Architeture Design of a Network-centric Platform for Unified Communication and Collaboration Applications

Changsup Keum[1], Sungwon Kang[2] and Hyunjoo Bae[1]
[1]Future Internet Service Research Team, Electronics and Telecommunications Research Institute, 218 Gajeongno, Yuseong-gu, Daejeon, 305-700, Republic of Korea
[2]Department of Computer Science, Korea Advanced Institute of Science and Technology, 291 Daehak-ro, Yuseong-gu, Daejeon, 305-701, Republic of Korea

Keywords: Network-centric, Application Platform, Unified Communication and Collaboration.

Abstract: As an effective reuse paradigm, service-oriented computing provides a number of benefits. As another emerging trend, mobile computing has become a most common paradigm offering the conveniences of mobility, connectivity, ever-increasing computing power, and various sensors. However, mobile enterprise applications with complex business logics could not be easily deployed on mobile devices owing to resource limitations. An appealing approach to this issue is to deliver these enterprise applications by using a network-centric platform. In this paper, we present the architecture design of a network-centric platform that provides capabilities of UCC (unified communication and collaboration) service enablers, service creation environment, service delivery management, and service execution environment. The presented platform is developed with the design goals of wide applicability to diverse domains including unified communication and collaboration domain.

1 INTRODUCTION

With the advent of smat phones, software service industry is facing new opptunities through novel mobile applications runing on mobile devices. Apple has created a complete value chain for terminal-centric mobile applications. However, these terminal-centric mobile applications have a major drawback of limited resources such as limited CPU power and main memory (König-Ries, 2009). Enterprise applications with heavy business logics such as UCC (unified communcation and collaboration) applications thus could not be elegantly executed on the mobile devices.

An appealing approach to this issue is to deliver these applications by using a network-centric platform based on SOA (service oriented architecture) (Tsai, 2005). In SOA, Cloud services can be used as reusable building blocks for service-based applications. SDP (service delivery platform) refers to a set of service integration and delivery environments (Levine, 2009). It enables efficient creation and delivery of service-based applications by composing cloud services accessible through networks. Current mobile platforms such as Android and iPhone are designed for mainly stand-alone mobile applications, not for service-based applications (Clark, 2008).

In this paper, we present a design of a network-centric platform that extends the traditional SDPs (Ohnishi, 2007); (Sunaga, 2008) to support mobile UCC applications. Our primary insight is that although SDP provides an adequate starting point as a network-centric platform for mobile UCC applications, it is not by itself sufficient. Our approach is to create a network-centric platform by adding novel features for UCC on top of a traditional SDP, which provides a set of core and common functionality required in creating and delivering UCC applications in a network-centric paradigm. We observed that this requires substantial additions and adaptations to the traditional SDP.

The rest of this paper is organized as follows: In section 2, the design goals and the architecture of our network-centric platform are described; In section 3, application examples using our platform are introduced to demonstrate its applicability; and, finally, section 4 concludes the paper.

Keum C., Kang S. and Bae H..
Architeture Design of a Network-centric Platform for Unified Communication and Collaboration Applications.
DOI: 10.5220/0004168602940297
In *Proceedings of the International Conference on Knowledge Management and Information Sharing* (KMIS-2012), pages 294-297
ISBN: 978-989-8565-31-0

2 DESIGN OF THE PLATFORM

2.1 Design Goals

The network-centric platform has the following design goals:

· One Platform: The platform integrates all key activities for service-based mobile applications such as development, deployment, and distribution, management, subscription and accounting into a single platform.

· Wide Applicability: The platform should support a wide range of mobile devices such as smart phones and tablet PCs under different operating systems.

· One-Stop Management: The platform should support efficient and integrated management of services including atomic services, composite services, and abstract services through a unified management portal.

· Easy Development of Service-Based Mobile UCC Applications: The platform should provide an environment that supports easy creation of service-based mobile applications that includes service registry and enables service composition.

· Open Source Based Development: The platform should use appropriate open sources to reduce the development cost.

2.2 Business Context of the Platform

As can be seen in Figure 1, service-based application development requires a collaborative effort from a chain of three stakeholders (Bertolino, 2009). Service developers create building blocks, i.e., web services that are available from the network, a platform provider then publishes and maintains the services, and finally application developers compose the published services into a new service-based application.

In our platform, the service life-cycle thus has three stages: service development, service testing, and service publication. The developed web services are expected to be published in the registry in the platform for discovery by the application developers. Application life-cycle includes the following stages: service-based application development, in which a service-based application is developed by service composition; service-based application testing; and service-based application deployment. Finally, an end user uses the service-based application. Benefits from end-users can be shared among all stakeholders of this value chain.

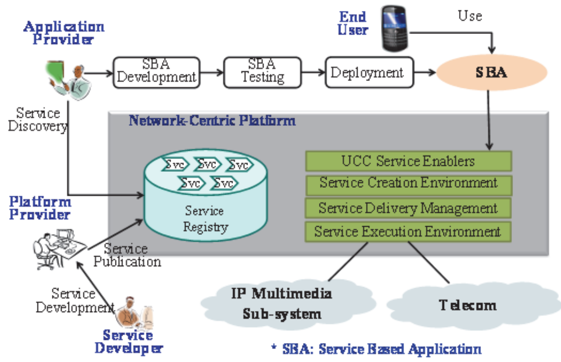

Figure 1: Business context diagram.

2.3 High-level Functional Architecture

Figure 2 shows the overall functional architecture of the platform.

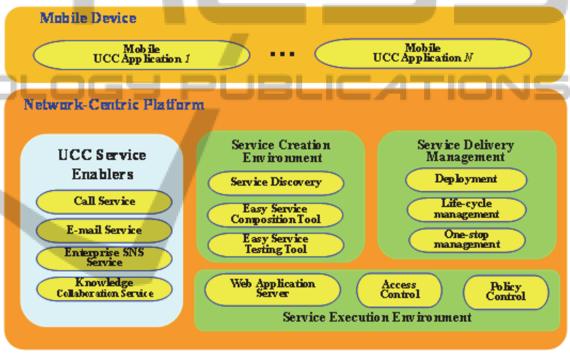

Figure 2: High-level functional architecture.

It consists of the following FGs (functional groups):

· Service Creation Environment FG includes service creation related functionalities including service registry, service creation, and service testing.

· Service Execution Environment FG includes service execution related functionalities including web application server, access control, and policy control.

· Service Delivery Management FG includes management related functionalities including service deployment, service life-cycle management, one-stop management portal, and service usage metering.

· UC Service Enabler FG includes service enablers for basic communications, enterprise social networks, and knowledge collaboration.

2.4 Deployment Architecture

Figure 3 shows the deployment architecture of mobile UCC applications based on our platform. A mobile application client invokes Open APIs (application programming interface) of UCC cloud services in the network-centric platform through web service protocols such as SOAP (simple object access protocol) and REST (representational state transfer). Each cloud UCC service receives Open APIs and then translates them into appropriate network protocols to communicate with back-end servers. In this way, our approach relieves application developers of a burden in service-based application deployment by deploying complex business logic on the network side instead of the mobile device side.

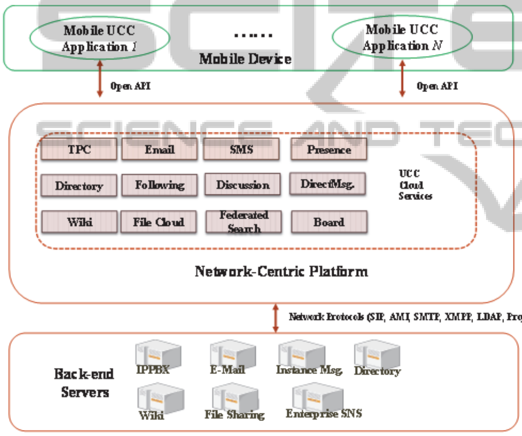

Figure 3: Deployment architecture.

3 UCC APPLICATION EXAMPE

We have developed several mobile UCC applications by using our platform to demonstrate applicability of our platform. Figure 4 shows snapshots of example mobile applications such as cocoGate, cocoBox, and cocoKwiki. Among them, we introduce our representative mobile UCC application, cocoGate. The cocoGate application implemented on top of Android 2.2 provides an advanced unified communication service that integrates basic communications such as call, SMS (short message service), e-mail, and chatting with enterprise SNS (social networking service) through a unified user interface. The client application of cocoGate executing on a mobile device is composed of UI (user interface) and light-weight controller for business logic that invokes Open API of the network-centric platform. The server side of the cocoGate, the network-centric platform, provides a variety of UCC cloud services through Open APIs, which enables the mobile applications to utilize basic communications and enterprise SNS. The UC back-end servers, such as IPPBX (internet protocol private branch exchange) and Instance Messenger, provide UCC server functionalities for call, SMS, e-mail, chatting, and enterprise SNS through native communication protocols such as SIP (session initiation protocol) and XMPP (extensible messaging and presence protocol).

(a) cocoGate UCC application

(b) cocoBox (c) cocoKwiki

Figure 4: Snapshots of mobile UCC applications.

Our platform also provides a set of application distribution functionalities through a web page, called Coco Web store, which are similar to Google's Web store. In particular, the UCC applications are distributed in a secure way that they can be accessed and utilized only by authorized users and devices.

4 CONCLUSIONS

Many stand-alone applications are available for mobile devices. However, they suffer from limited resources such as CPU power and main memory. Heavy enterprise applications such as UCC applications that have complex business logics and consume a large amount of resources cannot be easily deployed on mobile devices.

To alleviate the issues for developing and deploying complex mobile applications, we have designed and implemented a network-centric platform, NCP, which integrates all necessary functionalities for mobile applications such as UCC cloud service enablers, service creation environment, and service delivery management into a single platform.

To demonstrate applicability of our platform, we developed various mobile UCC applications by using the platform. The result shows that the platform effectively supports easy and efficient creation, deployment, and distribution of mobile UCC applications in a network-centric way.

ACKNOWLEDGEMENTS

This research was supported by the KCC (Korea Communications Commission), Korea, under the R&D program supervised by the KCA (Korea Communications Agency) [KCA-2012-(09911-05001)].

REFERENCES

König-Ries, B. and Jena, F., 2009. Challenges in Mobile Application Development, *IT-Information Technology*, 52(2), Pp. 69-71.

Tsai, W. T., 2005. Service-Oriented System Engineering: A New Paradigm, *IEEE International Workshop on Service-Oriented System Engineering (SOSE'05)*, Pp.3-8.

Levine, S., 2009. Service Delivery Platform Software and Services: Biannual Worldwide and Regional Market Share*, Size, and Forecasts, Infonetics Research*.

Clark, W. and King, M., 2008. Magic Quadrant for Mobile Enterprise Application Platforms, *Gartner RAS Core Research Note*.

Ohnishi, H., 2007. Service Deliver Platform for Telecom-Enterprise-Internet Combined Services, *IEEE Global Telecommunications Conference (GLOBECOM'07)*, Pp.108-112.

Sunaga, H., 2008. Service Delivery Platform Architecture for the next-Generation Network, *International Conference on Intelligence in next Generation Networks (ICIN'08)*, Pp.77-81.

Bertolino, a. and Polini, a., 2009. SOA Test Governance: Enabling Service Integration Testing across Organization and Technology Borders, *International Conference on Software Testing Verification and Validation Workshops*, Pp.278-289.