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

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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

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School of Information System and Technology
Faculty of Informatics
2010
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.


# TABLE OF CONTENTS

THESIS CERTIFICATION ............................................................................................................. ii

LIST OF PUBLICATIONS ......................................................................................................... iii

TABLE OF CONTENTS ........................................................................................................... iv

LIST OF TABLES ...................................................................................................................... viii

LIST OF FIGURES ................................................................................................................... ix

LIST OF ABBREVIATIONS .................................................................................................... xiv

ABSTRACT ............................................................................................................................ xvi

ACKNOWLEDGEMENTS ................................................................................................... xviii

Chapter 1: Introduction ........................................................................................................... 1

1.1 Introduction ..................................................................................................................... 1

1.2 Statement of Problems ................................................................................................. 3

1.3 Overview of Research Framework .............................................................................. 5

1.4 Research Aim ............................................................................................................... 7

1.5 Research Objectives ..................................................................................................... 7

1.6 Research Methods ........................................................................................................ 8

1.7 Research Contribution ............................................................................................... 9
Chapter 2: Literature Reviews

2.1 Nursing Roles and Functions Classification

2.1.1 Job Functionalities of Nurses

2.2 Nursing Documentations and Tools

2.2.1 Kardex Panel

2.3 Nursing Scenario: A Children Ward

2.4 Information Flow During a Shift: A Children Ward

2.5 Information Flow During Handover Time: A Children Ward

2.6 Workflow Management System

2.7 Web Technologies

2.8 Technologies for Web Services

2.9 Chapter Summary

Chapter 3: Dynamic Platform Development for Workflow Management

3.1 Proposed Conceptual Model of the DPWFMs

3.2 Proposed Mechanisms of DPWFMs

3.3 DPWFMs Recompilation Feature Demonstrated
LIST OF TABLES

Table 2.1 An example of function allocation designed for each nurse ........................................23

Table 3.1: Four web service repositories ..................................................................................49
LIST OF FIGURES

Figure 1.1 Dynamic platform for workflow management components .............................................. 6

Figure 2.1 Nursing functions ............................................................................................................. 14

Figure 2.2 Patient care responsibilities (NIA 2004, p3) ................................................................. 15

Figure 2.3 Work shifts of nursing care (based on low-care ward) .................................................. 17

Figure 2.4 Medical panel and Kardex panels (RecordSystem.net 2009) ........................................... 21

Figure 2.5 The nursing Kardex panels ............................................................................................ 21

Figure 2.6 The nursing Kardex panels and a chain of commands ................................................... 23

Figure 2.7 An example of assignment of tasks using Kardex cards .......... ......................................... 24

Figure 2.8 Nurse hierarchy in the children ward in a public hospital, Thailand .............................. 25

Figure 2.9 Work shifts in a children ward in public hospital, Thailand ........................................... 26

Figure 2.10 General ward workflow ............................................................................................... 27

Figure 2.11 The workflow of the children ward in public hospital, Thailand ................................. 30

Figure 2.12 Workflow process components .................................................................................... 32

Figure 2.13 Technique to enhance workflow process ........................................................................ 35

Figure 2.14 Relationship of WFM and BPM (van der Aalst et al. 2003, p5) ...................................... 36

Figure 2.15 YAWL representation of assignment of tasks to nurses in a general ward ......... 37

Figure 2.16 BPMN representation of assignment of tasks to nurses in a general ward ............... 38

Figure 2.17 Web service architecture (IBM 2001, Vaughan-Nichols 2002, W3C 2004) ................. 40
Figure 2.18 A basic service-oriented architecture (W3C 2004) ............................................... 41

Figure 3.1 Conceptual workflow components for the DPWF M .............................................. 47

Figure 3.2 Web service repositories of the DPWF M ............................................................... 48

Figure 3.3 Different user role models for the DPWF M ........................................................... 50

Figure 3.4 Proposed mechanism of customise web services .................................................... 50

Figure 3.5 Proposed mechanism of dynamic recompile services ............................................. 52

Figure 3.6 Diagrammatic representation for the DPWF M model ........................................... 52

Figure 3.7 Database relationship model of the DPWF M ........................................................ 54

Figure 3.8 Four web service repositories of nursing care scenario ......................................... 58

Figure 3.9 Function service repositories .................................................................................. 59

Figure 3.10 Recompile services .............................................................................................. 60

Figure 3.11 Elements in function service repositories ........................................................... 61

Figure 3.12 Recompilation services of the assigned function services .................................... 62

Figure 3.13 Dynamic recompilation after 1a, 1b, 1d, 4a, 7c and 6e have completed ............... 63

Figure 3.14 The presentation layer ........................................................................................ 64

Figure 3.15 The business logic layer ....................................................................................... 65

Figure 3.16 The data layer ....................................................................................................... 66

Figure 4.1 Using AJAX with the DPWF M ............................................................................ 69

Figure 4.2 Three architecture layers of the DPWF M ........................................................... 70
Figure 6.5 The new Kardex activities..................................................................................... 123

Figure 6.6 The status change to Done after the task is completed and submitted............... 124
# LIST OF ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>AJAX</td>
<td>Asynchronous JavaScript and XML</td>
</tr>
<tr>
<td>AfC</td>
<td>Agenda for Change</td>
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<tr>
<td>ANA</td>
<td>American Nurses Association</td>
</tr>
<tr>
<td>ANMC</td>
<td>Australian Nursing and Midwifery Council</td>
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<tr>
<td>ASP</td>
<td>Active Server Pages</td>
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<tr>
<td>BPD</td>
<td>Business Process Discovery</td>
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<tr>
<td>BPM</td>
<td>Business Process Management</td>
</tr>
<tr>
<td>BPMN</td>
<td>Business Process Modelling Notation</td>
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<td>DPWFNM</td>
<td>Dynamic Platform for Workflow Management</td>
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<tr>
<td>EN</td>
<td>Enrolled Nurse</td>
</tr>
<tr>
<td>FAS</td>
<td>Function Allocation Service</td>
</tr>
<tr>
<td>FS</td>
<td>Function Service</td>
</tr>
<tr>
<td>IPD</td>
<td>In-Patient Department</td>
</tr>
<tr>
<td>LAN</td>
<td>Local Area Network</td>
</tr>
<tr>
<td>LPN</td>
<td>Licensed Practical Nurse</td>
</tr>
<tr>
<td>NHS</td>
<td>National Health Service</td>
</tr>
<tr>
<td>NMC</td>
<td>Nursing and Midwifery Council (UK)</td>
</tr>
<tr>
<td>NMRA</td>
<td>Nursing and Midwifery Regulatory Authorities (AUS)</td>
</tr>
<tr>
<td>NP</td>
<td>Nurse Practitioner</td>
</tr>
<tr>
<td>NSW</td>
<td>New South Wales</td>
</tr>
<tr>
<td>OS</td>
<td>Operation System</td>
</tr>
<tr>
<td>PDA</td>
<td>Personal Digital Assistant</td>
</tr>
<tr>
<td>Acronym</td>
<td>Definition</td>
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<tr>
<td>PHP</td>
<td>PHP: Hypertext Preprocessor</td>
</tr>
<tr>
<td>RN</td>
<td>Registered Nurse</td>
</tr>
<tr>
<td>RS</td>
<td>Recompilation Service</td>
</tr>
<tr>
<td>SOA</td>
<td>Service-Oriented Architecture</td>
</tr>
<tr>
<td>SOAP</td>
<td>Service-Oriented Architecture Protocol</td>
</tr>
<tr>
<td>TAFE</td>
<td>Technical And Further Education</td>
</tr>
<tr>
<td>UDDI</td>
<td>Universal Description, Discovery and Integration</td>
</tr>
<tr>
<td>UML</td>
<td>Unified Modelling Language</td>
</tr>
<tr>
<td>W3C</td>
<td>World Wide Web Consortium</td>
</tr>
<tr>
<td>WFM</td>
<td>Workflow Management</td>
</tr>
<tr>
<td>WPS</td>
<td>Work Profile Service</td>
</tr>
<tr>
<td>WSDL</td>
<td>Web Service Description Language</td>
</tr>
<tr>
<td>XML</td>
<td>eXtensible Markup Language</td>
</tr>
<tr>
<td>YAWL</td>
<td>Yet Another Workflow Language</td>
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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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