Today's Topics:

- Singleton Class
- Immutable Class
- Wrapper Class

Singleton Class:

This class objective is to create only 1 and 1 Object.

Different Ways of creating Singleton Class:

- Eager Initialization
- Lazy Initialization
- Synchronization Block
- Double Check Lock (there is a memory issue, resolved through Volatile instance variable)
- Bill Pugh Solution
- Enum Singleton

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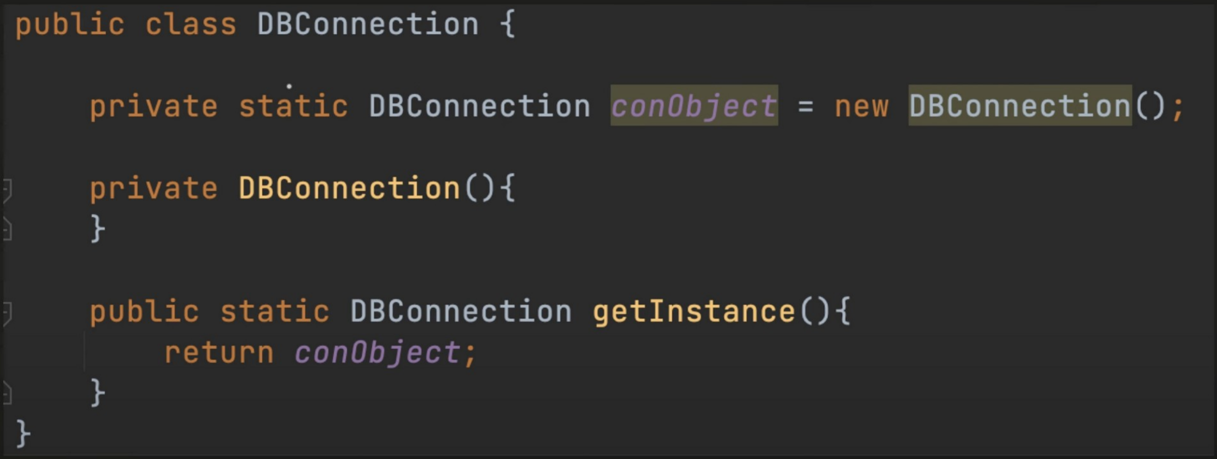
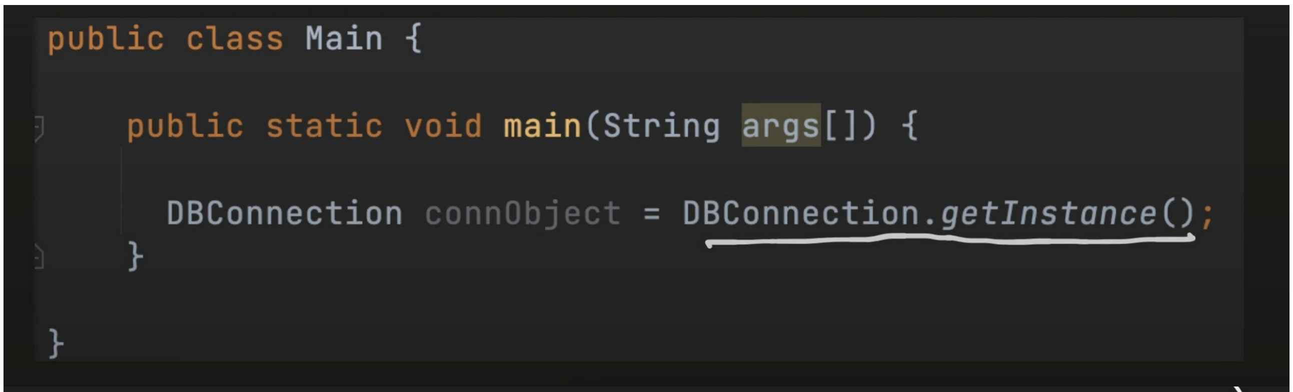
Eager Initialization:

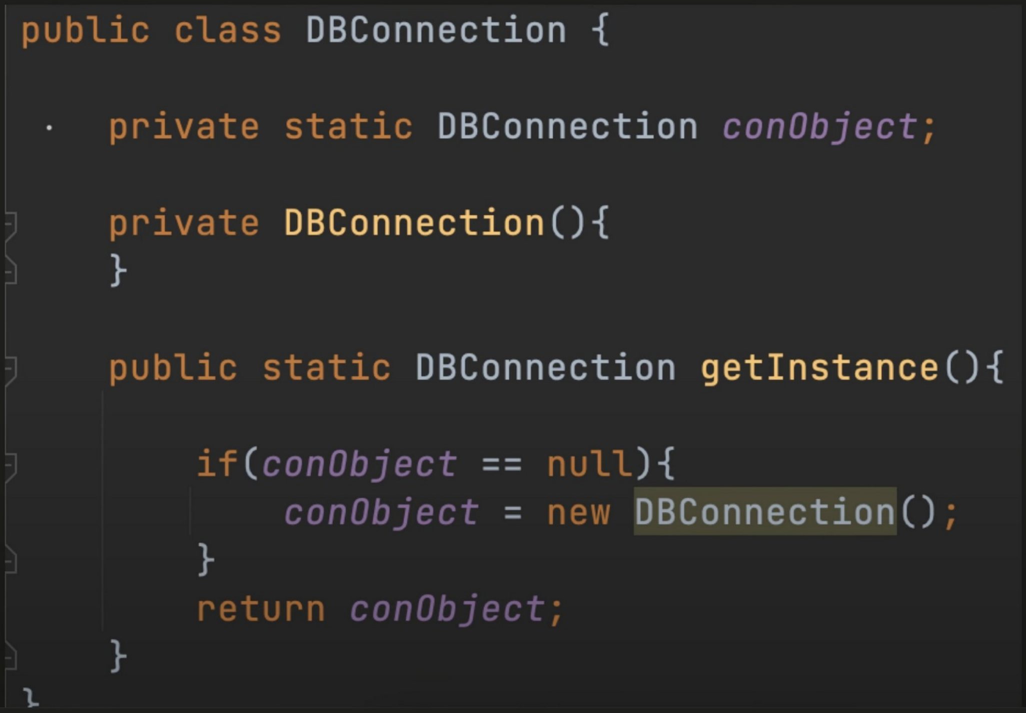


```
public class DBConnection {

    private static DBConnection conObject = new DBConnection();

    private DBConnection(){
    }

    public static DBConnection getInstance(){
        return conObject;
    }
}
```



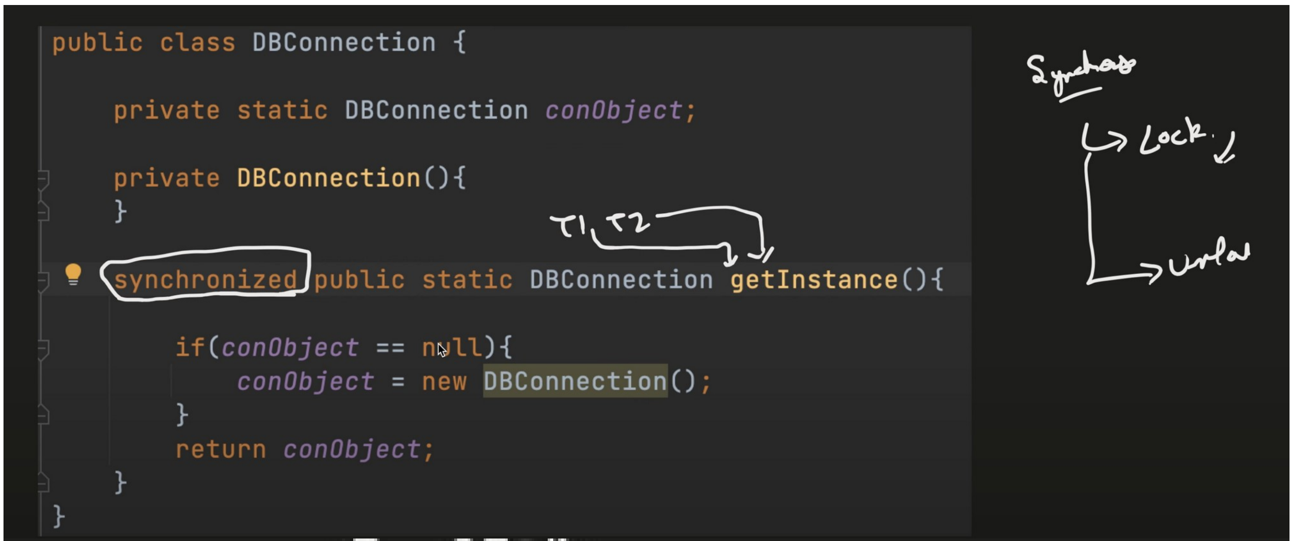
```java
public class Main {

    public static void main(String args[]) {

        DBConnection connObject = DBConnection.getInstance();
    }

}
```

Lazy Initialization:

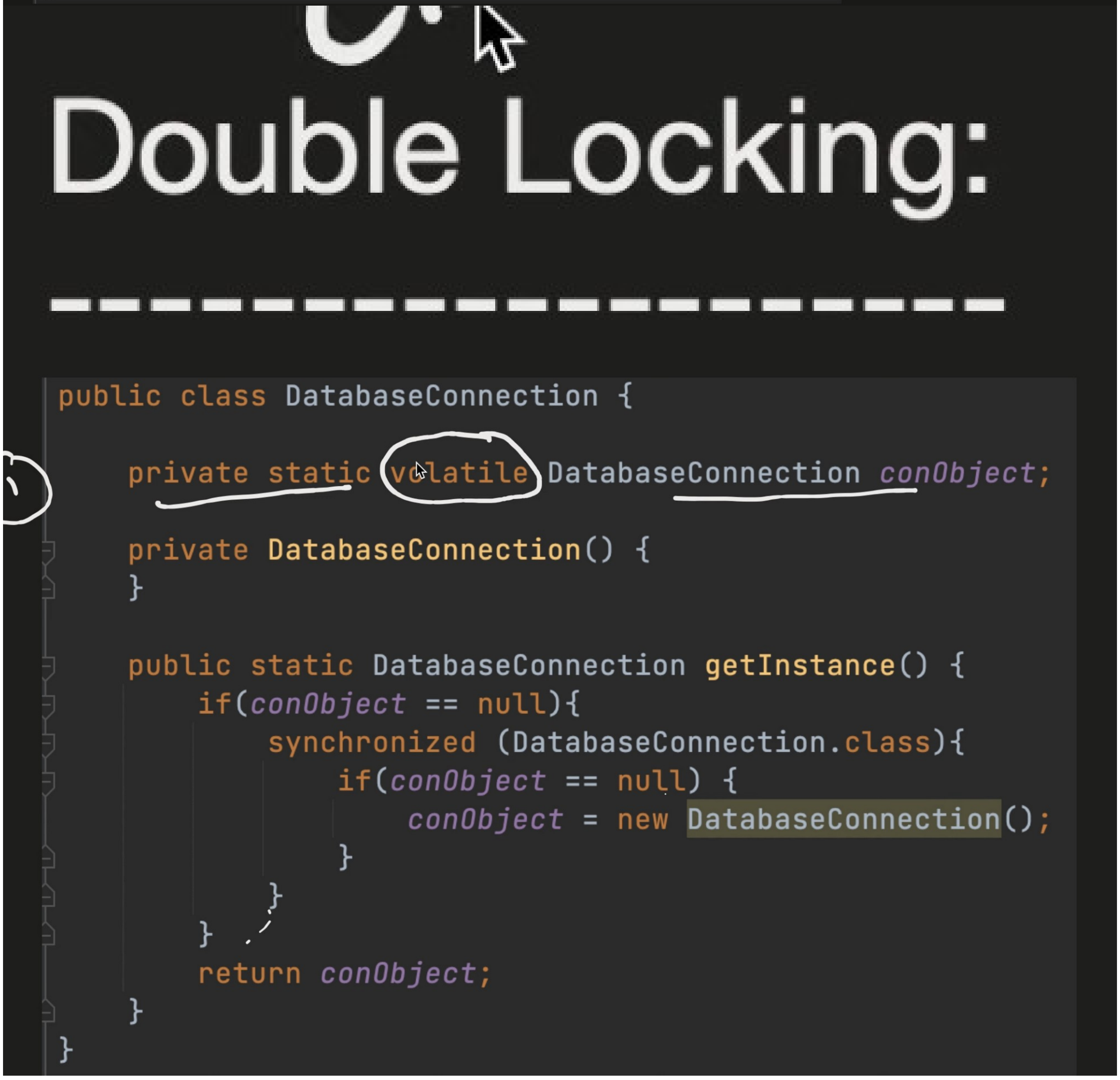


```java
public class DBConnection {

    private static DBConnection conObject;

    private DBConnection(){
    }

    public static DBConnection getInstance(){

        if(conObject == null){
            conObject = new DBConnection();
        }
        return conObject;
    }
}
```

Synchronized Method:

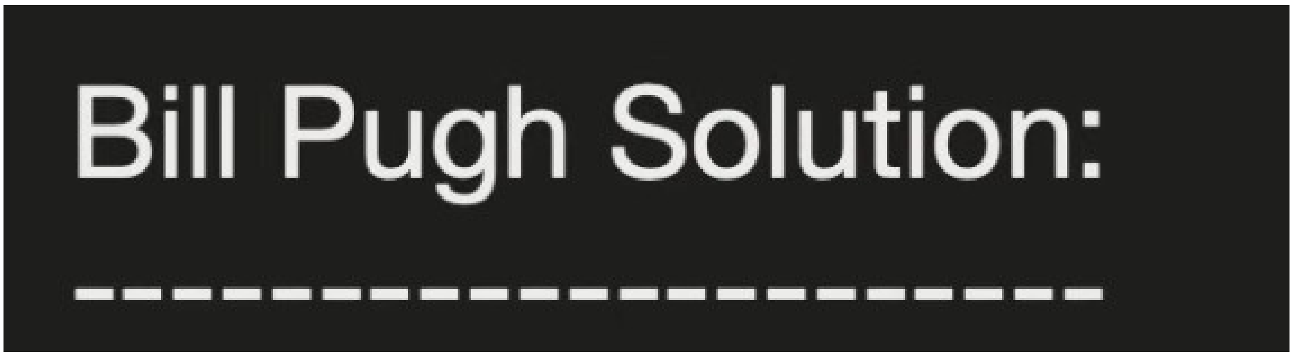


```java
public class DBConnection {

    private static DBConnection conObject;

    private DBConnection(){
    }

    synchronized public static DBConnection getInstance(){

        if(conObject == null){
            conObject = new DBConnection();
        }
        return conObject;
    }
}
```

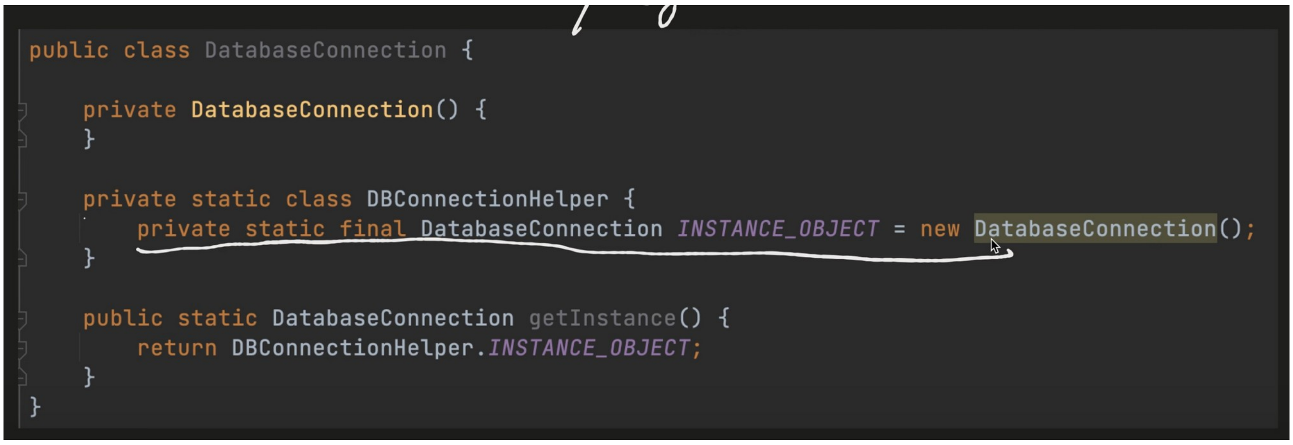


Double Locking:

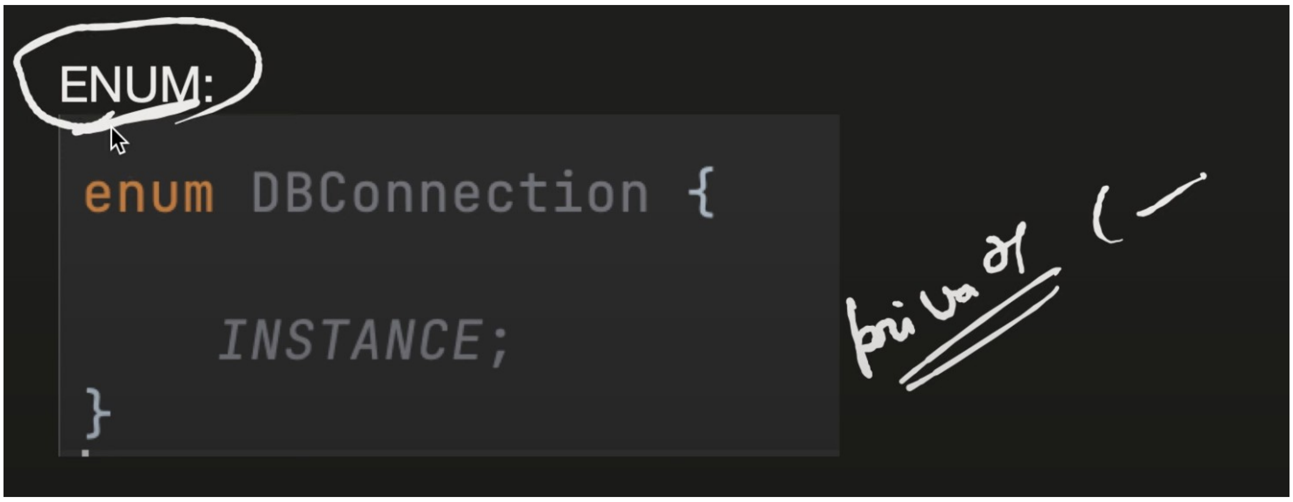
```java
public class DatabaseConnection {

    private static volatile DatabaseConnection conObject;

    private DatabaseConnection() {
    }

    public static DatabaseConnection getInstance() {
        if(conObject == null){
            synchronized (DatabaseConnection.class){
                if(conObject == null) {
                    conObject = new DatabaseConnection();
                }
            }
        }
        return conObject;
    }
}
```



Bill Pugh Solution:

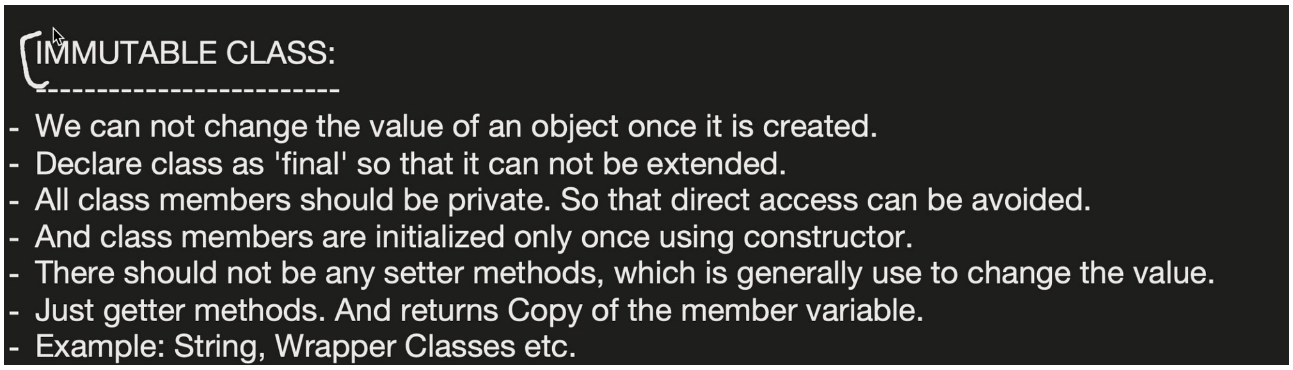


```java
public class DatabaseConnection {

    private DatabaseConnection() {
    }

    private static class DBConnectionHelper {
        private static final DatabaseConnection INSTANCE_OBJECT = new DatabaseConnection();
    }

    public static DatabaseConnection getInstance() {
        return DBConnectionHelper.INSTANCE_OBJECT;
    }
}
```



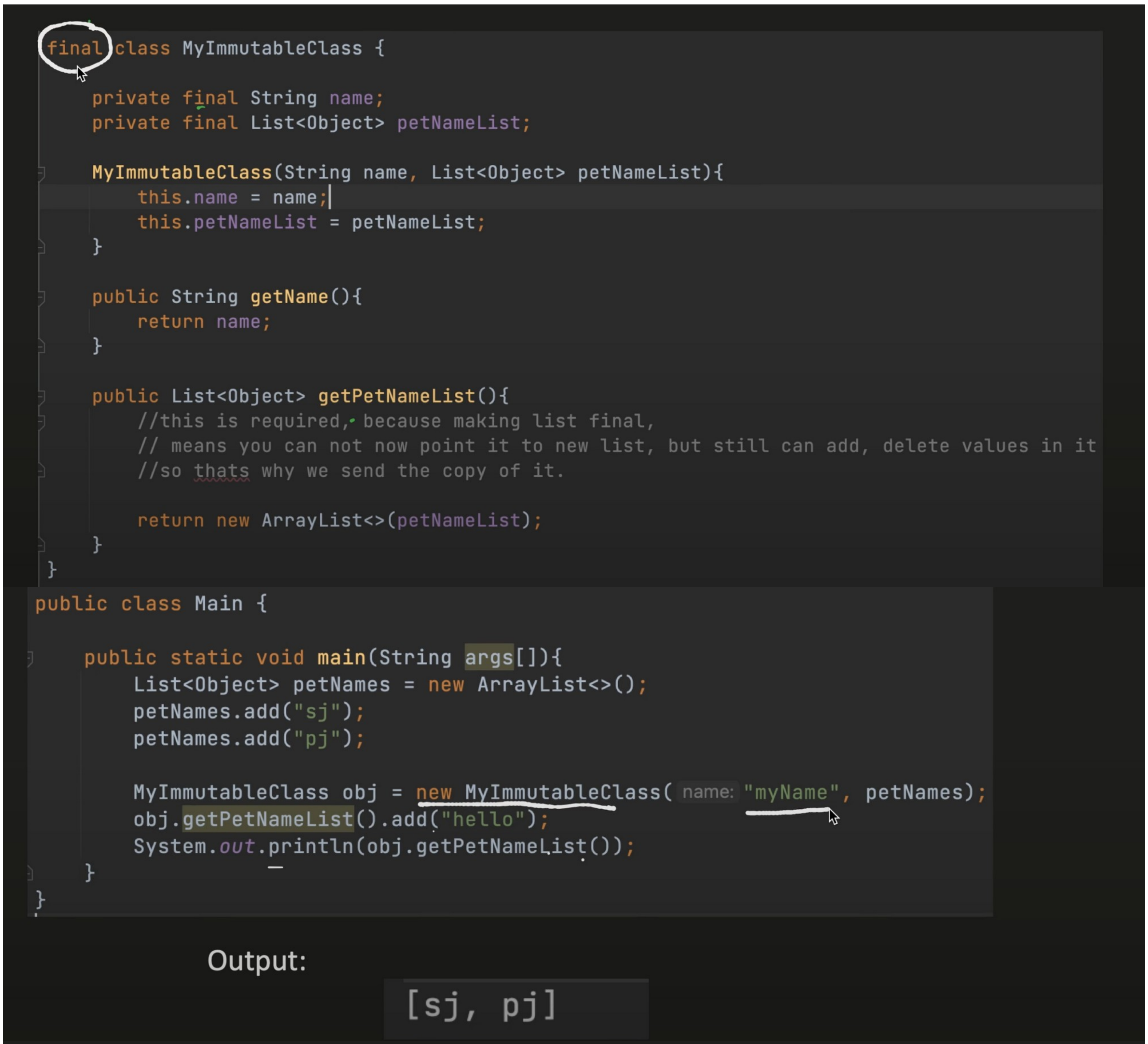
ENUM:

```java
enum DBConnection {

    INSTANCE;
}
```



IMMUTABLE CLASS:

- We can not change the value of an object once it is created.
- Declare class as 'final' so that it can not be extended.
- All class members should be private. So that direct access can be avoided.
- And class members are initialized only once using constructor.
- There should not be any setter methods, which is generally use to change the value.
- Just getter methods. And returns Copy of the member variable.
- Example: String, Wrapper Classes etc.



```
final class MyImmutableClass {

    private final String name;
    private final List<Object> petNameList;

    MyImmutableClass(String name, List<Object> petNameList){
        this.name = name;
        this.petNameList = petNameList;
    }

    public String getName(){
        return name;
    }

    public List<Object> getPetNameList(){
        //this is required, because making list final,
        // means you can not now point it to new list, but still can add, delete values in it
        //so thats why we send the copy of it.

        return new ArrayList<>(petNameList);
    }
}
public class Main {

    public static void main(String args[]){
        List<Object> petNames = new ArrayList<>();
        petNames.add("sj");
        petNames.add("pj");

        MyImmutableClass obj = new MyImmutableClass( name: "myName", petNames);
        obj.getPetNameList().add("hello");
        System.out.println(obj.getPetNameList());
    }
}
```

Output:

```
[sj, pj]
```

WRAPPER CLASS:

Checkout the Video no:
[6. Java Variables - Part2 | Reference/Non-Primitive Data Types in Depth]