# Objectives: Lab 09

The purpose of this lab of BTP500 is to familiarize yourself with **Red-Black Tree** algorithm.

# Red-Black Tree Implementation and Operations

# Objective:

# The objective of this lab exercise is to understand the concepts and operations of Red-Black Trees, a balanced binary search tree data structure. By the end of this exercise, students should be able to implement basic operations on Red-Black Trees, including insertion, deletion, and searching, while maintaining the properties of Red-Black Trees.

1. Write a C++ program to create **a Red-Black Tree with template** class to handle the following datasets string data, integer data and decimal data. **Store the color of the node along with data.**
   1. **String data:**
2. Milton, Ajax, Clarington, Brock, Oshawa, Pickering, Uxbridge, Whitby, Burlington, Oakville, Brampton, Caledon, Mississauga,Aurora,Georgina
   1. **Integer data:** 95,301,501,801,90,70,80,25,67,89,11
   2. **Decimal data:** 84.8,103.5,67.8,90.3,23.5,67.1,44.5,89.2,100.5,300.2
3. In the same C++ program, implement the functions to handle all 3 different data types and ask for 3 options to do the following.
   1. Insert data.
   2. Delete data.
   3. Search data.
   4. Print tree data using in order traversal.
4. Paste the screenshots of each of the 3 types of data for each of the following test.
   1. Print the tree data, add the following node, and print the tree.
      * Stouffville
      * 506
      * 88.5

A screen shot of a computer code

Description automatically generated

A computer screen shot of a black screen

Description automatically generated

* 1. Print the tree data, delete the following node, and print the tree.
     + Caledon
     + 89
     + 23.5

A screen shot of a computer code

Description automatically generated

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* 1. Search the following node and print the height of the node and its parent node data from the tree.
     + Whitby
     + 11
     + 90.3

A computer screen shot of a black screen

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A screenshot of a computer code

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# **LAB 09 – SUBMISSION 2 files.**

# **1.   Word document BTP500-LAB9-NAME.DOCX filled with screenshots of each of the 3 types of data for each of the 3 operations.**

# **2.   BTP500-LAB9-STUDENTNAME-red-black-tree.cpp**

Do not submit a .zip or RAR file.