

**A DATA WAREHOUSE ARCHITECTURE MODEL
FOR
AL-QUDS OPEN UNIVERSITY**

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UNIVERSITI UTARA MALAYSIA

2006



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**A DATA WAREHOUSE ARCHITECTURE MODEL
FOR
AL-QUDS OPEN UNIVERSITY**

A thesis submitted to the Graduate School in partial
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Abstract

Data warehousing is important, not only in business enterprises, but in the university environment as well. The goal of a data warehouse is to integrate timely, accurate information and to make it available to an organization's employees and decision makers. The data warehouse is developing in response to increasing data and information requirements. The traditional notion of data warehouses is evolving into a federated warehouse augmented by a set of processes and services to support integrated and consistent access to heterogeneous, decentralized warehouse systems. This study will explore the design and implementation of a data warehouse architecture model for the Al-Quds Open University (QOU) in Palestine, within the Context of Relational Online Analytical Processing (OLAP). The model aims at integrating data from different sources in the QOU.

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CHAPTER 1

INTRODUCTION

This chapter will explain the background of the research study in data warehouse. Starting with introduction to concept of data warehousing it will provide the basic concepts associated with data warehouse. Additionally I have formulated the research question and aim of study in this chapter.

1.1 Background

Building a data warehouse has become fairly common in today's world but with varying degrees of success. The reason for the mixed results is due to the complexity of building the data warehouse in addition to the level of competency of the participants involved (Ken, 2006).

Data warehouses are computer based information systems that are home for "secondhand" data that originated from either another application or from an external system or source. Warehouses optimize database query and reporting tools because of their ability to analyze data, often from disparate databases and in interesting ways. They are a way for managers and

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REFERENCES

- Batini, C., Ceri, S., and Navathe, S.K.,(1992), Conceptual Database Design: An Entity-Relationship Approach. Benjamin/Cummings, Redwood City, CA.
- Brown, A.J. (1995), "What is a data warehouse?", UNIX Review, Volume. 13 No.9, pp.39.
- Connolly, Thomas; Begg, Carolyn, (2005), Database Systems A Practical Approach to Design, Implementation, and Management, Fourth Edition, Pages (1150 -1178).
- Elamy A.H.; Reda S. Alhadj; Behrouz H. Far, (2005), Building Data Warehouses With Incremental Maintenance For Decision Support, IEEE CCECE/CCGEI, Saskatoon, pp. 1809-1814.
- Fred R. (1996), Data Warehouse for EIS: Some Issues and Impacits, IEEE, Volume 1060-342519.
- Fuller D.R., (2002), The Fundamentals of Data Warehousing: What is a Data Warehouse? <http://www.datawarehouse.com/article/?articleid=2989> Access on 7 June 2006
- Guan J., Nunez W., Welsh J., (2002), Institutional strategy and information support: the role of data warehousing in higher education, Campus-Wide Information System, Volume 19, pp. 168-174.

- Inmon, W. (1997), Metadata in the data warehouse: A statement of vision, White Paper; www.inmoncif.com/library/whiteprs/techtopic/tt10.pdf Access on 9 June 2006
- Inmon, W. (2000), Metadata in the data warehouse, White Paper; www.inmoncif.com/library/whiteprs/earlywp/ttmeta.pdf Access on 9 June 2006
- Inmon, W. (2002), Building the Data Warehouse, 3rd edition. Wiley, New York.
- Inmon, W. (2006), The Spiral Development Methodology In DW2.0, White Paper; <http://inmoncif.com/news/pdf/methodologyFN.pdf> Access on 22 June 2006
- Ken, Pohl, (Published January 10, 2006), How to Build a Data Warehouse, <http://www.datawarehouse.com/article/?articleid=5898>, access on 2 June 2006.
- Kimball, R., Reeves, L., Ross, M., and Thronthwaite, W., (1998) The Data Warehouse Lifecycle Toolkit. Wiley, New York.
- Kothari, C. R. (1985). Research Methodology, Methods and Techniques. Delhi: Wiley Eastern Limited.
- Lambert B. (1996), Data Warehousing Fundamentals: What You Need To Know To Succeed; http://www.dmreview.com/article_sub.cfm?articleId=1313 Access on 4 August 2006.
- Ma C., Chou. D., Yen D., (2000), Data warehousing, technology assessment and management, Industrial Management & Data Systems, Volume 100 pp. 125-135.

- Raizada S., (2001), Eleven Steps to Success in Data Warehousing, white paper, www.syntelinc.com/uploadedFiles/Syntel_DW_11steps.pdf Access on 10 June 2006.
- Sung Ho Ha, Sang Chan Park, (1998), Data Modeling For Improving Performance Of Data Mart, IEEE, Volume 0-7803-5082-0/98.
- Unknown, (2002), Data Warehouse Description, <http://www.mnhs.org/preserve/records/dwintro.html>, access on 2 June 2006.
- Vaishnavi, V. & W. Kuechler (2005): Design research in information systems, <http://www.isworld.org/Researchdesign/drisISworld.htm> .
- Varde A.S.,(1999), Data Warehousing and Data Extraction on the World Wide Web, WebTech99.
- Vassiliadis P., (2000), Data Warehouse Modeling and Quality Issues, Ph.D. Thesis; www.dbnet.ece.ntua.gr/pubs/uploads/PHD-2000-1.pdf Access on 13 June 2006.
- Wayne Eckerson, (2003), Four Ways to Build a Data Warehouse, <http://www.tdwi.org/Publications/display.aspx?id=6699&t=y> Access on 9 June 2006
- Zhou Sh., Zhou A., Tao X., and Hu Y.,(2000), Hierarchically Distributed Data Warehouse, IEEE, Volume 0-7695-0589-2/00.