DEVELOPMENT OF MULTI-AGENT BASED DECISION SUPPORT STUDENT-LECTURER APPOINTMENT TOOL

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DEVELOPMENT OF MULTI-AGENT BASED DECISION SUPPORT STUDENT-LECTURER APPOINTMENT TOOL

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DECLARATION

I declare that this thesis entitled "Development of Multi-Agent Based Decision Support Student-Lecturer Appointment Tool" is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature : ……..

Name : GBEFA PEREMOBOERE MAUREEN

Date : ……..……

APPROVAL

I hereby declare that I have read this thesis and in my opinion this thesis is sufficient in term of scope and quality for the award of Master of Computer Science (Software Engineering and Intelligence).

Signature : ……..

Supervisor Name : DR. SABRINA AHMAD

Date : ……..……

DEDICATION

I dedicate this project to God Almighty my all in all for seeing me through this phase of my life and study, for provision, protection, wisdom and knowledge and for guidance. I also dedicate this project to my parents for their prayers and support, to Pst. Yomi Aremu for being a father, for his endless support, prayers and encouragement, Pst Lucky for his encouragements and prayers. Lastly, to my mentor and friend Bokolo Anthony for his assistance, prayer and also being there for me. I appreciate all your efforts towards me completing this project thesis and study. Thanks and God bless.

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ABSTRACT

University research and educational process has been positively influenced by the World Wide Web which has tremendously facilitates learning and teaching, this same internet can also facilitate student lecturer appointments, but currently students and lecturers are faced with issues such as finding free time-slot, difficulty of students to meet supervisor and difficult to manage appointment records. Therefore this thesis proposed a model and software agent based tool to support the decision making of students and lectures in managing appointment scheduling in universities there by address the aforementioned shortcomings. The model proposed in this thesis comprises of the variables that influence appoint scheduling and process to be implemented in making appointment scheduling by students alongside their lecturers. The tool was developed using PHP MYSQL integrated by multi-software agents that supports the decision making of students in finding free time-slot, resolving difficulty of students to meet supervisor and also addressing difficult of managing scheduled appointment records. The proposed model was evaluated (verified) from online survey data collected from randomly selected 102 respondents and the developed tool was also evaluated using different data collected from paper based questionnaire from another 102 respondents. SPSS software was used to analyse both the online survey data and paper based questionnaire data using statistical analysis such as test of normality, reliability test, validity test, descriptive statistical study and lastly correlation analysis. Findings from this study show that the proposed model variables and process are important and should be considered in appointment scheduling in university domain. Furthermore findings also outlines that the developed software agent based tool is applicable in supporting student lecturer appointment scheduling in universities.

ABSTRAK

penyelidikan universiti dan proses pendidikan telah positif dipengaruhi oleh World Wide Web yang mempunyai dengan hebat memudahkan pembelajaran dan pengajaran, internet yang sama juga boleh memudahkan pelajar pelantikan pensyarah, tetapi kini pelajar dan pensyarah berhadapan dengan isu-isu seperti mencari percuma masa-slot, kesukaran pelajar untuk memenuhi penyelia dan sukar untuk menguruskan rekod pelantikan. Oleh itu karya ini mencadangkan satu alat berasaskan ejen model dan perisian untuk menyokong pembuatan keputusan pelajar dan ceramah dalam menguruskan penjadualan pelantikan di universiti di sana by Alamat kelemahan yang dinyatakan di atas. Model yang dicadangkan dalam karya ini terdiri daripada pembolehubah yang mempengaruhi melantik penjadualan dan proses yang akan dilaksanakan dalam membuat penjadualan pelantikan oleh pelajar bersama pensyarah mereka. Alat ini dibangunkan dengan menggunakan PHP MYSQL bersepadu oleh ejen multi-perisian yang menyokong keputusan yang dibuat oleh pelajar dalam mencari masa-slot percuma, menyelesaikan kesukaran pelajar bagi memenuhi penyelia dan juga menangani sukar mengurus rekod pelantikan dijadualkan. model yang dicadangkan dinilai (disahkan) daripada data kaji selidik dalam talian yang dikumpul daripada 102 responden yang dipilih secara rawak dan alat yang dibangunkan juga telah dinilai dengan menggunakan data yang berbeza yang dikumpul daripada soal selidik berasaskan kertas daripada 102 responden lain. perisian SPSS digunakan untuk menganalisis kedua-dua data kaji selidik dalam talian dan kertas berdasarkan data soal selidik menggunakan analisis statistik seperti ujian normal, ujian kebolehpercayaan, ujian kesahan, kajian statistik deskriptif dan analisis korelasi akhir sekali. Penemuan daripada kajian ini menunjukkan bahawa pemboleh ubah model yang dicadangkan dan proses adalah penting dan perlu diambil kira dalam penjadualan pelantikan dalam domain universiti. Tambahan pula kajian juga menggariskan bahawa alat ejen perisian yang dibangunkan berdasarkan terpakai dalam menyokong pensyarah pelajar pelantikan penjadualan di universiti.

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LIST OF ABBREVATIONS

HTML	Hypertext Markup Language
PHP	Hypertext Preprocessor
MYSQL	Microsoft Structured Query Language
XAMPP	Cross-Platform (X), Apache (A), MariaDB (M), PHP (P) and Perl (P).
SPSS	Statistical Package for the Social Sciences
UTeM	Universiti Teknikal Malaysia Melaka
FTMK	Fakulti Teknologi Maklumat dan Komunikasi
UML	Unified Modeling Language
SDLC	System Development Life Cycle
SWOT	Strength, Weakness, Opportunity and Threats
SMS	Short Message Service
DSS	Decision Support System
RAM	Radom Access Memory
GUI	Graphical User Interface
CBR	Case Based Reasoning
IV	Independent variables
DV	Dependent variable
TCP/I	Transmission Control Protocol/Internet Protocol

CHAPTER 1

INTRODUCTION

1.1 Overview

The aspects of people's daily life have been changed due to technology, many of which are becoming indivisible from the network due to the development of Internet. Also, web based applications have helped tremendously in streamlining many of the tasks we carry out on a daily basis, and have made our lives much more easier. One of the very important aspects in the establishment of education process is setting up and attends appointments with your lecturers and professors. Computer technology today has made it to a significant era since the 20th century. Many hardware and software applications have been developed to help people meet their needs. Internet, calendar, e-mail, web, word processing, and more are examples of popular applications and services.

According to (Suresh et al., 2010), scheduling of lecturer's availability is a problem for both students who are trying to set meeting time with the lecturer and lecturers who have to make themselves available even outside school hours. In other to solve this problem, software agent approach can be applied. An agent is something that can be seen as perceiving its environment through sensors and acting upon that environment through effectors (Russell and Norvig, 1995). Appointments that are done manually can be tedious and time consuming as seen by experience. The pen-and-paper method is the oldest technique of scheduling appointments for most institutions. The scheduling of an appointment between staff and students are done sometimes through a secretary with a

central calendar. In this manual method, the staff whose time is being booked must check with secretary or check diary regularly to find out what their schedule is, and to let the secretary know the available times (Dwayne et al., 2013).

Making an appointment schedule that will be fair enough and suitable to all parties involved is a difficult task at many universities nowadays. It is seen as been time consuming and occasionally doesn't work in the favour of all parties involved. Most people have used computerized systems appointment systems like Microsoft outlook to solve the scheduling problem in Universities and colleges. The involvement of humans still exists towards scheduling of appointment in universities. In the field of computing, the use of software agents to automate task has been on the lips of every computer scientist.

Multi-agent system technology has become a popular paradigm over the few years in the design modelling and implementation of software solutions. So, based on that there has been a quite an amount of work done on the use of Software agents towards automating the scheduling system from desktop which is evident from the literature. But still there exist drawbacks in the existing system. The use of Mobile Phones has been an ever growing phenomenon since the early 1990s. The main stakeholders in the educational system including lecturer and students have been partakers of this phenomenon where the cell phone has become a part of their daily lives with the inclusion of other ICT devices into the educational sector (Dwayne et al., 2013).

These appointment processes are done manually and, because of this, there are many instances of overbooking or forgetting to cancel an appointment which could free up the space to schedule another in its place. To eliminate human error due to setting appointments manually, a multi-agent based student-supervisor appointment system will be developed to make the scheduling process easier (Alaa Qaffas et al, 2012). It is very important to maintain efficient software to handle information in any school or

organization. There is need for an application that provides a way to record this information and to access them in a simpler way. The main purpose of the proposed system is to make information management task easier and to develop software that replaces the manual appointment scheduling system into automated agent based student lecturer appointment scheduling system (Anurag and Praveen, 2013).

Furthermore, the internet provides a structure that supports unprecedented communication capabilities and opportunities for collaboration. The purpose of this research is to concentrate on the process of booking and scheduling appointments through an online multi-agent based system. Scheduling and appointment systems allow students and lecturers to interact through the web and manage their appointments.

1.2 Key Features

Online appoint management system's main focus is to manage appointment fixing where students can make appointments with the supervisors and it requires the following features to be implemented in the project:

Schedule appointment between students and supervisors

View students appointment information

Maintain cancel appointments information and notify students through email or SMS etc.

1.3 Problem Statement

In this present world, where the current scenario in the education domain requires efficiency, the numbers of missed appointments that are missed have led to an incredible problem for many lectures/supervisors and students. Scheduling a meeting that involves persons with different commitments and preferences is a difficult task. This research presents a multi-agent based student-lecturer decision support appointment tool in which

each person is represented by an agent. Each agent has its own capabilities to manage, negotiate and schedule tasks, meetings, events, appointments for its assigned user. In this multi-agent based student-supervisor appointment system, the agents coordinate their activities and negotiate on behalf of their associated users to find a solution that satisfies the users' desires.

1.3.1 Finding a common free time-slot:

For the supervisor in an appointment is the most basic goal of an appointment scheduler. If such a slot is not found, the students have to ask the busy lecturers/supervisors to move the existing schedule and to adapt to the proposed appointment.

1.3.2 Difficulty of students to meet supervisor:

There are many situations where students did not find lecturers in their room not knowing the lecturer/supervisor was in consultation hour. Sometimes the lecturers/supervisor did not write a notice or announce if they have meeting or other important events to attend to. Students on the other hand may also not know the lecturer's schedule and contact's number.

1.3.3 Difficult to manage appointment records:

From manual system, appointment records of students are kept in lecturer's notebook. With this proposed system, record of appointment time will be store more systematic and regular. The lecturer/supervisor will not have to worry about losing their notebook. This system will remind the lecturers/supervisors and students about their appointment.

Therefore the proposed Multi-Agent Based Student-Lecturer Decision Support Appointment tool will enable the students to discovery the easiest way to contact with lecturers (supervisor) at the university and make appointments.

1.4 Research Question

RQ1: What are the process and variables for scheduling appointment between students and their lecturers?

RQ2: How to support decision making of student and lecturer appointment scheduling using multi-software agents?

1.5 Research Objectives

The objectives of this study are:

RO1: To identify the processes and variables for appointment scheduling

RO2: To propose a model and agent based tool to support decision making of students and supervisors towards appointment scheduling.

RO3: To verify the model processes and variables using online survey and also evaluate the developed agent based tool using questionnaire.

1.6 Research Scope

Appointment scheduling is applied in various enterprises; however this research is mainly focused on educational sector such as universities. The research concern students and their supervisors in Malaysian based university UTeM who will use the system, to make the appointment via online based service.

1.7 Target Users

The target users of this project are students and lecturers. The tool is developed to help student's make an appointment online with supervisor that they want to meet depending on the lecturer's timetable. Only students who had registered can use this system.

The project is restricted to appointment management for the meeting between supervisor and students only in terms of functionality. There are no scheduling and other educational functions, such as course management, timetable scheduling, and resource booking etcetera. Quantitative research will be adopted in this research using survey to verify the process and variables involved in an appointment system for the universities. Thus data will be collected using questionnaire from the respondents. Based on the questionnaire technique, a minimum of 100 respondents will be involved in the data collection process. The data from the survey will be analyzed using SPSS 22.

1.8 Project Contribution/ Expected Output

Theoretical: The contribution of this project is to propose a model/architecture to support students in making appointments and lecturers/supervisors in making decisions on how to manage their schedule based on the students' appointments.

Practical: This research will developed a model comprising of appointment process and techniques which are multi-software agents. The model will show how students and lecturers/supervisors can manage their appointment and schedules.