Alexander Kindall Notes for CS2050

Review Code and Concepts

Data Types

- When declaring a variable for a primitive data type enough memory is allocated based on the data type
- **Primitive Data Types**
  - Can only store one thing

- **Non-Primitive Data types**
  - Stores an address on the stack
- Rules
  - When declaring variables be sure that the potential values can fit into the type assigned(real numbers to int)

Static and Instance Variables

Static:

- Static Variables belong to the class and don't need an instance of an object to be used or created. Each instance of the class will share these variables. Used when each object needs to share a certain variable/attribute.

Instance:

- Instance variables are variables that are specific to a certain object of a class, or the instance of that class. Used when an object needs to have its own specific attribute.

Pass by Reference and Pass by Value

Pass by Reference:

- Pass by reference allows for any method to directly modify the value of the original variable.

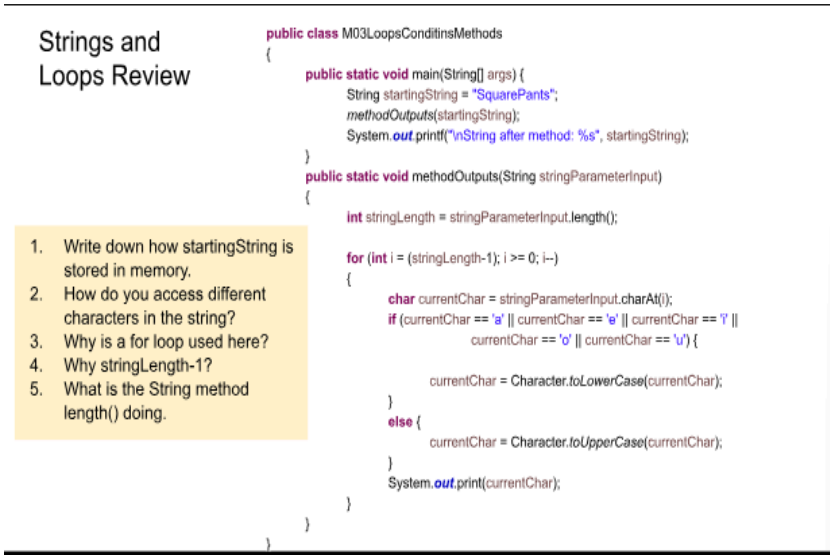
Pass by Value:

- Pass by Value means that only a copy of some variable is used and doesn't affect the original value.

Strings/Arrays

Strings are just arrays that hold characters instead of objects.

Example code in Slides(slide 11)



1. startingString is stored as a reference variable because it is not a primitive data type. It is also an array that is stored from index 0 and placed in memory consecutively.
2. You can access different characters in the string by indexing through the string using a loop.
3. A for loop is used to index through the string because it can work with the value of the string's length.
4. stringLength-1 is used because if you used the full value of the string the for loop will fall out of bounds and cause an error within the program.
5. The String method length() is getting the length of the string, the amount of characters, that has been assigned to the variable startingString, this then produces an integer value for the variable stringLength to use.

Arrays are passed by Reference because they are non-primitive, and hold a reference to a memory address.

Rules for Arrays

- Once created an Arrays size is fixed
- All elements in an array will be the same type

Scope

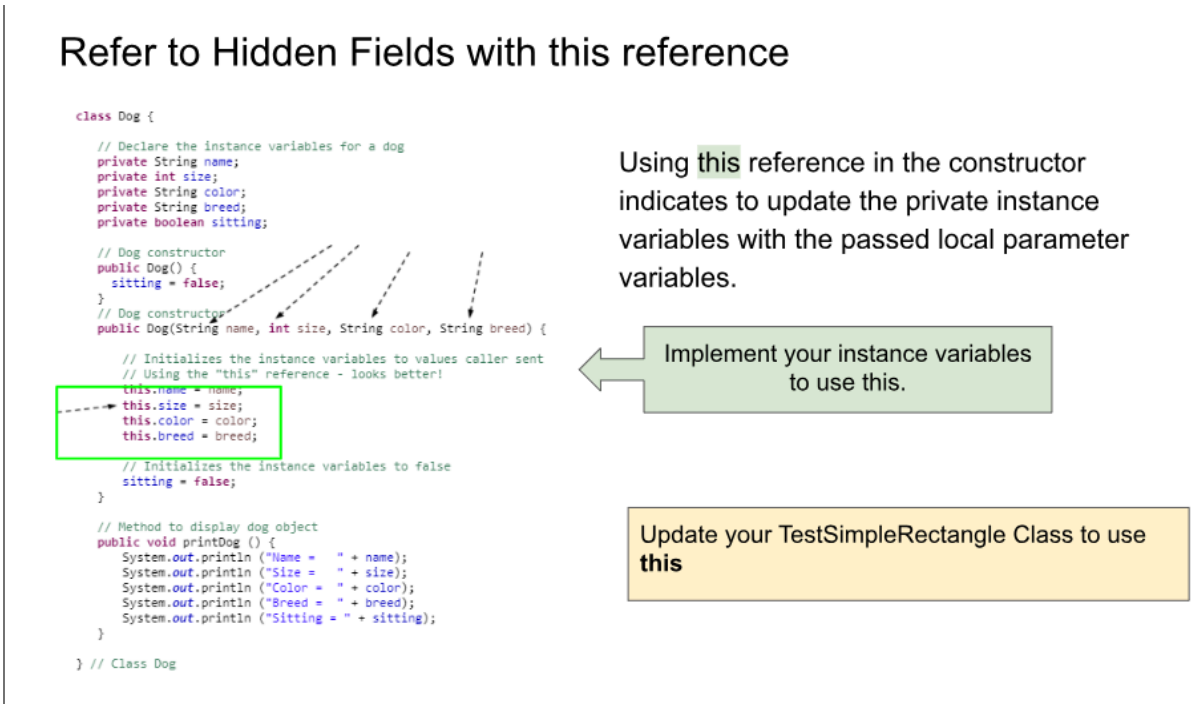
- Section of a program that a variable is visible in.

Local variable

- A variable that is defined inside a method
- The scope is from the point of declaration to the end of the block containing the variable
- Must be initialized before you can use it

this(Keyword in Java)

- Keyword in Java **this** is the name of a reference that refers to the object itself when writing code in the class.



Array of Objects

If an array is declared within code and does not contain a memory address the corresponding slots will be stored with **null**.

An array containing the same object from a class can be made instead of creating variables one by one.

An array known as “pets” is a reference variable that holds the address to the array on the heap.

At each index of that “pets” array is a reference variable that contains the address to the object on the heap.

Module 1

Polymorphism/Inheritance

Through inheritance, one class—referred to as the child class or subclass—can acquire the attributes and functionalities (fields and methods) of another class—referred to as the parent

class or superclass. This facilitates the creation of a hierarchical connection between classes and the reuse of code.

```
class Animal{
	private String name;
	private String food;
	private int weight;
	private int sleep;
	private String location;

	public Animal(String name, String food, int weight, int sleep, String location) { // constructor
		this.name = name;
		this.food = food;
		this.weight = weight;
		this.sleep = sleep;
		this.location = location;
	}
}
class Sloth extends Animal{
	public Sloth(String name, String food, int weight, int sleep, String location) {
		super(name, food, weight, sleep, location);
	}
}
```

Polymorphism can be used to run and execute methods of the same name/type but in different ways, for example:

```
class Sloth extends Animal{
	public Sloth(String name, String food, int weight, int sleep, String location)
{
		super(name, food, weight, sleep, location);
	}
}
```

The Sloth class only uses the super() method to call the Animal constructor to get the attributes for the sloth, however, the Sloth doesn't contain any of it's own unique methods, so it uses methods that are made in class Animal to showcase the attributes.

```
//general methods for animals
	public void eat() {
		System.out.println("Animal eats.");
	}
	public void sleep() {
		System.out.println("Animal sleeps");
	}
	public void swim() {
		System.out.println("Animal swims");
	}
```

Bear on the other hand doesn't use any of the general Animal methods, so it overrides those methods for it's own.

```
@Override
	public void eat() {
```

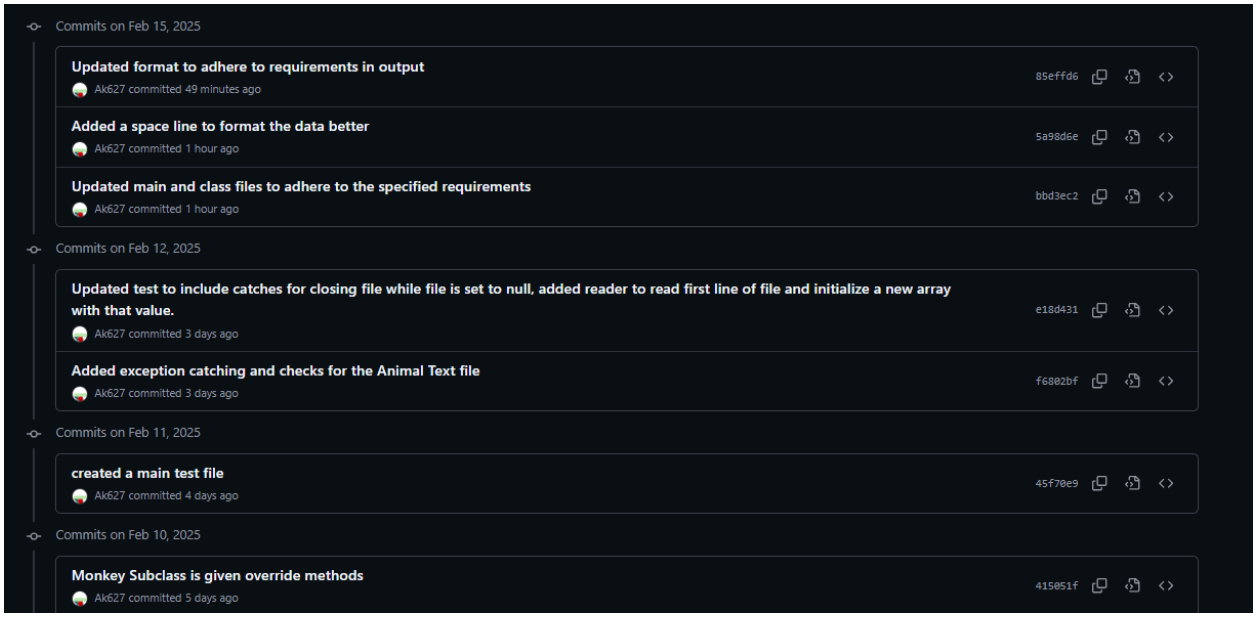
```
        System.out.println("Bear eats.");
    }

    @Override
    public void sleep() {
        System.out.println("Bear sleeps.");
    }

    @Override
    public void swim() {
        System.out.println("Bear swims.");
    }
```

Git/Github

Git and GitHub are tools that are used in development to version and upload code onto a cloud network for easy access later on.
This can be useful for development, especially in large groups, as developers can look back at old versions of code when needed if anything doesn't work and if there are updates made to the code without a developer knowing.



This showcases the history that can be seen by developers in a project.

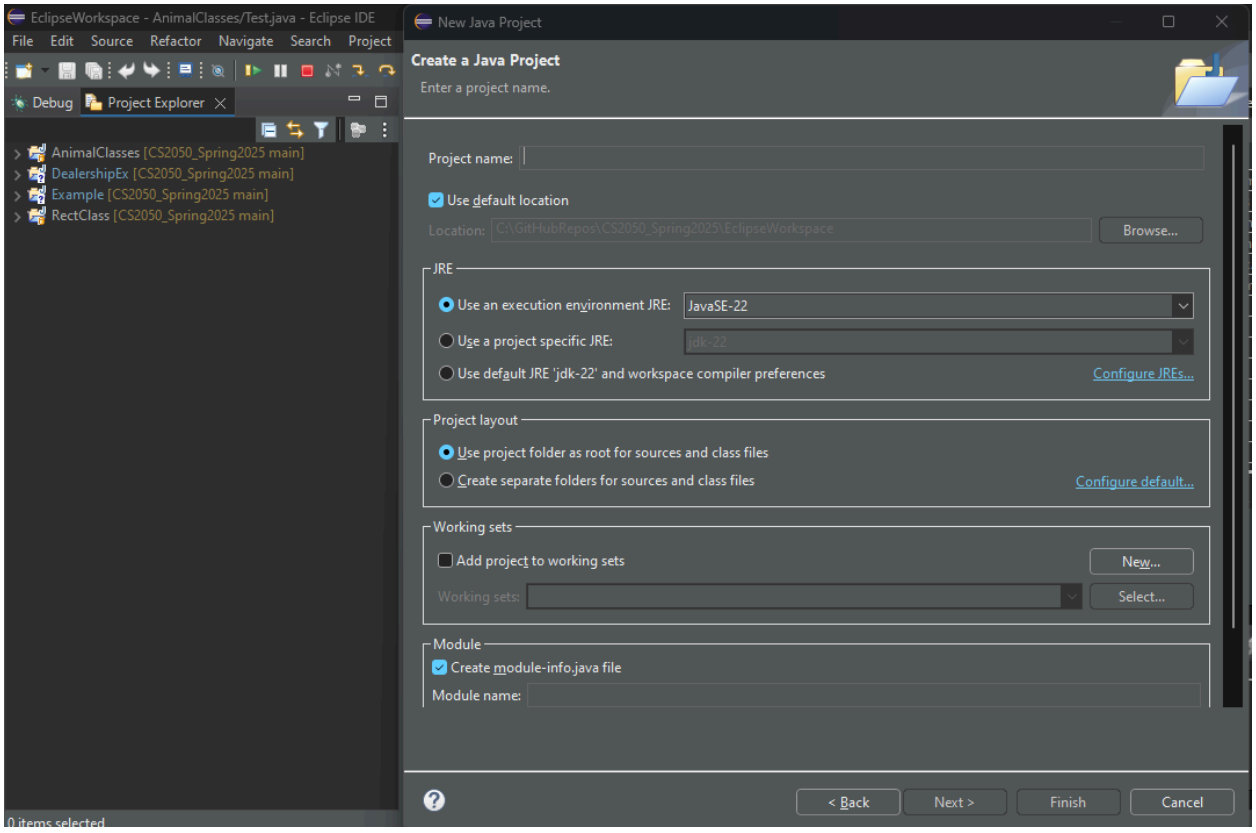
Pulls can also be used through GitHub Desktop, which can pull code from the origin(Cloud) and allow developers to update their version of code on personal devices to be the most recent version of code uploaded.

Eclipse IDE

Using Eclipse, an IDE more suited for Java development, Developers can easily organize, debug, and create Java programs.

Creating Java Programs in Eclipse

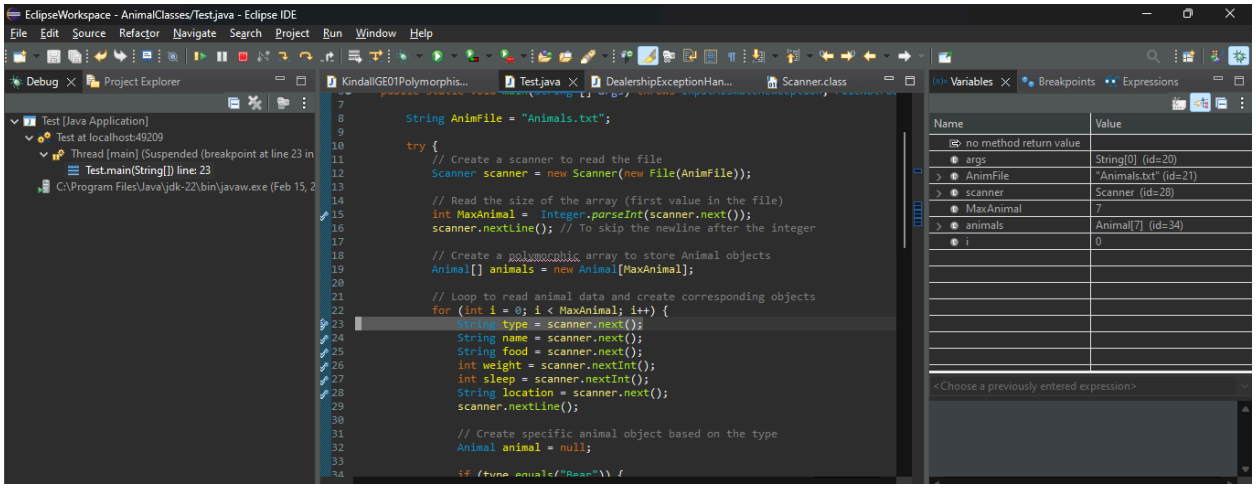
Eclipse uses file directories to find where the launch the IDE and what to read from, when creating a new project developers can create projects that hold all the files needed for that specific program much like folders that hold multiple files.



Above is what developers see when creating a new project and how they appear on the project explorer page. This creates a clear and easy way of navigating different projects at once.

Debugger

Eclipse also offers an easy-to-use debugger that can be used to find where different things can go wrong and also shows what is stored within variables to determine whether or not they are instance or static.



The above showcases my use of breakpoints in the debugger which helped me to find an issue when my code wasn't working, this was given a MismatchException that was only resolved using the debugger.