

## Problem Set 4 Exercise #08: Lifts

**Reference:** Lecture 10 Unit 2 notes

**Learning objective:** Object-oriented programming

**Estimated completion time:** 45 minutes

### Problem statement:

In **PS4\_Ex08\_Lift.java**, write a `Lift` class to describe lifts. Every lift has two attributes:

- *currLevel* which indicates the level a lift is currently at.
- *distance* which indicates the distance a lift has travelled.

A newly created `Lift` object has a default level of 1 and travel distance 0. It takes 2 seconds for a lift to move one level up or down.

Write a program **PS4\_Ex08\_OperateLifts.java** to do the following:

- Create two `Lift` objects (with their default level at 1).
- Read several lines of operation instructions and moves two lifts according to the instructions. Each instruction operates on one lift and contains the following 3 integers:
  - **First number** (*lift number*, either 1 or 2) indicates one of the two lifts to operate on.
  - **Second number** (*from level*) indicates which level a passenger presses the button of that lift. The lift would have to travel from where it currently is to that level to pick up that person. The *from* level could be the same as the level where the lift is currently at, in which case there is no need for the lift to move.
  - **Third number** (*to level*) indicates which level a passenger wants to go. You can assume that *from* level is always different from *to* level and therefore, no input validation is needed.

For example, assume that lift 1 is currently at level 1 and an instruction is **1 3 6**. Hence lift 1 has to move from level 1 to level 3 to pick up the passenger first and then moves to level 6 where the passenger will alight. In brief, lift 1 takes  $(2+3) * 2$  seconds to finish movement and ends at level 6 (a lift will stop at *to* level and never move without a further instruction).

As another example, assume another instruction is **2 6 2** and lift 2 is currently at level 4. Hence lift 2 will move upward to level 6 to pick up a passenger first and then move down to level 2 to let the passenger alight. In total, it takes  $(2+4) * 2$  seconds to finish movement and stops at level 2.

Your program is to read two instructions one by one and print out the time taken for each lift to move and the final position of each lift. Take note of the case that two instructions may operate on the same lift.

### Sample run #1:

```
How many instructions? 2
Enter 2 instructions:
2 5 8
1 9 7
lift 1 took 20 seconds and ended at level 7
lift 2 took 14 seconds and ended at level 8
```

### Sample run #2:

```
How many instructions? 2
Enter 2 instructions:
1 9 10
2 12 1
lift 1 took 18 seconds and ended at level 10
lift 2 took 44 seconds and ended at level 1
```

### Sample run #3:

```
How many instructions? 3
Enter 3 instructions:
2 6 8
2 2 1
1 5 1
lift 1 took 16 seconds and ended at level 1
lift 2 took 28 seconds and ended at level 1
```