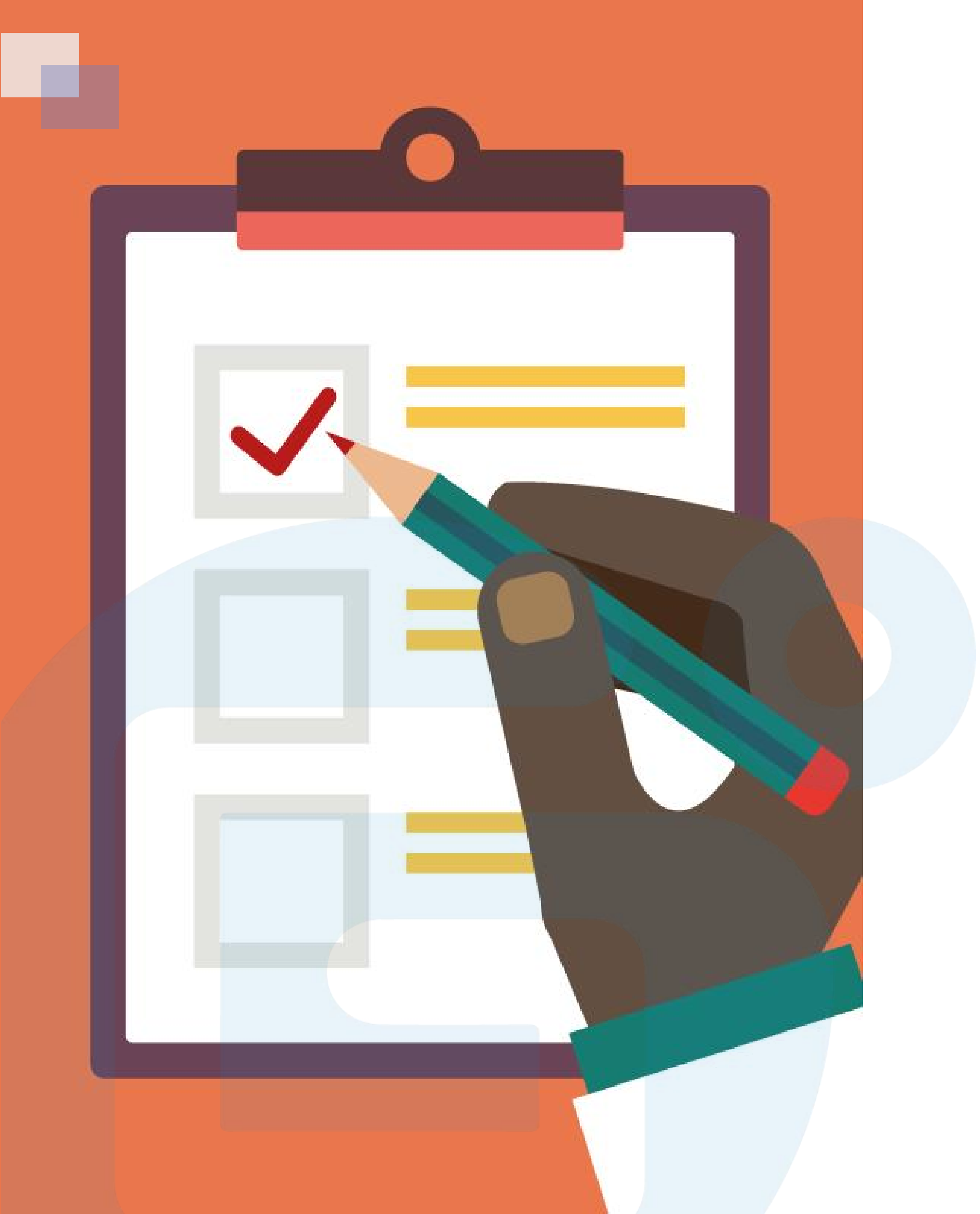
Lecture 5: Java Classes



CONTENTS OF THIS LESSON

- Classes/Objects
- Class Attributes
- Constructors
- User Input
- Date and Time
- ArrayList

Classes/Objects

- Java is an object-oriented programming language.
- Everything in Java is associated with classes and objects, along with its attributes and methods. For example: in real life, a car is an object. The car has attributes, such as weight and color, and methods, such as driving and braking.
- A Class is like an object constructor, or a “blueprint” for creating objects.
- In Java, an object is created from a class. We can first create the class and then create objects through the class.

Create a class called “Main” with a variable x:

```java
public class Main {
  int x = 5;
}
```

Create an object called “myObj” and print the value of x:

```java
public class Main {
  int x = 5;
  public static void main(String[] args) {
    Main myObj = new Main();
    System.out.println(myObj.x);
  }
}
```

Class Attributes

- We can access attributes by creating an object of the class, and by using the dot syntax (.)
- Attribute values can also be modified.

Eg. Ccreate an object of the Main class, with the name myObj and use the x attribute on the object to print its value.

```
public class Main {
  int x = 5;
  public static void main(String[] args) {
    Main myObj = new Main();
    System.out.println(myObj.x);
  }
}
```

Eg. Change the value of x to 25

```
public class Main {
  int x = 10;
  public static void main(String[] args) {
    Main myObj = new Main();
    myObj.x = 25; // x is now 25
    System.out.println(myObj.x);
  }
}
```

Constructors

- A constructor in Java is a special method that is used to initialize objects.
- The constructor is called when an object of a class is created.
- The constructor can be used to set initial values for object attributes.

```java
// Create a Main class
public class Main {
  int x;  // Create a class attribute
  // Create a class constructor for the Main class
  public Main() {
    x = 5;  // Set the initial value for the class attribute x
  }
  public static void main(String[] args) {
    Main myObj = new Main(); // Create an object of class Main (This will call the constructor)
    System.out.println(myObj.x); // Print the value of x
  }
}
```

Note: The constructor name must match the class name, and it cannot have a return type, such as void.

Constructors can also take parameters, which is used to initialize attributes.

```java
public class Main {
  int x;
  public Main(int y) {
    x = y;
  }
  public static void main(String[] args) {
    Main myObj = new Main(5);
    System.out.println(myObj.x);
  }
}
// Outputs 5
```

```java
public class Main {
  int modelYear;
  String modelName;
  public Main(int year, String name) {
    modelYear = year;
    modelName = name;
  }
  public static void main(String[] args) {
    Main myCar = new Main(1969, "Mustang");
    System.out.println(myCar.modelYear + " " + myCar.modelName);
  }
}
// Outputs 1969 Mustang
```

User Input

- In java.util package, Scanner can be used to get user input.
- nextLine( ) method is used to read the user input.

Types of input

Method	Description
nextBoolean()	Reads a boolean value from the user
nextByte()	Reads a byte value from the user
nextDouble()	Reads a double value from the user
nextFloat()	Reads a float value from the user
nextInt()	Reads a int value from the user
nextLine()	Reads a String value from the user

```java
import java.util.Scanner;
class Main {
  public static void main(String[] args) {
    Scanner myObj = new Scanner(System.in);
    System.out.println("Enter name, age and salary:");
    // String input
    String name = myObj.nextLine();
    // Numerical input
    int age = myObj.nextInt();
    double salary = myObj.nextDouble();
    // Output input by user
    System.out.println("Name: " + name);
    System.out.println("Age: " + age);
    System.out.println("Salary: " + salary);
  }
}
```

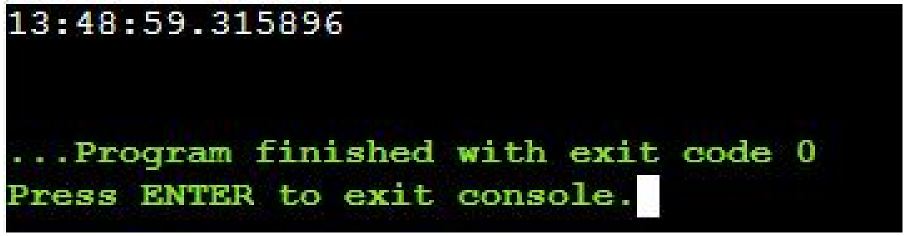
Date and Time

Java.time package can be used to work with the date and time API.

Class	Description
LocalDate	Represents a date (year, month, day (yyyy-MM-dd))
LocalTime	Represents a time (hour, minute, second and nanoseconds (HH-mm-ss-ns))
LocalDateTime	Represents both a date and a time (yyyy-MM-dd-HH-mm-ss-ns)
DateTimeFormatter	Formatter for displaying and parsing date-time objects

- Display the current time.

```
import java.time.LocalTime; // import the LocalDate class
 public class Main {
 public static void main(String[] args) {
 LocalTime myObj = LocalTime.now(); // Create a date object
 System.out.println(myObj); // Display the current date
 }
}
```

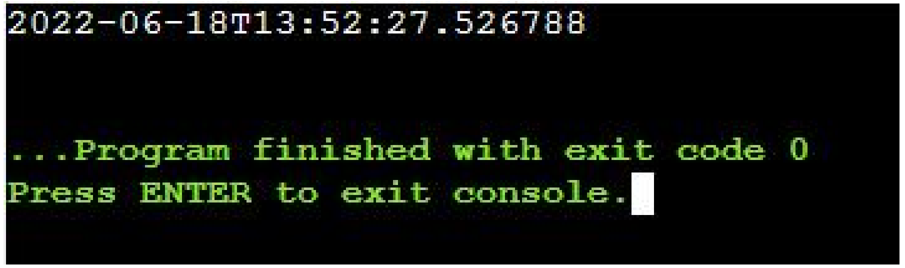


```
13:48:59.315896


...Program finished with exit code 0
Press ENTER to exit console.
```

- Display current date and time

```
import java.time.LocalDateTime; // import the LocalDateTime class
public class Main {
  public static void main(String[] args) {
    LocalDateTime myObj = LocalDateTime.now();
    System.out.println(myObj);
  }
}
```



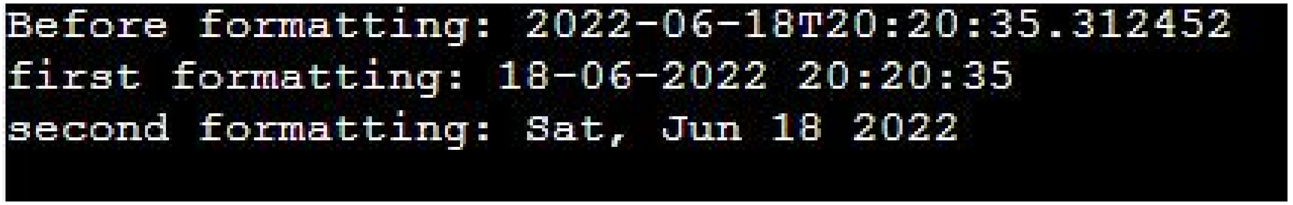
```
2022-06-18T13:52:27.526788


...Program finished with exit code 0
Press ENTER to exit console.
```

How can we remove "T" and nanoseconds from the date-time?

We can use DateTimeFormatter class with ofPattern( )method to format date-time objects.

```java
import java.time.LocalDateTime; // Import the LocalDateTime class
import java.time.format.DateTimeFormatter; // Import the DateTimeFormatter class
public class Main {
  public static void main(String[] args) {
    LocalDateTime myDateObj = LocalDateTime.now();
    System.out.println("Before formatting: " + myDateObj);
    DateTimeFormatter myFormatObj = DateTimeFormatter.ofPattern("dd-MM-yyyy HH:mm:ss");
    DataTimeFormatter myFormatObj_2 = DateTimeFormatter.ofPattern("E, MMM dd yyyy");
    String formattedDate = myDateObj.format(myFormatObj);
    String formattedDate_2 = myDateObj.format(myFormatObj_2);
    System.out.println("first formatting: " + formattedDate);
    System.out.println("second formatting: " + formattedDate_2);
  }
}
```

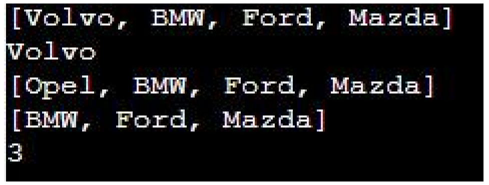


```
Before formatting: 2022-06-18T20:20:35.312452
first formatting: 18-06-2022 20:20:35
second formatting: Sat, Jun 18 2022
```

ArrayList

- ArrayList can store strings. It can be found in java.util package.
- add( ) method can be used to add elements to the ArrayList.
- get( ) method can be used to access the element with the index number.
- set( ) method can be used to modify the element based on the index number.
- remove( ) method can be used to remove an element at certain index.
- clear ( ) method can be used to delete all elements
- size( ) method can be used to find out how many elements in an ArrayList.

```
import java.util.ArrayList;
public class Main
{
            public static void main(String[] args) {
            ArrayList<String> cars = new ArrayList<String>();
            cars.add("Volvo");
            cars.add("BMW");
            cars.add("Ford");
            cars.add("Mazda");
            System.out.println(cars);
            // Access an item
            System.out.println(cars.get(0));
            // Change item
            cars.set(0, "Opel");
            System.out.println(cars);
            // Reomve item
            cars.remove(0);
            System.out.println(cars);
            // Size count
            System.out.println(cars.size());
            }
}
```



```
[Volvo, BMW, Ford, Mazda]
Volvo
[Opel, BMW, Ford, Mazda]
[BMW, Ford, Mazda]
3
```

Thank you!
Any questions?