ENHANCEMENT OF UML-BASED WEB ENGINEERING FOR METAMODELS: HOMEPAGE DEVELOPMENT CASESTUDY

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I declare that this dissertation entitled "*Enhancement of UML-Based Web Engineering for metamodels: Homepage Development Case Study*" is the result of my own research except as cited in the references. The dissertation has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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Dedicated to my beloved family

and best friend who has always believed in me.

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ABSTRACT

Web Engineering is the application of systematic, disciplined and quantifiable approaches to the cost-effective development and evolution of high-quality solutions in the web-based applications. *UML-Based Web Engineering* (UWE) is one of the approaches of web engineering, which provides a standard and systematic approach for the development of Web applications. UWE metamodel is a design considered as the conservative extension of the UML metamodel. In this thesis we used UWE metamodels to develop web homepages, the problem is current UWE cannot support homepage contents directly because UWE metamodels are not enough elements for supporting homepages. The goal of this research is enhancement UWE metamodels to high usability UWE in homepage development. There are two steps in this development process. In the first step, we compared UWE with *Object Oriented Hyperlink* (OOH) and *Web Modeling Language* (WebML) to show the strengths and weaknesses of UWE in the development of homepages. In the second step, extended UWE metamodel was proposed eleven elements (six elements for navigation model and five elements for presentation model) to solve these weaknesses to fully support the homepage development process. For the enhanced UWE metamodel, we defined the eleven elements to support the design of homepages, it is fully integrates the UWE metamodel and provides an *XML Metadata Interchange* (XMI) extension. The construction process of Web applications is supported by incorporating the semi-automatic UWE development steps and the *Object Constraint Language* (OCL) of the UWE. Finally we compared the enhanced UWE metamodel with the original UWE metamodel by using a case study, and then the result showed capabilities of the eleven elements in UWE metamodel for development website homepages, and become to increase usability UWE metamodels.

ABSTRAK

Kejuruteraan Web menggunakan pendekatan yang sistematik, berdisiplin dan boleh diukur yang dapat menyumbang kepada penjimatan kos yang efektif dan evolusi berkualiti tinggi dalam aplikasi berasaskan web. *UML-Based Web Engineering (*UWE) adalah salah satu pendekatan dalam kejuruteraan web yang menyediakan piawaian dan pendekaatan sistematik dalam pembangunan aplikasi web. UWE meta-model adalah rekaan yang dianggap sebagai lanjutan konservatif UML meta-model. Dalam tesis ini, pendekatan UWE meta-model digunakan untuk membangunkan laman web.Namum begitu, terdapat masalah berkaitan UWE sedia ada tidak mempunyai elemen yang mencukupi untuk menyokong kandungan laman web secara terus. Kajian ini bermatlamat untuk menambahbaik UWE meta model seterusnya menyelesaikan isu berkaitan pembangunan laman web. Terdapat dua langkah dalam proses pembangunan ini. Dalam langkah pertama, perbandingan UWE dengan *Object Oriented Hyperlink* (OOH) dan *Web Modelling Languange* (WebML) dibuat untuk menunjukkan kekuatan dan kelemahan UWE dalam pembangunan laman web. Manakala dalam langkah kedua, lanjutan UWE Metamodel telah dicadangkan dengan sebelas elemen (enam elemen untuk model navigasi dan lima elemen bagi model persembahan) bagi menyelesaikan kelemahan ini seterusnya menyokong sepenuhnya proses pembangunan laman Web. Untuk menambahbaik UWE Metamodel ini, sebelas elemen dikenalpasti untuk menyokong rekabentuk laman web. Ia adalah integrasikan sepenuhnya UWE Metamodel dan menyediakan *lanjutan Metadata Interchange* XML (XMI). Proses pembangunan Aplikasi Web ini menyokong dengan menggabungkan langkah-langkah semi-outomatik UWE dan *Object Constraint Language (OCL)* daripada UWE tersebut. Akhir sekali, UWE metamodel yang telah ditambabaik dibandingkan dengan UWE metamodel asal dengan menggunakan kajian kes, maka hasil menunjukkan sebelas elemen dalam UWE metamodel berkeupayaan dalam pembangunan Laman Utama bagi Laman Web dan manjadi untuk meningkatkan kebolehgunaan UWE metamodel.

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