

Why do we have to prepare a Software Schedulability Analysis?

In this talk, we will focus on a well-known but reluctantly addressed topic. The schedulability analysis (SA) of flight software. The ECSS-E-ST-40C calls for the delivery of a Schedulability Analysis Report (SAR) which can be and commonly is prepared at different quality levels and at different depth of analysis.

Some missions provide this deliverable by presenting a well-processed set of measurements taken during qualification test-runs of the flight software. Other missions prepare a formal mathematical model which is enriched with worst-case execution time data and formally prove that all deadlines are met under all conditions.

In this presentation lessons-learned from OHB missions that have prepared a SA based on a formal mathematical model are drawn. To technically onboard the audience, first a quick overview on the essential analysis steps and outline the prerequisites, tools and methods engaged is given. Based on this framework the envelope and limits of what can be shown with reasonable effort are outlined answering the question “What can the Schedulability Analysis deliver?” Additionally to the aimed-at result of showing that the timing requirements are met, engaging the presented tools and methods bear further insight into the software supporting software quality, correctness and efficiency. Some surprising but beneficial side-effects are shown, making the proper preparation and execution of the schedulability analysis even more valuable for the mission.