

# Safe Specialization of the CCM Container for Simultaneous Provisioning of Multiple QoS

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**Keywords** Specialization, Middleware, Computational Reflection, Context-Awareness, Aspect-Oriented Programming

Component-based distributed real-time and embedded systems are often deployed in environments that simultaneously require non-functional properties timeliness, fault-tolerance, and load balancing capabilities. In order to safely support these quality of service (QoS) properties simultaneously, component middleware developers have to constantly face obstacles in the design and implementation of the component containers due to the general-purpose nature of the middleware implementations. As a result, the developers have to commit compromises which often end up in custom solutions in the form of custom containers to support each individual QoS. This approach however is not only redundant due to the requiring rewrite of the applications but it is also cumbersome to maintain custom containers on a per QoS basis. Therefore, it is necessary to develop a generic container implementation that has specialized support for multiple QoS properties safely so that no two QoS interfere with one another at design-time as well as run-time. We propose a dynamic container design that can be easily specialized to enable the applications to seamlessly and safely adapt to particular execution environments by changing their QoS without requiring rewrite. We demonstrate how a generic container can be realized in LwCCM.