

Programming Assignment 4

Traffic Light (10 points) (Groups of 3)

Assignment Objective

Students will implement a traffic light simulation system that manages car queues at four intersections. They will learn to apply concepts of object-oriented programming, queue data structures, and control flow while designing their own traffic light controller function.

Assignment Task

1. Design the Traffic Light Controller

- **Create the `traffic_light_controller` Function:**
 - **Queue Initialization:** Set up four separate queues for the streets (North, East, South, West).
 - **Traffic Light Management Logic:** Implement the following functionality:
 - Ensure that only one street has a green light at any given time.
 - Change a street's light to green when its queue reaches 5 cars.
 - If the current street's queue is empty, switch the light to the next street with the highest number of cars waiting.
 - Allow cars to pass through the intersection when the light is green, and log this action.
 - **Random Car Generation:** Incorporate a mechanism to randomly generate cars for the queues, with a configurable probability of 35%.
 - **Simulation Iterations:** Ensure that the program runs for a total of 15 iterations to observe the behavior of the traffic light system.