MAINTAINABILITY EVALULATION FOR WEB APPLICATIONS

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MAINTAINABILITY EVALUATION FOR WEB APPLICATIONS

By

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December 2006

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Within a short period, the Internet and World Wide Web have become widespread, surpassing all other technological developments in our history. They have also grown rapidly in their scope and extent of use, significantly affecting all aspects of our lives. The scope and complexity of current Web applications is vary, from small-scale to large-scale enterprise applications distributed across the intranets and extranets. As Web applications have evolved, the demands placed on complexity of designing, developing and maintaining have also increased significantly. However, very little has been said about the maintainability factor. Poorly developed Web applications that continue to expand have a high probability of failure. The costs of bad design have many serious consequences.

Therefore, new quality model and Web applications model must be developed for web applications. The model is needed to assess the elements of Web applications. Thus, the study is conducted on the maintainability of Web applications in accordance with ISO 9126. In order to evaluate the maintainability in Web applications, static analysis was applied. A static analysis is used to evaluate internal metrics for Web applications code. To prove and validate the metrics, experiment has been done. The experiment was done to identify the appropriate metrics for Web applications. The result of the study clearly point up the maintainability metrics consisting of separation, reuse and split-into.

A Maintainability Evaluation Tool (MaEt) was developed to measure internal metrics in order to assist web developer or web designer in evaluating and creating maintainable Web applications.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

PENILAIAN PENYELENGGARAAN UNTUK APLIKASI WEB

Oleh

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Pengerusi : Profesor Madya Abdul Azim Abd Ghani, PhD

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Dalam tempoh masa yang singkat, Internet dan *World Wide Web* telah berkembang dan melangkaui kesemua pembangunan teknologi dalam sejarah kita. Ianya telah membangun dengan pesatnya dalam skop dan had penggunaannya, serta mempengaruhi semua aspek hidup kita. Skop dan kompleksiti aplikasi web sekarang ini adalah berbeza, daripada perniagaan yang berskala kecil hingga yang berskala besar tersebar melepasi intranet dan extranet. Apabila aplikasi web telah berkembang terhadap kompleksiti dalam merekabentuk, membangunkan dan menyelenggarakan juga meningkat. Walau bagaimanapun, terlalu sedikit kajian yang menyatakan mengenai kualiti penyelengaraan. Aplikasi web yang yang dibangunkan secara tidak sempurna akan terus berkembang mempunyai kemungkinan yang tinggi untuk gagal. Akibat daripada rekabentuk yang teruk akan menyebabkan akibat yang serius.

Oleh itu, model aplikasi web dan model kualiti yang baru perlu dibangunkan untuk aplikasi web. Model ini diperlukan untuk menilai element aplikasi web. Oleh yang demikian, kajian ini dijalankan terhadap kualiti penyelenggaraan aplikasi web mengikut ISO 9126. Untuk menilai kualiti penyelenggaraan di dalam aplikasi web, analisis statik telah diaplikasi. Analisis statik digunakan untuk menilai metrik dalaman kod aplikasi. Untuk membuktikan dan mengesahkan metrik, eksperimen telah dilakukan bagi mengenalpasti metrik untuk faktor penyelenggaraan aplikasi web. Keputusan kajian jelas menunjukkan metrik untuk penyelenggaraan adalah *separation, reuse* dan *split-into*.

Alatan Menilai Penyelenggaraan (MaEt) dibangunkan untuk menguji metrik dalaman bagi membantu Pembangun Web dalam menilai dan membangukan aplikasi web.

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I certify that an Examination Committee has met on 26th December 2006 to conduct the final examination of Zaida bt Zaini on her Master of Science thesis entitled "Perfective Maintainability Evaluation For Web Applications" in accordance with Universiti Pertanian Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulations 1981. The Committee recommends that the candidate be awarded the relevant degree. Members of the Examination Committee are as follows:

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This thesis submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Master of Science. The members of the Supervisory Committee are as follows:

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DECLARATION

I hereby declare that the thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions.

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ZAIDA ZAINI

Date : 20 MARCH 2007

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AMES	**Application Management Environment and Support**
ATS	**Atomic Sections**
CMF	**Common Metric Format**
CSS	**Cascading Style Sheet**
CVP	**Composite View Pattern**
DBMS	**Database Management System**
DCOM	**Distributed Component Object Model**
FPA	**Function Point Analysis**
GUI	**Graphic User Interface**
GOMS	**Goals, Operators, Methods, and Selection Rules**
GQM	**Goals Question Metrics**
HDM	**Hypermedia design Model**
HTML	**HyperText Markup Language**
ISO	**International Organization for Standardization**
IFPUG	**International Function Point User Group**
J2EE	**Java 2 Platform Enterprise Edition**
JSP	**Java Server Pages**
LOC	**Line of Code**
MaEt	**Maintainability Evaluation Tool**
MAT	**Maintainability Analysis Tool**
MI	**Maintainability Index**

OLE	**Object Linking and Embedding**
RMM	**Relationship Management Methodology**
RMD	**Repeated Measure Design**
SCOPE	**Software Certification on Programmed in Europe**
UML	**Unified Model Language**
W3C	**World Wide Web Consortium**
WAMME	**Web Application Model for Maintainability Evaluation**
WARE	**Web Application Reverse Engineering**
WebQEM	**Web Quality Evaluation Method**
WSDM	**Web Services Distributed Management**
WWW	**World Wide Web**
WA	**Web Applications**
XML	**Extensible Markup Language**