Mobile Application Development for Converged Telecommunication/Internet Environments

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Abstract — In the last few decades, the telecommunications and Internet worlds have been converging. This has resulted in the proliferation of Open Web APIs, which enable communication to occur over the Internet using telco infrastructure. Ultimately this has led to the emergence of telco-mashups: value added services developed by combining services from both worlds. At the same time, there have been steep increases in the number of high-end mobile devices that support the delivery of rich services. Combined, these two trends have given rise to the need to develop mobile tools and guidelines that support the creation and execution of telco-mashups. This paper discusses work in progress towards the development of these tools and guidelines.

Index Terms—telco-mashup, Mobicents, Teleweaver

I. INTRODUCTION

The communication industry is experiencing significant changes, in part, due to the emergence of Over-The-Top (OTT) providers - service and content providers that do not own the network they use. For instance, Google and Skype [1] have incorporated voice, video, SMS and MMS into their services and web APIs. Telecommunication companies (telcos) have observed this and are changing their business models from "closed platforms", where end-users only gained access through a single entry point, to "open platforms", which allow end-users to access services through applications developed by third parties [1].

The convergence of Internet domains and telcos around the Internet Protocol (IP) has enabled developers to include features of the telco domain in web-mashups, i.e., web applications developed by integrating data, application logic, and/or pieces of user interfaces sourced from the Web [2]. Similarly, new types of mashups known as telco-mashups have emerged. Telco-mashups are "web-mashups which integrate telco services and/or device APIs in order to support communication and collaboration" [2, p4]. However, the integration of such functionalities into Web applications is still challenging [1, 2]. Some of the challenges are due to the lack of understanding of telco-mashups, lack of models, and limited support for multi-platform deployment.

This paper discusses work towards the development of mobile tools and guidelines for supporting the creation and execution of telco-mashups. Moreover, it presents the challenges associated with the design of telco-mashup applications.

II. BACKGROUND

A. Mobile device as a medium

There have been steep increases in high-end mobile phone penetration rates across the world. According to Vision Mobile [3], in 2011, the global smartphone penetration increased from 26% in the first quarter to 34% in the fourth quarter. Thus, the global smartphone penetration reached an average of 30% in 2011, up from 11% in 2008. In the same year, 1.6 billion mobile handsets were shipped and some 483 million of these were high-end mobile phones [3]. If this trend continues, there is a high probability that data traffic will entirely shift to mobile communication [4].

Based on the above observations, it may be inferred that mobile phones are contributing to the convergence of IT and telecommunication systems by providing a platform for a range of services which span from basic telephony to data services. Indeed, some work has already begun to target the platform, for instance, at the Rhodes University Mobility Research Group (RUMRG), which specialises in mobile phone and tablet development for Internet services.

B. Telco-mashup development

Telco-mashups have gained attention from industry. Many companies see telco-mashups as an opportunity to make web-mashups more powerful and offer additional value [2]. For example, Nokia cooperated with Stuttgart University in Germany to produce the TELAR Mashup platform, a client-server solution that facilitates adaptive mashup creation for mobile devices such as the Nokia Internet Tablets [5]. Similarly, the Council of Scientific and Industrial Research (CSIR) used the Mobicents platform to integrate telco services in the web-based SINGA (short for SINGAZINZELA - we can do it by ourselves) environment [6]. Mobicents is an open source implementation of JAIN/SLEE that enables developers to create, manage, and monitor services that integrate voice, video and data [6]. Though multi-device deployment was supported, this project only targeted a specific group of users, namely children.

The Rhodes University Convergence Research Group (RUCRG) in collaboration with the Reed House Systems (RHS) software company presents an opportunity to create telco-mashups. The RUCRG uses Mobicents for developing next generation services that are aligned with open standards in the telecommunication world. By combining Mobicents and RHS's Teleweaver (a lightweight, custom built OSGi

container which supports offline and online service access through open web services interfaces [7]) telco-mashups can be developed.

III. Motivation

Despite extensive studies on the development of telco-mashups, there still exists a scarcity of knowledge with respect to the development of mobile tools for telco-mashups. One of the reasons for this gap is the challenge in integrating telco services to work with mobile devices, since mobile devices were initially not designed to support such services [2]. However, the proliferation of feature-rich mobile phones in the developing world (e.g., South Africa) that are able to run telco-mashups inside the browsers, presents an opportunity to target the platform.

In addition, the motivation for this work follows from work being carried out by researchers at Rhodes University. There are obvious synergies to exploit in the collaboration between the RUCRG and RUMRG given that services developed in RUCRG can have client software developed for them. Moreover, the combination of platforms such as Mobicents (RUCRG) and Teleweaver can cross-pollinate each other to create telco-mashups, presenting an opportunity to create more powerful value-adding services.

IV. Research goals

The main goal of this research is to develop mobile/telco-mashups (telco-mashups adapted to mobile devices). In addition we intend to foster research in this field by enhancing understanding about what telco-mashups are and how they can be developed. To this end, we hope to develop guidelines that can be used by current and future researchers who wish to develop mobile front-ends to telco-mashups, in particular for the Mobicents-Teleweaver ecosystem.

V. Research Approach

To begin with, an in-depth literature survey will be carried out to provide solid knowledge base and understanding of various telco-mashups/APIs developed by previous researchers in the field. This literature review will help to understand the types of telco services in existence, their key characteristics, and how they are combined with web-mashups in terms of technologies used. Having understood telco-mashups, telco services and fundamental concepts, the selection of necessary technologies and development tools will be an essential second step (see Section VI).

Subsequently a telco-enhanced mashup application (prototype) will be developed. First, a conceptual design will be created. During this stage, mashup characteristics such as title, policies, purpose and category will be defined. It is starting from this stage that guidelines will begin to be developed. These guidelines will aim to advise and quicken the development of mobile/telco-mashups in the Mobicents-Teleweaver ecosystem. Secondly a logical design will be produced. At this stage abstract layouts and basis components (e.g., policies and requirements) will be defined. Thirdly, an implementation phase will follow. This involves assigning physical implementations of data, services to logical description. Subsequently, mobile tools (front-end) will be developed. Finally, the execution and testing phase is the last phase, where a mashup instance will be running and used by users to execute their tasks. In addition, the front end of the mashup will be rendered according to the physical design description. Lastly, mashup testing will be conducted. This will include unit testing, usability testing and integration testing.

VI. Current work

A literature survey is currently underway. The process involves understanding telco-mashups/API, telco services and technologies used. In tandem, a mobile application (using HTTP GET) to configure telecom services (HTTP API) developed by RUCRG in Mobicents, is being developed. The aim is to aid in the selection of necessary technologies, development environments, and reveal the synergies to exploit in the collaboration between RUCRG and RUMRG. Android, an open source platform and according to a Canalys report [8], one of the widely adopted platforms has been chosen for this reason. Using mobile devices running Android OS, users can execute the following operations (previously desktop-bound): service discovery, service activation or deactivation, service registration or deregistration, query services registered for and the creation of a new user list. XML is used for data transfer, and an event-driven XMLPullParser for parsing XML response data.

VII. Conclusion

This paper discussed work in progress towards the development of mobile tools and guidelines for aiding the creation of telco-mashups. The completion of this research will result in an enhanced understanding of telco-mashups; but most importantly, will result in the availability of easy to use mobile tools for telco-mashups (mobile/telco-mashups).

VIII. References

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