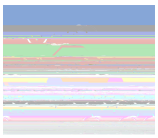

Module: Priority Queues and Disjoint Sets (Week 2 out of 4)
Course: Data Structures (Course 2 out of 6)
Specialization: Data Structures and Algorithms

Programming Assignment 2: Priority Queues and Disjoint Sets

Revision: August 26, 2016

After swapping elements 5 in position 0 and 1 in position 1

2 Problem: Parallel processing

Problem Introduction

In this problem you will simulate a program that processes a list of jobs in parallel. Operating systems such

5. Finally, after 2 more seconds, thread 0 is done with the third job and takes the fifth job from the list, and starts processing it immediately at time 4.

Sample 2.

Input:

3 Problem: Merging tables

Problem Introduction

In this problem, your goal is to simulate a sequence of merge operations with tables in a database.

Problem Description

Task. There are n tables stored in some database. The tables are numbered from 1 to n. All tables share the same set of columns. Each table contains either several rows with real data or a symbolic link to another table. Initially, all tables contain data, and i-th table has r_i rows. You need to perform m of the following operations:

1. Consider table number $destination_i$. Traverse the path of symbolic links to get to the data. That is,

   while $destination_i$ contains a symbolic link (destination r_i) do
   $destination_i \leftarrow$ destination of $destination_i$

2. Consider the table number $source_i$ and traverse the path of symbolic links from it in the same manner as for $destination_i$.
3. Now, $destination_i$ and $source_i$ are the numbers of two tables with real data. If $destination_i \neq source_i$, copy all the rows from table $source_i$ to table $destination_i$, then clear the table $source_i$ and instead of real data put a symbolic link to $destination_i$ into it.
4. Print the maximum size among all n tables (recall that size is the number of rows in the table). If the table contains only a symbolic link, its size is considered to be 0.

See examples and explanations for further clarifications.

Input Format.

Sample 1.

Input:

```
5 5
1 1 1 1 1
3 5
2 4
1 4
5 4
5 3
```

Output:

```
2
2
3
5
5
```

Explanation:

In this sample, all the tables initially have exactly 1 row of data. Consider the merging operations:

1. All the data from the table 5 is copied to table number 3. Table 5 now contains only a symbolic link to table 3, while table 3 has 2 rows. 2 becomes the new maximum size.
2. 2 and 4 are merged in the same way as 3 and 5.
3. We 1 and 4, but 4J/F15 9.9626 Tf 9.116 0 Td [(and,)has)-415 ebolicoint ng

linall the data from the table number to

2. After merging the table number 5 into the table number 6, the table number 5 is cleared and has size 0, while the table number 6 has size 6. Still, the maximum size is 10.
3. By merging the table number 4 into the table number 5,4we actually merge the table number

ble number 6 (table 5

4 General Instructions and Recommendations on Solving Algorithmic Problems

Your main goal in an algorithmic problem is to implement a program that solves a given computational problem in just few seconds even on massive datasets. Your program should read a dataset from the standard input and write an answer to the standard output.

same way on your machine and on the testing machine (note that a buggy program may behave di□erently when compiled by di□erent compilers, or even by the same compiler with di□erent flags).

C (gcc 5.2.1). File extensions: .c-334(extensions:)]T. Flags:

4.5 Testing Your Program

5 Frequently Asked Questions

5.1 I submit the program, but nothing happens. Why?

You need to create submission and upload the file with your solution in one of the programming languages `C`, `C++`, `Java`, or `Python` (see Subsections 4.3 and 4.4). Make sure that after uploading the file with your solution you press on the blue "Submit" button in the bottom. After that, the grading starts, and the submission being graded is enclosed in an orange rectangle. After the testing is finished, the rectangle disappears, and the results of the testing of all problems is shown to you.

5.2 I submit the s]TJ/F15 980 -27.8stions