



Software-Engineering und Software Qualität

Softwareprozesse – Teil 2

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- Vorgehensmodelle
- **Prozessaktivitäten**
- Umgang mit Änderungen
- Rational Unified Process



- Softwarespezifikation
- Softwareentwicklung
- Softwareverifikation/-validierung
- Softwareevolution



- CASE – Computer Aided Software Engineering
 - Unterstützen Software-Engineering
 - Beispiele: Entwurfseeditoren, Compiler, Debugger, Werkzeuge, um Prozessaktivitäten zu automatisieren (kombiniert mit IDE)
 - Automatisierung z.B.
 - Codeerzeugung aus grafischen Modellen
 - Erzeugung von Benutzeroberflächen aus einem grafischen Modell, die der Benutzer entwirft
 - Verwaltung von Fehlern

IDE - Testautomatisierung



Karma Coverage

Coverage report produces HTML files -> inspect in browser

coverage

- my-app
 - app
 - admin
 - child
 - form
 - mat-form
 - my-component
 - parent
 - reactive-form
 - run-form
 - special
 - toolbar
 - user-detail
 - app.component.ts.html
 - auth.interceptor.ts.html
 - index.html
 - my-service.service.ts.html
 - security-guard.guard.ts.html

base.css

block-navigation.js

favicon.png

index.html

prettify.css

prettify.js

sort-arrow-sprite.png

sorter.js

```
1 <!doctype html>
2 <html lang="en">
3
4
5 <head>
6   <title>Code coverage report for app/app.component.ts</title>
7   <meta charset="utf-8" />
8   <link rel="stylesheet" href=".../prettify.css" />
9   <link rel="stylesheet" href=".../base.css" />
10  <link rel="shortcut icon" type="image/x-icon" href=".../favicon.png" />
11  <meta name="viewport" content="width=device-width, initial-scale=1" />
12  <style type="text/css">
13    .coverage-summary .sorter {
14      background-image: url(.../sort-arrow-sprite.png);
15    }
16  </style>
17 </head>
18
19 <body>
20   <div class="wrapper">
21     <div class="pad1">
22       <h1><a href=".../index.html">All files</a> / <a href="index.html">app</a>
23       <div class="clearfix">
24         <div class="fl pad1y space-right2">
25           <span class="strong">28.57%</span>
26           <span class="quiet">Statements</span>
27           <span class="fraction">2/7</span>
28         </div>
29       </div>
30     </div>
31   </div>
32
```

All files / app app.component.ts

28.57% Statements 2/7 100% Branches 8/8 0% Functions 0/1 16.66% Lines 1/6

Press n or j to go to the next uncovered block, b, p or k for the previous block.

```
1 import { Component } from '@angular/core';
2 import { AppModule } from '../app.module';
3
4 @Component({
5   selector: 'app-root',
6   standalone: false,
7   templateUrl: './app.component.html',
8   styleUrls: ['./app.component.scss']
9 })
10 export class AppComponent {
11   title = 'my-app';
12   name: string = '';
13   userName: string = '';
14   userInput = {
15     name: "Please enter your name",
16   };
17   onChange() {
18     console.log(this.userName);
19   }
20 }
21
22
23
24
25
```

Hints what is
untested / unreachable code
or tested too often



IDE - Testautomatisierung



Karma Coverage

Visiting coverage/index.html allows to navigate through folders and files = components

All files app

31.57% Statements 6/19 100% Branches 8/8 12.5% Functions 1/8 27.77% Lines 5/18

Press *n* or *j* to go to the next uncovered block, *b*, *p* or *k* for the previous block.

Filter:

File	Statements	Branches	Functions	Lines
app.component.ts	28.57% 6/19	100% 8/8	0/0	16.66% 1/6
auth.interceptor.ts	25% 1/4	100% 4/4	0/0	25% 1/4
my-service.service.ts	33.33% 2/6	100% 6/6	20% 1/5	33.33% 2/6
security-guard.guard.ts	50% 1/2	100% 2/2	0/0	50% 1/2

=> indication what component is least tested

=> starting point to add unit tests

=> navigate to specific component to find untested functions or state attributes



CASE Tools



- Sourceforge (Open Source)
 - <https://sourceforge.net/directory/os:windows/>
- Beliebteste Tools 2022
 - <https://geekflare.com/software-engineering-tools/>
 - IDEs - IntelliJ / Eclipse / PyCharm
 - Code - GitHub
 - Container - Docker
 - CI/CD - Jenkins
 - Ticketplanung - JIRA