Lecture 1

Introduction

Your world is filled with objects. Many of these objects are controlled by computers. Computers rely on ________ to determine their execution. Modern computer programming is built from the concept of objects (Object-Oriented Programming OOP).

Definition (from a computer science perspective)

An object is something that has
• ________ - the object’s attributes or characteristics
• ________ - any action that is performed by or upon the object

example objects

a smart watch
your student records
What is the behavior of this object?
What are possible attributes for this object?

**objects interact with other objects**
What additional objects are essential in order to place a cell phone call?

**objects can be made from other objects**
What are the component parts of a cell phone?

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Every object belongs to a group.
Membership in the group determines behavior & attributes
In software such a group of objects is called a **class**.
Every object must belong to some class.

**for example**
- The white oak in your front yard belongs to the class of ________.
- Wisconsin is an object of type ________.
- Your new Tesla is an object from the ________ class.
Software Engineering

Write software for each class.

Discover & design objects/classes
(software ________)

Learn what the software is supposed to do
(software ________)

Software Design

discover the objects and design/specify classes for the objects

A class diagram is a picture of the members of a class. The notation used here is borrowed from the Universal Modeling Language (UML).

<table>
<thead>
<tr>
<th>Class Name</th>
<th>state attributes/instance variables</th>
<th>operations/methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>FitnessTracker</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Example
public class FitnessTracker{
    private boolean isOn;
    private int stepCount;
    private int stepsPerMile;
    private int stairStepCount;
    private HourAndMinute time;

    public void turnOn() {
        isOn = true;
    }
    public void turnOff() {
        isOn = false;
    }
    // There is code omitted from here
}

A __________ is a collection of instructions that can be executed by a computer.
Software is one or more programs or portions of programs.
Programming is the act of composing software. Synonym: software development

Two Characteristics of Good Software
Correct
A correct program is one that properly performs the intended task.

Readable
A readable program is easily understood by other programmers.

Each program follows the rules of some programming __________.
In this course the programming language that is used is called Java.
Every programming language has rules for...

**syntax**
Syntax is the **form** of the program. (grammar, punctuation, spelling)

**semantics**
Semantics refers to the **meaning** of the program.

The hungry student ate a Chicago-style pizza.

Does the following represent a change in **syntax** or **semantics**?

The hungry student consumed one Chicago-style pizza.

Does the following represent a change in **syntax** or **semantics**?

The hungry students cooked two stuffed crust pizzas.

Find the errors below. Are they **syntactic** or **semantic** errors?

Student the HuyNgRyeated a Cicago-style pizzas$

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Program: from concept to execution

<table>
<thead>
<tr>
<th>Action</th>
<th>Software Tool</th>
<th>Deliverable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Programmer types the software into the computer.</td>
<td>Text editor</td>
<td>Source code file (className.java)</td>
</tr>
<tr>
<td>The software is translated into a form that is &quot;understood&quot; by the computer.</td>
<td>Java compiler</td>
<td>Bytecode file (className.class)</td>
</tr>
<tr>
<td>The program executes.</td>
<td>Java Virtual Machine</td>
<td></td>
</tr>
</tbody>
</table>