Null: When Nothing gives you Headaches

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Software Composition Seminar

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public Car buildAndOpen() {
    Car car = Factory.build();
    car.open();
    return car;
}
WAT!?

java.lang.NullPointerException
You betrayed me!

@RxLogSubscriber NullPointerException #14

spirosok commented on Jan 20

There are a few problems with a library dude which I will try to solve and send a PR. I found that if send an empty observable back or a null value back then the RxLogSubscriber crashes with NullPointerException. If I removed it then the subscriber works normally.
public Car buildAndOpen() {
    Car car = Factory.build();
    if (car == null) {
        return null;
    }
    car.open();
    return car;
}
Unexpressive

Car car := car ∈ Car ∪ car = null
Bad habit

java.util.Map.get(Object)

might return null
Null is a trouble maker

- NullPointerException-related bugs are the most frequent in Java projects
- Often fixed by guarding problematic code with a null check
- 35% of conditionals are null checks
- 71% of objects compared against null are return values from a method call

Leuenberger, Osman et al. 2015
java.lang.NullPointerException
because car was nulled by...

Where did this null come from???, Lina Tran
 Compile-time

```java
    public Car buildAndOpen() {
        Car car = Factory.build();
        car.open();
        return car;
    }
```

Null: When Nothing gives you Headaches, Manuel Leuenberger
Questions

• Is null usage bug-prone?
• How is null used?
• What could null be replaced with?
Null Virus

• Do return-null APIs infect clients?

• Does a high potential null-reference count imply more bugs?

• What’s the price of return null?
Expressive

Car car := car ∈ Car

Optional<Car> car := car ∈ Car ∪ car = null
Good habit

nonnull.java.util.Map.get(Object)
returns Optional<V>
Summary

- Is null usage bug-prone?
  - Examine correlation

- How can we prevent these bugs?
  - Tools to support developer with hints
  - Replace null usage with *placeholder*
  - Change language semantics