A business Processes Reference Model for Course Document Management for Supporting Accreditation

A Project Report submitted to the Graduate School in partial fulfillment
Of the requirements for
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Abstract

A reference model is a fundamental starting point for the development of new information systems. Reference models are also called universal models, generic models, or model patterns. In order to obtain a higher learning programme accreditation, most of the educational institutions such as private and public universities have to clearly demonstrate that the programmes offered by them meet the quality standards established by the accreditation body. However, there is no complete and effective reference model for the business process of managing courses' document in order to support accreditation. Therefore, this master's thesis is an attempting to design a reference model, which will be as a general reference model for the business processes of managing document of courses in higher educational institutions and universities in order to obtain accreditation. As the processes to obtain the accreditation is almost similar in most universities and higher educational institutions around world, this study tries to design general business processes reference model to these process that can be as a reference for any education institutions to model its own model since the specific model is a partial model of the reference model. Moreover based on this reference model, the requirements model for Universiti Utara Malaysia (UUM) was designed and implemented as web-based system for Courses' document management supporting Accreditation. In addition to this, the purposed reference model covers all processes that are used in most universities and higher educational institutions to store, retrieve and organise the information of the courses. The methodology of this study is the general design research methodology that contained; awareness of problem, suggestion, development, evaluation, and conclusion. To evaluate the system that was designed and implemented based on the reference model, two methods was used. The first one is black box testing to ensure that the functionality specified in the requirement specification works. The other method is the questionnaire to evaluate the usability of the systems in terms of usefulness. The summary of evaluation results emphasises that this system provides an enhancement and improvement to the performance of the users to accomplish their tasks, and enables the users to complete their tasks quickly.

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Table of Acronyms

Acronym	Full name
HTML	Hyper Text Mark-up Language
UUM	Universiti Utara Malaysia
CDMS	Courses' Documents Management System
PU	Perceived Usefulness
SPSS	Statistical Package for Social Science
CLO	Course Learning Outcome
PLO	Program Learning Outcome
UML	Unified Modeling Language
ABET	Accreditation Board for Engineering and Technology
ECPD	Engineers Council for Professional Development
CSAB	Computing Sciences Accreditation Board
MQF	Malaysia Qualification Framework
MQA	Malaysia Qualification Agency
CAC	Computing Accreditation Commission
ODP	Open Distributed Processing
RM-ODP	Reference Model for Open Distributed Processing

CHAPTER 1

INTRODUCTION

1.1 Introduction

A business process is a group of tasks or activities that are performed at some organisations based on some rules to achieve a specific objective. A business process model contains and describes all the elements that are involved in performing the business processes and the rules that controlling their execution (Axenath et al., 2005).

To analyse, design, implement, and deploy the information system, information modeling is considered as an efficiency way to do perform these processes (Wand et al., 2002). However, the modeling of process often lead to failure and is resource consuming, when it be conducted without any guide or previous experience. To avoid these problems and to model process efficiently, the idea of reference modeling is introduced (Mertins et al., 1998; Scheer et al., 2000).

While an application model represents a particular enterprise system, a conceptual model represents a class of similar enterprise systems. It is a conceptual framework that can be used as a blueprint for information system construction (Fettke et al., 2003). To use a particular reference model, it must be adapted to the requirements of a particular enterprise. Reference models are also called universal models, generic models, or model patterns. The term reference model for business processes refers to a specific type of reference model. A process reference model represents dynamic aspects of an enterprise for example, activity sequences, organisational activities require to satisfy customer needs, control-flow between activities, and particular dependency constraints (Becker et al., 2003).

According to Scheer (1990) to develop new information system, the reference model is a fundamental beginning point. Every reference model is a model which can be consulted for the development of other models (Hars 1994). Scheer (1997) abstracted from information models and sees a reference model as a model which can serve as the starting point for the development of solutions based on concrete problems. Thus, Becker et al., (2003) refers to information models used as initial solutions for the development of project-specific models, as reference models.

According to Aalst et al., (2002), reference models can be considered as general models which contain recommended practices for a specific domain. The focus on the reference model is always on all aspects of the same domain. For example, the Dutch NVVB (http://www.nvvb.nl/) provides a

The contents of the thesis is for internal user only

References

Aalst, W.V.D., & Hee, K.M.V. (2002). Workflow Management. Models, Methods, and Systems. MIT press, Cambridge, MA, 2002.

Axenath, B., & Kindler, E., & Rubin, V. (2005). Proceedings of the Workshop on Business Process Reference Models (BPRM 2005). Satellite workshop of the Third International Conference on Business Process Management (BPM) Nancy, France, September 5, 2005

ABET (2004). SELFSTUDY QUESTIONNAIRE FOR REVIEW of the COMPUTER SCIENCE PROGRAM, Retrieved on January 5, 2010 from http://www.abet.org/forms.shtml, 2004.

Athena, P. (2004). Protos User Manual. Pallas Athena BV, Plasmolen, the Netherlands.

Beeri, C., & Eyal, A., & Kamenkovich, S., & Milo, T. (2006). Querying business processes. In Proc. Of VLDB, 2006.

Becker, J., & Kugeler, M., & Rosemann, M. (2003). Process Management. Springer.

Becker, J., & Rosemann, M., & Uthmann, C. (2000). Guidelines of Business Process Modeling. Business Process Management. Models, Techniques and Empirical Studies. W. Aalst, J. Desel, A.Oberweis. Berlin, Springer: 30-49, 2000; pp. 30-49.

Bernus, P.(1998). Generalised Enterprise Reference Architecture and Methodology, IFIP-IFAC Task Force, 1998

Caetano, A., & Silva, A. R., & Tribolet, J. (2005). Using Roles and Business Objects to Model and Understand Business Processes. 2005 ACM 1-58113-964-0/05/0003

Davenport, T. H. (1993). Process Innovation. Reengineering Work Through Information Technology. Boston, MA: Harvard Business School Press, 1993.

Davis, F.D. (1989). Perceived Usefulness, perceived Ease of Use, and User Acceptance of Information Technology.MIS Quarterly,13(3), 319-340.

Dedeke, A.L., B. (2006). Qualifying use case diagram associations. Computer and Information Technology, 2004. CIT '04. The Fourth International Conference. P.23-29

Eertink, H. W., & Janssen, P., & Luttighuis, W., & Teeuw, C., & Vissers, A. (1999). Business Process Design Language, World Congress on Formal Methods, Springer, 1999, pp. 76-95.

Erl, T. (2005). Service-Oriented Architecture. Concept, Technology, and Design. Prentice Hall.

Fabjan, D. A., & Jermol, M. (2008). Public evaluation and analysis of reference business process model. TOOL-EAST Jozef Stefan Institute.

Feisel, D. L. (2009). Accreditation: Quality assurance for education. Accreditation journal 0278-6648/09 l. IEEE 2009

Fettke, P., Loos, P. (2003). Classification of reference models - a methodology and its application. Information Systems and e-Business Management 1 (2003) 1, 35-53

Glinz, M. (2007). On Non-functional Requirements. Proceeding of the 15th IEEE International Requirements Engineering Conference, Delhi, India. 21-26.

Gourley, M., & Qian, G., Sung, H., & Turner. T (2008). SEEKING ABET ACCREDITATION OF A COMPUTER SCIENCE PROGRAM AT A PUBLIC REGIONAL UNIVERSITY. CCSC: South Central Conference 2008. Consortium for Computing Sciences in Colleges. USA

Hammer, M., & Champy, J. (1993). Reengineering the Corporation. A Manifesto for Business Revolution. London, U.K.: Brealey.

Hars, A. (1994). Referenzdatenmodelle. Grundlagen effizienter Datenmodellierung. Wiesbaden : Gabler, 1994 (in German)

Havey, M. (2005). Essential Business Process Modelling. Sebastopol, CA: O'Reilly.

Hoffer, J.A., George, J.F., & Valacich, J.S. (2002). Modern systems analysis & design (3rd Ed.). New Jersey: Prentice Hall.

Holm, Ivar (2006). Ideas and Beliefs in Architecture and Industrial design: How attitudes, orientations, and underlying assumptions shape the built environment. Oslo School of Architecture and Design. ISBN 82-547-0174-1.

Huba, M. E., & Freed, J. E. (2000). Learner-Centered Assessment on College Campuses- Shifting the Focus from Teaching to Learning, Allyn & Bacon.

Huget, M P. (2002). Extending Agent UML protocol Diagrams, Technical Report ULCS02-014, Department of Computer Science, University pf Liverpool.

Impagliazzo, J. (1997). Accreditation in the Computing Profession. Proceedings of the 1997 Conference on Systemics, Cybernetics, and Informatics, SCI'97, 1997.
Kumaran, V. S. (2006). Web-based Course Information System supporting Accreditation using ASP.NET; the Division of Computing Studies, Arizona State University, Mesa, AZ 85212, USA 2006

Jakob,. N (1994), Usability Inspection Methods, Morgan John Wiley & Sons, ISBN 0-471-01877-5

Larman, C. (2001). Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and the Unified Process, 2nd edition, prentice Hall PTR Upper Saddle River,NJ,USA.

Laycock, G. T. (1993) (PostScript). The Theory and Practice of Specification Based Software Testing. Dept of Computer Science, Sheffield University, UK. Retrieved 2008-02-13.

Malaysian Qualifications Agency (2009): Retrieved from http://www.lan.gov.my/eng/introduction.cfm MQA In Brief

Mayr, H. C., & Kop, C., & Esberger, D. (2007). Business Process Modeling and Requirements Modeling, Proceedings of the First International Conference on the Digital Society (ICDS'07), 2007 IEEE,

Mertins, K., & Bernus, P. (1998). Reference Models. In: Schmidt, G. (ed.) Handbook on Architectures of Information Systems. Springer, Berlin et al. (1998) 615-617

Ministry of Higher Education (2008): Retrieved from Quality Assurance Division - About Us (retrieved June 7, 2008)

Misic, V. B., & Zhao, J. L. (2000): Evaulating the quality of reference models. 19th International Conference on Conceptual Modeling, Salt Lake City, Utah, 2000; pp.

Misic, V. B., & Zhao. J. L. (1999). Reference models for Electronic Commerce [Electronic version].the 9th Hong Kong computer society database conference: Database and electronic commerce. Retrieved December 18,2003 from http:// www.ops2.moc.go.th/pdf/HKDC-MisicZhao-pdf.

Naumenko, A. (2001). Reference model for Open Distributed Processing [Electronic version]. Retrieved January 15,2004 from http://lamswww.epfl.ch/reference/rm-odp.

Razavian, M., & Khosravi (2008). Modeling Variability in Business Process Models Using UML: Fifth International Conference on Information Technology: New Generations . 2008 IEEE,

RM-ODP overview. (2003). [Electronic version]. Retrieved February 14,2004 from http://jmxuodp.sourceforge.net/rm-odp-in-a-natshell.html.

Rozanski, E. P. (1994). ACCREDITATION: DOES IT ENHANCE QUALITY?. 1994 ACM 0-89791-646-3/94/0003

Scheer, A. W. (1990). Unternehmensdatenmodell. In: Information Management 5 (1990), no. 1, pp. 92–94 (in German)

Scheer, A.W., & Nüttgens, M. (2000). ARIS Architecture and Reference Models for Business Process Management. In: Oberweis, A. (ed.) Business Process Management - Models, Techniques, and Empirical Studies. Springer, Berlin et al. (2000) 376-389

Schütte, R. (1998). Grundsätze ordnungsmäßiger Referenzmodellierung. Wiesbaden, Gabler,1998.

Scheer, A. W. (1997). House of Business Engineering: Konzept zur Beschreibung und Ausführung von Referenzmodellen. In: Becker, J.; Rosemann, M.; Schütte, R. (eds.): Entwicklungsstand und Entwicklungsperspektiven der Referenzmodellierung : Proceedings zur Veranstaltung vom 10. März 1997. Münster : Institut für Wirtschaftsinformatik, Westfälische Wilhelms-Universität, 1997, pp. 3–15 (in German)

Spady, W., & Marshall. K. (1994). "Light, not heat on OBE", The American School Board Journal, pp.29-33, Nov. 1994.

Souza, D. F., & Wills, A. C. (1998). Object, Components and framework with UML: The Catalysis Approach. Addison-Wesly.

PHP web site (2010). Retrieved on April 30, 2010 from http://php.net/index.php

Pressman. R (2001). *Software Engineering: A Practitioner's Approach*. Boston: McGraw Hill.

USA Federal Enterprise Architecture (2005). Federal Enterprise Architecture Records Management Profile Version 1.0. Architecture and Infrastructure Committee, Federal Chief Information Officers Council December 15, 2005.

U.S. Department of Education (2009). Retrieved on 2009 from http://ope.ed.gov/accreditation/FAQAccr.aspx.

Vaishnavi & Kuechler. (2004). Design Research in information System. Retrieved on May 4th 2008, from http://www.isworld.org/Researchdesign/drisISworld.htm

Wiggins, B. (2000). Effective document management: unlocking corporate knowledge. Gower USA

Walford, T. (1999). Business Process Implementation for IT Professionals and Managers, Arthech House, MA, 1999.

Wand, Y., & Weber. R. (2002). Research Commentary: Information Systems and Conceptual Modeling - A Research Agenda. Information Systems Research 13 (2002) 4, 363-377

Wen, J., & Zhang. Y., & Xia. S., Yan, Y. (2005). A Web-based Examination System Based on PHP+MySQL. Engineering in Medicine and Biology Society,2005. IEEE-EMBS 2005. 27th Annual International Conference.p.2882-2885.

Wilkinson, R., & Arnold-Moore, T., & Fuller, M., & Sacks-Davis, R., Thom, J., & Zobel, J. (1998). Document computing : technologies for managing Electronic document collections. Kluwer Academic Publishers. Massachsetts

Workflow management coalition (1996). The workflow management coalition specification – terminology and glossary. Brussels, Belgium, 1996.

Yamamoto, R., & Ohashi, K., & Inomata, J. (2005). Development of a Business Process Modeling Methodology and a Tool for Sharing Business Processes, Proceedings of the 12th Asia-Pacific Software Engineering Conference (APSEC'05), 2005 IEEE,

Yao, J.F., & Liu, Y., & Grubb, Y., & Williams, G. (2007). COURSE ASSESSMENT FRAMEWORK THAT MAPS PROFESSIONAL STANDARD AND ABET ACCREDITATION CRITERIA INTO COURSE REQUIREMENTS. Southeastern Conference. Consortium for Computing Sciences in Colleges 2007.

Zimmermann, O., & Tomlinson, M., & Peuser, S. (2003). Perspectives on Web Services – Applying SOAP, WSDL and UDDI to real-world projects. Springer.