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A dynamic platform for workflow management system: a ward management perspective

Nantika Prinyapol
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A DYNAMIC PLATFORM FOR WORKFLOW MANAGEMENT SYSTEM: A WARD MANAGEMENT PERSPECTIVE

A thesis submitted in (partial) fulfilment of the
requirements for the award of the degree

Doctor of Philosophy

from

UNIVERSITY OF WOLLONGONG

by

NANTIKA PRINYAPOL

B.Sc. Information Technology, Assumption University
M.Sc. Information Management, Asian Institute of Technology

School of Information System and Technology

Faculty of Informatics

2010

THESIS CERTIFICATION

CERTIFICATION

I, Nantika Prinyapol, declare that this thesis, submitted in partial fulfilment of the requirement for the award of Doctor of Philosophy, in the School of Information Systems and Technology, University of Wollongong, is wholly my own work unless otherwise referenced or acknowledged. The document has not been submitted for qualifications at any other academic institution.

Nantika Prinyapol

31 March 2010

LIST OF PUBLICATIONS

This is a list of referred conference papers that are related to this research work.

- Prinyapol, N, Lau, SK & Fan, J 2010, 'A Dynamic Nursing Workflow Management System: A Thailand Hospital Scenario', in *Intelligent Automation and Computer Engineering*, Lecture Notes in Electrical Engineering, Springer, vol.52, pp489-501.
- Prinyapol, N, Fan, J & Lau, SK 2009, 'A Hospital Based Dynamic Platform Workflow Management', *IAENG International Journal of Computer Science*, vol.36, no.2, pp192-198.
- Prinyapol, N, Fan, J & Lau, SK 2009, 'A Dynamic Platform for Business Process Management (BPM) Using Service-Oriented Enterprise (SOE)', in *Proceedings of the 3rd International Conference on Internet Technologies and Applications (ITA09)*, Wrexham, North Wales, UK, 8-11 September 2009, pp245-252.
- Prinyapol, N, Fan, J & Lau, SK 2009, 'A Dynamic Platform for Workflow Management Using Web Services: A Hospital Scenario', in *Proceedings of the International Conference on Internet Computing and Web Services (ICICWS'09)*, Hong Kong, 18-20 March 2009, pp944-949.
- Prinyapol, N & Sun, Z 2006, 'Expectation and Perception of E-Customers and E-Providers for E-Service Recommendation', in *Proceedings of the 5th International Conference on E-Business (NCEB2006)*, Bangkok, Thailand, 2-3 November 2006, pp87-94.

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LIST OF ABBREVIATIONS

AJAX	Asynchronous JavaScript and XML
AfC	Agenda for Change
ANA	American Nurses Association
ANMC	Australian Nursing and Midwifery Council
ASP	Active Server Pages
BPD	Business Process Discovery
BPM	Business Process Management
BPMN	Business Process Modelling Notation
DPWFM	Dynamic Platform for Workflow Management
EN	Enrolled Nurse
FAS	Function Allocation Service
FS	Function Service
IPD	In-Patient Department
LAN	Local Area Network
LPN	Licensed Practical Nurse
NHS	National Health Service
NMC	Nursing and Midwifery Council (UK)
NMRA	Nursing and Midwifery Regulatory Authorities (AUS)
NP	Nurse Practitioner
NSW	New South Wales
OS	Operation System
PDA	Personal Digital Assistant

PHP	PHP: Hypertext Preprocessor
RN	Registered Nurse
RS	Recompilation Service
SOA	Service-Oriented Architecture
SOAP	Service-Oriented Architecture Protocol
TAFE	Technical And Further Education
UDDI	Universal Description, Discovery and Integration
UML	Unified Modelling Language
W3C	World Wide Web Consortium
WFM	Workflow Management
WPS	Work Profile Service
WSDL	Web Service Description Language
XML	eXtensible Markup Language
YAWL	Yet Another Workflow Language

ABSTRACT

This research proposes a dynamic recompilation platform for a workflow management system to manage a hospital ward. Literature review has shown that ward management in hospitals and nursing care processes are complicated and it is not easy to design and develop a ward management system that is easy to use and one that suits requirements of any ward due to the complex nature of the hospital environment. A workflow management system that can be customised and recompiled is desired due to the dynamic nature of the nursing care process. This research investigates the feasibility of using web service technology to develop a workflow management system that enables a nursing supervisor to customise their work requirements using a dynamic recompilation technique. The two main features of the proposed system are customisation and dynamic recompilation. Customisation allows users to modify functions within the web service repository to suit individual tasks based on their work profile and situations, whereas dynamic recompilation allows multiple web service repositories to be recompiled and arranged into a new set of dynamic functional services when task assignment changes. This research proposes a framework of ward workflow management system using web services technology. We called the proposed system the dynamic platform for workflow management system (DPWFM) consisting of four web service repositories that include work profile service (WPS), function service (FS), function allocation service (FAS) and recompilation service (RS). There are three perspectives to the DPWFM: organisational, functional and procedural. The organisational aspect of the WPS defines the organisational roles of individual nurses in the hospital, the functional aspect of the FS describes tasks, activities and services to be performed and the procedural aspect of the FAS describes the allocation and assignment of tasks. The recompilation aspect of the

DPWFM is the RS that dynamically recompiles the function services using inputs from the WPS, FS and FAS to create an agenda workflow in the form of scheduled tasks to help nurses in organising and performing the assigned tasks. We will present a scenario to show how the dynamic recompilation of the DPWFM can be applied in a ward. The architecture of the proposed system consisting of three architectural layers of presentation, business logic and data layers will also be presented. The contribution of this research is the development of an innovative approach of using web services technology to manage workflow in the hospital ward.

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