CSE2011 Problem Solving, 2016 Spring

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Homework 5 (80 points): 2015/5/12

Due date: 2016/5/23 23:59 (submission to icampus)

Problem 5-1: Wire 1 (40 points)

- There is a 100-story building. In this building, there are N electric wires in the wall. We can see each wire in either the first or the 100th story. Since the shape and color of every wire is the same, we cannot match the connectivity of wires in the first story and those in the 100th story.
- In detail, we mark numbers from a1 to aN to each wire in the first story, and also mark numbers from b1 to bN to each wire in the 100th story. We want to find each wire's connectivity between aX and bY. There are three operations we can do.

  O1. We can bind/untie two wires. (This can only be done in either the first or the 100th story.)

  O2. We can test whether two wires are connected or not. (This can only be done in either the first or the 100th story.)

  O3. We can move from the first story to the 100th story, or from the 100th story to the first story.
- There is no elevator in the building, so you should minimize the number of operations of O3. Describe your algorithm to find connectivity of every wire while minimizing the number of operations of O3.

In your code

- No code

In your report

- Explain your algorithm.
- Show the number of operations of O3 when N=10 (with explanation).

Problem 5-2: Wire 2 (40 points)

- Recall the problem of Wire 1.
- Now, an elevator is installed in the building. However, you missed a tester for O2; you need to borrow a tester. You will pay 1 million won for each operation for O2, so you should minimize the number of operations of O2. Describe your algorithm to find connectivity of every wire while minimizing the number of operations of O2.

In your code

- No code

In your report

- Explain your algorithm.
- Show the number of operations of O2 when N=10 (with explanation).