

Seoul National University

M1522.000900 Data Structure

Fall 2017, Kang

Homework 5: Non-binary Trees (Chapter 6)

Due: November 7, 02:00 PM

Reminders

- The points of this homework add up to 100.
- Like all homeworks, this has to be done individually.
- Lead T.A.: Jun-gi Jang (elnino9158@gmail.com)
- Please type your answers in English. Illegible handwriting may get no points, at the discretion of the graders.
- If you have a question about assignments, please upload your question in eTL.
- If you want to use slipdays or consider late submission with penalties, please note that you are allowed one week to submit your assignment after the due date.

Remember that:

1. Whenever you are making an assumption, please state it clearly

Question 1

Postorder traversal is defined in the general trees. Given a general tree in Figure 1, list the node sequence from the postorder traversal. [15 points]

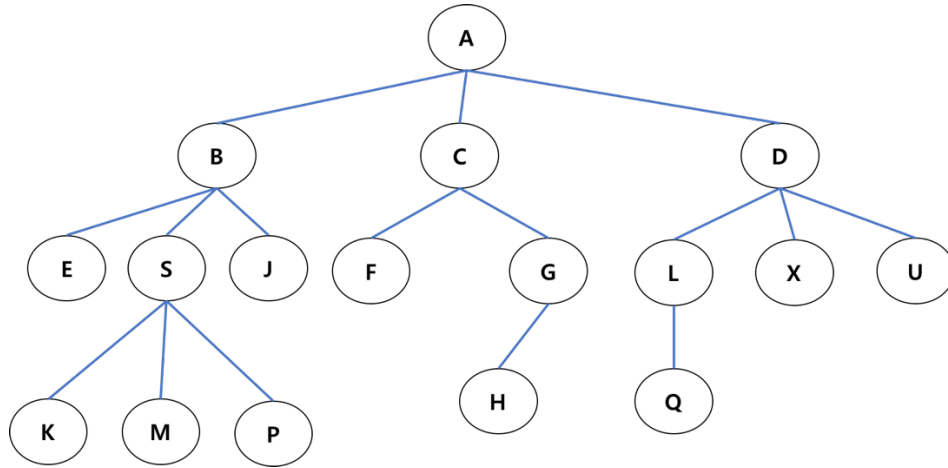


Figure 1. A general tree

Question 2

Using the weighted union rule and path compression, show the array for the parent pointer implementation that results from the following series of equivalences on a set of objects indexed by the values 0 through 15. Initially, each element in the set should be in a separate equivalence class. When two trees to be merged are the same size, make the root with greater index value be the child of the root with lesser index value. [20 points].

(10, 13) (6, 1) (14, 1) (13, 1) (7, 3) (4, 9) (7, 9) (13, 9) (8, 2) (11, 0) (11, 2) (14, 5) (11, 5) (0, 7)

Question 3

A potential alternative to the weighted union rule for combining two trees is the height union rule. The height union rule requires that the root of the tree with greater height become the root of the union. [25 points]

1) Fill the `Height_union` function below to implement *union* operation with height rule. [15 points]

```
public void Height_union (int a, int b)
{
    Integer root1 = FIND(a);
    Integer root2 = FIND(b);
    if (root1 != root2)
    {
        
    }
}
```

2) Describe the case where the height increases after performing *union* operation with height rule [10 points]

Question 4

Analyze the space overhead of the “list of children” implementation, and the “left-child/right-sibling” implementation. Indicate the size of the data value as D , the size of point as P , and the size of an index as I . [20 points]

Question 5

Answer the following questions. [20 points]

1) Draw the general tree represented by the following sequential representation for general trees: [10 points]

XPC)QA)B))RV)))MDE))J

2) Draw the binary tree representing the following sequential representation. [10 points]

DE/AL///CG/E//FJ//H//