Advanced Programming

Java Basics

Instructor: Ali Najimi
Author: Hossein Masihi
Department of Computer Engineering
Sharif University of Technology

Fall 2025

Primitive Data Types

- Java has **8 primitive types**:
  - `byte`, `short`, `int`, `long` → integers
  - `float`, `double` → decimals
  - `char` → single character (Unicode)
  - `boolean` → true/false
- Each has a fixed size (e.g., `int` = 4 bytes, `double` = 8 bytes)

```java
int age = 21;
double pi = 3.14;
boolean active = true;
char grade = 'A';
long big = 3_000_000_000L;
float ratio = 0.75f;
byte b = 127;
short s = 32000;
```

Variables

- Variables store data in memory.
- Syntax:

```
type name = value;
```

- Example:

```java
String name = "Advanced Programming!";
int year = 2025;
```

- **Rules:**
  - Must start with letter or underscore.
  - Case-sensitive.
  - Cannot be a reserved keyword.

Methods

- Methods define reusable blocks of code.

```
returnType name(parameters) {
    // body
}
```

- Example:

```
int sum(int a, int b) {
    return a + b;
}
```

- **Benefits:** Code reusability, readability, and structure.

Controllers: if, while, switch, for

- Control the flow of execution.

```
if (x > 10) System.out.println("Big");
else System.out.println("Small");
```

```
for (int i = 0; i < 5; i++) {
    System.out.println(i);
}
```

```
switch (day) {
    case 1: System.out.println("Monday"); break;
    default: System.out.println("Unknown");
}
```

Strings

- A `String` is a sequence of characters.
- Stored as an **immutable** object.
- Common methods:
    - `length()`, `substring()`, `equals()`, `concat()`

    ```java
    String s = "Sharif";
    System.out.println(s.toUpperCase());
    ```
- Immutable means: once created, cannot be changed.

Arrays

- Arrays store multiple values of the same type.

```java
int[] nums = {10, 20, 30};
```

- Access with index: `nums[0]`
- Loop example:

```java
for (int n : nums) {
    System.out.println(n);
}
```

- Multidimensional:

```java
int[][] matrix = {{1, 2}, {3, 4}};
```

Example: Combining Concepts

```
public class Example {
    public static void main(String[] args) {
        int[] numbers = {2, 4, 6, 8};
        for (int n : numbers) {
            if (n % 4 == 0) {
                System.out.println(n + " is divisible by 4");
            }
        }
    }
}
```

- Demonstrates variables, arrays, loops, and conditionals.

Best Practices

- Use descriptive names (`studentAge`, not `a1`).
- Avoid magic numbers → use constants.
- Keep methods short and focused.
- Use consistent indentation and comments.

```java
// Bad
int a1=21; if(a1>18){System.out.println("ok");}

// Good
final int ADULT_AGE = 18;
int studentAge = 21;
if (studentAge > ADULT_AGE) {
    System.out.println("ok");
}
```

Thank You 🙌

Good luck and happy coding!

Advanced Programming – Fall 2025 – Sharif University of Technology