



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

DEPARTMENT OF COMPUTER SCIENCE

COS212: PRACTICAL 4

RELEASE: THURSDAY 9 MARCH 2017
DEADLINE: FRIDAY 10 MARCH 2017, 18:00

Instructions

Complete the tasks below. Certain classes have been provided for you in the *files* sub-folder 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.

Heaps

Binary heaps are a particular type of binary tree with the following two properties: 1. The value of each node is greater than or equal to the values stored in either of its children (the tree is then a max-heap) 2. The tree is perfectly balanced, and the leaves in the last level are all in the leftmost positions As described in Section 6.9.2 of the course textbook, a heap can be implemented using an array to store its elements. Your task will be to implement a simple heap with insert and remove operations, using Java’s ArrayList class instead of an array. Refer to <https://docs.oracle.com/javase/7/docs/api/java/util/ArrayList.html> for more info.

Task 1: Insert [15]

You have to implement the insert method, which inserts the given element into the tree. If the element is already in the tree, insert again, duplicates are allowed. You are encouraged to add helper functions for yourself, such as a recursive method to move the inserted element up the tree to rebalance.

Task 2: Delete [15]

You have to implement the delete method, which deletes the given element from the tree. If the element is not in the tree, do nothing and return. You are encouraged to add helper functions for yourself, such as a recursive method to move the swapped leaf element down the tree to rebalance.

Submission

Submit your source files on the CS Website. Place all the files in a zip archive named as uXXXXXXXXX.zip where XXXXXXXXX is your student number. Upload your archive to the *Prac4* slot on the CS website. Submit your work before the deadline. No late submissions will be accepted.