Comp 2071 -- Train Simulation (updated 7/8/2016)

Saturday, February 27, 2016   6:39 PM

Train

At station:
- Open doors
- Passengers on train disembark if at their destination
- Passengers on platform board to capacity of train
- Close doors
- Ready to depart station

Depart station:
- Accelerate to safe speed in direction of travel

Traveling:
- ???

Arrive at station:
- Slow to complete stop

Station

Upon passenger arrival (they will board a train here):
- Direct passenger to appropriate platform given the passenger's destination

Upon passenger arrival (they disembarked a train here):
- Direct passenger from platform to exit

Upon train arrival:
- Announce arrival of train at platform
- Once the train has stopped and opened its doors:
    - Direct disembarking passengers from train onto platform then to exit
    - Permit passengers waiting on platform to board the train as long as the train has capacity for another/more passenger(s)

Notes

- Each train has a finite capacity (in passengers)
- A train could have multiple cars where each car has a capacity and the train's capacity is the sum of the cars' capacities
- Different train cars could have different capacities
- Different train cars could have different lengths
- Train length (for multiple cars) must not exceed the length of the shortest platform (at a station)
- A platform may have a maximum capacity (number of passengers)
- A platform may have a length
- Log/display activities
- If a train arrives at a station but cannot arrive (stop fully at the platform), it must wait for the train(s) ahead of it to depart from that station

- Each platform needs a queue for passengers waiting to board a train
- Each platform needs a queue for arriving trains
- Each train needs a collection for passengers
- A station may need a queue (maybe multiple) to handle passengers who cannot get to a platform because it is full

- What context does each object need?

Logging

- Simple log or GUI?
- Should each object be responsible for logging its own status?

Passenger

Leave home:
- Proceed to departure station

Upon arrival at departure station:
- Enter station
- Proceed to platform for desired direction of travel
- Move into position at the end of the line of passengers who arrived before you

Upon arrival of train (at your departure station):
- Wait for passengers to disembark (if any)
- Board the first train with space for you (once all passengers ahead of you - in order of arrival - have boarded)

On boarding train:
- Take a seat or 'hang on a strap'
- Wait for train to arrive at your destination station

Upon arrival of train (at your destination station):
- Wait for doors to open
- Proceed onto the station platform
- Proceed to the station exit and exit (you're on your own from here…)

Train Route

- Ensure trains are on correct tracks for their direction of travel
- Guide trains from station to station along route
- For end-to-end routes:
    - Enable trains to reverse direction at terminal stations
- For loop routes:
    - Unnecessary for trains to reverse direction
- The distance between stations may be variable (for any particular simulation run) - fixed for the duration of a simulation

Simulation

- Runs for a specified duration (may simply be 'ticks' - recommended)
- Can be single- or multi-threaded - recommend single-threaded
- Must construct train route(s) and populate each with one or more stations and one or more trains
- Can pre-populate trains and platforms with passengers (see notes for potential issues doing this)

Once components of simulation have been created:
- On each 'tick':
    - Add passengers (arrive at starting stations)
    - Move trains
    - …