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Software Adaptation

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The development of distributed systems requires means to structure them in order to leverage their complexity. This has led in the last years to different structuring means, e.g., modules, objects, components and services. Systems are then built as assemblies of these smaller and reusable entities.

Coordination addresses the description of the interactions between entities and provides one with effective expressive means to compose them. Coordination is a hot topic in Component-Based Software Engineering (CBSE) and Service Oriented Architectures (SOA), e.g., for Web Services where choreography and orchestration are instances of the coordination concept.

Components and services should be reusable and composable from their interfaces. Yet, basic signature based interfaces have proven insufficient for this, requiring more expressive interface description languages, such as Behavioural IDLs (BIDLs). BIDLs support component discovery, composability and substitutability checking. With the emergence of SOA, BIDLs have also proven to be valuable to discover and compose services. However, software entities seldom match perfectly as they often have been developed independently from the context in which they are to be reused. This can lead to lower discovery results or deadlocking component or service architectures.

Software adaptation aims at deriving automatically, from generated or end-user specified composition contracts, pieces of software, namely adaptors, to solve interaction mismatch. Adaptation processes should combine solution from different research domains, namely (i) model-based or formal approaches to develop mismatch detection and adaptor models generation algorithms, (ii) middleware technology to support the detection of mismatch at run-time and the implementation of adaptor models, and (iii) QoS and prediction models to assess the effect of adaptation on running systems. Software adaptation has been tackled mainly at the behavioural interface (protocol) level, yet it should be addressed at any of the four interface levels: signatures, behaviours, non functional properties (time, QoS) and semantics.

The International Workshop on Coordination and Adaptation Techniques for Software Entities (WCAT) is a venue dedicated to lively and working discussion on these topics and has led in the previous years to active collaborations between its participants. With reference to the previous editions of the workshop, the 2007 edition (`http://wcat.unex.es/wcat07/`) addressed more specifically issues related to coordination and adaptation at run-time, the implementation of coordinators and adaptors, context-aware and dynamically evolving coordination or adaptation contracts, and relations between service composition and adaptation in pervasive computing.

The scientific program of WCAT 2007 consisted of 10 accepted papers. Due to the high-quality of the discussions they fostered at the venue, the organizers decided to organize a special issue related to the workshop topics.

The Program Committee invited authors of papers presented at the workshop to send a revised and extended version of their works for considering its publication in this J.UCS special issue. Moreover, the call was open to the whole community working on software adaptation. This resulted in the end in 9 high-quality papers being submitted to the special issue, 3 being extensions of papers originally presented at the workshop. After a double blind review phase resulting in additional requests and recommendations to authors, the 5 papers presented in this special issue were finally accepted.

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