

Editorial

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Object- and component-oriented software design and development is a subject of growing interest to both researchers and practitioners in the real-time software field. Dependability is an important and challenging aspect that requires a huge investment in research and development. This is as well evidenced by recent activity in the software industry and the success of relevant conferences in that field. Areas of interest include aspects of component-oriented dependable real-time systems such as programming and system engineering, modeling, design, development and verification tools, infrastructure support, middleware, operating systems and system software, timeliness, evaluation and analysis, applications and case studies, fault-tolerance, security and other aspects of Quality-of-Service.

For the above reasons, it was felt that it would be highly timely and appropriate to publish a special issue on this important topic. We have carefully selected six important and relevant contributions written by established experts. Garbage collection for automatic memory management is a very important issue that has come to the forefront in recent years. It is essential for the development of long-running secure and dependable systems. Therefore, three articles in this special issue focus on this area. Two of these articles combine and relate garbage collection to utility accrual scheduling, a new approach for handling overloaded real-time systems as well as systems with soft real-time constraints. The third paper investigates schedulable garbage collection in virtual software execution systems. The approach presented allows one to meet time and memory constraints with predictable overhead.

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Three other topics besides garbage collection are also addressed in this special issue. The time-triggered message-triggered object (TMO) model is an enhancement of conventional object oriented programming for real-time systems. TMO-based middleware is an efficient tool that can be used to ease and improve object- and component-oriented design in distributed environments. Thus, one contribution in this special issue focuses on such a middleware model and describes efficient techniques to adapt this model to standard Linux systems. Automotive applications are an important application area for dependable object- and component-oriented software. The requirements for safety, reliability and timeliness are considerably high. Thus, another article in the present issue investigates the benefits of an integrated architecture as an electronic infrastructure for future car generations. The authors show possible ways to mix safety-critical and non safety-critical subsystems and to achieve given dependability requirements. Finally, precise specification and analysis of timing requirements is a fundamental issue in the design of hard real-time systems. Therefore, the last article selected researches techniques to specify and, even more importantly, to verify such timing requirements for component-based real-time system design. We hope the selection of articles in this special issue helps and inspires researchers as well as practitioners in this all-important area of dependable object- and component-oriented real-time software design.

Guest Editors