Ain Shams University
Faculty of Engineering

A Decision Support System for Fund Management

THESIS

Submitted for the partial fulfillment of the requirements of
Master Degree in Computer Engineering

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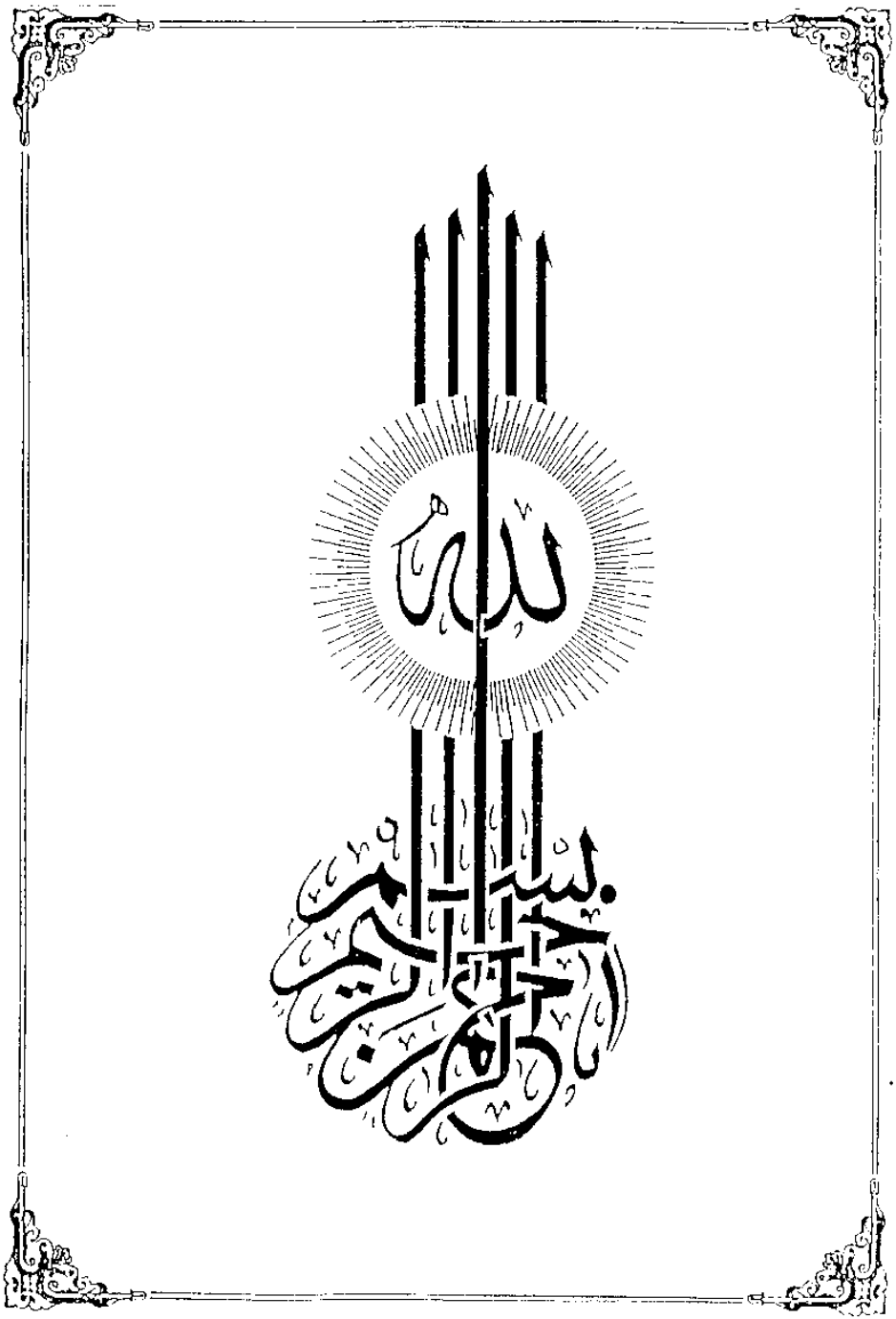

Statement

This dissertation is submitted to Ain Shams University for the degree of Master of Science in Computer Engineering.

The work included in this thesis was carried out by the author in the department of Computers and Automatic Control, Faculty of Engineering, Ain Shams University, from 1991 to 1994.

No part of this thesis has been submitted for a degree or a qualification at any other university or institute.

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Thesis Construction

Expert Systems are fast becoming the leading edge of the Artificial Intelligence (**AI**) technology, because of the need for such systems in commercial and scientific enterprise. ***Expert Systems*** are now proving their financial and economic worth in today's commercial market place. The complexity of the business problems and the critical nature of the decisions to be made, make management one of the most important application fields for expert systems.

This thesis discusses the design and implementation aspects of a **F**und **M**anagement **S**ystem (**FMS**) which is capable of managing large numbers of portfolios simultaneously, starting from the creation of the model portfolio to analyzing the existing client's portfolio and generating the recommended Buy/Sell orders

A prototype system has been constructed using **NEXPERT OBJECT** expert system shell together with the modeling power of the **K**nowledge **A**cquisition and **D**esign **S**tructuring methodology (**KADS**) to simulate the user interest, for the development of a **K**nowledge **B**ased **E**xpert **S**ystem (**KBES**).

The study consists of five chapters and two appendices, with the necessary figures and tables. The introductory part is a highly tutorial one. It was meant to be so, so as to provide the reader interested in the subject with a short

concentrated logical summary of that area. The following is a brief description of the thesis chapters :

Chapter one (Introduction to Expert Systems), starts with an introduction to expert systems, expert systems terminology, the domains suitable for expert systems design, the components of an expert system and the stages of development of a **KBES**, focusing on the knowledge representation and the knowledge acquisition techniques. Finally concentrates on the principles and models that underlie the **KADS** approach to build a **KBES**.

In ***chapter two (Expert Systems in the Financial Business Services)***, we present a quick survey of the available existing expert systems application in the domain of the financial and banking services, then we focus on the decision support systems for investment management. Finally the idea behind the Fund Management System (**FMS**) which is the subject of this thesis is discussed.

In ***chapter three (Business requirements for the FMS)***, we describe the development of the **FMS**, in **KADS** terms. We focus our description on the organizational and application models summarizing the business requirements of the prototype system. Then we investigate some types of common securities. Finally we discuss the factors affecting the investment decision, from which we will try to find an answer to the important question, how can we create a model portfolio ?

Chapter four (Logical design specification for the FMS using KADS), goes through the development of **FMS**, in **KADS** terms. We focus our description on the conceptual model (model of expertise and cooperation model), as well as a full task decomposition and distribution of the **FMS** prototype.

Chapter five (The FMS prototype Design Model and Implementation), describes the **FMS** design model and the system database, as well as a full decomposition of the knowledge bases used in the development of the **FMS** prototype (Classes, Objects and Rules), and finally we focus the light on the conclusion and system's limitations.

Appendix (A) talks about an introduction to NEXPERT Object explaining its reasoning dimension as well as its representation dimension, and briefly goes through the NEXPERT environment and then focuses on the knowledge design and editing. After that it explains the rule and object worlds, and finally explains the NEXPERT database links.

Appendix (B) gives a case study of the complete FMS system, starting from its main menu, maintaining a number of holdings for a client's portfolio, then loading the strategy knowledge base, inferencing it, showing the resultant strategy or model portfolio, calculating its percentage distribution, then loading the portfolio analysis knowledge base, showing the resultant buying and selling orders, which if confirmed, will bring the client's portfolio in line with the created model portfolio.

Table of Contents

Chapter (4)
Logical design specification for the FMS Using KADS 80

Chapter (5)
The FMS Prototype Design Model and Implementation 124

List Of Figures