

Evaluation of Car Rental Reservation/Management System with Tracking Capability Performance

A thesis submitted to Graduate Department of Computer Science, college of Art and
Science, in partial fulfillment of the requirements for the degree of Master of Science
(Information Technology)

University Utara Malaysia

Fathi Ali El_Shahawi

All rights reserved 2009

PERMISSION TO USE

In presenting this thesis in partial fulfillment of the requirement for a postgraduate degree from University Utara Malaysia, I agree that the University Library may make it freely available for inspection. I further agree that permission for copying of this thesis in any manner, in whole or in part, for scholarly purpose may be granted by my supervisor(s) or, in their absence by Dean of Research and Postgraduate studies. It is understood that any copying or publication or use of this thesis or parts thereof for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and University Utara Malaysia for any scholarly use which may be made of any material from any thesis.

Requests for permission to copy or to make other use of materials in this thesis, in whole or in part should be addressed to:

Dean of Research and Postgraduate studies

College of Art and Science

University Utara Malaysia

06010 UUM Sintok

Kedah Darul Aman

Acknowledgement

I owe my most sincere gratitude to Allah the almighty and the most powerful for offering me such a strength, endurance, audacity, and capability to accomplish this project.

I would also like to express my deep and sincere gratitude to my supervisor, Adi Affandi Hj Ahmad, his wide knowledge and his logical way of thinking have been of great value for me. His understanding, encouraging and personal guidance have provided a good basis for the present thesis.

During this work I have collaborated with many colleagues for whom I have great regard, and I wish to extend my warmest thanks to all those who have helped me with my work in the College of Art and Science (Information Technology) University Utara Malaysia.

I owe my loving thanks to my mother, and all my family members. They have lost a lot due to my research abroad. Without their encouragement and understanding it would have been impossible for me to finish this work. My special gratitude is due to my brother, my sisters and their families for their loving support.

CAR RENTAL RESERVATION/MANAGEMENT SYSTEM WITH TRACKING CAPABILITY

ABSTRACT

This research presents a framework for development of new car reservation/management with GPS tracking capability for car rental businesses. The research will look into different aspects; such as to provide an early, instantaneous coordinates via SMS text messages directly to the administrators when they request their motor vehicles' locations. In order to come out with the intended system, this research suggests integration of GPS technology and mobile device into the overall proposed system architecture. This research also points out that the proposed system is not intended to replace, but rather to compliment the current car management and the GPS technologies available in the market. When they all work together, they will offer a more comprehensive and rigorous car web-based reservation/management system with GPS tracking capability to car rental businesses.

TABLE OF Content

ABSTRACT.....	1
CHAPTER 1: INTRODUCTION:	
1.0 Introduction.....	2
1.1 Problem Statement.....	4
1.1.1 Financial Risk.....	5
1.1.2 Rental Fraud.....	5
1.2 Objectives.....	6
1.3 Research Question.....	6
1.4 Significance of the Study.....	7
1.5 Scope of the Study.....	8
1.6 Limitations of the Study.....	8
1.6.1 Data Limitations.....	8
1.6.2 Time Limitations.....	9
1.6.3 Financial Limitation.....	9
CHAPTER 2: LITERETURE REVIEW	
2.0 Introduction.....	10
2.1 World Wide Web.....	12
2.2 Testing a Website.....	13
2.3 Web Based Requirement.....	13
2.4 Design of UML (Unified Modeling Language).....	15
2.4.1 The Definition of UML.....	15
2.4.2 UML Diagrams.....	16
2.5 GPS Technology.....	18
2.5.1 How it Works.....	18
2.5.2 How Accurate is GPS?	19
2.5.3 The GPS Satellite System.....	20
2.6 Conclusion.....	21
CHAPTER 3: METHODOLOGY:	
3.0 Introduction.....	22
3.0.1 Conceptual Design.....	23
3.0.2 Construct Design of the System.....	23
3.0.3 Prototyping.....	24
3.0.4 Evaluate Use of the System.....	24
3.0.5 Purpose of Study.....	26
3.0.6 Type of Investigation.....	26
3.0.7 Unit of Analysis.....	26
3.0.8 Study Setting.....	27
3.0.9 Data Collection.....	27
3.1 Conclusion.....	27

CHAPTER 4: RESULT AND DISCUSSION:

4.0 System Functionality (Conceptual View).....	28
4.1 Use Case Diagram.....	28
4.2 Use Case Specification.....	30
4.3 Class Diagram.....	43
4.4 Sequence Diagram.....	45
4.5 Review of Car Management/Reservation System with Tracking Capability.....	48
4.6 Design of Use Requirements (Questionnaire).....	48
4.7 Prototype Evaluation Based On Survey Results.....	52
4.7.1 Usability Testing.....	52
4.7.2 Customer Web Reservation Task.....	54
4.8 Result of Research Design Method.....	59
4.9 Result of Awareness Problem.....	59
4.10 Result of Suggestion.....	60
4.11 Result of Development.....	60
4.12 Result of Evaluation.....	60
4.13 Result of Conclusion.....	61
4.14 Summary.....	61

CHAPTER 5: CONCLUSIONS AND RECOMMENDATION

5.0 System Functionality Screenshots.....	66
5.0.1 User Registration and Reservation Page.....	66
5.0.2 Administrator Login Page.....	68
5.0.3 Users' List.....	69
5.0.4 Cars Tracking Page.....	70
5.1 Conclusions.....	72
5.2 Recommendations.....	73
5.3 Suggestions for Further Research.....	74

CHAPTER 1

1.0 INTRODUCTION

Today, there are wide varieties of vehicle anti-theft devices in the market. These include from simple security devices, such as steering lock, gear lock and immobilizer, to a more advanced security system that can track down stolen vehicles. Unfortunately, despite the availability of such security systems, vehicle theft is still growing. As reported by the Persatuan Insurans Am Malaysia (PIAM News Release, 2001), the industry had to compensate a total claim amounting to RM168.6 million for the period of January 2001 to June 2001. Whereas Wah, K.C. et al. (2005) in the journal for Kuala Lumpur Royal Malaysia Police College reported that vehicle theft contributed 49% of the total index crime for the year 2004, as compared to 26% for year 1994. This issue has affected the car rental businesses negatively.

The car rental contract is designed in a specific form for the car leasing at which consists of the agreement between the lessee (renter) with the leaser (owner) of the automobile. Whereby at the specific time agreed he lessee entitles the right of the usage of the car, and at the same time the leaser will offer the features of the car agreed, together with the tax payment, insurance, maintenance, and the accessories

The contents of
the thesis is for
internal user
only

REFERENCES

- Agarwal, R., Ghosh, B., Banerjee, S., & Kishore, S. (2000). Ensuring WebSite Quality: A case study. (IEEE), 665-670.
- Ambler, & William, S. (2004). The Object Primer: Agile Model Driven Development with UML 2.: Cambridge University Press.
- Andrews, T., Curbera, F., Dolakia, H., J. Golland, Klein, J., Leymann, F., et al. (2003). Business Process Execution Language for Web Services.
- Arch-int, S., & Batanovv, D. N. (2003). Development of industrial information systems on the Web using business components. 50(Feb, 2), 231 – 250.
- Atkinson, R. J. (1997). Toward a More Secure Internet. (IEEE Computer), 57-61.
- Bemers-Lee, T. (1996). “WWW: Past, Present, and Future. (IEEE Software), 69-77.
- B. C. Smith and E. L. Johnson, "Robust airline fleet assignment: Imposing station purity using station decomposition," Transportation Science, vol. 40, no. 4, pp. 497-516,2006
- Chris Wullems, Oscar Pozzobon, Kurt Kubik: (Trust your receiver) Enhancing location security. GPS World, Oct 1, 2004
- Chonoles, Jesse, M., & Schardt, J. A. (2003). UML 2 for Dummies.: Wiley Publishing.

Coad, Peter, Lefebvre, E., & Luca, J. D. (1999). Java Modeling In Color With UML: Enterprise Components and Process.: Prentice Hall.

Discoverahobby. (2009). Extreme Sports : Learn Go Kart Racing [Electronic Version]. Retrieved 9/1/09 from <http://www.discoverahobby.com/learn-go-karts.htm>.

Fowler, & Martin. (2004). UML Distilled: A Brief Guide to the Standard Object Modeling Language, : Addison-Wesley

Guo, Y., & Xu, Z. (2007). Risk Management of Car Rental Industry in China. China: Xiamen University.

GPS technology retrieved on the 10/07/2009 from <http://www8.garmin.com/aboutGPS/>

Hooijdonk, A.V. (2008) Passive/Real time GPS car tracking systems. Retrieved on the Oct. 2008 from <http://www.gps-practice-and-fun.com/gps-car-tracking.html>

Jessa Liying Wang and Michael C. Loui University of Illinois at Urbana-Champaign(2006)

Jeon, H.T. (2006). Car Management System Using Mobile Phones and The Method Thereof. Retrieved on August 3, 2006 from <http://www.wipo.int/pctdb/en/wo.jsp?wo=2006080632>

Khalaf, R., Mukhi, N., & Weeravarana., S. (2004). Service Oriented Composition in BPEL4WS.

Krueger, C. W. (1992). Software Reuse. (ACM Computer Surveys), 131-183.

Li Jun, "Quick development of abroad car rental industries". China Vehicle Newspaper, August 27, 2002.

Lance N. Ulanoff, e. a. (1996, Sep, 10). Build Your Own WebSite. PC MAGAZINE, 101-111.

Lemiux, M. (2005). The Future of Web Design is Content Management! [Electronic Version]. Retrieved Feb, 8, 2008 from <http://www.webpronews.com/printable.php>

Maglogiannis, I., Kormentzas, G., Rouskasa, A., Vergadosa, D., & Panagiotarakis, N. (2003). An integrated platform for providing ship management, tourist information and booking services.

March, S., & Smith, G. (1995). Design and Natural Science Research on Information Technology. 251-266.

Marshall, C. C., & Shipnian, F. M. (1996). "Spatial Hypertext: Designing for Change. Vol. 38, No. 8(Communication of The ACM), 88-97.

Mowat, B. (2003). Exploding myths: online travel spreads its tentacles.

Markus Miettinen_ Lehrstuhl für Kommunikationssicherheit Ruhr(July

21, 2003)-Universität Bochum, Germany

Nielsen, J. (1993). Usability engineering.

Noruzzi, A. (2004). Introduction to Webology [Electronic Version], 1.
Retrieved Feb, 3 2008 from <http://www.webology.ir/2004/v1n1/a1.html>.

Orlikowski, W. J., & Iacono, C. S. (2001). Research Commentary:
Desperately Seeking the “IT” in IT Research—A Call to Theorizing the
IT Artifact. 12(Information Systems Research), 121-134.

Polo, L. (2003). World Wide Web Technology Architecture: A Conceptual
Analysis [Electronic Version]. Retrieved Jan 8 from
<http://newdevices.com/publicaciones/www/>.

Purao, S. (2002). Design Research in the Technology of Information
Systems: Truth or Dare. (GSU Department of CIS Working Paper).

Peter H. Dana. Global positioning system overview. Available at URI:
http://www.colorado.edu/geography/gcraft/notes/gps/gps_f.html,
September 1994. [Link last checked: 2.6.2003]

Perot Systems. (2005). Application and IT Solutions for the Car Rental
Industry. United States.

Souer, J., Weerd, I. v. d., Versendaal, J., & Brinkkemper, S. (2005).
Situational Requirements Engineering for the Development of Content
Management System-based Web Applications.

Troyer, de, O. M. F., & Leune, C. J. (1998). WSDM: a user centered design
method for Web sites. 30(Apr 1-7), 205 – 212.

Vaishnavi, V. and Kuechler, B. (2006). Design Research in Information
Systems.

Wah, K.C., Yoong, M.Y.M. and Keng, G.B. (2005). Journal of Kuala Lumpur
Royal Malaysia Police College, pp51-52.

Yixun GUO, Zhiduan XU, College of Economics, Xiamen University,
361005,Xiamen, China

Yazao Yang, Wenzhou Jin, Xiaoni Hao Institute of Intelligent Transportation
Systems and Logistics South China University of Technology
Guangzhou, P.R.China