ELECTRONIC CAR PARKING COUPON MANAGEMENT SYSTEM USING WEB SERVICES

KUA SIEW HEE

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Faculty Computer Science and Information Technology
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Abstract

Electronic Car Parking Coupon Management System is an online parking coupon system. This system allows the subscribed user to pay the fine due to over time parking. This system will also let the subscribed car owner or the car park user to check for their fine 24 hours and enable them pays the fine online. By changing the traditional management system to electronic management system using web services, it will make the system become more efficient and useful. User can register as a prepaid or postpaid user. The bill will indicate how much of the usage and the total of amount the postpaid need to pay. The amount of parking fee will deduct from the prepaid user account once the user using the service.
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CHAPTER 1
INTRODUCTION

1.1 Background

Coupon parking system is a system that requires the car owners or the car users to purchase parking coupon in advance before they can use the parking place. The parking coupons are like a proof of payment when the relevant tabs are tear off completely and are displayed on the dashboard of the car. Each of the coupons is only valid for a certain period. The car owners or the car users have to decide how long they want to use the parking place and display the correct amount of the coupons. Failure to display the parking coupon will be issued a fine notice. Over time parking will also be issued a summons. All the fines have to be pay within a time period specified earlier in the summons [Sarawak, Miri Municipal Council, 2002].

1.2 Problem Statement

The car owners or the car park users always face the problem to pay for the fine issued to them due to over time parking. This is because of time constraints especially for those who are working. They are too busy with their work that they do not have time to pay for the fine at the counter.

Beside, some of the car owners might not have any idea that he or she was issued a fine as phenomena like the fine was blown away by strong wind or got wet in the process. This will cause the car owners or the car users fail to pay for the fine. Failure to
pay for the compound charge(s) within the specified period in the notice, he or she will be taken to court and on conviction be liable to a fine of RM300.00 [Sarawak, Miri Municipal Council, 2002].

The writing on the fine ticket might be fuzzy. This is mainly caused by the officer who issues the ticket. Their handwriting might not be readable or understandable. Thus, car owners might not understand what is written in the content of the ticket.

In addition, people who want to park their car for a longer period might find themselves facing a big problem with coupons. [Bin, 2003] For examples, if the car owners or car users want to park the car for 6 hour, it requires 12 coupons. It seems absurd to put all 24 pieces of coupons on the car dashboard and arrange them properly if they want to park the car for 1 day.

1.3 Objective

This system is developed with the objective to solve the problem of paying fine for overtime parking. It also aims to solve the problems of lost compound and provides a well compound collection management.

1.4 Methodology

Web services are a set of technologies and standards like Extensible Markup Language (XML), Universal Description Discovery and Integration (UDDI), Simple Object Access Protocol (SOAP), and Web Service Description Language (WSDL).
Commonly these technologies are being applied today in an ad hoc project driven fashion with no Web services specific methodology being applied [Champion, 2004].

Therefore, Automated Error Prevention (AEP) methodology is applied to develop web services as there are no other specific methodologies available. AEP was introduced by Parasoft. AEP is an industry best practice that improves application quality through the automatic prevention of errors during the entire software development lifecycle [Parasoft, 2005] [David, 2004]. AEP automates the development process to help software organizations learn from their own and people’s mistakes to prevent errors from being repeated in software. Implementing the Automated Error Prevention Methodology into the development process ensures that fundamental development practices are established for a reliable Web service. The AEP Methodology provides clear and practical guidelines for every Web service implementation in details [Implementing Automated Error Prevention in Web Services Development Methodology, 2004].

There are only two phases in Parasoft Automated Error Prevention methodology. Each phase is divided into many sub stages.

**Planning and design**

I. Target requirements

Create the test case for the target requirements (client and agent). The progress of the project and how much it is completed is known by monitoring the test case. The target requirements help to define the features of the web services.
II. Robustness Requirements

Add new features for different uses. There are normal use, abnormal use, malicious use, and use over time.

III. Initial Architecture

Design the architecture for the database, client, server, proxy server, application logic and Web Service Description Language (WSDL).

IV. Critical Infrastructure

Design the source control system and sandbox. Source control system is a place where the source codes are stored.

V. Nightly Build, Deployment, and Test Process

Any incompatible change in the application components are known from the nightly build process. The nightly development process will set up context in which a set of tests can be run on our Web service. The nightly test process will be tested on all the changes that were made earlier.

Development

I. Application Logic

Divide the application logic into modules and from each module we define the functionality requirement and create as unit test for each requirement met.
II. The Web Services Description Language (WSDL)

Create and deploy the WSDL at the server environment and create a regression test on the WSDL and schemas to track undesired changes.

III. Server Deployment

Deploy the Web service and create the unit tests that verify the functionality of the web services.

IV. Client Development

Create web services client and test the client functionality using server stubs.

V. Adding Security

Determine the level of the security needed and deploy it.

VI. Performance or Load Testing

Using load test to determine final deployment configuration to choose from vendors

1.5 Scope of Project

This project will focus on designing how the car owner make payment for the over parking fine. In addition, the data storage and data transfer between the client and server side will also be a focus. The features of modifying and updating data from the data server will also be included in this project.
1.6 Expected Outcome

Once the system is completed, a car parking coupon management system will be developed. After the car owners subscribe to the system, the system enables the car owners to pay and check their fine by browsing the web site using their home PC or mobile devices. This system also allows the car owners or the car park users to check for their fine anytime. With the systematic data storage, the officers can easily check or modify information from the database. Apart from that, the car owner will also receive an email notification once they get a fined resulting from over time parking. They can pay their fine by browsing through the web using their home PC or mobile devices. In this system, we assume that all the officer own a Personal Digital Assistant (PDA) that are used to verify that the car is parked over time or vice versa.

1.7 Significant Of Project

This system enables the car owners to check and pay for their fine via online. By using this system, the car owners can always check online anytime and anywhere whether there is any fine issued to them. Furthermore, car owners or the car park users will be more aware of their fines as well as increase the effectiveness of car parking management.

1.8 Outline Of Project

The outline of the project report has been stated clearly at the early stage. So, the project can be completed and delivered on time. The contents of the report consist of 5 chapters. The brief descriptions of each chapter are discussed as follow:
Chapter 1 discusses about the problems of the current coupon parking system and state out the solutions in solving the problems in the project. It also includes the objectives of the final year project and significant of the project. The methodology that is used in this project is discussed in this chapter.

Chapter 2 concerns with the background of the project. It includes some research and analysis of the current system and systems similar with this project.

Chapter 3 emphasizes on the requirement analysis and design for the project. It describes the methods used to collect the required information and the techniques applied for analyzing this information. The design phase is concerned with presenting the design of the project and justifying how it meets the identified requirements. This chapter also draws out an outline and structure of the system which is going to be developed.

Chapter 4 concerns with the implementation of the project. It focuses on the realization of the design by an implementation. The behaviors of the implementation will be described in this chapter.

Chapter 5 discusses on the system testing, system evaluation and user acceptance testing. The results are analyzed and conclusions are made based on the results.

Chapter 6 is all about investigation, achievements and future work of the project.
1.9 Conclusion

This chapter has provided an overall picture of the report flow. These included the objectives, significant of the project, scope and also the expected outcome. However, the success of the proposed system depends on the initial planning and researches. It is very important that the initial planning is in order to achieve a successful design and implementation.
CHAPTER 2
BACKGROUND

2.1 Introduction

This chapter will discuss about technology review and review of the existing system. The technology review is concerned about what type of technologies is going to be used to develop the proposed system. On the other hand, the review of the existing system will study the functionalities of the existing system from the user perspectives.

2.2 Reviews of Existing System

The research studies on the existing system are important because it helps us to gather ideas and information needed on developing the proposed system.

2.2.1 Case Study: Parking Ticket System

The City of Torrance offers the functionality to process user parking tickets via online to increase the convenience to Torrance residents and visitors [Parking Ticket System, 2005]. In this case study, the system is focus on the payment of the fine.

2.2.1.1 System Functionality

The Parking Ticket System allows user to perform web inquiries and to pay parking citations. The parking citation number is a reference number on the Notice of Illegal Parking. The user has to select the agency from the list where the user received the parking citation. Once the user has selected the citation(s) to be paid, the user will be
asked to provide their credit card information. After verifying the user information, the amount of the charge will be preceded. The payment will be immediately applied to the citation if successful and user will see the charge on their credit card statement [Parking Ticket System Frequently Asked Questions, 2005].

2.2.2 Case Study: Mobile Parking

EMT (Estonian Mobile Telephone) produces a parking system called “Mobile Parking” on the 1st of June 2000 in Tallinn, Estonia. Mobile Parking service enables parking area owners and parking inspectors to monitor the payments of parked cars [Parking made easy via WAP and SMS", 2004]. In this case study, the focus of this system is on the functionalities of the system from the technology perspective.

2.2.2.1 System Functionality

The client has to create a WAP connection and then choose the "Parking" link under EMT's services menu to enable using WAP for parking. The customer must enter the licensed plate number and choose the respective parking zone from the provided list. To terminate the parking session, the client needs to make a WAP connection again and then choose the "end" function from the parking menu. A notice will be displayed to the customer indicating the parking time, the amount of money charged and the balance of the mobile phone account.

Besides using WAP, this system also enables users to pay the parking fees using the mobile phone credit. Users have to call a short number and provide the number plate
of the car, the area parking code as well as when the parking session starts. The credit from the mobile phone starts deducting when the parking session starts.

2.2.3 Case Study: PARKIT

PARKIT parking payment system was designed and implemented by Nixu for Payway Oy. Payway Oy was founded in 1997, and it is used to operate in Finland, Sweden and in Central Europe. In Finland, dozens of city parking authorities have joined to use the PARKIT system [Parking payment and management system]. In this case study, the system focuses on how the payment for parking is done.

2.1.3.1 System Functionality

Motorists can begin and end the parking session with his/her own mobile phone without having to look for a pay machine with this system. There are three modes to do payment. First, the parking fees can be debited from the mobile phone account. The other two modes are by credit card account or payment by monthly phone bill. The users can join the system either through the system Web pages or by phone.

The PARKIT system operates as a standalone server that processes the incoming event messages in real time. The system contains dynamic end-user data management and general management components. In this case, the end-user car registers plate information, mobile phone number and payment method information, are stored into the system. The parking events are collected and billed monthly. The system also contains a WAP phone to enable parking management features. The traffic wardens can check the
status of a vehicle in real time with their WAP phones. All events are stored for later monitoring and reporting [Parking payment and management system].

2.2.4 Case Study: Virtual Park and Pay System

Virtual Park and Pay System was part of the state's Multiple Integrated On-Street Parking System (MIPS), which was developed by Swastapark Parking Management Sdn Bhd. [usjXpress Team, 2002] In this case study, the system focusing on the functionality from the technology perspective view is study.

2.1.4.1 System Functionality

This system allows motorists to pay for parking using Wireless Application Protocol (WAP), Interactive Voice Response (a guided voice mail recording) or Short Message Service (SMS). Motorists are required to pre-register for the service. Motorists, who register for the service need to indicate the number of hours their car, will be parked. Besides that, they must give a personal identification number, car registration number and a zone code that are prominently displayed at the entrance of each parking area.

The information will be transmitted to a central server located in Shah Alam, where it will be processed and sent to the zone's Compliance Parking Regulation Officer (CiPRO).

The CiPRO is a team of officials authorized by MPSJ, which will be joined later by other participating municipal councils, to issue over parking notices to motorists. Each
CiPRO officer is equipped with a hand-held computer. Telecommunications companies will be involved in the process to acquire the payment for parking charges. Parking fees, which range from 50 sen to several dollars, will be considered as transactions generally classified as micro-payment, an amount that is too minimal for credit card but ideal for the telecommunications companies [usjXpress Team, 2002].

The telecommunications companies will bill users according to the usual rate of SMS, WAP or Interactive Voice Response plus the standard parking rate of 50 sen an hour. Users can pay their bills later to the telecommunications companies by credit cards, debit cards, prepaid cards, phone bills or direct debit [usjXpress Team, 2002].

2.3 Technology Review

The technology reviews are important because it helps us to gather some ideas on the technology needed to develop the proposed system.

2.3.1 Web Services

A web service is a network accessible interface to application programs, built using standard Internet technologies. Web service is also described by programmers as application logic accessible via standard Web protocol. Web services are targeted for distributed application, where a loosely coupled interface is preferred than tightly coupled object interface.