UNIVERSITI PUTRA MALAYSIA

DEVELOPMENT OF PRIORITY ORIENTED SCHEDULING METHOD TO INCREASE THE EFFICIENCY AND RELIABILITY FOR AUTOMOTIVE JOB

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DEVELOPMENT OF PRIORITY ORIENTED SCHEDULING METHOD TO INCREASE THE EFFICIENCY AND RELIABILITY FOR AUTOMOTIVE JOB

By

SEYEDEHFARZANEH NOJABAEI

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfillment of the Requirement for the Degree of Master of Science

JAUNUARY 2012

DEDICATION

I dedicate this thesis to my father and mother who my love to them is never ending and I am nothing without them.

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Master of Science

Development of Priority Oriented Scheduling Method to Increase the Efficiency and Reliability for Automotive Job

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JANUARY 2012

Chairman: Tang Sai Hong, PhD

Faculty: Engineering

Scheduling occurs in every organization without considering the nature of its activities. In this regard, numerous scholars have attempted to schedule via divergent methods including classical scheduling, genetic algorithm, neural network, fuzzy logic, and so on. Studies in manufacturing scheduling mostly deal with priority rules without considering the system states. An appropriate scheduling leads to significant enhancement of fairness in job scheduling. The term fairness can be transformed into a specific selection of job weights. There is no method of scheduling in which "Priority, Time Action (duration), and Time Stamp" of jobs have simultaneously been considered. The proposed method of scheduling can

enhance the efficiency and reliability of manufacturing systems via considering aforementioned aspects. To fulfill this target, first and foremost, the normalize method should be performed. This method allows data (time stamp, time action, priority) of jobs on different scales to be compared by bringing those to a common scale. Secondly, the jobs should be arranged based on three criteria which are priority, time action and time stamp. This sorting algorithm is programmed via MATLAB distributed computing server (DCS) software. Eventually, to evaluate the proposed method of scheduling, simulation is operated. The simulated algorithm shows that applying the proposed method of scheduling increases the efficiency of simulated scheduler in comparison with common method of scheduling. Besides the mentioned simulated algorithm, there is a mathematical proof to prove the enhancement of reliability. Also, to evaluate the proposed method of scheduling, a case study in an automotive manufacturing company (IKCO) is conducted. In this case study, cause and effect analysis was employed. Therefore, the causes derived from ignoring priority and time action are determined. By applying the proposed method of scheduling, the mentioned causes are spontaneously eliminated. To show the significant difference between efficiency of system before and after applying proposed method of scheduling pair sample t-test is employed. Also, this test is operated to show the significant difference between reliability of system after and before employing the proposed method of scheduling. Finally, the provided results (Sig. (2-tailed) = 0) show that there are remarkable enhancement in efficiency and reliability of system by applying the proposed method of scheduling.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra M+alaysia sebagai memenuhi ijazah Master Sains

Pembangunan priority Oriented Menjadualkan Kaedah Meningkat Kecekapan dan Kebolehpercayaan untuk Kerja Automotif

Oleh

SEYEDEHFARZANEH NOJABAEI

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Penjadualan berlaku pada setiap organisasi tanpa mengira keadaan aktivitinya. Dalam perhatian ini, ramai cendekiawan telah cuba untuk menjadualkan melalui kaedah-kaedah tercapah termasuk Penjadualan klasik, algoritma genetik, jaringan saraf, logik kabur , dan sebagainya. Kajian-kajian dalam mengeluarkan Penjadualan kebanyakannya berurusan dengan keutamaan menguasai tanpa mengira status sistem. Penjadualan yang sesuai dapat meningkatkan penting keadilan dalam penjadualan kerja. Istilah ini Keadilan dapat ditukar bertukar menjadi satu pemilihan berat kerja yang tertentu. Tiada kaedah menjadualkan di mana “Keutamaan, Tempoh, dan Mula masa” bagi kerja telah serentak dianggap. Penjadualan cara disarankan dapat meningkatkan kecekapan dan kebolehpercayaan sistem pembuatan melalui pertimbangan aspek-aspek tersebut. Untuk memenuhi sasaran ini yang paling

penting, adalah normalisasi. Kaedah ini membenarkan data “Keutamaan, Tempoh, dan Mula masa” pekerjaan yang berbeza berbeza dapat dibandingkan dengan satu skala biasa. Kedua, kerja-kerja seharusnya disusun berdasarkan tiga kriteria “Keutamaan, Tempoh, dan Mula masa”. Pengisihan ini diprogramkan melalui MATLAB mengedarkan mengira pelayan (DCS) perisian. Akhirnya, untuk menilai cara yang disarankan Penjadualan kaedah, simulasi dikendalikan. Mengikut persembahan algorithm, cora yang disarankan dapat meningkat kecekapan penjadualan dalam perbandingan dengan cara penjadualan yang biasa. Selain menyebut algoritma tersimulasi , di samping itu, satu bukti matematik yang dapat membuktikan peningkatan kebolehpercayaan dijalankan. Di samping itu, satu kajian kes dalam syarikat pembuatan automotif (IKCO) dijalankan. Kajian dalam kes ini, analisis sebab dan akibat telah dijalankan. Oleh itu, sebab-sebab berasal daripada pengabaian keutamaan dan tempoh ditentukan.Dengan menggunakan cara penjadualan yang disarankan menjadualkan, menyebut sebab-sebab dengan spontan disingkirkan. Untuk menunjukkan perbezaan penting antara kecekapan sistem sebelum dan selepas menggunakan cara yang disarankan menjadualkan sepasang sampel ujian t telah pun digaji. Di samping itu, ujian ini dikendalikan untuk menunjukkan perbezaan penting antara kebolehpercayaan sistem selepas dan sebelum mengambil cara penjadualan yang disarankan menjadualkan. Akhirnya, menyediakan keputusan-keputusan yang disarankan (Sign. (2-tailed) = 0) telah menunjukkan peningkatan luar biasa dalam kecekapan dan kebolehpercayaan sistem dengan menggunakan cara penjadualan yang disarankan.

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Finally, I am keen on expressing my appreciation to those people who are not listed above but have helped me to come up with constructive solutions in my research field.

I certify that a Thesis Examination Committee has met on 5th January 2012 to conduct the final examination of Seyedehfarzaneh Nojabaei on her thesis entitled "**Development of Priority Oriented Scheduling Method to Increase the Efficiency and Reliability of Manufacturing Systems for Automotive Job**" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Master of Science in Industrial Engineering.

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Saya mengesahkan bahawa satu Jawatankuasa PeN periksaan Tesis telah berjumpa pada (masukan **tarikh viva voce)** untuk menjalankan peperiksaan akhir bagi (masukan **nama pelajar)** bagi menilai tesis beliau yang bertajuk "**Pembangunan priority Oriented Menjadualkan Kaedah Meningkat Kecekapan dan Kebolehpercayaan untuk Kerja Automotif**" mengikut Akta Universiti dan Kolej Universiti 1971 dan Perlembagaan Universiti Putra Malaysia [P.U.(A) 106] 15 Mac 1998. Jawatankuasa tersebut telah memperakukan bahawa calon ini layak dianugerahi ijazah kejuruteraan industri

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This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfillment of the requirement for the degree of Master of Science. The members of the Supervisory Committee were 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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SEYEDEHFARZANEH NOJABAEI

Date: 5th January 2012

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