**Class Diagram, Exercise Questions:**

**Q:** The city of Islamabad is developing an intelligent transportation management system as part of its smart city initiative. This system must integrate various modes of transportation, including public transit (buses, metro trains, and ferries) and private ride-sharing services (such as cars, bikes, and electric scooters). It must also connect to traffic control centers and smart parking facilities spread throughout the city.

Each vehicle in the system, whether public or private, will have a unique identification number, a defined type (such as bus, bike, or scooter), a maximum capacity, and a status indicating whether it is currently in service or under maintenance. Drivers operating public transport vehicles must be certified while ride-sharing drivers register themselves independently through the platform. Some vehicles, such as autonomous buses, can operate without any driver at all.

Passengers will interact with the system by booking rides, purchasing digital tickets for public transportation, and receiving real-time updates about their trips. In the ride-sharing system, users must create individual ride bookings, and some ride-sharing options allow for shared rides, where unrelated passengers travel together.

Parking lots equipped with smart sensors will allow vehicles to reserve spots in advance, and parking spaces will automatically detect occupancy. Some parking lots are private and use dynamic pricing models that adjust rates based on current demand.

Additionally, traffic control centers collect and analyze traffic data, including congestion levels, accident reports, and optimal route suggestions. This information must feed back into both public and private transportation operations to optimize overall efficiency and safety.

The system needs to accurately model all of these components, their behaviors, and their relationships to one another.