goal = sc.nextInt();
            System.out.print("Enter the distance : ");
            int distance = sc.nextInt();
            System.out.print("Enter the minutes played : ");
            int min_played = sc.nextInt();
            for(int i = 0; i < n; i++)
                if(players[i].name.compareToIgnoreCase(name) == 0)
                    players[i].add_match(goal, min_played,
distance);
        }
        sc.close();
        Arrays.sort(players,
Comparator.comparing(Player::get_goal_per_match).reversed());
        Player top_speed = new Player(),
        best_striker = players[0];
        for(int i = 0; i < players.length; i++){
            if(top_speed.get_speed() < players[i].get_speed())
                top_speed = players[i];
        }
        System.out.println("----------------Top Speedy player
-------");
        top_speed.show_stat();
        System.out.println("\n--------------Best
Striker--------------");
        best_striker.show_stat();
    }
}
```

Output:

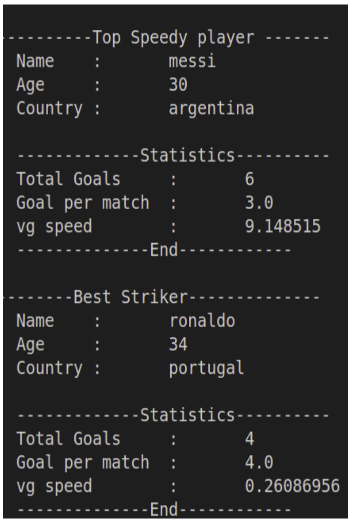


```
Enter number : 2
Enter the new player's Name : ronaldo
Enter the new player's age : 34
Enter the new player's country : portu
Country :portugal
        Name    :       ronaldo
        Age     :       34
        Country :       portugal

        -------------Statistics-------
        Total Goals     :       0
        Goal per match  :       0.0
A       vg speed        :       0.0
        --------------End------------
Enter the new player's Name : messi
Enter the new player's age : 30
Enter the new player's country : arger
Country :argentina
        Name    :       messi
        Age     :       30
        Country :       argentina
```



```
        -------------Statistics-------
        Total Goals     :       0
        Goal per match  :       0.0
A       vg speed        :       0.0
        --------------End------------
Do you want to add match? 1 =yes, 0=no
1
Enter the name of the player messi
Enter the goals : 2
Enter the distance : 34
Enter the minutes played : 34
Do you want to add match? 1 =yes, 0=no
1
Enter the name of the player ronaldo
Enter the goals : 4
Enter the distance : 90
Enter the minutes played : 345
Do you want to add match? 1 =yes, 0=no
1
Enter the name of the player messi
Enter the goals : 4
```



```
---------Top Speedy player -------
 Name    :       messi
 Age     :       30
 Country :       argentina

 -------------Statistics----------
 Total Goals     :       6
 Goal per match  :       3.0
 vg speed        :       9.148515
 --------------End------------

-------Best Striker-------------
 Name    :       ronaldo
 Age     :       34
 Country :       portugal

 -------------Statistics----------
 Total Goals     :       4
 Goal per match  :       4.0
 vg speed        :       0.26086956
 --------------End------------
```

Conclusion:

We had to make sure that the denominator in the methods `get_goal_per_match` and `get_speed` is always greater than zero. Otherwise, we may get `runtimeError due to` Division by zero.