Editorial

Introduction to the special issue on Pervasive and context-aware middleware

1. Introduction

Context-aware applications [1] are the building blocks of a pervasive computing environment. In fact, the existence of this kind of applications distinguishes the new paradigm of computing from the traditional distributed computing. A context-aware application always uses contexts of the involved entities in the scenario to provide pervasive and improved services to the users. The main challenge to implement a context-aware application is discovering and obtaining required context data. Gathered context is usually in the form of raw data (e.g. location in the form of longitude and altitude); therefore, the application should process and convert it to meaningful information (e.g. name of a place such as university, restaurant, room, etc). Furthermore, for many contexts (e.g. activity) there is not any direct sensor and the application should infer it from low-level contexts. In combination with cloud based solutions the possibilities for innovative technological architectures become large, intricate and novel [3]. In summary, designing and implementing a context-aware application is a lengthy and sophisticated process.

Context-aware middleware [2] or middleware for pervasive computing is aimed at providing platforms to facilitate the development of context-aware applications. In spite of much previous research [4], this subject is still largely vague and in need of conceptual formalization. Most of the problems concerned by previous middleware studies are varied in nature, and their proposed middleware systems are also different in terms of functionality. Since different tasks are supported by current context-aware middleware systems, the question raised is then "what functional and non-functional requirements should be generally provided by context-aware middleware?" Obviously, a context-aware middleware inherits the general tasks of a traditional middleware in distributed systems such as coordination, communication, security and tolerance for component failures and disconnections. In general, context-aware middleware lies on top of the operating system of mobile phones, PDAs, personal computers, servers, laptops, and other computational devices of the environment to *gather the contextual data, assess the quality of context, and perform context modeling and reasoning.*

This special issue aims to investigate the state-of-the-art and trends in middleware for pervasive computing. It considers revised and substantially extended versions of selected papers presented at the "Third International Workshop on Pervasive and Context-Aware Middleware" (PerCAM13). In the next section, a brief review of the content is provided.

2. Scanning the Issue

In general, the papers of this issue are categorized into two groups: (a) applications of context-awareness in various domains, and (b) investigating functionalities of a context-aware middleware. Three papers of the special issue involve the application of context-aware computing in different areas. Among them, the paper entitled "AOMD approach for context-adaptable and conflict-free web services composition" proposes a context-aware approach to web service composition. In another paper, by Simin Ghasemi et al., context-awareness has been utilized in performing cloud offloading process. Finally, the paper by Ines Riahi and Faouzi Moussa, proposes a context-aware user interface, which is able to provide the right information for a given user in a pervasive human–computer system.

Three other papers investigate the functionalities of a context-aware middleware including context modeling and quality of context assessment. Among them, the paper entitled "A Metamodel and Taxonomy to facilitate Context-Aware Service Adaptation" mainly concerns context modeling to provide new opportunities for code generation and development of

context-aware applications. Moreover, Alexandru Sorici et al. propose CONSERT, an approach for context meta-modeling by semantic web technologies. Finally, the paper by Khaled Alanezi and Shivakant Mishra investigates the quality of context. It specifically, considers the effect of position of a smart phone on the accuracy of its sensor values.

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