CS 7353: Analysis of Algorithms Project: Red-Black Tree

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Contents

1 Problem Introduction

2 Program Platform and Submission Files

This problem was solved using C++ on a Linux system. Attached with the submission is a zip folder that contains:

- A CMakeLists.txt file for compiling
- An "images" folder that contains:
    1. Various images included in this report
- A "src" folder that contains:
    1. A Node.cpp and Node.h file for the Node class and associated functions
    2. A Red-Black.cpp and Red-Black.h file for the Red-Black Tree class and associated functions
    3. The main file
- A "build" folder that contains:
    1. A build.sh script to simplify the build process
    2. A run.sh script to simplify running the program
    3. Various CMake files
    4. The compiled binaries for the program and associated libraries
- Various LaTeX files used in the generation of this report.

This program offers no guarantee of functionality on other Operating Systems. Testing was only conducted on the local Linux machine.

3 Programming Approach

3.1 Node Class

3.2 Red-Black Tree Class

3.2.1 Constructing the Problem

3.2.2 Generating the Solution

3.2.3 Printing the solution

4 Results

4.1 Part 1.B: "Tree 1"

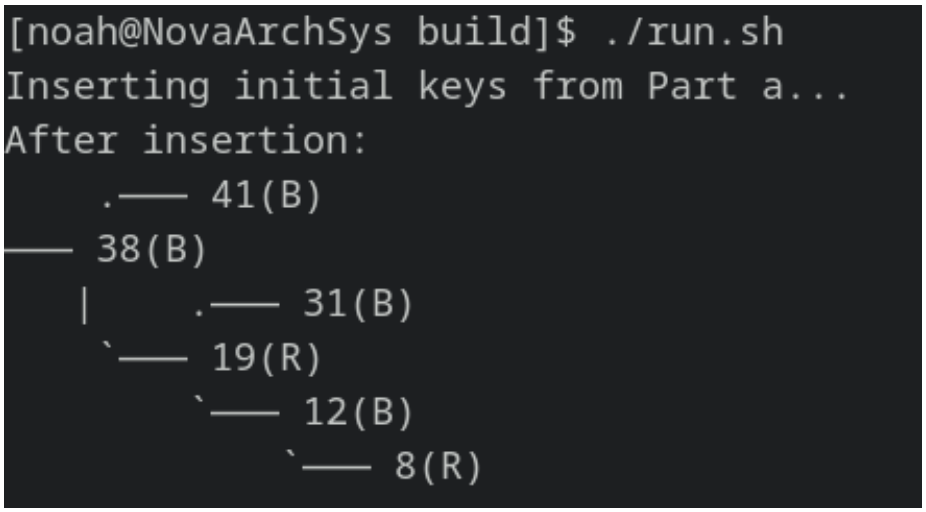

Figure 1: Part 1.B: Initial Tree After Key Insertions

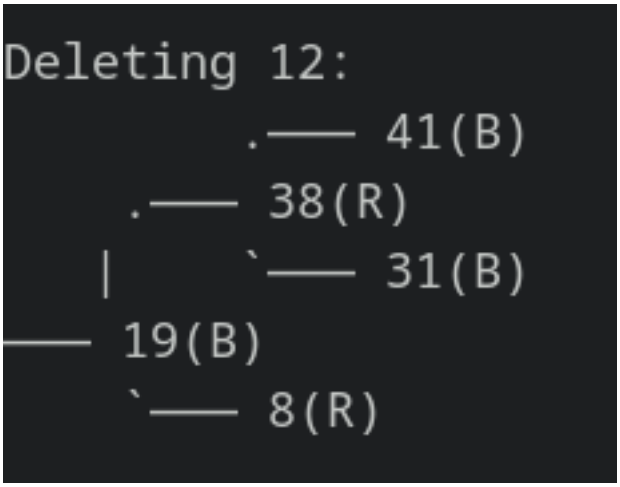

Figure 2: Part 1.B: Tree After Deleting Key 12

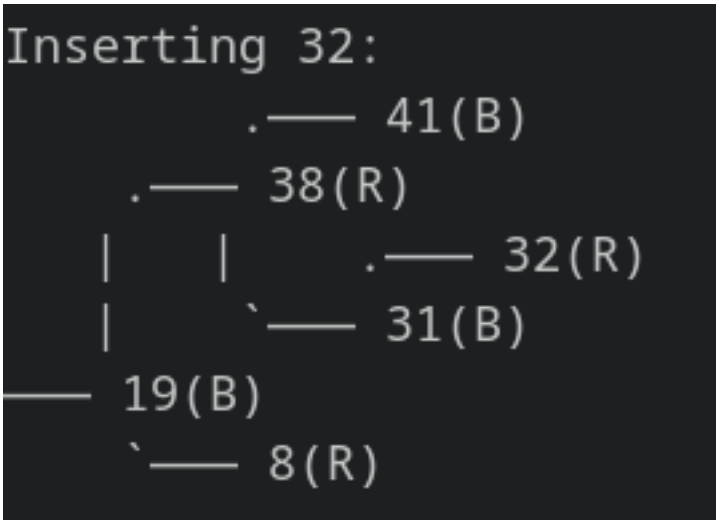

Figure 3: Part 1.B: Tree After Inserting Key 32

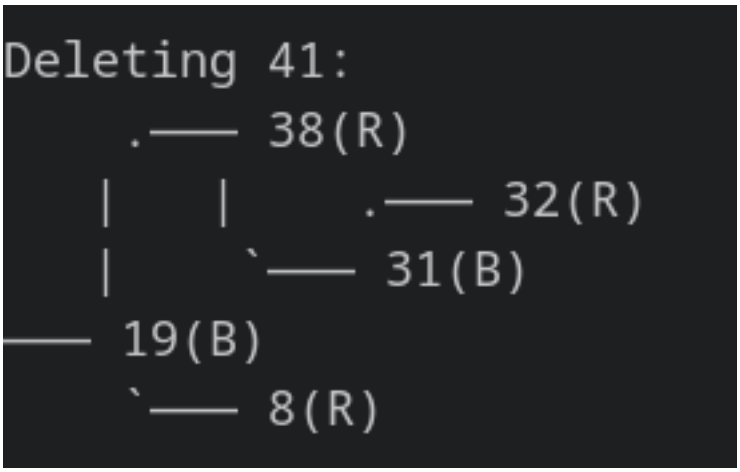

Figure 4: Part 1.B: Tree After Deleting Key 41

4.2 Part 1.C: "Tree 2"

5 Part 2: Red-Black Discussion

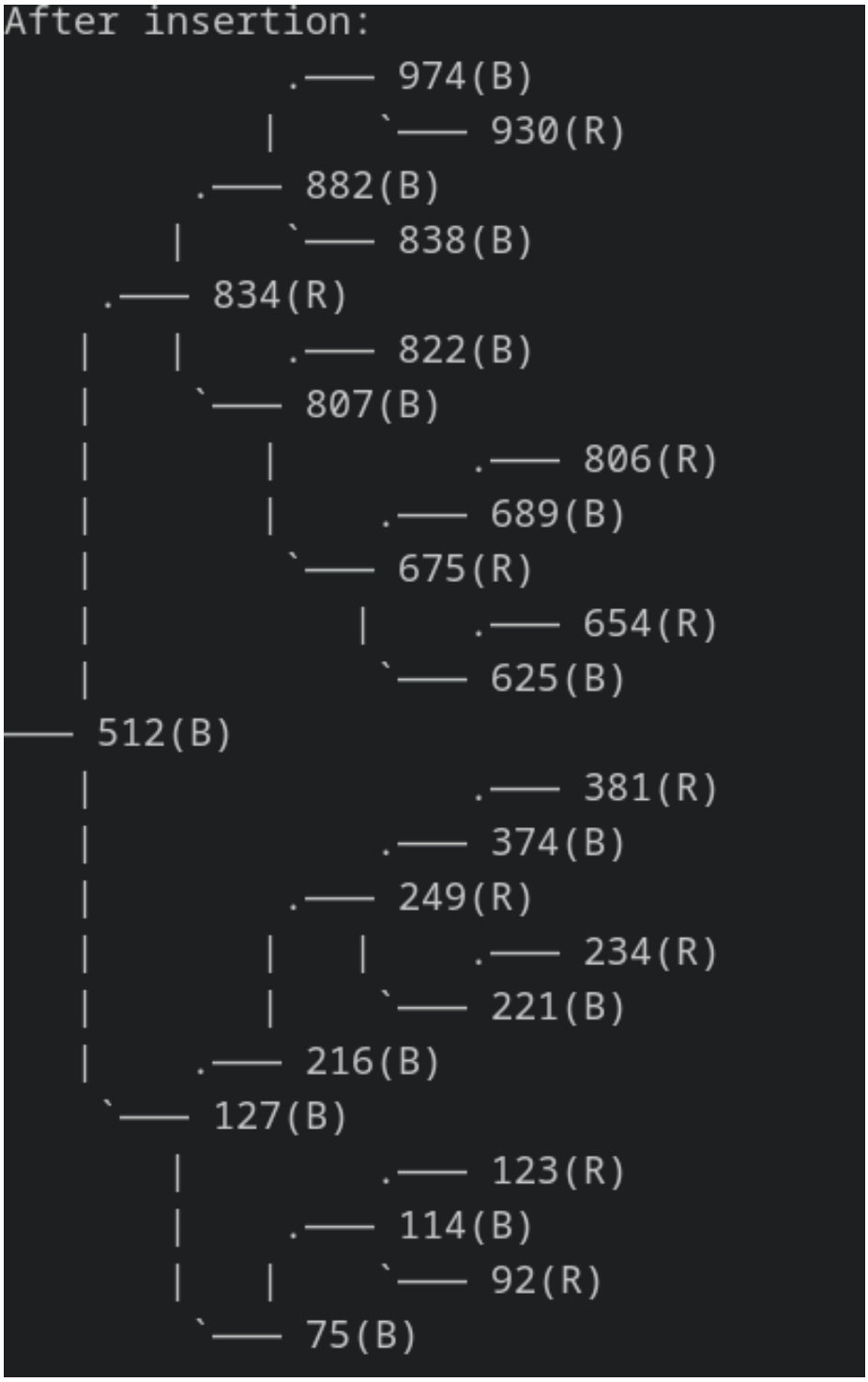

Figure 5: Part 1.C: Initial Tree After Key Insertions

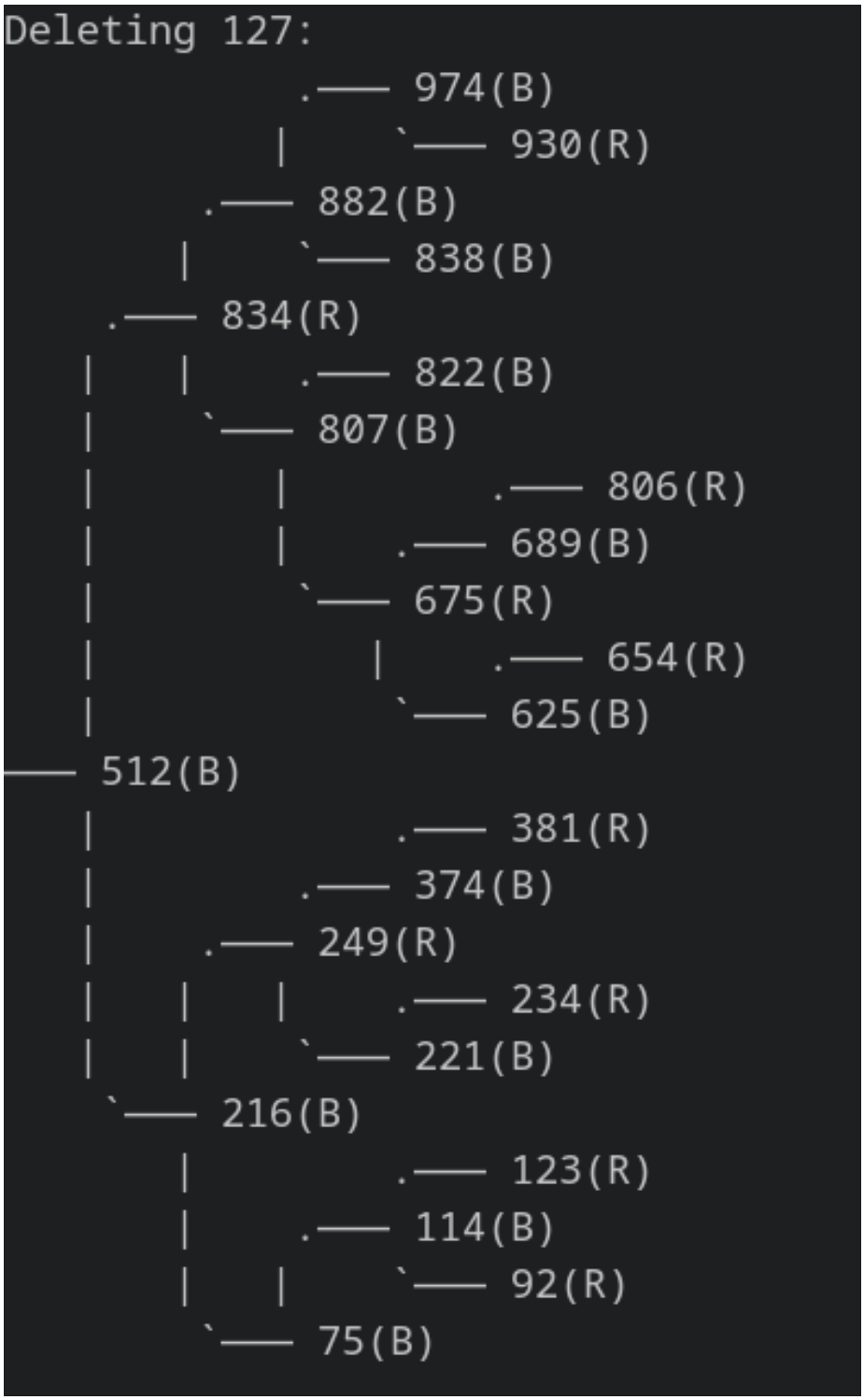

Figure 6: Part 1.C: Tree After Deleting Key 127

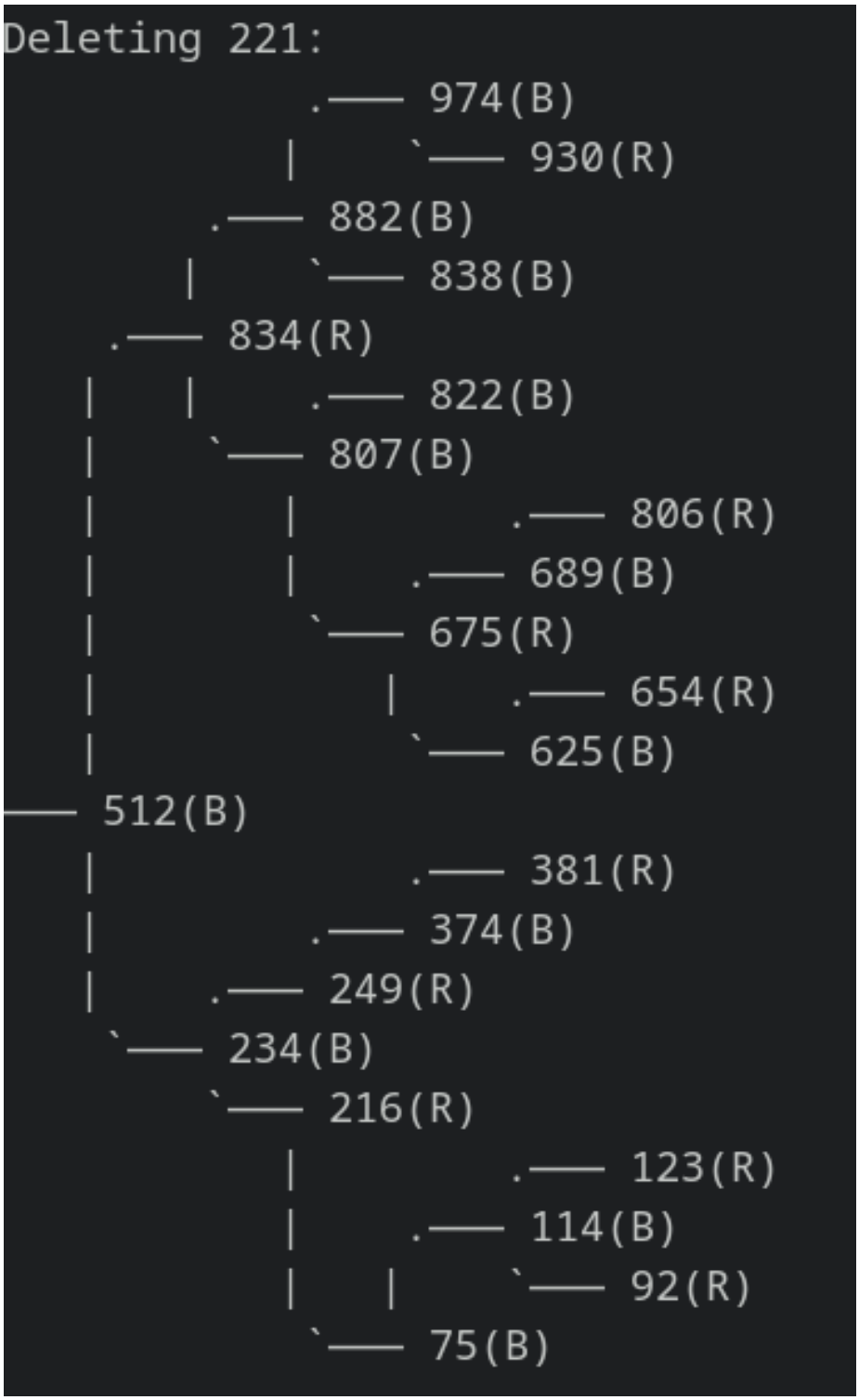

Figure 7: Part 1.C: Tree After Deleting Key 221