WEB DEVELOPMENT PRODUCTIVITY IMPROVEMENT THROUGH OBJECT-ORIENTED APPLICATION FRAMEWORK

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ABSTRAK

Kebanyakan aplikasi web yang digunakan untuk komersial dan industri adalah kompleks, sukar untuk dilaksanakan, berisiko untuk diselanggara dan memerlukan pemahaman yang mendalam tentang keperluan untuk penyesuaian. Pasaran perisian pada masa ini lebih berdaya saing, maka produktiviti telah menjadi perhatian utama dalam industri pembangunan perisian. Tujuan kajian ini adalah untuk mereka bentuk dan membangunkan satu kerangka aplikasi untuk mempercepatkan produktiviti pembangunan web melalui teknologi berorientasikan objek. Ini akan membenarkan penyesuaian, mengguna semula rekabentuk dan menjana kod secara automatik untuk membantu meningkatkan produktiviti sebagai kejayaan meyelesaikan masalah yang diberi. Kajian ini menggunakan *Systematic Literature Review (SLR)* untuk mengenalpasti sumber kerumitan dan faktor pengeluaran. Metodologi pembangunan tangkas (*Agile*) telah digunakan untuk mereka bentuk kerangka dan ianya telah disahkan dengan data empirikal dari dua projek komersial. Penemuan kajian mendapati bahawa Kerangka Aplikasi Berasaskan Objek (*OOAF*) mempunyai faktor ketara yang mempengaruhi produktiviti dan secara dramatik meningkatkan produktiviti yang lebih tinggi berbanding pendekatan tradisional. Ia telah memenuhi keperluan semasa dengan mengurangkan kerumitan, usaha-usaha pembangunan dan mempercepatkan produktiviti pembangunan web. Kajian ini menyumbang dalam bidang kejuruteraan perisian, khususnya dalam bidang peningkatan produktiviti perisian dan penyesuaian perisian. Ini akan membawa kepada masa pembangunan yang lebih cepat kepada industri perisian.

Katakunci: Kerangka Aplikasi Berasaskan Objek, Pembangunan Web, Produktiviti Perisian, Metrik Perisian, Pengukuran Produktiviti.

ABSTRACT

Most of the commercial and industrial web applications are complex, difficult to implement, risky to maintain and requires deep understanding of the requirements for customization. As today's software market is more competitive, productivity has become a major concern in software development industry. The aim of this research is to design and develop an application framework for accelerating web development productivity through object-oriented technology. It allows customization, design reuse and automatic code generation to support productivity improvement as a breakthrough solution for the given problem. This research employed systematic literature review (SLR) to identify the source of complexity and productivity factors. Agile development methodology was used to design the framework and it was validated by empirical data from two commercial projects. Results showed that object-oriented application framework (OOAF) has significant factors that affect productivity and dramatically improve higher productivity over traditional approach. It has fulfilled the current needs by reducing complexities, development efforts and accelerates web development productivity. This research contributes in the area of software engineering, specifically in the field of software productivity improvement and software customization. These will lead to faster development time for software industries.

Keywords: Object-oriented Application Framework, Web Development, Software Productivity, Software Metrics, Measuring Productivity.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ABBREVIATIONS

3GL	Third Generation Language
4GL	Fourth Generation Language
AAF	Adaption Adjustment Factor
AJAX	Asynchronous JavaScript and XML
API	Application Programming Interface
B2B	Business to Business
BPM	Business Process Management
C2C	Customer to Customer
CBSE	Component-Based Software Engineering
CBD	Component-Based Development
CM	Code Modified
COTS	Component of the Shelf
COCOMO	Component Cost Model
DM	Design Modified
D&D	Design and Development
D2D	Domain to Domain
ESLOC	Equivalent Source Line of Code
FP	Function Point
GUI	Graphical User Interface
HTML	Hyper Text Markup Language
IDE	Integrated Development Environment
IEEE	Institute of Electrical and Electronics Engineers
JSF	Java Server Face
JSP	Java Server Page
J2EE	Java 2 Enterprise Edition
JDHTML	Java Dynamic Hyper Text Markup Language
KSLOC	Kilo (Thousand) Source Line of Code
LOC	Line of Code
MD	Man Days
MVC	Model View Controller

MFC	Microsoft Foundation Class
MSC	Multi-media Super Corridor
MSLOC	Modified Source Line of Code
NSLOC	New Source Line of Code
OO	Object Oriented
OOP	Object Oriented Programming
OOM	Object Oriented Method
OOT	Object Oriented Technology
OOAF	Object Oriented Application Framework
OOSAD	Object Oriented System Analysis and Design
QA	Quality Assurance
RDBMS	Rational Database Management System
RSLOC	Reuse Source Line of Code
SDLC	Software Development Life Cycle
SLR	Systematic Literature Review
SLOC	Source Line of Code
UML	Unified Modeling Language
UFP	Unadjusted Function Point
VOS	Visual Object Sharing
WM	Work Modified
XSLT	Extensible Stylesheet Language Transformations
XML	Extended Markup Language

CHAPTER ONE
INTRODUCTION

This chapter presented an overview of the thesis. It described the problem statement and continues with research questions, objectives, scope and contribution. At the end, it presents the organization of the thesis.

1.1 Background

Object-Oriented (OO) based web application development is not easy, mapping user requirements into a function is complex, customization requires deep understanding and risky to maintain. Technology for completely integrated user interface, reuse design, customization environment and implementation is still immature in the area of web engineering. It is different from traditional web development as it focuses on visual elements (Kaur & Singh, 2008). OO software development method includes requirements analysis, system design, development, testing and documentation that enable web engineers to repeat Software Development Life Cycle (SDLC) phases and avoid possible failure of current ubiquitous web. This revolution makes easier for web engineers to develop software packages and also made a significant impact to working on it.

Previously, most of the developed web applications were procedure-oriented. It is an ever-growing complexity due to an exponential increase in software size. It also make it unsuitable to reuse and customize based on user preferences. Considering this effort has pushed legacy applications into the new OO-based web application development. There are numerous recurring efforts, particularly in the user interface design and coding phase (Pardo Leite, Yu & Liu, 2005; David, 2012). An approach

The contents of the thesis is for internal user only

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