COJ :: Exception Handling

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Learning Objectives

The content in this presentation is aimed to learn the following:

- Define Exception
- Differentiate Exception and Error
- Explain Types of exceptions
- Use try-catch-finally construct
- Use throws construct

Exception Handling

Define Exception:
Exception is a run-time error which arises during the execution of java program. The term exception stands for an “exceptional event”.
What happens when an exception occur:

- Exception are typically an event or conditions that arise during the execution which interrupt the normal flow of program
- Java Provides with exception handling mechanism using try and catch
- Exception handling is used to ensure graceful termination of program

Exception Handling

Difference between Error and Exception:

Errors:

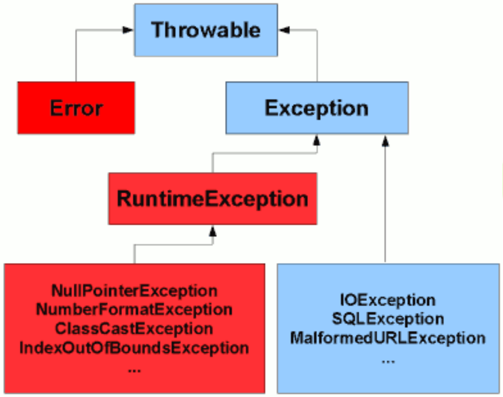
- Error indicates serious problem that a reasonable application should not try to catch
- You cannot handle Error
  Example: JVM out of memory, Stack overflow

Exception:

- Exception indicates conditions that a reasonable application might want to catch
- You can handle Exceptions
  Example: ArithmeticException

Exception Handling

Exception Hierarchy:



Exception Handling

Types of Exceptions:

There are two types of Exceptions:

1. UnChecked Exceptions: These are the exceptions that are not checked at compile time All these exceptions are sub-classes for RuntimeException class
   Example: ArithmeticException, ArrayIndexOutOfBoundsException
2. Checked Exceptions: These are the exceptions that are checked at compile time These exceptions are sub-classes of Exception class and not RuntimeException class
   Example: IOException

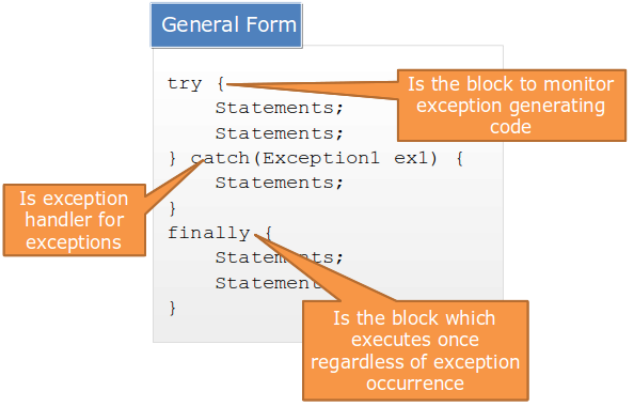
Exception Handling

Exception Constructs:

try	This block encases any statements that might cause an exception to occur.
catch	This block(s) provide a place to handle the exception thrown by the statements within a try block.
finally	The statements in the finally block are always executed. We can write resource clean up code here.
throw	Used to throw a specific exception from the program.
throws	Specifies which exceptions a given method can throw.

Exception Handling

Exception-Handling Blocks:


General Form
Is the block to monitor exception generating code
Is exception handler for exceptions
Is the block which executes once regardless of exception occurrence

```
try {
    Statements;
    Statements;
} catch(Exception1 ex1) {
    Statements;
}
finally {
    Statements;
    Statements;
}
```

Exception Handling

Program without exception handler:

```java
public class ExceptionDemo {
    public static void main(String[] args) {
        int i = 0, j = 10;
        int k = j / i;
        System.out.println("K is: " + k);
    }
}
```

Output

```
Exception in thread "main"
java.lang.ArithmeticException: / by zero at
com.ts.exceptions.ExceptionDemo.main
```

Note

The above code is without exception handling mechanism.

Exception Handling

What happens when an exception occurs and program doesn't have exception handling code:

- When an exception occurs an object of the exception type is created first.
- This object contains the information about the exception like its type, message and when it occured.
- This object is handed over to runtime system which is called as throwing an exception.
- Now the runtime system searches for a block of code that can handle the exception.

Exception Handling

Program with exception handler:

```
public class ExceptionDemo {
    public static void main(String[] args) {
        try {
            int i = 0, j = 10;
            int k = j / i;
            System.out.println("K is: " + k);
        } catch(ArithmeticException ae) {
            System.out.println(“diving by
  zero”);
        }
    }
}
```

Exception Handling

What happens when an exception occurs and program have exception handling code:

- When an exception occurs an object of the exception type is created first.
- This object contains the information about the exception like its type, message and when it occurred.
- This object is handed over to runtime system which is called as throwing an exception.

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Exception Handling

What happens when an exception occurs and program have exception handling code:

- Now the runtime system searches for a block of code that can handle the exception. This block of code is called exception handler.
- An exception handler is considered appropriate if the type of the exception object thrown matches the type that can be handled by the handler.
- If the match is found, then the appropriate exception handler block is executed.

Exception Handling

Multiple catch blocks:

```
try {
    Statements;
    Statements;
} catch(Exception1 ex1) {
    Statements;
} catch(Exception1 ex1) {
    Statements;
}
```

- The statements within a single try block can generate different kind of exceptions
- So its a good programming practice, to write a dedicated catch block for each kind of exception

Exception Handling

The **finally** block

- The statements in the finally block are always executed
- This is a good place to write clean up code like releasing file objects etc
- The statements within finally will execute if any exception occurs or not

Syntax

```
finally {
    Statements;
}
```

Exception Handling

Program generating checked Exception:

Example

```
public class ExceptionDemo {
    public static void main(String[] args) {
        Thread.sleep(100);
    }
}
```

Exception Handling

Program generating checked Exception:
After compilation:

```
javac ExceptionDemo.java
ExceptionDemo.java:3: error: unreported
  exception InterruptedException;
  must be caught or declared to be
  thrown Thread.sleep(100);
                      ^
1 error
```

Exception Handling

throws keyword:

- used to delegate the responsibility of exception handling to the caller method
- used to throw checked exceptions out of a method

Usage of throws

```
public class ExceptionDemo {
    public static void main(String[] args)
   throws Interrupted Exception {
        Thread.sleep(100);
    }
}
```

Exception Handling

Rules to remember:

- A try block should be followed by either a catch or finally block
- Even though we have mutliple catch blocks at a time only one exception occurs and only one catch block gets executed
- All catch blocks must be ordered from most specific to most general i.e catch for ArithmeticException must come before catch for Exception
- For handling all the exceptions using single catch block do the following:

```
catch(Exception e) {
    System.out.println("For all Exceptions"); }
```

Exception Handling