

Java Error Handling and Error Types

1. What is Error Handling in Java?

Error handling in Java is the mechanism to catch runtime errors so that the normal flow of the program can be maintained. Without proper error handling, a program will crash when it encounters an error. Java provides a mechanism called Exception Handling for this purpose.

2. Types of Errors in Java

Errors in Java can broadly be classified into three main types:

A. Compile-time Errors

- Occur while compiling the code.
- Usually due to syntax mistakes.

Example:

```
int x = "Hello"; // Type mismatch
System.out.println("Hello" // Missing closing parenthesis
```

B. Runtime Errors

- Occur when the program is running.
- Often called exceptions.

Example:

```
int a = 10;
int b = 0;
int c = a / b; // ArithmeticException
```

C. Logical Errors

- Do not crash the program, but the output is incorrect.

Example:

```
int sum = 50 - 10; // Mistake, should be 50 + 10
System.out.println(sum); // Prints 40 instead of 60
```

3. Exception Handling in Java

Java provides a mechanism using try, catch, finally, and throw keywords.

Syntax:

```
try {
    // Code that may throw an exception
} catch (ExceptionType e) {
    // Code to handle exception
} finally {
    // Code that always executes
}
```

Example:

```
public class ErrorExample {  
    public static void main(String[] args) {  
        try {  
            int a = 10, b = 0;  
            int c = a / b; // Will cause ArithmeticException  
        } catch (ArithmeticException e) {  
            System.out.println("Cannot divide by zero!");  
        } finally {  
            System.out.println("This block always executes.");  
        }  
    }  
}
```

Output:

Cannot divide by zero!
This block always executes.

4. Common Exception Types

Exception Type	When it occurs
ArithmeticException	Division by zero
ArrayIndexOutOfBoundsException	Accessing invalid array index
NullPointerException	Using null object reference
FileNotFoundException	File not found when opening a file
IOException	Input/output errors