CSCI 132:
Basic Data Structures & Algorithms

Interfaces

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Fall 24

MONTANA
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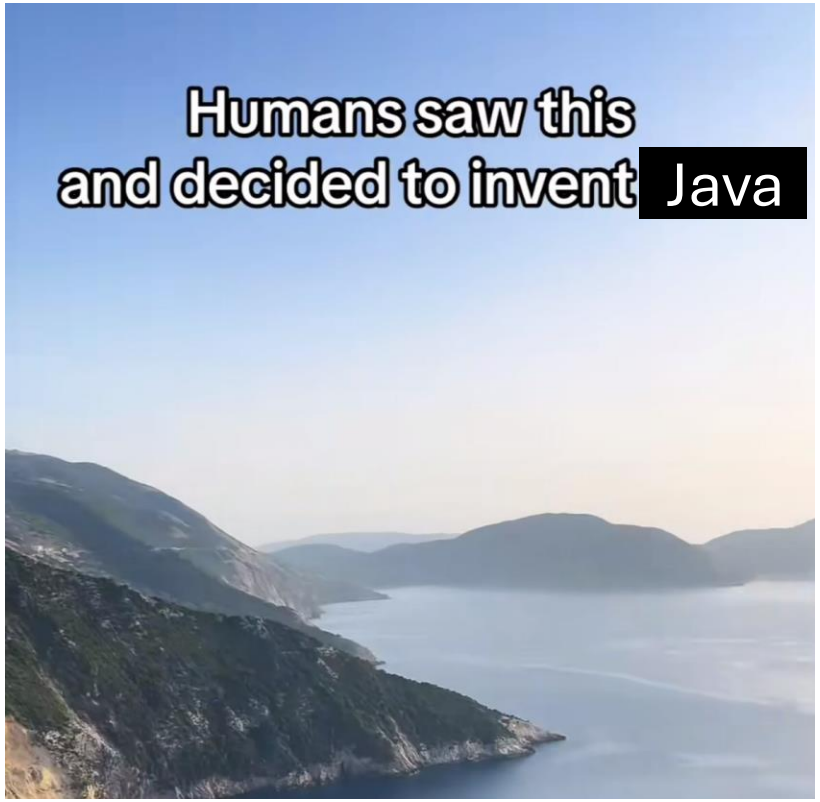
Announcements

- Course website is back!
- Lab 3 due Sep 12th (tomorrow) @ 11:59PM
- Program 1 due in < 2 weeks
- Remember to pick up a duck if you haven't yet



Inheritance is a mechanism that allows a parent class to pass on **public** and **protected** instance fields and methods to a *child* class

```
public class Vegetable extends Food{
}
```

Inheritance is great when you have **shared behaviors and attributes** across classes with the **same implementation**

Inheritance is a mechanism that allows a parent class to pass on **public** and **protected** instance fields and methods to a *child* class

```
public class Vegetable extends Food{
}
```

Inheritance is great when you have **shared behaviors and attributes** across classes with the **same implementation**

Vegetable

```
public String getName(){
     return this.name;
}
```

Fruit

```
public String getName(){
     return this.name;
}
```

Beverage

```
public String getName(){
     return this.name;
}
```

Same code (same implementation!!!)

Interfaces are abstract classes that only contain methods with no body

```
public interface Vehicle {
	void accelerate(int a);
	void slowdown(int a);
	void refuel(int a);
}
```

`accelerate`, `slow down`, and `refuel` are all common behavior that all vehicles will have

However, the specifics of how they accelerate, slow down, refuel will be different between vehicles (ie the body of the methods will be slightly different)

Interfaces can be used to specify what a class must do, but not how

Interfaces are abstract classes that only contain methods with no body

```
public interface Vehicle {
	void accelerate(int a);
	void slowdown(int a);
	void refuel(int a);
}
```

```
public class Ferrari implements Vehicle {
}
```

For a Java class to use an interface, it must use the `implements` keyword

We can implement multiple interfaces (unlike inheritance)

Interfaces are abstract classes that only contain methods with no body

```
public interface Vehicle {
        void accelerate(int a);
        void slowdown(int a);
        void refuel(int a);
}
```

```
public class Ferrari implements Vehicle {

@Override
public void accelerate(int a) {
        …
}
@Override
public void slowdown(int a) {
        …
}
@Override
public void refuel(int a) {
}
        …
}
```



You can not create an instance of an interface

In the interface, the method bodies must be empty

- (Remember, the classes that use our interface will have the method bodies)

The code of the method body is omitted, but that is where the programmer can put the specific behavior of:

- how a Ferrari will accelerate
- how a Ferrari will slow down
- how a Ferrari will refuel

Interfaces are abstract classes that only contain methods with no body

Why use interfaces?

- Interfaces are great when you **shared behavior** with **different implementations**

- It forces classes to implement X methods that might not logically belong to them (more control)

- It provides **abstraction** (ie the details of how things are implemented are not revealed in an interface)

Given a side length **a**

Shape	**Perimeter Formula**	**Area Formula**
Square	a * 4	a^2
Equilateral Triangle	a * 3	$\frac{\sqrt{3}}{4}a^2$
Regular Pentagon	a * 5	$\frac{1}{4}\sqrt{5\left(5+2\sqrt{5}\right)}\,a^2$
Regular Hexagon	a * 6	$\frac{3\sqrt{3}}{2}a^2$

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Shared behaviors with different implementations