

Multicore emulation on virtualised environment

The main aim of the study "Multicore emulation on virtualised environment" (MCORE-VIRT) was to assess the impact of virtualisation on the simulation and emulation of real-time systems.

Virtual Machines (VMs) are increasingly used in IT environments as the use of VMs offers benefits, e.g., with respect to resource usage, isolation, maintenance, or migration. However, in scope of real-time systems, the use of virtualisation technologies may have undesired and potentially critical impacts.

With respect to simulation/emulation of critical systems or components, it is paramount that simulation/emulation results are reliable independently of whether virtualisation was used or not. The use of virtualisation must not impact or alter the behaviour and outcome of simulations/emulations.

In scope of MCORE-VIRT, at first a literature survey was conducted to assess the state-of-the-art on virtualisation in the scope of real-time systems. Subsequently, important characteristics for the emulation/simulation of real-time systems in virtualised environments were devised and benchmarks for their assessment were defined. The benchmarks were implemented in an automated test suite that allows to automatically execute measurements and to summarize results in automatically generated reports.

The developed test suite was used to conduct an evaluation campaign to assess the impact of various virtualisation configurations and implementations using the use cases of an Instruction Set Simulator (ISS) (T-EMU) and a host compiled simulator (RTEMS POSIX BSP). The results of the evaluation campaign were summarized in a corresponding report. Based on the experiences gained throughout the study, suggestions for virtualised setups with respect to simulation/emulation of real-time systems in virtualised environments were devised. Furthermore, the developed test suite can be used to evaluate further general aspects and to assess concrete virtualised setups before executing simulation/emulation campaigns.