



Quarter Programming Project Initial Implementation (Elevator Functionality)

Initial Implementation Minimum Requirements

In this project phase, the minimum deliverable is a partial implementation of the application in which the elevators will respond to call requests (i.e., requests to go to a floor sent to the elevator by the elevator controller) and floor requests (numbered floor button pressed from within the elevator). No actual elevator selection logic or decision making processes are needed for this deliverable.

The behaviors that are required in this phase reflect some (or all) the behavior detailed in the “High-Level Behavioral Flow”, “Elevator Rider Presses a Floor Button”, “Elevator Remains Idle for “N” Time” and “Elevator Stops at a Floor” activity diagram from the original project handout.

More specifically, the working functionality should include:

- A working elevator that can move up or down from floor to floor at the appropriate speed.
- A working elevator that stops at a floor if there is a floor request, and can open the doors, pause, then close the doors.
- An operational elevator that can be told to go to a specific floor (as would happen if a person pressed a floor button from inside the elevator). *Activity Diagram “A”*.
- Required components include (but not limited to) Building, Floor, & Elevator

Initial Implementation Execution

You must provide a driver (“main”) that makes calls (requests to go to a specific floor as is described in Activity Diagram A) to your elevator(s). This driver must be able to do the following:

- Create a Building with “15” floors and “6” elevators.
- Instruct an elevator (i.e., elevator “1”) to go to the 11th floor. It should take some time for the elevator to travel to that floor. Upon arrival the doors should open, stay open for a period of time, then should close. Then the elevator would proceed to its next destination if there is one, otherwise it would remain idle.
- While elevator “1” is moving, instruct a *different* elevator (i.e., elevator “2”) to go to the 14th floor. *Both elevators should be travelling at the same time*. Again here, upon arrival the doors should open, stay open for a period of time, then should close. The elevator would proceed to its next destination if there is one, otherwise it would remain idle.
- While elevator “2” is moving towards the 14th floor, instruct it to also go to the 13th floor. The elevator should continue traveling and should stop at both destinations – 13th & 14th floor.
- While elevator “2” is moving towards the 14th floor, instruct it to also go to the 15th floor. The elevator should continue traveling and should stop at all three destinations – 13th, 14th & 15th floor.
- Wait for the elevators to complete their travels, then do nothing else with these elevators for a period of time. They should eventually time out and return to their default floor. Wait for this to complete.
- Instruct an elevator (i.e., elevator “1”) to go to the 10th floor. It should take some time for the elevator to travel to that floor. While on the way to the 10th floor, instruct the elevator to go to the 1st floor (back in the opposite direction). That request should be ignored.
- Once elevator “1” arrives at the 10th floor, instruct it to go to the 2nd floor.



- Then also instruct it to go to the 5th and 3rd floors.
- Wait for the elevators to complete their travels, then do nothing else with these elevators for a period of time. They should eventually time out and return to their default floor. Wait for this to complete.

Your “main” and the methods of your classes should log what they are doing as is required by the “Narrative” Description of Activity output described in the original handout. The following is a hypothetical example of how the output of these tests might look:

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10:40:00      Creating Building...
10:40:01      Building created, 15 Floors, 6 Elevators.
10:40:02      Sending Elevator 1 to Floor 11...
10:40:02      Elevator 1 going to Floor 11, Full Destination List: [11]
10:40:03      Elevator 1 passing Floor 2 on the way to 11. Full Destination List: [11].
10:40:04      Elevator 1 passing Floor 3 on the way to 11. Full Destination List: [11].
10:40:04      Sending Elevator 2 to Floor 14...
10:40:05      Elevator 2 going to Floor 14, Full Destination List: [14]
10:40:05      Elevator 1 passing Floor 4 on the way to 11. Full Destination List: [11].
10:40:05      Elevator 2 passing Floor 2 on the way to 14. Full Destination List: [14].
10:40:06      Elevator 1 passing Floor 5 on the way to 11. Full Destination List: [11].
10:40:06      Elevator 2 passing Floor 3 on the way to 14. Full Destination List: [14].
10:40:07      Sending Elevator 2 to Floor 13...
10:40:07      Elevator 2 going to Floor 13, Full Destination List: [13, 14]
10:40:07      Elevator 1 passing Floor 6 on the way to 11. Full Destination List: [11].
10:40:07      Elevator 2 passing Floor 4 on the way to 13. Full Destination List: [13, 14].
10:40:08      Elevator 1 passing Floor 7 on the way to 11. Full Destination List: [11].
10:40:08      Elevator 2 passing Floor 5 on the way to 13. Full Destination List: [13, 14].
10:40:09      Elevator 1 passing Floor 8 on the way to 11. Full Destination List: [11].
10:40:09      Elevator 2 passing Floor 6 on the way to 13. Full Destination List: [13, 14].
10:40:10      Sending Elevator 2 to Floor 15...
10:40:10      Elevator 2 going to Floor 13, Full Destination List: [13, 14, 15]
10:40:10      Elevator 1 passing Floor 9 on the way to 11. Full Destination List: [11].
10:40:10      Elevator 2 passing Floor 7 on the way to 13. Full Destination List: [13, 14, 15].
10:40:11      Elevator 1 passing Floor 10 on the way to 11. Full Destination List: [11].
10:40:11      Elevator 2 passing Floor 8 on the way to 13. Full Destination List: [13, 14, 15].
10:40:12      Elevator 1 arrived at destination Floor 11. Doors open...
10:40:13      Elevator 2 passing Floor 9 on the way to 13. Full Destination List: [13, 14, 15].
10:40:14      Elevator 2 passing Floor 10 on the way to 13. Full Destination List: [13, 14, 15].
10:40:15      Elevator 1 Doors close. No further destinations.
10:40:15      Elevator 2 passing Floor 11 on the way to 13. Full Destination List: [13, 14, 15].
10:40:16      Elevator 2 passing Floor 12 on the way to 13. Full Destination List: [13, 14, 15].
10:40:17      Elevator 2 arrived at destination Floor 13. Doors open...
10:40:20      Elevator 2 Doors close. Continuing to next destination: 14. Full Destination List: [14, 15].
10:40:21      Elevator 2 arrived at destination Floor 14. Doors open...
10:40:24      Elevator 2 Doors close. Continuing to next destination: 15. Full Destination List: [15].
10:40:25      Elevator 2 arrived at destination Floor 15. Doors open...
10:40:28      Elevator 2 Doors close. No further destinations.
<time passes>
10:41:15      Elevator 1 timed out, returning to default floor: Floor 1.
10:41:16      Elevator 1 passing Floor 10 on the way to 1. Full Destination List: [1].
10:41:17      Elevator 1 passing Floor 9 on the way to 1. Full Destination List: [1].
10:41:18      Elevator 1 passing Floor 8 on the way to 1. Full Destination List: [1].
10:41:19      Elevator 1 passing Floor 7 on the way to 1. Full Destination List: [1].
10:41:20      Elevator 1 passing Floor 6 on the way to 1. Full Destination List: [1].
10:41:21      Elevator 1 passing Floor 5 on the way to 1. Full Destination List: [1].
10:41:22      Elevator 1 passing Floor 4 on the way to 1. Full Destination List: [1].
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10:41:23      Elevator 1 passing Floor 3 on the way to 1. Full Destination List: [1].
10:41:23      Elevator 1 passing Floor 2 on the way to 1. Full Destination List: [1].
10:41:25      Elevator 1 arrived at destination Floor 1. Doors open...
10:41:28      Elevator 1 Doors close. No further destinations.
10:41:28      Elevator 2 timed out, returning to default floor: Floor 1.
10:41:29      Elevator 2 passing Floor 14 on the way to 1. Full Destination List: [1].
10:41:30      Elevator 2 passing Floor 13 on the way to 1. Full Destination List: [1].
10:41:31      Elevator 2 passing Floor 12 on the way to 1. Full Destination List: [1].
10:41:32      Elevator 2 passing Floor 11 on the way to 1. Full Destination List: [1].
10:41:33      Elevator 2 passing Floor 10 on the way to 1. Full Destination List: [1].
10:41:34      Elevator 2 passing Floor 9 on the way to 1. Full Destination List: [1].
10:41:35      Elevator 2 passing Floor 8 on the way to 1. Full Destination List: [1].
10:41:36      Elevator 2 passing Floor 7 on the way to 1. Full Destination List: [1].
10:41:37      Elevator 2 passing Floor 6 on the way to 1. Full Destination List: [1].
10:41:38      Elevator 2 passing Floor 5 on the way to 1. Full Destination List: [1].
10:41:39      Elevator 2 passing Floor 4 on the way to 1. Full Destination List: [1].
10:41:40      Elevator 2 passing Floor 3 on the way to 1. Full Destination List: [1].
10:41:41      Elevator 2 passing Floor 2 on the way to 1. Full Destination List: [1].
10:41:42      Elevator 2 arrived at destination Floor 1. Doors open...
10:41:43      Elevator 2 Doors close. No further destinations.
10:41:44      Sending Elevator 1 to Floor 10...
10:41:44      Elevator 1 going to Floor 10, Full Destination List: [10]
10:41:45      Elevator 1 passing Floor 2 on the way to 10. Full Destination List: [10].
10:41:46      Elevator 1 passing Floor 3 on the way to 10. Full Destination List: [10].
10:41:47      Elevator 1 passing Floor 4 on the way to 10. Full Destination List: [10].
10:41:48      Sending Elevator 1 to Floor 1...
10:41:48      Elevator 1 request for Floor 1 is not in the current direction of travel - ignored.
10:41:48      Elevator 1 passing Floor 5 on the way to 10. Full Destination List: [10].
10:41:49      Elevator 1 passing Floor 6 on the way to 10. Full Destination List: [10].
10:41:50      Elevator 1 passing Floor 7 on the way to 10. Full Destination List: [10].
10:41:51      Elevator 1 passing Floor 8 on the way to 10. Full Destination List: [10].
10:41:52      Elevator 1 passing Floor 9 on the way to 10. Full Destination List: [10].
10:41:53      Elevator 1 arrived at destination Floor 10. Doors open...
10:41:56      Elevator 1 Doors close. No further destinations.
10:42:00      Sending Elevator 1 to Floor 2...
10:42:00      Elevator 1 going to Floor 2, Full Destination List: [2]
10:42:01      Elevator 1 passing Floor 9 on the way to 2. Full Destination List: [2].
10:42:02      Elevator 1 passing Floor 8 on the way to 2. Full Destination List: [2].
10:42:03      Sending Elevator 1 to Floor 2...
10:42:03      Elevator 1 going to Floor 5, Full Destination List: [5, 2]
10:42:03      Elevator 1 passing Floor 7 on the way to 5. Full Destination List: [5, 2].
10:42:04      Elevator 1 passing Floor 6 on the way to 5. Full Destination List: [5, 2].
10:42:05      Sending Elevator 1 to Floor 2...
10:42:05      Elevator 1 going to Floor 5, Full Destination List: [5, 3, 2]
10:42:05      Elevator 1 arrived at destination Floor 5. Doors open...
10:42:08      Elevator 1 Doors close. Continuing to next destination: 3. Full Destination List: [3,2].
10:42:09      Elevator 1 passing Floor 4 on the way to 3. Full Destination List: [3, 2].
10:42:10      Elevator 1 arrived at destination Floor 3. Doors open...
10:42:13      Elevator 1 Doors close. Continuing to next destination: 2. Full Destination List: [2].
10:42:14      Elevator 1 arrived at destination Floor 2. Doors open...
10:40:17      Elevator 1 Doors close. No further destinations.
<time passes>
10:41:17      Elevator 1 timed out, returning to default floor: Floor 1.
10:41:18      Elevator 1 arrived at destination Floor 1. Doors open...
10:41:21      Elevator 1 Doors close. No further destinations.
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Development Phases

- *Design & Development Plan (4/10 – 4/24) [Completed]*
 - *Submit a UML Class diagram showing the classes, interfaces & relationships that you have designed and plan to implement. Classes & interfaces should show all relevant domain data and behaviors where applicable.*
 - *Submit a development schedule indicating what you plan to do/submit by when based upon the milestone dates below.*
 - *Formats: Visio, PDF*
- **Initial Implementation (Elevator functionality) (4/24 – 5/8) [Current]**
 - **Submit implementation of working Elevator code (standalone). This will consist of an initial implementation containing elevators that take floor number requests and respond to “commands” from the elevator controller. Further requirement and submission details will be posted closer to the start date of 4/24.**
 - **Code must be Javadoc’d and JUnit tested.**
- **2nd Implementation Phase (5/8 – 5/22)**
 - **Submit implementation of complete working code that includes working Person, Elevator, Elevator Call Box, Elevator Controller, Floor & Building code (results reporting not required in this submission). Further requirement and submission details will be posted closer to the start date 5/8.**
 - **Code must be Javadoc’d and JUnit tested.**
- **Final Submission (5/22 – 6/5)**
 - **Submit final version of Elevator Simulation application. Including all outputs. Further requirement and submission details will be posted closer to the start date 5/22.**
 - **Code must be Javadoc’d and JUnit tested.**

Project Assistance

If you are stuck on some code-related problem that you have exhaustively debugged yourself, you can email me a ZIP file of your entire project so that I can examine the problem. All emailed assistance requests must include a detailed description of the problem, and the details of what steps you have already taken in trying to determine the source of the problem.

Submissions & Grading

All submissions must include all code necessary to compile and run your application. Submitted code must be in the required package-folder form. ZIP’d project folder submissions are usually the best option (with compiled .class & JAR files removed before ZIP’ing). Only one team member needs to submit – one score will be generated for both team members.



The following are the key points that will be examined in your Part 1 classes when graded:

- Good Object Oriented Design & Implementation
- Properly formatted, useful Javadoc documentation
- Properly written, JUnit tests with good code coverage
- Proper Application Execution

When submitting, you should submit a ZIP file of your entire project so that I can compile and execute it on my end.

Late submissions will be penalized by 10% per week late. (i.e., one second late to 1 week late: 10% penalty, one week plus one second late to 2 weeks late: 20% penalty, etc.).

If you do not understand anything in this handout, please ask. Otherwise the assumption is that you understand the content.