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**REUSABLE PATIENT NAVIGATION SOFTWARE ARCHITECTURE USING
SOFTWARE PRODUCT LINE APPROACH**

USHANANTHINY SUVELAYUTNAN

A dissertation submitted in partial fulfilment of the
requirements for the award of the degree of
Master of Computer Science

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JUNE 2018

I declare that this thesis entitled "*Reusable Patient Navigation Software Architecture using Software Product Line Approach*" is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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Specially dedicated to

The wonderful healthcare personnel especially those involved in cancer patient navigation

The Almighty

My wonderful family whose affection, love and encouragement kept me motivated

The noble healthcare personnel especially those involve in cancer patient navigation

For the wonderful healthcare personnel especially those involved in cancer patient navigation

For the wonderful healthcare personnel especially those involved in cancer patient navigation

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ABSTRACT

Cancer is a non-communicable disease that needs a continuous and expensive treatment plan. Patient Navigation Program (PNP) is a patient centred health care service delivery model that integrates fragmented healthcare system for the individual patient, identify disparities, eliminates barriers across all phases of the health care continuum effectively, promotes timely movement of cancer patients and carried out through a one-to-one relationship between the navigator and the patient. Currently PNP patient data, process flow and milestones, data analysis and reporting managed manually in Ministry of Health (MoH), Malaysia hospitals. This occupies the quality time of the healthcare personnel. Therefore, an automated reusable software architecture for MoH using Software Product Line Engineering approach for a systematic cancer patient management, analysis and reporting activities effortlessly proposed in this research. The domain features identified using Feature Oriented Reuse Method (FORM) and organised into traceability table that substitutes the feature model. The defined Feature – Architecture mapping rules used to map the features to architectural design effortlessly. The reusability of the proposed architecture validated with vertical and horizontal reusability metrics and shows promising results in terms of its functional coverage. The usability of the proposed architecture validated through an experiment involving domain experts and revealed positive correlation between usefulness and ease of use of the process. This study has defined systematic feature organization using traceability table with feature-architecture mapping rule for domains with high volume of features and developed reusable Patient Navigation Software Architecture for MoH Hospitals.

ABSTRAK

Penyakit kanser adalah penyakit tidak berjangkit yang memerlukan perancangan rawatan yang berterusan dan mahal. Program Navigasi Pesakit (PNP) adalah model penyampaian perkhidmatan penjagaan kesihatan yang berpusatkan pesakit yang mengintegrasikan semua jabatan yang berkaitan dalam pelan rawatan penyakit kanser secara berkesan dan berterusan. Proses pengurusan pesakit dan analisis data serta penjanaan laporan diuruskan secara manual di hospital-hospital dibawah Kementerian Kesihatan Malaysia (KKM). Kerja-kerja pengurusan ini memakan masa kualiti pengamal kesihatan yang sewajarnya digunakan untuk pejagaan pesakit. Maka, pembangunan sistem untuk mengautomasikan proses pengurusan PNP secara sistematik untuk setiap jenis hospital dibawah KKM adalah amat kritikal. Maka, seni bina perisian yang menggunakan pendekatan kejuruteraan Barisan Produk Prisian (SPLE) dicadangkan dimana ciri-ciri domain dikenalpasti menggunakan kaedah Kaedah Guna Semula Berdasarkan Ciri-ciri (FORM) dan diklasifikasikan ke dalam jadual pengesanan yang mengantikan model ciri. Peraturan pemetaan ciri-ciri kepada seni bina ditakrifkan untuk memudahkan proses pemetaan. Kebolehgunaan semula seni bina yang dicadangkan yang disahkan secara menegak dan mendatar dan menunjukkan keputusan yang memberangsangkan dari segi liputan fungsinya. Kepenggunaan seni bina diuji melalui eksperimen empirikal yang melibatkan pakar domain dan ujian ini menunjukkan hubungan kolerasi yang positif antara kebolehgunaan dan kemudahan proses tersebut. Kajian ini telah mengenal pasti pengurusan ciri-ciri domain secara sistematik menggunakan jadual pengesanan dan pemetaan ciri-ciri domain kepada seni bina menggunakan peraturan pemetaan yang ditakrifkan dalam menghasilkan seni bina Perisian Navigasi Pesakit untuk Hospital KKM yang boleh diguna semula.

TABLE OF CONTENTS

CHAPTER	TITLE	PAGE
	DECLARATION	ii
	DEDICATION	iii
	AKNOWLEDGEMENTS	iv
	ABSTRACT	v
	ABSTRAK	vi
	TABLE OF CONTENTS	vii
	LIST OF TABLES	xii
	LIST OF FIGURES	xiv
	LIST OF ABBRIVIATIONS	xvi
	LIST OF APPENDICES	xviii
1	INTRODUCTION	1
	1.1 Overview	1
	1.2 Problem Background	2
	1.3 Problem Statement	6
	1.4 Research Question	8
	1.5 Research Objectives	9
	1.6 Research Scope	9
	1.7 Research Significance	10
	1.8 Thesis Outline	11

2	LITERATURE REVIEW	12
2.1	Overview	12
2.2	Health Care	12
2.2.1	Information Technology and Healthcare in Malaysia	14
2.3	Non-communicable Disease – Cancer	15
2.4	Patient Navigation Program	20
2.4.1	Patient Navigation Program in Malaysia	24
2.5	Software reuse	27
2.6	Software Product Line Engineering	29
2.6.1	SPLE Development Processes	31
2.6.2	Commonalities and Variabilities	32
2.6.3	Feature Oriented Domain Analysis	33
2.6.4	Feature-Oriented Reuse Method	34
2.6.5	Product Line UML-Based Software Engineering (PLUS)	34
2.6.6	Cardinality-based Feature Modelling (CBFM)	35
2.6.7	FeatuRSEB	35
2.6.8	Product Line Use-case for Software and System Engineering (PLUSS)	36
2.6.9	Discussion on SPL approaches	36
2.7	Software Architecture	39
2.8	Agile-Lean Software Development	41
2.9	Summary	44
3	RESEARCH METHODOLOGY	45
3.1	Introduction	45
3.2	General Research Framework	45
3.3	Research Process	47
3.4	Architecture Model : ‘4+1’	50
3.5	Case study	51
3.5.1	Domain analysis case study	51

3.5.2 Evaluation case study	51
3.6 Reuse Effectiveness Evaluation Technique	52
3.6.1 Functional Coverage	52
3.6.2 Experimental Evaluation	53
3.6.2.1 Goal-Question-Metric Framework	54
3.6.2.2 Technology Acceptance Model	55
3.7 Summary	56
4 DOMAIN REQUIREMENTS OF BREAST CANCER PATIENT NAVIGATION PROGRAM	57
4.1 Introduction	57
4.2 The Domain Engineering and Mapping Process	58
4.3 Feature extraction based on PNP case studies	61
4.3.1 Domain Selection	62
4.3.2 Domain Scoping	62
4.3.3 Domain Analyst Team Organization	63
4.3.4 Domain Analysis	62
4.3.5 Feature Identification	66
4.3.6 Feature Classification and Organization	67
4.4 Feature-Architecture Mapping Processes	69
4.5 Discussion	70
4.6 Summary	71
5 REFERENCE ARCHITECTURE OF BREAST CANCER PATIENT NAVIGATION PROGRAM	72
5.1 Introduction	72
5.2 Conceptual / Logical View	73
5.3 Process View	75
5.4 Development view	76
5.5 Physical View	77
5.6 Scenario View	78
5.7 Conclusion	79

6 EVALUATION OF THE PROPOSED REFERENCE ARCHITECTURE	80
6.1 Introduction	80
6.2 Metrics for Reusability and Usability using GQM	80
6.3 Reference Architecture Usability and Reusability Validation	84
6.4 Experiment Goal	84
6.5 Experiment Planning	85
6.5.1 Experiment Context and Hypothesis formulation	85
6.5.2 Variables Selection	91
6.5.3 Subject Selection	91
6.5.4 Instrumentation	92
6.5.5 Experiment Design	94
6.6 Data Analysis	95
6.6.1 Experience and Demography of The Subjects	96
6.6.2 Vertical Validation of Architecture Reusability	97
6.6.3 Horizontal Validation of Architecture Reusability	98
6.6.4 Reliability Test	102
6.6.5 Hypotheses Testing	103
6.7 Threats To Validity	106
6.7.1 Internal Validity	107
6.7.2 Construct Validity	108
6.7.3 Conclusion Validity	108
6.7.4 External Validity	109
6.7.5 Experimentation Results Discussion	109
6.8 Result and Discussion	110
6.9 Conclusion of the Evaluation	111
6.10 Summary	113

7	CONCLUSION	
7.1	Summary	114
7.2	Achievement of Research Objectives	115
7.3	Research Contribution	116
7.3.1	Traceability Table and Mapping Method	117
7.3.2	Reusable Architecture for Breast Patient Navigation Program Domain	117
7.4	Recommendations for Future Work	118
REFERENCES		119

Appendices A-J	128-188
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