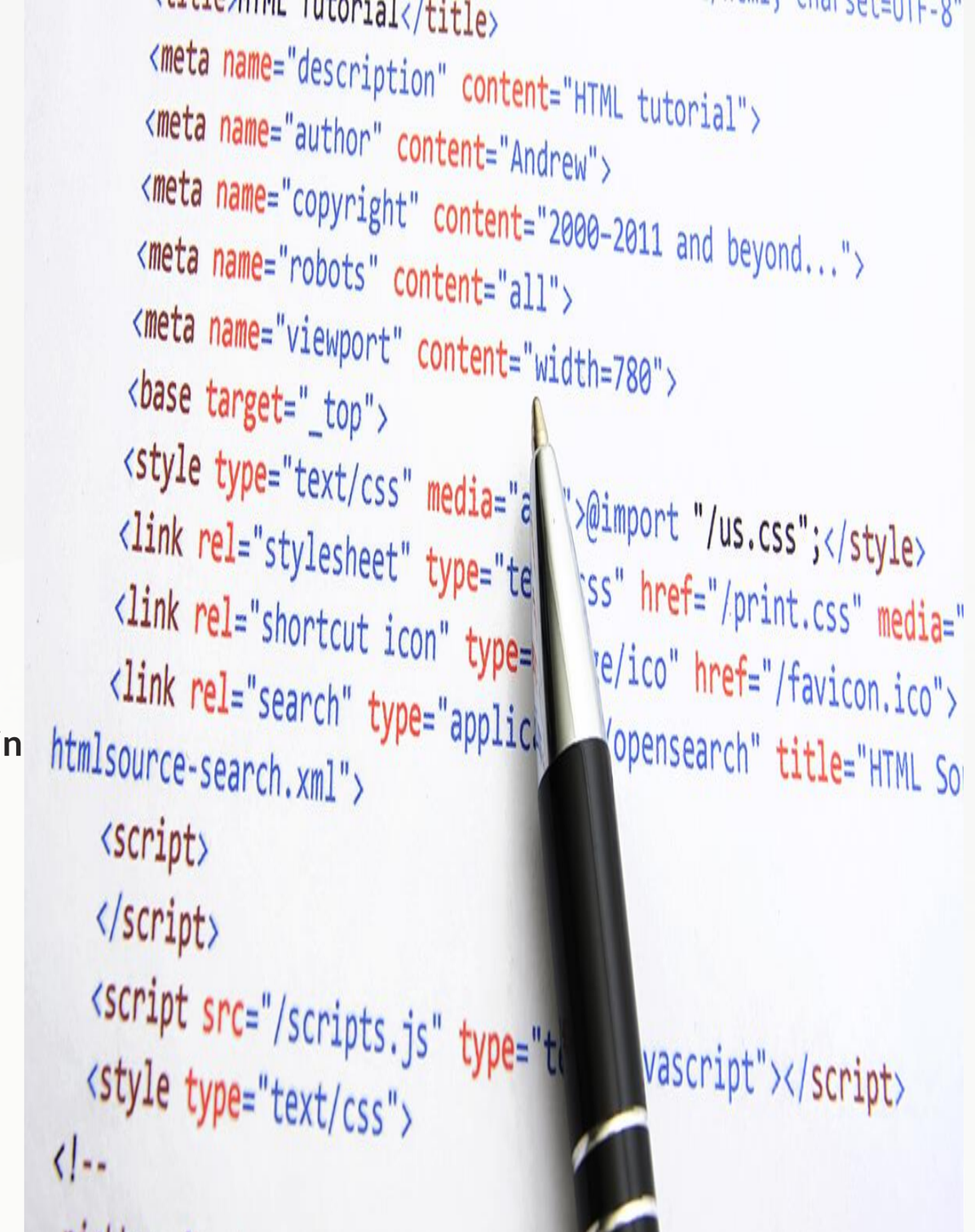
Understanding Data Datatypes and Information

This presentation provides an introduction to data and information in Java. We will explore data types and their differences, learn about RAM and hard disk, and discover primitive and non-primitive data types.



Overall

01

What is data &information

02

Types of data

03

Data types in java

04

Practical exercise

Introduction

Review last lesson

In Java, to print text or variables to the console, you typically use the System.out.println() method. This method prints the text or the value of the variable and then inserts a newline

Saifullah “Haidari”

How can you use ?

Review last lesson

```
System.out.println("Hello World!");
```

You can add as many `println()` methods as you want. Note that it will add a new line for each method:

```
System.out.println("Hello World!");
System.out.println("I am learning Java.");
System.out.println("It is awesome!");
```

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Using Quotes?

Review last lesson

Double Quotes

When you are working with text, it must be wrapped inside double quotations marks "".
If you forget the double quotes, an error occurs:

```
System.out.println("This sentence will work!");
System.out.println(This sentence will produce an error);
```

Differences

Review last lesson

There is also a `print()` method, which is similar to `println()`.
The only difference is that it does not insert a new line at the end of the output

```
System.out.print("Hello World! ");
 System.out.print("I will print on the same line.");
```

Print Numbers

Review last lesson

numbers

You can also use the println() method to print numbers.
However, unlike text, we don't put numbers inside double quotes:

Examples

```
System.out.println(3);
System.out.println(358);
System.out.println(50000);
```

Hello World in Java

```
public class HelloWorld {
    public static void main(String[] args) {
        System.out.println("Hello, World!");
    }
}
```

The "Hello World" program demonstrates the basic structure of a Java program, including the "main" method, which is the entry point for execution.

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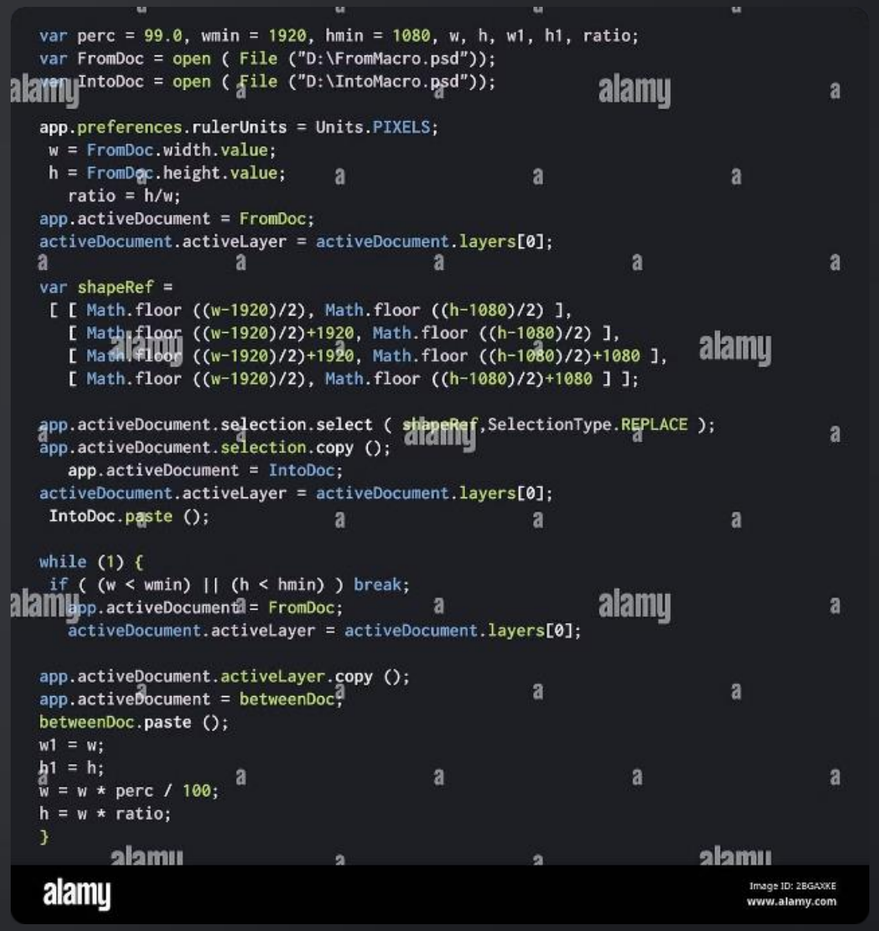
Review last lesson



```
var perc = 99.0, wmin = 1920, hmin = 1080, w, h, w1, h1, ratio;
var FromDoc = open ( File ("D:\FromMacro.psd"));
var IntoDoc = open ( File ("D:\IntoMacro.psd"));

app.preferences.rulerUnits = Units.PIXELS;
 w = FromDoc.width.value;
 h = FromDoc.height.value;
   ratio = h/w;
app.activeDocument = FromDoc;
activeDocument.activeLayer = activeDocument.layers[0];

var shapeRef =
 [ [ Math.floor ((w-1920)/2), Math.floor ((h-1080)/2) ],
   [ Math.floor ((w-1920)/2)+1920, Math.floor ((h-1080)/2) ],
   [ Math.floor ((w-1920)/2)+1920, Math.floor ((h-1080)/2)+1080 ],
   [ Math.floor ((w-1920)/2), Math.floor ((h-1080)/2)+1080 ] ];

app.activeDocument.selection.select ( shapeRef,SelectionType.REPLACE );
app.activeDocument.selection.copy ();
   app.activeDocument = IntoDoc;
activeDocument.activeLayer = activeDocument.layers[0];
 IntoDoc.paste ();

while (1) {
 if ( (w < wmin) || (h < hmin) ) break;
   app.activeDocument = FromDoc;
   activeDocument.activeLayer = activeDocument.layers[0];

app.activeDocument.activeLayer.copy ();
app.activeDocument = betweenDoc;
betweenDoc.paste ();
w1 = w;
h1 = h;
w = w * perc / 100;
h = w * ratio;
}
```

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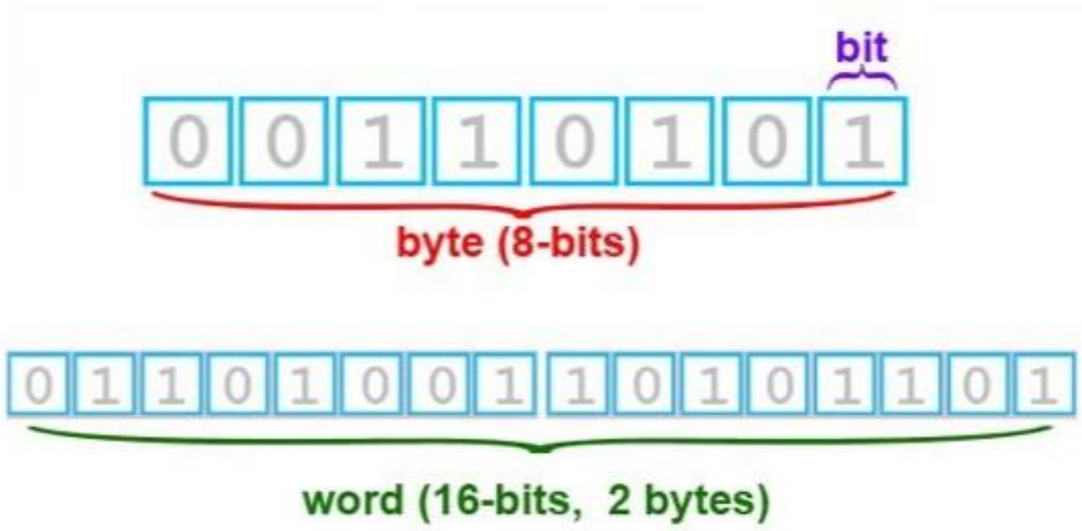
Common data storage measurements

Common Data Storage Measurements

UNIT	VALUE
bit	1 bit
byte	8 bits
kilobyte	1,024 bytes
megabyte	1,024 kilobytes
gigabyte	1,024 megabytes
terabyte	1,024 gigabytes
petabyte	1,024 terabytes

Bit and byte


bit
0 0 1 1 0 1 0 1
byte (8-bits)
0 1 1 0 1 0 0 1 1 0 1 0 1 1 0 1
word (16-bits, 2 bytes)

RAM vs. Hard Disk

RAM

RAM is temporary, volatile memory. It's like a workspace where the computer actively stores data and instructions while you're working.

Hard Disk

The hard disk is permanent, non-volatile memory. It's like a library where the computer stores files and data for long-term access.

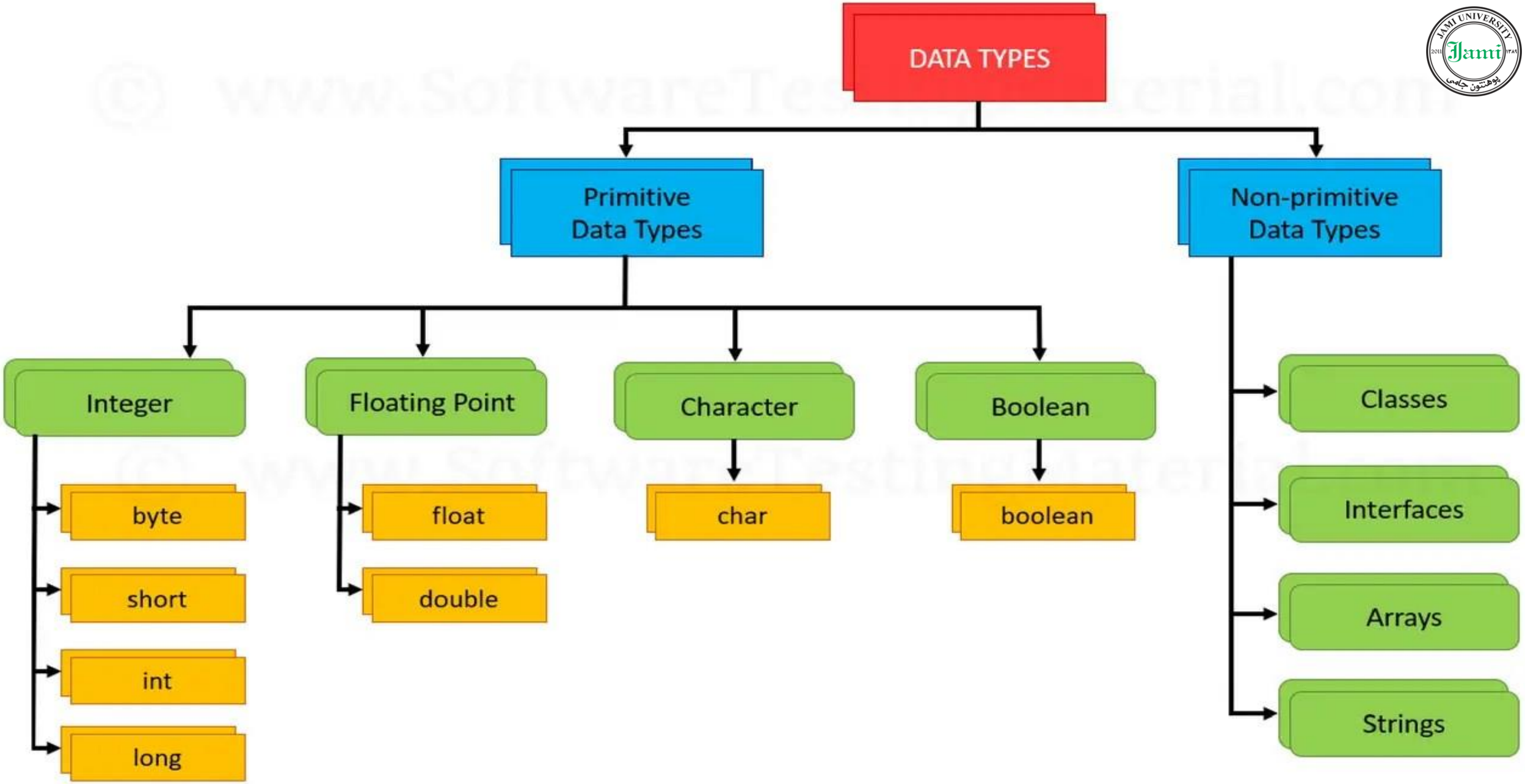
What is Data? What is Information?

Data

Data is raw, unprocessed facts and figures, lacking context or meaning. It's like a collection of ingredients before they are assembled into a dish.

Information

Information is processed data that provides context and meaning. It's like a recipe that guides you to create a meal from raw ingredients.


DATA TYPES
Primitive Data Types
Non-primitive Data Types
Integer
Floating Point
Character
Boolean
byte
short
int
long
float
double
char
boolean
Classes
Interfaces
Arrays
Strings

File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help FirstCodes - NumericDataTypes.java

FirstCodes > src > NumericDataTypes > main

Project | FirstCodes.java | NumericDataTypes.java | VariableDeclaration.java

```
public class NumericDataTypes {

    public static void main(String[] args) {
        //Numeric Data Types
        byte DogAge =12;

        short HumanAge = 150;
        int HumAge = 150;

    }
}
```

Jami

Prof. Saifullah Haidari

TODO Problems Terminal Profiler Build Event Log

Download pre-built shared indexes: Reduce the indexing time and CPU load with pre-built JDK shared indexes // Always download // Download ad-hoc // Don't show again // Configure... (today 8:50 PM)

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Type	Size (in bits)	Range
byte	8	-128 to 127
short	16	-32,768 to 32,767
int	32	-2^{31} to $2^{31}-1$
long	64	-2^{63} to $2^{63}-1$
float	32	1.4e-045 to 3.4e+038
double	64	4.9e-324 to 1.8e+308
char	16	0 to 65,535
boolean	1	true or false

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Data Types

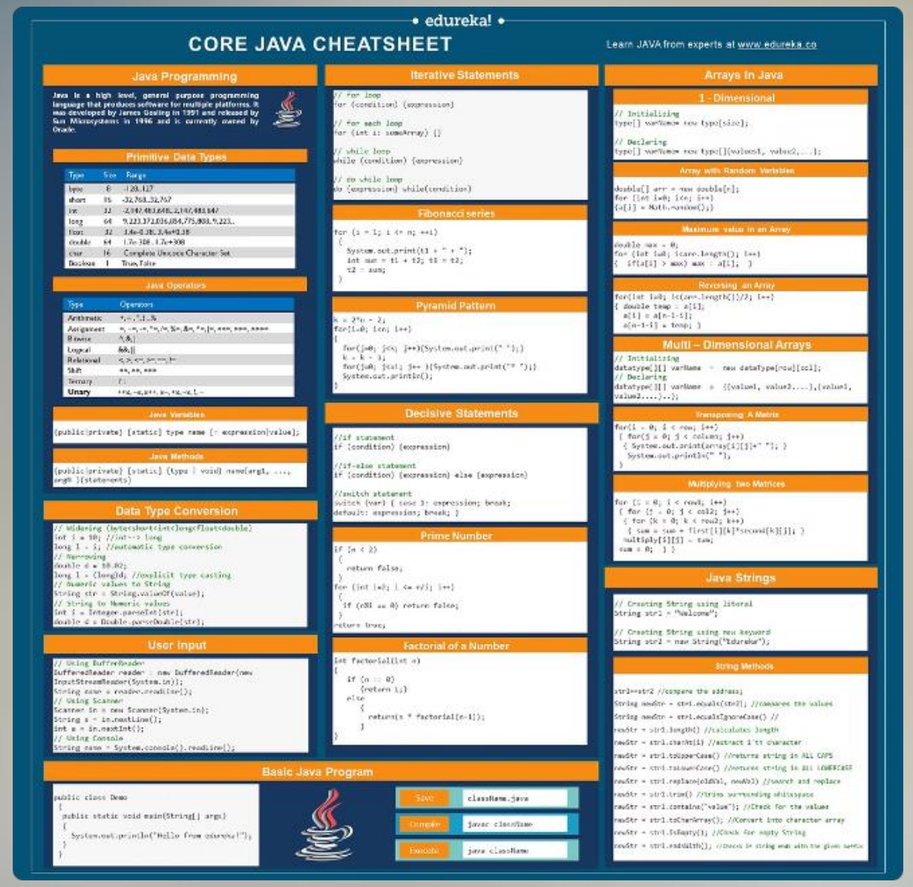
Data Type	Size	Description
byte	1 byte	Stores whole numbers from -128 to 127
short	2 bytes	Stores whole numbers from -32,768 to 32,767
int	4 bytes	Stores whole numbers from -2,147,483,648 to 2,147,483,647
long	8 bytes	Stores whole numbers from -9,223,372,036,854,775,808 to 9,223,372,036,854,775,807
float	4 bytes	Stores fractional numbers. Sufficient for storing 6 to 7 decimal digits
double	8 bytes	Stores fractional numbers. Sufficient for storing 15 decimal digits
boolean	1 bit	Stores true or false values
char	2 bytes	Stores a single character/letter or ASCII values

Example

```
int myNum = 5;               // Integer (whole number)
float myFloatNum = 5.99f;    // Floating point number
char myLetter = 'D';         // Character
boolean myBool = true;       // Boolean
String myText = "Hello";     // String
```

Data Types

Data Type	Size (bytes)	Usage
int	4	Whole numbers
long	8	Larger whole numbers
float	4	Single-precision floating point numbers
double	8	Double-precision floating point numbers
char	2	Single 16-bit Unicode character
String	Variable	Sequence of characters
boolean	1	True or false values



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Primitive Data Types

Definition

Primitive data types are fundamental building blocks in Java. They are predefined and provide basic storage for different types of data.

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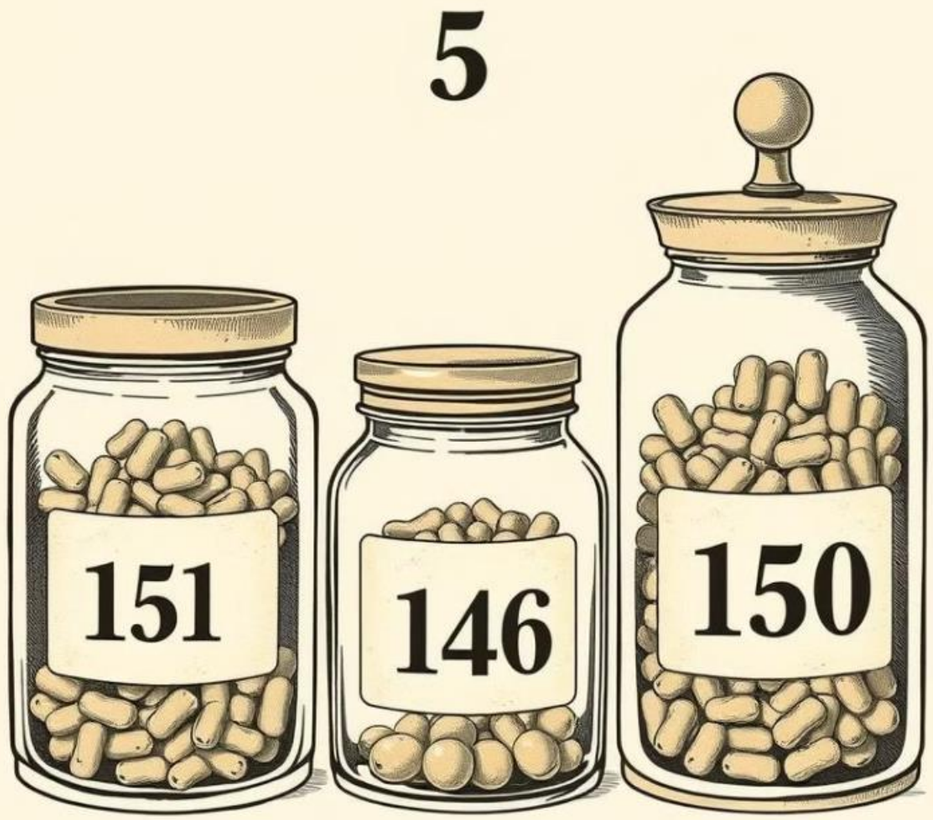
Numeric Data Types

Type	Size	Example
Byte	1 Byte	byte b = 100;
Short	2 Bytes	short s = 10000;
Int	4 Bytes	int i = 100000;
Long	8 Bytes	long l = 10000000000L;



Example of Data Types

Example

```java
// Create variables of different data types
int items = 50;
float costPerItem = 9.99f;
float totalCost = items * costPerItem;
char currency = '$';

// Print variables
System.out.println("Number of items: " + items);
System.out.println("Cost per item: " + costPerItem + currency);
System.out.println("Total cost = " + totalCost + currency);
```

Floating Point Data Types

Float

The float data type stores single-precision floating-point numbers, allowing for decimal values.

Double

The double data type stores double-precision floating-point numbers, providing higher precision for decimal values.

Other Primitive Data Types

Character

The char data type stores a single character, like a letter, number, or symbol.

Boolean

The boolean data type stores a truth value, either true or false. It's used for representing conditions and logic in your programs.

Example

```
boolean isJavaFun = true;
boolean isFishTasty = false;
System.out.println(isJavaFun);      // Outputs true
System.out.println(isFishTasty);    // Outputs false
```

Example

```
char myVar1 = 65, myVar2 = 66, myVar3 = 67;
System.out.println(myVar1);
System.out.println(myVar2);
System.out.println(myVar3);
```

Non-Primitive Data Types

Definition

Non-primitive data types are constructed using primitive data types. They provide more complex ways to represent data and manage information.

Examples

The String data type represents sequences of characters, while arrays store collections of elements of the same data type.

Date Data Type

Date

The Date data type represents dates and times, allowing you to work with specific points in time within your programs.

LocalDate Example

The LocalDate class provides functionality for working with dates, allowing you to create, manipulate, and compare dates.

1

Import from sccanner

```java
import java.util.Scanner;

public class UserInfo {
    public static void main(String[] args) {
                        // ایجاد یک شیء Scanner برای خواندن ورودی از کنسول
        Scanner scanner = new Scanner(System.in);

                                                // دریافت نام کاربر
        System.out.print("لطفاً نام خود را وارد کنید: ");
        String name = scanner.nextLine();

                                                // دریافت سن کاربر
        System.out.print("لطفاً سن خود را وارد کنید: ");
        int age = scanner.nextInt();

                                                // نمایش پیام خوش آمدگویی
        System.out.println("سلام " + name + "! سن شما " + age + " سال است.");

                                                // بستن شیء Scanner
        scanner.close();
    }
}
```

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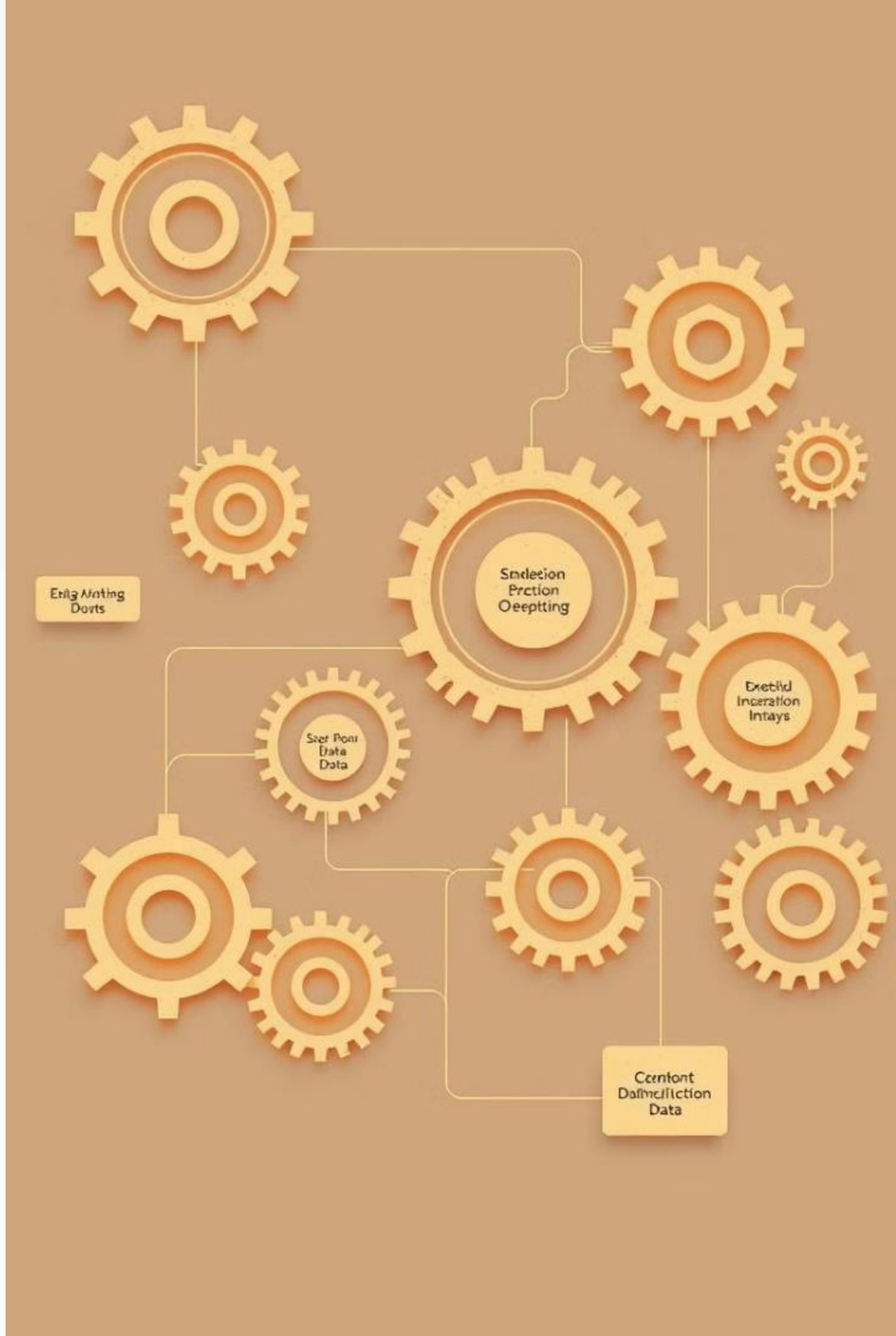
Import from scanner

```java
import java.util.Scanner;

public class Main {
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in); // ایجاد یک شیء Scanner

        System.out.print("لطفاً نام خود را وارد کنید: ");
        String name = scanner.nextLine(); // خواندن یک رشته از ورودی

        System.out.print("لطفاً سن خود را وارد کنید: ");
        int age = scanner.nextInt(); // خواندن یک عدد صحیح از ورودی

        System.out.println("سلام " + name + "! سن شما " + age + " سال است.");

        scanner.close(); // بستن شیء Scanner
    }
}
```

Summary

Understanding data types is essential for any Java programmer. This presentation has provided a fundamental overview of data types, including primitive types like byte, short, int, long, float, double, char, and boolean, as well as non-primitive types like String and arrays. This knowledge lays the groundwork for understanding complex data structures and algorithms in Java.



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Homework

Exercise:

Add the correct data type for the following variables:

```
myNum = 9;
myFloatNum = 8.99f;
myLetter = 'A';
myBool = false;
myText = "Hello World";
```