Proposition de recherche doctorale

QoS-aware Service-Oriented Middleware for Pervasive Environments

Mots clés :

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- **Domaine scientifique principal**: Divers

Résumé du projet de recherche (Langue 1)

Pervasive computing is an intuitive evolution of computing paradigms driven by the wide adoption of mobile devices and wireless networks. It introduces a novel way to support users in their everyday life based on open and dynamic environments populated with unobtrusive services able to perform user tasks on the fly. Nevertheless, supporting user tasks from a functional point of view is not enough to gain the user's satisfaction. Users instead require that their tasks meet a certain Quality of Service (QoS) level. QoS is indeed an inherent and primary requisite of users going along with their required tasks. In the context of pervasive environments, fulfilling user tasks while delivering satisfactory QoS brings about several challenges that are mainly due to the openness, dynamics, and limited underlying resources of these environments. These challenges are mainly about (i) the lack of common QoS understanding among users and service providers, (ii) determining and integrating, on the fly, the services available in the environment and able to fulfill the functional and QoS requirements of users, and (iii) adapting the provided services at run-time to cope with QoS fluctuations and ensure meeting user requirements. To cope with the aforementioned issues, we opt for a middleware-based solution. Middleware represents indeed the appropriate software system to deal with common concerns of user applications such as QoS. In particular, we opt for a specific kind of middleware, viz., Service Oriented Middleware (SOM). SOM can leverage middleware technologies and the Service Oriented Computing (SOC) paradigm to enable pervasive environments as dynamic service environments. Particularly, SOM can provide middleware services that allow for supporting QoS of user applications o.ered by pervasive environments. This thesis presents a QoS-aware service-oriented middleware for pervasive environments. The main contributions of this middleware are: (1) a semantic end-to-end QoS model that enables shared understanding of QoS in pervasive environments, (2) an efficient QoS-aware service composition approach allowing to build service compositions able to fulfill the user functional and QoS requirements, and (3) a QoS-driven adaptation approach to cope with QoS fluctuations during the execution of service compositions. The proposed contributions are implemented within a middleware platform called QASOM and their efficiency is validated based on experimental results.