

Code Coverage

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Lecture #15 out of 24

80 minutes

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Example, Part I

Live Code:

```
1 int fibonacci(int n) {  
2     if (n <= 0) {  
3         return 0;  
4     }  
5     if (n <= 2) {  
6         return 1;  
7     }  
8     return fibonacci(n-1)  
9         + fibonacci(n-2);  
10 }
```

Test Code:

```
1 assert fibonacci(1) == 1;  
2 assert fibonacci(2) == 1;
```

$$C = 3/10 = 30\%$$

Example, Part I

Live Code:

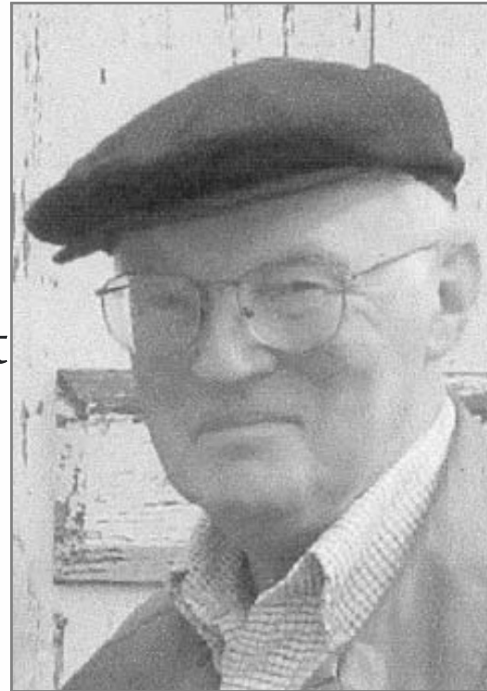
```
1 int fibonacci(int n) {  
2     if (n <= 0) {  
3         return 0;  
4     }  
5     if (n <= 2) {  
6         return 1;  
7     }  
8     return fibonacci(n-1)  
9         + fibonacci(n-2);  
10 }
```

Test Code:

```
1 assert fibonacci(1) == 1;  
2 assert fibonacci(2) == 1;  
3  
4 assert fibonacci(9) == 34;  
5 assert fibonacci(10) == 55;
```

$$C = 5/10 = 50\%$$

+2pt



“A disciplined test control process is composed of five steps: 1) establish the intended extent of testing; 2) create a list of functional variations eligible for testing; 3) rank and subset the eligible variations so that test resources can be directed at those with the higher payoff; 4) calculate the test coverage of the test case library; and 5) verify attainment of the planned test coverage.”

— William Robert Elmendorf, *Controlling the Functional Testing of an Operating System*, IEEE Transactions on Systems Science and Cybernetics, 5(4), 1969

+2pt



“Coverage numbers (like many numbers) are dangerous because they’re objective but incomplete. They too often distort sensible action. Using them in isolation is as foolish as hiring based only on GPA.”

— Brian Marick, *How to Misuse Code Coverage*, 1997

+2pt



“I would be suspicious of anything like 100% — it would smell of someone writing tests to make the coverage numbers happy, but not thinking about what they are doing.”

— Martin Fowler, *Test Coverage*, 1997

+2pt



“Google does not enforce any code coverage thresholds across the entire codebase. Projects (or groups of projects) are free to define their own thresholds and goals. Many projects opt-into a centralized voluntary alerting system that defines five levels of code coverage thresholds.”

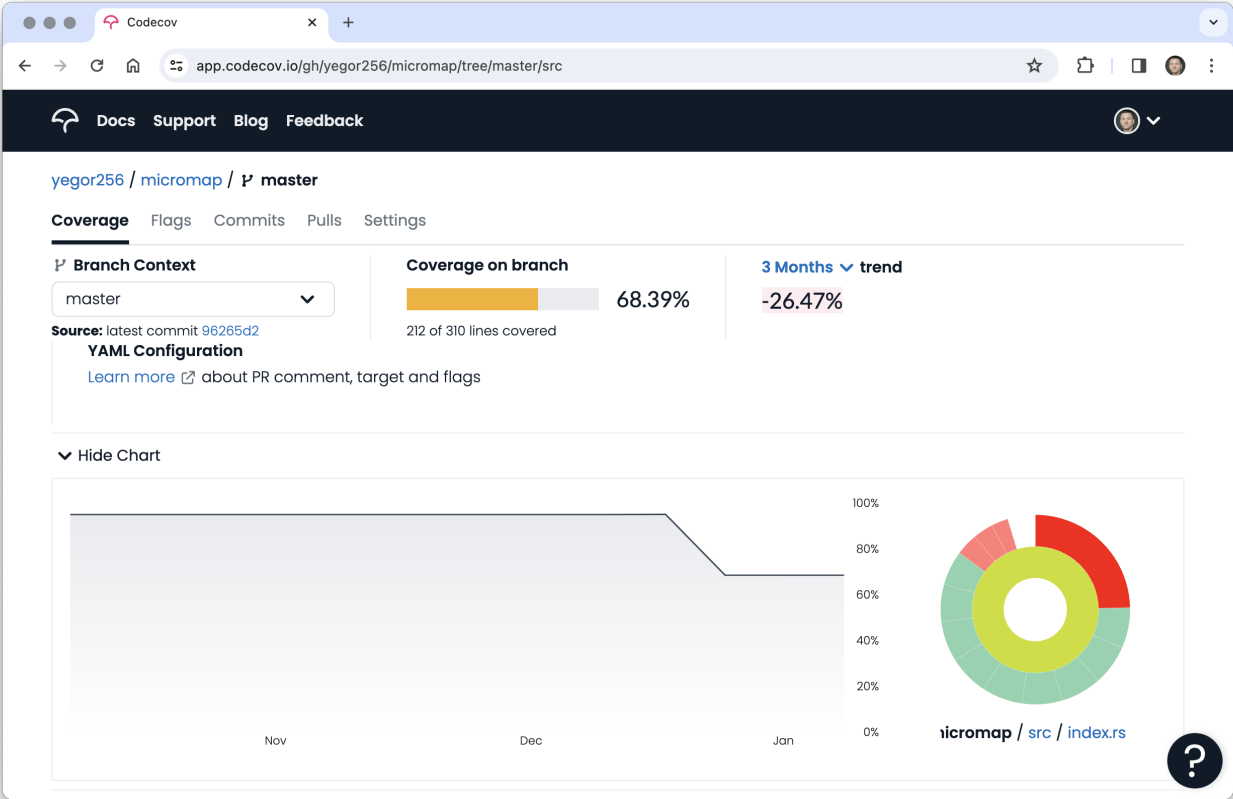
— *Code Coverage at Google*, Goran Petrović, Marko Ivanković, René Just, Gordon Fraser, Proceedings of the 27th Joint Meeting on ESEC/FSE, 2019

Code Coverage Threshold Levels in Google

Table 2: Coverage levels and corresponding thresholds. Many projects voluntarily set these thresholds as their goal.

LEVEL	THRESHOLD
Level 1	Coverage automation disabled
Level 2	Coverage automation enabled
Level 3	Project coverage at least 60%; Changelist coverage at least 70%
Level 4	Project coverage at least 75%; Changelist coverage at least 80%
Level 5	Project coverage at least 90%; Changelist coverage at least 90%

Codecov.io



Line Coverage

yegor256 / micromap / master

CoverageFlagsCommitsPullsSettings

micromap / src / iterators.rs

UncoveredPartialCovered

110#[inline]

111#[must_use]

112fn into_iter(self) -> Self::IntoIter {

113 IntoIter {

114 pos: 0,

115 map: ManuallyDrop::new(self),

116 }

117}

118}

119

120impl<K: PartialEq, V, const N: usize> Drop for IntoIter<K, V, N> {

121 fn drop(&mut self) {

122 for i in self.pos..self.map.len {

123 self.map.item_drop(i);

124 }

125 }

126}

127

128impl<'a, K, V> DoubleEndedIterator for Iter<'a, K, V> {

129 fn next_back(&mut self) -> Option<Self::Item> {

130 self.iter.next_back().map(|p| {

131 let p = unsafe { p.assume_init_ref() };

132 (&p.0, &p.1)

133 })

134 }

135}

Tarpaulin for Rust

```
Code Blame 23 lines (23 loc) · 551 Bytes Raw Copy Download Edit View Source
```

```
1  ---
2  name: tarpaulin
3  on:
4    push:
5      branches:
6        - master
7  jobs:
8    tarpaulin:
9      runs-on: ubuntu-22.04
10     steps:
11       - uses: actions/checkout@v4
12       - uses: actions-rs/toolchain@v1
13         with:
14           toolchain: stable
15           override: true
16       - uses: actions-rs/tarpaulin@v0.1
17         with:
18           version: '0.22.0'
19           args: '--all-features --exclude-files src/lib.rs -- --test-threads 1'
20       - uses: codecov/codecov-action@v3
21         with:
22           token: ${ secrets.CODECOV_TOKEN }
23           fail_ci_if_error: true
```

Code Coverage can be calculated by a few tools:

- JaCoCo for Java
- Istanbul for Javascript
- Gcov for C/C++
- Coverage.py for Python
- Simplecov for Ruby
- Tarpaulin for Rust

Read this:

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