THE DEVELOPMENT OF ONLINE BILLING AND INVOICE MANAGEMENT SYSTEM FOR SAUDI SMALL COMPANIES

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THE DEVELOPMENT OF ONLINE BILLING AND INVOICE MANAGEMENT SYSTEM FOR SAUDI SMALL COMPANIES

A Thesis submitted to the College of Arts and Sciences in partial fulfillment of the requirements for the degree Master of Science (Information and Communication Technology),

Universiti Utara Malaysia

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ABSTRACT

Invoicing and billing application for different business purposes helps mainly the service providers and freelancers to manage, send professional invoices online, and track its status. Generally, all the small companies in Saudi Arabia facing a various issues for managing and tracking the invoice status of customers, which mostly back to the lacks of adapting new technology in these companies. One of these lacks is tracking the bills status for a definite projects'. Therefore, this research intends to design and develop an online billing and invoice management system to expenses effortlessly and saves both time and money on the employees in the Saudi small companies (Sepco Company). The propose system intend to provide a digital tracking of the time spend on projects and send invoices directly to clients. An evaluation was conducted among 30 employees and business administrators at Sepco Company to perceive their opinion towards the system ease of use, usefulness, and satisfaction. The result revealed that the proposed system gained a satisfactory level among the participants.

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CHAPTER 1

INTRODUCTION

This chapter mainly focuses on introducing the research aims, background, and the current issues towards the billing and invoice management systems and its performance among different business companies. In addition, this chapter addresses the research solutions along with the relevant research questions in terms of designing and developing a new billing management system, which involves both technical and page optimization test. Finally, research process is introduced in order.

1.1 Introduction

E-business (also referred to as Web-based management systems) is defined as a new context for business where a large amount of information and services describe the e-commerce practices in different business organizations (Welsh, Wanberg, Brown, & Simmering, 2003). This kind of service obtains a better representation of information based on deploying different web tools and techniques for certain purposes, which could be seen as a blessing: plenty of information readily available just a click away (Tang & McCalla, 2005). Even so, it could equally be seen as an exponentially growing nightmare, in which unstructured information chokes the end users without providing any articulate details about the billing contents. An example of these integrations is data mining, which was used to simplify the existing problems with e-businesses (Dredze, et al., 2007), which can be understood not just as a collection of

The contents of the thesis is for internal user only

References

- Austria, T. (2009). Infonova Billing System for an All IP Service Platform. *Infonova Billing System*Retrieved 21-10, 2011, from http://www.ministerialkongress.de/0302 CA EN TelekomAustria final web. pdf
- Bonk, C., Wisher, R., & Lee, J. (2004). Moderating learner-centered e-learning: Problems and solutions, benefits and implications. *Online collaborative learning: Theory and practice*, 54-85.
- Brandmeier, R. A., Hain, S., & Rupp, F. (2011). Emerging Markets Case Studies Collection. *Emerald*.
- Brusilovsky, P., Sosnovsky, S., & Shcherbinina, O. (2005). User modeling in a distributed e-learning architecture. *User Modeling* 387-391.
- Center, N. F. (2003). Internet Billing System (IBIL). 2011(19-Sep). Retrieved from http://cod.nfc.usda.gov/publications/IBIL/ibil.pdf
- Chou, Y., Lee, C., & Chung, J. (2004). Understanding m-commerce payment systems through the analytic hierarchy process. *Journal of Business Research*, 57(12), 1423-1430.
- Cohen, A. D. (1999). Strategies in learning and using a second language. Strategies, 3(4).
- Cossentino, M., Burrafato, P., Lombardo, S., & Sabatucci, L. (2010). Introducing pattern reuse in the design of multi-agent systems. *Agent Technologies, Infrastructures, Tools, and Applications for E-Services*, 107-120.
- Costa, G., & Silva, N. (2010). Knowledge versus content in e-learning: A philosophical discussion. *Information Systems Frontiers*, 1-15.
- Costmedia CMS Billing System. (2008). Retrieved 12-11, 2011, from http://www.costmedia.com/costmedia/brochure/Costmedia_CMS_Billing_Bureau.pdf
- Cuerda, X., & Minguillón, J. (2005). Introducción a los sistemas de gestión de contenidos (CMS) de código abierto. *Mosaic*, 36.
- Dredze, M., Blitzer, J., Talukdar, P., Ganchev, K., Graca, J., & Pereira, F. (2007). Frustratingly hard domain adaptation for dependency parsing. Paper presented at the CoNLL Shared Task Session of EMNLP-CoNLL.

- Driscoll, M. (1994). *Psychology of Learning for Instruction*: Allyn & Bacon, A Division of Paramount Publishing, Inc., 160 Gould Street, Needham Heights, MA 02194.
- eInvoice. (2009). Invoice Management via the Cloud to Reduce Efforts and Ensure Compliance. Retrieved 17-10, 2011, from http://www.hubwoo.com/pdf/librairie/en/Hubwoo eInvoice.pdf
- Fernández-Caballero, A., López-Jaquero, V., Montero, F., & González, P. (2003). Adaptive Interaction Multi-agent Systems in E-learning/E-teaching on the Web. Web Engineering, 359-366.
- Ferrer, N., & Alonso, J. (2010). Content Management for E-Learning: Springer Verlag.
- Garro, A., & Palopoli, L. (2010). An xml multi-agent system for e-learning and skill management. Agent Technologies, Infrastructures, Tools, and Applications for E-Services, 283-294.
- Gay, L. R., & Airasian, P. W. (2000). Educational research: Competencies for analysis and application: prentice Hall Upper Saddle River, NJ.
- Gregg, D. (2007). E-learning agents. Learning Organization, The, 14(4), 300-312.
- Harel, I., & Papert, S. (1991). Constructionism: Ablex Publishing.
- Hislop, D. (2005). Knowledge management in organizations: A critical introduction: Oxford University Press London.
- Imitola, J., Raddassi, K., Park, K., Mueller, F., Nieto, M., Teng, Y., et al. (2004). Directed migration of neural stem cells to sites of CNS injury by the stromal cell-derived factor 1 /CXC chemokine receptor 4 pathway. *Proceedings of the National Academy of Sciences of the United States of America*, 101(52), 18117.
- Jaap, N., & Charles, B. (2010). *E-invoicing*: Gilbert Lichter (EBA) and Chiel Liezenberg (Innopay).
- Jacobson, M., & Wilensky, U. (2006). Complex systems in education: Scientific and educational importance and implications for the learning sciences. *Journal of the Learning Sciences*, 15(1), 11-34.
- John, F., & Wallen, N. E. (1993). How to design and evaluate research in education: McGraw-Hill New York.
- Kanteev, M., Minakov, I., Rzevski, G., Skobelev, P., & Volman, S. (2007). Multi-agent meta-search engine based on domain ontology. Paper presented at the

- 2nd international conference on Autonomous intelligent systems: agents and data mining
- Kotzab, H. (2005). The role and importance of survey research in the field of supply chain management. *Research Methodologies in Supply Chain Management*, 125-137.
- Lowe, D. (2003). Web system requirements: an overview. *Requirements Engineering*, 8(2), 102-113.
- Maier, R. (2007). Knowledge management systems: Information and communication technologies for knowledge management: Springer Verlag.
- Maier, R., & Schmidt, A. (2007). A.: Characterizing knowledge maturing: A conceptual process model for integrating e-learning and knowledge management. Paper presented at the 4th Conference Professional Knowledge Management
- Marwick, A. (2010). Knowledge management technology. *IBM systems journal*, 40(4), 814-830.
- May, M., George, S., & Prévôt, P. (2008). A closer look at tracking human and computer interactions in web-based communications. *Interactive Technology and Smart Education*, 5(3), 170-188.
- Mercer, N. (1995). The guided construction of knowledge: Talk amongst teachers and learners: Multilingual Matters Ltd.
- Moertini, V. S., Athuri, A. A., Kemit, H. M., & Saputro, N. (2011). The Development of Electronic Payment System for Universities in Indonesia: On Resolving Key Success Factors. *Arxiv preprint arXiv:1105.0153*.
- Nonaka, I., & Von Krogh, G. (2009). Perspective---Tacit Knowledge and Knowledge Conversion: Controversy and Advancement in Organizational Knowledge Creation Theory. *Organization Science*, 20(3), 635-652.
- O'Neill, E. L. (2004). *Introduction to statistical optics*: Dover Pubns.
- O'Sullivan, E., Rassel, G. R., & Berner, M. (2003). Research methods for public administrators: Longman.
- Oppenheim, A. N. (1998). Questionnaire design, interviewing and attitude measurement: Pinter Pub Ltd.
- Osborn, C. (1995). SDLC, JAD, and RAD: Finding the Right Hammer: Babson Hall
- PortaBilling. (2006). PortaBilling Templates Guide. Retrieved 15-11, 2011, from http://voip.iglobalink.net/porta/PortaBilling Templates Guide MR12.pdf

- Prusak, L. (2010). Where did knowledge management come from? *IBM systems* journal, 40(4), 1002-1007.
- Ramakrishnan, R., & Gehrke, J. (2003). Database Management Systems: International Edition: McGraw-Hill.
- Rea, L. M., Parker, R. A., & Allen, R. (1997). Designing and conducting survey research: A comprehensive guide: Jossey-Bass Publishers San Francisco, CA.
- Sajja, P. (2008). Multi-agent system for knowledge-based access to distributed databases. *Interdisciplinary Journal of Information, Knowledge, and Management*, 3, 1-9.
- Shah, N., Iqbal, R., James, A., & Iqbal, K. (2009). Exception representation and management in open multi-agent systems. *Information Sciences*, 179(15), 2555-2561.
- Shih, P., Muñoz, D., & Sánchez, F. (2006). The effect of previous experience with information and communication technologies on performance in a Web-based learning program. *Computers in Human Behavior*, 22(6), 962-970.
- Simpao, A., Heitz, J. W., McNulty, S. E., Chekemian, B., Brenn, B. R., & Epstein, R. H. (2011). The design and implementation of an automated system for logging clinical experiences using an anesthesia information management system.

 Anesthesia & Analgesia, 112(2), 422.
- Singh, S. (2009). Emergence of payment systems in the age of electronic commerce: The state of art. Global Journal of International Business Research, 2(2), 1-18.
- Soloway, E., & Pryor, A. (1996). The next generation in human-computer interaction. *Communications of the ACM*, 39(4), 16-18.
- Tang, T., & McCalla, G. (2005). Smart recommendation for an evolving e-learning system. *International Journal on E-learning*, 4(1), 105–129.
- Tarwireyi, P., Terzoli, A., & Muyingi, H. (2008). Adapter-based revenue management system for the exploration of non-conventional billing options in new markets for telecommunications. Paper presented at the Proceedings of the SATNAC conference Wild Coast Eastern Cape Province, South Africa.
- Tramullas, J. (2005). Open source tools for content management. *Hipertext. net*, 3, 12–11.

- Tsai, C., Chang, C., & Chen, L. (2006). A Case Study of Knowledge Management Implementation for Information Consulting Company. *International Journal of The Computer, the Internet and Management*, 14(3), 60-78.
- Tseng, J., Chu, H., Hwang, G., & Tsai, C. (2008). Development of an adaptive learning system with two sources of personalization information. *Computers & Education*, 51(2), 776-786.
- Tsoukas, H. (2009). A dialogical approach to the creation of new knowledge in organizations. *Organization Science*, 20(6), 941-957.
- Vaishnavi, V., & Kuechler, W. (2004). Design Research in Information Systems, 20.11. 2004. URL: http://www.isworld.org/Researchdesign/drisISworld.htm.
- Weisberg, M., & Reisman, K. (2008). The robust volterra principle. *Philosophy of science*, 75(1), 106.
- Welsh, E. T., Wanberg, C. R., Brown, K. G., & Simmering, M. J. (2003). E learning: emerging uses, empirical results and future directions. *International Journal of Training and Development*, 7(4), 245-258.
- Wilensky, U., & Resnick, M. (1999). Thinking in levels: A dynamic systems perspective to making sense of the world. *Journal of Science Education and Technology*, 8(1), 3–19.
- Zeng, S., Melville, P., Lang, C. A., Boier-Martin, I., & Murphy, C. (2008). *Using predictive analysis to improve invoice-to-cash collection*. Paper presented at the International conference on Knowledge discovery and data mining Las Vegas, Nevada, USA.
- Zikmund, W. (2000). Business Research Methods, 6th (ed) Dryden Press.
- Zikmund, W., Carr, B., Griffin, M., Babin, B., & Carr, J. (2000). Business research methods (Vol. 6): Dryden Press Fort Worth, TX.