JOHANNES KEPLER
UNIVERSITY LINZ

Ph.D. Position

Engineering in the Cloud –New Dimensions for Collaboration and Cooperation

Institute of Software Systems Engineering
Johannes Kepler University, Linz, Austria

The big picture:

The engineering of systems is unimaginable without software tools. Engineers use them to capture and analyze engineering problems; specify, implement, test, and maintain engineering solutions, and manage engineering processes. Yet, there is a gap between the needs of independently working engineers and the needs of a collaborative engineering team. The existing tool landscape emphasizes the former. Most engineering tools are single-user applications – often of an excellent quality but limited in that they support the works of individuals and not that of a group. Collaborative Engineering in a Multi-Tool Environment (DesignSpace[1]) envisions that the next generation of engineering environments does not require better tools but innovative ways on how engineers collaborate using the tools they already have. Tool quality alone cannot guarantee engineering quality. What the existing tool landscape misses is how knowledge flows among engineers and the tools they use. Without this knowledge, engineers cannot effectively visualize the bigger picture, propagate changes among tools, and detect errors. This is known as the tool interoperability problem and it is the most critical software and systems engineering problem today. The DesignSpace bridges the gap between single-user tools and collaborative engineering environments by providing engineers with flexible cross-tool sharing, transformation, linking (traceability), and guidance (e.g. inconsistency detection) to enable multi-user collaboration on an unprecedented scale. In terms of ongoing integration efforts, the DesignSpace is a breakthrough in that it does not affect which tools engineers use or how they use them.

The goal:

The main goal of this Ph.D. is to investigate mechanisms for collaborative engineering. The focus of the thesis is on tool usage during engineering. The thesis thus focuses on the humans and their needs. /models/code while making sure that all the related artifacts remain harmonious after those changes. What are impacts of such changes? Do all artifacts still remain traceable[2] after the changes? Can such a process be (completely) automated? Can we come up with generic patterns in this regard?

Required expertise:

- A Master's degree in computer science or a closely related discipline
- Strong programming skills (for example in Java, C++, or C#)
- Ability to work on own initiative and also as a part of a team
- English language proficiency, written and spoken

Application Instructions:

Applications should include a cover letter, CV, preferably also letters of reference, and a brief statement

[1] Andreas Demuth, Markus Riedl-Ehrenleitner, Alexander Nöhrer, Peter Hehenberger, Klaus Zeman, Alexander Egyed: DesignSpace: an An Infrastructure for Multi-user/multi-tool Engineering. SAC 2015: 1486-1491

[2] Catia Trubiani, Achraf Ghabi, Alexander Egyed, Exploiting traceability uncertainty between software architectural models and extra-functional results, Journal of Systems and Software, Volume 125, 2017, Pages 15-34

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describing the applicant's research motivation in relationship to this topic. Electronic submissions are required. Review of applications will begin immediately and continue until suitable candidates are appointed.

Contact:

- Prof. Dr. Alexander Egyed (alexander.egyed@jku.at)
- Dr. Atif Mashkoor (atif.mashkoor@jku.at)

About the Institution:
The JKU Institute for Software Systems Engineering is a 30+ people strong research institute that is ranked among the best in the world (e.g., recently Microsoft ranked JKU 16th in the world in software engineering). Research at the institute covers a wide area of software engineering from requirements to capture software, systems architecture, design and testing, to maintenance. Engineering is an inherently creative process that requires rigorous attention to details. However, engineering is also a collaborative, human centric process with adhoc activities. Engineering automations are few and rare – not just during programming but also during modeling, testing or maintenance.

About the Advisor:
Prof. Dr. Egyed received his Doctorate from the University of Southern California, USA and previously worked at Teknowledge Corporation, USA and the University College London, UK. He is most recognized for his work on software and systems design – particularly on variability, consistency, and traceability. Dr. Egyed has published over 200 refereed scientific books, journals, and conferences with over 6000 citations to date. He was recognized a Top 1% scholar in software engineering in Communications of the ACM, Springer Scientometrics, and Microsoft Academic Search. He was also named an IBM Research Faculty Fellow in recognition to his contributions to consistency checking.

Location: Linz, Austria
Website: http://isse.jku.at/