AUTOMATED BUS DRIVERS SCHEDULE SYSTEM

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This report is submitted in partial fulfilment of the requirements for the Bachelor of Computer Science (Software Development)

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
KOLEJ UNIVERSITI TEKNIKAL KEBANGSAAN MALAYSIA
2005

BORANG PENGESAHAN STATUS TESIS

JUDUL: **AUTOMATED BUS DRIVER SCHEDULE SYSTEM (ABDSS)**

SESI PENGAJIAN: **SEMESTER 2004/2005**

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I hereby declare that this project title name of

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ACKNOWLEDGEMENTS

Alhamdulillah with time and health given by Allah almighty, I have used this opportunity to finish up my work in the time given to me.

I would like to thank my beloved parents who have been giving me support and motivation throughout my project. Not forget, thank you to all my friends especially all my housemates for giving and sharing a lot of things in order to complete this project.

I also would like to thank Mr. Sazalinsyah Razali, my *Projek Sarjana Muda* (PSM) supervisor for giving assistant and guidance throughout my progress to complete this project successfully. I appreciate his help and all knowledge he had shared in helping me completing this *PSM* including spending a lot of time to make a consultation with me.

Finally, I would like to thank you all people that had given and sharing some information needed for my project analysis and review.

Thank you all.

ABSTRACT

This project is the development of bus drivers' scheduling system. It focuses on one type of bus transportation, which is the shuttle bus. This document describe in detail all of stages taken during the system development. Automated Bus Driver Schedule System was developed in order to enhance and provide an easy way for creating a new schedule. Current systems are not systematic and take a lot of time and human resource just to create a new schedule. Thus, this project is important especially to replace the manual scheduling making; process that is still used by most organization today. Automated Bus Driver Schedule System users are employees that are involved in making a schedule for bus drivers. It can receive and save new data. Furthermore, users can view those data if they wish to do. Users need to select generate function in the schedule menu, and the system will automatically generate a new schedule based on the Genetic Algorithm employed. The development of this system aim to increase the level of acceptance by drivers to the schedule generated. The testing phase revealed that, some of the system functionalities were not fully functional, namely features are, printing, selecting and storing data for new schedule. Most of the objectives set-out in this project were successfully achieved.

ABSTRAK

Projek ini adalah pembangunan sistem penjadualan untuk pemandu bas. Ianya memfokuskan kepada satu jenis pengakutan bas iaitu bas ulang alik.Tesis ini menerangkan dengan terperinci peringkat-peringkat yang dilalui sepanjang tempoh pembangunan sistem ini. Automated Bus Driver Schedule System ini dibangunkan dengan bertujuan untuk mempertingkat dan mempermudahkan lagi sistem penjadualan semasa yang banyak digunakan pada masa kini. Sistem semasa yang terdapat pada masa ini kurang sistematik dan memerlukan tempoh yang lama untuk pengguna menyesuaikan diri menggunakannya. Oleh itu, projek ini sangat penting dalam usaha untuk menggantikan sistem manual yang sedia ada, yang sering digunakan oleh pelbagai organisasi. Pengguna sisyem ini adalah pekerja yang terlibat dalam menyediakan jadual perjalanan bas ulang alik. Sistem ini dapat menerima dan menyimpan data baru yang dimasukkan oleh pengguna. Malahan pengguna juga boleh melihat kembali data-data yang terdapat di dalam pangkalan data sistem ini. Pengguna perlu memilih fungsi membuat jadual baru untuk mengarahkan sistem ini membina jadual perjalanan bas secara automatik berdasarkan Algoritma Genetik yang telah digunakan. Pembinaan sistem ini bertujuan membantu meningkatkan tahap penerimaan pemandu terhadap jadual yang telah dihasilkan. Fasa ujian telah menunjukkan beberapa kefungsian sistem ini tidak beroperasi dengan sepenuhnya iaitu fungsi mencetak, mengambil dan menyimpan data untuk jadual baru. Kebanyakan objektif yang telah diletakkan untuk projek ini telah berjaya dicapai.

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Abbreviation	Word/Description
ERD	Entity Relationship Diagram
KUTKM	Kolej Universiti Teknikal Kebangsaan Malaysia
LAN	Local Area Network
RAD	Rapid Application Development
UAT	User Acceptance Test
CM	Configuration Management
SE	Software Engineering
SCM	Software Configuration Management
MP3	Makmal Pengaturcaraan 3
K1	Makmal Viva 1
AUT	Application under Test
ABDSS	Automated Bus Driver Schedule System
SCR	System change request

CHAPTER I

INTRODUCTION

1.1 Project background

The idea of developing this system comes because there is not yet a scheduling system created for bus companies to manage their schedule. Nowadays there are many system used for scheduling. Most of the application that was used for scheduling purpose is still depends on the manual ways of scheduling and data management. Current systems are using manual scheduling which need particular personnel to maintain the drivers' working turn every week.

The current system requires the maintainer to rearrange and update and the bus drivers' schedule at the end of every week for next week schedule. Maintainer need to compare the previous schedule and create a new schedule for drivers' working turn for the next working week. Those person in-charges also need to maintain all the previous and current data for future uses.

There are systems that already exist which used the same concept as this bus scheduling system. It is used by companies for certain department such as management departments only and there are also used for big companies that was including all the services it provided into the schedule. The purpose of using it is to increase productivity, reduce scheduling time, simplify planning process and manage resource scheduling.

The system is created to make an easier way to schedule the drivers turn working. There is no need to do manual analysis and comparison anymore. The entire task can be accomplished by the system after particular data needed was inserted.

1.2 Problem statement(s)

According to the research done for scheduling application uses, manual process was used to make a schedule and manage them. This will cause a lot of problem when there is some changes happen, because new schedule and arrangement need to be done and it requires human force to do it. The schedules are done by as weekly scheduling. Thus, this approach requires a lot of time and it very tedious to do so, especially for a big bus companies.

There will be a low level of acceptance of the schedule that had made. Drivers sometimes may do not agree with the schedule because they may not have enough rest. This may due to the fact that the person in-charge in the process to generate did not realize such situation. This happened either the schedule was arranged without considering any circumstance that may occur or relate to the drivers.

The process to generate the schedule also needs to take into account the days when certain drivers' want to take a leave. This maybe a bit difficult for the manual scheduling because the person in-charge needs to reschedule the entire week schedule and find a new person that available for the task . There also exist various rules and regulation pertaining transportation and employees' service that need to be looked into. These rules are enforced by related local authorities which is another stakeholder of the system. The schedule must comply with all the rules to fulfil the stakeholders' requirements.

Besides, the manual system application does not have a very good database management. The data is kept manually, so there will be a lot of problems occur such a large data storage room needed and there will be a difficulty to find data when it was needed. This is due to the fact that, the manual system uses papers and it takes a lot of time to manage it. By using this manual system, it is also harder to get particular data in a short period of time. There may also be a data redundancy, because when a new data created, there are impossible to review last data stored to make sure it was not the same because it was stored in a manual ways.

There is also have a computerized scheduling system uses. This current system can only be used by person in-charge because they know how to use the system effectively. The current system was a bit complicated, so they need to be trained before they can use the system. The training session will takes time and cost. So, it is difficult when the jobs position need to be filling in a short period of time.

1.3 Objectives

These are the objectives for developing this new scheduling application:

i. To provide a more systematic system for shuttle bus services using a computerized application.
ii. To develop an intranet system to automatically generate the schedule for bus driver schedule after particular data needed was inserted or selected.
iii. To develop a static schedule generator system, which only a basic scheduling generator.
iv. To facilitate and ease the process for making a drivers' scheduling shift and in turn of to reduce the overall cost.
v. To increase the level of acceptance, compliance and satisfaction of all the stakeholders to the generated schedule.
vi. To generate a schedule that complies with the regulations set forth in various acts related to transportation and employees.
vii. Help to increase the bus services quality. Reduces scheduling time, simplified planning process and manage resources scheduling.

1.4 Scopes

The system will be provided to shuttle bus services. The application will be used when company management want to create a schedule for drivers' working turn by weekly scheduling. This application will run in user computer using window platform. The administration department is assigned to manage the schedule for drivers. The system also keeps all the data in a database for future use.

This is a first system develop for the bus companies, so there is only a small amount of function will be covered. Functions that covered in this system are like below:

a. **Authentication for security purpose.**
   Users need to insert user Id and password to enter and use the application. Different level of user Id can access a different level of application.

b. **Inserting and saving new data.**
   This function is only for management users. In this function, user can insert new data and save it in the database for future uses. This function also allows users to update the data and save it.

c. **Viewing data.**
   All users can use this function. But different level of users can view different data.

d. **Generating a static schedule and manages the schedule.**
   According to the data inserted or selected by the person in-charge the schedule can be generated. This function is only for management users.

All the main function above can describe the function in this system to be. However, there will be an additional characteristics depend on functions during development period of time.

The system cannot generate a dynamic schedule. This means that this system cannot generate the schedule if there is a problem that occur suddenly such as an absent driver, bus

broken down, the driver fell sick during working hour or driver make an emergency leave. This system cannot make a driver replacement automatically from the current situation happened.

There are some rules and regulation that will include for this application. Those rules are such as working hour for each driver cannot be more than eight hours per day, there must be a gap or rest time between each schedule time in a day, at least one day off for a week and drivers must in a good condition before he drive the bus on that day. This rules and regulation must be followed to make sure the bus services are good and save.

1.5 Project significant

The system will enable the bus services or companies to manage the schedule easily. This system will help users to create drivers working turn schedule automatically after particular data was inserted or selected. So, this application can help reduce the time uses, human labour and cost in order to generate a schedule. This will be very beneficial to bus companies.

This will also have an effect on the bus services, which there will be a good schedule and the bus services will follow the bus departure time because all drivers are manageable. The system will help the bus companies to make a more systematic and easier schedule for each day. It will help increase the bus service quality, reduces scheduling time, simplified planning process and manage resource scheduling.

The driver will happier and more acceptable to the schedule because they can have enough rest and it will be fair to all the drivers. Having enough rest will in turn make the drivers better fit to drive and stays alert. Thus the journey will be relatively safer.

The system will also take into considerations all the applicable rules and regulation in setting up the schedules. This means that it will comply with certain acceptable demands from the Employees union and steer away from trouble with related local authorities.

1.6 Expected output

Based on what this system scope, there will be some expected output produce after user inserts some data needed. User must insert or select workers Id and the system will generate the schedule for the whole week. This is was secure system because the accesses for the system only have by a certain users. So, the schedule cannot be changed without person in-charge verification.

Results get after the process done is a bus driver's working turn schedule. This schedule can be view in the computer, and it is also can be printed. All the schedule that had been generated will be save in the database for future review. This scheduling system is an intranet system that supported in Windows application and with database support complete with GUI.

1.7 Conclusion

This system is developed for bus services or companies' for a better and systematic bus schedule generator. It will help users in order to increase the bus services quality, reduces scheduling time, simplified planning process and manage resource scheduling.

This will create an intranet computerized application to do the scheduling task. It will generate a schedule automatically after user inserted or selected particular data, then select to process the data. The schedule that had been generated was a static schedule.

This system is developed because the manual process that being practices gives a lot of insufficient result for the bus companies. The result sometimes are not followed a right rules and regulation for human force, also there maybe had data redundancy and etc. Besides, the current computerized system needed to be managed by fix person in-charge because only that particular person in-charge knows how and where to find data and take it to create a new

schedule. So, this new system can help in reducing the problems for the administration staffs by generating better schedules.

The next chapter will detail on the current literature review on this topic and discuss project methodology chosen.

CHAPTER II

LITERATURE REVIEW AND PROJECT METHODOLOGY

2.1 Introduction

Literature review and project methodology in this chapter two will give explanations about the system that will be developed. There are also some studies made from the previous system and some system that used concept similar like this system. Studies had been done by searching, collecting, analyzing and drawing conclusion from all debates issues raised in relevant body of literature. All the finding will be conclude in this chapter.

These studies will include make used of other people work. So, there will be some examples and proven that will help to make develop a better system than the existing system available now. Based on the finding and case study, comparison can be done to make a better use of system to be. The methodology that selected in order to manage the development flow will also be described in this chapter.

2.2 Fact and finding

Many studies had been done for scheduling application system. Case studies are done based on the scheduling application used in real life that uses the same concept as the system that will be developed. Case studies are done on organization that had their own transportation services in order to make sure their organization main activities moved as planned.

The existed system found from a fact and finding study is a meeting room manager system. This system will eliminate a booking, automate attendee invitations, and manage catering requests, equipment reservations. It will also enable meeting schedulers throughout organization to instantly find the right room available at the right time.

This studies done refer to Meeting Room Manager information on the internet. The approaches are proven succeed based on the user comment. "Meeting Room Manager has saved us quite a bit of staff times, and has worked beautifully. We are very happy with the product. "[1]

Other user comment is "We required an online reservation system to replace our paper reservation format. We've found Meeting Room Manager to be extremely easy to use and we were able to easily customize the forms for our use. Meeting Room Manager was clearly the best software choice for our needs." [2]

Other finding related to scheduling application is Bustops software. This is a transportation management application system. The function includes other than transportation management are customizes reports, mapping and graphics, boundary analysis, automatic assignment of students to stops and routes, automatic route optimization and combination of runs into routes. There are three main modules in this application which are Students transportation Management system, Single route optimization and Multi route optimization.

The Bustops transportation software is a good system approach for bus services management. It had been enhance since it first launch. It can be describe from the statement given. "MicroAnalytics' new Bustops transportation software has enhanced optimization, context sensitive on-line help, improve map graphics, automatic data handling features and custom-designed reports. Bustops sets up optimum bus loads and plans route schedules for school districts of all sizes."[3]

Based on this finding, there are some features that meeting room manager will be delivering in this system. Those features are increased productivity, reduced scheduling time, simplified meeting planning process, and managed resource scheduling. So, this automated

bus driver schedule system will used similar approach almost like the meeting room manager system. There is also feature used as example taken from Bustops application like generating a bus schedule with its routes. Those features from fact and finding research done will be guidelines to the system that will be develop, but the scopes are different from those system.

There is also an analysis done for case study. Case study had been done according to the actual bus services. Based on the case study, the function covered in the current system was making scheduling based on the current data get from transportation department. From the analysis, all data was already in the database. When person in-charge wants to create a new schedule, that person in-charge must take all data needed and arrange it in the schedule one by one.

Below are bus driver schedule for Cubic and KUTM shuttle bus.

Table 1 : Cubic bus driver schedule

Cubic Bus Driver Schedule

	Time for previous date		Time for current date				
Shift	1915	2315	715	315	1915	2315	No. of shift
Route							
BHA			In/out	Out		in	2
BHB			In/out	Out		in	2
BHC			In/out	in/out		in/out	3
BHD			In/out	in/out		in/out	3
BHE			In/out		in/out		2
VCA			In/out	Out		in	2
VCB			In/out	Out		in	2
VCC			In/out	in/out		in/out	3
VCD			In/out	in/out		in/out	3
VCE			In/out		in/out		2
Total vehicle			8	4 in, 8 out	2 in, 2 out	8 in, 4 out	

VC = van Cubic

BH = bas Hostel

Table 2 : KUTKM Bus Driver schedule for route Bachang and Durian Tunggal

KUTKM Bus Driver Schedule 1	
Bachang to Durian Tunggal	Durian Tunggal to Bachang
715 am	1015 am
915 am	1215 noon
1115 am	215 pm
115 pm	515 pm
315 pm	630 pm

Table 3 : KUTKM Bus Driver schedule for route Bunga Raya and Durian Tunggal

KUTKM Bus Driver Schedule 3	
Bunga Raya to Durian Tunggal	Durian Tunggal to Bunga Raya
715 am	1015 am
915 am	1215 noon
1115 am	215 pm
115 pm	515 pm
315 pm	630 pm