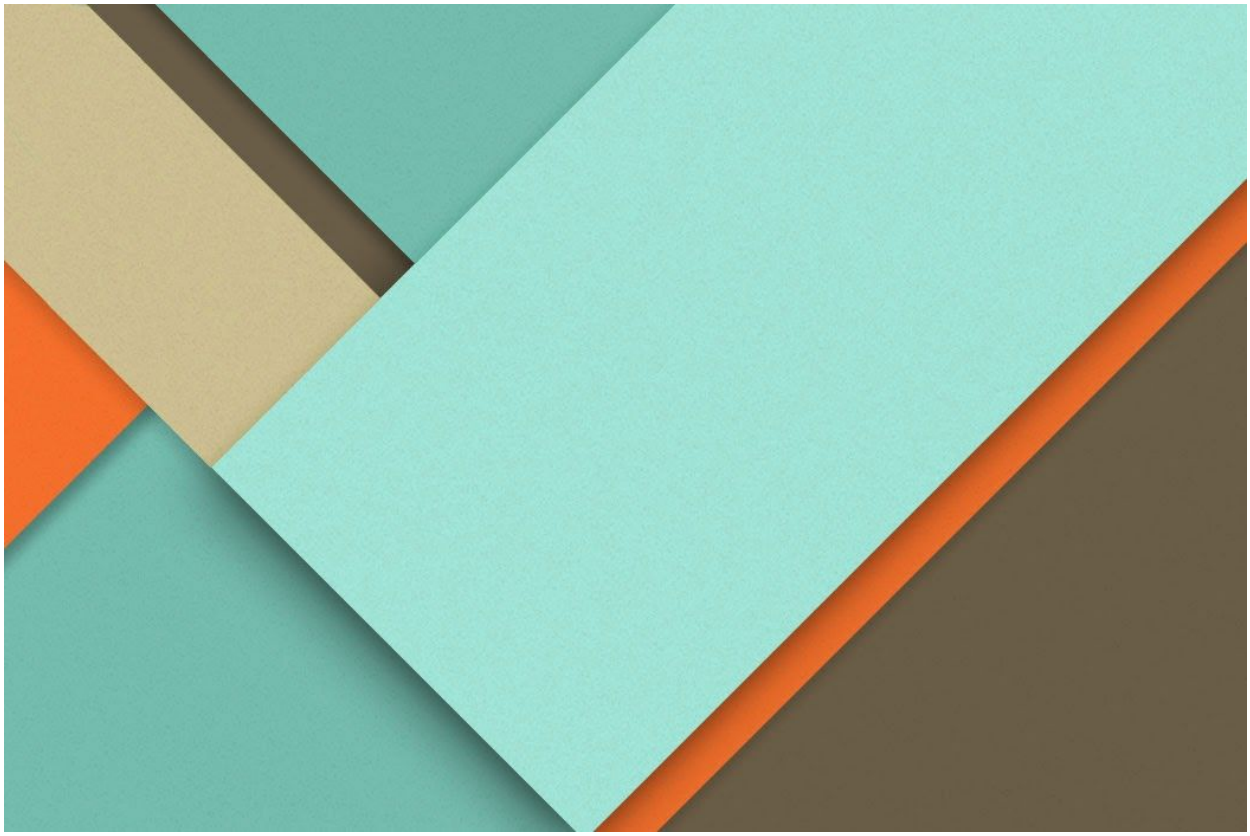

CIS 600 - FINAL PROJECT

Elevator Simulation

07.05.2020

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Prerequisites

1. This project needs to be run using Visual Studio, on a Windows machine.
2. The default console window size needs to be set to at least 120x50
    a. This can be done by Right-Clicking the console top bar
    b. Select Defaults -> Layout -> Edit the window buffer size
    c. You can also use the Properties option in the console bar
3. Currently, the simulation only supports single speed. The times will be detailed in the overview.
4. This simulation is infinite - it has been tested for 30 minutes without any deadlock or livelock. To end the simulation, the console must be closed.

Goal

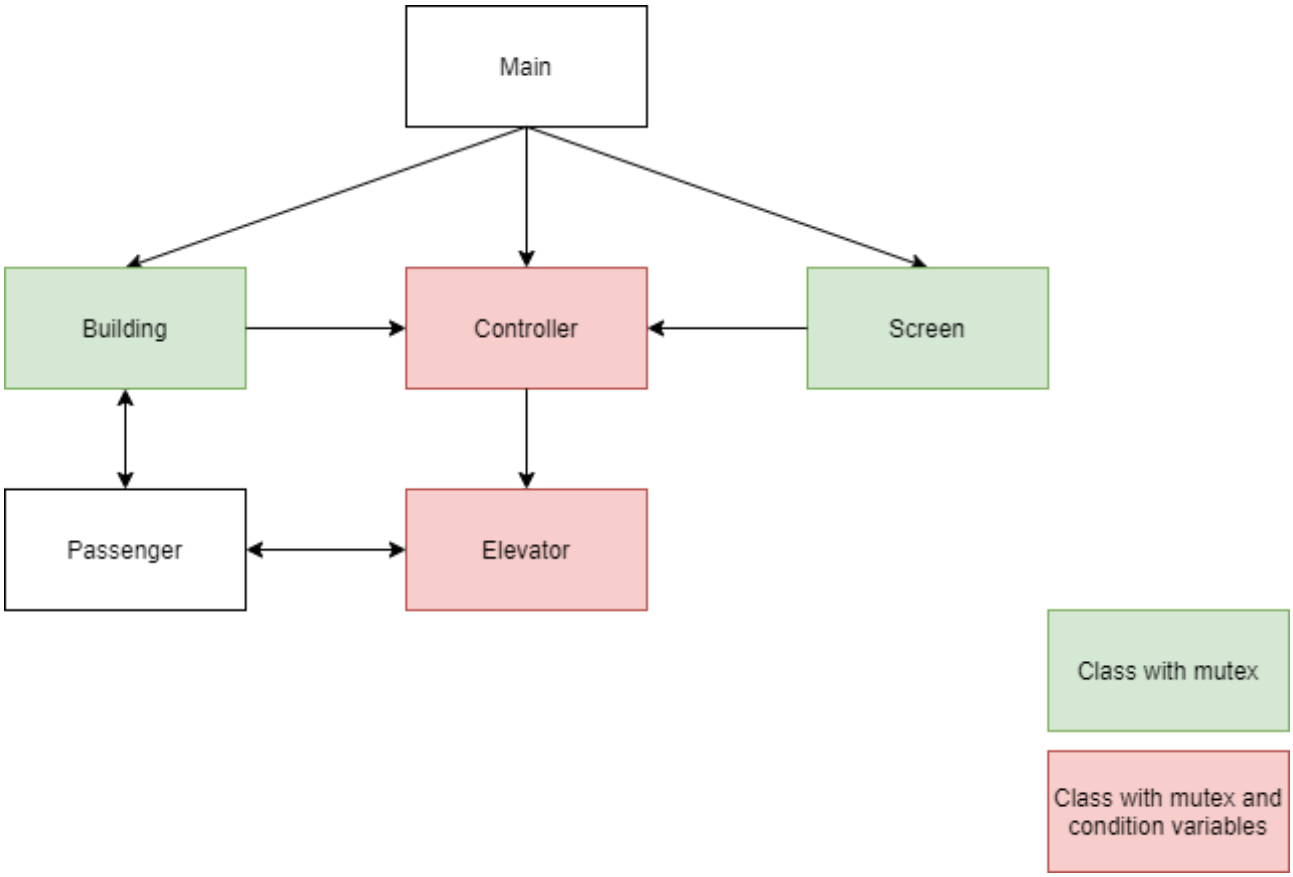
The goal of the project is to simulate a Building-Elevator Control System. The results are calculated based on the number of passengers transported in the corresponding simulation time, and the waiting time for each passenger.

Specifications

- Building size : 40 floors. Numbered 1 through 40
- Number of Elevators : 5 - labeled E1 through E5
- Elevator capacity : 10 passengers
- Max passengers spawned on each floor : 10
- Elevator speed : 2 floors per second - (500ms)
- Passengers spawned : Upto 10 on a floor every 10 seconds - (10000ms)
- Loading and unloading: 1 second per passenger - (1000ms)

Classes & Code Structure

- **Main** - Base simulation class
- **Building** - Contains all the floors, spawns passengers
- **Passenger** - Passengers spawned at src, despawned at dest
- **Screen** - GUI Controller
- **Controller** - Elevator and building controller
- **Elevator** - Individual elevator carrying passengers



Threaded features

- 8 Threads in total
- 5 Elevator threads - each per elevator
- 2 threads for controller - to assign elevators their destinations, and check for passengers waiting (button press)
- 1 thread for indefinite passenger spawning and deleting
- Screen has its own lock, to prevent errant access to shared buffer
- Building has own lock, to load and unload passengers
- Each elevator has own lock to pick up or drop passengers
- Controller and elevators have condition variables - so controller can signal if there is a pick up required, and notify the closest elevator

GUI

Future Work

- Spawning passengers based on floor
  - Increase probability of spawning on first floor
  - Increase passenger destination probability to first floor
  - Create a waiting area for passengers, so they are only despawned when they go back to first floor
- Better elevator control with respect to pick-up destinations - currently, multiple elevators are set to move to same destination if available.