ARCHITECTURAL DESIGN DECISION KNOWLEDGE MANAGEMENT SYSTEM

Shashi Lakshan Chandrasinghe

(179311P)

M.Sc. in Computer Science

Department of Computer Science and Engineering

University of Moratuwa

Sri Lanka

May 2019

ARCHITECTURAL DESIGN DECISION KNOWLEDGE MANAGEMENT SYSTEM

Shashi Lakshan Chandrasinghe

(179311P)

This dissertation submitted in partial fulfillment of the requirements for the Degree of MSc in Computer Science specializing in Software Architecture

Department of Computer Science and Engineering

University of Moratuwa

Sri Lanka

May 2019

DECLARATION

I declare that this is my own work and this MSc Thesis Project Report does not incorporate without acknowledgement of any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

Also, I hereby grant to University of Moratuwa the non-exclusive right to reproduce and distribute my thesis, in whole or in part in print, electronic or other medium. I retain the right to use this content in whole or part in future works.

....

Shashi Lakshan Chandrasinghe Date

I certify that the declaration above by the candidate is true to the best of my knowledge and that this project report is acceptable for evaluation for the MSc Thesis (CS6997).

....

Dr. Indika Perera Date

ACKNOWLEDGEMENT

My sincere appreciation is dedicated to my research supervisor Dr. Indika Perera for his valuable support and guidance to complete the MSc Thesis Report successfully and also I would like to express my gratitude to my friends and colleagues in MSc' 17 who supported to complete the task.

Finally, I would like to thank the academic and non-academic staff of Department of Computer Science and Engineering of the University of Moratuwa.

ABSTRACT

The software systems typically fail and deviate from its prescriptive architecture due to various reasons such as incorrect architectural design, lack of experience and lack of domain knowledge. After precise software requirements are gathered from customers, those requirements should be converted into an appropriate design. Suppose if any inappropriate design is constructed from these requirements, it may cause to reconstruct the system implementation. So, a set of good architectural design decisions form a good system architecture and those architectural design decisions should be documented or stored as knowledge bases to use further.

Various methodologies exist to store architectural design decisions and trace them. Most of them have some drawbacks such as lack of time to gather and store and additional cost to maintain such knowledge bases. As the key objective, this report proposes an ontological knowledge management system to solve above mentioned problems in software engineering industry for avoiding the extra costs to redevelop or refine the software system implementation.

Though the implemented solution is ontology-based knowledge management system, it seems to be a simple web application to the end user. User-friendly web interfaces are implemented to store and retrieve the architectural design decisions, based on completed or already initiated software projects. Those design decisions would be useful for the professionals who design the effective software architecture designs.

Finally, empirical and Likert questionnaires were conducted to prove that the implemented solution works perfectly as a solution for the stated problems and this report ends mentioning some limitations and future work with relevant to ontological knowledge management systems and its technologies.

Keywords: knowledge bases, ontology, architectural design decisions

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

Abbreviation	Description
SDLC	Software Development Life Cycle
RDF	Resource Description Framework
RDFS	Resource Description Framework Schema
OWL	Web Ontology Language
JESS	Java Expert System Shell
RDQL	RDF Data Query Language
OWL-QL	OWL Query Language
W3C	World Web Consortium
SPARQL	Simple Protocol and RDF Query Language
OOP	Object Oriented Programming
RAM	Random Access Memory