Context Data Management for Mobile Spaces

Penghe Chen[1], Shubhabrata Sen[2], Hung Keng Pung[2],
Wenwei Xue[3], and Wai Choong Wong[2]

[1] NUS Graduate School for Integrative Sciences and Engineering, NUS, Singapore
[2] National University of Singapore, Singapore
[3] Nokia Research Center, Beijing, China
{g0901858,g0701139,dcsphk,elewwcl}@nus.edu.sg,
wayne.xue@nokia.com

Abstract. Context-aware applications can monitor and detect the surrounding Context-aware applications can monitor and detect the surrounding situation changes of context entities, and adapt to these situations automatically. As context-aware applications can reside in mobile entities such as cars and mobile phone, an efficient context data management mechanism is required for mobile context-aware applications. In this paper, we propose a new mechanism to model and represent mobile entities. In addition, we also propose new system services to support mobile applications so that disruptions caused by mobility can be minimized.

Keywords: Context-aware, ubiquitous computing, context data management, mobile space, mobile application, availability, callback, mobility.

1 Introduction

The recent advances in mobile computing and wireless communication technology have resulted in the proliferation of context-aware applications on mobile devices. In order to realize the context-awareness, more and more context sources will be utilized. Consequently, an effective context-data management is quite necessary for context-aware applications inside mobile devices whereby mobility is one of the most significant problems that should be solved by the context-data management. Figure 1 illustrates how mobility can affect the on-going context-aware applications. Our paper is just trying to solve this mobility problem by proposing the concept of "Mobile Space" and designing new system services based on our previous system – Coalition [1].

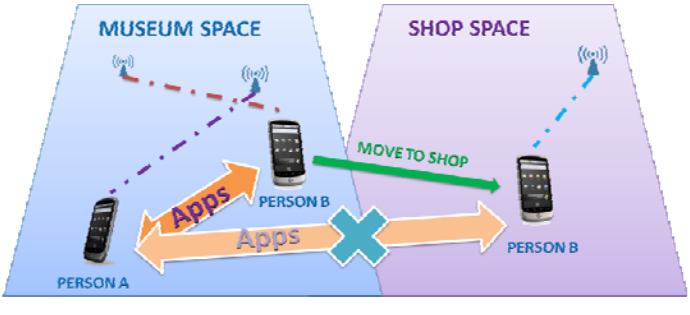

Fig. 1. Application failure due to mobility

P. Sénac, M. Ott, and A. Seneviratne (Eds.): MobiQuitous 2010, LNICST 73, pp. 340–341, 2012.

2 Mobile Space and Data Management

For any operating environment whose entities including Physical Space Gateway (PSG) [1] *are moving together, we call this environment a Mobile Space, the corresponding* Context Domain as *a Mobile Context Domain, and the PSG is denoted as an M-PSG.*

To be consistent with the schema concept [1] of Coalition, three special attributes are defined for "Mobile Space". *location* -- closely related with mobility is an important context element which can be used to identify the surrounding situations of a mobile space. *visitingSpace* -- the physical space in the mobile space is immersed which supplies different context applications to its inside entities and varies when mobile space moves. *powerPSG* -- the current power level of an M-PSG and can be used as a situation context to assess the state of an M-PSG.

The current context data management of Coalition specifies common functions for context spaces, such as how data is collected, processed, managed and provisioned. In order to better serve "Mobile Spaces", we propose and design one new system service: Availability Updating Service to handle the availability, which defines as the reachability through communication network, of mobile spaces for context acquisition via network. Each mobile space achieves one unique ID during registration with Coalition that can be used to update the new availability information with Coalition when availability information varies. In addition, in order to make this availability change transparent to applications, we propose and design another system service: Application Callback Service to manage the callbacks, which defined as notifications of availability information changes, of mobile spaces on behalf of context-aware applications running on mobile devices. Applications running on MPSGs can issue callbacks to Coalition when failures happen due to availability information of service provider PSGs vary, and receive notifications when new availability information updated. As a result, application failures caused by mobility are solved.

3 Conclusion

In this paper, we propose the concepts of "Mobile Space" to model mobile physical spaces and extend the context data management. In addition, we propose two new system services: Availability Updating Service and Application Callback Service to help "Mobile Spaces" handle mobility problem and relief its influence to context-aware applications. Our future work will be to derive the detail reasons of application disruption on behalf of applications.

Acknowledgments. This work is partially support by project grant NRF2007IDM-IDM002-069 on "Life Spaces" from the IDM Project Office, Media Development Authority of Singapore.

References

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