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Advances in Mobile Cloud Computing

Min Chen · Yulei Wu · Athanasios V. Vasilakos

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Recently the cloud computing technology has emerged as a new information technology infrastructure for the fast developing IT industry. In cloud computing, information is permanently stored in large-scale data centers on the Internet all over the world and temporarily accessed and cached on clients including desktops and portable PCs, sensors, etc. With the "cloud" as a metaphor for the Internet, cloud computing promises to deliver massively scalable IT-enabled data, software, and hardware capabilities as a service to external clients with Internet accesses. And the highly scalable computation capability of the cloud data centers can further assist and accelerate most of our computation intensive services and works effectively. Therefore the cloud computing has been envisioned as the key technology to achieve economies of scale in the deployment and operation of IT solutions.

Regarding recent advances in mobile communication technologies, a new wave of user demands for rich mobile service experience has been fueled. Mobile users always expect broadband Internet access wherever they go, interact with each other via social networks while moving; furthermore, they are seeking ubiquitous access to a wealth of media-based contents and services. Because mobile devices are resource limited inherently, it is essential for the cloud to provide computational support for many media-rich applications. The combination of mobile media and cloud computing highly arises many technical challenges, and the fundamental tension between resource-hungry multimedia streams and power-limited mobile devices has to be resolved. The effort for providing a universal rich-media experience across any screen is typically hindered by the heterogeneity amongst ever-evolving mobile devices, as manifested in their different physical form factors, middleware platforms, and interactive functions. Furthermore the developments of innovative pervasive mobile services, e.g., mobile video streaming, rich media dissemination, surveillance, gaming, e-health care, etc., can be greatly facilitated by Mobile Cloud Computing (MCC) platform employing emerged and emerging technologies.

This issue consists of five papers addressing the various aspects of MCC, such as mobile cloud computing services and applications, mobile cloud gaming, integration of MCC with Cyber-Physical Systems (CPS), as well as the relationship between cloud computing and big data. The issue opens with a comprehensive survey on diverse ways of combining cloud computing and mobile platforms towards a new computing/communications paradigm. In "Mobile Cloud Computing: A Survey, State of Art and Future Directions", M. R. Rahimi et al. provided a complete survey on the field of MCC on its state of art applications, research challenges, opportunities and future research directions. The typical MCC applications are discussed, such as mobile learning, commerce, healthcare and social networks. The authors further identify research gaps from three critical aspects from enhancing the efficiency of task offloading to improve the business model, and the research challenges and opportunities are made clear within the context of the existing schemes.

In the paper "A Cloudlet-Assisted Multiplayer Cloud Gaming System" by W. Cai et al., the authors proposed a novel cloudlet-assisted multiplayer cloud gaming system, in which the mobile devices are connected to the cloud server for real-time interactive game videos, while sharing the received video

M. Chen (✉)
Huazhong University of Science and Technology, Room 410, Building Southern No. 1, 1037 Luoyu Road, Wuhan 430074, China
e-mail: minchen@ieee.org

Y. Wu
Computer Network Information Center, Chinese Academy of Sciences, 4 Zhongguancun Nansijie, Haidian District, P.O. Box 349, Beijing 100190, China
e-mail: wuyulei@cstnet.cn

A. V. Vasilakos (✉)
Computer Science, Kuwait University, P.O. Box 5969, Safat 13060, Kuwait
e-mail: vasilako@ath.forthnet.gr

frames with their peers via an ad hoc cloudlet. Experimental results show that expected server transmission rate can be significantly reduced compared to the conventional video encoding schemes for cloud games.

The third article titled "VCMIA: A Novel Architecture for Integrating Vehicular Cyber-Physical Systems and Mobile Cloud Computing" from J. Wan et al., designed a vehicular CPS and MCC Integration Architecture (VCMIA), which provides mobile services for potential users such as drivers and passengers to access mobile traffic cloud. Then, the authors analyze two crucial cloud-supported components: Geographic Information System (GIS) with traffic-aware capability and cloud-supported dynamic vehicle routing. Finally, the vehicle maintenance service as an application scenario is used to carry out the validation.

In the paper "Cloud-assisted Computing for Event-driven Mobile Services", A. Boukerche et al., discussed the importance and challenges in designing event driven mobile services that will detect conditions of interest to users and notify them accordingly. Today, software developers for desktop computing build request and respond applications to do what end users tell them to do and answer what they ask. In mobile computing, software developers will need to develop sense and response applications that will interact with the end user. These applications will notify or ask users what they want based on what they have sensed or on a personal profile. MCC has the potential to empower mobile users with capabilities not found in mobile devices, combining different and heterogeneous data sets.

The main objective of cloud computing is to use huge computing and storage resources under concentrated management, so as to provide big data applications with fine-grained computing capacity. On the other hand, the emergence of big data also accelerates the development of cloud computing. The last paper "Big Data: A Survey" presented the relationship between cloud computing and big data. The distributed storage technology based on cloud computing can effectively manage big data; the parallel computing capacity by virtualization of cloud computing can improve the efficiency of acquisition and analyzing big data. The evolution of big data was driven by the rapid growth of application demands and cloud computing developed from virtualized technologies.

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