Proposition de recherche doctorale

Service Composition in Converged Service Environment

Mots clés :

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- Co-encadrant(s) :
- Unité de recherche : Services répartis Architectures MOdélisation Validation Administration des Réseaux
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Résumé du projet de recherche (Langue 1)

Service Oriented Architecture (SOA) is now acknowledged as a central paradigm for service delivery, acquisition and consumption. Under SOA, services are loosely coupled and thus greatly facilitating the interactions among service providers, service consumers and repositories. Over last decade, prodigious research and technology developments have been achieved for enhancing this paradigm both in IT and Telecom worlds, resulting supporting technologies, such as the IMS architecture for NGN, the mashup technologies for web services. However, there are still some substantial challenges hindering network and service evolutions. From the services point of view, these challenges mainly relate to certain essential functionalities in the SOA paradigm such as service description, discovery, access and composition management. The goal of this thesis is to provide upcoming networks, mainly targeting Next Generation Network (NGN) and Future Internet (FI), with enhanced mechanisms to deploy revenue-generating and competitive services in a rapid and cost-effective manner. To achieve this objective, our research work concentrates on two topics in this field: i) Service composition management that facilitates the service creation and maintenance; ii) Service exposure that provides underlying supports for service composition management. After a deep investigation of the related SoTA for service composition both in IT and Telecom domains, we propose an automatic service composition model relying on an IMS/Web converged environment. This proposed service composition model is intended to be one in which even non-professional users can easily reuse existing services, capabilities and resources to create new services by enforcing the automatic service selection, composition and monitoring. To further improve the automatic service composition feature, three strategies including passive update, active update and hybrid update are proposed and analyzed. Thereby the automatic service composition paradigm is enabled to go beyond design time to dynamically compose services at runtime. These enhancements allow users to profit from a highly personalized, meaningful communication and interaction experience. Considering the significantly important role of service exposure in the paradigm of service composition, we then introduce three different service exposure strategies for catering to the different domains' service requirements. We firstly propose a centralized service exposure framework for a variety of services, including Telecom/Web/Device/user-generated services. This framework mainly aims at enhancing the user-centric feature and the convergence feature, as well as providing the unified access to diverse services, thereby enabling a seamless interaction among heterogeneous services and facilitating the reuse of these existing services by both professional and non-professional users. Subsequently, perceiving the challenges generally encountered by the centralized solutions such as single access, high maintenance cost, and easy to lead to performance bottleneck, we analyze the feasibility of using decentralized P2P to support the distributed service exposure in large scale. Then two P2P based service information sharing models are designed to complement the centralized service exposure model: i) A hierarchical P2P based model, which reuses the structured P2P overlay (i.e. Chord) for guaranteeing the service discovery efficiency, meanwhile adopts the concept of abstract service publication and discovery for enabling the ambiguous service searching which is indigent in current structured P2P systems. ii) A triplex P2P overlay based model, which mainly targets the devices offered services. In this model, we use the gateways to delegate the devices residing in them for the global service exposure, and use a triplex overlay based architecture, which includes an underlying unstructured P2P layer, a Semantic Overlay Network (SON) based overlay and a service dependency overlay, for the service information sharing and discovery. These introduced architectures and mechanisms for service exposure are analyzed and evaluated through a set of implementations and simulations.