Lab Assignment 3: Synchronization and Mutual Exclusion

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(1) Code Orgnization:

Station:

num_pass : number of passengers waiting in the station
pass_waiting_board : number of passengers that have a seat in the train and did not board yet.
pass_waiting_board : empty seats in the train
seats_left : empty seats on the train
mutex.
Conditions:
available_seats,train_on_board ,pass_wait_board

Functions:

void station_load_train:
1- to notify passengers of the arrival of the train
2- to leave when seats are full or all passengers have boarded

void station_wait_for_train:
1- Increases number of waiting passengers.
2- Increases number of passengers waiting for boarding.
3- Decreases number of empty seats.

void station_on_board:
1- passenger got a seat and is ready to board
2- notify train when all passengers have boarded

(2) Mutex and condition variables:

1- **Available_seats:**
   - passenger waits when no available seats.
   - Train signals passengers waiting there is available seats.

2- **Pass_wait_board:** (not necessarily)
   - waits if no passengers are ready to board.
   - signals when a waiting passenger got a seat and is ready to board

3- **Train_on_board:**
   - waits when there exist empty seats and waiting passengers, and also if there exist passengers that haven't boarded yet.
   - signals train when all passengers has boarded , and all seats are taken or no passengers are waiting.