Virtualising Control Applications on a Distributed CompSOC Platform

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System-on-Chip (SOC) design is increasingly complex, as a growing number of applications are integrated in such systems. These applications have mixed time-criticality, i.e., some have firm-, some soft-, and others non-real-time requirements. Executing such a mix of applications on a SOC poses several challenges, especially if some of these are real-time control applications.

To reduce cost, platform resources such as processors and memories are shared, leading to interference between applications. Since the performance of applications is inter-dependent they cannot be developed or tested in isolation.

The CompSOC platform addresses this problem by *executing each application on an independent virtual execution platform* (VEP). The VEPs are *composable*, i.e., cannot affect each other's behaviours in terms of timing or energy. As a result, applications can be designed, developed, verified, and executed in isolation.

The VEPs are also *predictable*, such that the performance of real-time applications can be computed at design time, and guaranteeed at run time. This is particularly important for embedded control applications with (firm) real-time requirements. VEPs can be started and stopped independently, and without affecting running applications, using a general resource management software stack.

In our University Booth we will demonstrate that *multiple real-time control applications* can be developed independently even though they share platform resources. We show that they can run together with other applications on a *wireless network of multiple CompSOC platforms*, where each platform has multiple processors, NOC, and a complete microkernel, streaming software, and resource management stack. We will also show that (control) applications can be *quickly and safely loaded and started without interference* to other (real-time control) applications, thus implementing a network of MPSOCs for distributed mixed time-criticality applications.

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