WIA1002/WIB1002 Data Structure
Semester 2 2018/2019
Assignment

Read the instruction carefully, form your group, and complete the given task.

Group formation

1. Form a group of not more than 4 members. All the members must be from the same tutorial group.
2. Each of the groups will be given one of the listed projects randomly.
3. Every group member must contribute to the project, including certain amount of coding.
4. The role played by and contribution of each member to the project must be included in the managerial report.

Submission

Your group has to submit the softcopy of the items listed below:

1. A technical report explaining the assigned task, the requirements of the task, the approach taken to solve the task, a detail description of your solution (including the flowchart, modules, etc.), sample snapshot of your program output.
2. A managerial report explaining the formation of the group, role and assigned work for each of the members, the project timeline, the problems faced in accomplishing this assignment and your solutions, and other issues encountered.
3. The complete source code.

For softcopy, the group leader will submit them in one .zip file to Spectrum. The name of the zip file should be *TutorialGroupNumber-GroupLeaderName.zip.*

Important dates

1. Submission: (week 13th) 12:00pm on Friday, 24th May 2018
2. Viva/demo: (week 14th) during tutorial & lab

Marking scheme: (20 marks)

1. Source code/Program. (18 marks)
   a. Meeting the basic task requirements, i.e. identify the requirements of the task and produce a workable solution - *10 marks*
   b. Extra features/functionalities that are not included in the task specification - *6 marks*.

2. Reports (4 marks)

   In your technical report and during viva, justify the design of your solution and the choice of **data structures** being used, it may include **technical difficulties*** that are impossible to achieve or any other valid reasons.

   * *Subjected to your lecturer's judgement based on your justifications*

Warning: **Plagiarism** is prohibited, should there be any evidence found, it will result in a **heavy penalty** on your assignment grades!

Good luck and have fun!

Topic 4: DreamCorporation

Introduction

Figure 1: The graphical illustrations of a multi-level marketing scheme

DreamCorporation (With slogan "**Do You Have a Dream?**") is a newly found startup that is based on multi-level marketing as the organisation's primary source of income. DreamCorporation has nothing to sell except its exclusive membership which it has spent a lot of money marketing to target people who would like to earn money without doing much work.

Multi-level marketing, also called pyramid selling is a marketing strategy for the sale of products or services where the revenue of the MLM company is derived from a non-salaried workforce selling company's products/services, while the earnings of the participants are derived from a pyramid-shaped or binary compensation commission system. (Sourced from Wikipedia: https://en.wikipedia.org/wiki/Multi-level_marketing)

Problem Statement

DreamCorporation has contacted University of Malaya to hire talented students like you to build the system. Depending on the capability of your system, the equivalent reward will be added to your Data Structure assignment marks.

DreamCorporation want to test you out to see if you're fit for the job, here's the skills you need:

1. Traversing in Tree using Reference - Make sure you understand parent-child relationship
2. Encryption and Decryption - To protect information leaking to interested parties
3. Primary school maths - Percentage, Addition and Multiplication... Seriously??

Project Requirements

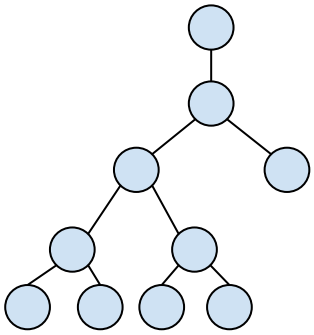

Figure 2: Implementation of Multi-level marketing scheme as a tree

Definition with examples (Referring to Figure 2)

- Direct Downline : C's direct downlines are E and F
- All Downlines : C's all downlines are E, F, G, H, I, J
- Direct Upline : C's direct upline is B
- All Uplines : C's all uplines are A, B

How does MLM work - by example?

1. User A is the root node owned by DreamCorporation, its commission will be added to the company revenue.
2. User J just paid RM 50 and signed up.
    a. User F will get RM 25 (50%)
    b. User C will get RM 6 (12%)
    c. User B will get RM 4.5 (9%)
    d. User A will get RM 3 (6%)
    e. Since root node (User A) is reached, whatever's that left RM 11.5 (3% + 20%) will be added to company revenue.

Encryption & Decryption

1. Every user will need to have an encrypted_name to protect their identity.
2. Only the company has the KEY to decrypt the encrypted_name to real_name.
    a. encrypt(NAME, KEY) → ENCRYPTED_NAME
    b. decrypt(ENCRYPTED_NAME, KEY) → NAME
3. When signing up the new user, you must only save the encrypted name.
4. Every time you want to see the user original NAME, you should type in the KEY.

Expected Output

1. Show that when adding a new user, RM50 registration fee be added into the new user's uplines.

2. Show that your encryption and decryption works as expected.

3. Print the tree of users
4. Requirements as identified in the table 1 below:

No.	Requirements by Role

1	**As a USER,**
	- I must have ID, ENCRYPTED_NAME, REVENUE
	- I must pay RM50 buy a member card to join DreamCorporation
	- I can only have one direct upline but any number of direct downlines
	- I can receive payments from 5 generation of my downlines when they sign up and pay RM50, with the following commision. The commission are added to my REVENUE.
	  - 1st gen: 50%
	  - 2nd gen: 12%
	  - 3rd gen: 9%
	  - 4th gen: 6%
	  - 5th gen: 3%

2	**As a COMPANY_ADMIN,** - I have COMPANY_REVENUE - I can CRUD (Create/Retrieve/Update/Delete) users - I can encrypt and decrypt - I can save and load all users and data in a file - I can see the entire tree of users - I collect all the remaining profit after commissions are paid (in other words, i will earn at least 20% of every membership signup) - I can see the company's revenue - I can see the company's revenue of each generation - I can check every user's revenue - I can change the registration fee and commission from time to time to motivate people to ask more people to sign up for membership

Table 1: Requirements by Role

Some crazy idea

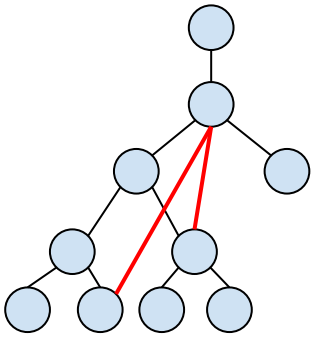

Figure 3: Implementation of "Why Only One Direct Upline?"
Allows relationships like the red line.

1. WHY ONLY ONE DIRECT UPLINE? [A+ guaranteed for this feature]
- All the features above + the system now allow user to have more than 1 direct upline - Direct uplines will share the commission (commission / number_of_direct_upline)
2. GRAPHICS
- GUI Interface
- Animation - When a user signed up, do an animation on the RM50 as it splits into parts and is given to respective uplines
3. DO IT YOUR WAY
- Or any modification that makes your system more user-friendly and efficient