

CMSC 132: OBJECT-ORIENTED PROGRAMMING II



UML (Unified Modeling Language)

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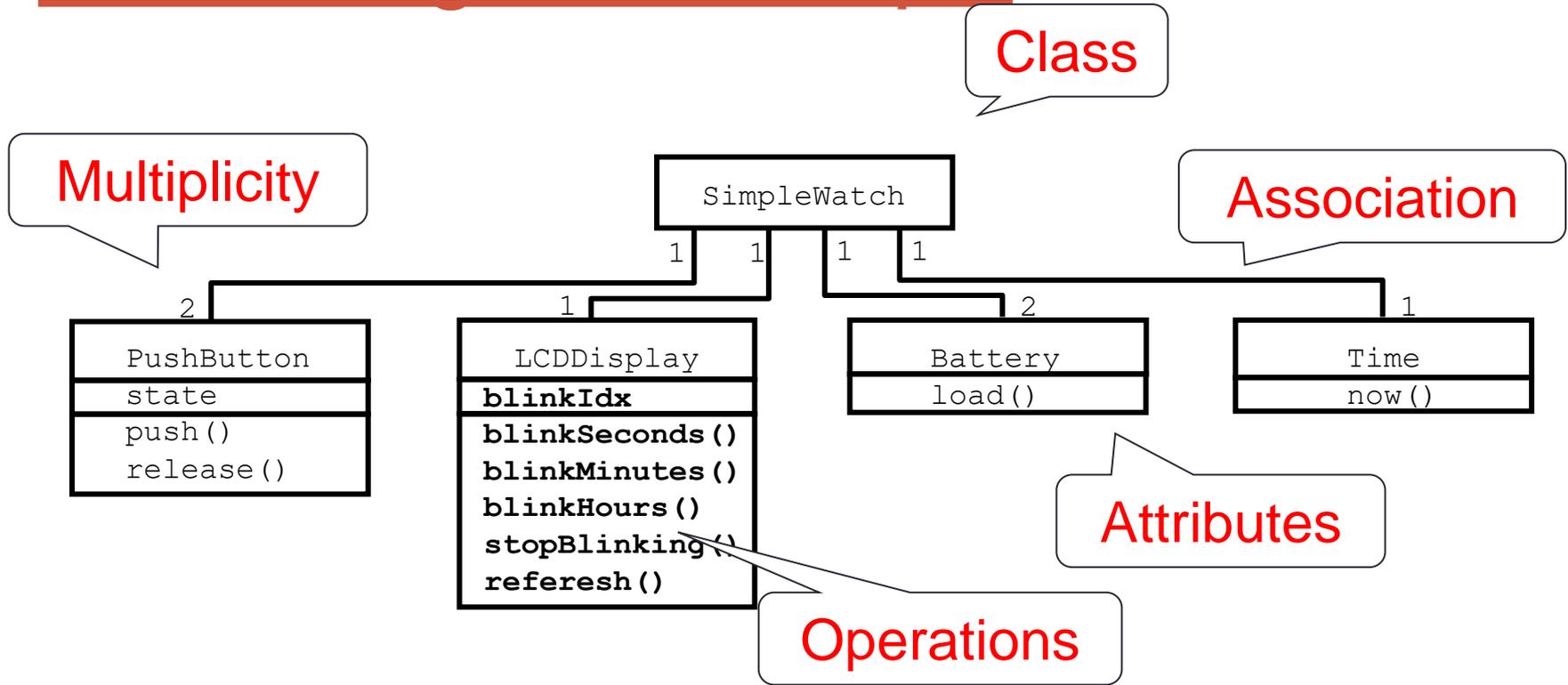
UML (Unified Modeling Language)

- UML is a modeling language for object-oriented software that allow us to specify, visualize, construct and document systems
- Use UML to help visualize design of software
- UML provides a number of **diagrams** that
 - Describe a **model** of all or part of system
 - From a particular point of **view**
 - With varying level of abstraction
- We want to use class diagrams to describe our designs

UML (Unified Modeling Language)

- Class diagram
 - Represents (static) structure of system
 - It displays
 - Information for class
 - Relationships between classes
- Note:
 - You can use them to provide description of designs
 - You may see UML formally in later courses
 - You are not responsible for knowing or using UML in this course (it will not be part of quizzes or exams)
 - It is good to know UML class diagrams basics as you can use them to define your own designs

Class Diagram Example



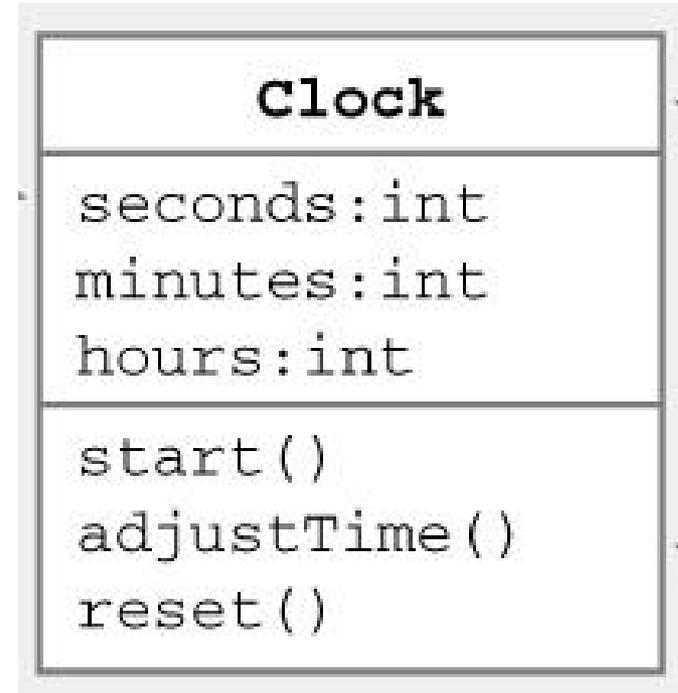
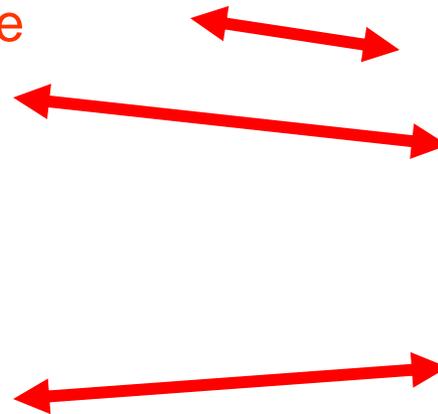
Class diagrams represent structure of the system

Java → UML : Clock Example

- Java

```
class Clock { // name
  // state
  int seconds;
  int minutes;
  int hours;
  // behavior
  void start();
  void adjustTime();
  void reset();
}
```

Java Code



Class Diagram

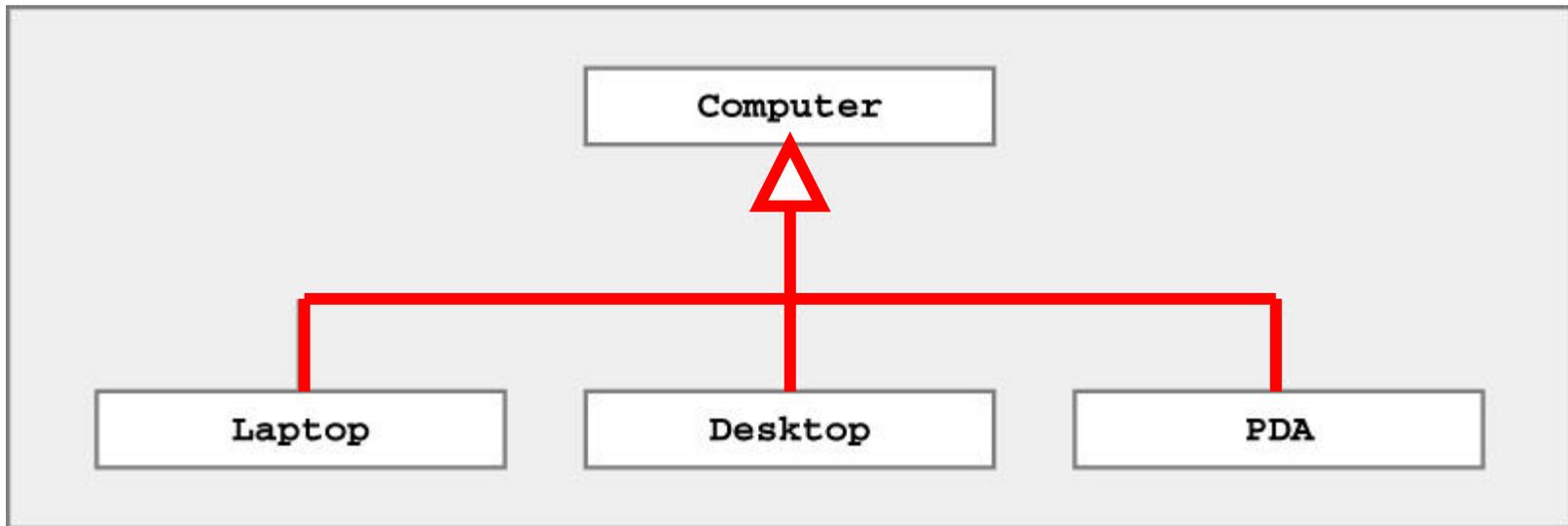
Generalization

- Denotes inheritance between classes
 - Can view as “is a” relationship
- Example
 - Lecturer is a person (Lecturer extends Person class)
- Types of generalization
 - Subclass extends superclass
 - Solid line ending in (open) triangle
 - Class implements interface
 - Dotted line ending in (open) triangle



Generalization Example

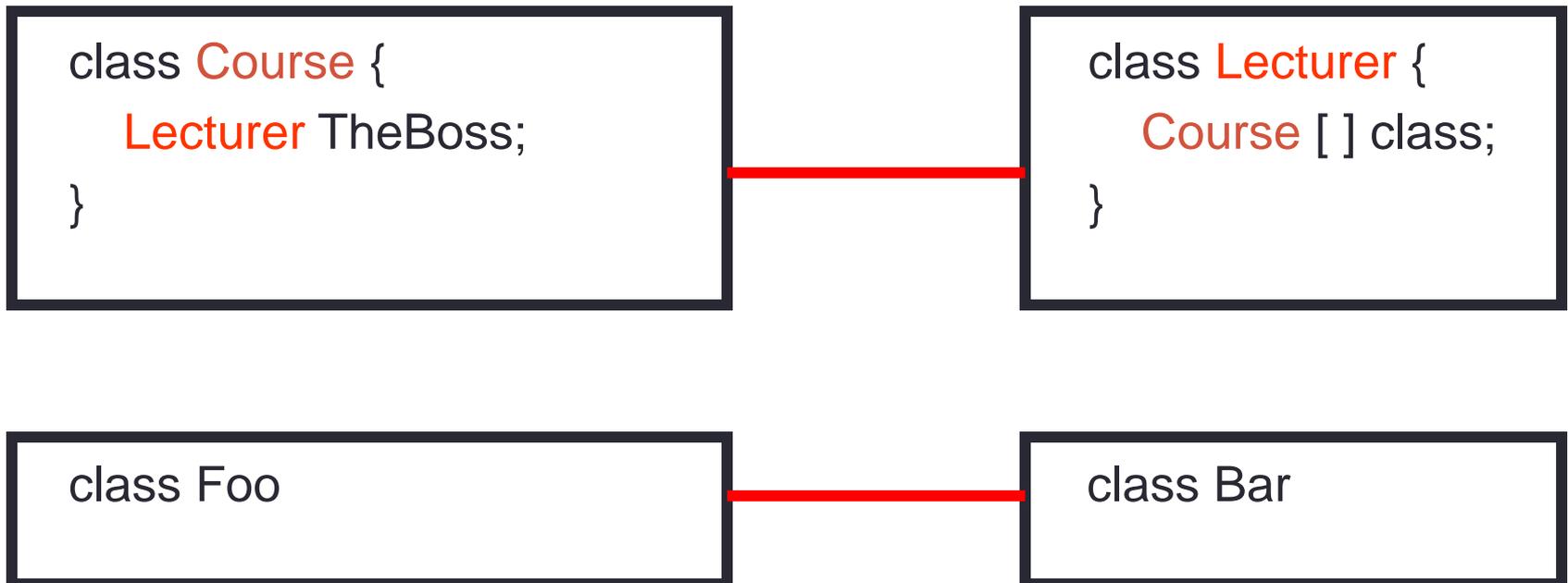
- Inheritance



**Laptop, Desktop, PDA inherit
state & behavior from Computer**

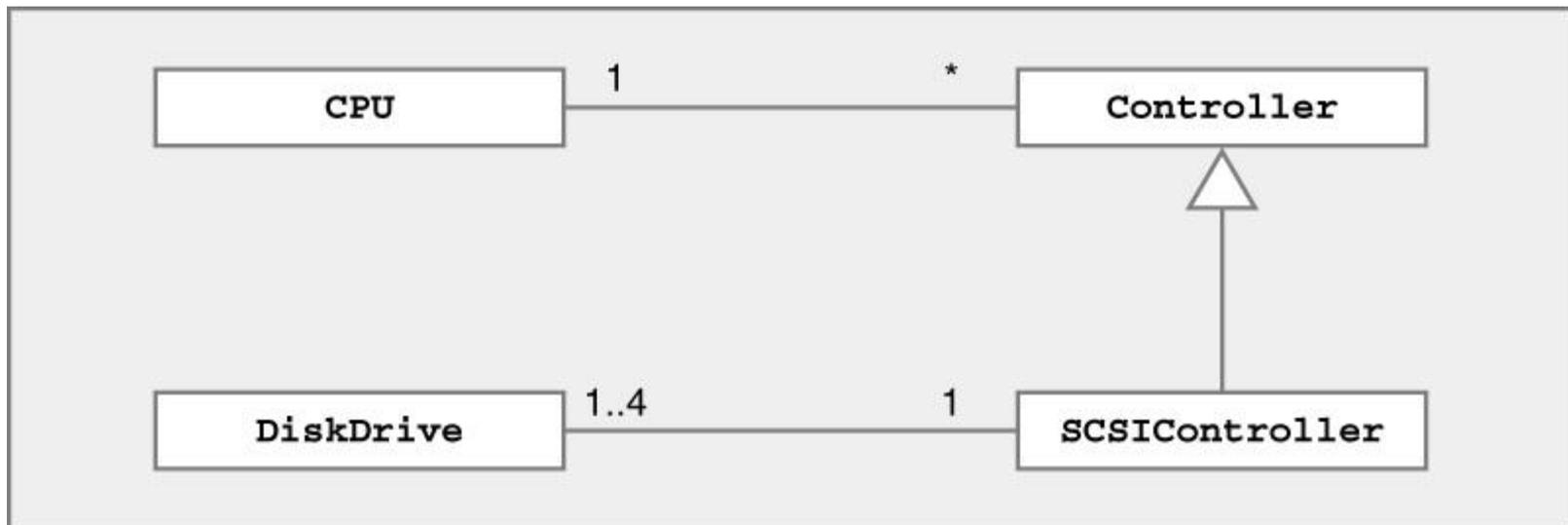
Association w/o Navigation

- Undirected edge
 - Relationship between classes may be bi-directional
 - Direction of relationship may be unknown
- Examples



UML Example – Computer System

- Try to read & understand UML diagram



- **CPU is associated with Controllers**
- **DiskDrive is associated with SCSIController**
- **SCSIController is a (type of) Controller**