

## Abstract

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In context-aware computing, applications perform adaptations at the occurrence of pre-defined context-based situations. Research in context-aware computing has produced a number of middleware systems for context management, i.e. to intermediate the communication between applications and sensor/agents that generate context information. However, development of ubiquitous context-aware applications is still a challenge because most current middleware systems are still focused on isolated and static context-aware environments. For example, applications typically require global knowledge of all underlying context management systems in order to start context-based interactions. Moreover, context-aware environments are inherently dynamic as a result of occasional additions or upgrade of sensors, applications or context inference mechanisms. The main challenge of this scenario is to accommodate such changes in the environment without disrupting running context-aware applications. Some middleware approaches that tackle some of the mentioned problems, do not properly support other aspects, such as generality and scalability of context management. This thesis argues that in distributed and dynamic environments, context-aware applications calls for *context interests of variable wideness*, i.e. primitives for describing context-based conditions that involves context types and context management systems that cannot be defined in advance. To achieve this goal, this thesis proposes a novel architecture for context management based on the concept of *context domains*, allowing applications to keep context interests across distributed context management systems. To demonstrate the feasibility of the approach, this thesis describes a distributed middleware that implements the aforementioned concepts, without compromising scalability and efficiency of context access. This middleware allows the development of context-aware applications for mobile devices, and runs on two platforms: Android and Java J2ME CDC 1.1.

## Keywords

context-awareness; context-aware computing; middleware; distributed systems; pervasive computing; ubiquitous computing