UNIVERSITEIT VAN PRETORIA
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Department of Computer Science

COS212: Practical 2 (Friday)

Release: Thursday 18 February 2016
Deadline: Friday 19 February 2016, 18:00

Instructions

Complete the tasks below. Certain classes have been provided for you in the *files* subfolder of the practical download. You have been given a main file which will test some code functionality, but it is by no means intended to provide extensive test coverage. You are encouraged to edit this file and test your code more thoroughly. Remember to test "corner" cases. Upload **only** the given source files with your changes in a zip archive before the deadline. Please comment your name **and** student number in at the top of each file.

Task 1: Recursion[5]

Below is the definition of a function:

$$f(n) = \begin{cases} n & \text{if n <= 6} \\ f(f((n/2) - 3)) + 1 & \text{if n >= 7} \end{cases}$$

Implement the `int recursion(int num)` function in `Recursion.java`. The parameter num is the number that needs to be solved using the functions definition. The function should return the result of the function.

Task 2: Teams[15]

You are entering a competition and are asked to split the teams. The members are assigned a weight.This weight Represents the strength of the member. The teams are split in two.Each team needs to have a total weight that has the least difference between the teams.Teams should be split as evenly as possible.You will be required to implement the solve(int index) function found in `Teams.java` using backtracking. This function takes a single parameter:

1. `index:` This is the position in the list of members.Index 0 indicates the first member in the list.

A few helper functions have been given to you as help:

- `getDiffTeamStrength():` this function gets the difference in team strenth between the two arrays.
- `print():` this function sorts and prints out the teams.
- `updateLists():` this function uses the boolean array to split the teams.

A few things to note for this practical:

- There is a int array called members which is sent through to the constructor. This array will contain the weights of the members.

- There is a boolean array called myTeam which corresponds with the members array(position 0 in members is linked to position 0 in myTeam).This array will be used to split the weights.False will be put into one team and True will be put in a separate team.
- Team1 and Team2 are ArrayLists that will contain the weights of the sorted teams. This is done using the update function. The teams are split in half, if there are 10 members there will be 5 in each team but if there are 11 there will be 5 in one team and 6 in the other. You can not use any of Java's data structures in future practicals unless it is given to you or otherwise stated.
- minDiff is the difference in total weights of the two teams.This has to be as small as possible. If team1 has a weight of 134 and team2 has a weight of 133 the difference is 1.
- You must use backtracking to complete this practical.

Submission

Submit your source files on the CS Website. Place all the files in a zip archive named as uXXXXXXXX.zip where XXXXXXXX is your student number. You have all week to finish this practical, regardless of what practical session you attend. Upload your archive to the *Prac2Friday* slot on the CS website. Submit your work before the deadline. No late submissions will be accepted.