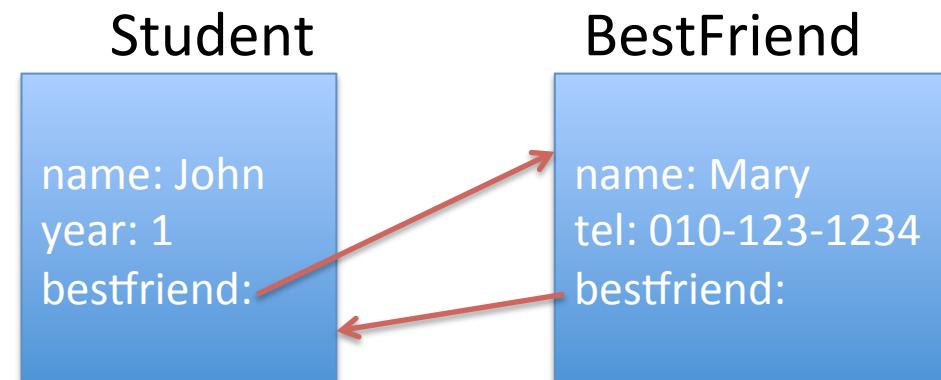


Class2Class Connection

One-to-One

- A class may need to know other class objects
- Forward reference

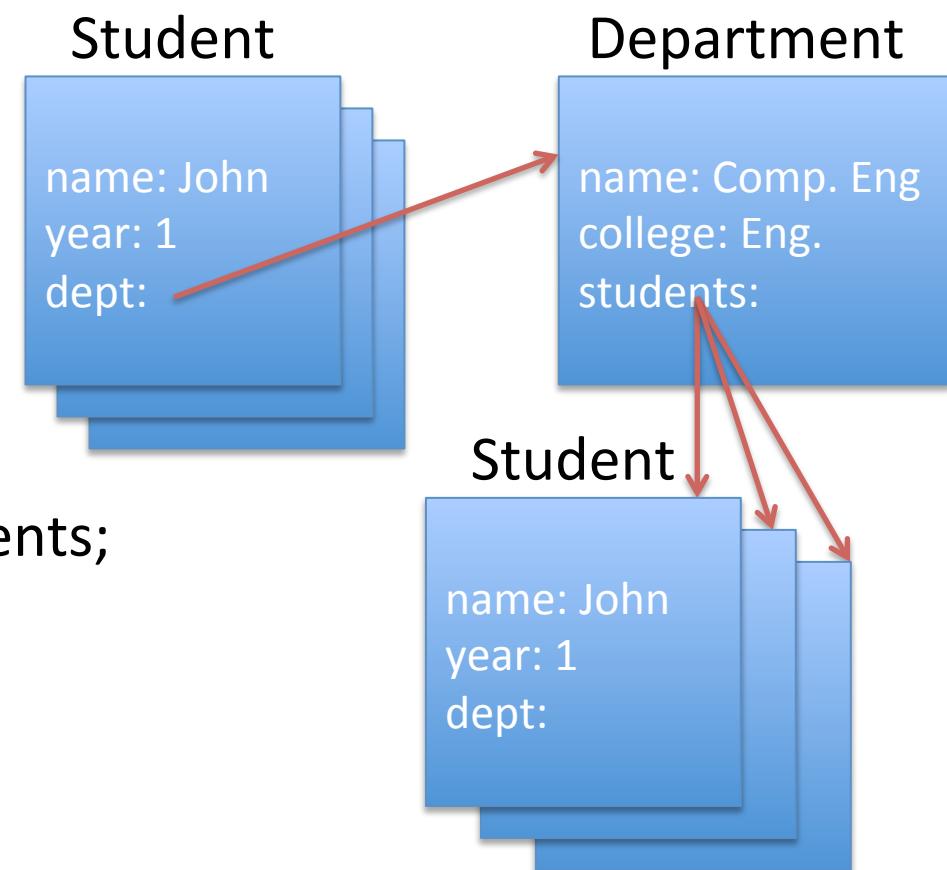
```
class Friend;  
class Student {  
    Friend &bestfriend;  
}  
class Friend {  
    Student &bestfriend;  
}
```



One-to-Many

- vector of copies (wrong)

```
class Department;  
class Student {  
    Dept &dept;  
}  
class Dept {  
    vector<Student> students;  
}
```



One-to-Many

- Pointer vector

```
class Department;
```

```
class Student {
```

```
    Dept &dept;
```

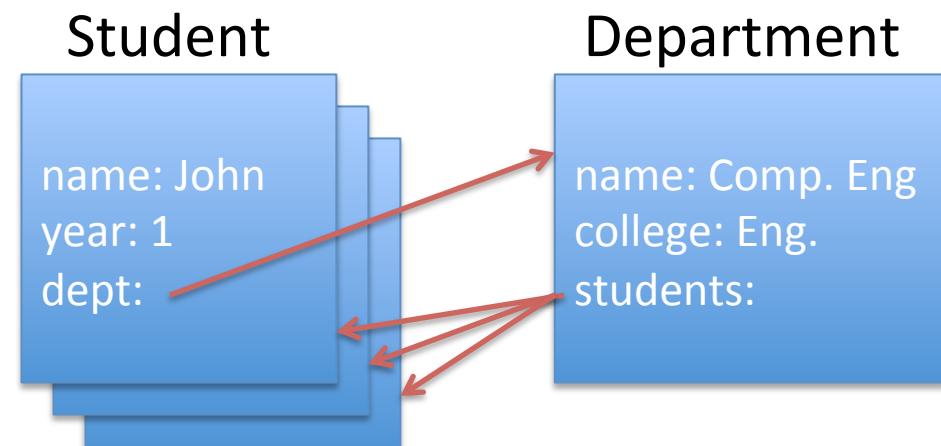
```
}
```

```
class Dept {
```

```
    vector<Student *> students;
```

```
    string std_name(int i) { return students[i]->get_name(); }
```

```
}
```



One-to-Many

- Reference vector (wrong)

```
class Department;
```

```
class Student {
```

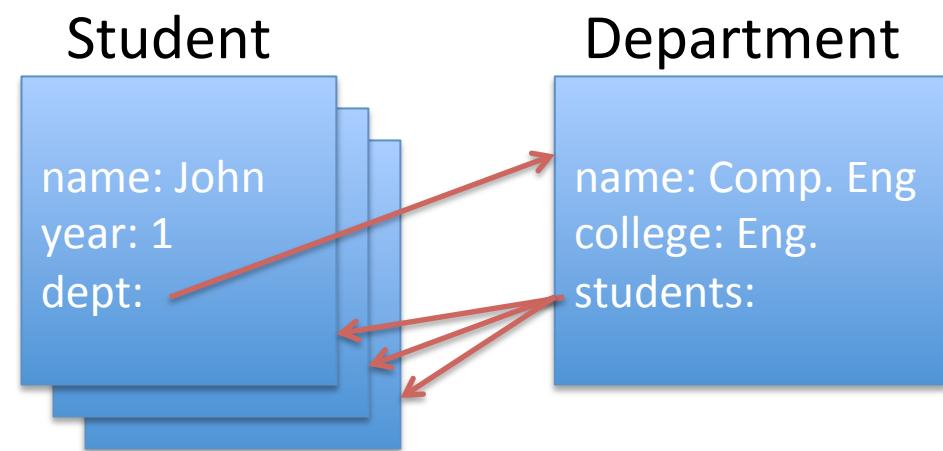
```
    Dept &dept;
```

```
}
```

```
class Dept {
```

```
    vector<Student &> students; ← ERROR
```

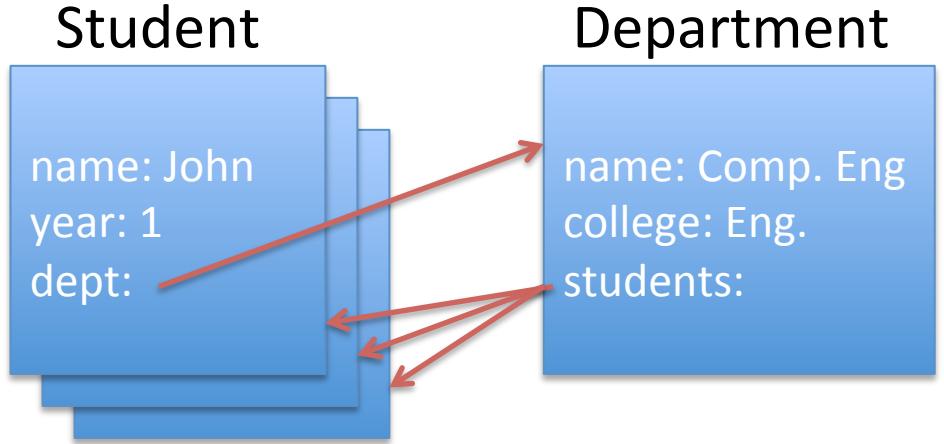
```
}
```



One-to-Many

- **Reference wrapper** vector (C++11)

```
class Department;
class Student {
    Dept &dept;
}
class Dept {
    vector<std::reference_wrapper<Student>> students;
    string std_name(int i) { return students[i].get_name(); }
}
```



The diagram illustrates a one-to-many relationship using `std::reference_wrapper`. It shows a `Student` object and a `Department` object. The `Student` object has attributes: name: John, year: 1, and dept: `Dept`. The `Department` object has attributes: name: Comp. Eng, college: Eng., and students: `vector<std::reference_wrapper<Student>>`. Red arrows point from the `dept` field of the `Student` object to the `students` vector of the `Department` object, indicating that the `Student` is associated with the `Department`.

실습

- reference wrapper vector를 써서 Dept의 students 를 수정, 해당 코드 수정
- Dept::set_name() 정의
- Test

```
Dept ce( "Computer Engineering" );
Student s1( "Kim", "Soochul", ce );
ce.set_name("Computer Eng.");
check( "dept name", s1.get_dept().get_name(),
       "Computer Engineering" );
check( "std name", ce.get_student_at(0).get_name(),
       "Kim Soochul" );
s1.promote(); // year become 2
check( "s1's year from dept", ce.get_student_at(0).get_year(), 2 );
```

Many-to-Many

```
class Department;  
class Student {  
    vector<...> subjects;  
}  
class Subject {  
    vector<...> students;  
}
```

