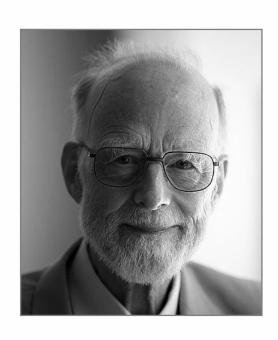


YEGOR BUGAYENKO

Lecture #6 out of 8 80 minutes

The slidedeck was presented by the author in this YouTube Video

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"I was designing the first comprehensive type system for references in an OO language (ALGOL W). My goal was to ensure that all use of references should be absolutely safe. But I couldn't resist the temptation to put in a null reference, simply because it was so easy to implement. This has led to innumerable errors, vulnerabilities, and system crashes, which have probably caused a billion dollars of <u>pain</u> and <u>damage</u> in the last forty years."

— Tony Hoare. Null References: The Billion Dollar Mistake. https://jttu.net/hoare2009null, 8 2009. [Online; accessed 22-09-2024]

Fail Fast vs Fail Safe

Alternatives to Returning NULL

Alternatives to Checking for NULL

Alternatives to Storing NULL

**Object Thinking** 

**Spring Boot** 

4/24

Chapter #1:

Fail Fast vs Fail Safe



"Over time, more and more errors will <u>fail fast</u>, and you'll see the cost of debugging decrease and the quality of your system improve."

— James Shore. Fail Fast. <u>IEEE Software</u>, 21(5), 2004. doi:10.1109/MS.2004.1331296

[ Defaults Swallowing SDLC ]



#### Fail Safe:

```
int size(File file) {
  if (!file.exists()) {
   return 0;
  }
  return file.length();
}
```

#### Fail Fast:

```
int size(File file) {
  if (!file.exists()) {
    throw new IllegalArgumentException(
        "The file is absent :("
      );
  }
  return file.length();
}
```

The right snippet is more <u>fragile</u>, leading to more errors in runtime, but eventually ... leading to less bugs [Bugayenko, 2015a].

[ Defaults Swallowing SDLC ]

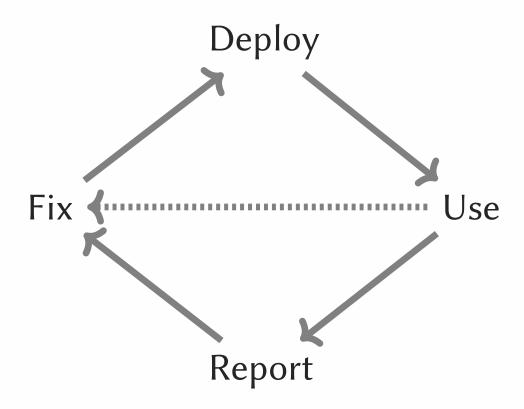
## Exception swallowing

```
String read(File file) {
  try {
  return new String(
    Files.readBytes(file)
  );
} catch (IOException e) {
  e.printStackTrace();
  return ""; // default
}
```

The right snippet is escalating, while the left one is swallowing.

[ Defaults Swallowing SDLC ]

# Software Development Lifecycle



Watch this video from DEVit'2016 conference: Need It Robust? Make It Fragile!

9/24

Chapter #2:

Alternatives to Returning NULL

# Returning NULL or raising an error?

```
String nameOfEmployee(int id) {
   if (!em.existsInDb(id)) {
     return null;
   }
   return em.readFromDb(id);
   }

String nameOfEmployee(int id) {
   if (em.existsInDb(id)) {
     throw new EmployeeNotFound(id);
   }
   return em.readFromDb(id);
   }
```

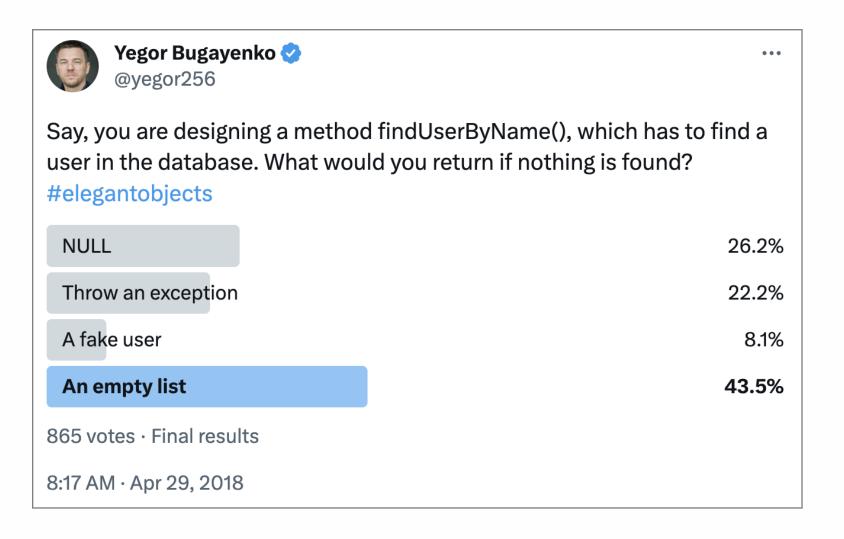
The right snippet is "Fail Fast," that's why more preferrable [Bugayenko, 2014, 2015b].

# Returning a List or a NULL?

```
String nameOfEmployee(int id) {
   if (!em.existsInDb(id)) {
     return null;
   }
   return em.readFromDb(id);
}
```

```
List<String> nameOfEmployee(int id) {
List<String> names =
   new ArrayList<>(0);
if (em.existsInDb(id)) {
   names.add(em.readFromDb(id));
}
return names;
}
```

There are mo elegant alternatives in most languages, like |Optional| in Java 8+ [Bugayenko, 2018].



### Returning a Fake Entity

```
Employee employee(int id) {
   if (!em.existsInDb(id)) {
     return null;
   }
   return new PgEmployee(id);
}

e = employee(42);
print(e.id());
print(e.salary());
```

```
Employee employee(int id) {
   if (!em.existsInDb(id)) {
     return FakeEmployee(id);
   }
   return new PgEmployee(id);
}

e = employee(42);
print(e.id());

print(e.salary());
```

14/24

Chapter #3:

Alternatives to Checking for NULL

[ ??-operator Ruby Kotlin ]

# null-coalescing operator in C#

```
int? sizeOf(File f) {
   if (!f.exists()) {
     return null;
   }
   return f.size();
}

int? s = sizeOf(f);

if (s == null) {
   s = 0;
}
```

```
int? sizeOf(File f) {
  if (!f.exists()) {
    return null;
  }
  return f.size();
}
int s = sizeOf(f) ?? 0;
```

Both snippets are bad design, though. They are workarounds.

[ ??-operator Ruby Kotlin ]

## &. operator in Ruby

```
def employee(id)
unless db.exists?(id)
return nil
end
return db.get(id)
end

end

puts e.name unless e.nil?
```

```
def employee(id)
unless db.exists?(id)
return nil
end
return db.get(id)
end
puts employee(42)&.name
```

Actually, the snippets produce different output when the employee is not found. How are they different?

[ ??-operator Ruby Kotlin ]

# NULL-awareness in Kotlin

```
var a: String = "abc"
a = null // compilation error

var b: String? = "abc"
b = null // no error here

println(b?.length) // prints what?
println(b?.length ?: -1) // Elvis operator
```



18/24

Chapter #4:

Alternatives to Storing NULL

[ Immutability ]

### Immutable objects

```
class Employee {
  private String name = null;
  void setName(String n) {
    this.name = n;
  }
}
e = new Employee();
e.setName("Jeff");
```

```
class Employee {
  private final String name;
  Employee(String n) {
    this.name = n;
  }
  Employee withName(String n) {
    return new Employee(n);
  }
}

el = new Employee();
  e2 = el.withName("Jeff");
```

20/24

Chapter #5:

Object Thinking

#### Pay respect to your objects!

```
d = getDepartment(42);
e = d.getEmployee("Jeff");
if (e != null) {
  printf("Hello, %s", e.name());
}
```

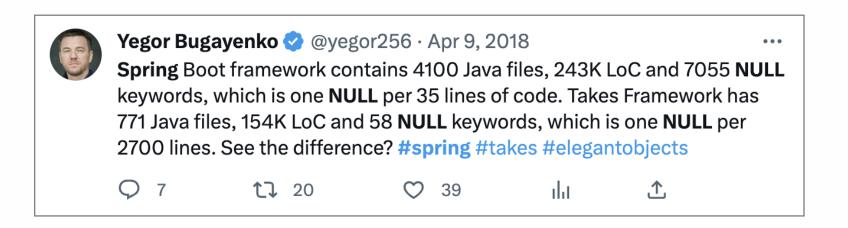
```
1 - Hello, is it the department no.42?
2 - Yes.
3 - Let me talk to your employee "Jeff".
4 - Hold the line please...
5 - Hello.
6 - Are you NULL?
```



22/24

Chapter #6:

Spring Boot



You can do you own analysis of existing Java open source GitHub repositories to see how often their developers use |null| keyword.

The Takes framework is here: yegor256/takes.

#### References

Yegor Bugayenko. Why NULL Is Bad? https://www.yegor256.com/140513.html, 5 2014. [Online; accessed 22-09-2024].

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Proper Context Is a Bad Habit. https://www.yegor256.com/151201.html, 12 2015b. [Online; accessed 22-09-2024].

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