SHOPPING DISCOUNT ALERT SYSTEM

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Shopping Discount Alert System

A project submitted to Dean of Awang Had Salleh Graduate School in Partial Fulfilment of the requirement for the degree Master of Science of Information Technology University Utara Malaysia

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Abstract

The Web technologies have been very advanced now. They are incorporated with RFID, GSM, and mobile technologies in enabling the Web functions be accessed more widely. Hence, the business functions are accelerated. This study takes the advantages of such the advancements in assisting marketing purposes. Consequently, a system that alerts users of sales in malls based on their locations is developed, and is named Shopping Discount Alert System (SDAS). UML and Java are used in designing and developing it from start to finish. It sends the advertisements to users' mobile phones, so that the information is pervasive. The Shopping discount alert system has been functionally tested, besides its interface. Results show that the Shopping discount alert system runs well as intended, besides ensuring that the users are happy with the idea. It is anticipated that the Shopping discount alert system could reduce the cost for promotions in a long run.

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CHAPTER ONE INTRODUCTION

1.1 BACKGROUND

Information and communication technology (ICT) has been one of the important determinants for the rapid growth of E-Commerce transactions all over the world since the last decades. In Malaysia, the upshot of ICT and the initiative by the government for the development of E-Commerce have been emphasized for the purpose of deploying resources in developing knowledge-base economy. In addition, the internet advancement and the improvement of ICT have positive implications for the E-Commerce development in the country to participate and sustain in the competitive advantage. By definition, Ecommerce refers to the process of buying or selling products or services over the Internet. The increasing rate of internet users, online shopping activities, and adoption of new technologies are the key drivers for the development of E-Commerce transactions, in which websites are the main interface between online merchants and their customers (Muhammad, Dominic, Durai, Naseebullah, & Alamgir, 2011).

Online shopping is becoming increasingly popular because the speed is getting faster and websites are getting easier to use (Ontario, 2008), especially with the ability of performing transactions in wireless environments. The development in wireless environment and digital media such as mobile phones provide new marketing media for the businesses and marketers.

The contents of the thesis is for internal user only

- Bultan, T., Ferguson, C., & Fu, X. (2009). A tool for choreography analysis using collaboration diagrams. Paper presented at the Web Services, 2009. ICWS 2009.
 IEEE International Conference on.
- Chan, S., Fang, X., Brzezinski, J., Zhou, Y., Xu, S., & Lam, J. (2002). Usability for mobile commerce across multiple form factors. Journal of Electronic Commerce Research, 3(3), 187-199.
- Chen, J., Subramanian, L., & Brewer, E. (2010). *Sms-based web search for low-end mobile devices*. Paper presented at the Proceedings of the sixteenth annual international conference on Mobile computing and networking.
- Chen, Y. F., Gibbon, D., Liu, Z., Shahraray, B., & Wei, B. (2006). Personal Media Alert Systems: Personalization and Dissemination of Broadcast Content with a P2P Micropayment Scheme. Paper presented at the Multimedia and Expo, 2006 IEEE International Conference on.
- Chitnis, M. Tiwari, P. & Ananthamurthy, L. (2002). Sequence Diagram in UML.Retrieved
 May 5, 2011, from developer.com web
 site:http://www.developer.com/design/artical.php/3080941.
- Crawford, I. (1997). Questionnaire Design. In I. Crawford, Marketing Research and Information Systems (pp. 32-42). FAO Regional Office for Africa Retrieved April 25, 2011 from http://www.developer.com/design/article.php/3080941/Sequence-Diagramin-UML.html.

- Daintith, J. (2009). "System design", A Dictionary of Computing. Retrieved May 1, 2011, from <u>http://www.encyclopedia.com/doc/1011-systemdesign.html</u>.
- de Arantes, W., & Verdier, C. (2005). Public health alert system for health networks: application to cardiology. Paper presented at the Computers in Cardiology, 2005.
- Degeratu, A. M., Rangaswamy, A., & Wu, J. (2000). Consumer choice behavior in online and traditional supermarkets: The effects of brand name, price, and other search attributes. *International Journal of Research in Marketing*, *17*(1), 55-78.
- Dennis, A., Wixom, B. H., & Tegarden, D. (2009). Systems Analysis and Design with UML Version 2. New Jersey: WILEY.
- Don, C. BYU, H. 2004. Using a MySQL Database, http://quizgen.org/tut/q23.MySQL.p7.pdf
- Drossos, D., Giaglis, G. M., Lekakos, G., Kokkinaki, F., & Stavraki, M. G. (2007).Determinants of effective SMS advertising: an experimental study. Journal of Interactive Advertising, 7(2), 16-27.
- DuBois, P. (2003). MySQL cookbook: O'Reilly Media.
- Erl, T. (2005). *Service-oriented architecture: concepts, technology, and design*, Prentice Hall PTR.
- ErsavaÅŸ, B. F. (2005). Java Server Pages (JSP) and MySQL Internationalization, Localization, and Turkish Language Support.

- Faulkner, X. and F. Culwin (2005). "When fingers do the talking: a study of text messaging." *Interacting with Computers* 17(2): 167-185.
- Field, A. P. (2009). Discovering Statistics Using Spss. Singapore:SAGE Publications Asiapacific Pte Ltd.
- Field, A. P. (2009). Discovering Statistics Using Spss. Singapore:SAGE Publications Asiapacific Pte Ltd.
- Fielding, R. T. and R. N. Taylor (2002). "Principled design of the modern Web architecture." ACM Transactions on Internet Technology (TOIT) 2(2): 115-150.
 - Fielding, R. T. and R. N. Taylor (2002). "Principled design of the modern Web architecture." *ACM Transactions on Internet Technology* (TOIT) 2(2): 115-150.
- Florescu, D., Levy, A., & Mendelzon, A. (1998). Database techniques for the World-WideWeb: A survey. *SIGMOD record*, 27(3), 59-74.
- Ghezzi, C., & Tamburrelli, G. (2009). Reasoning on non-functional requirements for integrated services. Paper presented at the Requirements Engineering Conference, 2009. RE'09. 17th IEEE International.
- Ghezzi, C., & Tamburrelli, G. (2009). Reasoning on Non-Functional Requirements for Integrated Services. IEEE , 69-78.
- Goldstein, A., & O'Connor, D. (2000). *E-commerce for development: prospects and policy issues*: OECD Development Centre.

- Heinonen, K., & Strandvik, T. (2006). *How do consumers react to mobile marketing*?Paper presented at the Mobile Business, 2006. ICMB'06. International Conference on.
- Hellerstein, J. M., Stonebraker, M., & Hamilton, J. (2007). Architecture of a database system. *Foundations and Trends in Databases*, 1(2), 141-259.
- Hellerstein, J. M., Stonebraker, M., & Hamilton, J. (2007). Architecture of a database system. *Foundations and Trends in Databases*, 1(2), 141-259.

Hoffman, J. (1996). Introduction to structured query language: J. Hoffman.

Hord, J. (2006). "How SMS works." Retrieved April 14: 2006.

Hord, J. (2006). "How SMS works." Retrieved April 14: 2006.

Huebsch, R., Chun, B., Hellerstein, J. M., Loo, B. T., Maniatis, P., Roscoe, T., et al. (2005). The architecture of pier: an internet-scale query processor. *Departmental Papers* (CIS), 305.

Jubadi, W. M., & Sahak, S. F. (2009). Heartbeat Monitoring Alert via SMS. IEEE, 1-5.

Jubadi, W. M., & Sahak, S. F. (2009). Heartbeat Monitoring Alert via SMS. IEEE, 1-5.

Junior, W. M. d. A., & Verdier, C. (2005). Public Health Alert System for Health Networks:

- Kaindl, H., Kramer, S., & Kacsich, R. (1998). A Case Study of Decomposing Functional Requirements Using Scenarios. IEEE,156-163.
- Kamran, M., & Juena, S. S. (2008). Utilization of Mobile Advertising in B2C Marketing.
- Karolidis, D., A. Papadakis, et al. (2005). MoBINo: an integrated mobile and web based environment for automatic SMS notification. *Proceedings of the 9th WSEAS International Conference on Communications*, World Scientific and Engineering Academy and Society (WSEAS).
- Kuechler, B. and V. Vaishnavi (2008). "On theory development in design science research: anatomy of a research project." European Journal of Information Systems 17(5): 489-504.
- Liang, Y. D. (2009). Introduction to Java programming: Comprehensive version, Prentice Hall.
- Markett, C., SÃinchez, I. A., Weber, S., & Tangney, B. (2006). Using short message service to encourage interactivity in the classroom. *Computers & Education*, 46(3), 280-293.
- Martin, R. C. (2003). UML Tutorial: Part 1 -- Class Diagrams .Retrieved April 4, 2011 from http://www.objectmentor. com/resources/articles/umlClassDiagrams.pdf.
- Midmarket CIO (2005). Definitions Rational Rose, Retrieved May 2, 2011, from http://searchciomidmarket.techtarget.com/definition/Rational-Rose.

- Midmarket CIO (2005). Definitions Rational Rose, Retrieved May 2, 2011, from http://searchciomidmarket.techtarget.com/definition/Rational-Rose.
- Mitrovic, A. (2003). "An intelligent SQL tutor on the web." *International Journal of Artificial Intelligence in Education* 13(2-4): 173-197.

Muller, N. J. (2002). Desktop encyclopedia of telecommunications: McGraw-Hill.

- Muhammad, J., Dominic, P., Durai, D., Naseebullah, R., & Alamgir Khan, A. (2011).Towards Digital Economy: The Development of ICT and E-Commerce in Malaysia.*Modern Applied Science*, 5(2), 171-178.
- Nasco, S. A., & Bruner II, G. C. (2007). Perceptions and recall of advertising content presented on mobile handheld devices. *Journal of Interactive Advertising*, 7(2), 51-62.
- Nelson, G. and J. Wright (2005). "Real time decision support: creating a flexible architecture for real time analytics." *DSSResources*. *COM* 11: 18.
- Nelson, G. and J. Wright (2005). "Real time decision support: creating a flexible architecture for real time analytics." *DSSResources*. *COM* 11: 18.
- Novak, L. and M. Svensson (2001). "MMS- Building on the success of SMS." *ERICSSON REV(ENGL ED)* 78(3): 102-109.
- Novak, L. and M. Svensson (2001). "MMS- Building on the success of SMS." *ERICSSON REV(ENGL ED)* 78(3): 102-109.

- Ontario. (2008). E-Commerce: Purchasing and Selling Online What You Need to Consider [Electronic Version]. Retrieved 20 June 2009 from http://www.bruce.on.ca/tools/ECommerce_Purchasing_and_Selling_Online.pdf.
- Pan, H., Jiang, W. R., Yan, J., Ge, X., Pang, H., & Chen, J. (2010). Design and Implementation of E-commerce Feature Major Website. Paper presented at the Multimedia and Information Technology (MMIT), 2010 Second International Conference on.

Perry, B. W. (2004). Java servlet and JSP cookbook, O'Reilly Media.

- Rangone, A., & Renga, F. M. (2006). *Mobile Advertising: a Framework for the Appraisal of the Campaigns*. Paper presented at the Mobile Business, 2006. ICMB'06.International Conference on.
- Reese, G. and A. Oram (2000). Database Programming with JDBC and JAVA, O'Reilly & Associates, Inc.
- REN, Y., & WANG, Z. (2006). Design and Implementation for Dynamic Table Structure Based on JSP and MySQL [J]. *Computer Engineering*, 5.
- Rettie, R., & Brum, M. (2001). M-commerce: *The role of SMS text messages*. Paper presented at the COTIM 2001 Proceedings. From E-Commerce to M-Commerce.
- Saad, Salah Eldeen Ali (2009) Marketing Distribution Using Mobile Technology. Masters thesis, Universiti Utara Malaysia.

- Sang, B. K., Ramli, A. R., Prakash, V., & Mohamed, S. A. (2003). SMS Gateway Interface Remote Monitoring And Controlling Via GSM SMS. IEEE, 84-87.
- Scharl, A., Dickinger, A., & Murphy, J. (2005). Diffusion and success factors of mobile marketing. *Electronic Commerce Research and Applications*, 4(2), 159-173.
- Sengupta, S., & Bhattacharya, S. (2008). Formalization of UML diagrams and their consistency verification: AZ notation based approach. Paper presented at the Proceedings of the 1st India software engineering conference.
- Siang, B. K., Bin Ramli, A., Prakash, V., & Bin Syed Mohamed, S. (2003). SMS gateway interface remote monitoring and controlling via GSM SMS. Paper presented at the Telecommunication Technology, 2003. NCTT 2003 Proceedings. 4th National Conference on.
- Song, J. and F. Zahedi (2001). "Web design in e-commerce: a theory and empirical analysis." *ICIS 2001 Proceedings*: 24.
- Subramaniam, S. K., Husin, S. H., Yusop, Y. b., & Hamidon, A. H. (2007). Real time mailbox alert system via SMS or email. IEEE, 1-4.
- Von der MaÄŸen, T., & Lichter, H. (2002). Modeling variability by UML use case diagrams. Paper presented at the Proceedings of the International Workshop on Requirements Engineering for product lines.

Wapforum (2002b). Wireless Application Protocol (WAP 2.0): Technical White Paper Retrieved September 23, 2009, from

www.wapforum.org/what/WAPWhite_Paper1.pdf

- Xiao, Q., Zhou, S., Xing, Y., Dai, G., & Wu, Y. (2007). Wireless pre-paid Phone cards distributing system based on SMS. Paper presented at the Software, Telecommunications and Computer Networks, 2007. SoftCOM 2007. 15th International Conference on.
- Xiao, Q., Zhou, S., Xing, Y., Dai, G., & Wu, Y. (2007). Wireless pre-paid Phone cards distributing system based on SMS. Paper presented at the Software,
 Telecommunications and Computer Networks, 2007. SoftCOM 2007. 15th
 International Conference on.
- Yew, T. L. (2000). *Development of a web-based distance learning environment using database*. University of Oklahoma.
- Yew, T. L. (2000). *Development of a web-based distance learning environment using database*, University of Oklahoma.
- Yu, Y., & Liang, S. (2011). Sale system analysis and design for the online cosmetic store based on JSP. Paper presented at the Software Engineering and Service Science (ICSESS), 2011 IEEE 2nd International Conference on.

- Zhao, L., Chen, X., & Ding, J. (2010). Interference Clearance Process of GSM-R network in China. IEEE , 424-428.
- Zarka, N., Al-Houshi, J., & Akhkobek, M. (2006). Temperature Control Via SMS. IEEE, 2678-2683.