

Web Based Help Desk System for UUM CAS Postgraduate Help Desk

Department Based On Problem Tracking Technique

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UNIVERSITI UTARA MALAYSIA

2011

A handwritten signature in black ink, appearing to read "Fadi Shaar". The signature is fluid and cursive, with some loops and variations in letter form.

Web Based Help Desk System for UUM CAS Postgraduate Help Desk

Department Based On Problem Tracking Technique

A thesis submitted to the Academic Dean Office in partial fulfillment

of the requirement for the degree Master of Science

(Information Technology)

Universiti Utara Malaysia

By

Fadi Shaar

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ABSTRACT

The current traditional help desk mechanisms used in UUM CAS postgraduate help desk department at UUM are no longer enough to support the increase of the interactions between the users and the technical support employees because there is no standard and organized process for handling the users' requests. This paper proposes a technical support system that can help students, staff and even lecturers at UUM CAS Postgraduate department to freely interact with the customer service employees by sending their requests and inquiries through a web-based help desk system. In the other side, this proposed system also helps to increase the productivity of the employees in the customer service department since each specific ticket or problem is received by a specific group of the technical support employees. In order to achieve that, we suggest to use a problem tracking technique. This technique enables the users to send their inquiries to the proper person in the customer service department. Moreover, this technique aims to track the problem or ticket until it gets their direction to the proper person of the customer service employees who have the ability to solve it within a convenient time.

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LIST OF APPREVIATION

BLL Business Logic Layer

CLR Common Language Runtime

DLL Dynamic Link Library

FAQ Frequently Asked Questions

JIT Just-In-Time Compiling

IL Intermediate Language

IDAL Interface Data Access Layer

OOP Object Oriented Programming

SQL Structured Query Language

T-SQL Transaction-Structured Query Language

UML Unified Modeling Language

CHAPTER ONE

INTRODUCTION

1.0. Background

Nowadays, a technical support service plays a main role in a University's ability to assist their students who really need some information and technical support guides. In the meanwhile, Educational institutions face the challenge of providing technical support to faculty, staff, and students for answering their questions and responding to their inquiries and problems with a suitable solution and within a convenient time (Cruess, 2002 and Niedzwiecki & Peterson, 2002). Moreover, the main goal of customer service is to provide better overall service to the customer when they contact the customer service employees, either through email, or a phone call. The most important thing is to make sure that everyone is satisfied with the first answer they receive with a correct solution in a timely manner. In addition, technical support employees should be proactive and resolve as many issues as they can before the customer even notices that something may have gone wrong. The customer should notice an improvement in the turnaround time when a help request is submitted, as well as a reduction in the number of times they have to ask for help until he/she gets the solution (Schauer & Thompson, 2004).

This proposed study makes an enhancement in the current technical support mechanism used by the UUM Postgraduate technical support department. It is conducted based on Problem Tracking Technique which helps to ensure consistent and quality support, tracks the information and problems that come into the Help

The contents of
the thesis is for
internal user
only

REFERENCES

Ali, H. N., Shukur, Z., & Idris, S. (2007). A Design of an Assessment System for UML class Diagram. *International Conference on Computational Science and Application, ICCSA 2007*. Kuala Lumpur, Malaysia: IEEE Computer Society. 539.

Albin, J. (2002). *A Beginner's Guide To Understanding Technical Support*. Indiana: Juniverse.

Al-Asiri, T. (2007). N-Tier Application Design [Photograph]. Retrieved January 2, 2011, from URL <http://www.al-asiri.com/Contents/articles/NTierDesign/6.jpg>

Al-Asiri, T. (2007). N-Tier Application Design [Photograph]. Retrieved January 2, 2011, from URL <http://www.al-asiri.com/Contents/articles/NTierDesign/3.jpg>

Al-Asiri, T. (2007). N-Tier Application Design [Photograph]. Retrieved January 2, 2011, from URL <http://www.al-asiri.com/Contents/articles/NTierDesign/4.jpg>

Booch, G., Maksimchuk, A. R., Young, J. B., Conallen, J., Houston, A. K. (2007). *Object-Oriented Analysis and Design with Applications*. Boston: Pearson Education, Inc.

Bacal, R. (2005). *Perfect Phrases For Customer Service*. New York: McGraw-Hill.

Cruess, A. (2002). Transforming a help desk from average to excellent. In *Proceedings of the 30th annual ACM conference on User services, SIGUCCS 2002*. New York, USA: ACM, Inc. 229-231.

Czengel, B. (2001). *Technical support on the Web Designing and Maintaining an Effective E-Support Site*. New York: John Wiley & Sons, Inc.

Cooper, J. (2002). *Introduction to design patterns in C#*, California: IBM T J Watson Research Center.

Dennis, A., Wixom, H., & Tegarden, D. (2005). *System analysis and design with UML version 2.0: an object-oriented approach with UML*, Hoboken, NJ: John Wiley and Sons, Inc.

Edwards, J. (2010). Documentation space for Kayako Fusion, Kayako Resolve and Kayako Engage. Retrieved October 25, 2010, from :
<http://wiki.kayako.com/display/DOCS/Home>

Grove, F. R. (2009). *Web-Based Application Development*. USA: Jones & Batlett.

Hoffer, J., George, J., & Valacich, J. (2002). *Modern Systems Analysis and Design*. New Jersey, USA: Prentice Booking.

Iwai, K., Iida, K., Akiyoshi, M., & Komoda, N. (2010). A helpdesk support system with filtering and reusing e-mails. In *Proceedings of the 8th IEEE International Conference on Industrial Informatics, INDIN 2010*. Osaka, Japan: IEEE Computer Society. 321-325.

Ivar, J., Magnus, C., Patrik, J., & Gunnar, O. (1993). *Object-Oriented Software Engineering*. England: Addison Wesley.

James, R., Ivar, J., & Grady, B. (2006). *The Unified Modeling language reference manual*. New York: Addison Wesley.

Kayako, I. (2009). Kayako Support Suite Quick Start Guide: KSSQS. Boise, Idaho United States of America.

Knapp, D. (2009). *A Guide To Help Desk Concepts*, Stamford: Cengage Learning.

Liu, Z. (2002). *Object-Oriented Software Development with UML*. Macau, China: International Institute for Software Technology.

Leffingwell, D., Widrig, D. (2003). *Managing Software Requirements: A Use Case Approach*. New York: Addison - Wesley Professional, Inc.

Nash, T. (2010). *Accelerated C# 2010*. New York: Paul Manning.

Niedzwiecki, R., Peterson, M. (2002). Help desk support: to be or not to be eligible. In *Proceedings of the 30th annual ACM conference on User services, SIGUCCS 2002*. Rhode Island, USA: ACM, Inc. 89-94.

Powell, G. (2006). *Beginning Database Design*. Indianapolis: Wiley Publishing, Inc.

Refsdal, A., & Stølen, K. (2008). Extending UML sequence diagrams to model trust-dependent behavior with the aim to support risk analysis. *Electronic Notes in Theoretical Computer Science*, 197(2), 15-29.

Robertson, S., Robertson, J. (2006). *Mastering the Requirements Process*. New York: Addison - Wesley Professional, Inc.

Schauer, N. R., Thompson, R.S. (2004), Improving Customer Service at the ARL MSRC. In *Proceedings of the Users Group Conference, DOD _UGC 2004*. MD, USA: IEEE Computer Society. 285-288.

Schmuller, J. (2002). *SAMS teach yourself UML in Hours*. Indiana, USA: SAMS Publishing.

Sekaran, U. (2006). *Research Methods For Business*. India: Wiley India Pvt. Ltd.

Underwood, A.J., Hegdahl, D., & Gimbel, J. (2003). To Corral Support, A Proper Set of Tools are Needed. In *Proceedings of the 31st annual ACM fall conference, SIGUCCS 2003*. New York, USA: ACM, Inc. 23-26.

Vanderlip, S. (2004). IT Support Help Desk Implementation Strategies. *Paper presented at the California Educational Technology Professionals Association conference*, California: Internet software Sciences.

Vaishnavi, V., & Kuechler, W. (2004). Design Research in Information Systems. Retrieved 10, 25, 2010, from: <http://desrist.org/design-research-in-information-systems/>

Vieira, R. (2005). *Beginning SQL Server™ 2005 Programming*. Indianapolis: Wiley Publishing, Inc.

Walther, S. (2010). *ASP.NETMVC Framework unleashed*. San Francisco: Pearson Education, Inc.

Wooten, B., Wooten, R.G. (2001). *Building & Managing a World Class IT Help Desk*. New York: McGraw- Hill Osborne Media.