ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

TIK
Institut für Technische Informatik
und Kommunikationsnetze
Computer Engineering and
Networks Laboratory

Prof. L. Thiele

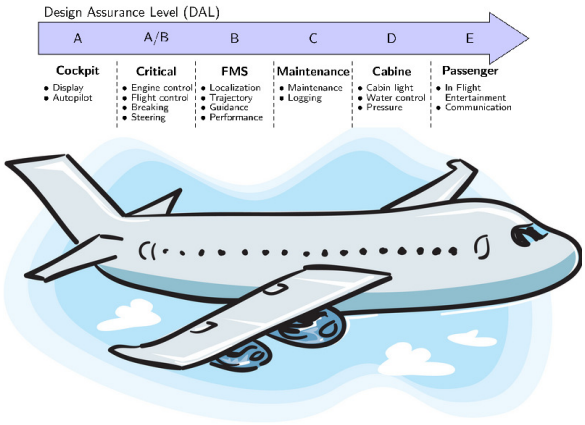
Semester/Master Thesis:

Safe Software for Safe Flights

Implementation and Evaluation of Mixed-Criticality Scheduling Approaches

The Problem: Complex embedded systems are typically mixed-criticality systems, where functionalities of different importances (criticalities) co-exist. As an example, the airborne software systems are usually categorized as flight critical or mission critical. For flight critical functionalities, like the autopilot, a failure could result in an airplane crash, whereas for the mission critical functionalities, like the radio communication, the failure consequences are not severe. On the other hand, various unexpected situations may happen during the operation of the airplane, since neither the hardware nor the software that we build are perfect. How should a software system react to those unexpected situations depending on its criticality? And what should/can we guarantee in such a dynamic system? Smart online adaptation to the revealed scenarios is necessary to answer those questions.

The Thesis: Recently, in our group, we have developed a scheduling framework for Linux environments, featuring several classical scheduling policies as well as policies targeting especially mixed-criticality systems. All implemented policies address single-core systems.



For this semester/master thesis, you can extend the existing framework, by (i) implementing mixed-criticality scheduling policies that have been designed for multi-core systems, and (ii) evaluating their runtime behavior on a real platform. You will need to design good metrics to quantify and compare the performance and overheads of the implemented scheduling approaches. For a master thesis, you can additionally get involved in the design of new algorithms and the corresponding analysis. During the thesis, you will be exposed to the cutting-edge research of mixed-criticality real time scheduling, while you gain practical programming skills on modern hardware platforms (e.g. the Intel Single Chip Cloud Computer).

Requirements:
Courses: Embedded Systems.
Programming: Familiarity with C/C++ and the Linux OS is an advantage.

Interested? Please have a look at http://www.tec.ethz.ch/research.html and contact us for more details!

Contacts

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