Exceptions

Exception

- Exceptions in Java are special objects describing exceptional state occured in some place within program‘s code. If execution flow has run into some exceptional state an Exception object is created and passed to handler method.
- Exceptions may be thrown manually in custom code as well.

Syntax

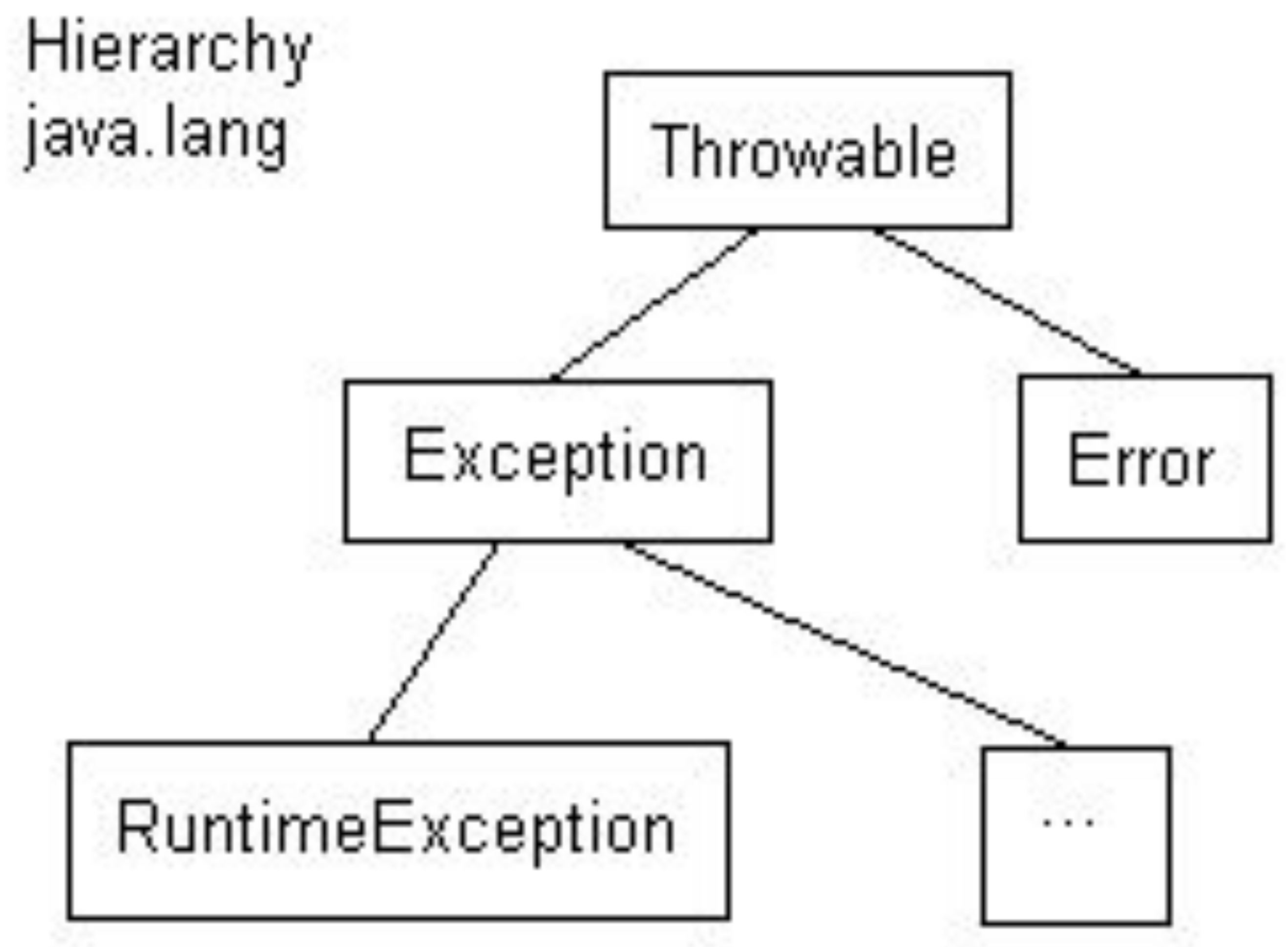
```
try {
    // some code that might run into exceptional state
}
catch (CustomException e) {
    // handle CustomException
}
catch (FileNotFoundException e) {
    // handle FileNotFoundException
    throw e;     // rethrowing exception up the call stack
}
finally {
    // some code that will run anyway
}
```

Checked vs. unchecked exceptions

‘Checked’ exceptions are checked by compiler – it goes through methods and constructors and produces an error if *throws* declaration is omitted. Any exception class inherited from Exception class is by default a checked exception.

Unchecked exceptions are successors of RuntimeException class. Unchecked exceptions are not checked at compile-time, so if such an exception occurs it must be caught either it will be thrown up the call stack to the end user.

Exceptions hierarchy



Exceptions hierarchy : Throwable

- Every exception class inherits Throwable class
- Throwable has two predefined constructors:
  - Throwable(); - default constructor
  - - Throwable(String message) you can define a message describing exceptional state.
- Message passed to the constructor can be obtained by `getMessage()` method. If the default constructor is used, this method will return null.
- `toString()` method returns brief string representation of the exception occured.
- You can get information about stacktrace of any exception by using `printStackTrace()` method – it prints entire call stack to the standard output;

Exceptions hierarchy : Error

- Classes that extend Error are to represent internal errors within JVM.
- Errors should not be thrown from custom code.
- You should not extend Error in your custom code either.
- Classes that extend Error usually contain Error in their names.

Exceptions hierarchy : Exception

- Exception classes that extend Exception class are to designate common exceptional state that could and should be handled.
- These exceptions may be raised using throw operator
- You can find appropriate exception class in JDK or create your own

Exceptions hierarchy : RuntimeException

- RuntimeException indicates occurrence of a serious exceptional state, though not as serious as Error
- All RuntimeException children are unchecked exceptions
- RuntimeException and its child classes can be inherited, thrown and caught within custom code

Catching exceptions

Exceptions are caught in order of catch blocks declaration

```
try {
   // some code
   throw new ArrayIndexOutOfBoundsException();
   // ...
} catch(RuntimeException re){
   // some handling
} catch(ArrayIndexOutOfBoundsException ae){
   // won't be executed
}
```

Creating your own exceptions

When creating your own exception you must keep in mind:

- Which situations may cause raising your exception
- Is it possible that catching your exception will catch some other exceptions intentionally or unintentionally
- Which exception class your exception will inherit
- In most cases your exception won’t need anything special except two constructors and getMessage() method override

Common exceptions

ArrayIndexOutOfBoundException

```
int i = 0;
int[] nArray = new int[5];
while(true) {
  try {
    nArray[i] = i;
  } catch(Exception ex) {
    System.out.println("\n" + ex.toString());
    break;
  }
  System.out.print(i);
  i++;
}
```

Common exceptions

ClassCastException

In Java you can not cast instance of one class to another arbitrary class. If classes belong to different hierarchies or you are trying to cast parent class instance to child class, you will get ClassCastException

```
Object ch = new Character('*');
try {
  System.out.println((Byte)ch);
}
catch(Exception ex) {
  System.out.println(ex.toString());
}
```

Common exceptions

NullPointerException

If you try to call method or address a field from null reference, NullPointerException will occur.

```
int[] nNulArray = new int[5];
nNulArray = null;
try{
   i = nNulArray.length;
}
catch(Exception ex){
   System.out.println(ex.toString());
}
```

Q&A

Thank you!