Java Data Types - Detailed Notes

Introduction

Java requires every variable to have a clear data type, which defines the kind of data it can hold. Data types help the compiler allocate the appropriate memory and define valid operations.

Primitive Data Types

Java provides 8 primitive types:

Data Type Size (bits) Description Default Value

byte 8 Small integer (-128 to 127) 0

short 16 Larger integer 0

int 32 Default integer type 0

long 64 Large integer 0L

float 32 Single precision decimal 0.0f

double 64 Double precision decimal 0.0d

char 16 Single Unicode character '\u0000' (null char)

boolean 1 (conceptual) true or false values false

Reference Data Types

These include classes (e.g., String), arrays, and interfaces. They store references pointing to objects in memory, not the actual data.

Java Code Example Data Types

```
public class DataTypeDemo {
    byte b = 100;
    short s = 10000;
    int i = 100000;
    long l = 100000L;
    float f = 10.5f;
    double d = 20.5;
    char c = 'A';
```

```
    boolean bool = true;

    public void printData() {
        System.out.println("byte: " + b);
        System.out.println("short: " + s);
        System.out.println("int: " + i);
        System.out.println("long: " + l);
        System.out.println("float: " + f);
        System.out.println("double: " + d);
        System.out.println("char: " + c);
        System.out.println("boolean: " + bool);
    }
}
```

Interview Questions and Answers

Q1: What are the primitive data types in Java?

A1: byte, short, int, long, float, double, char, and boolean.

Q2: What is the size and range of an int in Java?

A2: 32 bits, range: 2,147,483,648 to 2,147,483,647.

Q3: What is the default value of a boolean type?

A3: false.

Q4: How is a char variable different from an int?

A4: char holds Unicode characters, int holds numeric values.

Q5: Can a float hold integer values?

A5: Yes, but it's used for fractional values.

Q6: What is the difference between float and double?

A6: float = 32-bit (~7 digits), double = 64-bit (~15 digits).

Q7: Can variables be declared without specifying a type in Java?

A7: No, Java is statically typed.

Q8: What happens if you assign a value outside the range to a byte?

A8: Compile-time error.

Q9: How do you denote a long literal?

A9: Append 'L' or 'l'.

Q10: What is Unicode, and why does Java use it for char?

A10: Unicode is a global character encoding standard.

Q11: Is the size of boolean precisely defined in Java?

A11: No, handled internally by JVM.

Q12: What is the default value of a char type?

A12: '\u0000'.

Q13: What distinguishes primitive from reference types?

A13: Primitive stores values, reference stores object memory addresses.

Q14: Can you store fractional values in an int?

A14: No, use float or double.

Q15: Which data types support decimal values?

A15: float and double.

Assignments

1. Write a Java program to declare variables of all primitive types and print their min and max values using

constants like Integer.MIN_VALUE.

2. Create a program to swap values of two variables of different types, such as int and double.

3. Implement a class demonstrating usage of char with Unicode symbols, numerals, and alphabets.

4. Write a program showing default initialized values of instance variables vs. uninitialized local variables.

5. Develop a temperature converter converting Fahrenheit (float) to Celsius (double) and output results.