

GENETIC ALGORITHM FOR EVENT SCHEDULING SYSTEM

¹Abd. Samad Hasan Basari, ²Siti Musliza Jalal,
³Burairah Hussin, ⁴Nabihah Mohd Isa

Faculty of Information and Communication Technology
UTeM, Hang Tuah Jaya, 76100 Durian Tunggal,
Melaka, Malaysia

¹abdsamad@utem.edu.my, ³burairah@utem.edu.my, ²
greengirl_muhi@yahoo.com, ⁴biha_isa@yahoo.com

Abstract

UTeM's Event Alert System (UTeM-EAS) is an improved version of previous Event Alert System in Universiti Teknikal Malaysia Melaka (UTeM) official site that aims to apply Artificial Intelligence (AI) in order to provide its users with events priority. This newer system intend be more user friendly by providing organized management. The improved version is also designed to have the capability of sending Short Message Service (SMS) among UTeM's staff to notify them of future events. Some researches about another existing Event Alert Sytem are carried to provide more understanding to the system to be developed. UTeM-EAS then is created by exploiting one of AI approach namely Genetic Algorithm (GA) with Crossover Technique. There are four main interfaces that ask for login information, add, edit and view events details. As for the development environment, UTeM-EAS is developed and to run in windows XP with support of Adobe Dreamweaver and MS SQL Server. Ozeki Messenger 6 are installed and configured for this system to operate with its SMS function. The functionality, usability and security testing are conducted between UTeM's staffs and administrators itself to measure the performance and user acceptance of the proposed system. Aside from achieving its development objectives, UTeM-EAS also gain great satisfactions from most of its tested users. The system could be more efficient if password encryption is applied and the system is able to reply the message sent by UTeM's staff asking for further events details.

Keywords: intelligent system; genetic algorithm; artificial intelligence.

I. INTRODUCTION

There is a need for large organizations such as UTeM to have a proper alert system that not only alert their staffs to attend organizer events but also to help the user to decide on events priority if they are held at the same time. An ideal system should be user friendly and providing systematic management over events information.

Although UTeM have its own alert system via web application, the existing system cannot be considered as ideal. This is because the system is not automatically updated and has no systematic management. The events need to be updated regularly and they should be sorted by date and time. Besides, it is hard to notice the staff about events to be held, as they might forget about it. The system still does not provide ease of use to all its users, since the administrator need to update the events regularly and the staff needs to check the future events only via UTeM portal. If any redundancies occurs, where staffs need to attend more than two events that occur at the same time, the current existing system cannot help the staff to decide which event need to be given priority to attend.

A new intelligent UTeM's Event Alert System (UTeM-EAS) was developed to satisfy the entire requirement stated previously by applying some knowledge of GA [1]. GA will make the system reschedule the events in list and assign to its priority by taking into account staff

s' position, department, faculty and so forth.

II. COMPARISON OF BOTH EXISTING AND PROPOSED APPLICATIONS

In order to develop an efficient event alert system that can benefit both administrator of UTeM and other UTeM staff, it is vital to understand well about the concept of event alert system. Comparisons between several existing event alert systems in different universities such as USM (Universiti Sains Malaysia) (available at www.usm.my), UMS (Universiti Malaysia Sabah) (available at www.ums.edu.my) and UTeM (available at www.utem.edu.my) itself, are performed to provide more understanding on system to be developed. Necessary improvements include applying artificial Intelligence (AI) to the proposed system, UTeM-EAS. The comparisons summary of compared systems is shown in Table 1.

Table I. Comparison Between Existing Sytems And The Proposed System

Comparison Items/Characteristics	UTeM official site	USM official site	UMS official site	UTeM-EAS (necessary improvement)
Techniques	Website with scroll down menu and pop up page.	Website with flash.	Website with scroll down menu.	SMS with standalone system and GSM modem.
AI Technique Application	No AI technique Applied	No AI technique Applied	No AI technique Applied	AI technique applied is genetic algorithm with crossover technique.
Mechanism to solve Redundant event	No solving mechanism	No solving mechanism	No solving mechanism	Can decide the highest priority of events.
Necessity to delete data regularly	Necessary	Necessary	Necessary	The outdated data will be removed automatically
Remainder function availability	Does not have any remainder function	Does not have any remainder function	Does not have any remainder function	Alert the user one week, three day, and one day before events.

III. DESIGN OF UTEM'S EVENT ALERT SYSTEM

In designing UTeM-EAS, the genetic algorithm was chosen as an AI approach in measuring the priority of events for each UTeM staff. A genetic algorithm (GA) is an algorithm used to find approximate solutions to difficult-to-solve problems through application of the principles of evolutionary biology to computer science [2]. Crossover and Mutation are two common techniques of genetic algorithm [3]. Crossover technique was chosen since it is more suitable for a large population [4].

A. System Architecture of UTeM-EAS

Based on Figure 1 below, the system architecture is made up of three tiers, application, client and server tier. The application tier is a tier where users used to communicate with the server by giving appropriate input to be processed and saved in the web server. The Global System for Mobile Communications (GSM) modem used to output the input from the web server to the client tier via SMS [5].

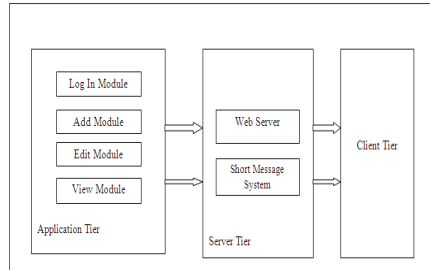


Figure 1. UTeM-EAS System's Architecture

B. User Interface Design

For input design there are four pages to be considered that is login, add, edit and view event details page. The design of the input pages of the system to be developed are shown in separate in Figure 2 to Figure 5.

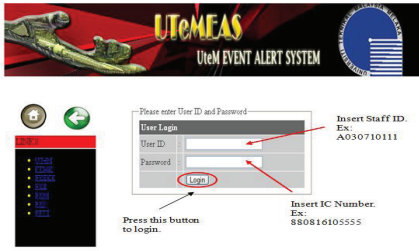


Figure 2. Login Page Input Design

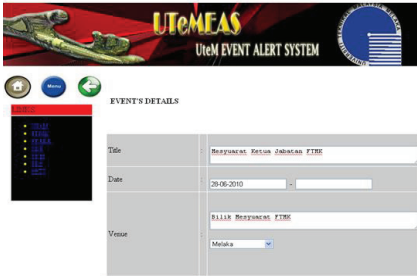


Figure 3. Add Event Details Page Input Design

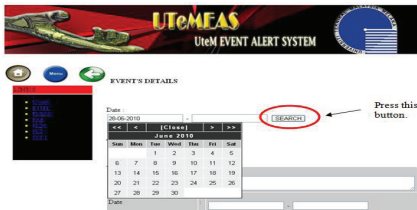


Figure 4. Edit Event Details Page Input Design

As mentioned previously genetic algorithm with crossover technique will be used in technical design for this application. Crossover technique in this case can be defined as a genetic operator used to vary the programming of a chromosome or chromosomes from one generation to the next by combining between two chromosomes. Table II is the description of that AI approach.

Table II. Ga Approach For UTeM-EAS

Technique	Genetic algorithm
Responsibility	To make decision or classify input into level of priority
Attributes	Individual: Venue, type of event, who the important people are, additional
	Population : Add event details form
	Search Space : Level priority
	Chromosome : Individual weight
Methods	Crossover technique
Algorithm	BEGIN
	Do parent selection
	Get user input from the input data
	Set each input with its weigh
	Do the crossover
	Each input will be act as parent
	Each parent will do the crossover
	Offspring will be generate
After crossover	
The generated offspring will be the survival one	
The survival will be classify	
Do classification based on survival weight	
END	

Since UTeM-EAS will alert UTeM staff by SMS [6] besides by announcing the events in official portal, there are two designs for the system's output. One will be in website view page and the other one will be in message form through SMS system. The output message is as in Figure 5, page input design and the output details are same occurs in SMS.

C. Database Design

For this event alert system, MySQL has been chosen as the software to develop the database that designed to offer an organized mechanism for storing, managing and retrieving information. The relationship between the entities with the attributes or characteristics of entities in UTeM-EAS are presented by an entity relationship diagram (ERD) is illustrated in Figure 6.

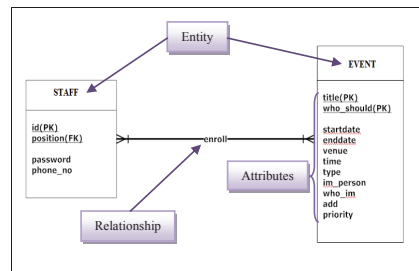


Figure 6. UTeM-EAS Entity Relationship Diagram

The ERD indicate that the relationship between staff and event is many to many type. Hence the business rules are set in this manner:-

- (a) Each STAFF may enroll one or many EVENT. Therefore, EVENT data is mandatory to STAFF.
- (b) Each EVENT may enroll one or many STAFF. Therefore, STAFF data is mandatory to EVENT.

IV. SYSTEM DEVELOPMENT AND IMPLEMENTATION

The development environment for UTeM-EAS running in windows XP with support of Adobe Dreamweaver to write the web programming codes and MS SQL Server to store up all information required. Messenger 6 also being installed and configured for this system to act as SMS gateway which makes it possible to send (and receive) SMS messages from a computer to mobile phones used in GSM digital cellular telephone networks.

Since UTeM-EAS is a web based application, the development setup was modeled within Window XP web server. The supported browsers are used as web application and MySQL as database management system are installed on the server to provide services to client. As for the hardware development environment, all the required development software and a GSM modem are installed in the same computer to ease development process. The installation is done as shown in Figure 7.

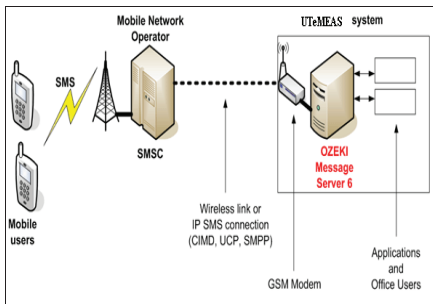


Figure 7. UTeM Event Alert System (UTeM-EAS) hardware development environment

Ozeki Message Server 6 and a GSM modem need to be configured correctly so that the system can have SMS connectivity through both of them. Ozeki Message Server Monitor will be run first before the GSM modem driver can be installed. By clicking the install link, the installation process will proceed. Depending on the cell phones brand, a new configuration may need to be done so that the cell phone can receive the SMS connectivity from the proposed system. Figure 8 is a diagram that shows some of configuration steps.

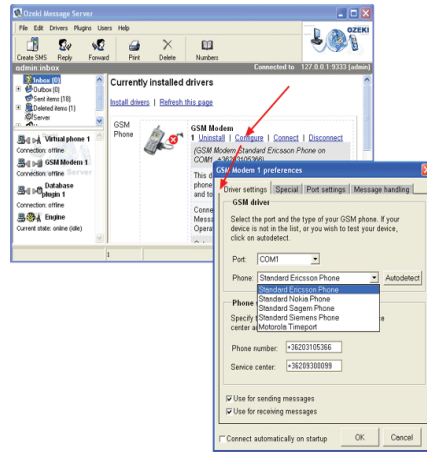


Figure 8. Configuring the device settings

V. TESTING AND RESULTS

Functional, usability and security testing are conducted in determining the status of the developed UTeM-EAS. There are four module of the system testing that depend on the number of system pages which is Login, Add, Edit and View Events Details pages. The results and analysis for the system testing are recorded in the Table III.

Table III. Test Result And Analysis For UTeM-EAS

Test Case ID	Tester	Date	Result (OK/Failed)	Satisfactory (1-5:Worst-Great)
UTeM-EAS_01_01 till UTeM-EAS_01_04	System developer and course mate	16/06/2010	OK	5
UTeM-EAS_02_01 till UTeM-EAS_02_03	System developer and course mate	16/06/2010	OK	4
UTeM-EAS_03_01 till UTeM-EAS_03_04	System developer and course mate	26/05/2010	OK	4
UTeM-EAS_04_01 till UTeM-EAS_04_02	System developer and course mate	26/05/2010	OK	3

VI. CONCLUSION

In conclusion the Event Alert System developed for UTeM is able to achieve its objective by applying GA in its development to make decision over the level of priority for each event. Besides, by applying GA, the administrator does not need to update regularly the events page because the outdated events will be removed by the system automatically. The list of events too, will be sorted by date the events will be held. This makes the system becoming more user friendly than previous system. The UTeM-EAS turn out to be more convenient to use since it uses SMS application in notifying the staff about the future events in UTeM.

However, for future work, the system should improve the system security by providing password encryption to be stored in the database. The system too, can be designed so that it can reply messages from the staff if they ask further details about the events to be held by UTeM.

ACKNOWLEDGMENT

The authors would like to thank Faculty of Information and Communication Technology, UTeM for providing facilities and financial support.

REFERENCES

- [1] M. Mitchell, *An Introduction to Genetic Algorithms*. Cambridge, MA: MIT Press, 1996.
- [2] C. Dimopoulos and A.M. S. Zalzal, "Recent Developments in Evolutionary Computation for Manufacturing Optimization: Problems, Solutions, and Comparisons" *IEEE Transactions on Evolutionary Computation*, Vol. 4, No. 2, July 2000, pp. 93-113.
- [3] S. Russell and P. Norvig, *Artificial Intelligence: A Modern Approach*, 3rd Ed. Upper Saddle River, New Jersey: Pearson, 2010.
- [4] T. Yamada and R. Nakano, "A Genetic Algorithm with Multi-Step Crossover for Job-Shop Scheduling Problems", *Genetic Algorithms in Engineering Systems: Innovations and Applications*, 12-14 September 1995, pp.146-151.
- [5] A. Idris, A.S.H Basari and N. Zubir, "An Application of SMS Technology for Customer Service Centre" *International Conference on Social Computing and Pattern Recognition*, Melaka, Malaysia, pp. 633 - 636, 2009.
- [6] A.S.H. Basari, A.M. Zain, N.K. Ibrahim, N.Yusof and S.A. Asmai, "A Mobile Disaster Alert Intelligent System" *Proceedings of MUCET 2010*, Melaka, Malaysia, pp. 291-294, 2010.

