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Subject Area	Software and Systems

Debugging of RxJS-Based Applications

User Journey and Usability Tests

Initial Situation: Reactive programming is a programming paradigm allowing software engineers to solve data-flow and data-transformation related problems declaratively. With RxJS, engineers get a library to develop front- and backend applications in JavaScript utilizing reactive programming paradigms. We showed in our previous work that applications implemented with reactive programming carry their challenges for traditional debuggers: Software engineers modify code manually since traditional debuggers can not help them the way they expect. In this second iteration on "Debugging of RxJS-Based applications," we explored: (i) how previously identified problems could be resolved using improved debugging tool support and (ii) what usability-related issues arise from our proposed debugging utility.

Approach: Based on previous results, we built a prototype extension for Microsoft Visual Studio Code, which allows software engineers to inspect RxJS observables at runtime without modifying any source code. We used the cognitive walkthrough technique to pinpoint potential usability problems. We composed a refined user journey based on this insight, which describes how our prototype would improve an engineer's user experience. Finally, we successfully ran a remote usability test study with four professional software engineers to validate the prototype's effectiveness in a practical scenario.

Conclusion: We implemented a prototype providing a specialized debugging tool, helping software engineers to inspect RxJS-based code without manual code modification. We used a user journey to explain how we expect our prototype to improve the overall debugging process for such an application. The usability test study finally provided us with invaluable data in two ways: First, we could verify that the prototype solves an issue in a more realistic scenario, and second, uncover various usability problems we were not aware of before when we implemented the prototype. The outcome of this work will serve as the foundation for our upcoming master thesis.

The user journey is available online: https://alabor.me/research/user-journey-debugging-of-rxjs-based-applications/