# HTEC Technical Interview Test Assignment

## *Dakar Rally*

### Simulation

Design and implement Dakar Rally real-time simulation that has car, trucks and motorbikes as participants. Every vehicle has it's team name, vehicle model, and vehicle manufacturing date. Additionally, cars can be of sport or terrain type, and motorcycles can be of cross or sport type. Distance from start to finish of the rally is 10.000 km. Max speeds of vehicles are as follows:

- Sports car: 140 km/h
- Terrain car: 100 km/h
- Truck: 80 km/h
- Cross motorcycle: 85 km/h
- Sport motorcycle: 130 km/h

While heavier malfunctions on vehicles mean that race is over for those vehicles, in case of light malfunction on some of the vehicles, repairments last:

- 5 hours for cars
- 7 hours for trucks
- 3 hours for motorcycles

Probabilities of malfunctions (per hour) on vehicles are as following:

- Sports car: 12% (light) 2% (heavy)
- Terrain car: 3% (light) 1% (heavy)
- Truck: 6% (light) 4% (heavy)
- Cross motorcycle: 3% (light) 2% (heavy)
- Sport motorcycle: 18% (light) 10% (heavy)

For the sake of easier implementation, consider that drivers have no rest, except during vehicle repairment. Simulation is over when all vehicles that didn't suffer heavy malfunction finish the race, or when all vehicles suffer





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heavy malfunction.

## Web API

Write Web API with endpoints that provide following functionalities:

1. Create race (parameters: year)
2. Add vehicle to the race - available only prior to the race start (parameters: vehicle)
3. Update vehicle info - available only prior to the race start (parameters: vehicle)
4. Remove vehicle from the race - available only prior to the race start (parameters: vehicle identifier)
5. Start the race - only one race can run at the time (parameters: race identifier)
6. Get leaderboard including all vehicles
7. Get leaderboard for specific vehicle type: cars, trucks, motorcycles (parameters: type)
8. Get vehicle statistics: distance, malfunction statistics, status, finish time (parameters: vehicle identifier)
9. Find vehicle(s) (parameters: team AND/OR model AND/OR manufacturing date AND/OR status AND/OR distance, sort order)
10. Get race status that includes: race status (pending, running, finished), number of vehicles grouped by vehicle status, number of vehicles grouped by vehicle type (parameters: race identifier)





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