Self-Aware QoS Management in Virtualized Infrastructures

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Motivation

- Modern software systems increasingly complex and dynamic
- Loosely-coupled highly-distributed and dynamic architectures
- Multi-layered execution environments & virtualized infrastructures
- Shift towards Cloud Computing (SaaS, PaaS, IaaS) platforms

- Challenges
  - General lack of trust in virtualized infrastructures & Cloud Computing
  - Inability to provide end-to-end quality-of-service guarantees
  - Overprovisioning leading to high TCO (Total-Cost-of-Ownership)

Long-term Vision

- Self-aware software systems that are
  - self-reflective, aware of their software architecture, execution platform and their hardware infrastructure,
  - self-predictive, able to predict the effect of external changes in their environment on their behavior, as well as the effect of undertaken system adaptation actions,
  - self-adaptive, proactively adapt as the environment evolves to ensure that QoS requirements are continuously satisfied.

Case Studies

- Modeling performance-relevant aspects of software architecture and multi-layered execution environment, e.g., virtualization platforms [CLOSER’11]
- Extracting architecture-level performance models from online monitoring data [ROSSA’09]