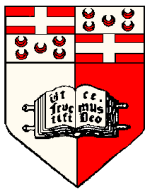
University of Malta



Data Structures and Algorithms 2
Course Assignment 2016

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Skip Lists

- Write a program that implements a Skip List of integers with the following functions:
    - Initialise the empty Skip List.
    - Insert an integer value in the Skip List.
    - Find an integer value in the Skip List and return its index (or -1 if the item is not found).
    - Delete an item from the Skip List by value. Returns TRUE if the delete was successful or FALSE if the item was not found.
    - Delete an item from the Skip List by index.
    - Gets an item by index.
    - Counts the number of items in the Skip List.
    - “FindSteps” returns the number of “steps” required to find a given value. Returns -1 if the item is not found.
    - Print the height of the Skip List.
    - Emptying the Skip List.
- You may write a console or GUI application as long as your program exposes all of the functionality above.

Red-Black Trees

- Write a program that implements a Red-Black tree of integers with the following functions:
    - Initialise the empty RBT.
    - Insert an integer value in the RBT.
    - Find an integer value in the RBT and return whether that item is found or not.
    - Delete an item from the RBT by value. Returns TRUE if the delete was successful or FALSE if the item was not found.
    - Counts the number of items in the RBT.
    - Print the height of the RBT.
    - Emptying the RBT.
    - Pre-order traverse (print) the RBT.

- You may write a console or GUI application as long as your program exposes all of the functionality above.

General

- The mark carried by this assignment may be found in the course booklet.
- Your artifact may be implemented in C#, Visual Basic .NET, C, Objective C, Swift, Python, or Java. If you really want to use another language, discuss with me.
- The program must be accompanied by a **short** (10-20 pages) technical report describing any implementation details and techniques used to complete the assignment.
    - Your technical report MUST include screenshots of the application.
    - DO NOT create an installer, but include any special installation instructions.
    - DO NOT print the source code of the program/library.
    - Assume that your artifact will be tested on a clean installation of Windows 10, or Mac OS X.
- On a CD accompanying the documentation YOU MUST:
    - Include the source code for the program.
    - A compiled executable (EXE) of the program.
    - Include a soft copy of your documentation.
    - WRITE YOUR NAME ON THE CD!
- **The deadline for this assignment is Friday 27th May 2016** and should be handed in to the ICS Departmental secretary by noon.
- Remember that you should include the plagiarism declaration form with your submission.
- Plagiarism will not be tolerated and is considered to be a serious offence.
- Do not use Wikipedia as an exclusive source of information.
- In the first pages of your documentation, YOU MUST complete and include this table:

Task	Completed (Yes/No/Partially)	Comments
Skip List: Development of assignment as specified.		(**do not leave blank**, write your observations).
Skip List: Initialise.		(**do not leave blank**, write your observations).
Skip List: Inserting an item.		(**do not leave blank**, write your observations).
Skip List: Finding an item.		(**do not leave blank**, write your observations).
Skip List: Delete by value.		(**do not leave blank**, write your observations).

Skip List: Delete by index.		(**do not leave blank**, write your observations).
Skip List: Get item by index.		(**do not leave blank**, write your observations).
Skip List: Count items.		(**do not leave blank**, write your observations).
Skip List: Number of steps to find value.		(**do not leave blank**, write your observations).
Skip List: Print height.		(**do not leave blank**, write your observations).
Skip List: Empty.		(**do not leave blank**, write your observations).
Skip List: Overall evaluation.		(**do not leave blank**, write your observations).
RBT: Development of assignment as specified.		(**do not leave blank**, write your observations).
RBT: Initialise.		(**do not leave blank**, write your observations).
RBT: Insert value.		(**do not leave blank**, write your observations).
RBT: Find value.		(**do not leave blank**, write your observations).
RBT: Delete by value.		(**do not leave blank**, write your observations).
RBT: Count.		(**do not leave blank**, write your observations).
RBT: Print height.		(**do not leave blank**, write your observations).
RBT: Empty the RBT.		(**do not leave blank**, write your observations).
RBT: Preorder traverse.		(**do not leave blank**, write your observations).
RBT: Overall evaluation.		(**do not leave blank**, write your observations).