Activity 07: Advanced Class Diagram and State Machine Diagram

Case Study 1: Metropolitan Car Service Bureau (Satzinger, Jackson, & Burd, 2016, p. 126)

Metropolitan Car Service Bureau needs a system that keeps car service records. The company's analyst has provided information about the problem domain in the form of notes. Your job is to use those notes to draw the domain model class diagram. The analyst's notes are as follows:

- The Owner class has attributes name and address.
- The Vehicle class is an abstract class that has attributes VIN, model, and model year.
- There are two types of vehicles, cars and trucks:
  - Car has additional attributes for the number of doors and luxury level.
  - Truck has an additional attribute for cargo capacity.
- The Manufacturer class has attributes name and location.
- The Dealer class has attributes name and address.

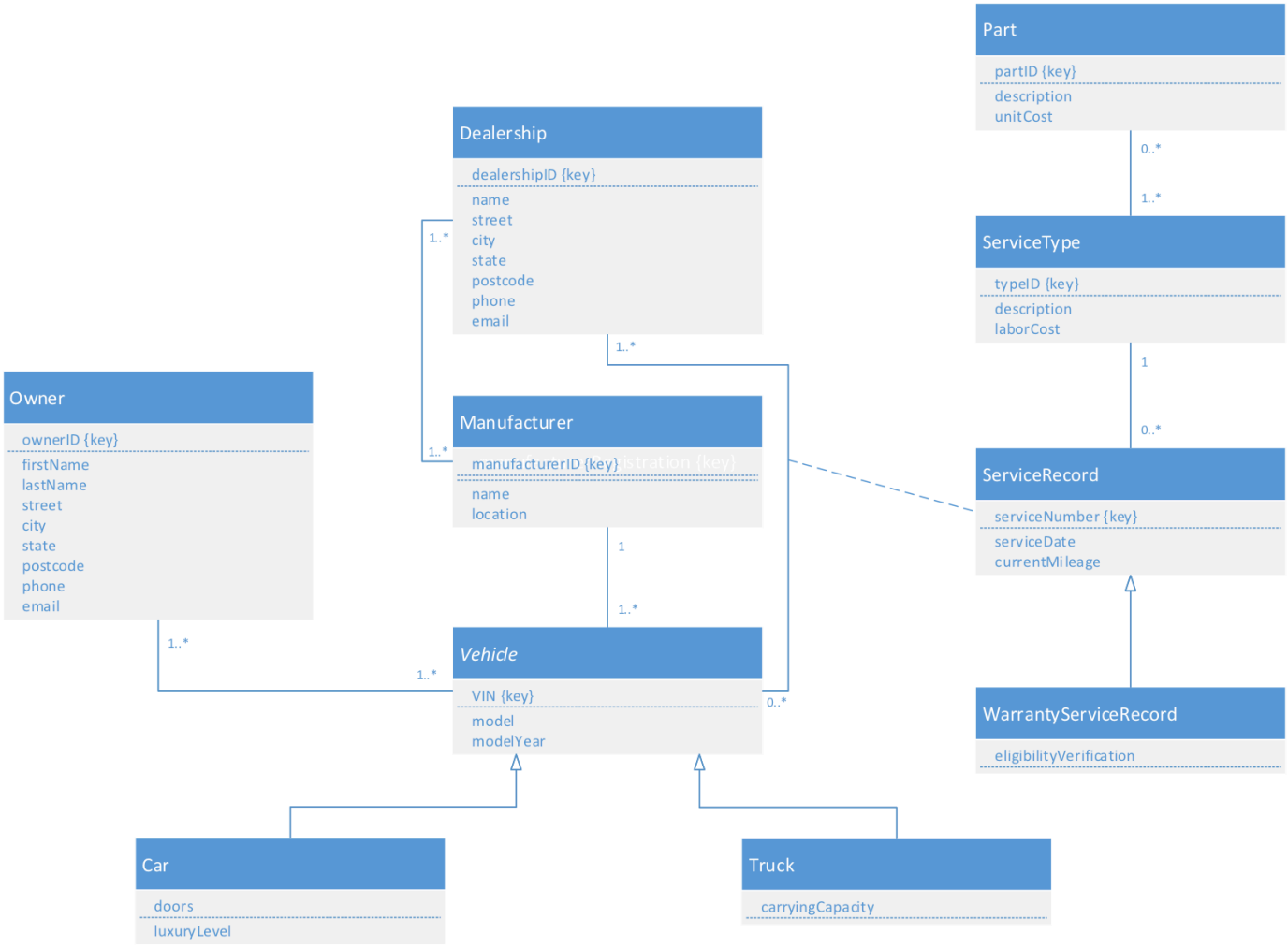
A service record is an association class between each vehicle and a dealer, with attributes service date and current mileage. A warranty service record is a special type of service record with an additional attribute: eligibility verification. Each service record is associated with a predefined service type, with attributes type ID, description, and labor cost. Each service type is associated with zero or more parts, with attributes part ID, description, and unit cost. Parts are used with one or more service types.

An owner can own many vehicles, and a vehicle can be owned by many owners. An owner and a vehicle are entered into the system only when an owned vehicle is first serviced by a dealer. Vehicles are serviced many times at various dealers, which service many vehicles.

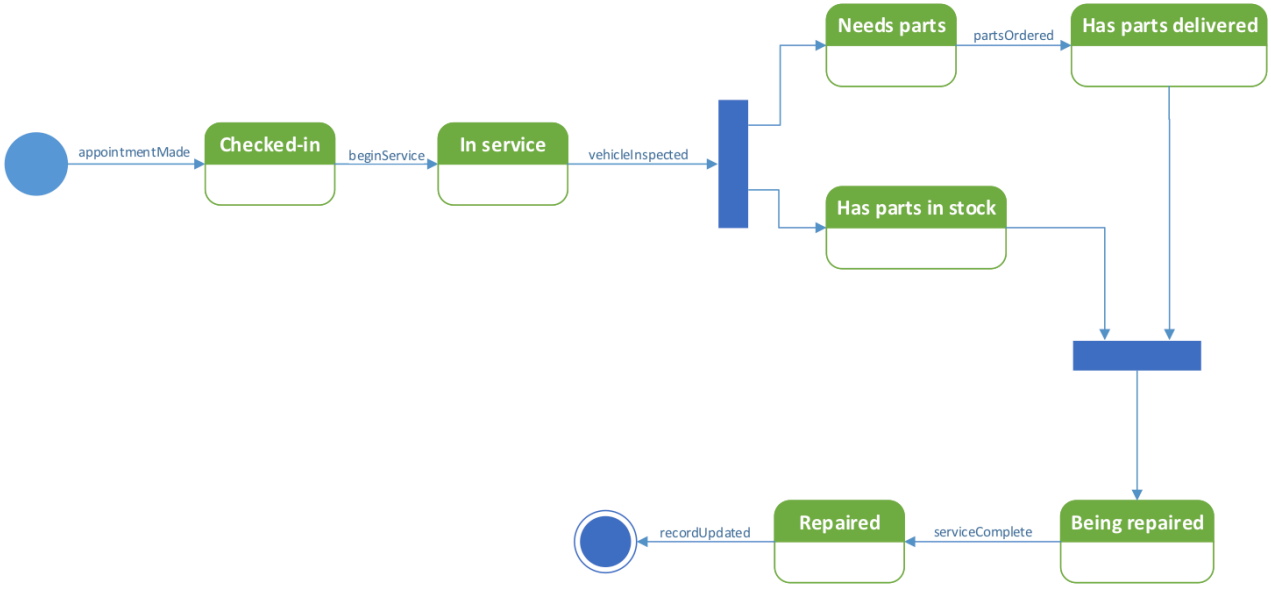
1. **Draw a UML domain model class diagram** for the system as described here. Be as specific and accurate as possible, given the information provided. If needed information is not given, make realistic assumptions.

2. Consider that a vehicle goes through many states and state transitions from the perspective of Metropolitan. For example, a new vehicle might be brought in for the first time. A previously serviced vehicle might be brought in. Think through the sequences that go on for a vehicle when it is being worked on by Metropolitan. **Draw a state machine diagram** showing states and state transitions, including names for the transitions.

Domain Model Class Diagram



State Machine Diagram: Vehicle



Case Study 2: Community Board of Realtors (Satzinger, Jackson, & Burd, 2016, p. 127)

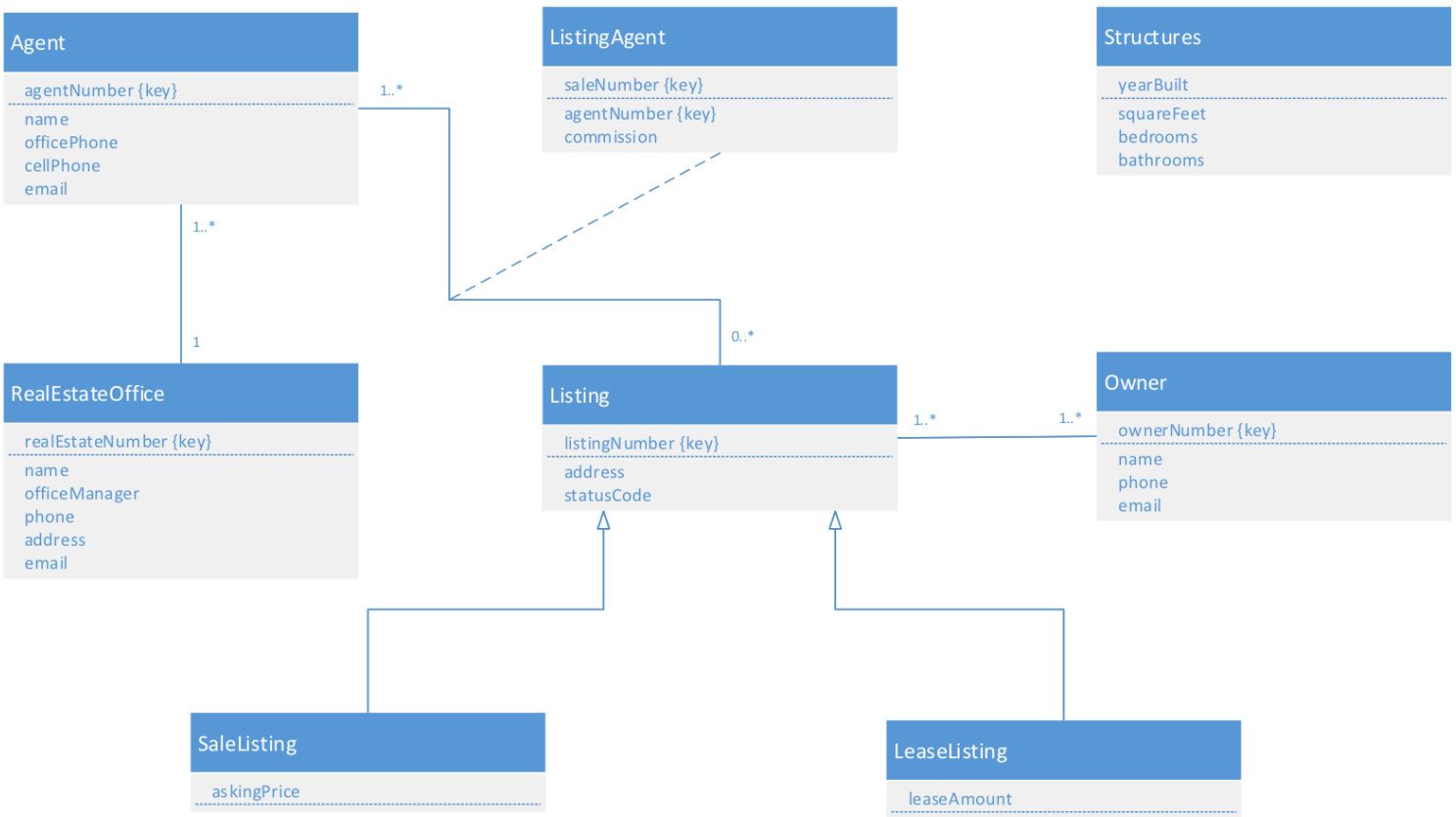
The Board of Realtors Multiple Listing Service (MLS) system supplies information that local real estate agents use to help them sell houses to their customers. During the month, agents list houses for sale (listings) by contracting with homeowners. Each agent works for a real estate office, which sends information on listings to the multiple listing service. Therefore, any agent in the community can get information on the listing. Much of the information is available to potential customers on the Internet.

Information on a listing includes the address, year built, square feet, number of bedrooms, number of bathrooms, owner name, owner phone number, asking price, and status code. It is also important to have information on the listing agent, such as name, office phone, cell phone, and e-mail address. Agents work through a real estate office, so it is important to know the office name, office manager name, office phone, and street address.

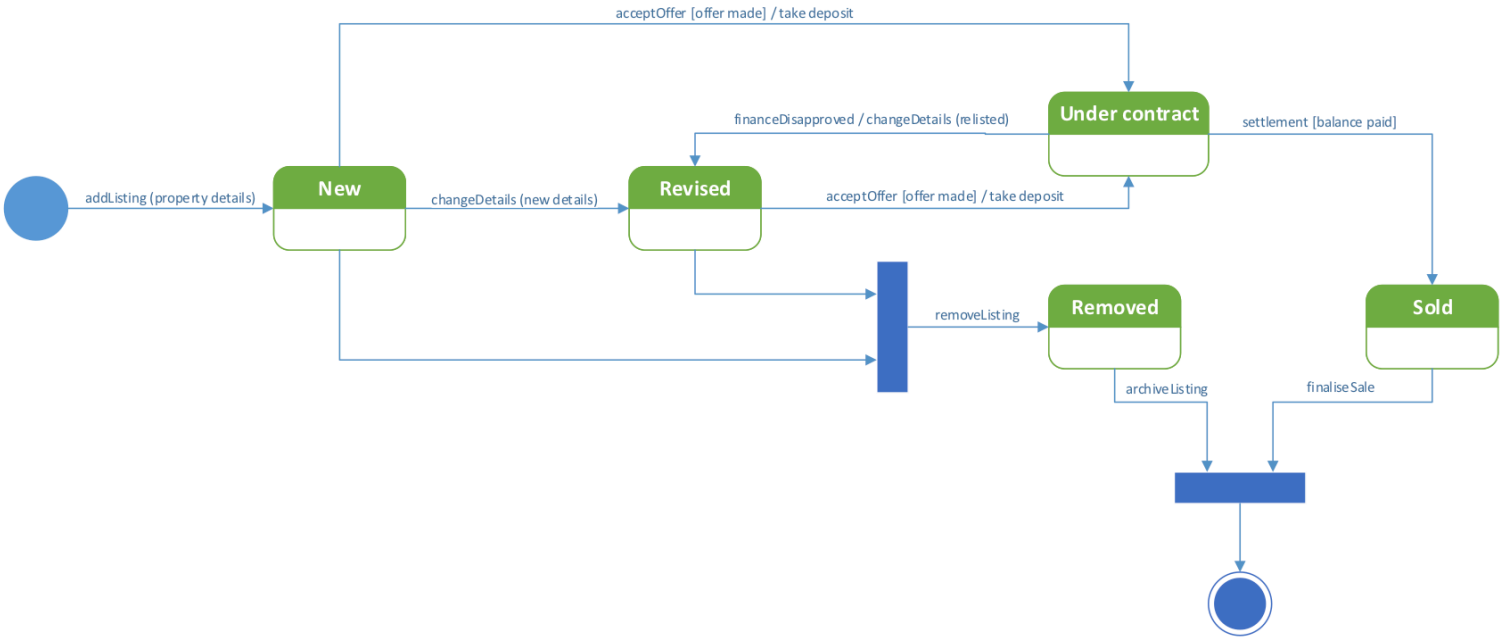
1. Draw a domain model class diagram that assumes a listing might have multiple owners. Additionally, a listing might be shared by two or more agents, and the percentage of the commission that each agent gets from the sale can be different for each agent.

2. Consider that a real estate listing goes through several different states over time. For example, it might be a new listing, a mature listing, a revised listing, an under contract listing, and a sold listing. Draw a state machine diagram for a listing object based on this information. Include transition names and be sure to consider all of the possible transitions. For example, can a new listing transition directly to an under contract listing?

Domain Model Class Diagram



State Machine Diagram: Listing



Case Study 3: Patient Record and Scheduling System

A patient record and scheduling system in a doctor's office is used by the receptionists, nurses, and doctors. The receptionists use the system to enter new patient information when first-time patients visit the doctor. They also schedule all appointments. The nurses use the system to keep track of the results of each visit including diagnosis and medications. For each visit, free form text fields are used to capture information on diagnosis and treatment. Multiple medications may be prescribed during each visit. The nurses can also access the information to print out a history of patient visits. The doctors primarily use the system to view patient history. The doctors may enter some patient treatment information and prescriptions occasionally, but most frequently they let the nurses enter this information. Each patient is assigned to a family. The head of family is responsible for the person with the primary medical coverage. Information about doctors is maintained since a family has a primary care physician, but different doctors may be the ones seeing the patient during the visit.

1. Draw a **domain model class diagram** for the above case study.