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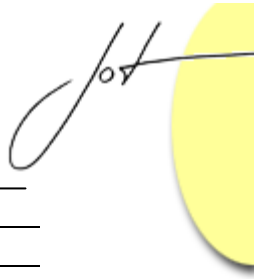
must activate adaptation mechanisms to bring the service quality to the desired level. A case study is presented in this paper to validate the QoS contract management design approach and architecture for SLM.

Self-adaptive systems are capable of changing their behaviour at runtime to meet target constraints. An important research question is how quality of service models can inform runtime adaptation. We sketch one solution to this question by application of control theory to improve performance of queued systems by means of architectural adaptation. Previous research by our group has shown how Auto-Regressive Integrated Moving Average techniques can be utilized to forecast how Quality of Service (QoS) characteristics are likely to evolve in the near future. This is particularly important in cases where systems can be adapted to counter QoS constraint violations. In this paper, we show how, given a similar type of QoS characteristic forecasts, strategies of architectural adaptation can be implemented that pre-emptively avoid QoS violations. The novelty of our approach is that we use classical control theory to ensure that our adaptation strategies are stable, in the sense that they do not oscillate between choices. We provide a description of how our control theoretic model can be implemented using context-based interception in .NET via model driven engineering.

Component-based applications require good middleware support. In particular, business logic should be separated from management code for guaranteeing nonfunctional proper ties of a system. We present an approach called Container-Managed Quality Assurance, in which a component container uses nonfunctional specifications of components to determine how to use these components, and which system resources to allocate, to provide cer tain ser vices with guaranteed nonfunctional proper ties. As an example, we show how this technique can be applied to automatically allocating CPU and memory resources for components with real-time constraints. To this end, we use a mathematical model based on jitter-constrained streams, a mathematical abstraction of event streams.



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