QUIZ 2
COMP6048 – Data Structures Even 2019 / 2020
VAR 3

Notes :

1. There are **2 parts** in this quiz, Essay and Case.
2. For essay problem:
   a. You are required to solve it using by ***handwritten on a paper***
   b. Subsequently, your essay answers ***should be converted in 1 pdf file*** using this format: ***nim.pdf***
   c. The lecturers won't accept any answers using word processing application in order to prevent copy-paste answers in a last minute
3. For case problem:
   a. ***The submission code is in .cpp file*** and using this format: ***nim.cpp***
4. All your answers ***either essay (nim.pdf) or case (nim.cpp) should be zipped and submitted through*** the platform that your lecturer set**.** Other than that, the submission won't be accepted for any reasons. ***(Note : Please zip both files using this format: nim.zip)***
5. **Your Quiz will be *marked as 0* if any *plagiarism is found***

I. Essay (60%)

When deleting, always take the replacement value from **leftmost** of **right** children.

Write down every step for insert and delete happen in all simulation tree below.

1. **[20%]** Given Red Black Tree in the figure 1 below:

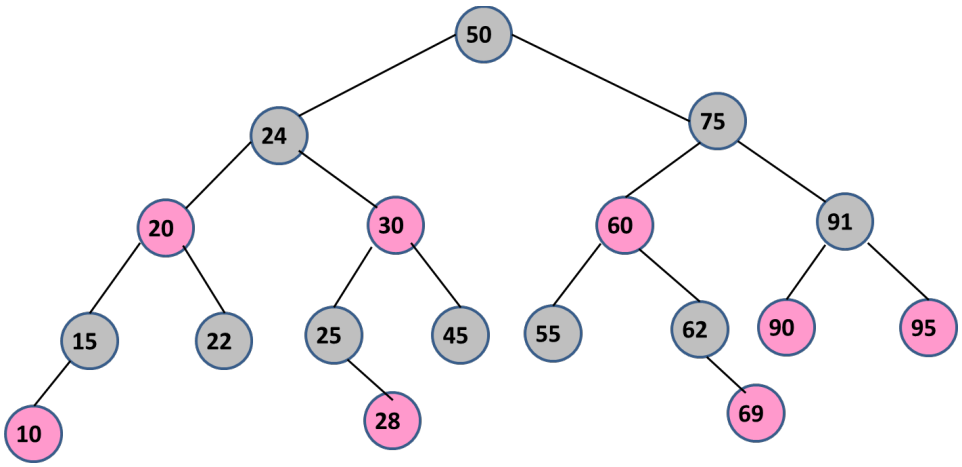


*Figure 1Red Black Tree*

a. **[10%]** Please insert the following numbers : **98, 72, 74, 73** and **70** subsequently!

b. **[10%]** Refer to resulting tree in 1(a), please delete the following numbers **72, 75, 50, 24** and **45** subsequently!

2. **[20%]** Given B-Tree order 3 in the figure 2 below:

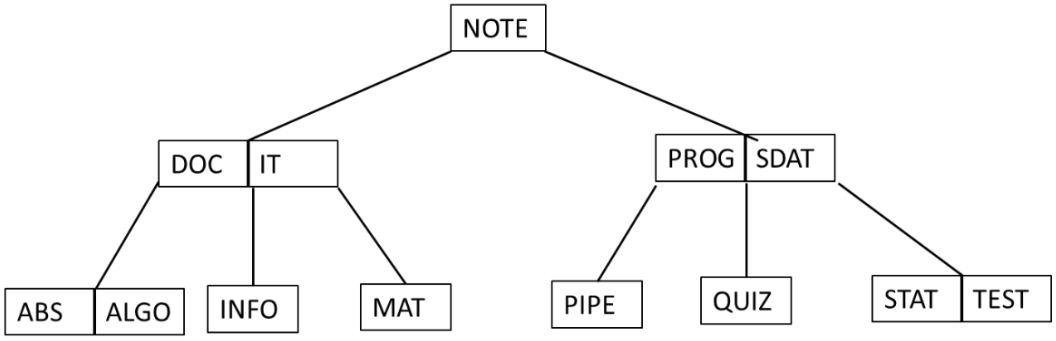


*Figure 2 B-Tree Order 3*

You are arranging your folders in your computer to prepare for an Exam. In order to searchfor the folders easily and with a good performance, the folders are arranged in a B-tree of order 3 shows in figure 2.

In the mean time, you have prepared several folders to be added to the B-tree.

a. **[10%]** Add the following folders using existring tree in figure 2 subsequently : **ILMU, EXAM, UTS, UAS** and **LAT**

b. **[10%]** Refer to resulting tree in 2(a), please delete the following folders subsequently : **MAT, LAT, EXAM, PIPE** and **QUIZ**

3. **[20%]** A well known Bank In Jakarta has 9 main branches, scattered around Indonesaia and overseas. This bank will connect all of their main baranches via a network. It is very important that Jakarta Bank can conect to other citiy to get their best performance. The Bank decided to connect to the cities and connection tests have been performed to identify the time required to establish connection from/to each cities as listed on the following table 1.

a. **[10%]** Draw the directed graph represented by the data in figure 1!

b. **[10%]** Using Dijkstra's algorithm (is it compulsory to show the steps), prepare the routing table consisting the shortest time required to reach every single cities from Jakarta.

*Table 1 Table of Bank Connections*

| No. | From | To | Connection Time (seconds) |
|---|---|---|---|
| 1 | Jakarta | Palembang | 5 |
| 2 | Jakarta | Canberra | 10 |
| 3 | Jakarta | Singapore | 5 |
| 4 | Jakarta | Bandung | 3 |
| 5 | Jakarta | Hongkong | 4 |
| 6 | Palembang | London | 6 |
| 7 | Palembang | Kualalumpur | 2 |
| 8 | London | Kualalumpur | 7 |
| 9 | Hongkong | Kualalumpur | 4 |
| 10 | Hongkong | Bandung | 5 |
| 11 | Bandung | Medan | 2 |
| 12 | Canberra | Medan | 6 |
| 13 | Canberra | Singapore | 4 |
| 14 | Singapore | Washington | 5 |
| 15 | Singapore | Medan | 8 |
| 16 | Singapore | Londong | 6 |
| 17 | Hongkong | Medan | 2 |
| 18 | Medan | Washington | 6 |

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II. Case (40%)

A stationery store wants to have a list of all items that they have including their corresponding Item number. This list will be used by the store when they need to order the items. For Fast Searching, the item numbers and the item description will be put to a balanced AVL tree.

The structure for the Item list is as follows:

```
struct node
{
      int partnum;
      char name[100];
      struct node *left,*right;
      int ht; // the height
};
```

Write a program in C Languange to Insert, Delete, Search and Print the Items in the list using AVL Tree Structre, balancing the AVL tree vased on the art number Your program should display the following Menu:

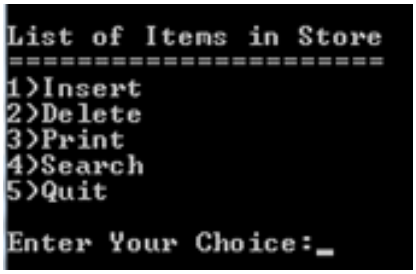
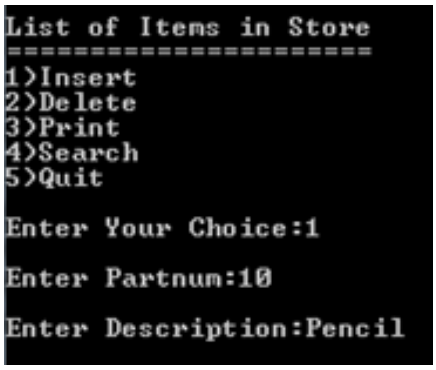



*Figure 3 Menu*

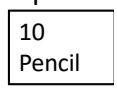
1. Insert

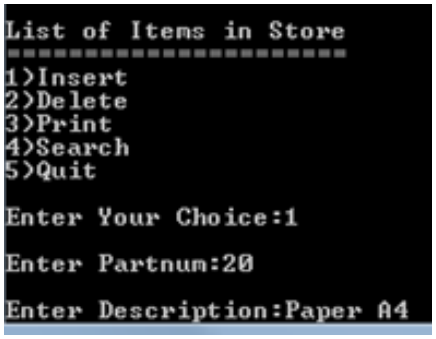
   Menu Option 1, is to insert all information into a the AVL Tree.

   For example, inserting the following 3 items,

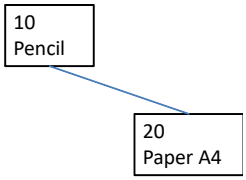


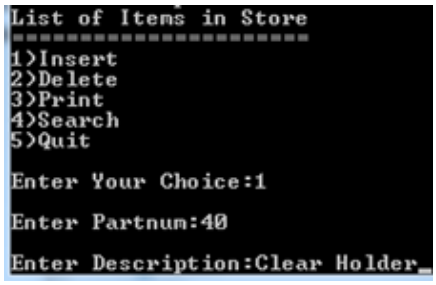

Expected tree:



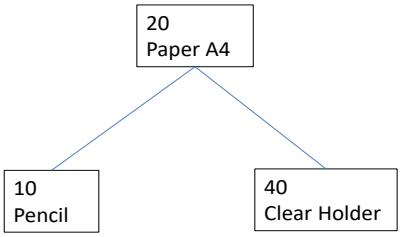




Expected tree:



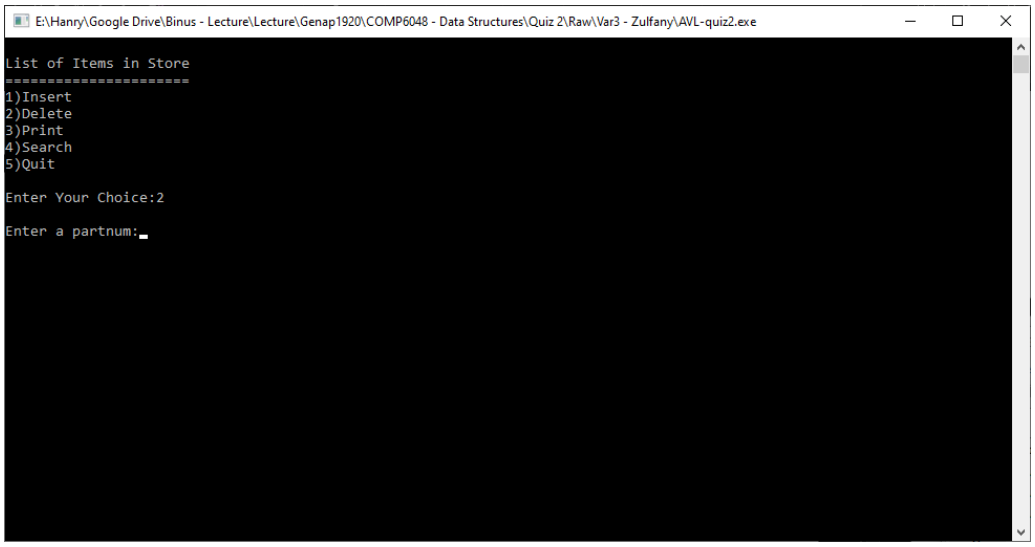




Expected tree:




2. Delete

   Menu option 2, allows you to delete items from the AVL tree. The items to be deleted is base on the part number. Theitems will be removed from the AVL Tree.

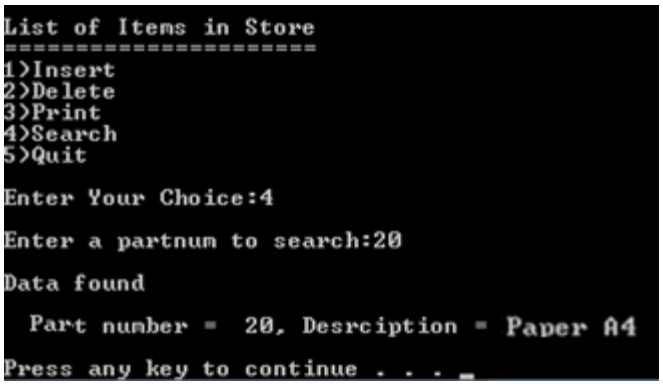



3. Print

   The correctness of the AVL tree can be seen in option 3 (print). The figure below shows the result of the sequence insertion that had been done in menu 1.


4. Search

   Menu option 4 allows you to search for an item based on the part number. If data is found, display the item, other wise display an error message,



5. Quit

   Menu option 5 is to exit the program.

-- Good Luck --