The Impact of Zoning Concept on Data-Flow Management within LBS System Components

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Abstract

Typical Location Based Services (LBS) system is compound of a mobile device with positioning capability connected to a LBS service provider via wireless network. Thus, the efficiency of LBS System depends on each sub-element composing its architecture. One of the most important factors affecting LBS efficiency is the volume of data streamed from the server to the client. This problem has emerged as a consequence of customer demands for richer services such as videos and high-quality pictures. Therefore this paper discusses the impacts of transmitting huge size of information and services on: the mobile devices, wireless networks and the data server. In addition, it introduces a mechanism to improve the data flow based on the zoning concept in which data is organised in individual databases and then streamed gradually according to the end user's new location. The outcome of the evaluation of this mechanism has shown better utilisation of the mobile device resources (memory and battery) as well as reducing the network and server consumption time.

Keywords: Location Based Services, Zone based Update Mechanism, Mobile Handheld Computing, Data Management, Wireless Network, Zoning Concept.

Conclusion

At this paper, a Zone-based Update Mechanism for improving LBS performance has been presented and investigated. A simplified prototype was implemented and evaluated using a laptop mobile device. The results obtained from this work showed that this mechanism has contributed to reducing the size of information significantly. Subsequently, the impact of this new mechanism was evaluated on a PDA. The results showed that the new mechanism minimised unnecessary expenses which might be accrued due to uploading redundant information by the end users which affected and enhanced the overall LBS performance.

Moreover, the evaluation results showed that the zoning concept can directly enhance the usability of mobile devices in terms of memory and battery consumption. Furthermore, it showed a significant enhancement of the wireless bandwidth as well as the query processing time.

It has been concluded that this mechanism can be used as an open platform for LBS applications, particularly over heterogeneous mobile networks. Furthermore, it can be deployed in critical and real time applications such as visual impaired guidance applications (Hunaiti et al., 2009) and m-learning applications (Hunaiti et al., 2008)

References

Almasri, S., Alnabhan, M., Hunaiti Z. and Sedoyeka, E. 2009. Location-based services (LBS) in micro-scale navigation: shortcomings and recommendations. *International Journal of E-Services and Mobile Applications.* Vol. 1 (4).

Almasri, S., Hunaiti, Z., Sedoyeka, E. and Balachandran, W. (2008). Zone-Based Update Strategy for Location based Services (LBS). *IEEE International Symposium on Industrial Electronics.* Cambridge, UK.

Andersson, C. (2001). GRPS and 3G Wireless Applications, *Published by John Wiley & Sons.* ISBN-10: 0471414050.

Artem G. (2002). Management of Geographic Information in Mobile Environments. *Department of Computer Science and Information Systems*, University of Jyväskylä.

Bertino, E. (2004). Advances in Database Technology-EDBT 2004. *9th International Conference on Extending Database Technology*. Crete, Greece, March 14-18

Blank, A. (2004). TCP/IP Foundations. *Published by John Wiley and Sons*, ISBN 0782143709, 9780782143706

Gartner, G. (2004). Location-based mobile pedestrian navigation services – the role of multimedia cartography*, ICA UPIMap* 2004, Tokyo

Gellersen, H. (1999). Handheld and ubiquitous computing. *Published by Springer.* ISBN 3540665501, 9783540665502

Geomedia Professional™ (2008). Intergraph Corporation. Retrieved on 23/12/2008 from: http://www.intergraph.com/sgi/products/default.aspx.

Green, K. Wilson, J.C. (2001). Future power sources for mobile communications. *Electronics & Communication Engineering Journal.* 13(1), 43-47.

Holox (2008). Blutooth GPS receiver. Retrieved on 23/12/2008 from http://www.holux.com/JCore/en/products/products_spec.jsp?pno=227

HTC. (2008). HTC P3300 PDA. Website retrieved on 14./11/2008 from: http://www.htc.com/www/product.aspx?id=392.

Hunaiti, Z., Almasri, S., Matter, N., Sedoyeka E. and Fenton, A. (2008), Extending Location-Based Services into M-learning. *The IEEE Multidisciplinary Engineering Education Magazine (MEEM)*. Vol 3(4)

Hunaiti, Z. and Almasri, S. (2009). Guide interface for a Remote Vision Guidance System for Visually Impaired Pedestrians. *International Conference on Information and Communication Technologies and Accessibility*. 7-9 May 2009, Hammamet, Tunisia

Katasonov A. and Sakkinen M. (2005) Content Quality in Location-Based Services: A Case Study. In: Proc. IEEE *International Conference on Pervasive Services (ICPS'05)*, July 11-14, 2005, Santorini, Greece, © IEEE, pp. 461-464

Kim, S., Kim, H. and Lee, K. (2005). Unified Optimal Power Allocation Strategy for MIMO Candidates in 3GPP HSDPA. *ETRI Journal*, 27(6), 769-776

Kubber, A. (2005). "Location Based Services", *John Wiley and Sons*, ISBN: 0470092319, Published October 2005

Intergraph. (2008). Intergraph Corporation. Retreived on 14/11/2008 from: http://www.intergraph.com/

Lee, D., Zhu, M. and Hu, H. (2005). "When location based services meet databases", *mobile information systems Journal*. 1(2), 81-90

OS (2009). Ordnance Survey , Great Britain's national mapping agency. Retrieved on 21/04/2009 from: http://www.ordnancesurvey.co.uk/oswebsite/

Pivo, G., 1990, The Net of Mixed Beads: Suburban Office Development in Six Regions. *Journal of the American Planning Associations*, Vol. 56 (4),457-469.

Renault S., Le Meur A., Meizel D. (2005). GPS/GIS localization for management of vision referenced navigation in urban environments. *Intelligent Transportation Systems, IEEE*, pp. 608-613.

T Table (2009). T-Test distribution table. Retrieved on 22/04/2009 from http://www.union.edu/PUBLIC/BIODEPT/t.html

Tchapi, A., Sangbong, T., Koum, G., Yekel, A. (2005) Tracking system using location-based services technology. *The International Conference on Signal-Image Technology & Internet-Based Systems (SITIS'05)*. November 27th - December 1st 2005. Hilton Hotel - Yaoundé Cameroon.

Sedoyeka, E.; Hunaiti, Z.; Almasri, S.; Cirstea, M.; Rahman, A (2008). Evaluation of HSDPA (3.5G) mobile link quality. *International Symposium on Industrial Electronics, ISIE 2008*. *IEEE*, June 30 2008, Pages:1446 – 1451

Urdan, T. (2005). Statistics in plain English. *Published by Routledge*. ISBN 0805852417, 9780805852417