MEASURING BUSINESS PROCESS COMPLEXITY USING CYCLOMATIC NUMBER

A dissertation submitted to the Faculty of Information Technology in partial fulfillment of the requirements for the degree
Master of Science (Information Technology),
Universiti Utara Malaysia

By
Sharifah Intan Eriyatty Syed Mansor

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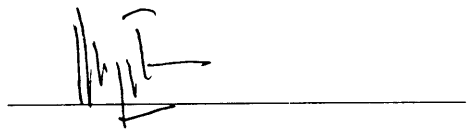
(Signature) : 

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ABSTRAK

Kajian ini adalah bertujuan untuk mengukur tahap kompleksiti sesuatu proses perniagaan. Proses perniagaan yang dipilih bagi kajian ini adalah Proses Pendaftaran Kursus Ijazah Sarjana Muda Teknologi Maklumat (BIT) dan Proses Pendaftaran Kertas Kerja Online KMICE (Knowledge Management International Conference and Exhibition). Proses-proses pendaftaran ini dipilih memandangkan ia tidak melibatkan agen-agen luar Universiti Utara Malaysia yang mana ia tidak menyukarkan dalam kerja-kerja mendapatkan maklumat. Selain itu, proses-proses ini juga diambil untuk membandingkan tahap kompleksiti di antara dua proses tersebut. Kaedah yang digunakan dalam kajian ini yakni untuk mengukur tahap kompleksiti merupakan satu kaedah penggabungan antara teori graf dan juga pengiraan dengan berdasarkan kepada formula kekomplesan siklomatik.

Kajian ini pada awalnya menumpukan kepada aktivit-aktiviti yang terbabit dalam sesuatu proses daripada peringkat awal hingga akhir. Selepas keseluruhan proses dikenalpasti, ia kemudiannya dimodelkan dengan menggunakan notasi UML. Model yang dihasilkan adalah diagram aktiviti. Diagram ini akan memberikan keseluruhan gambaran berkenaan proses tersebut. Diagram ini kemudiannya dialihkan kepada graf kekompleksan siklomatik berdasarkan algoritma yang dihasilkan. Akhir sekali, graf kekompleksan siklomatik dapat digunakan untuk menghasilkan matriks hubungan. Pengukuran kompleksiti dalam kajian ini telah diautomasikan dan matriks hubungan akan diguna pakai dalam pengiraan ini.

Konklusinya, kajian ini dapat menentukan nilai kompleksiti sesuatu proses perniagaan. Ia juga dapat membantu organisasi dalam mengetahui tahap kompleksiti sesuatu proses dan juga membantu dalam proses penstrukturan semula. Walaubagaimanapun, kajian ini diharap dapat diperkembangkan lagi didalam industri-industri lain selain akademik dan pengautomasian graf kekompleksan siklomatik juga diharap dapat dilakukan.

ABSTRACT

This research study focuses on the measurement of the business process complexity. The business process that are chosen are the Bachelor of Information Technology (BIT) Student Course Registration and Knowledge Management International Conference and Exhibition (KMICE) Participant Registration. Both business processes are chosen because the processes do not relate with any external agent aside Universiti Utara Malaysia as it will bring difficulties in capturing the business process information. On the other hand, these two business processes are used to compare the complexity value of the registration process. Method that is used to measure the complexity value is by using cyclomatic number. This cyclomatic number is a method which combines the graph-theory and mathematical technique to measure complexity.

At the first place, this research analyze the activities that involved in one business process from the beginning to the end. Then, it is mapped into a UML notation which is in an activity diagram. The activity diagram will give an overview of a business process. It will then be transformed to the cyclomatic graph according to algorithm produced. This research also will measure the complexity according to the connectivity matrix derived from the cyclomatic graph. Finally, calculation of the complexity value by using the cyclomatic number is automated.

To draw a conclusion, this research will help us to indicate the value of a business process complexity. It is also hoped to help organization on order to measure their business process complexity and thus help in the re-structuring process. However, in the future, it is hoped that business process from any other discipline aside from academic will measure their business process complexity using the automated tool developed.

ACKNOWLEDGEMENTS

I would like to express my heartiest gratitude towards several individuals who have lighten my ways throughout doing the research. First and foremost, my supervisor, Assoc. Prof Nazib Nordin, who had given encouragement during my ups and downs, the one with outstanding ideas in doing research and who had also been my idol ever since I got to know him.

Heartfelt thanks to few of the lecturers in the Faculty of Information Technology, Mr. Azmi, Mr.Shahbani, Mr.Baha, Mr.Azizi who had given their views and comments for me upon the completion of this research.

Not to forget, the individuals and committee whom I had interviewed in capturing the business process information for the BIT Student Course Registration and KMICE Participant Registration. Thank you for spending their time and cooperation.

Last but not least, to my supportive family, dad (Sy Mansor), mom (Fatimah), sisters (Ena and Eka), brother (Emir) and to all my beloved friends. Thank you very much.

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CHAPTER 1

INTRODUCTION

Over recent years, there has been awareness in measuring the software program complexity. Despite this awareness, there is lack of process complexity measurement done towards any business process. A process is an activity which transform inputs into outputs. It plays a major role in one business process. According to Whitten, Bently (1998), a process is a work performed on, or in response to incoming data flows or conditions. Once the processes are not clearly defined, it may lead to poor business process. This is where the concept of measurement are put into practice. Martin (1995) defined measurement in his book as "the process of assigning symbols, usually numbers, to represent an attribute of the entity of interest, by rule". Since the measurement are indeed important, it cannot be put aside or being separated from the software engineering discipline. There are so many methods of measurement in software engineering. Generally, the term 'software metrics' are being used in this field to replace the word 'measurement'.

One of the many purposes on using software metrics is to measure complexity. According to Conte, Dunsmore, Shen (1986) software complexity metrics will help to

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