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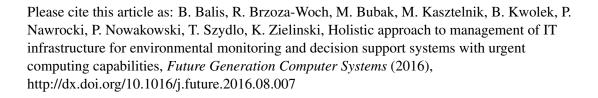
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Abstract

Modern environmental monitoring and decision support systems are based on complex IT infrastructures comprising multiple hardware and software subsystems that need to provide a variety of Quality of Service (QoS) guarantees required for urgent computing services, essential in emergency situations. Such IT infrastructures need to be managed in order to maintain the quality of service, which - especially when operating in the urgent mode - involves optimization of multiple, often conflicting, objectives and making trade-offs between them. Existing approaches do not solve this issue optimally because they focus on delivering quality of service within individual subsystems in isolation. We propose a holistic approach to system management which takes into account knowledge about the system as a whole - in particular the interplay of conflicting objectives and configuration options across all subsystems. We argue that such an approach produces a better configuration of the involved subsystems, improving the resolution of tradeoffs between cost, energy and performance objectives, leading to their better overall fulfillment in comparison with the non-holistic approach in which individual subsystems are managed in isolation. We validate our approach using a prototype implementation of the holistic optimization algorithm - the Holistic Computing Controller, and applying it to

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