CORE JAVA

MANUAL V8.3

MODULE CODE:

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Module 6: Thread and Exception Handling

Chapter 4

Objective: After completing this lesson you will be able to : * Gain an introduction to the different error types in Java * Learn about checked and unchecked exception in Java * Observe an example of pre-defined Java exceptions	**Materials Required:** 1. Computer 2. Internet access
Theory Duration: 120 minutes	**Practical Duration:** 0 minute
Total Duration: 120 minutes	

Chapter 4

4.1 Types of Errors

Errors can be made by Java programmers during the code writing and execution processes. An error has to be identified and fixed to successfully run a program. The errors or mistakes that generally occur can be divided into three categories –

i) Syntax errors

ii) Runtime errors

iii) Logic errors

i) Syntax errors – Syntax errors refer to grammatical errors that occur while programming in Java. Programmers have to follow syntax rules and guidelines to prevent these errors. Some of the most prominent examples of syntax errors in Java are –

* The absence of semicolons

* Mismatch between curly braces, parentheses and square brackets

* Wrong function or variable spellings

* Wrong formatting in loop statements and selection

ii) Runtime errors – Runtime errors occur if a computer system is not able to perform the tasks directed by a program If the syntax of a program' s code is free from errors, it will display no error during the compilation time. But if a program finds executing code impractical or impossible during runtime, a runtime error will be displayed. Runtime errors might occur in these examples –

* When a program tries to load a file that does not exist

* When a program tries to load a file that has been renamed

iii) Logic errors – A logic errors occur when there are issues with the design of a Java program. If a programmer attempts methods or operations that are not in line with a program' s objectives, a logic error can occur. Some examples of cases where logic errors can occur include –

* Performing addition where subtraction is needed

* Performing multiplication when division is needed

* Accessing from the wrong file

4.2 Checked and Unchecked Exception

What is an exception in Java?

In Java, an exception refers to an unexpected event that occurs during runtime, or when a program is being executed. An exception can stop a program from performing its expected actions.

The two broad categories of exceptions in Java are –

i) Checked exception

A checked exception in Java that is checked at the time of compilation. If a checked exception is thrown by a section of code, there are two options. The first option is the method handling the exception. The other option is to highlight the exception with a *throws* keyword.

Gain a better understanding of a checked exception with the example below.

A text file named mydata.text is being read and its contents displayed as output. In the example, you can see some checked exceptions, namely the FileNotFoundException and IOException. Take a look –

```
import java.io.*;

class Demo {
  public static void main(String args[])
  {
   FileInputStream fis = null;
          //* Constructor FileInputStream(File filename) throws FileNotFoundException (a checked exception)
     fis = new FileInputStream(‘C:/mydata.txt‘);
   int i;
   //* FileInputStream class read() method throws IOException (a checked exception)
   while(( i = fis.read() ) != -1 )
  {
      System.out.print((char)i);
   }


   //* close() closes the file input stream and throws IOException (a checked exception)
          fis.close();
  }
}
```

Output:

```
Unresolved compilation problems:
FileNotFoundException
IOException
IOException
```

ii) Unchecked exception

An unchecked exception is one that is not checked during compile time. It means that a compilation error will not be exhibited for this exception type. An unexpected exception is mainly a result of bad data provided by a programmer. Every unchecked exception belongs to the RuntimeException class in Java.

Gain a better understanding of an unchecked exception with the example below.

```
class Example1 {
  public static void main(String args[])
  {
   int num1=16;
   int num2=0;
   //*Here an integer is being divided by 0. So, the program will throw an ArithmeticException upon being run.
   int res=num1/num2;
   System.out.println(res);
  }
}
```

Output:

‘ArithmeticException’ will be displayed after running the program.

4.3 Example of Pre-defined Exception

Java has several pre-defined or built-in exceptions within its libraries. These are ideal for explaining particular error situations. Take a look at an example provided below displaying the ArrayIndexOutOfBounds Exception. This particular exception is thrown when an illegal index is used for accessing an array.

```
class ArrayIndexOutOfBound_Example {
public static void main(String args[])
  {
    try {
      int a[] = new int[6];
      a[7] = 10;
// * accessing 7th element in an array of size 6
    }
    catch (ArrayIndexOutOfBoundsException e) {
      System.out.println(‘Array Index is Out Of Bounds‘);
    }
  }
}
```

Output:

Array Index is Out Of Bounds

Instructions: The progress of students will be assessed with the exercises mentioned below.

MCQ (10 minutes)

1. Which of these is not an error type in Java?

a) Runtime errors

b) Syntax errors

c) Logical errors

d) Logic errors

2. Syntax errors are a reference to ____________ errors

a) grammatical

b) logical

c) multi-dimensional

d) None of the mentioned

3. If a programmer forgets to use a semicolon, he has committed a _________ error.

a) runtime

b) logical

c) syntax

d) None of the mentioned

4. Using a wrong spelling for a variable results in a ________ error.

a) Runtime

b) logical

c) syntax

d) None of the mentioned

5. What error is exhibited when a code being executed is impractical?

a) runtime

b) logical

c) syntax

d) None of the mentioned

6. What error is exhibited if a program attempts to load a file that does not exist?

a) runtime

b) logical

c) syntax

d) None of the mentioned

7. What error is exhibited if a programmer performs multiplication when division is needed?

a) runtime

b) logical

c) syntax

d) None of the mentioned

8. __________ exception in Java is one that is checked at compilation time.

a) A verified

b) An unchecked

c) A checked

d) None of the mentioned

9. What exception is not checked during compile time?

a) Unwanted

b) Unchecked

c) Checked

d) None of the mentioned

10. Pre-defined Java exceptions are also known as ________ exceptions.

a) built-in

b) initial

c) initialized

d) None of the mentioned