LEVELS OF PROTECTION AND ASSOCIATED OVERHEAD IN THE FORMULARY PROTECTION SYSTEM

by

LYLE KLEOPFER

B. A., TABOR COLLEGE, 1971

A MASTER'S REPORT

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Department of Computer Science

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1975

Approved by

Virgil E. Wallentine
Major Professor

TABLE OF CONTENTS

ACKNOWLEDGEMENTS

I wish to acknowledge the assistance given by Dr. Virgil Wallentine, my major professor, Dr. Paul Fisher and Dr. Myron Calhoun in the preparation of this report. I especially want to thank Dr. Wallentine for suggesting the topic, basic format and proofreading the report.

LIST OF FIGURES

LIST OF TABLES

CHAPTER I

INTRODUCTION

In recent years large computer data banks have moved from a place in the future to a very real part of today's world. No longer do companies depend on clerks to do bookkeeping, most company records are now maintained by a computer. Many people now expect that a nationwide computer information system will be developed in the very near future. A real cost savings will be realized due to the fact it is much less expensive to share information than to reproduce it. Already many companies depend on a central facility to provide information almost instantaneously for management at remote terminals.

Much of this information stored on these on-line files can be considered confidential. Divulgence of such information to company personnel who have no real need to know or to intruders poses a real threat to an information system. Thus protection of the files and verification of attempted accesses is a subject of vital importance.

Protection refers to the logical and physical mechanisms for controlling access to data. The purpose of a protection system is to guarantee that during the execution of a program each attempted access to a data object be verified as authorized. Additionally, the protection mechanism must verify the mode of the access, for example 'read-only' access, to a particular object. The protection system

must be designed in such a way as to guard against failures in either hardware or software that would leave data records unprotected.

Thus the object of a protection system is to devise mechanisms which will provide protection to the greatest extent possible at the lowest cost in terms of hardware usage, run-time or program size. One comment has been made by Farr concerning this area: "An information system can never be completely safe but the cost to an intruder to gain information can be made higher than the value of the information to be gained." (3).

At this time very few cost justification or overhead studies of protection systems have been done. This is due, in large part, to the difficulty in isolating (identifying) distinct parts of the standard protection system which induce overhead and the difficulty in separating the protection system from general operating system overhead. One additional factor needs to be considered when analyzing the costs of the usual protection system; and that is, to upgrade the level of protection usually entails extensive modifications to the overall system.

One protection system model which readily lends itself to both cost evaluations of different modules and modifications of existing protection levels is the formulary protection system model developed by Lance J. Hoffman (7). This ease of measurement and extensibility of protection is due primarily to the modularity of the system. Thus to determine