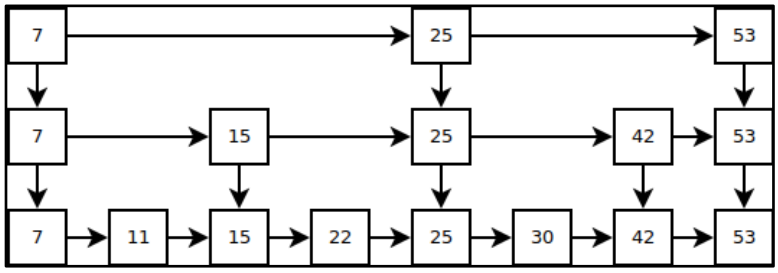
11.12.2023

CSE 2105 – Data Structures 2023 – 2024 Fall Semester Project

1. A skip list is a probabilistic data structure. The skip list is used to store a sorted list of elements or data with a linked list. It allows the process of the elements or data to view efficiently. In one single step, it skips several elements of the entire list, which is why it is known as a skip list.

   The skip list is an extended version of the linked list. It allows the user to search, remove, and insert the element very quickly. It consists of a base list that includes a set of elements which maintains the link hierarchy of the subsequent elements.



   Write a Java program that builds a Skip List Data Structure. You are responsible to implementing add node and search key methods. You don't need to write deleting method. Compare your efficiency with a normal single linked list. **(30p)**

2. Given two sorted lists L1 and L2, write a Java program to generate a third list which contains all nodes of L1 and L2 in sorted order. (i.e., the third list is sorted too). Same values in lists should be retrieved only once i.e., union set of lists should be created (You can assume that the lists contain only integer values). **(20p)**

3. Implement a Java application that place each word from text file to a hash table. Find distinct word size and find most repeated word in a file. **(25p)**

4. Write a Java program that calculates a mathematical string received from the user. You must calculate your values either use tree or stack. You can use both of them. It's up to you. Hint: You can use infix postfix or prefix expressions. **(25p)**

   (25 + 10) * 3 4 * 2 / 4 90 / 2 / 3

   Result = 105. Result = 2. Result = 15.

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!!! Your implementations should be **efficient** as possible. Write your own algorithms! Write main codes to try your programs and show that they are working correctly.

P.S.: - You can prepare homework yourself (single person) or with one of your classmates.

- Please upload your compressed(zip/rar) file(that includes your Java source code files ".java", **not project files**) to the **Microsoft Teams** page of the course to the appropriate area(projects that are sent via e-mail or other different ways of sending, will not be accepted !) before **2 January 2024, Tuesday 23:59.**

- One of the group member's project upload is sufficient, but please write **your numbers** and **names** to your report and in Java source code files.

- A **face-to-face** interview will be held after the delivery of the project (3 – 5 January 2024).