1 Modeling Object-Oriented Design Using UML

- UML stands for *Unified Modeling Language*
- It is becoming an industry standard for object-oriented design.
- Two types of descriptions: *diagram-based* and *text-based*.

1.1 Text-Based UML

This is the UML covered in cs203.

```
--------------------
|     Clock        |   Class name
--------------------
|  mHour           |
|  mMinute         |   Member Data
|  mSecond         |
--------------------
|  setTime()       |
|  advanceTime()   |   Methods
|  displayTime()   |
--------------------
```

Syntax for member data

visibility name: type = defaultValue

- *visibility* is + (public), - (private) or # (protected)
- *name* is the name of the data member
- *defaultValue* is an initial value for the data member

Example: -mHour: integer = 12

Syntax for methods

visibility name(parameter-list):return-type {*property-string*}

- *visibility* is the same as that of data members
- *name* is the name of the operation (method)
- *parameter-list* is a comma-separated parameters whose syntax is as follows
  direction name:type=defaultValue
  Then *name:type=defaultValue* has the same meaning as that of regular data members. The *direction* indicates whether the parameter is used for input (`in`), output (`out`) or both (`inout`)
- *return-type* is the data type of the result of the operation
- *property-string* may contain various pieces of information. Of interest in this course is *query* which shows that the operation (method) does not modify the values of the class.

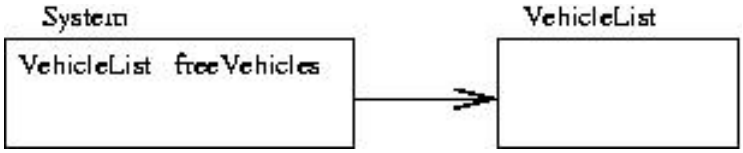
Example: +setTime(in hr: integer, in min: integer, in sec: integer)

1.2 Diagram-Based UML

This portion of UML shows the relationship between the various text-based boxes.

Association ("has")

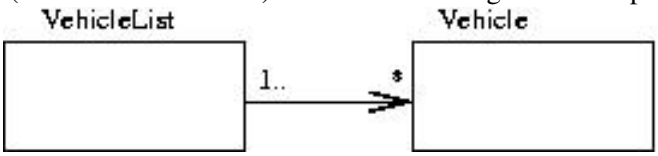
Used with member data.



The class System has member data for a VehicleList.

Multiplicity

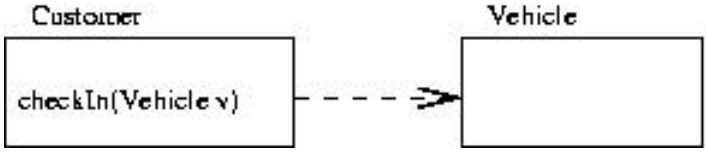
Likely to have two vehicle lists (available and rented). Will have a large and not predetermined number of vehicles.



A VehicleList may contain many Vehicles.

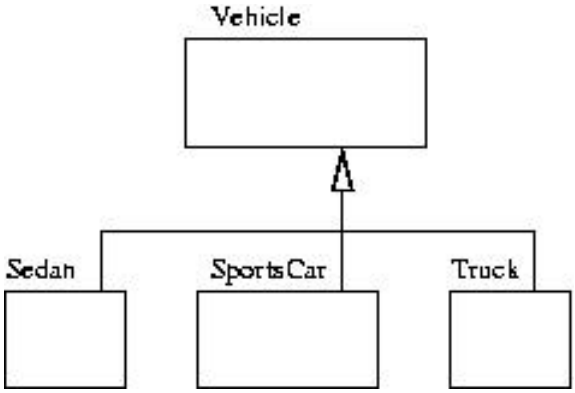
Dependence ("uses")

Used with parameters in a method.



The checkIn method uses a Vehicle.

Inheritance



Sedan, SportsCar, and Truck all inherit class Vehicle.