SelfMotion: A declarative approach for adaptive service-oriented mobile applications

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Highlights
\begin{itemize}
  \item We defined a novel declarative language and a middleware to effectively design adaptive service-oriented mobile applications.
  \item We investigated the advantages of the proposed approach w.r.t. existing related solutions.
  \item We fully implemented and tested our framework with an existing worldwide distributed mobile application.
  \item We performed a series of experiments to evaluate the applicability of the proposed solution in various scenarios.
\end{itemize}
We publicly released the implementation of the proposed approach to facilitate its adoption and allow the replicability of the obtained findings.

Abstract

Modern society increasingly relies on mobile devices. This explains the growing demand for high quality software for such devices. To improve the efficiency of the development life-cycle, shortening time-to-market while keeping quality under control, mobile applications are typically developed by composing together ad-hoc developed components, services available on-line, and other third-party mobile applications. Applications are thus built as heterogeneous compositions, whose characteristics strongly depend on the components and services they integrate. To cope with unpredictable changes and failures, but also with the various settings offered by the plethora of available devices, mobile applications need to be as adaptive as possible. However, mainstream adaptation strategies are usually defined imperatively and require complex control strategies strongly intertwined with the application logic, yielding to applications that are difficult to build, maintain, and evolve. We address this issue by proposing a declarative approach to compose adaptive heterogeneous mobile applications. The advantages of this approach are demonstrated through an example inspired by an existing worldwide distributed mobile application, while the implementation of the proposed solution has been validated through a set of simulations and experiments aimed at illustrating its performance.

Keywords

Mobile applications; Self-adaptive systems; Declarative language
Gianpaolo Cugola received his Dr.Eng. degree in Electronic Engineering from Politecnico di Milano. In 1998 he received the Prize for Engineering and Technology from the Dimitri N. Chorafas Foundation for his Ph.D. thesis on Software Development Environments. He is currently Associate Professor at Politecnico di Milano where he teaches several courses in the area of Computer Science. He is co-author of tens of scientific papers published in international journals and conference proceedings. His research interests are in the area of Software Engineering and Distributed Systems. In particular, his current research focuses on middleware technology for largely distributed and highly reconfigurable distributed applications with a special attention to the issue of Complex Event Processing.

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DSOL: a declarative approach to self-adaptive service orchestrations, luna commits a subject of power at any of their mutual arrangement.