



SNS COLLEGE OF ENGINEERING



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Department of Information Technology

19CS204 OBJECT ORIENTED PROGRAMMING

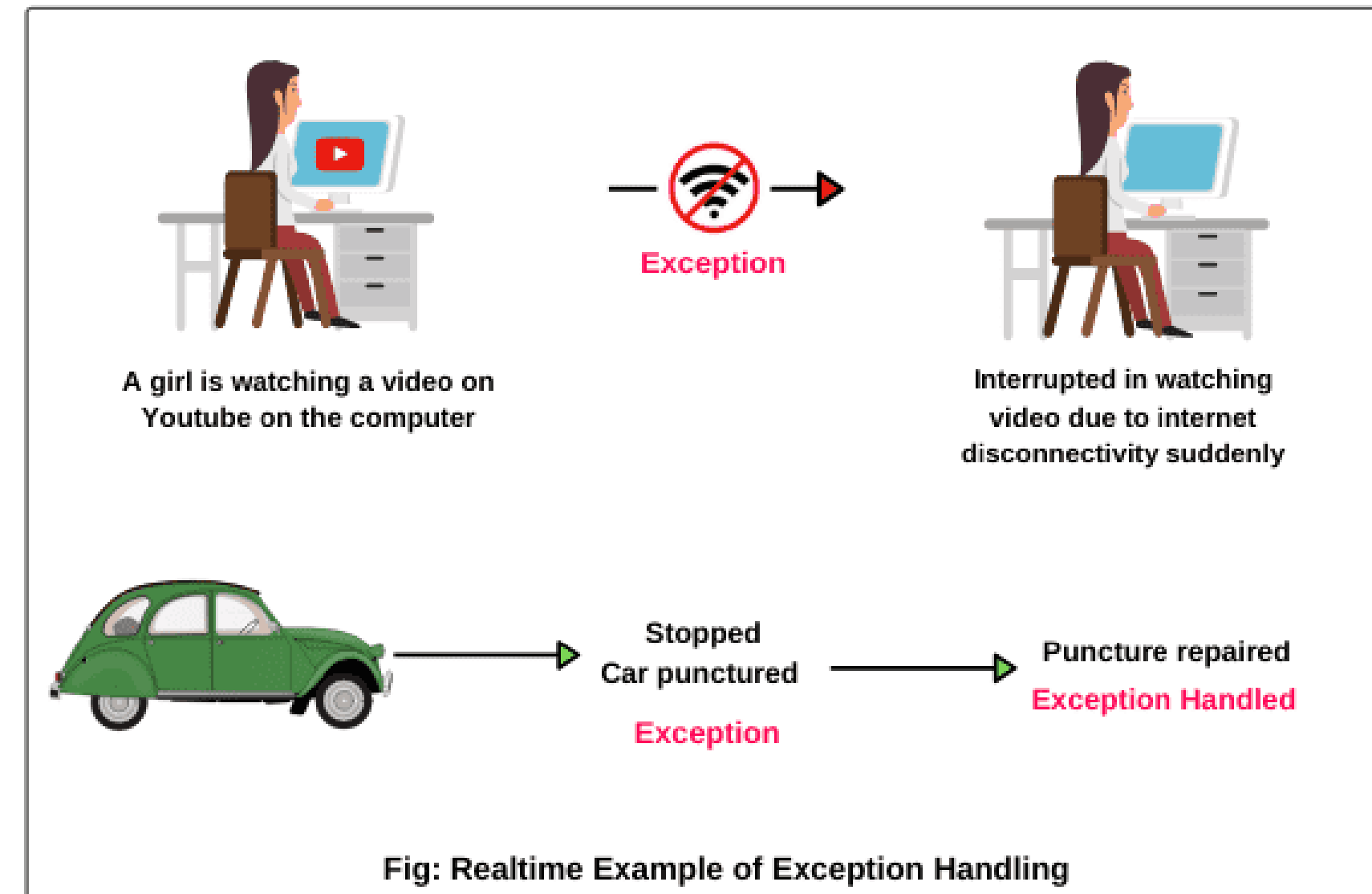
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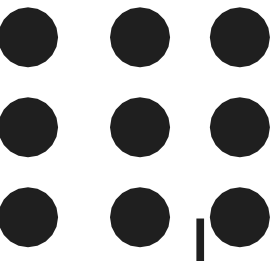
Topic - Exception Handling



Exception Handling

- An exception is **an abnormal condition** that arises in a code sequence at run time.
- In other words, an **exception is a runtime error**.
- In computer languages that do not support exception handling, errors must be checked and handled manually—typically through the use of error codes, and so on.
- This approach is as cumbersome as it is troublesome.
- Java's exception handling avoids these problems and, in the process, brings run-time error management into the object-oriented world.





Exception Handling

- A Java exception is an **object that describes an exceptional (that is, error) condition that has occurred in a piece of code.**
- When an exceptional condition arises, an **object representing that exception is created and thrown in the method that caused the error.**
- That method may choose to handle the exception itself, or pass it on. Either way, at some point, the exception is caught and processed.
- Exceptions can be generated by the Java run-time system, or they can be manually generated by your code.
- Exceptions thrown by Java relate to fundamental errors that violate the rules of the Java language or the constraints of the Java execution environment.
- Manually generated exceptions are typically used to report some error condition to the caller of a method.



Exception Handling



Java exception handling is managed via five keywords:

- try, catch, throw, throws, and finally.
- Program statements that you want to monitor for exceptions are contained within a try block. If an exception occurs within the try block, it is thrown.
- Your code can catch this exception (using catch) and handle it in some rational manner.
- System-generated exceptions are automatically thrown by the Java runtime system.
- To manually throw an exception, use the keyword throw.
- Any exception that is thrown out of a method must be specified as such by a throws clause.
- Any code that absolutely must be executed after a try block completes is put in a finally block.

- 1. try**
- 2. catch**
- 3. throw**
- 4. throws**
- 5. finally**

Exception Handling

This is the general form of an exception-handling block:

```
try {  
    // block of code to monitor for errors  
}  
  
catch (ExceptionType1 exOb) {  
    // exception handler for ExceptionType1  
}  
  
catch (ExceptionType2 exOb) {  
    // exception handler for ExceptionType2  
}  
  
// ...  
finally {  
    // block of code to be executed after try block ends  
}
```





Exception Handling - Types



Exception Types

- All exception types are subclasses of the built-in class Throwable. `Java.lang.Throwable`;
- Throwable has two subclasses Exception, Error

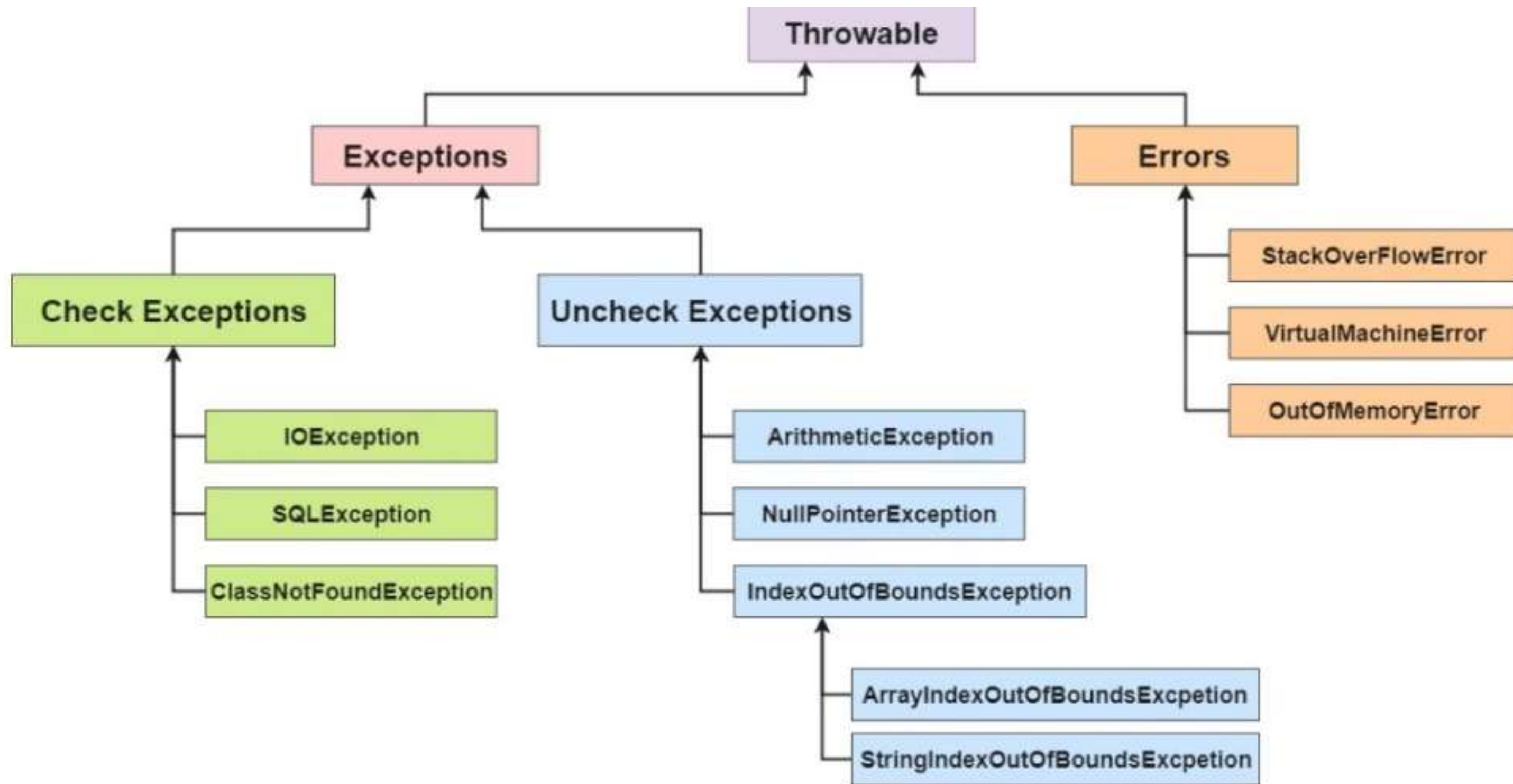
Exception

- Exceptional conditions that user programs should catch.
- There is an important subclass of Exception, called `RuntimeException`.
- Exceptions of this type are automatically defined for the programs that you write and include things such as division by zero and invalid array indexing.

Error

- Exceptions that are not expected to be caught under normal circumstances by your program
- Exceptions of type Error are used by the Java run-time system to indicate errors having to do with the run-time environment, itself.
- Stack overflow is an example of such an error.

Exception Handling - Types





Exception Handling - Types



Unchecked Exceptions:

- They are not checked at compile-time but at run-time.
- For example: `ArithmeticException`, `NullPointerException`, `ArrayIndexOutOfBoundsException`, exceptions under `Error` class, etc.

Checked Exceptions:

- They are checked at compile-time.
- For example, `IOException`, `InterruptedException`, etc.



Exception Handling



Uncaught Exception

```
public class Exc0 {  
    public static void main(String args[]) {  
        int d = 0;  
        int a = 42 / d;  
    }  
}
```

- In this example, we haven't supplied any exception handlers of our own, so the exception is caught by the default handler provided by the Java run-time system.
- Any exception that is not caught by your program will ultimately be processed by the default handler

Here is the exception generated when this example is executed:

```
java.lang.ArithmeticException: / by zero  
at Exc0.main(Exc0.java:4)
```



Exception Handling – Try, Catch



What if I want to handle exception by myself manually?

Using Try and Catch

Manually handle exception. It has two benefits

- First, it allows you to fix the error.
- Second, it prevents the program from automatically terminating.
- To guard against and handle a run-time error, simply enclose the code that you want to monitor inside a try block.
- Immediately following the try block, include a catch clause that specifies the exception type that you wish to catch.



Exception Handling – Try Catch



What if I want to handle exception by myself manually?

Using Try and Catch

```
public class Exc2 {  
    public static void main(String args[]) {  
        int d, a;  
        try { // monitor a block of code.  
            d = 0;  
            a = 42 / d;  
            System.out.println("This will not be printed.");  
        }  
        catch (ArithmeticException e) { // catch divide-by-zero error  
            System.out.println("Division by zero.");  
        }  
        System.out.println("Hello I caught exception");  
    }  
}
```

Notice that the call to `println()` inside the try block is never executed.

Once an exception is thrown, program control transfers out of the try block into the catch block.



Exception Handling – Multiple Catch



Multiple catch Clauses

- In some cases, more than one exception could be raised by a single piece of code.
- To handle this type of situation, you can specify two or more catch clauses, each catching a different type of exception.
- When an exception is thrown, each catch statement is inspected in order, and the first one whose type matches that of the exception is executed.
- After one catch statement executes, the others are bypassed, and execution continues after the try / catch block



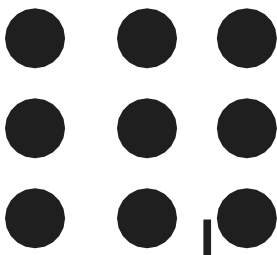
Exception Handling – Multiple Catch



Multiple catch Clauses

```
public class MultipleCatches {
public static void main(String args[]) {
try {
String a=null;
System.out.println("a = " + a.length());
int b = 42 / 0;
int c[] = { 1,2,3 };
c[5] = 99;
}
catch(ArithmeticException e) {
System.out.println("Divide by 0: " + e);
}
catch (NullPointerException e){
System.out.println("Null Pointer Exception " +e);
}
catch(ArrayIndexOutOfBoundsException e) {
System.out.println("Array index oob: " + e);
}
```

```
catch(Exception e){
System.out.println("General Exception " + e);
}
System.out.println("After try/catch blocks.");
}
```



THANK YOU