Forschungsprojekt:  
Concept of a modular Toolchain for runtime analysis of Embedded Realtime-Systems 

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In Brunswick, Volkswagen AG develops safety critical steering systems. The HFD/25 division of VW Brunswick analyzes the timing behavior of these systems and has developed a tailored process for dynamic runtime analysis of Embedded Realtime Systems. The process integrates different tools at different stages (e.g., for code instrumentation and performing measurements). Currently, the process of analyzing the timing behavior of a particular version of the control software requires expert knowledge and, due to a lack of atomization, can be very time consuming. With increasing complexity of the control software, more analysis cycles will be required in the future. Volkswagen is interested in improving the degree of automation and the performance of the process in order to make it available to non-expert engineers and reduce costs. In this paper, we analyze the established process and the used tools in order to identify potential for cost optimization. As a basis for our analysis, we develop a conceptual architecture of a modular toolchain for the dynamic analysis of runtime behavior. The conceptual architecture defines standardized interfaces between different stages of the process and abstracts from the concrete tools used currently. We identify dependencies between individual stages in the process (e.g., shared protocols) and evaluate the current tools as well as potential alternative combinations of tools in terms of their maturity, runtime cost, degree of automation, and learnability.