Exception Handling in Java (Java SE 11 Developer Certification 1Z0-819)

INTRODUCING EXCEPTION HANDLING

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App.java

```
try {
    // read a file
} catch (IOException ex) {
   // handle
}
finally { ... }


if(/* invalid input */){
   throw new IllegalArgumentException("ouch…");
}
```

Valid Code?

```
if(checkSomething()){
   throw RuntimeException();
 }
```

```
try {
// do stuff
} catch (IllegalArgumentException ex) {
 // handle
} catch (NumberFormatException ex) {
// handle
}
```

Be the compiler...

Who This Course Is For

Studying for the Java SE 11 certification exam

Studying for future Java exams

Learning the details of exception handling

Exceptions in Java

2004
Java 5

2011
Java 7
try-with-resources
Catching multiple exception types

2018
Java 11

20xx
Java 15+

Java

=

strong backwards compatibility

Prerequisites

Java fundamentals

1+ years of working with Java

Course Overview

Advantages of exception handling

Practicing try-with-resources

Exception types

- Exception class hierarchy

Throwing

- Custom exceptions

Overview

Advantages of exception handling

Review try/catch/finally syntax

- Chaining catch blocks
- Multi-catch blocks

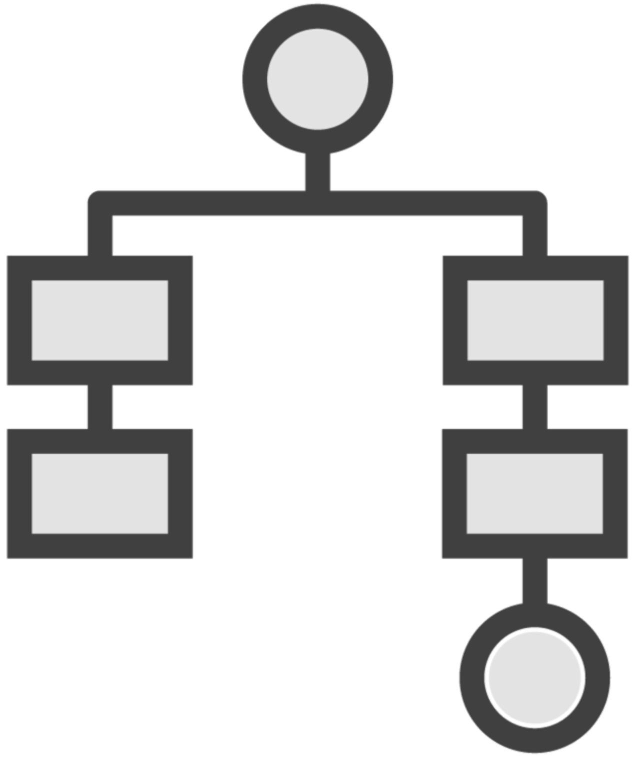
Demo

Internet is down

No disk space left

Access failure

Empty array



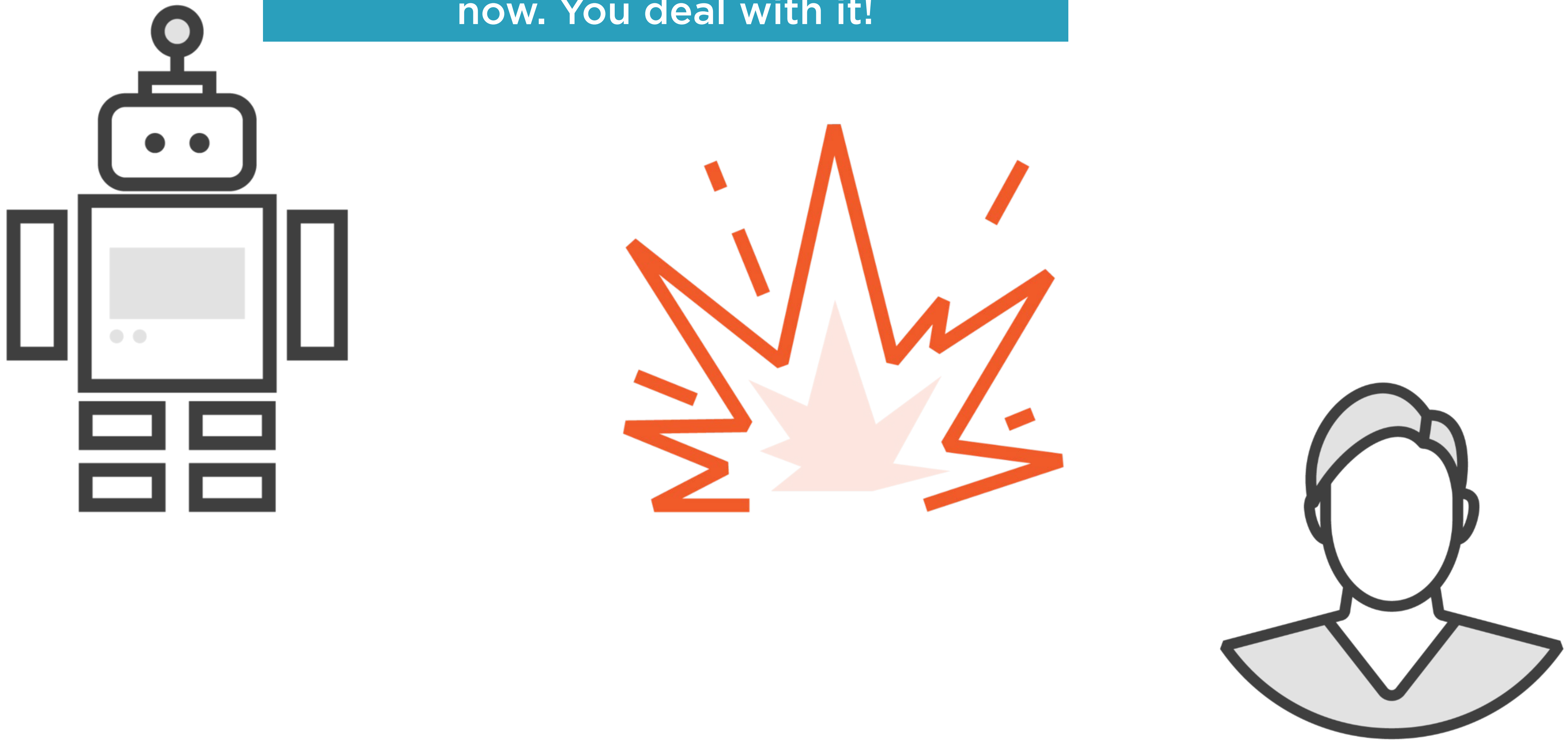
Errors:

- Within your control
- Outside of your control

Exam questions focus on exceptions caused by programming mistakes and errors (within your control)

Will this compile?

I give up. I don't know what to do right now. You deal with it!



```
System.exit(-1);
```

Error codes – ancestors of exceptions

A problem happened…

But what went wrong exactly?

Error: -4?

- File can't be opened?
- Enough memory can't be allocated?
- Something else?

Exceptions:

- Specific names for specific errors
- Example: NumberFormatException
  - “50” -> 50
  - “1a” -> ??

Special syntax to deal with exceptions:

- Try/catch/finally

```
try {

    // risky code

} catch (ExceptionType ex) {
    // handler
}
```

Curly braces are mandatory

Identifier – can have any name

e
err
anyVarName

Interchangeable Terms

Block

Clause

App.java

```java
BufferedReader br;
try {
    br = new BufferedReader(new FileReader("file.txt"));
    String line;
    while ((line = br.readLine()) != null) {
        System.out.println(line);
    }
} catch (IOException e) {
    System.err.format("IOException: %s", e);
}
```

Valid Code?

Unreachable statement

```
try {
    throw new IOException();
    openFile("file.txt");
} catch (IOException ex) {
   // handle
}
```

catch or finally is mandatory

```
try {
    doRiskyStuff();
}
doTheOtherThing();
```

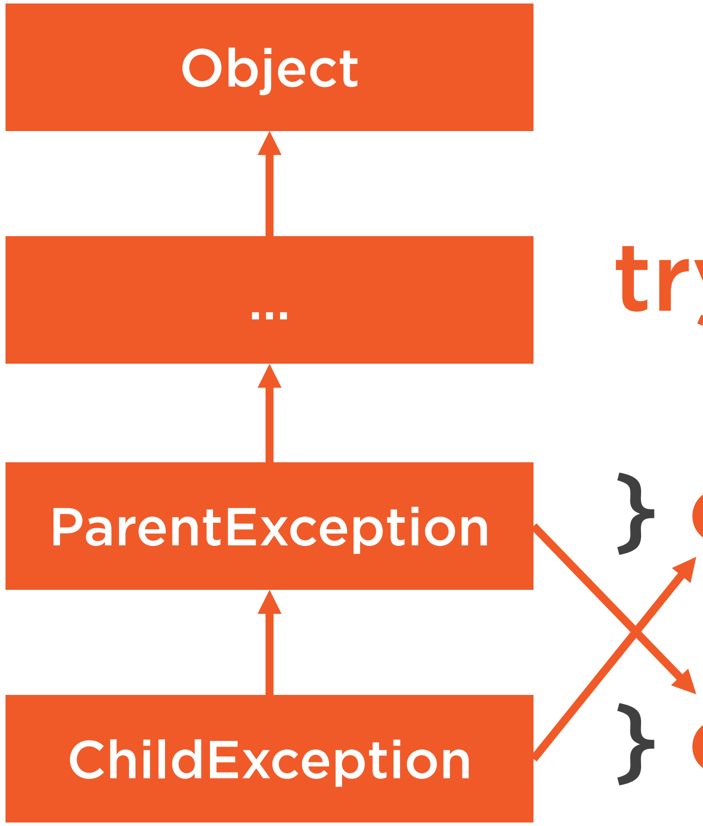
Valid Code?

Will not compile.
Mandatory for try-catch

```
try
  openFile(“file.txt”);
catch (IOException e)
   System.out.println(e);
```

Brackets are optional for
if-else blocks

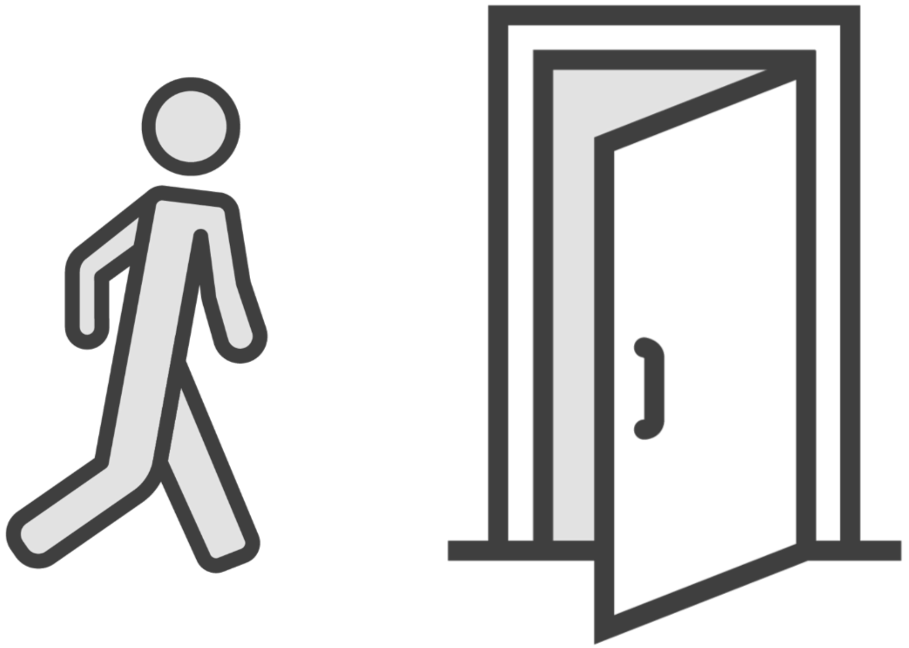
```
if (canReadFile(“file.txt”))
    openFile(“file.txt”);
else
    System.out.println(“error!”);
```



```
try {
  // code
} catch (ExceptionType1 ex) {
  // handler
} catch (ExceptionType2 ex) {
 // handler
}
```

Must respect the hierarchy

Understanding Exception Types

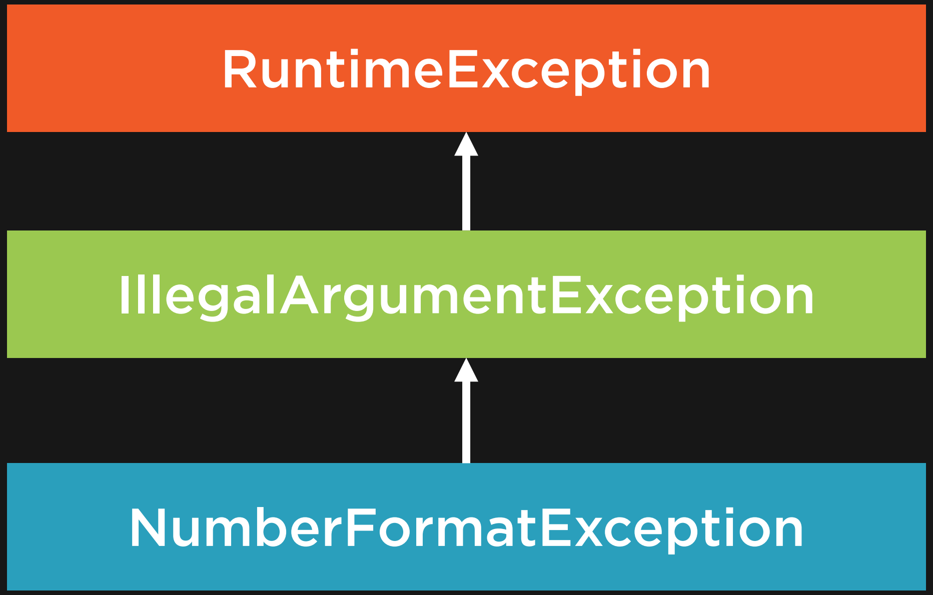


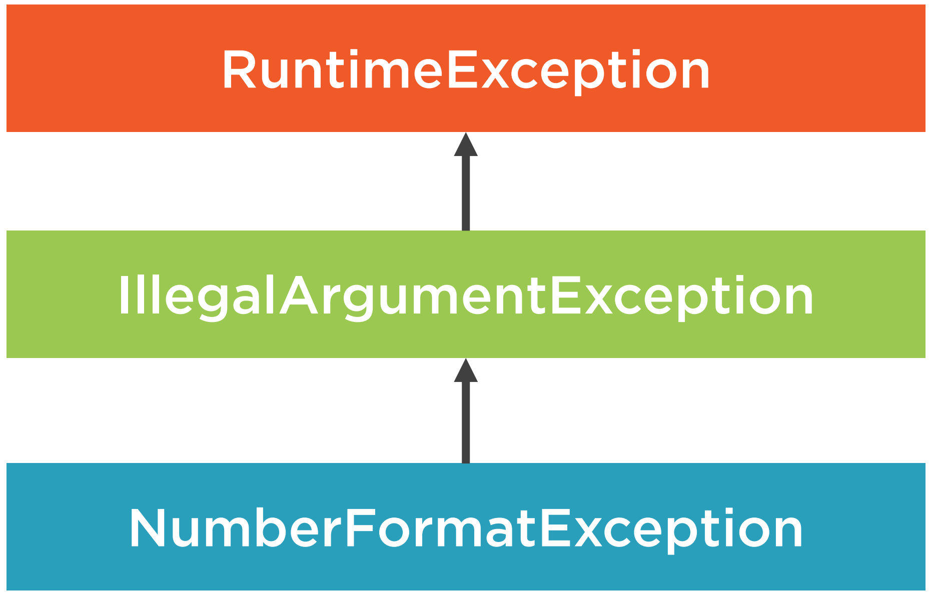
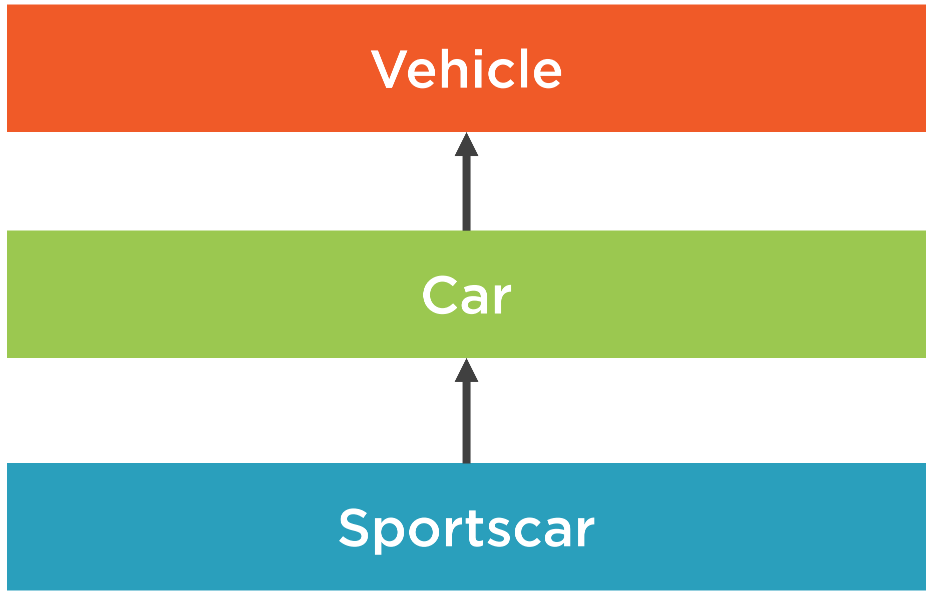
Understanding Exception Types

App.java

“1a” “-1” “Integer.MAX_VALUE + 1”

```java
try {
  // parse user input
} catch (NumberFormatException ex) { }

catch (IllegalArgumentException ex)  { }

catch (RuntimeException ex) { }
```



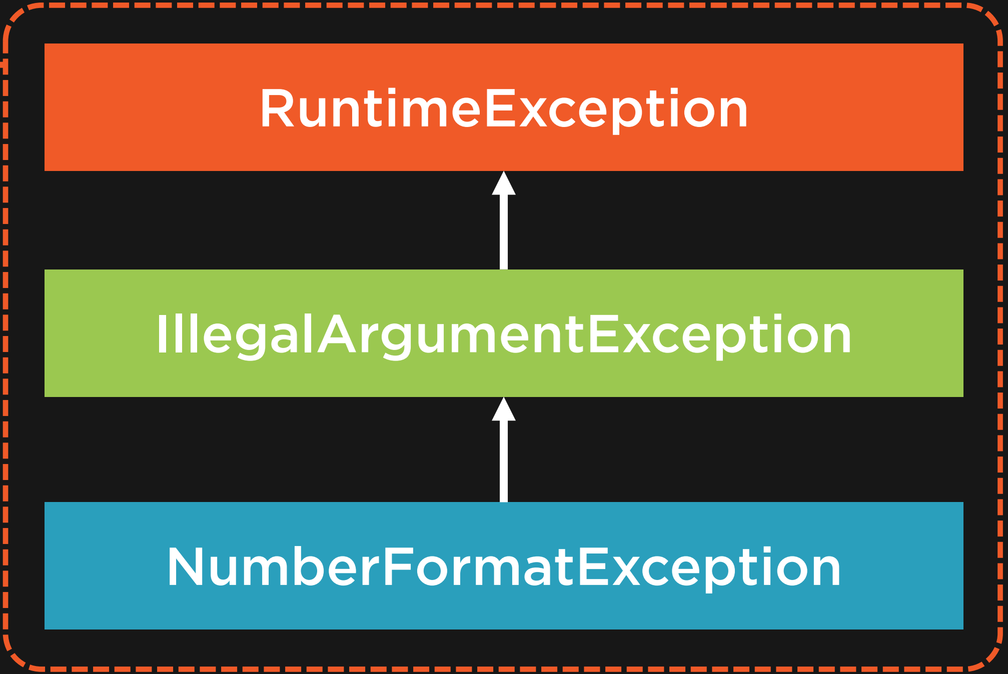

RuntimeException
IllegalArgumentException
NumberFormatException

Vehicle
Car
Sportscar

App.java

```java
try {

} catch (RuntimeException ex) { }

catch (IllegalArgumentException ex)  { }

catch (NumberFormatException ex) { }
```

Catches (almost) everything

Unreachable statements



App.java

```java
try {
  // parse user input
} catch (NumberFormatException ex1) {
    log(ex1);
}
catch (IllegalArgumentException ex2)  {
     log(ex2);
     log(ex1);
}
```

App.java

{no input}

```
int num = 0;
try {
  num = Integer.parseInt(args[0]);
}
catch (ArrayIndexOutOfBoundsException ex) {  /* identical handler */ }
catch (NumberFormatException ex)          {  /* identical handler */ }
catch (IllegalArgumentException ex)       {                         }
catch (RuntimeException ex)                {                         }
System.out.println(num);
```

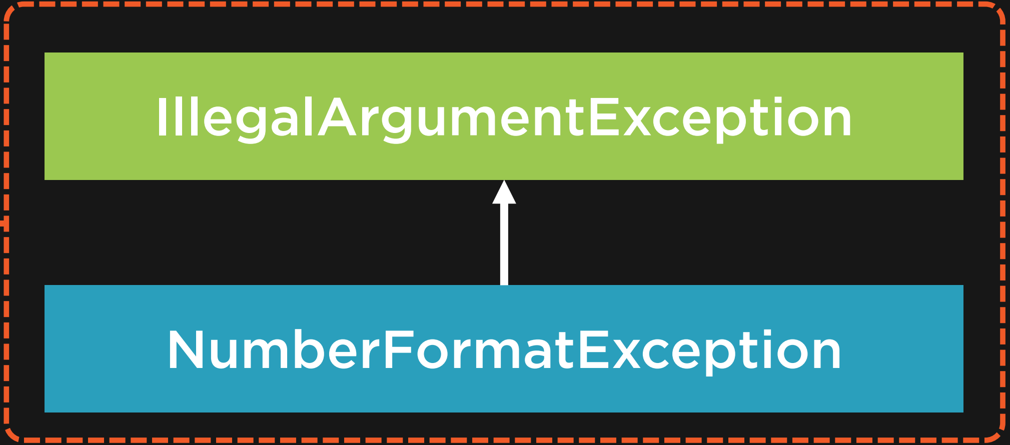
App.java

```
int num = 0;
try {
  num = Integer.parseInt(args[0]);
}
catch (ArrayIndexOutOfBoundsException | NumberFormatException ex) {
    System.out.println("Missing or invalid input");                ?
}
catch (IllegalArgumentException ex)           {                          }
catch (RuntimeException ex)                   {                          }
System.out.println(num);
```

App.java

```
int num = 0;

try {

  num = Integer.parseInt(args[0]);

}

catch ( ArrayIndexOutOfBoundsException |

        NumberFormatException          |

        IllegalArgumentException ex) {

    System.out.println("Missing or invalid input");

}

catch (RuntimeException ex)    {                          }

System.out.println(num);
```

Compilation failure:
Types in multi-catch must be disjoint



```
try {

    // risky code

} catch (Exception1 | Exception 2 e) {
    // handler
}
```

Catch either of these

Required between exception types

Single identifier for all exceptions

```
catch (Exception1 ex | Exception2 ex)
```
✗

```
catch (Exception1 ex1 | Exception2 ex2)
```
✗

```
catch (Exception1 | Exception2 ex)
```
✓

Valid Code?

```
try {

} catch (ChildException  ex ) {

} catch (ParentException ex ) {

}
```

OK

```
try {

} catch (ChildException |

         ParentException ex ) {

}
```

Not OK

Chaining catch() vs. Multi-catch

catch(E1 e) { } catch(E2 e) { }	catch(E1 | E2 e)
Handle things differently	Handle things the same way
Related exceptions allowed	Related (non-disjoint) exceptions not allowed
Specific exceptions first	

```
try {

    // open file / DB

} catch (ExceptionType ex) {
    // handler
} finally {
    // close file / DB
}
```

Optional if "finally" is present

Always (!) executes

Valid Code?

```
try {

} catch (Exception ex) {

} finally {

}
```

```
try {

} finally {

}
```

Valid Code?

try?

```
catch (Exception ex) {

} finally {

}
```

```
try {

} finally (Exception ex) {

}
```

App.java

Stop right now!

```
try {
    System.exit(0);
} finally {
    System.out.println(“This won’t print”);
}
```

Demo

try/catch/finally syntax

Demo

try/catch/finally flow

Summary

try { } catch () {} finally {}

- syntax
- try/catch OR try/finally

Chaining "catch" blocks

- Specific exceptions first, general last

Multi-catch blocks

- Special syntax

Exam questions: syntax and flow

try-with-resources