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 diagrams represent structure of the system
Java → UML : Clock Example

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

- Class Diagram

Class Diagram

- Clock
  ```
  seconds:int
  minutes:int
  hours:int
  start()
  adjustTime()
  reset()
  ```
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

```java
class Course {
    Lecturer TheBoss;
}
```

```java
class Lecturer {
    Course [] class;
}
```

```java
class Foo
```

```java
class Bar
```
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