MAKE SCHOOL

Polymorphism

What we're going to learn

- What polymorphism means and how it relates to inheritance and overriding
- How to implement and use polymorphism

Check In

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Share your favorite easy 30 min recipe!

Students, write your response!

Recap of OOP Part 2: Inheritance

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- **Inheritance** is a mechanism of objects that allows one to derive classes based off another class and share properties and methods among class hierarchies.
- Objects can inherit methods and properties from other objects, allowing for modular and D.R.Y. object characterization.
- A **superclass** is a higher-hierarchy base class that has basic attributes to derive from.
- A **subclass** is a lower-hierarchy class that derives attributes from another base class.

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Polymorphism
What does this word mean to you?

Students, write your response!

Polymorphism

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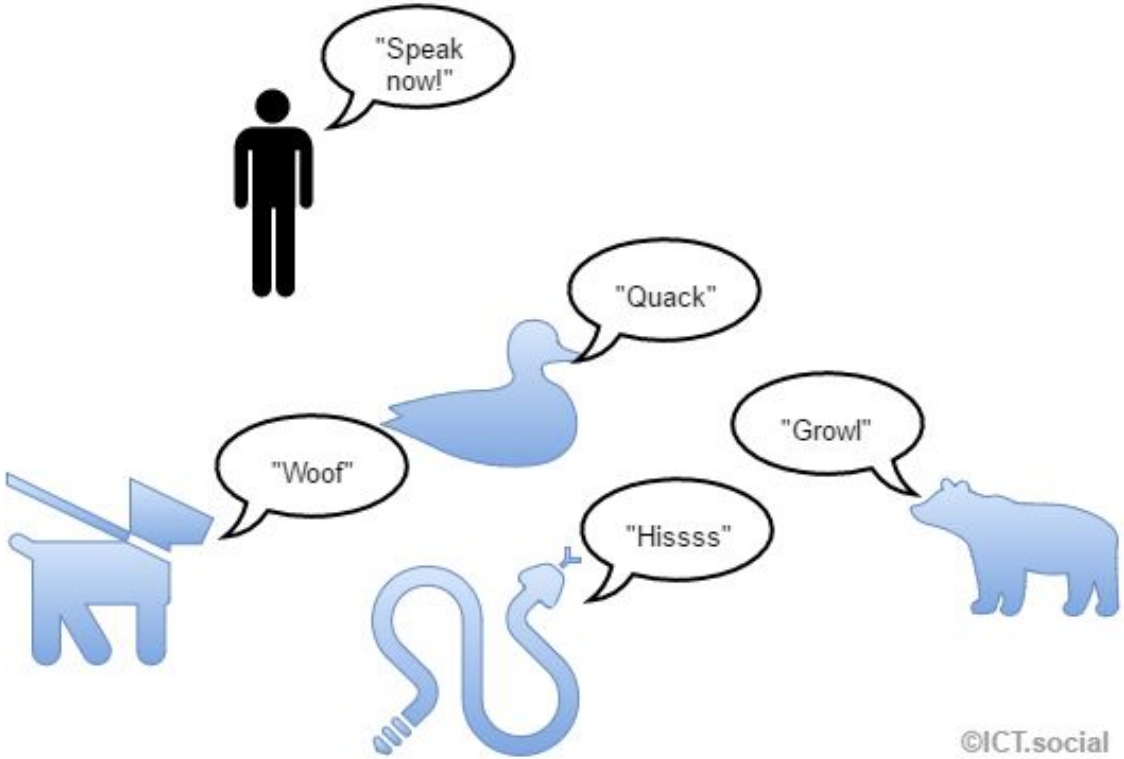
- **Polymorphism** is a mechanism by which a single object can take on many different forms.

- Objects demonstrating *polymorphism* often have multiple different instances with different methods/properties sharing the same name.

- Polymorphism occurs through the mechanic of *inheritance*.

Polymorphism



Pac-Man and Polymorphism

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Consider our **Pac-Man** class structure.

Let's extend our objects to include an example of polymorphism.

The `Eatable()` class has an `.eat()` method, but its implementation can differ between the superclass and each of its subclasses (e.g., Pac-Man can always eat pellets and fruits, but can only eat ghosts when they're scared).

This allows us to access different behaviors (implementations of the method), **even though the method name is the same**.

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Let’s look at an example!

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

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Now it's your turn!

Create another subclass of Animal with at least two methods one of them being an inherited method!

Be prepared to share with the class!

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

Consider...

We're calling the same function 3 times in the previous code snippet. How can we improve this code to be less redundant?

```
John = Person("John")
Jane = Student("Jane")
Jamie = Teacher("Jamie")

John.say_hello()
Jane.say_hello()
Jamie.say_hello()
```

Students, write your response!

Functionalize Our Classes

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We can modify and clean up our code to showcase how **polymorphism** and **inheritance** allows for more *D.R.Y.* and less redundant code snippets.

When we have objects of different classes that each inherit from the same superclass, we can call a method on each object and see different behavior.

```
John = Person("John")
Jane = Student("Jane")
Jamie = Teacher("Jamie")

people = [John, Jane, Jamie]

for person in people:
    person.say_hello()
```

Polymorphism in Functions

We can write functions that also take advantage of polymorphism!

In our function we don’t need to care about which object is being passed as a parameter, all we assume is that it has some sort of speak() method

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Summary

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- **Objects** are structured collections of data in the form of variables (**properties**) and functions that act on those variables (**methods**)
- **Classes** are blueprint-like structures used to **create object instances**.
- To use a class, access its properties and call its methods, one must **instantiate an object** that represents an instance of that class.
- **Subclasses** will **inherit** all properties and methods from its **superclass**, which allows code using OOP to avoid duplication and remain DRY.
- Classes can have **polymorphic** methods that have the same name but different behaviors (implementations) based on the object's actual class.

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Shout outs

Students, write your response!

Assignments

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- Flower Garden (Sept 4th)
- Quiz 1 (Sept 8th)
- Superhero Team Dueler Tutorial (Sept 11th)