ONTOLOGY BASED SOFTWARE DESIGN DOUMENTATION FOR DESIGN REASONING

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

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DECLARATION

I declare that this is my own work and this PG Diploma Project Report does not incorporate without acknowledgement 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.

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ABSTRACT

Designing a quality software product adhering to all the functional requirements and non-functional requirements is a difficult task in software architecture designing. This needs much practice and experience regarding the designing knowledge. Selecting the best designs to apply in the project includes design reasoning. The discussion on the selections are important, but it dies when the discussion ends. As reasoning is important in the decision-making process, documenting the reasoning that was applied throughout the process is important for maintenance purpose and to overcome architectural evolution at different stages of the project. There are tools and standards that have been proposed on how to carry out the reasoning process and documenting it by other researchers. The use of ontology for the software architecture processes has been a topic of interest among researches at present. Creating a tool to generate design reasoning based on an ontology approach and evaluating its usability has not been successfully conducted. Hence for this research, an ontology-based approach has been chosen as a method to conduct the software architecture reasoning documentation. As software designing is a vast area of design decisions the research was narrowed down to the RESTful web service domain. An ontology was created comprising the architectural elements and the design decisions applied in the domain. Based on the ontology design reasoning is generated for a given software project. The document text would be first extracted and then processed based on the ontology values. Three techniques were used in deriving the key words and architectural elements on the document. The techniques included were key word matching, deriving architectural elements based on Part of Speech tagging and using ontology reasoning to derive the architectural elements. For the Part of Speech tagging a training data set was used to derive the elements and for the ontology reasoning a reasoning tool was used. Using these techniques, the architectural elements were extracted, and the design reasoning was generated using the ontology. The captured data was then documented in a user-friendly manner. A prototype of this approach was developed and evaluated to prove its usability and accuracy. An overall precision of 0.58 was calculated with the use of the prototype application developed.

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LIST OF ABBREVIATIONS

Abbreviation	Description
OWL	Web Ontology Language
RDF	Resource Description Framework
IE	Information Extraction
REST	Representational State Transfer
API	Application Programming Interface
URI	Uniform Resource Identifier
HATEOAS	Hypermedia As The Engine Of Application State
CRUD	Create, Read, Update and Delete
NLP	Natural Language Processing
OBIE	Ontology Based Information Extraction