



**Department of Computer Science
COMP2321 Data Structures
(Spring 2019/2020)**

Research Paper No. 1 – Red-Black Trees

Due Date: Tuesday 19 May 2020 (FINAL DEADLINE)

In this research paper you are asked to explain another type of trees: *the Red-Black Trees data structure*.

In your submission, you should include the following information:

1. What is Red-Black tree? Explain the concept of Red-Black trees and how this algorithm works.
2. When it is best to use Red-Black trees.
3. Explain rotations on Red-Black trees (if exist).
4. Explain the find, insert, and delete operations of the Red-Black trees.
5. Add an example of an existing tree and then apply the operations: add (up to three items), find, and delete (to at least one item).
6. Analysis of the Red-Black trees in terms time and space complexity.

Instructions for submitting this paper:

1. **This is individual work.** It should represent your own efforts. It is fine to discuss your work and to ask your colleagues, but you are not allowed to copy/paste the work of others or give your work to anyone else.
2. **Document format.** Your submission should be a word document and named as:
“**RP1_YourStudentID_FirstNameLastName_SectionNo.docx**”.
E.g., RP1_1189999_QusaiRayyan_3.docx → given this student in section 3.

3. Include your full name, student ID, and section number in the beginning of your file.
4. Make sure to include proper references of the paper.
5. Make sure to explain the concepts "In Your Own Words!". No copy-paste is allowed.
6. In the discussion you may be asked about everything you include in your writing, so make sure you understand it well.

Good luck!