

EXPERT TRACKING
AND
MAINTENANCE SYSTEM

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ABSTRACT

The purpose of this project is to generate a Web-based database system model for medium-size organizations to improve the efficiency and effectiveness of the organization's functions. The Unified Approach methodology is used and model has been developed using the Unified Modeling Language (UML). A prototype system named Expert Tracking and Management System has also been developed. The MySQL Database, PHP Server-side scripting language and Apache web server are used to develop the System. The system model is defined to acts as a reference model of the organization's Tracking and management system. Some problems and limitations that were discovered during the development of project are discussed. Finally some recommendations to overcome the limitations for the future development of this project are presented.

ABSTRAK

Tujuan projek ini adalah untuk menghasilkan satu model prototaip sistem pangkalan data yang berasaskan web untuk sebuah organisasi bersaiz sederhana. Sistem ini diharapkan dapat menambah baik keupayaan dan kebekesanan fungsi-fungsi dalam organisasi tersebut. Metodologi Pendekatan Unified telah digunakan untuk membangunkan sistem ini melalui Bahasa Permodelan Unified atau *Unified Modeling Language* (UML). Satu prototaip yang dikenali sebagai Sistem Pengesanan dan Penyenggaraan Pintar atau *Expert Tracking and Maintenance System* telah dibangunkan. Pangkalan Data MySQL, *PHP Server-side scripting language* dan Pelayan Web Apache telah digunakan untuk membangunkan sistem ini. Sistem ini akan bertindak sebagai satu model rujukan untuk sistem pengesanan dan penyenggaraan bagi organisasi tersebut. Semasa membangunkan projek ini beberapa masalah dan kekangan dapat dikenalpasti dan cadangan-cadangan telah dikemukakan untuk mengatasi kekangan ini untuk memperkembangkan projek ini pada masa akan datang.

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CHAPTER 1

INTRODUCTION

This project is initiated and the fulfillment of course Project (TZ6996) as one of the graduation requirements for MSc-Information Technology in University Utara Malaysia. The purpose of this project is to generate a model of a Web-based database system for medium-size organizations. The Unified Approach methodology is used and for the notation the Unified Modeling Language (UML) is chosen. A prototype system named Expert Tracking and Management System has also been developed. The model is defined to acts as a reference model of the organization's Tracking and management system.

This chapter gives an overview of organization's requirements, brief explanation about Database, Model and web database application and further discusses the problem statement, objectives, project scope, hardware and software requirements of the project.

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REFERENCES

Ali Bahrami (1999). *Object oriented systems development*. McGraw-Hill Companies, Inc. USA.

ARTiSAN Software Tools (1998). *Extending UML to design Object Oriented Real-time Systems*. (A WHITE PAPER from ARTiSAN Software Tools)

Conallen, Jim (1999). *Building Web Applications with UML object technology. 1st edition*. Addison-Wesley Long-man, Reading, Massachusetts, USA

Conallen, Jim (2000). *Building web applications with UML*. The Addison-Wesley Object Technology Series.

Connolly, Thomas M., Begg, Carolyn E. (1999). *Database System: A practical approach to design, implementation, and management*. 2nd Edition. Addison Wesley.

Developers Resources (last updated : 10 August 2001). *Technical articles : Using UML to create an enhanced IDE*. Retrieved on January 18, 2002 available at <http://www.sun.com/forte/ffj/resources/index.html>

Douglass, Bruce Powel (1997), *Designing Real-Time Systems With the Unified Modeling Language*, *Electronic Design*, Vol. 45, No. 20, pp. 132-138.

Elmasri R. and Navathe S. (2000). *Fundamentals of Database Systems 3rd Edition*. Addison-Wesley pp 42-43

Eugene McSheffrey (2001). *Integrating Business Process Models with UML System Models* (A WHITE PAPER from Popkin Software)

Florescu, D., Levy, A., Mendelzon, A.(1998). *Database techniques for the World-Wide Web: A Survey*, ACM SIGMOD Record, 27, 3, Sept.

Jacobson, I., Christerson, M., Jonsson, P., Övergaard, G.,(1992). *Object-Oriented Software Engineering – A Use Case Driven Approach*, Addison-Wesley.

Jones, Meilir Page (2000). *Fundamentals of object-oriented design in UML*. Addison Wesley, Massachusetts.

Larman, Craig (2001). *Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design. 2nd Edition*. Prentice-Hall, Inc New Jersey.

MySQL Reference Manual for version 3.23.38. Available at :
<http://www.mysql.com/documentation/>

Nahouraii, Ez. And Petry, Fred. (1991). *Object oriented databases*. IEEE Computer Society Press.

OMG Unified Modeling (June, 1999), *UML 1999 Language Specification. Version 1.3* retrieved on January 9, 2002 available at <http://www.omg.org>

Sterling Hughes (2001). *A Database-Independent API for PHP*. Available at:
<http://www.webtechniques.com/archives/2000/10/hughes/>

Stopbit - *A technology news site using MySQL and PHP*. Available at :
<http://www.stopbit.com/>

UML Tutorial Part 1, retrieved on January 19, 2002 available at :
<http://www.sparxsystems.com.au/index.html>

Williams, Tom (1997) *Standard Graphical Notation Proposed For Object-Oriented Language*, Electronic Design, Vol. 45, No. 2, pp. 137-138.

Whitten. J, Bentley L, Ditmann, K (2000). *System analysis and design method 5th Edition*. Mc Graw Hill Irwin.

World Records - *A search engine for information about music that uses MySQL and PHP*. Available at : <http://www.worldrecords.com/>

Zachman, John A.,(1987). *A Framework for Information Systems Architecture*. *IBM Systems Journal*, vol. 26, no. 3. IBM Publication G321-5298