

# Null: When Nothing gives you Headaches

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Software Composition Seminar

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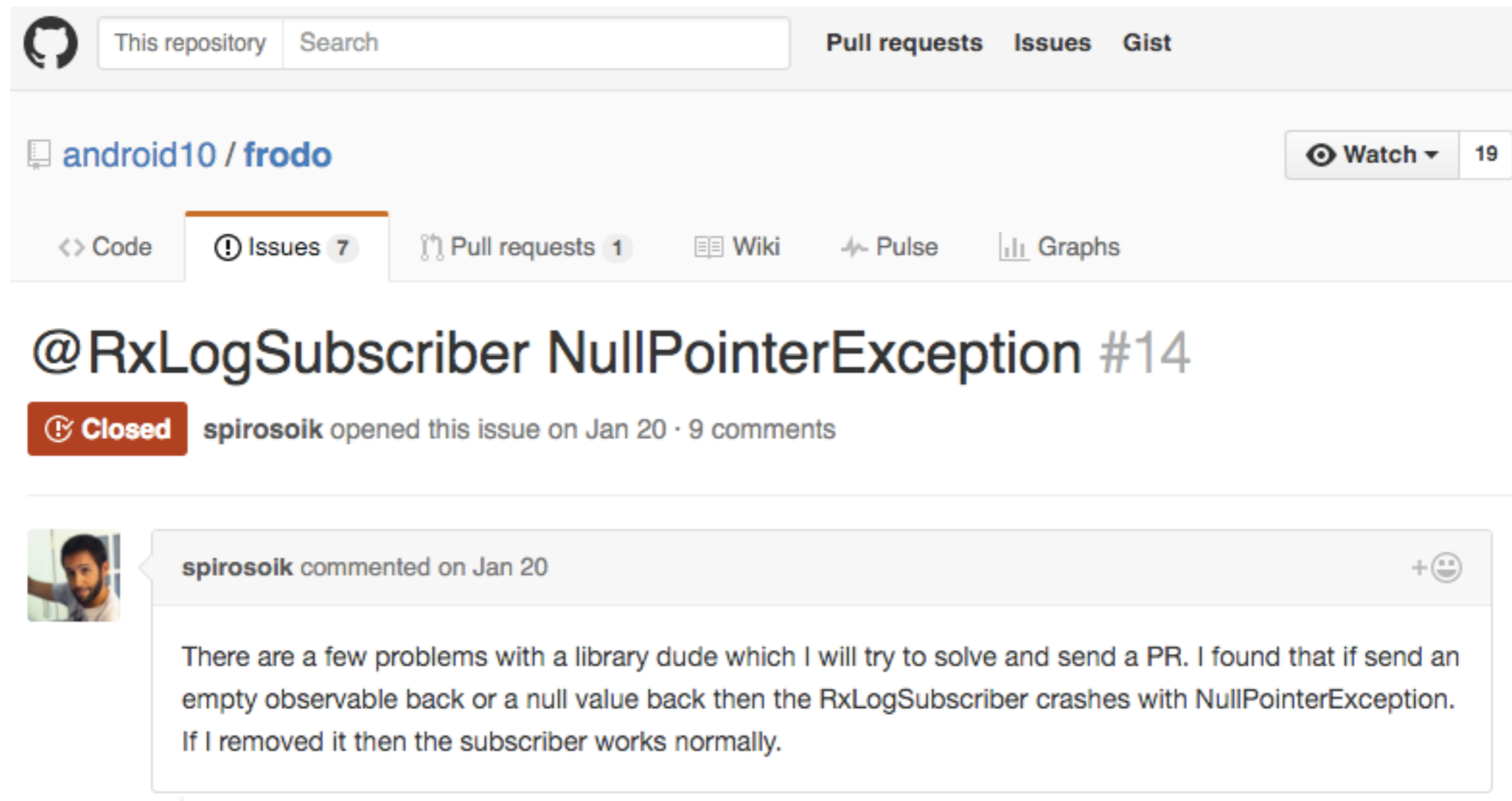
# Let's build a new car...

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

WAT!?

`java.lang.NullPointerException`

# You betrayed me!



The screenshot shows a GitHub repository page for 'android10 / frodo'. The issue title is '@RxLogSubscriber NullPointerException #14', which is marked as 'Closed'. The issue was opened by 'spirosoik' on Jan 20 and has 9 comments. A comment from 'spirosoik' dated Jan 20 explains that there are problems with a library 'dude' that cause a NullPointerException when an empty observable or null value is returned. The comment states that removing the problematic code allows the subscriber to work normally.


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## @RxLogSubscriber NullPointerException #14

**Closed** spirosoik opened this issue on Jan 20 · 9 comments

 spirosoik 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.

# Not my problem...

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

# Unexpressive

$\text{Car } \text{car} := \text{car} \in \text{Car} \cup \text{car} = \text{null}$

# 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




# Runtime

`java.lang.NullPointerException`  
because car was nulled by...

Where did this null come from???, Lina Tran

# Compile-time

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



might  
be null

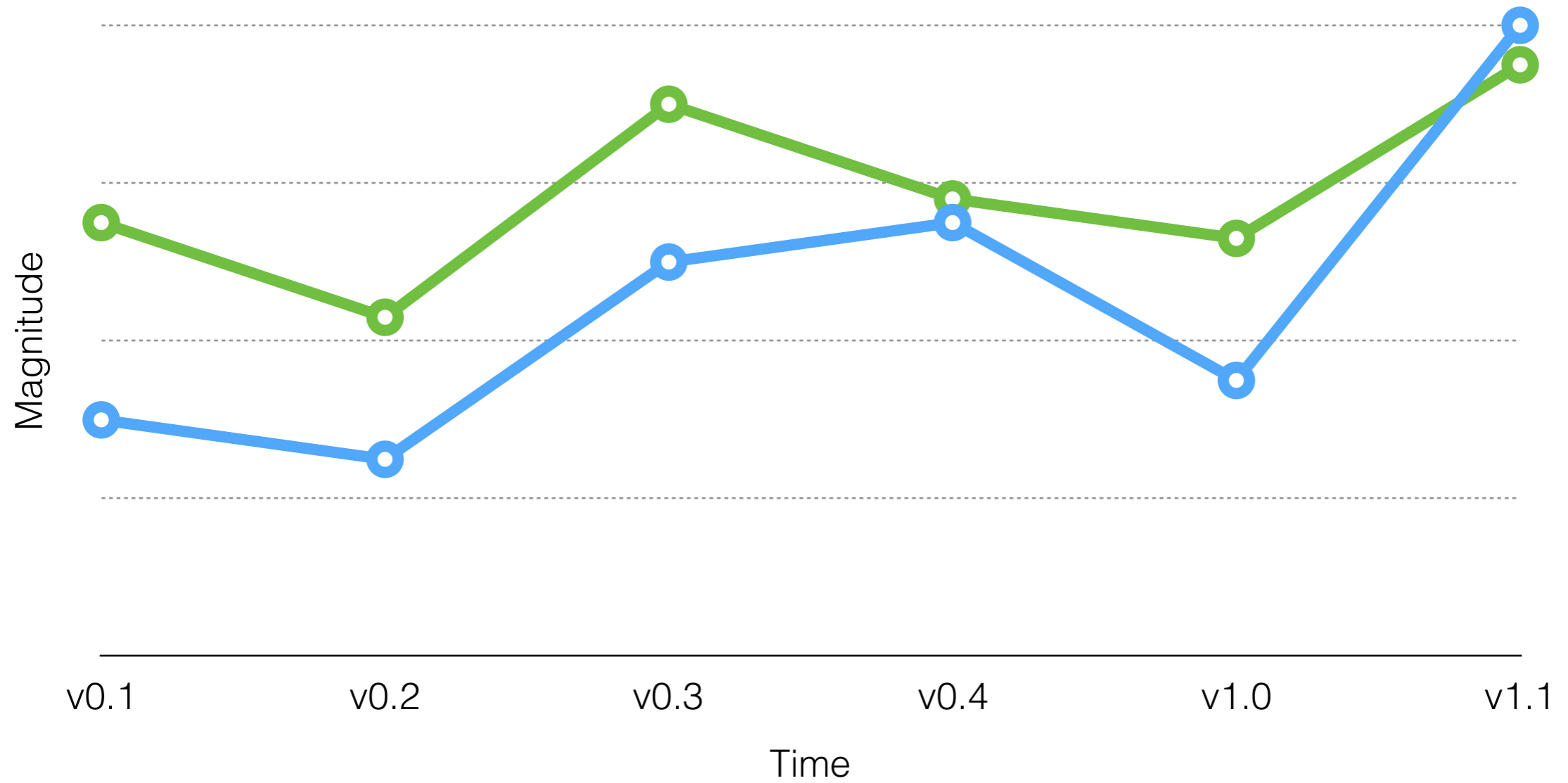
# Questions

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

# Nulls vs. Bugs

bugs

nulls



# 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

$\text{Car } \text{car} := \text{car} \in \text{Car}$

$\text{Optional}\langle \text{Car} \rangle \text{ car} := \text{car} \in \text{Car} \cup \text{car} = \text{null}$

# 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