CS 213 – Software Methodology
Spring 2017

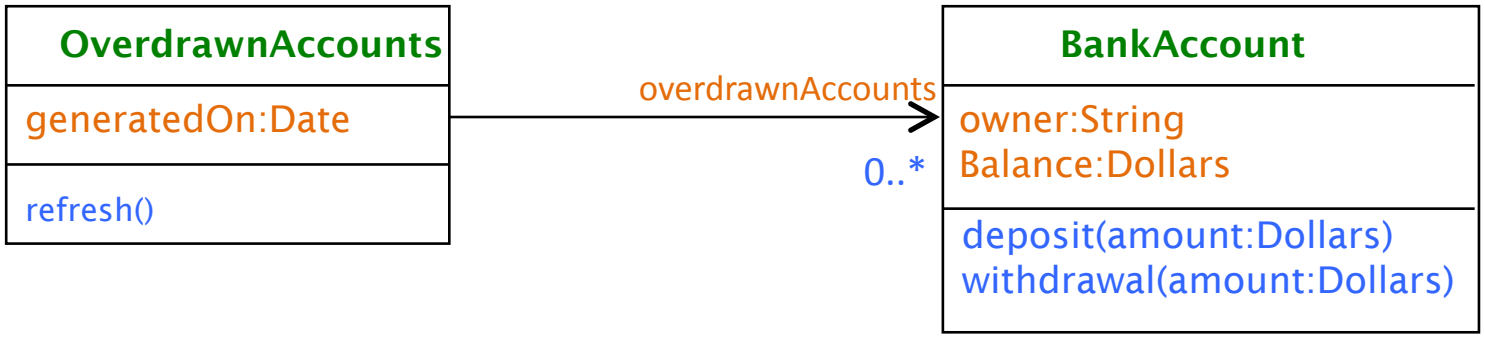
Sesh Venugopal

Lecture 14 – Mar 7

UML Class Diagram - III

Unidirectional Association

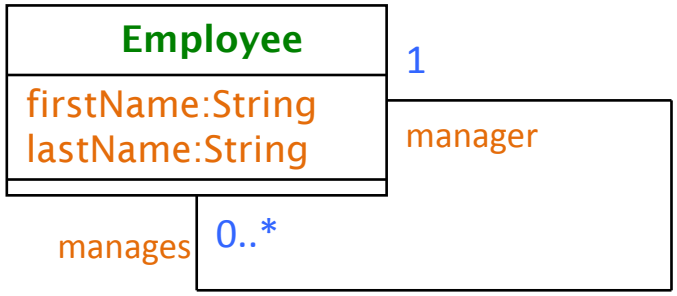
(From From "UML basics: The class diagram" by Donald Bell)
http://www.ibm.com/developerworks/rational/library/content/RationalEdge/sep04/bell/



OverdrawnAccounts *knows about* BankAccount,
but BankAccount does not know about OverdrawnAccounts => in the implementation OverdrawnAccounts would have a list of BankAccount instances, but BankAccount would not refer back to OverDrawnAccounts

---

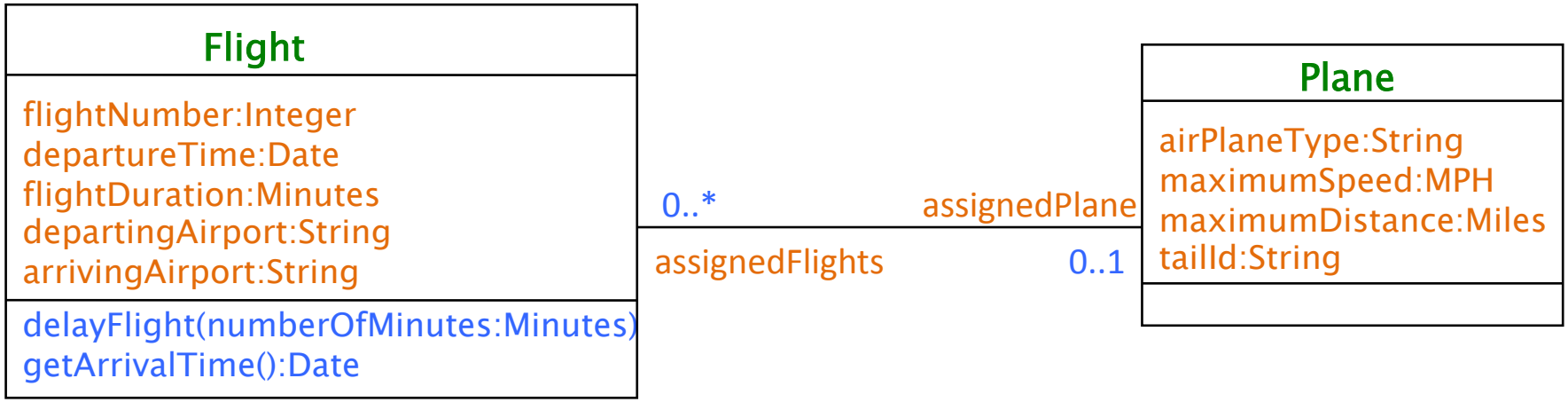
Reflexive Association



Bidirectional Association and Navigability

From "UML basics: The class diagram" by Donald Bell

http://www.ibm.com/developerworks/rational/library/content/RationalEdge/sep04/bell/

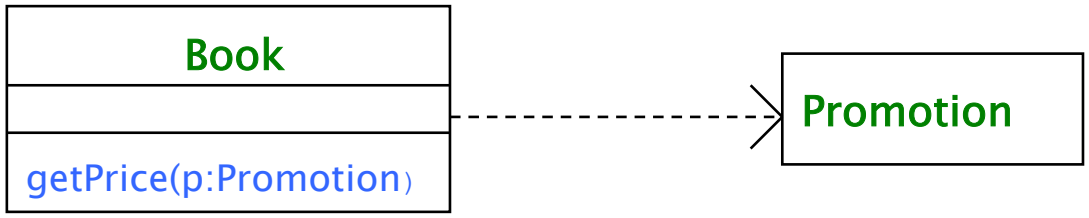


Flight *knows about* Plane, and Plane *knows about* Flight. When implemented, it will be easy to know which Plane is assigned to a Flight, and which Flights a Plane has been assigned to.

In other words, it is possible to **navigate** from Flight to Plane, and vice versa

Dependency

- Class A depends on class B if A uses B in such a way that a change in B will effect A



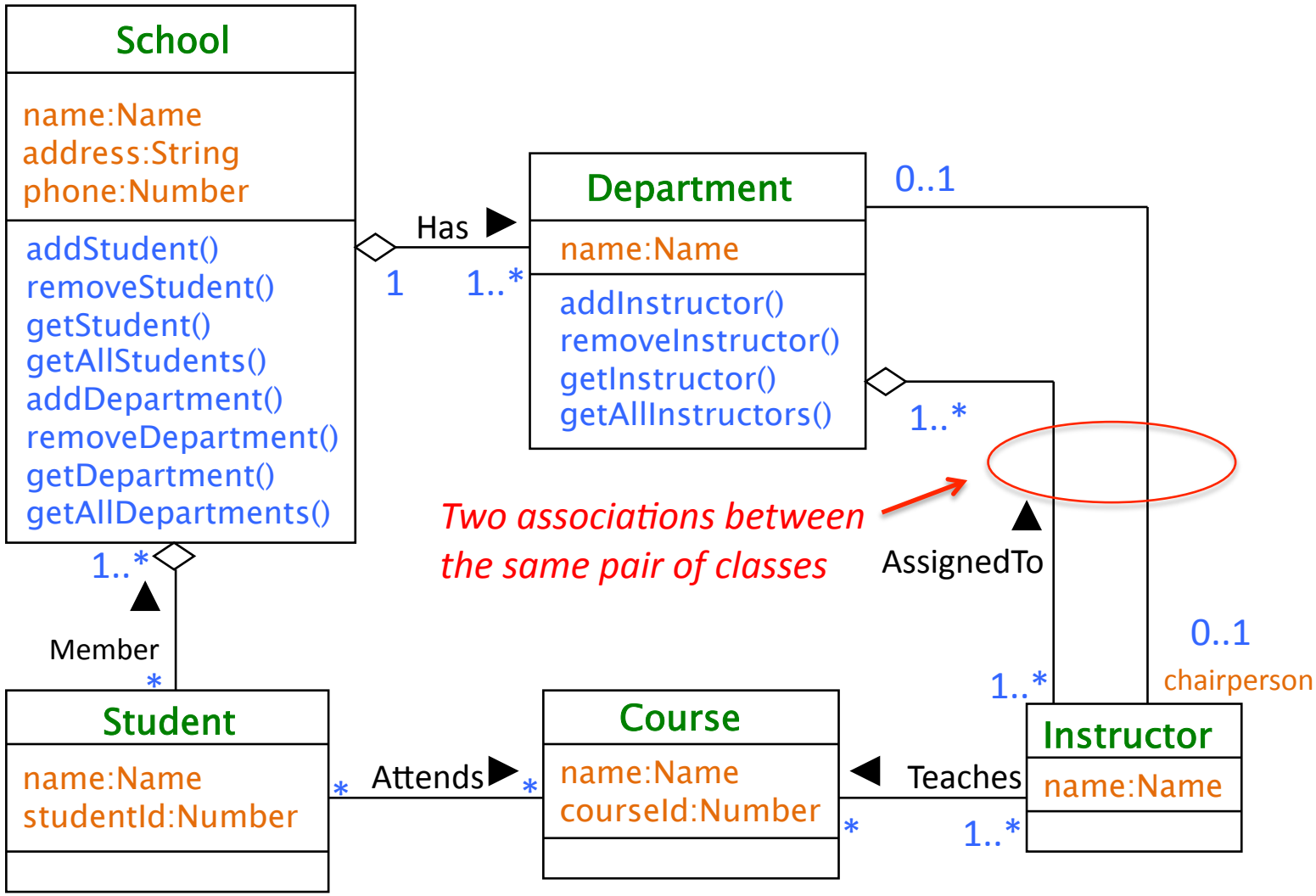
The Book class uses (depends on) on the Promotion class – changing Promotion would affect Book

- Say A depends on B. Typically then, B would appear as a parameter, return type, or local variable in a method of A

- Dependencies are the weakest kind of relationships, and the "dependee" class (e.g. Promotion) is subordinate to the "depender/dependent" class (e.g. Book) In other words, the Book class can be defined meaningfully even without the Promotion class

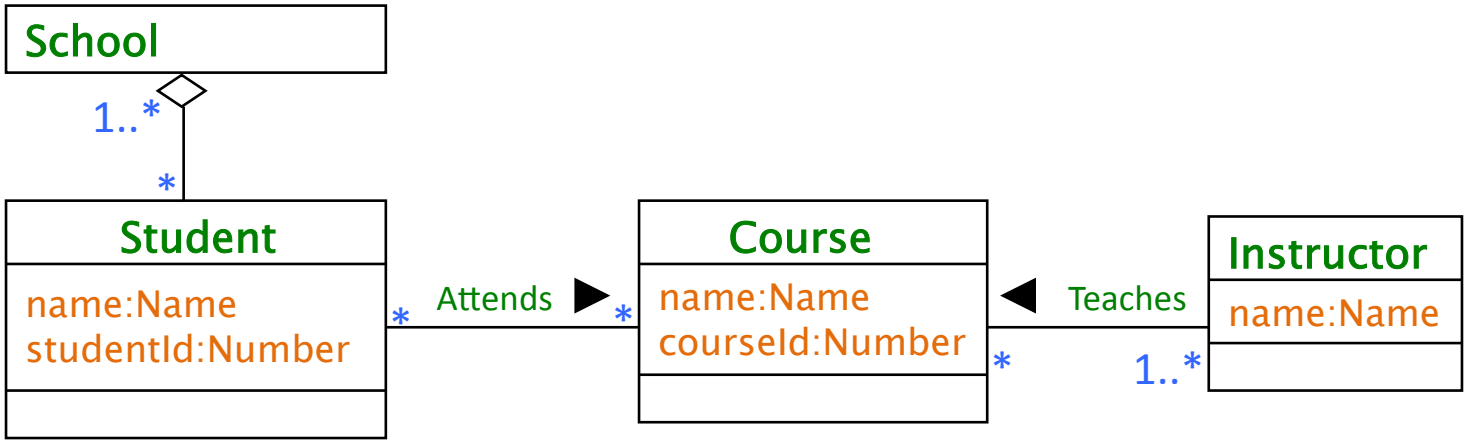
Modeling a University

From "The Unified Modeling Language User Guide" by Booch, Rumbaugh, and Jacobson



Modeling a University

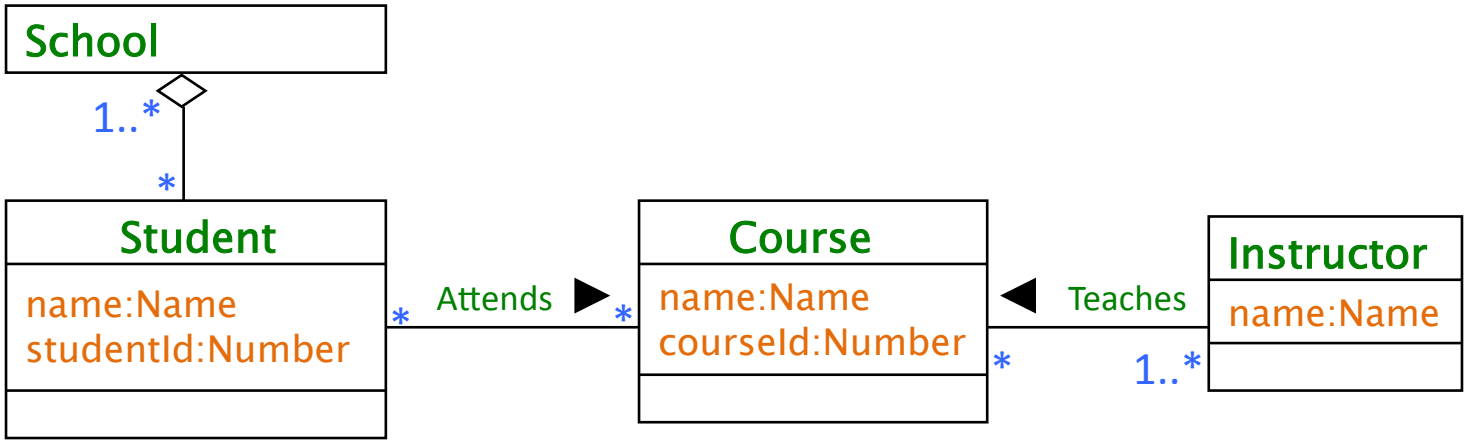
Relationship data



Write the Student and Course classes with just fields (no methods)

Modeling a University

Relationship data




```
public class Student
{
    Name name;
    Number studentId;

    Course[] courses;
    School[] schools;
    ...
}
```

```
public class Course {
    Name name;
    Number courseId;

    ArrayList<Student> students;
    Instructor[] instructors;
    ...
}
```

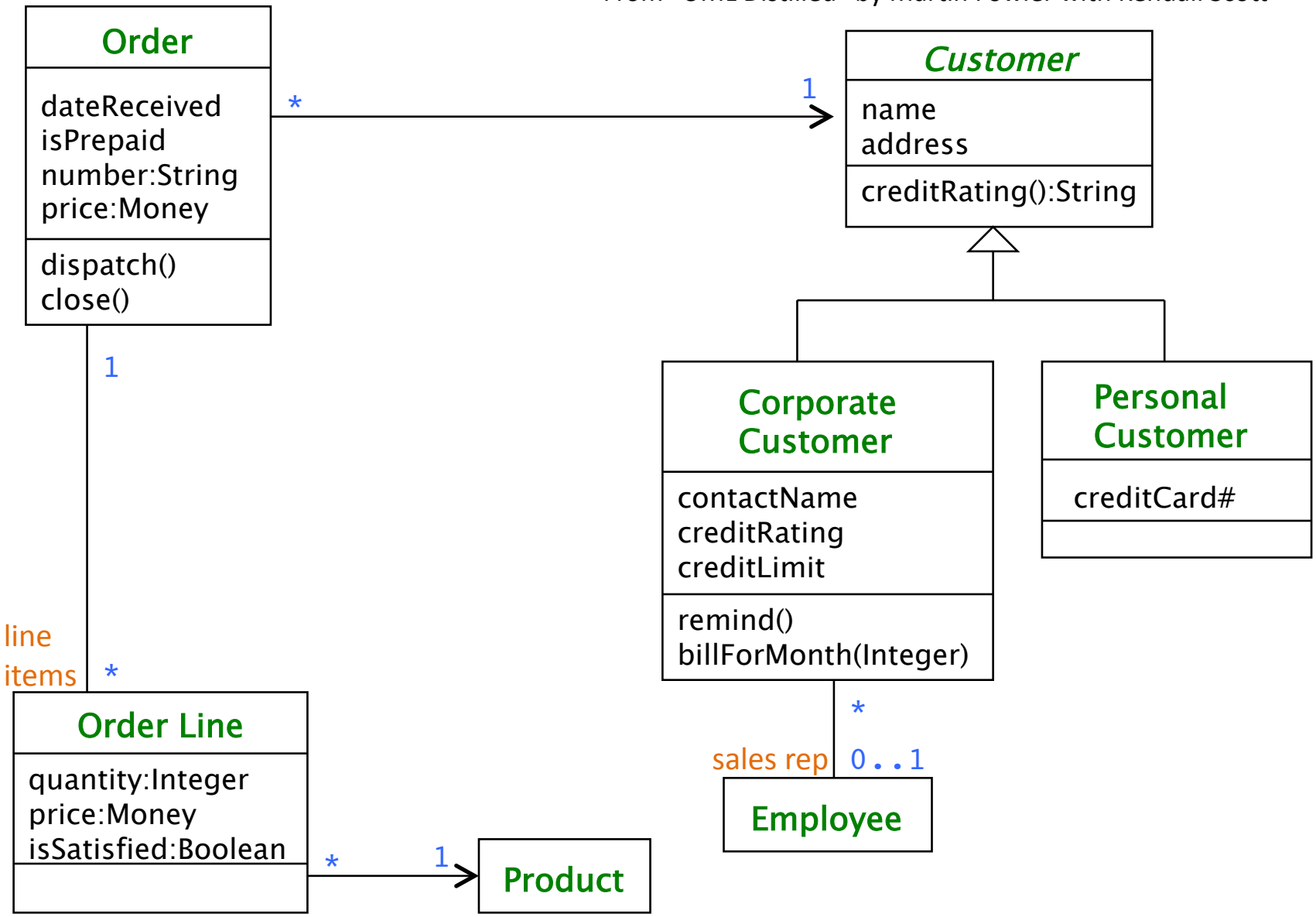
Data needed to store a relationship between two classes DO NOT show up as UML attributes in either class, because they are NOT inherent properties of either of the classes in the relationship.

Modeling Orders for Products

Draw a UML Class Diagram to model orders for products. Customers who place orders can be personal customers or corporate customers. An order could have multiple products (items) in it, and at any point in time the company needs to know which of these items have been shipped.

Modeling Orders for Products

From "UML Distilled" by Martin Fowler with Kendall Scott

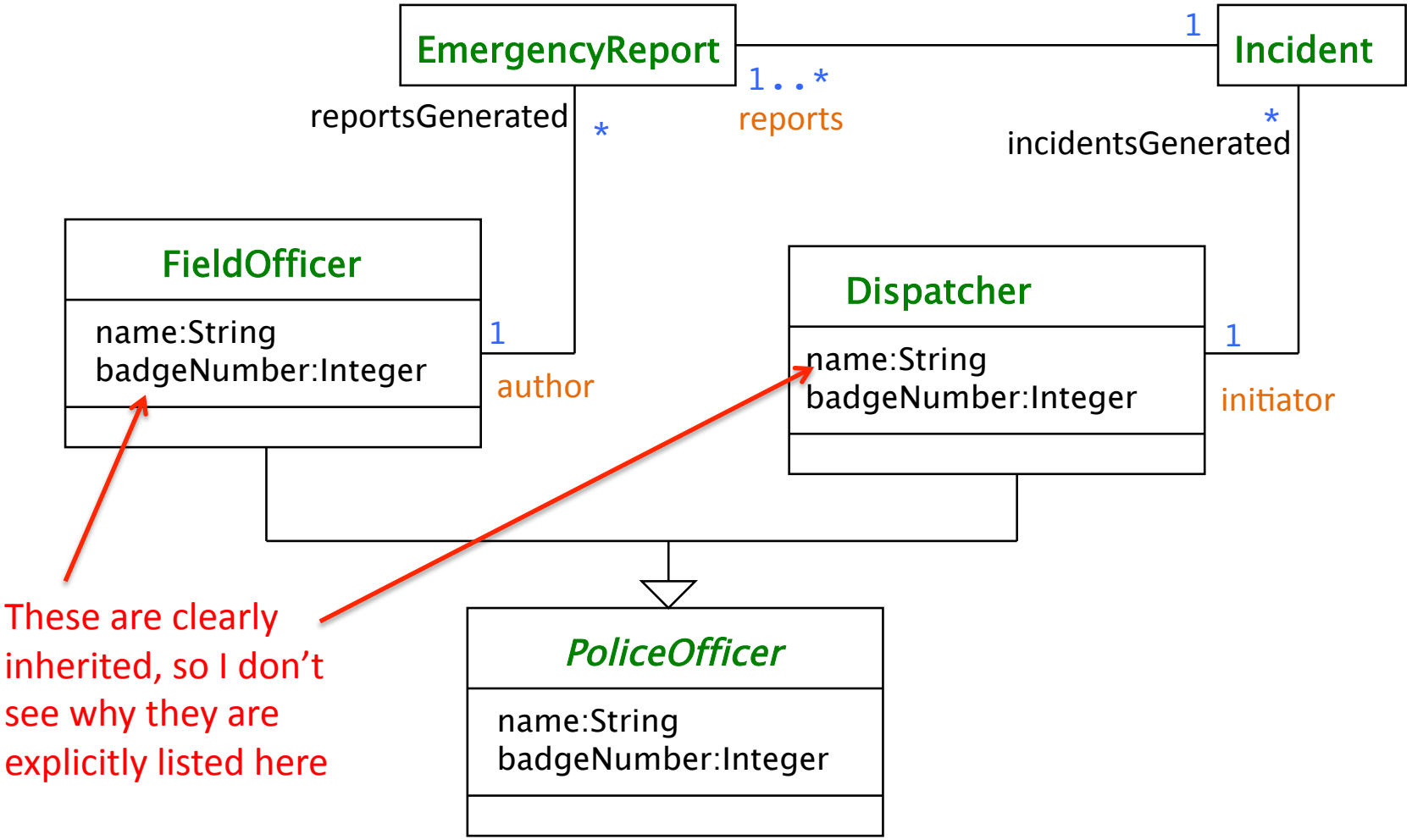


Modeling Police Incidents

Draw a UML Class Diagram to model the handling of incidents by the dispatchers and field officers of a police department. Dispatchers log incidents, and field officers write emergency reports, as many as each incident requires.

Abstract Class/Inheritance/Bidirectional Association

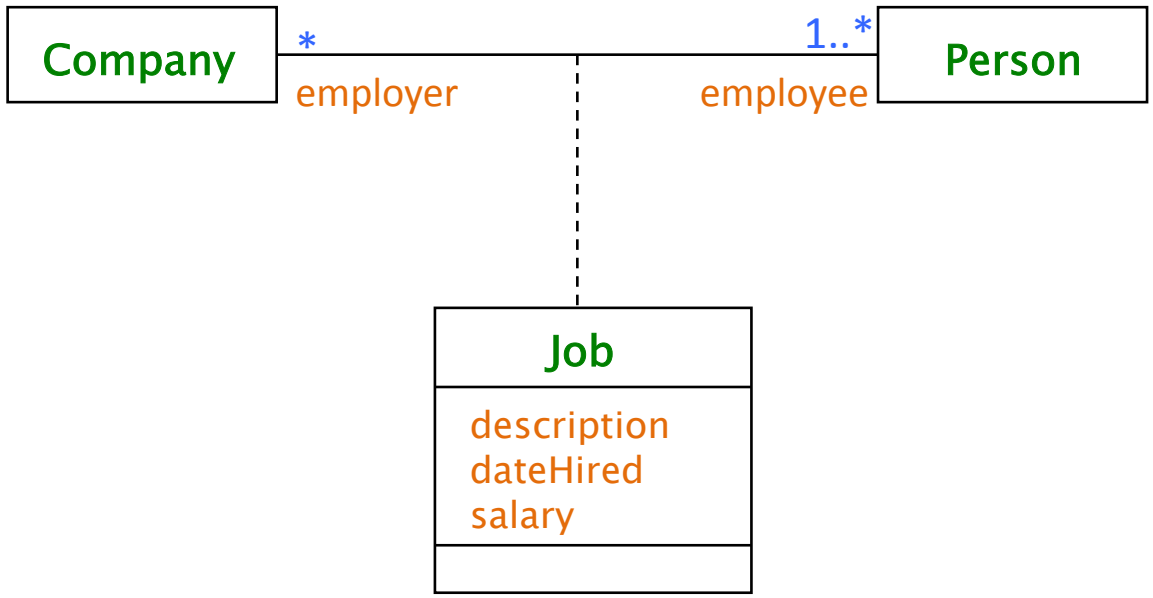
From "Object-Oriented Software Engineering" 2nd ed. by Bruegge and Dutoit



Association Class

- At times, an association between two classes itself has properties - an **association class** is used to model these properties.

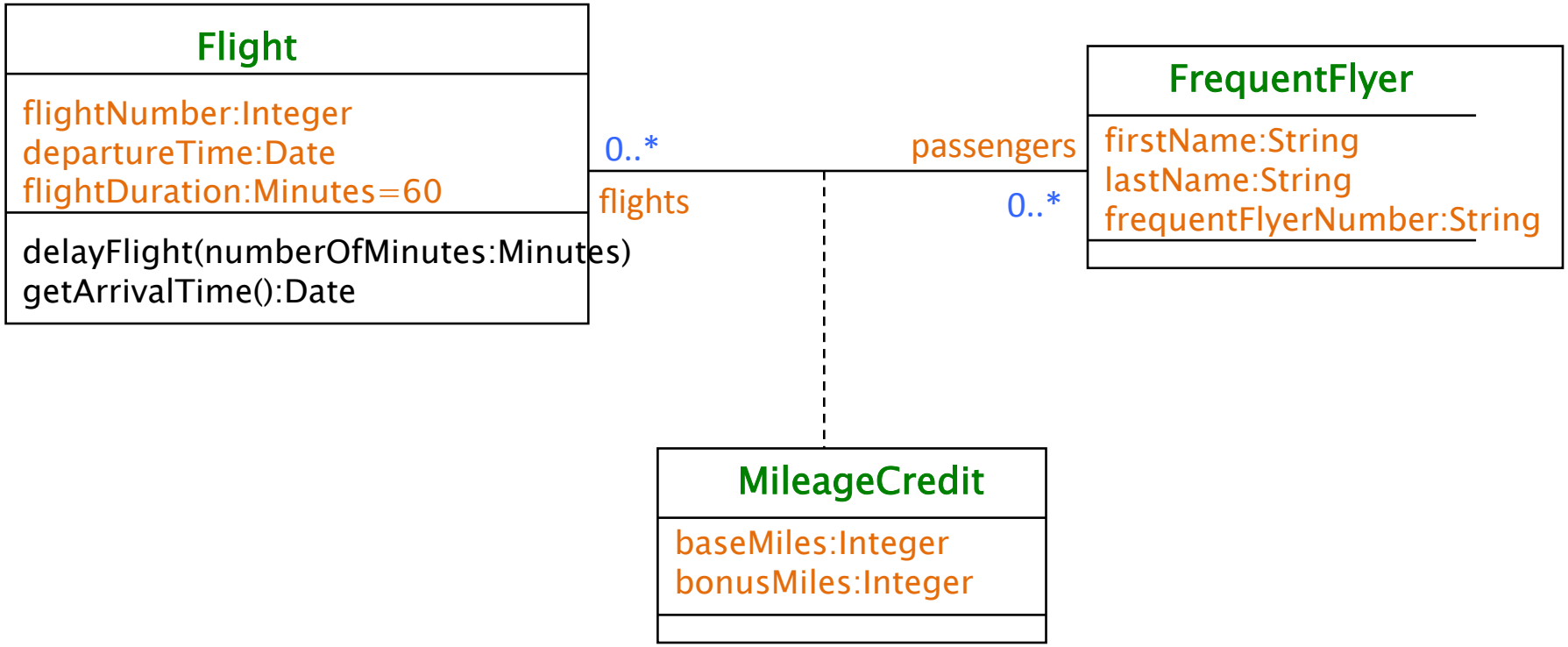
From "The Unified Modeling Language User Guide" by Booch, Rumbaugh, and Jacobson



Association Class: Example

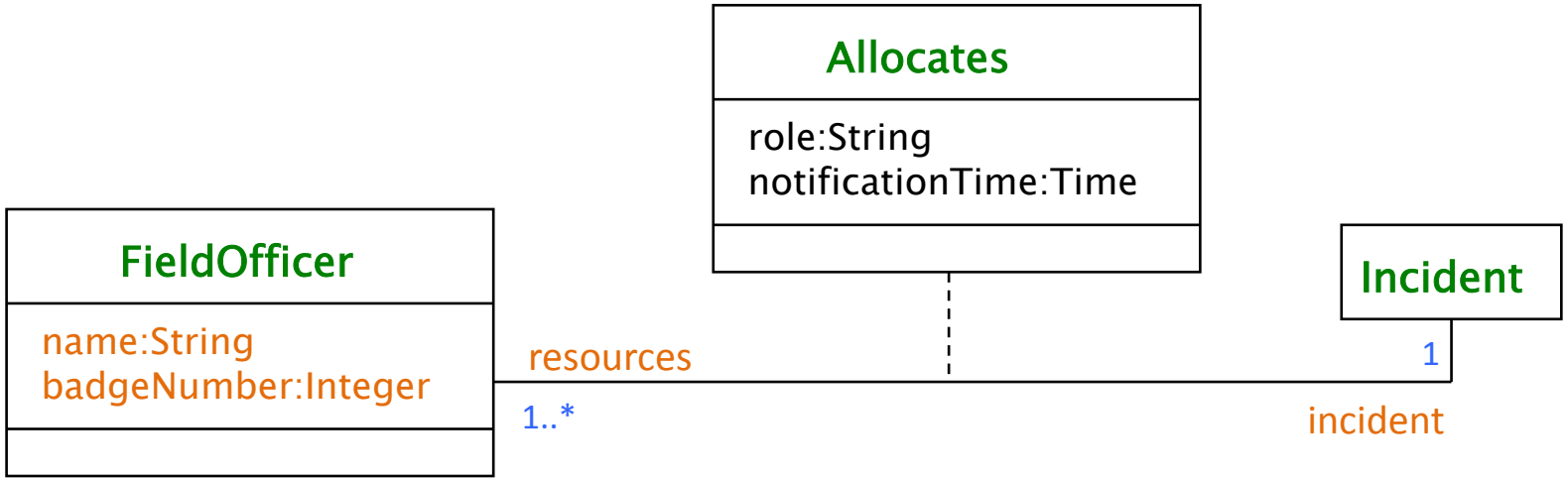
From "UML basics: The class diagram" by Donald Bell

http://www.ibm.com/developerworks/rational/library/content/RationalEdge/sep04/bell/



Association Class: Example

From "Object-Oriented Software Engineering" 2nd ed. by Bruegge and Dutoit



Is this equivalent to the above?