Chapter 1
Mobile Cloud Computing:
Technologies, Services, and Applications

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ABSTRACT

Mobile devices have gained great importance in the daily lives of people. Smartphones and tablet computers make people's lives easier by being more useful and offering more capabilities and services for a plethora of activities. Those devices include various sensing modules for collecting location information related to navigation, gravity, and orientation, which bring a diversity and intelligent ubiquitous mobile experience to users. In this chapter, cloud computing and mobile cloud computing are addressed in order to give insight about the topic and offer an important overview for this book. The diverse research definitions of these emerging technologies and contributions to enhance users' lives are considered. Furthermore, the technologies and identified advantages to improve and justify the strong use of mobile cloud are discussed. Relevant mobile cloud computing applications are presented, showing good results and a promising future for mobile cloud computing technologies.

1. INTRODUCTION

A wide range of potential mobile cloud applications has being recognized in the literature. These applications fall into different areas such as image processing, natural language processing (e.g., SIRI by Apple), sharing global positioning system (GPS), sharing Internet access, sensor data applications, querying, multimedia search, among others (Fernando, Loke, & Rahayu, 2013). Mobile cloud computing overcomes obstacles related to the performance, environment, and security issues identified on the above-mentioned powerful applications.

Smartphone and tablet devices are increasingly involved in the people daily life. They become one of the most effective and convenient tools for anytime and anywhere communications. Cho and Kim referred by (Mirusmonov, Changsu, Yiseul, & Jongheon, 2012) states that, in 2013, about 40% of all Internet traffic will be assigned to smartphones. Mobile devices have accumulated rich experience to their users through several services and mobile applications, which run on the devices or on remote servers via third Generation (3G) or common wireless technologies. On this way, mobile cloud computing will be a main branch of the development of cloud computing in the near future. The client of mobile cloud computing can also enjoy the interest of new Internet without the limitation of fixed equipment (Weiguang & Xiaolong, 2011). According to the study performed by Juniper Research (Holden, 2013), cloud computing based mobile software and applications are expected to rise 88% annually from 2009 to 2014.

In the literature, is not available a standard definition for mobile cloud computing. Nevertheless, several suggestions are available and the importance of the topic is evident. The MCCF (2013) refers mobile cloud computing to an "infrastructure where both the data storage and the data processing happen outside of the mobile device. Mobile cloud applications move the computing power and data storage away from mobile devices into the cloud, bringing applications and mobile computing to not just smartphone users but a much broader range of mobile subscribers". Han and Gani (2012) mention that previous mobile device-based intensive computing, data storage, and mass information processing have been transferred to 'cloud' and, thus, the requirements of mobile devices in computing capability and resources have been reduced. Therefore, the developing, running, and using mode of mobile applications have been totally changed. Thus, mobile cloud computing appears as a combination of two technologies: mobile computing and cloud computing (Christensen, 2009; Liu, Moulic, & Shea, 2010). In other words, the computing and major data processing phases have been migrated to the 'cloud'. In (Kadu, Bhanodiya, & Samvatsar, 2012; Zhong, Wang, & Wei, 2012), authors consider mobile cloud computing as a 3+ combination – the combination of mobile computing, mobile Internet, and cloud computing. Zhong et al. (2012) distinguish mobile computing from mobile cloud computing. They consider mobile computing as just resources exchange and sharing, unlike the nature of mobile cloud computing is the ability to provide valuable, accurate, and real-time information for any user at anywhere and anytime.

Given the importance of this topic, this book addresses innovative concepts and critical issues in the emerging field of mobile cloud computing. This chapter overviews the mobile cloud computing topic and elaborates about its technologies, services, and applications offering an important insight about them. The most relevant and updated issues related with the topic are considered, based on a deep review of the related literature.

The rest of the chapter is organized as follows. Section 2 presents a background and overviews the related work on cloud computing including its definition, architecture and corresponding services and deploying models, and an insight about its advantages. Mobile cloud computing is elaborated in Section 3 while mobile cloud technologies are described in Section 4. Section 5 discusses the major mobile cloud computing challenges. Applications and future trends of mobile cloud computing are studied in Section 6. Section 7 summarizes the chapter.

2. CLOUD COMPUTING OVERVIEW

The main idea behind cloud computing is not new. John McCarthy in the early 1960s already envisioned that computing facilities would be provided to general public like an utility (Zhang, Cheng, & Boutaba, 2010). However, after Google's CEO Eric

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