Universität Stuttgart

Software Quality and Architecture Group

Software Engineering Seminar (SoSe 2021)

Advanced Software Engineering: Non-Functional Aspects in Software Engineering

Description

With the increasing pervasiveness of software in business- and safety-critical applications, ensuring the quality of the software is gaining considerable importance. The quality describes how well the software conforms to its non-functional requirements like performance, safety, security, reliability, availability, and usability. Ensuring the quality is crucial in several domains such as online banking, e-commerce, online booking and reservation, car and aeroplane control systems, remote surgery, high availability systems, such as e-mail servers, or adaptive systems, such as cloud computing controllers.

Software quality assurance is a branch of software engineering concerned with the assurance of requirements satisfaction during both development and production phases. Examples of seminar topic areas include the following:

- Self-adaptive software systems: systems that in the presence of context or environment changes adapt to fulfil the promised requirements.
- Model-based prediction: workload prediction, software performance and reliability prediction.
- Continuous software engineering and DevOps: continuous delivery, live experimentation and chaos engineering.
- Systematic testing: methodologies for automatic test case generation, including model-based testing, random testing, mutation testing, search-based techniques and non-functional testing.
- Software analysis: symbolic execution, abstract interpretation and anti-patterns detection.
- Statistical forecasting and machine learning: online failure prediction and proactive failure management.

The focus of this seminar's iteration is how different tools/approaches/... of the Cloud Native domain contribute to different software/system qualities. For example, how Argo/Flux GitOps contributes to the maintainability of microservices running in a K8 cluster. The seminar will be held in English and is addressed to Bachelor students.

Requirements

Bachelor students who would like to attend this seminar should be interested in critical systems design, formal methods, software performance, statistical forecasting, machine learning, as well as basic notions on logics, probability, testing, and object-oriented programming.

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