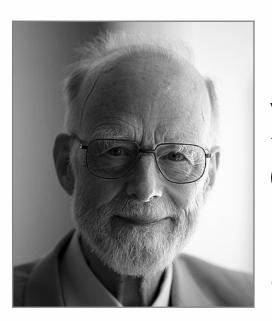
NULL

Fail Fast, Returning, Checking, OT

YEGOR BUGAYENKO

Lecture #6 out of 8 90 minutes

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"I call it my billion-dollar mistake. It was the invention of the null reference in 1965. At that time, I was designing the first comprehensive type system for references in an object oriented language (ALGOL W). My goal was to ensure that all use of references should be absolutely safe, with checking performed automatically by the compiler. 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 pain and damage in the last forty years."

- Tony Hoare, InfoQ, 2009

Fail Fast vs Fail Safe

Alternatives to Returning NULL

Alternatives to Checking for NULL

Alternatives to Storing NULL

Object Thinking

Spring Boot

Read and Watch

Chapter #1:

Fail Fast vs Fail Safe



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

— James Shore, IEEE Software, 2002

[Defaults Swallowing SDLC]

Defaults

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.

[Defaults Swallowing SDLC]

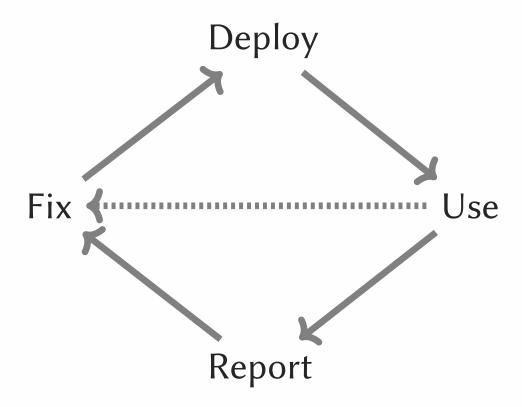
Exception swallowing

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

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!

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);
   }
```

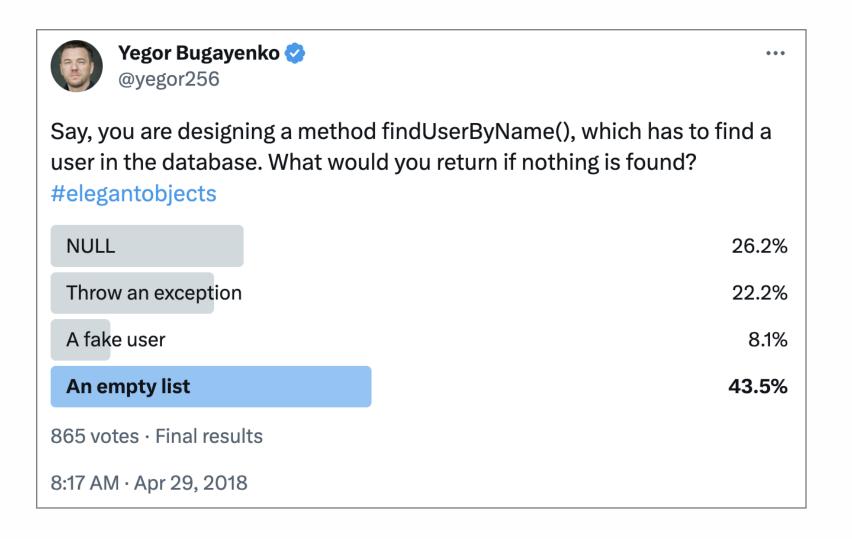
The right snippet is "Fail Fast," that's why more preferrable.

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)) {
return names;
}
names.add(em.readFromDb(id));
return names;
}
```

There are mo elegant alternatives in most languages, like Optional in Java 8+.



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());
```

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

end

puts e = employee(42)
puts e.name unless e.nil?

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

puts employee(42)&.name
```

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

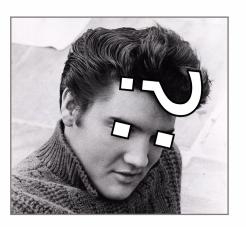
[??-operator Ruby Kotlin]

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
```



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");
```

Chapter #5:

Object Thinking

Pay respect to your objects!

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

```
- Hello, is it the department no.42?

- Yes.

- Let me talk to your employee "Jeff".

- Hold the line please...

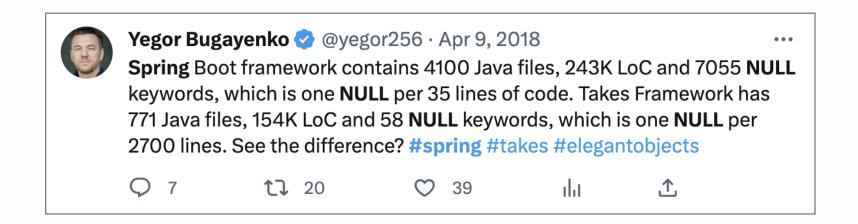
- Hello.

- Are you NULL?
```



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.

Chapter #7:

Read and Watch

Why NULL is Bad? by me (2014)

Throwing an Exception Without Proper Context Is a Bad Habit by me (2015)

One More Recipe Against NULL by me (2018)

Need Robust Software? Make It Fragile by me (2015)

What is Wrong About NULL in OOP? (Webinar #3) by me on YouTube