

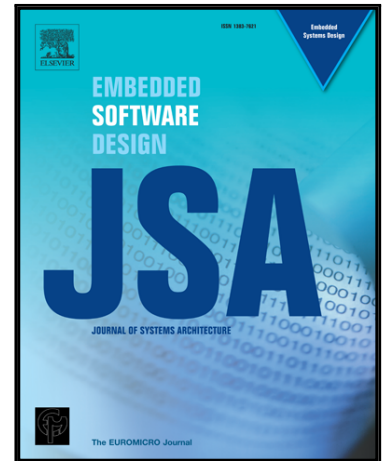
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Introduction to real time computing and distributed systems

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# Introduction to real time computing and distributed systems

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## 1 Introduction

Modern distributed systems are increasingly complex both on their architectural design and on the computational logic that they execute. Their timely operation is challenged, which is critical for some domains such as cyber-physical systems where timeliness and dynamic behavior must be satisfied simultaneously. Providing real-time operation whereas supporting the inherent dynamic behavior of cyber-physical systems requires solutions that are not yet available. A number of challenging scientific and engineering problems that span across a variety of research areas are raised. The new challenges go far beyond those of traditional networked real-time systems; cyber-physical systems are autonomous, open, large-scale, real-time, embedded, and control systems that make intensive use of networks, distribution, and wireless technology. Such complex systems have different [sub]parts/systems with different levels of real-time requirements.

From different (though related) research communities, researchers are trying to solve similar problems faced by cyber-physical systems; they walk parallel paths with the goal of effectively and efficiently providing the level of temporal guarantees required by these challenging complex systems, spanning from temporal predictability to probabilistic QoS guarantees. Solutions from different communities present interesting approaches that can benefit from meeting at a common forum with the goal of drawing complementary pictures of the problem to identify novel research directions as resulting from this crossbreeding.

In 2016, we organized the 4<sup>th</sup> *International Workshop on Real-Time Computing and Distributed Systems in Emerging Applications (REACTION)* co-located to the 36<sup>th</sup> IEEE Symposium on Real-Time Systems (RTSS). The objective of the 4<sup>th</sup> edition of REACTION was to bring together researchers, practitioners, designers, and developers of distributed software systems and communication middleware technologies that have special requirements of reliability and time-sensitivity. The topics of the contributions gathered around a following set of highly interesting and timely topics:

- Scheduling and resource management for Quality of Service support and Real-Time operation in distributed systems
- Real-time middleware
- Real-time reconfiguration in distributed computing

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