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Access Modifiers, Composition & Design

What we're going to learn

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- What are OOP access modifiers
- What composition is
- How to approach designing classes using what we've learned so far
- Flower Garden Assignment 1

Check In

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Draw how your week has been going so far and discuss with your group

Students, draw anywhere on this slide!

What are access modifiers?

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- Access modifiers are *typically* keywords in OOP programming languages that specify the accessibility of classes, methods, and properties
- They are used to have even more control over encapsulation of components of code that you write
- Help you use data hiding

Access Modifiers

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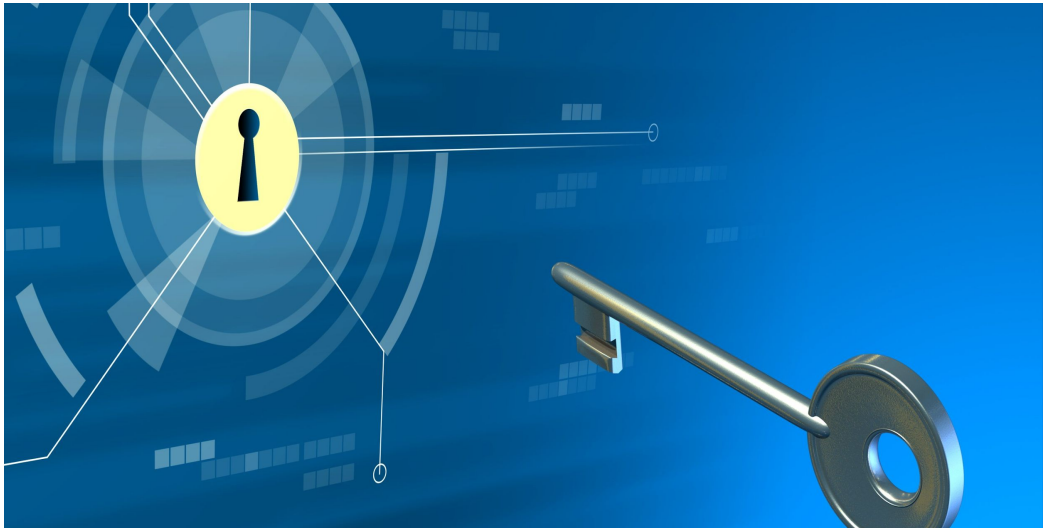
Why might we want to use access modifiers in our code? Are there cases where we don't want to give everyone access to use or make changes to some properties and methods in our classes we build?



Levels of Access

There are typically three types of access specified by OOP programming languages

- **Private**
- **Protected**
- **Public**

What do you think each of these mean?

Types of Access Modifiers

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- **Private**: Only accessible within the class
- **Protected**: Like private but also accessible to to subclasses
- **Public**: Accessible from anywhere

Access modifiers in Python

Unlike other OO Programming Languages Python **does not by default** use access modifier keywords

In fact, by default, everything in Python is public

Instead Python uses conventions and agreement to indicate access level but you can still access and mess with things if you want to

Access Modifiers in Python: An Example

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- **Private**: Double ___ prefix
  - Cannot access with .___, but can with ._class_name._class___variable
- **Protected**: A single _ prefix
- **Public**: doesn't need anything special, all members public by default

Now it’s your turn!

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Complete the TODO items in the given code

Students browse: repl.it/@MakeSchool/accessmodifierspractice?lite=true

Design Practice

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Let’s imagine we are designing a Car class.

Our Car class will include two properties: model and color.

Our Car class will also have : paint_car() which will update the color property of the car

What access would you assign to each of these members of the car class and why?

Students, write your response!

Getters & Setters

- Methods used to get and change properties without directly accessing a property that is supposed to be private
- Let's look at an example

Students browse: repl.it/@JessDahmen/gettersandsetters?lite=true

Getters & Setters

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- Do we need to create a getter and setter for every single private property in our class?

Students, write your response!

Composition

- A way to combine objects to create more complex objects
- Composition is when a class references one or more objects of other classes when it is instantiated into an object
- This is often called a “has-a” association

Let’s look at an example

Let’s create a class called Team that uses composition with Player objects

Students browse: repl.it/@MakeSchool/composition?lite=true

Now it’s your turn

Pretend you are building a fantasy video game

Create a class called Weapon that will represent the weapon the player is going to use

Create a class called Player that uses composition to have the weapon as a property of the the player

Students browse: repl.it/@MakeSchool/compositionpractice?lite=true

Check your Understanding

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In your own words describe what private, protected, and public mean in OOP

Students, write your response!

Check your Understanding

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In your own words describe what composition means in OOP

Students, write your response!

Sorting Machine

Let’s use what we have learned to start building a sorting machine class that will implement different sorting methods to sort lists of numbers!

Students browse: repl.it/@JessDahmen/sortingrobot?lite=true

Bubble Sort!

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Students browse: visualgo.net/bn/sorting

First Assignment

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Flower Garden

Some notes on turning in assignments

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To pass an assignment you need to turn in BOTH

- Code
- A video demo of your completed code
- This is to show that you completed the assignment and you understand what you turned in

What sorts of things should you do in your code demo to effectively demonstrate mastery of the concepts you used to complete the assignment?

Students, write your response!

Tips and Tricks

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- Double check the rubrics
- Put comments in your code to help guide you
- Don’t worry about perfection or polish, just pretend you are showing someone your code
- Highlight how you solved the problem at a high level and coding constructs you used

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Shout outs

Students, write your response!