Data Structure Assignment 6

Programming Homework

(Textbook p.258 Exercises 4)

4.

(a)

Write a function heightUnion that uses the height rule for union operations instead of the weighting rule. This rule is defined below:

Definition [Height Rule]: If the height of tree i is less than that of tree j, then make j the parent of I, otherwise make i the parent of j.

Your function must run in O(1) time and should maintain the height of each tree as a negative number in the parent field of the root.

Input:

The input begins with an integer n.

n represents the number of trees.

Each tree has only one node.

Example:

n=3

⇨ 0 ,1 , 2

Union rule by following:

Union(0,1)、Union(0,2)、Union(0,3)…..Union(0,n-1)

Sample input

5

Sample output

Node	parent
0	root
1	0
2	0
3	0
4	0

(d)

Experiment with functions weightedUnion (Program 5.20) and heightUnion to determine which one produces better results when used in conjunction with function collapsingFind (Program 5.21).

Situation 1:

Each tree has only one node.

Example:

0 ,1 ,2 ,3 ,4 ,5……n-1

Situation 2:

Each tree has one or more nodes.

Example:

Tree1:

Node	parent
0	root

Tree2:

Node	parent
1	root
2	1
3	1
4	3

Tree3:

Node	parent
5	root
6	5

…etc

Please compare these two situations with functions weightedUnion and heightUnion

Write down how you analyze these two situations in Readme file.

You don't need to write a code in this part.

General Information:

- Deadline：**2017/12/22 23:55**.
- Upload your assignment to Moodle system.

- Upload file format: Student-Id_Name.rar , Ex.P76991094_王小明.rar
- Your file should consist of the following items: Source Code & Readme file (Program description).
- Late homework will not be accepted.
- Any copies will be scored as zero. Do not plagiarize.
- Programming homework TA 陳仕軒 Email: p76064693@mail.ncku.edu.tw