

**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

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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.

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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

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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.

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