CS 211: Exceptions

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Week 9

Front Matter

Today

- Exceptions
- Maybe Generics

Lab 9: Quiz

- Enumerations, Abstract Classes, Interfaces
- Practice problems up

P4: GateSim

- Due ~ 2 weeks
- Minor updates for clarification
- Field Questions

Exceptions

- Generally allow nonlocal control flow,
- Thrown when execution must change location
- Done most often when an error occurs
- Exceptions Move up and out
  - Up the call stack
  - Out to a catch
  - Crash program if not caught

Java exceptions

- Are objects: `Exception e = new Exception("FAIL!!");`
- Subclass of `Throwable`, `Error` is as well
- Can be thrown: `throw e;`
- Can be caught: `try{...} catch(Exception e){...}`
- Throwing method must declare uncaught throws... sometimes; Catch or Declare
- Allow cleanup with `finally`

General Flow

```
always;
try {
  may cause exceptions;
  may also cause exceptions;
}
catch(SomeException e){
  handle this kind of exception;
  be graceful;
}
catch(OtherException o){
  handle a different kind;
}
finally{
  always do this;
  even if no exception thrown;
  even if exception thrown;
  even if uncaught is thrown;
  use it close files and flush output;
}
do this after no/handled exceptions;
```

Exercise

- `SimpleExceptions.java`
- Trace execution path
- What gets printed?

`catch` and Types

- `catch` figures types of exceptions identically to `instanceof`
- Ordering problems can arise
- See `TieredExceptions.java`

Errors Happen

Handling them is always painful

- Old style: return an error code - C
- Newish style: change the flow of control

Compare: Reading first Word of a File

- `ReadFirstWord.c`
- `ReadFirstWord.java`
- `ReadFirstNonlocal.java`
- `ReadFirstManyCatch.java`

Compare: Reading 3-column Input

- `CrashOnErrors.java`
- `HandleErrors.java`
- `HandleErrors2.java`

Catch or Declare... sometimes

How many times have you written

```
... throws NullPointerException
```

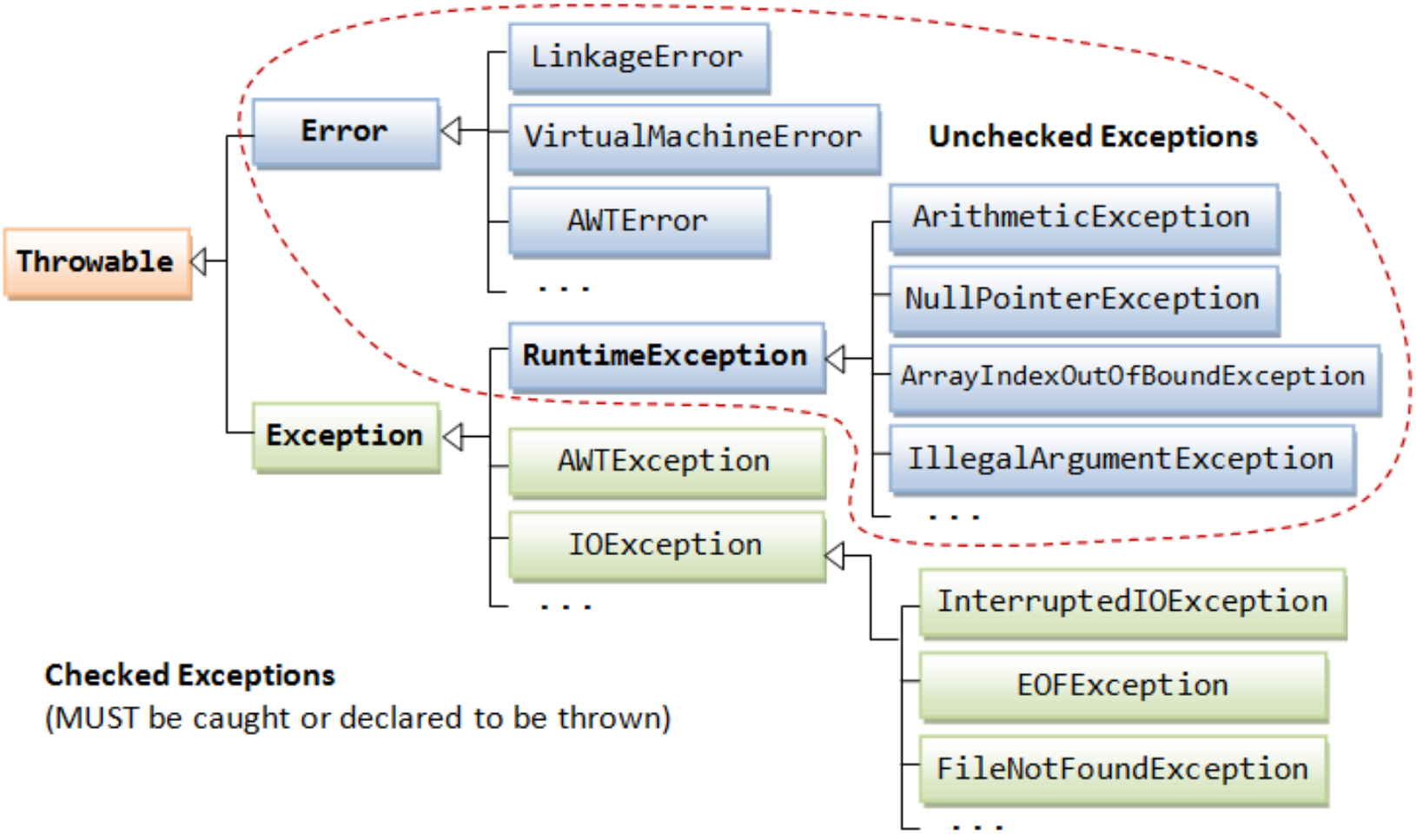
- `RuntimeExceptions` and `Errors` aren't declared
- Reserved for `bugs` rather than anticipated conditions

> *Unchecked runtime exceptions represent conditions that, generally speaking, reflect errors in your program's logic and cannot be reasonably recovered from at run time.*
> *– The Java Programming Language, by Gosling, Arnold, and Holmes*

See also

- Overview of Checked v. Unchecked by Hirondelle Systems
- Chua Hock-Chuan's Lecture Notes on Java Exceptions
- I am a great fan of `RuntimeException` during development

Checked versus Unchecked



Source: Chua Hock-Chuan: Java Programming Exception Handling & Assertion