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COMP90041 Programming and Software Development

Tutorial 10 Exception

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Overview

1. Exception
2. Error
3. Exercise

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1. Exception

Exception

```
/Library/Java/JavaVirtualMachines/jdk-10.jdk/Contents/Home/bin/java -Dvisualv
  Documents/com~apple~CloudDocs/Master_Of_Software/2019_Sem2/COMP90041_Java/c
  Documents/com~apple~CloudDocs/Master_Of_Software/2019_Sem2/COMP90041_Java/c
Exception in thread "main" java.lang.NullPointerException
    at tute10.ExceptionDemo.nullpointerException(ExceptionDemo.java:17)
    at tute10.ExceptionDemo.main(ExceptionDemo.java:13)

Process finished with exit code 1
```

Examples

```
public static void example1(){
    int numerator = 10;
    int denominator = 0;
    System.out.println(numerator / denominator);
}
```

```
public static void example1(){
    String fruits[] = {"apple", "banana", "watermelon"};
    System.out.println(fruits[3]);
}
```

try-throw-catch trio (handle exceptions)

```
try {
      /*
      Some_Code_That_May_Throw_An_Exception
      */

} catch (Exception_Name e){
     /*
       Code to be performed if an exception of the
       named exception class is thrown in the try block.
     */
}
```

Definition

- ✓ Exceptions are events that occur during the execution of programs that disrupt the normal flow of instructions (e.g. divide by zero, array access out of bound, etc.)

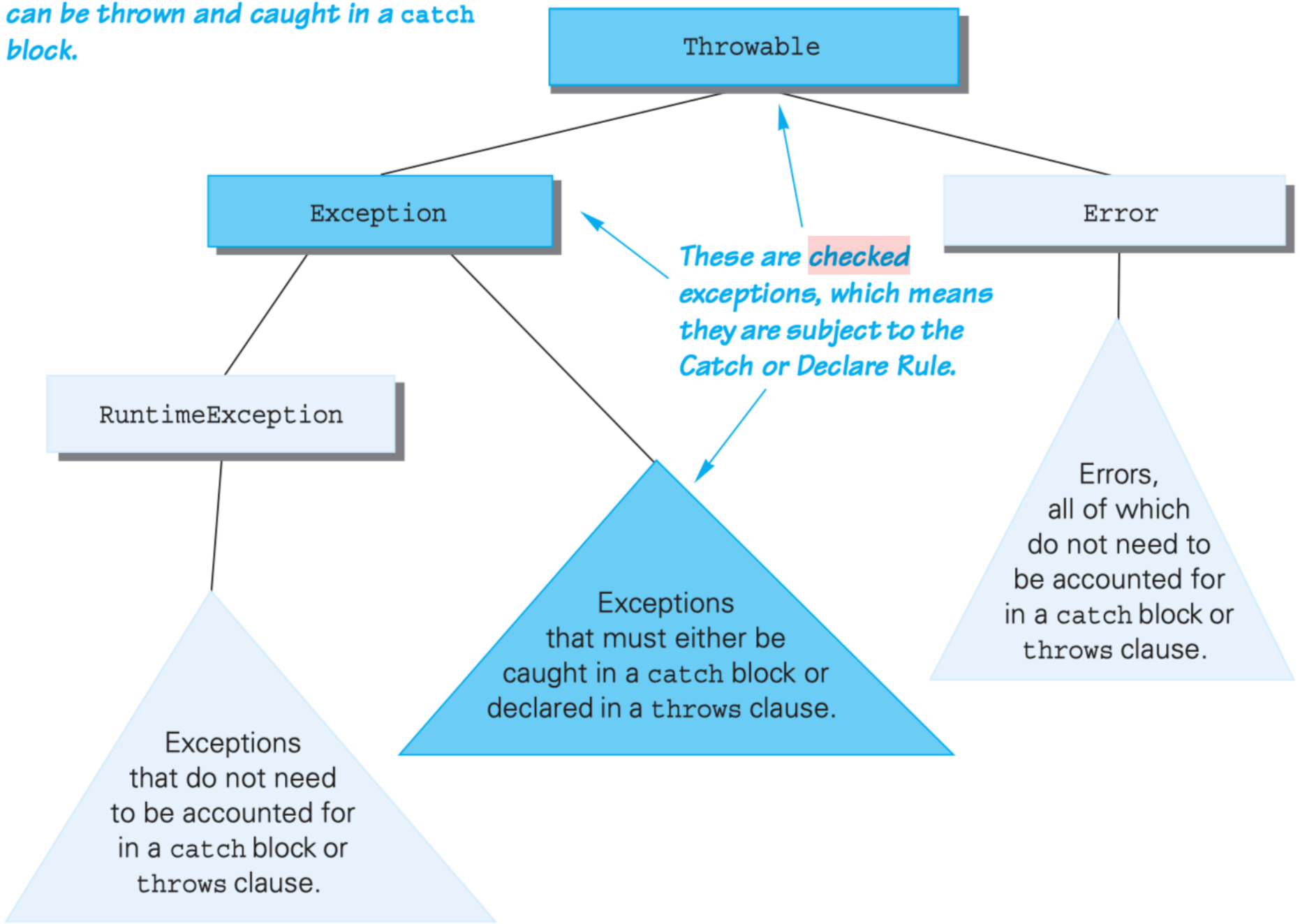
- ✓ **Checked Exception**

  Exceptions that are subject to the check and catch are called checked exceptions because the compiler checks to see if they are accounted for with a catch block or throws clause. e.g. SQLException

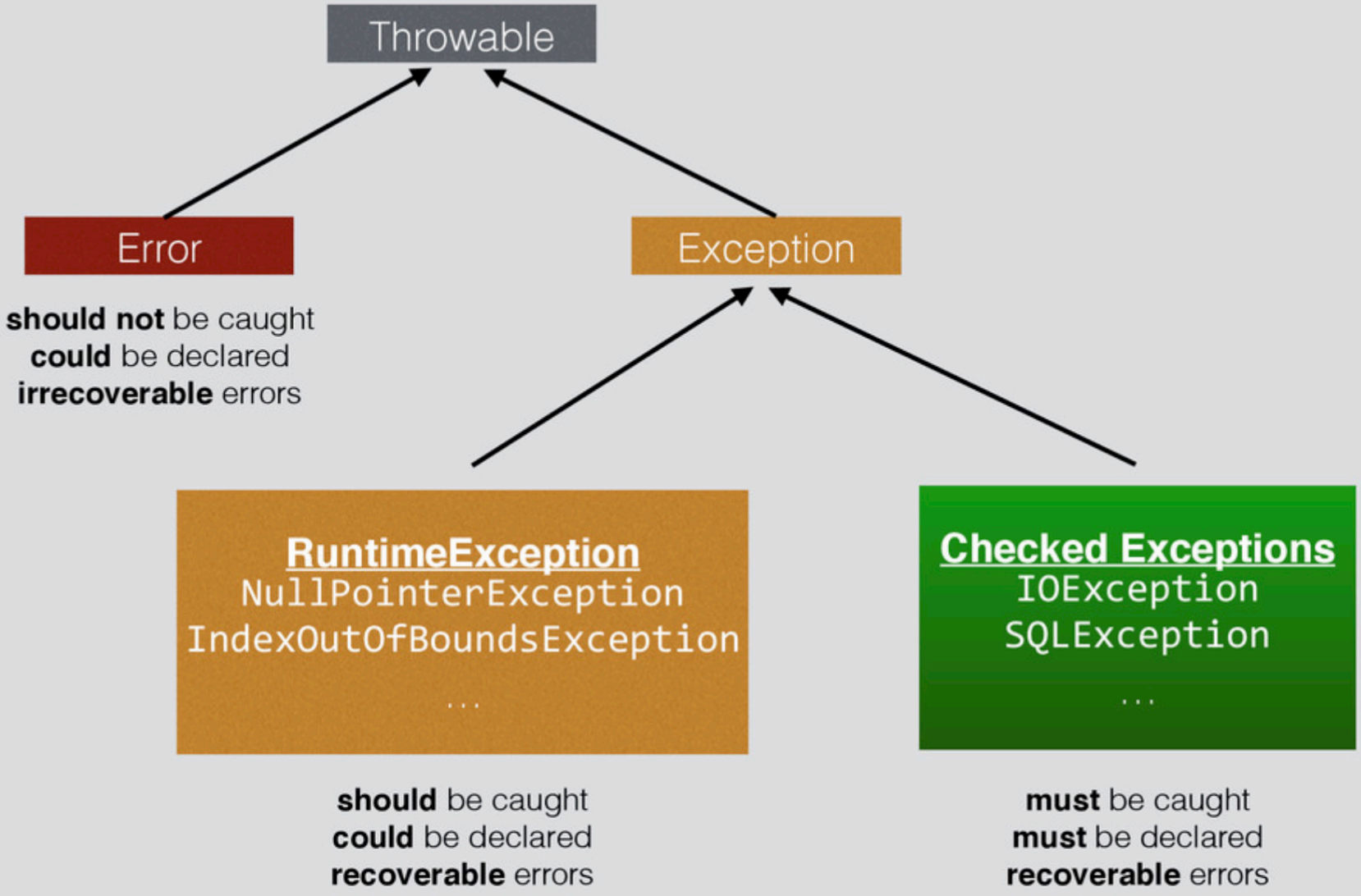
- ✓ **Unchecked exceptions**

  Exceptions that are not subject to the check and catch are called unchecked exceptions.

All descendents of the class `Throwable` *can be thrown and caught in a* `catch` *block.*



The Java Exception Hierarchy



Referenced from https://speakerdeck.com/gousiosg/exception-handling-bug-hazards-on-android

Why Use Exceptions?

Benefits

- ✓ Exceptions separate error handling code from regular code.
- ✓ Exceptions propagate errors up the call stack.
- ✓ Exception classes group and differentiate error types.
- ✓ Exceptions standardize error handling.

Create the custom exception class

```
public class LoginFailException extends Exception {
    public LoginFailException(String msg) {
        super(msg);
    }
}
```

Demo

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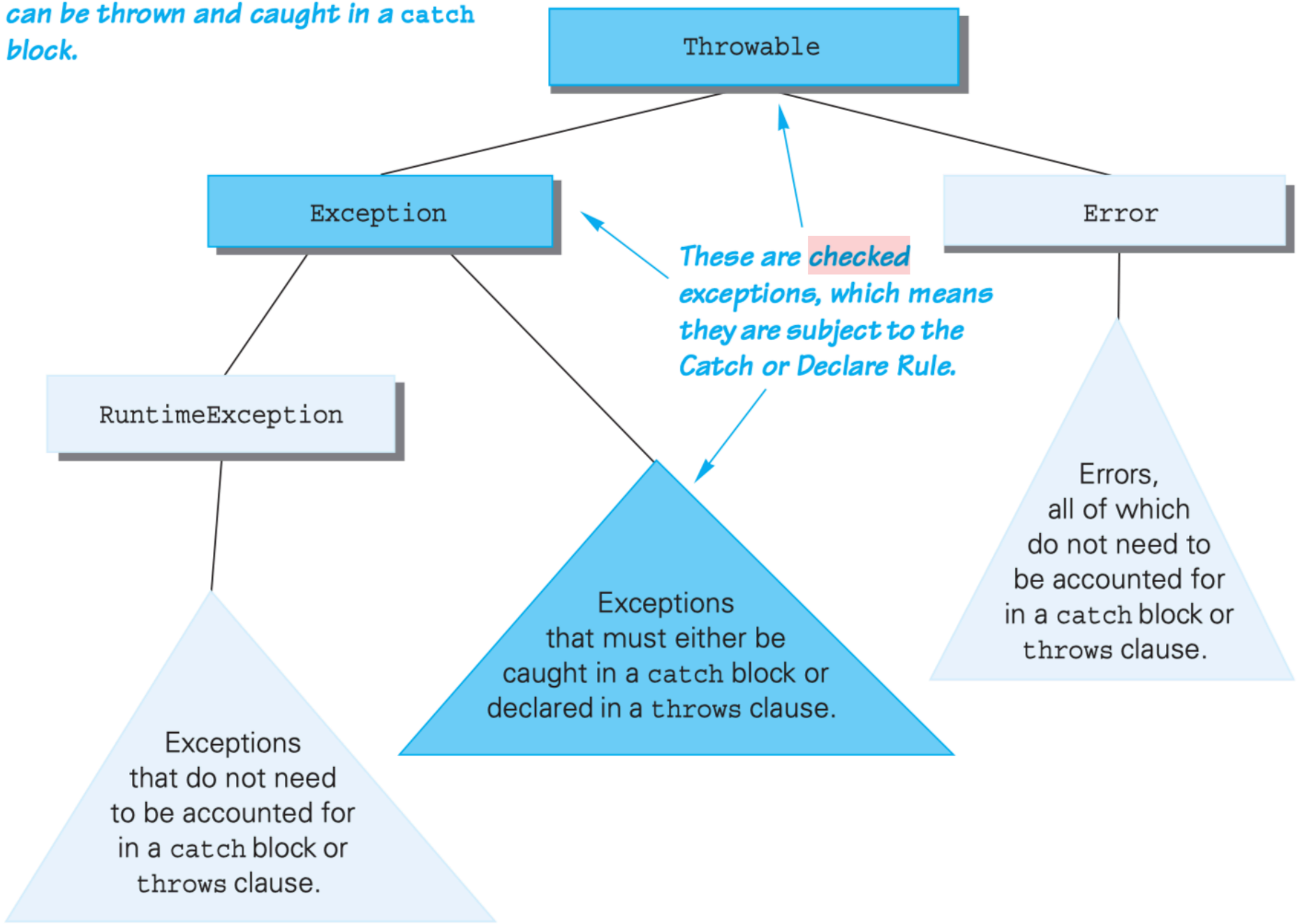
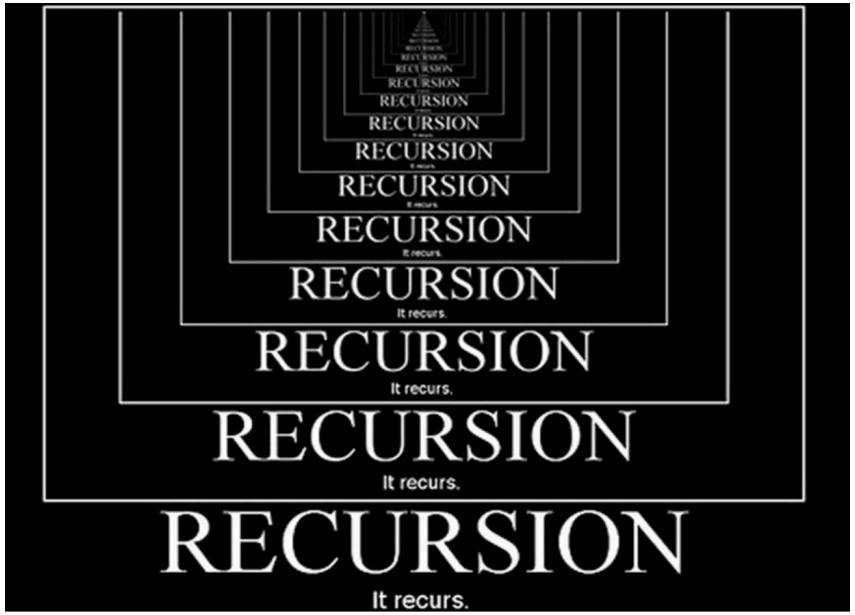
2. Errors

All descendents of the class `Throwable` *can be thrown and caught in a* `catch` *block.*



Errors

- ✓ Errors are thrown by JVM and should not be handled or declared.
- ✓ Errors indicate serious problems that a reasonable application should not try to catch. Most such errors are abnormal conditions.
- ✓ It is impossible to recover from errors.
- ✓ One example is StackOverflowError



Demo

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3. Exercise

Tutorial Exercise

1. Write a complete Java program that prompts the user for, and uses `nextInt()` to read in, two nonnegative integer numbers. Use a `try/catch` block to handle the `InputMismatchException` that is thrown if the user types in something other than an integer. In this case, print a suitable error message and exit the program.

Homework Exercise

2. Define an exception class called `NegativeNumberException`. The class should have a constructor with no parameters. If an exception is thrown with this zero-argument constructor, `getMessage` should return "Negative Number Not Allowed!". The class should also have a constructor with a single parameter of type String. If an exception is thrown with this constructor, then `getMessage` returns the value that was used as an argument to the constructor.

3. Revise the program in Exercise 1 above to use your new `NegativeNumberException`. Write a (static) method to print a prompt and read in a non-negative number. It should throw a `NegativeNumberException` if a negative number is entered. Then modify your `main` to catch `NegativeNumberException` as well as `InputMismatchException` and print a suitable error message in each case.

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Thank you