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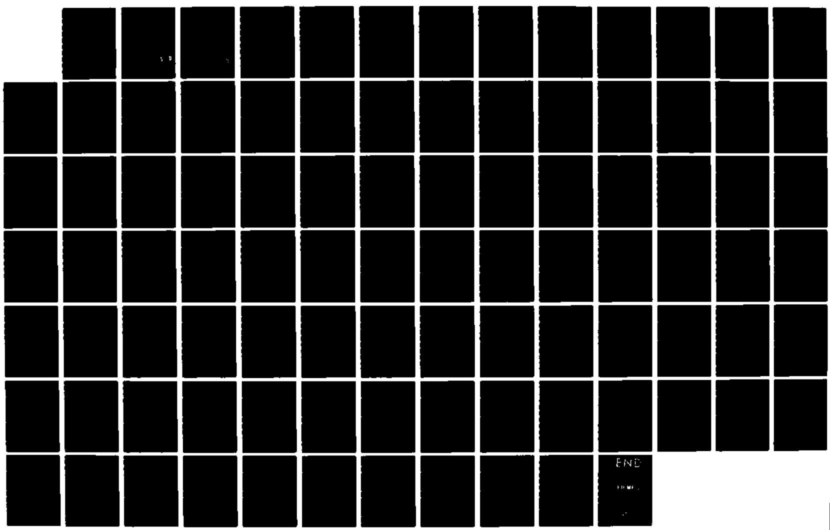

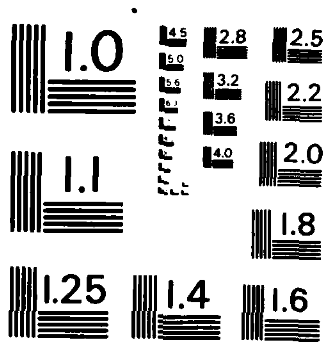

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DESIGN AND IMPLEMENTATION OF A
RELATIONAL DATABASE MANAGEMENT SYSTEM
FOR THE AFIT THESIS PROCESS

THESIS

Joseph D. Perkumas, B.S.
Major, USAF

AFIT/GLM/LSH/85S-63

DEPARTMENT OF THE AIR FORCE
AIR UNIVERSITY
AIR FORCE INSTITUTE OF TECHNOLOGY

Wright-Patterson Air Force Base, Ohio

2

AFIT/GLM/LSH/85

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AFIT/GLM/LSH/85S-63

DESIGN AND IMPLEMENTATION OF A RELATIONAL DATABASE MANAGEMENT SYSTEM FOR THE AFIT THESIS PROCESS

THESIS

Presented to the Faculty of the School of Logistics

of the Air Force Institute of Technology

Air University

In Partial Fulfillment of the

Requirements for the Degree of

Master of Science in Logistics Management

Joseph D. Perkumas, B.S.

Major, USAF

September 1985

Approved for public release; distribution unlimited

Preface

The purpose of this study was to evaluate the feasibility of implementing a computerized database management system to support the AFIT thesis process.

A database was designed and implemented using a relational database management system. Although the database was limited to thesis topics and advisors, this system would be useful for other supervisory and administrative functions.

I wish to express my appreciation to my advisor, Dr. Robert B. Weaver, for his guidance and assistance throughout this research project. I am also indebted to Major Charles E. Beck for initially suggesting the topic, and to Dr. Terrance M. Skelton and Major John A. Stibravy for their cooperation in developing and implementing the database. Finally, I would like to give special thanks to my wife, Leslie, and my children, Kristin and John, for their patience, understanding, and encouragement during this academic year.

Joseph D. Perkumas

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Abstract

The purpose of this research was to evaluate the feasibility of implementing a computerized database management system to support the AFIT thesis process.

The methodology consisted of both logical and physical database design. User requirements were determined through an analysis of the existing system and interviews, and a system-independent description of the database was developed. The database was implemented using R:base Series 6000, a relational database management system, on a Burroughs microcomputer system. A guide to the database is included.

DESIGN AND IMPLEMENTATION OF A RELATIONAL DATABASE MANAGEMENT SYSTEM FOR THE AFIT THESIS PROCESS

I. Introduction

General Issue

To be eligible for award of the Master of Science degree, each student in the School of Systems and Logistics must complete an independent research investigation on a problem of interest to the Department of Defense (DOD) and present the results of the research as a formal thesis (1:50). The Department of Communication and Research Methods (LSH) is responsible for the supervision and administration of the thesis research program. LSH is specifically responsible for:

1. Administering and supervising graduate thesis research,
2. Collecting potential research topics,
3. Coordinating faculty review and screening of topics,
4. Preparing faculty-approved topics for student review,
5. Maintaining a listing of the qualifications and interests of potential Thesis Advisors for student use,
6. Monitoring selection of the Thesis Advisors and other members of the Thesis Committees assigned to work with the graduate students on their research efforts,
7. Administratively controlling the use of research surveys/questionnaires for gathering information related to research topics,
8. Prescribing the format and requirements for preparation of the final copy of the thesis,

9. Reviewing the final copy of the thesis to assure compliance with the prescribed format, and
10. Supervising the publication and distribution of student theses in accordance with applicable directives. (1:64-65)

A student begins the thesis process by selecting a topic. To assist the student, a list of potential topics from DOD organizations and the faculty is maintained in a file in the School library (8:5). This list includes a working title, a statement of the problem, a faculty contact, and information sources on background, data, and expertise. The Air University Compendium of Research Topics and theses completed by recent graduates are also maintained in the library (8:5).

Once a topic is selected, the student must then select a thesis advisor interested in working on that topic. To assist the student in this process, a file of qualified faculty members is also maintained on reserve in the library (8:8). This file includes a list of qualified thesis advisors, adjunct readers, interns, and committee members; a topical index of thesis advisors; and a brief description of each faculty member's academic rank/job title, education, relevant experience, professional activity, and statement of research interest.

Although these sources are available, because of their lack of integration, they are not used to their fullest potential.

Specific Problem

The problem is that an integrated source of thesis topics and advisors does not exist in the School of Systems and Logistics. Can an integrated computerized database and database management system be applied to correct this deficiency?

Background

Database Systems. In *An Introduction to Database Systems*, C.J. Date describes a database system as a computer-based recordkeeping system composed of data, hardware, software, and users whose overall purpose is to record and maintain information (2:3-4).

Data. A database may be defined as "a collection of stored operational data used by the application systems of some particular enterprise" (2:7). This data is both integrated and shared. "Integrated" refers to the consolidation of distinct data files so redundancy is either partially or wholly eliminated. "Shared" refers to the condition in which the same data may be used by several different users (2:5). Databases may be modeled as hierarchies, networks, or relations depending on the relationships that exist between data elements (see Figure 1.1). Hierarchical and network data models both consist of several levels of data elements. In a hierarchy,

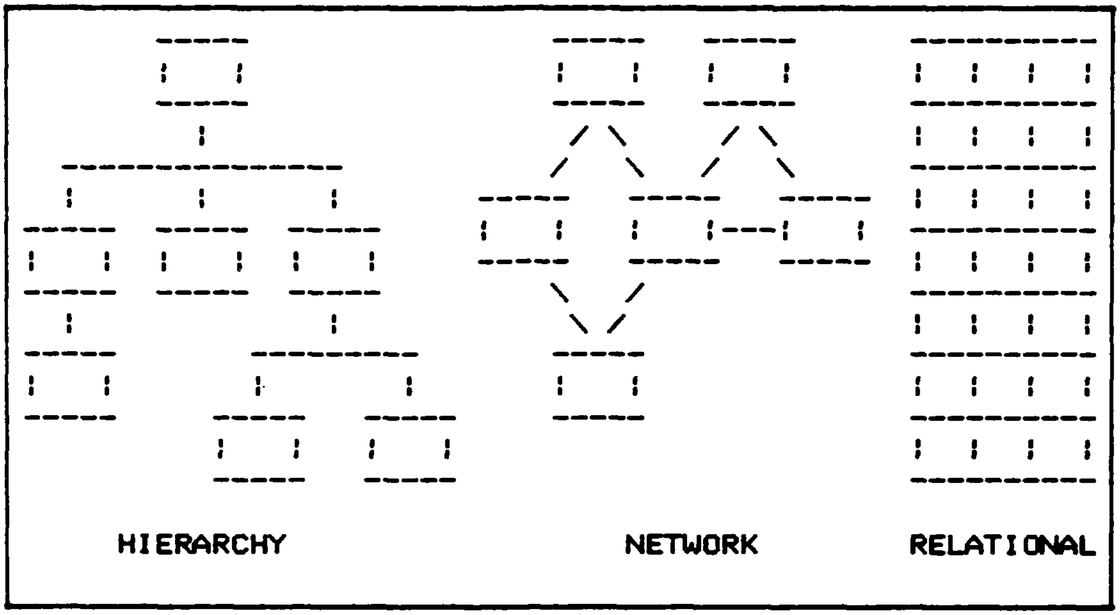

Figure 1.1. Database Models

data elements at lower levels are subordinate to single data elements in the next higher level. The single data element at the top of the model is called the root. A network is a more general structure since the data elements at lower levels may be subordinate to more than one data element in higher levels. A relation is a two-dimensional table containing data elements (10:12-13). Relational data models will be discussed more fully later in this chapter.

Table 1.1 lists the relative advantages and disadvantages of each data model. As the table indicates, a relational data model offers substantial advantages.

Table 1.1
Database Model Advantages and Disadvantages (9:25)

ADVANTAGE	DISADVANTAGE
Hierarchy:	
* Optimizes control and management of data * Eliminates redundancy * Centralizes control * Improves security of data for data center	* Old architecture designed only to optimize hardware usage * Inflexible to change * Data hard to manipulate * Changes to data base greatly affect programs attached to it * Fixed structure - data "locked" in place and inflexible * Difficult to get ad hoc reports
Network:	
* Optimizes control and management of data * Eliminates redundancy * Centralizes control * Improves security of data for data center * As compared to hierarchical, file structure less restricted and more flexible	* Aging technology, designed to optimize hardware usage and make information more accessible * For high-tech users - hard to use * Difficult to get ad hoc reports * Complicated structure: hard to maintain * Inflexible to change * Changes to data base greatly affect programs attached to it
Relational:	
* Optimizes control and management of data * Designed to optimize programmer/end-user usage * Easy to use - for all users * Extremely flexible * Simple data manipulation * Changes to data base have no effect on programs	* Uses more hardware resource (effect can be minimized through use of indexes in the data base)

Table 1.1 (Continued).
Database Model Advantages and Disadvantages (9:25)

ADVANTAGE	DISADVANTAGE
Relational:	
* Designed for applications design and development to help eliminate the backlog * Eliminates redundancy * Centralizes control * Improves security of data for data center * Easy to obtain ad hoc reports	

Hardware. The hardware consists of the secondary storage volumes, associated devices, control units, and channels (2:5).

Software. A database management system (DBMS) is the software that exists between the physical database itself and the users of the system. All access to the database is through the DBMS (2:6). A DBMS contains two specific functions: a Data Definition Language (DDL) and a Data Manipulation Language (DML). The DDL provides a definition or description of data elements, and the DML supports the manipulation of these elements (2:21). R:base Series 6000, a relational DBMS for microcomputers from Microrim Inc. was used on this project.

Users. C.J. Date defines three classes of users of a database management system: application programmers, end-users, and the database administrator (DBA). The applications programmer is responsible for writing

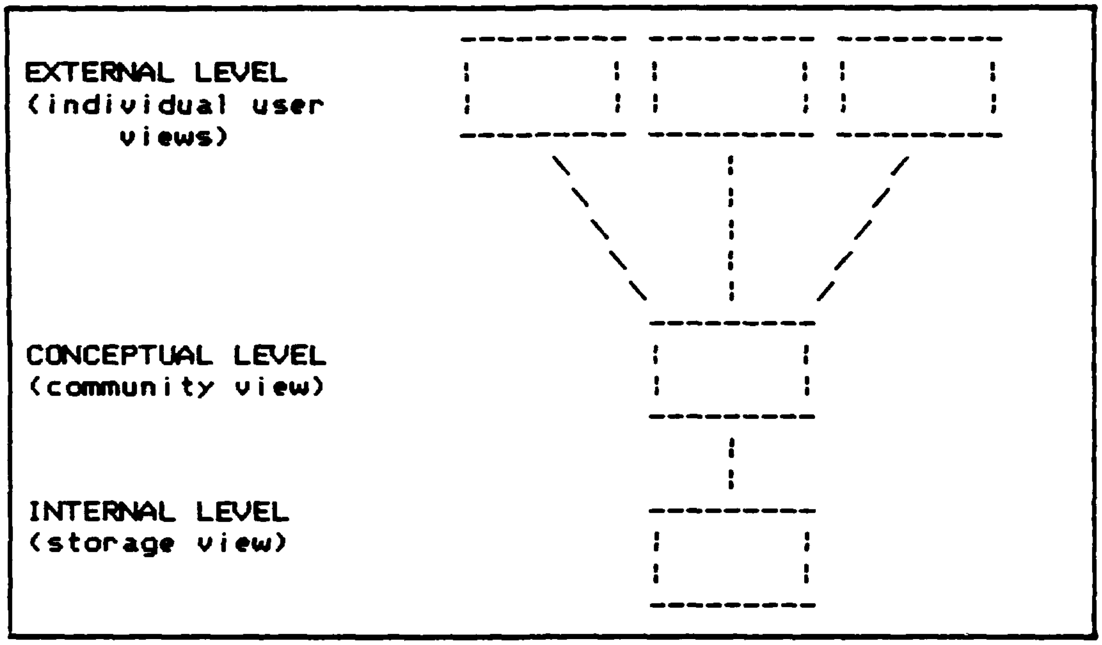

Figure 1.2. The Three Levels of Architecture

application programs typically in a high-level language that operate on the database by either retrieving, creating, deleting, or modifing information. The end-user, usually accessing the database through a terminal, may also perform these functions; however, he or she is primarily concerned with retrieval of data. The database administrator is responsible for overall control of the system (2:6).

Architecture of a Database System. The architecture of a database system is divided into three levels: internal, conceptual, and external (see Figure 1.2). The internal level involves the way data is actually stored and is defined by the internal schema. The external level refers to the way data is viewed by the individual user and is defined by an external schema. The conceptual level represents the entire information content of the database and is defined by the conceptual schema. Given these three levels, two levels of mapping exist: one defines the correspondence between the internal and conceptual levels while the other defines the correspondence between the conceptual and external levels (2:21-24).

Relational Data Model. In a relational data model, a relation is a two-dimensional table conforming to a set of simple rules. These rules are:

1. Within a relational system, the table must contain only one type of record. Each record has a fixed number of fields, all of which are explicitly named. The database will usually contain numerous tables, so that different kinds of records are held in different tables;
2. Within a table the fields are distinct, and repeating groups are not allowed;
3. Each record within a table is unique; there are no duplicate records;
4. The order of the records within the table is indeterminate. The records may come in any order, and there is no predetermined sequence;
5. The fields within any column take their values from a domain of possible field values. The same domain can be used for many different field types, perhaps in several tables;
6. Finally, new tables can be produced on the basis of a match of field values from the same domain in two existing tables. The formation of new tables from existing tables is the essence of relational processing. (5:27)

Two typical tables (relations) are shown in Figure 1.3. The columns of a table are known as attributes, while the rows, containing related attributes, are known as tuples (rhymes

ADVISOR

ADVNUM	NAME	STATUS	OFFSYM
0001	Brown	Q	LSH
0002	Smith	Q	LSM
0003	Jones	I	LSP
0004	White	C	LSY
0005	Green	Q	LSH

TOPIC

TOPNUM	TITLE	ADNUM
0001	Acquisition	0002
0002	Reliability	0001
0003	Contracts	0004

Figure 1.3. Two Typical Relations

with "couples") (2:65). The degree of a relation is the number of columns, while the cardinality of a relation is the number of rows (5:28). The relation ADVISOR shown in Figure 1.3 has four columns (attributes) or a degree of four and five columns (tuples) or a cardinality of five. Each column is headed by the name of the attribute, e.g., STATUS. The intersection of a row and column in a table is known as an attribute occurrence or attribute value, e.g., Jones (4:37). In traditional terms, a table resembles a file, a row resembles a record (occurrence, not type), and a column resembles a field (type, not occurrence) (2:93).

Relational Algebra. Relational algebra defines the set of high level operations which manipulate the database to produce new relations. Relational algebra includes the relational operations (SELECT, PROJECT, and JOIN) and the

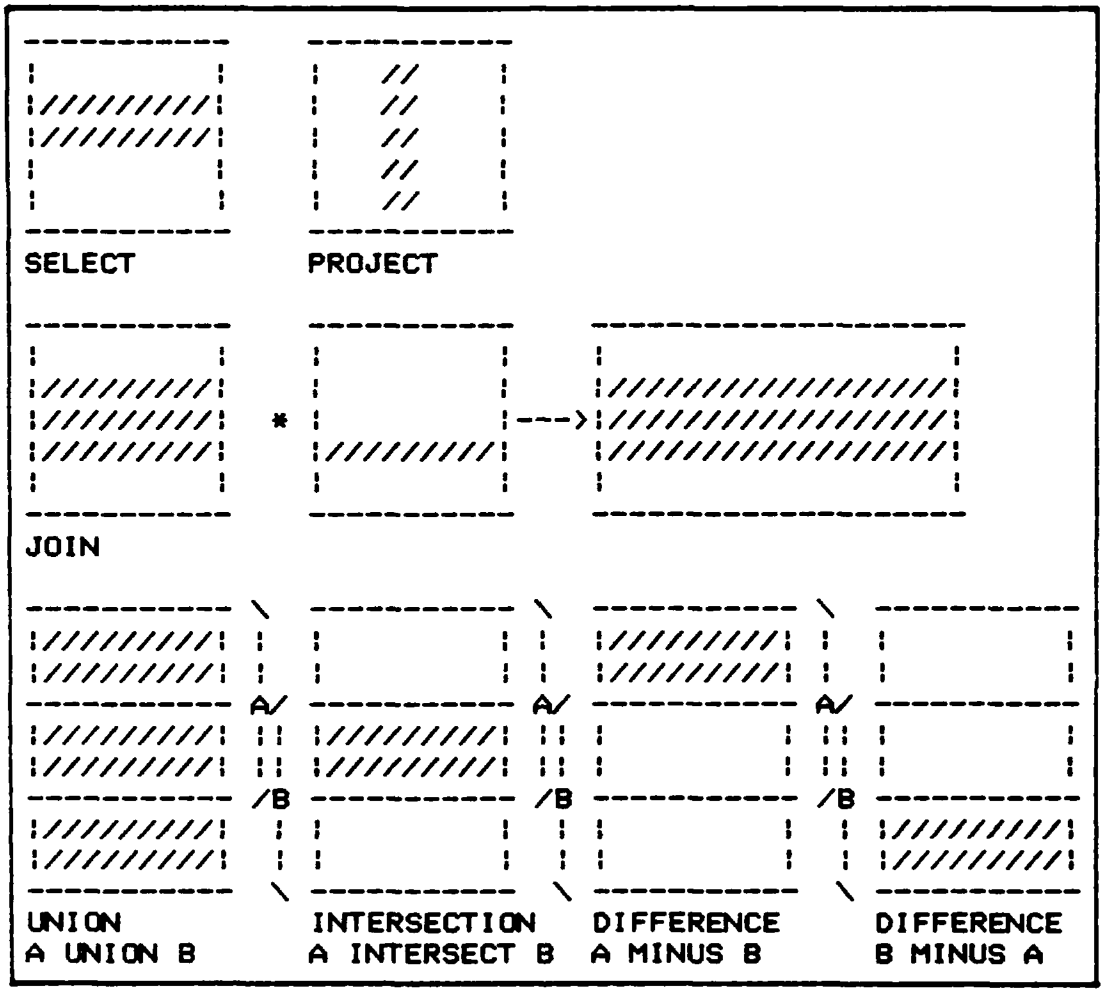

Figure 1.4. Relational Operations (5:33)

set operations (UNION, INTERSECTION, and DIFFERENCE) (5:31). The six operations are illustrated in Figure 1.4.

The SELECT operator creates a new table by taking a horizontal subset of an existing table, that is, the new table consists of all rows of an existing table that satisfy some specified condition (2:75). For example, to select all rows from the relation ADVISOR where STATUS equals

SELECT ALL FROM ADVISOR WHERE STATUS EQ Q

ADVNUM	NAME	STATUS	OFFSYM
0001	Brown	Q	LSH
0002	Smith	Q	LSM
0005	Green	Q	LSH

PROJECT TEMP1 FROM ADVISOR USING ADVNUM NAME

TEMP1

ADVNUM	NAME
0001	Brown
0002	Smith
0003	Jones
0004	White
0005	Green

JOIN TOPIC USING ADVNUM WITH ADVISOR USING ADVNUM FORMING TEMP2

TEMP2

TOPNUM	TITLE	ADVNUM	NAME	STATUS	OFFSYM
0001	Acquisition	0002	Smith	Q	LSM
0002	Reliability	0001	Brown	Q	LSH
0003	Contracts	0004	White	C	LSY

Figure 1.5. Relational Operation Examples

qualified (Q) would result in a new table with only three rows (see Figure 1.5).

The PROJECT operator creates a new table by taking a vertical subset of an existing table, that is, the new table consists of all columns of an existing table that satisfy some specified condition (2:75). For example, to project all columns from the relation ADVISOR using advisor number and last name would result in a new table with five rows but only two columns (see Figure 1.5). Although duplicate rows are not allowed in a table and should be removed automatically, a separate operation is required in some systems (7:20).

The JOIN operator creates a new table by adjoining, or concatenating, two tables each having a column defined over some domain (2:76). The two tables can have different degrees and different cardinalities. The join operation works conceptually as follows:

1. The first row of the first table is selected and the value is extracted from the column being used for the join.
2. The other table is then examined on the matching column taking records one by one until a match is found between the values in the two columns.
3. When a match is found, a new record is created for the new table. The record is formed by joining together the rows from the two tables.
4. The process continues until the end of the second table is reached.
5. The process is then repeated taking the next row from the first table and scanning all the rows of the second table until eventually the first table is exhausted. (5:27)

To join the two relations TOPIC and ADVISOR using advisor number would result in a new table consisting of three rows and six columns (see Figure 1.5).

The union of two tables A and B, A UNION B, is the set of all rows belonging to either A or B or both. The intersection of two tables A and B, A INTERSECT B, is the set of all rows belonging to both A and B. The difference between two tables A and B (in that order), A MINUS B, is the set of all rows belonging to A but not to B. For set operations, the tables A and B must be union compatible, that is, they must have the same number of columns, and the corresponding columns must be drawn from the same domain (5:32).

Scope

The scope of the research project is to evaluate the feasibility of implementing a computerized database management system to integrate thesis topics and advisors.

Research Objectives

Given the scope of the research project, the objectives are:

1. To determine the information requirements of a thesis topic/advisor database.

2. To design and implement a relational database to supply the determined needs.

II. Methodology

Introduction

The particlar methodology for this research essentially followed the database design process described by Jay-Louise Weldon in Data Base Administration. To Weldon, the objective of the database design process is "to produce an integrated data base which is accurate and secure and which supports application systems in an efficient manner" (11:89).

Description

The database design process consists of two sets of design tasks: logical database design and physical database design (see Figure 2.1). Logical database design is concerned with determining user requirements (external views) and developing a system-independent description (conceptual view) of the database that will support those requirements. Physical database design is concerned with the actual implementation of the database on a specific hardware/software system (internal view) (11:90).

Logical Database Design. Logical database design consists of four activities: requirements analysis, data modeling, integration, and schema development. These

```
                              REAL WORLD
                                  :
                                  V
              /          ---------------------
              :          :  Requirements     :
              :          :    Analysis       :
              :          ---------------------
              :                   :
              :                   V
              :          ---------------------
              :          :       Data        :
              :          :     Modeling      :
  Logical     :          ---------------------
              :                   :
  Design      :                   V
              :          ---------------------
              :          :    Integration    :
              :          ---------------------
              :                   :
              :                   V
              :          ---------------------
              :          :      Schema       :
              :          :    Development    :
              \          ---------------------
                                  :     Logical
                                  V     DB Schema
              /          ---------------------
              :          :       Data        :
              :          : Representation    :
              :          ---------------------
              :                   :
              :                   V
              :          ---------------------
  Physical    :          :   Selection of    :
              :          : Entry Points &    :
  Design      :          : Access Methods    :
              :          ---------------------
              :                   :
              :                   V
              :          ---------------------
              :          :       Data        :
              :          :    Allocation     :
              \          ---------------------
                                  :
                                  V
                              DB Schema
```

Figure 2.1. The Database Design Process (11:91)

activities may be performed in sequence or in parallel (11:91).

Requirements Analysis. Requirements analysis is concerned with determining user needs for both data and the operations that will be performed on this data (11:92). Davis and Olson describe four strategies for determining requirements:

1. Asking directly,
2. Deriving from an existing information system,
3. Synthesizing from characteristics of the utilizing system, or
4. Discovering from experimentation with an evolving information system. (3:480)

In the asking strategy, requirements are simply obtained by asking the users what their requirements are. This strategy is appropriate for stable, well-defined systems or those whose operation is defined by law, regulation, or other authority. If a similiar system exists, this system can be used to determine the requirements of a proposed system. The types of existing systems that are useful in this regard include

1. Existing systems that will be replaced by the new system,
2. Existing system in another, similiar organization,
3. Proprietary system or package,
4. Descriptions in textbooks, handbooks, industry studies, etc. (3:482)

Since the information system provides a service to the user, in the third strategy, requirements are determined from an analysis of this using system. Finally, if the users are not able to formulate their requirements, the fourth strategy is to derive an initial set of requirements and implement these. This approach is also known as prototyping or heuristic development. Selection of a strategy is based on the overall uncertainty of requirements. If uncertainty is low, asking directly or deriving from an existing system would be appropriate; whereas, if uncertainty is high, synthesis or experimentation would be used (3:480-490). Since uncertainty was low on this project, the first wo strategies were used.

Data Modeling. Data modeling is concerned with developing an abstract representation, or data model, of each user's view of the database. This involves identifying basic entities (their names and attributes) and the relationships that exist between these entities (11:92). Normalization may be used to develop more efficient models, and this technique will be discussed more fully later in this chapter.

Integration. Since several data models may be produced by the preceding steps, integration is concerned with synthesizing these models into a single model from which the various user views may be derived (11:92). During integration, common entities are identified and inconsistencies are resolved (11:110).

Schema Development. The schema development step is a transition between logical and physical database design.

The previous steps are independent of a DBMS; however, a database schema is a description of a database in the DDL of a particular DBMS. Schema development is concerned with choosing DBMS constructs and combining these constructs into a consistent schema (11:93).

Physical Database Design. Physical database design is concerned with how the logical schema is stored and accessed. It consists of three activities: data representation, selection of database entry points and access paths, and allocation of data to storage devices.

Data Representation. Data representation is concerned with specification of data types (alphabetic, numeric, or alphanumeric), field lengths, and replication factors (number of occurrences) using the DDL of the DBMS. These specifications may come directly from the data definitions developed during requirements analysis (11:93).

Selection of Entry Points and Access Methods. Selection of entry points and access methods is concerned with the choice of access methods for each entity in the database and how these data entities are going to be linked (11:93). The choices are DBMS dependent.

Data Allocation. Data allocation is concerned with apportioning the database to physical storage devices (11:94). Since the project uses a microcomputer system, storage is limited to magnetic floppy diskettes and a single hard disk unit.

```
 -----------------------------------------------------
 : Universe of relations                              :
 :      ------------------------------------------    :
 :      : 1NF                                    :    :
 :      :      ------------------------------    :    :
 :      :      : 2NF                        :    :    :
 :      :      :      ------------------    :    :    :
 :      :      :      : 3NF            :    :    :    :
 :      :      :      :                :    :    :    :
 :      :      :      ------------------    :    :    :
 :      :      :                            :    :    :
 :      :      ------------------------------    :    :
 :      :                                        :    :
 :      ------------------------------------------    :
 :                                                    :
 -----------------------------------------------------
```

Figure 2.2. Normal Form Relations

Normalization. Normalization is a technique used in data modeling. A relation is in a particular normal form (NF) if it satisfies certain constraints. Although C.J. Date describes five normal forms (2:237-265), the fourth and fifth forms are rarely used in practice (3:513), and will not be discussed further. Therefore, normalization will be defined as the process of transforming unnormalized relations into relations in third normal form (3NF) (see Figure 2.2).

A relation is in 1NF if it does not include any repeating groups. The formal definition is

> A relation R is in first normal form (1NF) if and only if all underlying domains contain atomic values. (2:243)

A normalized relation can be represented by a flat file where each row has a fixed format (5:63).

A relation is in 2NF when each attribute depends on the whole key. The formal definition is

> A relation R is in second normal form (2NF) if and only if it is in 1NF and every non-key attribute is fully dependent on the primary key. (2:246)

A key is formed from one or more attributes and identifies the row in the same way a social security number identifies an individual. A candidate key is a key which uniquely distinguishes that row from any other row in the relation. A primary key is a candidate key in which no attribute can be set to null. In a relational database, every data element can be uniquely addressed by the relation (R), the primary key value (K), and the attribute name (A) (5:55-59).

In 3NF, each field depends on the key, the whole key, and nothing but the key. The formal definition is

> A relation R is in third normal form (3NF) if and only if it is in 2NF and every non-key attribute is nontransitively dependent on the primary key. (2:248)

If B is dependent on A (A-->B) and C is dependent on B (B-->C), implying C is dependent on A, then C is transitively dependent on A (A-->C). To determine transitivity, each non-key data element is considered in turn to determine whether it is dependent on any other non-key data element in the relation (5:69).

Although 3NF is a goal in the design process, C.J. Date notes that the it is only a goal, and the only necessary requirement is that a relation be in 1NF (2:239).

Application of this methodology is presented in the next chapter.

III. Results and Discussion

Introduction.

This chapter describes the application of the methodology presented in the previous chapter using a microcomputer-based relational database management system.

Description.

Logical Database Design. Logical database design is concerned with determining user requirements and developing a system-independent description which will be implemented during physical database design. As previously described, logical database design consists of requirements analysis, data modeling, integration, and schema development. Requirements analysis and data modeling were combined on this project.

Requirements Analysis and Data Modeling. Requirements analysis is concerned with determining user needs for both data and the processing of this data. Data modeling involves developing an abstract representation of each user's view of the data. Since the thesis process is a relatively stable, well-defined system, the first two requirements analysis strategies were employed. The existing system, consisting of the thesis advisor and thesis topic files in the School library, were reviewed. These files contained three types of reports for thesis advisors: a Personal Data Sheet; a List of Qualified Thesis Advisors (Q), Adjunct Readers (A), Interns (I), and Committee Members (C); and a Topical Index of Thesis Advisors; the files contained one report for thesis topics: Thesis Research Topic Proposal (see Appendix A for representative examples). Initial interviews were also conducted with Maj John A. Stibravy and Dr. Terrance M. Skelton, who are responsible for these files. They provided copies of LS Operating Instruction (OI) 53-4 and an AFIT/LSH letter which described these programs (see Appendix A). Based on these documents, an initial list of data elements was identified. This was modified during subsequent interviews with Maj Stibravy and Dr. Skelton. Each data element was assigned a name, data type, and length, and then whether it was key was determined (see Table A.1 and A.2). Advisor Number (ADVNUM) and Topic Number (TOPNUM) were identified as key attributes. Final output report requirements were also determined (see Printouts B.15 to B.18 for representative examples). Since two user views (advisor and topic) were specified, a data model was developed for each view. Normalization was attempted; however, the structure of the output reports and the requirement to keep data entry and modification simple precluded normalization beyond first normal form.

Integration. Since two data models resulted from the previous step, integration of these models was required.

During integration, common data elements between the two models were identified and inconsistencies resolved. Common data elements included last name, first name, rank, office symbol, and phone number. Storing this data in the advisor data model would reduce data redundancy and inconsistencies substantially; however, not all information sources in the topic data model are advisors. This problem was resolved through the STATUS data element. All qualified advisors, adjunct readers, interns, committee members, and those pending classification would be coded with an alphabetic code (Q, A, I, C, or P); whereas, "non-advisors" would be left blank. The topic data model would access advisor data through the advisor number stored in FAC1, FAC2, FAC3, BACK1, BACK2, EXP1, and EXP2 data elements. Multiple query commands are required to reload the data; however, these are simply executed through a command file (see Printout B.14). The topic data model accesses a third relation storing keyword data in a similiar fashion.

Schema Development. Schema development forms the transition between logical and physical database design. During schema development, the conceptual schema is translated into DBMS constructs. This is a straightforward process using a relational database, since the basic construct is a relation or table and no special mapping is required. The data elements simply translate into attributes, and the two models are defined as relations in the database.

Physical Database Design. Physical database design is concerned with physically storing and accessing the database. Physical database design consists of data representation, selection of database entry points and access paths, and allocation of data to storage devices. Selection of access paths is DBMS dependent and R:base requires an indexed sequential access method (ISAM). Also, since the project was done on a microcomputer system, allocation to multiple storage devices was not possible. The system is resident on the hard disk drive with back-up copies maintained on floppy diskettes.

Data Representation. The data specifications defined during requirements analysis were translated into physical terms using the R:base data definition language described in the R:base Series 6000 Relational Database Management System User Manual (6:2-1 to 2-29) and accompanying documents. A guide to the database using R:base is provided in Appendix B.

IV. Conclusions and Recommendations

Summary

The intent of this thesis was to evaluate the feasibility of implementing a computerized database management system to support the AFIT thesis process. The previous chapters have demonstrated that the thesis process can be supported by a microcomputer-based relational database management system.

Conclusions

A relational database management system would assist the thesis process in a number of ways. The database would reduce redundancy and data inconsistencies. The database would optimize control and data management through standardization and data entry restricted by password. The database would increase flexibility by responding to the changing needs of varied users. The system is especially suited to ad hoc reports. The database would be easy to use with a limited amount of training since data is realistically represented in tables and data entry, retrieval, and manipulation is user oriented through simple query commands. The database would speed access with nearly instantaneous data retrieval. The only major restriction to the system is the limited storage ability of a microcomputer-based system.

Recommendations

It is recommended that LSH fully implement this database system. Although this project focused only on integrating thesis topics and advisors, this database system would be useful for other thesis administrative and supervisory functions, for example, monitoring the selection of current graduate theses research topics and advisors/committee members, controlling the use of surveys/questionnaires, and, finally, supervising the review, publication, and distribution of completed theses.

Appendix A

Requirements Analysis Inputs and Results

Appendix A

Personal Data Sheet

Tel #: 5-3944
Room: 213
Bldg: 641
Symbol: LSP

Name & Rank: Joel E. Adkins, Major, USAF

Academic Rank/
Job Title: Assistant Professor of Production Management

Education

1971 MS, Industrial Management, University of North Dakota, Independent Research Paper

1966 BBA, Industrial Management, University of New Mexico

Relevant Experience

1983 - Present: Assistant Professor, Department of Contracting Management, AFIT, Wright-Patterson AFB OH, Course Director for PPM 309, Introduction to Systems Production Management; PPM 501, Planning for Systems Production; and PPM 502, Producibility

1980 - 1983: Instructor, Department of Contracting Management, AFIT, Wright-Patterson AFB OH, Course Director for PPM 309, Introduction to Systems Production Management; PPM 501, Planning for Systems Production; and PPM 502, Producibility

1976 - 1980: Strategic Systems SPO, Wright-Patterson AFB OH, Chief of Government Furnished Property Management Division and Chief, Missile Manufacturing Branch

1975 - 1976: AFIT Education with Industry, Lockheed Missiles and Space Company, Sunnyvale CA

1971 - 1975: Space and Missile Test Center, Vandenberg AFB CA, Programs Planning Manager

Professional Activity

Publications: None

Professional
Societies: Member, National Contract Management Association
Member, Air Force Association

Statement of Research Interest

Research interests include manufacturing productivity analysis, industrial modernization, and manufacturing technology development and implementation for major systems within the Department of Defense.

Appendix A

LIST OF QUALIFIED THESIS ADVISORS (Q), ADJUNCT READERS (A),

INTERNS (I), OR COMMITTEE MEMBERS (C)

NAME	STATUS	OFFICE SYMBOL
ADKINS, Maj Joel	Q	ASD
ALLEN, Dr. Robert F.	Q	ENS
ANNESSER, Lt Col James	Q	LSMA
ASKREN, Dr. William B.	A	AFHRL
BABIARZ, Maj Anthony S.	Q	LSM
BARNES, Mr. Warren S.	Q	LSM
BATES, Mr. Michael D.	C	LSY
BECK, Maj Charles E.	Q	LSH
BENOIT, Mr. Donald G.	I	LSP
BLAZER, Douglas J.	A	AFLMC/LGSP Gunter AFS, AL 36114
BLOUIN, Capt George K.	Q	DET
BOWLIN, Maj William F.	I	LSQ
BOWMAN, Maj Thomas L.	I	LSY
BRESNAHAN, Mr. Patrick M.	Q	LSMA
BUDDE, Capt Michael J.	Q	LSM
BYLER, Maj Rodney	Q	LSM
CAIN, Dr. Joseph P.	Q	ENS
CAMPBELL, Mr. Dennis E.	Q	LSMA
CAMPBELL, Capt John A.	Q	LSP
CATHCART, LCDR George R.	I	LSQ
CLARK, Lt Col Charles T.	Q	LSM

Appendix A

TOPICAL INDEX OF THESIS ADVISORS

1. ACQUISITION

Askren
Bates
Dean
Ferens
Handrahan
Hitzelberger
Hoehl
Maass
McCarty
Pursch
Rowell
Shields
Smith, L.
Taliaferro
Witt

2. AIRCRAFT DAMAGE REPAIR

Hinrichsen

3. AIRLIFT

Gourdin

4. APPLIED MATHEMATICS

Daneman
Lee
Nargarsenker

5. ARTIFICIAL INTELLEGENCE

Genet

6. CAPABILITY ASSESSMENT

Budde
Talbott

Appendix A

THESIS RESEARCH TOPIC PROPOSAL

SHOPPING LIST NUMBER	FACULTY CONTACT	DEPARTMENT
1-2	Maj Alan E M Tucker	LS Asst For Academic Affairs Rm 324, Bldg 641

OTHER INTERESTED FACULTY

WORKING TITLE

Evaluation of Effect of Bare-base Layout Patterns on Base Survivability

STATEMENT OF PROBLEM

Several recent speakers in the contingency area have noted that current bare-base layout plans call for the "tent cities" to be organized in neat, predictable patterns. Many people are beginning to question the wisdom of these procedures in terms of their impact on base survivability. Assuming there is no natural cover (SW Asia), what is the optimum set up of tents in an open area? Air and ground attacks should be considered along with fire and expediency of construction.

INFORMATION SOURCES

BACKGROUND

Contingency Engineering Management Curriculum
Air Base Survivability Office

DATA

EXPERTISE

Maj Alan Tucker

AFIT Form 46 (LSM) Aug 83

Appendix A

SCHOOL OF SYSTEMS AND LOGISTICS
Headquarters Air Force Institute of Technology (ATC)
Wright-Patterson AFB OH

LS Operating Instruction 53-4
15 October 1982

Schools

Thesis Advisors

This operating instruction describes the procedure by which individuals, both faculty and non-faculty, participate in the AFIT/LS thesis program. It describes the qualifications for various types of involvement and establishes the responsibility of the Graduate Faculty for the quality of thesis research.

THESIS MANAGEMENT PROGRAM

Responsibility for the management of the thesis program and for the individual theses produced by AFIT/LS graduate students is shared by the graduate faculty, the individual thesis advisor, and by LSH for thesis administration. This OI specifies the qualifying process by which any interested person, whether a member of the LS faculty or not, can become a Thesis Advisor. The purpose of this procedure is to make available to graduate students the largest possible number of qualified thesis advisors. The general policy is to have individual theses although exceptions are allowed as determined by the Thesis Advisor involved.

1. The Thesis Advisor and Committee

a. Thesis Advisors

(1) The Thesis Advisor (fully qualified) has primary responsibility for the quality of the thesis and for assigning a grade to the thesis. The Advisor is also responsible for the training of less qualified committee members and for informing the degree candidate of the administrative requirements and schedules of thesis production. The fully qualified Advisor signs the thesis as "Thesis Advisor."

(2) The Thesis Advisor (Intern) is a person who has all the qualifications of an Advisor except that he or she has not yet advised an AFIT thesis. The Advisor (Intern) must have a fully qualified thesis advisor as a Reader on the Thesis Committee for the first thesis (or group of theses) advised by the intern. The intern performs all thesis advising functions in coordination with the Reader. The Advisor (Intern) signs the thesis as "Thesis Advisor" attesting to its acceptability. The status of Thesis Advisor (Intern) normally applies for only one class year providing the Reader recommends advancement of the intern to fully qualified Advisor.

OPR: AFIT/LS (Curriculum and Degree Requirements Committee)
Distribution: Each Department and AFIT/DAPE

(3) A Thesis Advisor (Adjunct) is a fully qualified Advisor who is not a member of the AFIT faculty or staff. The Thesis Advisor (Adjunct) performs all thesis advising functions in coordination with a Reader and signs the thesis as "Thesis Advisor" attesting to its acceptability.

b. The Thesis Committee may have two types of members. The Thesis Reader and the Thesis Committee Member. A Thesis Advisor fully qualified is not required to have a committee.

(1) A Thesis Reader is a Thesis Advisor (fully qualified) who assists a Thesis Advisor (Intern or Adjunct) as a member of the Thesis Committee. The responsibility of the Reader varies with the requirements of the Advisor. The Reader will help a new Advisor learn the administrative and academic peculiarities of AFIT thesis advising. The Reader, in every case, also attests to the acceptability of the thesis. The Reader is an expert who assists the Advisor in whatever way is needed. The Reader is involved in all stages of the thesis production process including the advancement of an Advisor (Intern) to fully qualified status.

(2) A Thesis Committee Member (other than a Reader) is a person not qualified to be an Advisor. The usual purpose of serving as a Committee Member (other than Reader) is to learn how to advise thesis research by working closely with an Advisor and a student through a thesis production effort. Normally, a person who has served on two thesis committees as a member, and has at least a Masters Degree, will qualify to serve as a Thesis Advisor (Intern) the following class year.

(3) The Advisor may add to the Committee. Members may come from any job assignment and will usually have strong expertise or interest in the thesis subject.

2. Qualifications for Thesis Program Participation

a.

Title	Qualifications
Thesis Advisor (fully qualified)	AFIT faculty or staff member who, within the past three class years, has served successfully as a (fully qualified) Thesis Advisor; Thesis Advisor (Intern), or Reader, as defined in this OI; or who have otherwise been determined qualified by the faculty.
Thesis Advisor (Intern)	AFIT faculty or staff member who has either: (a) a Masters degree or higher with completion of a formal research requirement (Thesis or Dissertation); or (b) favorable recommendation from the Thesis Advisor(s) of two theses for which the member has served as a Committee Member.

Thesis Advisor (Adjunct)	Non-AFIT individual with a Masters degree or higher with a formal research requirement (Dissertation or Thesis) who has been accepted by the faculty for this role.
Reader	AFIT faculty or staff member, serving as a thesis committee member, who is a fully qualified Thesis Advisor as defined in this OI.
Committee Member (other than Reader)	Any person with at least a Masters degree and an expressed interest in the thesis research.

b. Approval. Anyone interested in becoming a Thesis Advisor or Thesis Committee Member should submit a personal data sheet (Atch 1) to the LS Graduate Qualifications and Recruitment Committee (GQRC). The GQRC will evaluate applications and recommend approval or disapproval to the Graduate Faculty, with whom final authority resides. Anyone who does not meet the specific qualifications of this OI but who is considered qualified by the GQRC may be recommended by the GQRC to the Graduate Faculty for approval in any thesis management position. If approved by the Graduate Faculty, LSH will place the name and data sheet in the published list of ·vailable thesis advisors and committee members.

3. Operation

a. Thesis Quality. The Advisor has primary responsibility for the quality of the thesis. The quality of the overall thesis program (content, student achievement, and advisor performance) is the responsibility of the Graduate Faculty. The Graduate Academic Standards Committee and the Graduate Curriculum Committee will establish review procedures to determine whether the desired level of quality is being achieved.

b. Time Limits. Approval as Thesis Advisor will be indefinite provided at least one thesis is advised during the past three class years. Departure from WPAFB duty assignment, or request for removal by the individual concerned, will cause removal from the approved Advisor list.

c. Oral Defense. An oral defense of the thesis by the degree candidate, attended by the thesis committee and other persons who may be invited, is encouraged but is not mandatory.

d. Implementation. The approved Advisors and Committee Members list published annually by LSH 1 October will be the official list of potential participants in the thesis program for the then current class.

e. Administration and Training. LSH will administer the thesis program. In addition, LSH will periodically present workshops in thesis advising to include at least one annual training session in procedural detail for all Advisors. LSH will also maintain and make available name lists and the data sheets for everyone qualified for thesis management positions, including the theses with which they have been involved, and other such records deemed necessary by LSH or the Graduate Faculty.

Larry L. Smith

LARRY L. SMITH, Colonel, USAF
Dean
School of Systems and Logistics

1 Atch
Sample Personal Data Sheet

SAMPLE #1

Tel #: 5-1111
Room: 432
Bldg: 641
Symbol:

Name & Rank: Howard Neff, Captain, USAF

Academic Rank/
Job Title: Associate Professor of Logistics Management

Education

1975 PhD, Industrial & Organizational Psychology, Purdue University; Dissertation Title: X&T Y Management Theories as They Relate to Job Satisfaction

1972 MS, Human Factors Engineering, Purdue University; No thesis

1971 BA, Psychology, East Virginia University

Relevant Experience

1978-80 Instructor, Department of Psychology and Leadership, USMA
Courses Taught: Introduction to Psychology
Management Leadership

1975-78 Chief, Job Evaluation and Organization Center, USN Human Resources Laboratory

Professional Activity

Publications: "Why Worry About Job Satisfaction?" Defense System Management Review, Summer 1979

"Technology Transfer", Proceedings of the 10th Annual Workshop on Logistics Psychology

Professional Societies: Member, American Psychological Association
Chairman, Midwestern Psychological Association
Member, Rocky Mountain Psychological Association

Statement of Research Interest

Research interests include organizational diagnosis, organizational development, organization behavior, job satisfaction, organizational climate, leadership style and its relation to organizational performance, and organizational stress and its relation to baldness.

Note that if you have numerous publications or papers, list only most recent and merely indicate appropriate number and topic area of remainder. THIS DATA SHEET SHOULD BE ONE PAGE ONLY.

SAMPLE #1

SAMPLE #2

Tel #: 5-5555
Room: 101
Bldg: 35
Symbol:

Name & Grade: Loni Lee Poulsen, GS-12

Academic Rank/
Job Title: Chief, Research & Consultation, DISAM

Education

1979	Nonresident National Security Defense Course
1976	MS, Logistics Management, AFIT; Thesis Title: "Team Theory"
1972	BA, English Literature, Purdue University

Relevant Experience

1979-Present	Chief, Research & Consultation, DISAM, WPAFB
1976-79	Deputy Director, Research & Consultation, DISAM, WPAFB
1974-75	Assistant Professor, Defense Institute of Security Assistance Management, WPAFB
1972-74	Director, Accounting Division, Army Supply Center, Barstow

Professional Activity

Publications: "The Acquisition of Minor Systems," Journal of Logistics, Summer, 1979

"Old Bottles, New Wine," "Logistics Spectrum, Spring, 1978

Plus 14 additional articles, 1973-78, on Logistics Management

Papers: "Language and Logistics," 22nd ITCC, St. Paul, MN, 1978

Professional Societies:
Member, Data Processing Management Association
Member, Society of Logistics Engineers
Chairman, Logistics Management Association, Dayton Chapter

Statement of Research Interest

My areas of research interest include contracting and contract (construction) management, management cybernetics, Minority Business subcontracting and overhead monitorship.

Note that if you have numerous publications or papers, list only most recent and merely indicate appropriate number and topic area of remainder. THIS DATA SHEET SHOULD BE ONE PAGE ONLY.

SAMPLE 2

Appendix A

FROM: AFIT/LSH 10 August 1984

SUBJECT: Thesis Research Topic Proposals

TO: Thesis Advisors (All Classifications)

1. I am in the process of bringing our book of Thesis Research Topic Proposals to date for use by the current class. Dated proposals will be removed, some existing proposals will probably need modification, and new ones will be added to suggest your new ideas.

2. While some students develop ideas for their research from their own experience, this book is a shopping list which most students review for suggestions and idea starters. Some projects are taken essentially as proposed and some are modified and refocused through discussion with the faculty members who suggested them or are listed as the faculty contacts.

3. Because there are so many students, we must all do our part in providing suggestions for research in our areas and in acting as thesis advisors or readers. As professionals in our fields, we all have ideas about suitable topics for student theses. If we don't suggest them, the students will have no way of knowing what they are. And if you don't happen to have the students in class during the summer or fall quarter, they probably won't hear about your suggestions for thesis topics. By placing all such suggestions in several notebooks in the library, we make them available for the students to review at their convenience.

4. Please prepare a form for each proposed research topic. A sample and directions for completing the form are attached. Your secretaries should have copies of the Thesis Research Topic Proposal form. If they run out, they can get additional forms from LSH. If you've already submitted one--submit a couple more.

5. <u>Old Hands</u>

I attach all proposals from last year's book for which you are listed as the faculty contact--these may be proposals that you originated or they may have been originated by others. Please review them to determine whether they are still useable topics.

For each that is still OK as is--indicate this right on the form.
For each that is no longer useable--indicate this right on the form.
For each that needs revision--prepare a new proposal form and attach it to the old one so I'll know what has been supplanted.
For any new proposals that you may have--prepare a form.

Then return all topics (old, new, or revised) to LSH.

6. I'd like to have the new and revised topics available for the students to consider as soon as possible. The sooner we present your ideas to the students, the more likely it is that they will be selected for thesis research.

Terrance M. Skelton

TERRANCE M. SKELTON
Dept of Communication
and Research Methods
School of Systems and Logistics

3 Atch
1. Proposal Form
2. Directions
3. Sample

DIRECTIONS

1. Enter the general category number in pencil. We'll put all proposals in a given category in sequence and assign sequential numbers. The category numbers are as follows:

1. Civil Engineering
2. Contracts
3. Cost Estimation (Acquisition, Logistics, and Procurement)
4. Distribution
5. Economic Analyses
6. Energy/Environment/Safety
7. Human Resources/Organizational Behavior
8. International Logistics
9. Maintenance
10. Management Information Systems/Decision Support Systems
11. Manufacturing
12. Resource/Financial Management
13. Space Systems
14. Supply/Inventory Requirements
15. Systems Acquisition
16. Transportation
17. Other Management Topics

Please place the appropriate category nmber (lightly in pencil!) in the upper left-hand box (Shopping List Number). If a given proposal should appear in more than one of the sections of the book, place more than one number in the box. Thus, students searching the book will find the proposal when searching the category (or categories) in which it is placed. (Don't go hog wild on this or we'll defeat the purpose of the categorization.)

2. Your name.

3. Your department symbol.

4. If you know of other faculty who may be interested in this topic, list them (check with them first). Thus, if you have already accepted a full load of projects, interested students will know who else will be willing to act as advisor.

5. Keep this brief--just enough words to identify the project.

6. Describe the project as best you can in 150-250 words. You don't have room for close detail, but you can give the reader an idea of what the project is concerned with. Interested students will come to see you for further explanation and discussion. You might include a brief statement of the condition giving rise to the problem and indicate the specific problem to be addressed and the questions to be answered. Continue on a second page if absolutely necessary.

7. List people (with organizational symbols and telephone numbers) who may provide background information or particular documents or other published information to be checked for background information.

8. List possible or probable primary sources from which data might be collected in the course of the project.

9. List individuals (with organizational symbols and telephone numbers) or organizations that are specialists in all or part of the area concerned and might be contacted in the course of the project.

THESIS RESEARCH TOPIC PROPOSAL		
SHOPPING LIST NUMBER 1	FACULTY CONTACT 2	DEPARTMENT 3
OTHER INTERESTED FACULTY 4		
WORKING TITLE 5		
STATEMENT OF PROBLEM 6 All boxes will not necessarily be completed on all topic proposals, but most should be applicable to most proposals.		
INFORMATION SOURCES		
BACKGROUND 7		
DATA 8		
EXPERTISE 9		

AFIT FORM

THESIS RESEARCH TOPIC PROPOSAL

SHOPPING LIST NUMBER	FACULTY CONTACT	DEPARTMENT
	Maj T. C. Harrington	LSM

OTHER INTERESTED FACULTY

WORKING TITLE

Development of cargo generation forecast models for CONUS MAC aerial ports of embarkation.

STATEMENT OF PROBLEM

Historically, cargo generation at our aerial ports of embarkation (APOEs) roughly follows a seven-day cycle with Sunday and Monday being low generation days. Several modern time series analysis techniques have been applied to historical data to derive a forecasting model. These historical models have been only partially successful due to the high degree of randomness in the data (because of real-world situations). Preliminary exploration of real-time data to complement the historical model is under way. Once a reliable forecast method is in being, the schedulers can better plan in advance for cargo generation. This will allow scheduled airplane departure to be closer to to cargo arrival at the port, which reduces aerial port hold time and MAC pipeline possession time. While the primary purpose for developing a reliable cargo generation forecasting capability is to reduce cargo pipeline time, a significant by-product would be less aircrew scheduling turbulence, thereby contributing to the aircrew enhancement program.

The problem, then, is to determine a reliable way to forecast cargo generation (arrival) at the CONUS MAC APOEs at least 48 hours prior to actual generation.

INFORMATION SOURCES

BACKGROUND

HQ MAC/TRQS/Capt Bonnell/AV 638-2680
Scott AFB, IL 62225

DATA

Historical cargo transportation data is in the HQ MAC data base. It can be retrieved and formatted by inquesting techniques. Real-time data is resident in user-oriented data bases throughout the CONUS. HQ MAT/TRQS is currently exploring the content and availability of these data bases.

EXPERTISE

Same as background source.

AFIT Form 46 AUG 82 (LSM)

Table A.1

Thesis Advisor Data Elements

#	Data Element	Attribute Name	Type	Length	Key
1	Advisor Number	ADVNUM	TEXT	4 characters	Y
2	Status	STATUS	TEXT	1 characters	
3	Phone Number	PHONE	TEXT	8 characters	
4	Room	ROOM	TEXT	4 characters	
5	Building	BLDG	TEXT	4 characters	
6	Office Symbol	OFFSYM	TEXT	10 characters	
7	First Name	FNAME	TEXT	10 characters	
8	Last Name	LNAME	TEXT	15 characters	
9	Rank	RANK	TEXT	7 characters	
10	Job Title	JOBTITLE	TEXT	65 characters	
	Education:				
11	Date (1)	EDDATE1	TEXT	2 characters	
12	Degree (1)	DEGREE1	TEXT	5 characters	
13	Major (1)	MAJOR1	TEXT	40 characters	
14	School (1)	SCHOOL1	TEXT	35 characters	
15	Thesis/Dissertation (1)	TH/DIS1	TEXT	1 characters	
16	Comments (1)	EDTEXT1	TEXT	50 characters	
17	Date (2)	EDDATE2	TEXT	2 characters	
18	Degree (2)	DEGREE2	TEXT	5 characters	
19	Major (2)	MAJOR2	TEXT	40 characters	
20	School (2)	SCHOOL2	TEXT	35 characters	
21	Thesis/Dissertation (2)	TH/DIS2	TEXT	1 characters	
22	Comments (2)	EDTEXT2	TEXT	50 characters	
23	Date (3)	EDDATE3	TEXT	2 characters	
24	Degree (3)	DEGREE3	TEXT	5 characters	
25	Major (3)	MAJOR3	TEXT	40 characters	
26	School (3)	SCHOOL3	TEXT	35 characters	
27	Thesis/Dissertation (3)	TH/DIS3	TEXT	1 characters	
28	Comments (3)	EDTEXT3	TEXT	50 characters	
	Relevant Experience:				
29	Date (1)	EXPDATE1	TEXT	5 characters	
30	Comments (1)	EXPTEXT1	TEXT	65 characters	
31	Date (2)	EXPDATE2	TEXT	5 characters	
32	Comments (2)	EXPTEXT2	TEXT	65 characters	
33	Date (3)	EXPDATE3	TEXT	5 characters	
34	Comments (3)	EXPTEXT3	TEXT	65 characters	
35	Date (4)	EXPDATE4	TEXT	5 characters	
36	Comments (4)	EXPTEXT4	TEXT	65 characters	
37	Date (5)	EXPDATE5	TEXT	5 characters	
38	Comments (5)	EXPTEXT5	TEXT	65 characters	

Continued on next page

Table A.1 (Continued)

Thesis Advisor Data Elements

#	Data Element	Attribute Name	Type	Length	Key
	Professional Activity:				
39	Publication (1)	PUB1	TEXT	158 characters	
40	Publication (2)	PUB2	TEXT	158 characters	
41	Position (1)	POSIT1	TEXT	10 characters	
42	Organization (1)	ORGNAME1	TEXT	30 characters	
43	Position (2)	POSIT2	TEXT	10 characters	
44	Organization (2)	ORGNAME2	TEXT	30 characters	
	Research Interest:				
45	Area (1)	AREA1	TEXT	50 characters	
46	Area (2)	AREA2	TEXT	50 characters	
47	Area (3)	AREA3	TEXT	50 characters	

Table A.2

Thesis Topic Data Elements

#	Data Element		Attribute Name	Type	Length	Key
1	Topic Number		TOPNUM	TEXT	4 characters	Y
2	Category Number		CATNUM	TEXT	2 characters	
3	Sequence Number		SEQNUM	TEXT	3 characters	
	Faculty Contacts:					
4	Advisor Number	(1)	FAC1	TEXT	4 characters	
5	Last Name	(1)	F1LNAME	TEXT	15 characters	
6	First Name	(1)	F1FNAME	TEXT	10 characters	
7	Rank	(1)	F1RANK	TEXT	7 characters	
8	Office Symbol	(1)	F1OFFSYM	TEXT	10 characters	
9	Advisor Number	(2)	FAC2	TEXT	4 characters	
10	Last Name	(2)	F2LNAME	TEXT	15 characters	
11	First Name	(2)	F2FNAME	TEXT	10 characters	
12	Rank	(2)	F2RANK	TEXT	7 characters	
13	Office Symbol	(2)	F2OFFSYM	TEXT	10 characters	
14	Advisor Number	(3)	FAC3	TEXT	4 characters	
15	Last Name	(3)	F3LNAME	TEXT	15 characters	
16	First Name	(3)	F3FNAME	TEXT	10 characters	
17	Rank	(3)	F3RANK	TEXT	7 characters	
18	Office Symbol	(3)	F3OFFSYM	TEXT	10 characters	
19	Title		TITLE	TEXT	70 characters	
20	Statement of Problem		ABSTRACT	TEXT	790 characters	
	Information Sources:					
	Background:					
21	Advisor Number	(1)	BACK1	TEXT	4 characters	
22	Last Name	(1)	B1LNAME	TEXT	15 characters	
23	First Name	(1)	B1FNAME	TEXT	10 characters	
24	Rank	(1)	B1RANK	TEXT	7 characters	
25	Office Symbol	(1)	B1OFFSYM	TEXT	10 characters	
26	Phone Number	(1)	B1PHONE	TEXT	8 characters	
27	Advisor Number	(2)	BACK2	TEXT	4 characters	
28	Last Name	(2)	B2LNAME	TEXT	15 characters	
29	First Name	(2)	B2FNAME	TEXT	10 characters	
30	Rank	(2)	B2RANK	TEXT	7 characters	
31	Office Symbol	(2)	B2OFFSYM	TEXT	10 characters	
32	Phone Number	(2)	B2PHONE	TEXT	8 characters	
	Data:					
33	Data		TDATA	TEXT	158 characters	

Continued on next page

Table A.2 (Continued)

Thesis Topic Data Elements

#	Data Element		Attribute Name	Type	Length	Key
	Expertise:					
34	Advisor Number	(1)	EXP1	TEXT	4 characters	
35	Last Name	(1)	E1LNAME	TEXT	15 characters	
36	First Name	(1)	E1FNAME	TEXT	10 characters	
37	Rank	(1)	E1RANK	TEXT	7 characters	
38	Office Symbol	(1)	E1OFFSYM	TEXT	10 characters	
39	Phone Number	(1)	E1PHONE	TEXT	8 characters	
40	Advisor Number	(2)	EXP2	TEXT	4 characters	
41	Last Name	(2)	E2LNAME	TEXT	15 characters	
42	First Name	(2)	E2FNAME	TEXT	10 characters	
43	Rank	(2)	E2RANK	TEXT	7 characters	
44	Office Symbol	(2)	E2OFFSYM	TEXT	10 characters	
45	Phone Number	(2)	E2PHONE	TEXT	8 characters	
	Key Number:					
46	Key Number (1)		KEY1	TEXT	2 characters	
47	Key Number (2)		KEY2	TEXT	2 characters	
48	Key Number (3)		KEY3	TEXT	2 characters	

Appendix B

GUIDE TO THESIS DATABASE USING R:BASE SERIES 6000

September 1985

Table of Contents

List of Tables

List of Printouts

GUIDE TO THESIS DATABASE USING R:BASE SERIES 6000

INTRODUCTION

R:base Series 6000 is a multi-user relational database system which allows the user to enter, manipulate, and store data. This guide reviews some basic operations of R:base especially as they apply to the THESIS database. It assumes the user has read the R:base Series 6000 User Manual and accompanying documents, which are the source documents for this guide. It assumes, also, that the user is familiar with basic B25 operations. A list of R:base commands and their proper syntax is provided in Table B.1.

LOADING AND RUNNING R:BASE

After you sign on and the system displays the COMMAND prompt, type R6K [GO] to load R:base. The system will respond with a large graphic R indicating R:base is initializing. When the R> prompt is displayed, R:base is operating and ready to accept input.

If at any time you have a problem in R:base, use the HELP command to receive a description of R:base commands and their syntax. For assistance when entering command information, use the PROMPT command to be cued for parameters and options by "fill in the blank" screens.

To access a previously defined database, use the OPEN command (e.g., OPEN THESIS). The system will open the appropriate database files and respond with a "Database exists" message. If the OPEN command is executed while another database is open, R:base will close that database since only one database may be open at a time.

DEFINING A DATABASE

The R:base data dictionary contains definitions of a database's attributes and relations, rules for data validation, and passwords to restrict access.

The DEFINE command is used to initially define a database or to subsequently access an existing database to modify its structure. R:base will search through database files for the database and if the database does not exist, will create one. A database name is limited to seven characters. A D> prompt will be displayed indicating R:base is in the define module.

If you wish to restrict access to the database or relations in the database, a database password is required. To specify a database password in the define module use the OWNER command. An owner password may also be modified at any time by the RENAME OWNER command.

The ATTRIBUTES command defines attributes in the database. Attributes are specified by their name, type (DATE, DOLLAR, INTEGER, REAL, TEXT, or TIME), length, and whether they are a KEY. An attribute name is limited to eight characters and cannot contain embedded spaces.

The RELATION command defines relations in the database. A relation is specified by its name and the list of attributes that are related under this name.

The RULES command specifies validation rules on data in addition to automatic type checks. Data values are checked during data entry and modification either against some data value or against another attribute. To display the rules which apply to a database, type SHOW RULES [RETURN]. Rules for the THESIS database are listed in Printout B.1.

You may also restrict access to the database at the relational level. The PASSWORDS command specifies read (RPW) and/or modify (MPW) passwords for any relation in the database. A password is limited to eight characters. The default password is NONE, which allows anyone to read or modify a relation. The USER command identifies your password to R:base.

An example of a database definition is shown in Printout B.2. The attributes currently specified for the relations ADVISOR, ARES5, CATLIST, KEYLIST, STLIST, and TOPIC are listed in Printouts B.3 to B.9. Listings of CATLIST, KEYLIST, and STLIST may also be found in Printouts B.10 to B.12.

ENTERING DATA

The LISTREL command displays a list of all defined relations in the database. The LISTATT command displays a list of all defined attributes and their associated relations.

R:base provides a number of data entry options using the LOAD and ENTER commands. LOAD WITH PROMPTS uses the attribute name and data type as a prompt for each attribute to be loaded. This method is recommended for initial data entry. The ENTER command is used with R:base forms. Refer to Section 3 of the R:base user manual for a description on how to create forms or use the HELP FORMS command.

EDITING DATA

The CHANGE, ASSIGN, and EDIT commands change an individual value, several values, or all values in a relation. The EDIT command may also use a previously created form. You may use ADV.FM1, ADV.FM2, and ADV.FM3 to edit the ADVISOR relation, and TOP.FM1 to edit the TOPIC relation. The DELETE command deletes specific or duplicate rows from a relation. Data modification commands are limited to users who have permission to modify a particular relation.

MANIPULATING DATA

Using R:base commands, you may manipulate data stored in the database to meet your specific needs. Rows and columns from any relation can be displayed on the terminal, printed by the printer, or stored on disk in an ASCII file.

The SELECT command displays attributes from any relation in the database. The screen will display as much of each row as can fit on the screen. A SORTED BY clause specifies up to ten attributes for sorting. A WHERE clause specifies conditions for each output row.

The PROJECT command creates a new relation from an existing relation by selecting attributes, rows, and their sorted order. This command is useful for reducing the size of a large relation when only a subset is needed.

The JOIN command creates a new relation by combining rows from two other relations. The rows in the new relation are based upon the comparison of an attribute from each relation. Attributes must have the same data type to be compared.

The UNION command is used to combine two relations or to add a new attribute to an existing relation.

The INTERSECT command forms a new relation containing the rows from two relations that have common matching attributes.

The SUBTRACT command is the opposite of the INTERSECT command, and forms a new relation composed of rows from one relation that do not have an attribute matching a second relation.

If an application consists of a sequence of R:base commands, you may write the commands into a command file and use the INPUT command to execute the entire sequence as if the commands were entered at the terminal. RESEARCH.RPT and TOPIC.RPT are examples of two such command files (see Printouts B.13 and B.14).

REPORTS

The R:base report writer lets you create a report using one of the relations in the database. You can design a report with headings (titles), detail (body), and footings (summaries). Data may be used from selected attributes or computed variables. Output may be directed to the terminal, printer, or command file using the OUTPUT command and viewed with the PRINT command. If output is directed to the printer, it is necessary to redirect output to the terminal before printing will begin. For example:

```
R> OUTPUT PRINTER [RETURN]
R> PRINT ARES.RPT SORTED BY AREA LNAME [RETURN]
R> OUTPUT TERMINAL [RETURN]
```

If the report is written to an output file, it may be shared with word processing or other application programs. Refer to Section 5 of the R:base user manual for a description of the report generation process or use the HELP REPORTS command. ADV.RPT1, ADV.RPT2, ADV.RPT3, ARES.RPT, TOP.RPT1, and TOP.RPT2 are examples of report outputs (see Printouts B.15 to B.18).

EXITING R:BASE

To leave R:base and return to the command level, type EXIT [RETURN]. The system will respond with an exit message and the COMMAND prompt, and all modifications to the database will be written to disk files.

If the program or system crashes, or R:base is exited without using the EXIT command, a system lock may occur. This is indicated by a "Waiting for access..." message when you are the only user. To free a locked system, exit to the command level, delete database file dbname4.RBS and index file dbname4.IND of the locked database, and reload R:base.

BACK-UP COPY

To make a back-up copy of R:base database files, use the ISAM copy command. At the COMMAND prompt, type ISAM COPY [RETURN]. For example:

```
ISAM COPY [RETURN]
ISAM data set from  dbname1.RBS [RETURN]
ISAM data set to  [F0]<SYS>dbname1.RBS [GO]

ISAM COPY [RETURN]
ISAM data set from  dbname2.RBS [RETURN]
ISAM data set to  [F0]<SYS>dbname.RBS [GO]

ISAM COPY [RETURN]
ISAM data set from  dbname3.RBS [RETURN]
ISAM data set to  [F0]<SYS>dbname3.RBS [GO]

ISAM COPY [RETURN]
ISAM data set from  dbname4.RBS [RETURN]
ISAM data set to  [F0]<SYS>dbname4.RBS [GO]
```

Each RBS database file will be copied with the corresponding index file. The R:base RELOAD and UNLOAD commands may also be used to create a copy of the database. The first file contains the data dictionary. The second file contains the actual data. The third file contains the KEY index information. The fourth file contains multi-user locking information.

Table B.1

R:base Commands

Command	Syntax
ASSIGN	ASSIGN attname TO expression IN relname (WHERE...)
BUILD	BUILD KEY FOR attname IN relname
CHANGE	CHANGE attname TO value (IN relname) WHERE...
COMPUTE	COMPUTE [COUNT] attname MIN MAX AVE SUM ALL FROM relname (WHERE...)
DEFINE	DEFINE (dbname) The following commands are used in conjunction with DEFINE: OWNER password ATTRIBUTES attname type (length) (KEY) RELATIONS relname WITH attname1 (attname2...) RULES "error message" attname [IN relname] [EQ] NE GT GE LT LE CONTAINS EXISTS value ([AND]...) OR

Continued on next page

Table B.1 (Continued)

R:base Commands

Command	Syntax
	RULES (Continued) "error message" attname1 IN relname (EQA) NEA GTA GEA LTA LEA attname2 IN relname2 ([AND]...) OR
	PASSWORDS RPW FOR relname IS password MPW FOR relname IS password
DELETE	DELETE DUPLICATES FROM relname
	DELETE KEY FOR attname IN relname
	DELETE ROW(S) FROM relname WHERE...
EDIT	EDIT [attname1...] FROM relname ALL (SORTED BY...) (WHERE...)
	EDIT USING formname (SORTED BY...) (WHERE...)
ENTER	ENTER formname
EXIT	EXIT
FORMS	FORMS
HELP	HELP
	HELP command
INPUT	INPUT ufn
	INPUT TERMINAL
INTERSECT	INTERSECT relname1 WITH relname2 FORMING relname3 (USING attname1...)

Table B.1 (Continued)

R:base Commands

Command	Syntax
JOIN	JOIN relname1 USING attname1 WITH relname2 USING attname2 FORMING relname 3 (WHERE [EQ]...) NE GT GE LT LE
LISTATT	LISTATT
LISTREL	LISTREL
	LISTREL relname
	LISTREL ALL
LOAD	LOAD relname (FROM ufn) (USING attname1...)
	LOAD relname WITH PROMPTS (USING attname1...)
	CHECK
	NOCHECK
	FILL
	NOFILL
NEWPAGE	NEWPAGE
OPEN	OPEN dbname
OUTPUT	OUTPUT (ufn)
	OUTPUT TERMINAL (WITH PRINTER)
	OUTPUT PRINTER (WITH TERMINAL)
	OUTPUT (ufn) [WITH TERMINAL] WITH PRINTER WITH BOTH
PRINT	PRINT reportname (SORTED BY...) (WHERE...)

Table B.1 (Continued)

R:base Commands

Command	Syntax
PROJECT	PROJECT relname1 FROM relname2 USING [attname1 ...] (SORTED BY...)(WHERE...) ALL
PROMPT	PROMPT (command)
RELOAD	RELOAD newdbname
REMOVE	REMOVE relname
RENAME	RENAME (ATTRIBUTE) attname1 TO attname2 (IN relname)
	RENAME OWNER oldname TO newname
	RENAME RELATION relname1 TO relname2
REPORTS	REPORTS
SELECT	SELECT ALL (=S) FROM relname
	SELECT attname1 (attname2...) FROM relname (SORTED BY ...) (WHERE...)
	SELECT ALL FROM relname (SORTED BY...) (WHERE ...)
SET	SET character = newvalue
	Special characters are: BLANK DOLLAR $ COMMA , PLUS + QUOTES " SEMI ;
	SET keyword newvalue
	Special keywords are: USER ECHO BELL DATE CASE AUTOSKIP LINES RULE REVERSE WIDTH NULL

Table B.1 (Continued)

R:base Commands

Command	Syntax
SHOW	SHOW [special character] keyword
	SHOW RULES
	SHOW USER
SORT	SORTED BY attname1 [= A] = D (attname2 [= A]) = D
SUBTRACT	SUBTRACT relname1 FROM relname2 FORMING relname3 (USING attname1...)
TALLY	TALLY attname FROM relname (WHERE...)
UNION	UNION relname1 WITH relname2 FORMING relname3 (USING attname1...)
UNLOAD	UNLOAD SCHEMA (FOR relname)
	UNLOAD DATA (FOR relname) (USING [attname1...]) (SORTED BY...) (WHERE...) ALL
	UNLOAD ALL (FOR relname)
USER	USER password
WHERE	WHERE condition1 ([AND] condition2...) OR
	Conditions are: attname EXISTS attname FAILS attname EQ value attname NE value attname GT value attname GE value attname LT value attname LE value attname CONTAINS value

Continued on next page

Table B.1 (Continued)

R:base Commands

Command	Syntax
	WHERE (Contiued) attname1 EQA attname2 attname1 NEA attname2 attname1 GTA attname2 attname1 GEA attname2 attname1 LTA attname2 attname1 LEA attname2 LIMIT EQ value

Printout B.1

Listing of THESIS Database Rules

1. ADVNUM IN ADVISOR EXISTS
   Message: ADVISOR NUMBER MUST HAVE A VALUE

2. TOPNUM IN TOPIC EXISTS
   Message: TOPIC NUMBER MUST HAVE A VALUE

3. ADVNUM IN ADVISOR NEA ADVNUM IN ADVISOR
   Message: YOU ARE ENTERING A DUPLICATE ADV NUMBER

4. TOPNUM IN TOPIC NEA TOPNUM IN TOPIC
   Message: YOU ARE ENTERING A DUPLICATE TOPIC NUMBER

5. STATUS IN ADVISOR EQA STATUS IN STLIST
   Message: STATUS MAY BE A Q,A,I,C, OR P ONLY

Printout B.2

Example of DEFINE

```
R> DEFINE THESIS
 Database exists
 Begin R:base Database Definition
D> ATTRIBUTES
D> STATUS TEXT 1 KEY
D> STNAME TEXT 20
D> RELATIONS
D> STLIST WITH STATUS STNAME
D> RULES
D> "STATUS MAY BE Q,A,I,C, OR P ONLY" STATUS IN ADVISOR +
EQA STATUS IN STLIST
D> END
 End R:base Database Definition
R>
```

Printout B.3

Attributes in Relation ADVISOR

#	Name	Type	Length	KEY
1	ADVNUM	TEXT	4 characters	Y
2	STATUS	TEXT	1 characters	
3	PHONE	TEXT	8 characters	
4	ROOM	TEXT	4 characters	
5	BLDG	TEXT	4 characters	
6	OFFSYM	TEXT	10 characters	
7	FNAME	TEXT	10 characters	
8	LNAME	TEXT	15 characters	
9	RANK	TEXT	7 characters	
10	JOBTITLE	TEXT	65 characters	
11	EDDATE1	TEXT	2 characters	
12	DEGREE1	TEXT	5 characters	
13	MAJOR1	TEXT	40 characters	
14	SCHOOL1	TEXT	35 characters	
15	TH/DIS1	TEXT	1 characters	
16	EDTEXT1	TEXT	50 characters	
17	EDDATE2	TEXT	2 characters	
18	DEGREE2	TEXT	5 characters	
19	MAJOR2	TEXT	40 characters	
20	SCHOOL2	TEXT	35 characters	
21	TH/DIS2	TEXT	1 characters	
22	EDTEXT2	TEXT	50 characters	
23	EDDATE3	TEXT	2 characters	
24	DEGREE3	TEXT	5 characters	
25	MAJOR3	TEXT	40 characters	
26	SCHOOL3	TEXT	35 characters	
27	TH/DIS3	TEXT	1 characters	
28	EDTEXT3	TEXT	50 characters	
29	EXPDATE1	TEXT	5 characters	
30	EXPTEXT1	TEXT	65 characters	
31	EXPDATE2	TEXT	5 characters	
32	EXPTEXT2	TEXT	65 characters	
33	EXPDATE3	TEXT	5 characters	
34	EXPTEXT3	TEXT	65 characters	
35	EXPDATE4	TEXT	5 characters	
36	EXPTEXT4	TEXT	65 characters	
37	EXPDATE5	TEXT	5 characters	
38	EXPTEXT5	TEXT	65 characters	
39	PUB1	TEXT	158 characters	
40	PUB2	TEXT	158 characters	

Continued on next page

Printout B.3 (Continued)

Attributes in Relation ADVISOR

#	Name	Type	Length	KEY
41	POSIT1	TEXT	10 characters	
42	ORGNAME1	TEXT	30 characters	
43	POSIT2	TEXT	10 characters	
44	ORGNAME2	TEXT	30 characters	
45	AREA1	TEXT	50 characters	
46	AREA2	TEXT	50 characters	
47	AREA3	TEXT	50 characters	

Printout B.4

Attributes in Relation ARES5

#	Name	Type	Length	KEY
1	ADVNUM	TEXT	4 characters	
2	LNAME	TEXT	15 characters	
3	AREA	TEXT	50 characters	

Printout B.5

Attributes in Relation CATLIST

#	Name	Type	Length	KEY
1	CATNUM	TEXT	2 characters	
2	CATNAME	TEXT	50 characters	

Printout B.6

Attributes in Relation KEYLIST

#	Name	Type	Length	KEY
1	KEYNUM	TEXT	2 characters	
2	KEYWORD	TEXT	50 characters	

Printout B.7

Attributes in Relation STLIST

#	Name	Type	Length	KEY
1	STATUS	TEXT	1 characters	
2	STNAME	TEXT	20 characters	

Printout B.8

Attributes in Relation TOPIC

#	Name	Type	Length	KEY
1	TOPNUM	TEXT	4 characters	Y
2	CATNUM	TEXT	2 characters	
3	SEQNUM	TEXT	3 characters	
4	FAC1	TEXT	4 characters	
5	FAC2	TEXT	4 characters	
6	FAC3	TEXT	4 characters	
7	TITLE	TEXT	70 characters	
8	ABSTRACT	TEXT	790 characters	
9	BACK1	TEXT	4 characters	
10	BACK2	TEXT	4 characters	
11	TDATA	TEXT	158 characters	
12	EXP1	TEXT	4 characters	
13	EXP2	TEXT	4 characters	
14	KEY1	TEXT	2 characters	
15	KEY2	TEXT	2 characters	
16	KEY3	TEXT	2 characters	

Printout B.9

Attributes in Relation TOPOUT

#	Name	Type	Length	KEY
1	TOPNUM	TEXT	4 characters	
2	CATNUM	TEXT	2 characters	
3	SEQNUM	TEXT	3 characters	
4	FAC1	TEXT	4 characters	
5	FAC2	TEXT	4 characters	
6	FAC3	TEXT	4 characters	
7	TITLE	TEXT	70 characters	
8	ABSTRACT	TEXT	790 characters	
9	BACK1	TEXT	4 characters	
10	BACK2	TEXT	4 characters	
11	TDATA	TEXT	158 characters	
12	EXP1	TEXT	4 characters	
13	EXP2	TEXT	4 characters	
14	KEY1	TEXT	2 characters	
15	KEY2	TEXT	2 characters	
16	KEY3	TEXT	2 characters	
17	F1ADVNUM	TEXT	4 characters	
18	F1LNAME	TEXT	15 characters	
19	F1FNAME	TEXT	10 characters	
20	F1RANK	TEXT	7 characters	
21	F1OFFSYM	TEXT	10 characters	
22	F2ADVNUM	TEXT	4 characters	
23	F2LNAME	TEXT	15 characters	
24	F2FNAME	TEXT	10 characters	
25	F2RANK	TEXT	7 characters	
26	F2OFFSYM	TEXT	10 characters	
27	F3ADVNUM	TEXT	4 characters	
28	F3LNAME	TEXT	15 characters	
29	F3FNAME	TEXT	10 characters	
30	F3RANK	TEXT	7 characters	
31	F3OFFSYM	TEXT	10 characters	
32	B1ADVNUM	TEXT	4 characters	
33	B1LNAME	TEXT	15 characters	
34	B1FNAME	TEXT	10 characters	
35	B1RANK	TEXT	7 characters	
36	B1OFFSYM	TEXT	10 characters	
37	B1PHONE	TEXT	8 characters	
38	B2ADVNUM	TEXT	4 characters	
39	B2LNAME	TEXT	15 characters	
40	B2FNAME	TEXT	10 characters	
41	B2RANK	TEXT	7 characters	
42	B2OFFSYM	TEXT	10 characters	
43	B2PHONE	TEXT	8 characters	

Continued on next page

Printout B.9 (Continued)

Attributes in Relation TOPOUT

#	Name	Type	Length	KEY
44	E1ADVNUM	TEXT	4 characters	
45	E1LNAME	TEXT	15 characters	
46	E1FNAME	TEXT	10 characters	
47	E1RANK	TEXT	7 characters	
48	E1OFFSYM	TEXT	10 characters	
49	E1PHONE	TEXT	8 characters	
50	E2ADVNUM	TEXT	4 characters	
51	E2LNAME	TEXT	15 characters	
52	E2FNAME	TEXT	10 characters	
53	E2RANK	TEXT	7 characters	
54	E2OFFSYM	TEXT	10 characters	
55	E2PHONE	TEXT	8 characters	

PRINTOUT B.10

Listing of Relation CATLIST

CATNUM	CATNAME
01	CIVIL ENGINEERING
02	CONTRACTS
03	COST ESTIMATION
04	DISTRIBUTION
05	ECONOMIC ANALYSES
06	ENERGY/ENVIRONMENT/SAFETY
07	HUMAN RESOURCES/ORGANIZATIONAL BEHAVIOR
08	INTERNATIONAL LOGISTICS
09	MAINTENANCE
10	MANAGEMENT INFORMATION/DECISION SUPPORT SYSTEMS
11	MANUFACTURING
12	RESOURCE/FINANCIAL MANAGEMENT
13	SPACE SYSTEMS
14	SUPPLY/INVENTORY REQUIREMENTS
15	SYSTEMS ACQUISITION
16	TRANSPORTATION
17	OTHER MANAGEMENT TOPICS

Printout B.11

Listing of Relation STLIST

STATUS	STNAME
Q	QUALIFIED
A	ADJUNCT READER
I	INTERN
C	COMMITTEE MEMBER
P	PENDING
-0-	BLANK

Printout B.12

Listing of Relation KEYLIST

KETNUM	KEYWORD
01	ACQUISITION
02	AIRCRAFT DAMAGE REPAIR
03	AIRLIFT
04	APPLIED MATHEMATICS
05	ARTIFICIAL INTELLIGENCE
06	CAPABILITY ASSESSMENT
07	COMMUNICATIONS
08	COMPUTER AIDED DESIGN
09	COMPUTER BASED TRAINING
10	COMPUTER SOFTWARE
11	CONSTRUCTION MANAGEMENT
12	CONFIGURATION MANAGEMENT
13	CONTINGENCY ENGINEERING
14	CONTRACT ADMINISTRATION/MANAGEMENT
15	CONTRACT LAW
16	CONTROL THEORY
17	COST ANALYSIS
18	DECISION MAKING
19	DISTRIBUTION MANAGEMENT
20	ECONOMETRIC APPLICATIONS
21	ECONOMICS
22	ENERGY
23	ENGINEERING MANAGEMENT
24	ENVIRONMENTAL SYSTEMS
25	EXPERIMENTAL DESIGN
26	FINANCIAL MANAGEMENT
27	FOREIGN MILITARY SALES
28	FREIGHT FORWARDING INITIATIVES
29	INDUSTRIAL ENGINEERING
30	INFORMATION SYSTEMS
31	INITIAL PROVISIONING
32	INTERNATIONAL LOGISTICS
33	LABOR RELATIONS
34	LEGAL MATTERS
35	LOGISTICS EVOLUTION
36	LOGISTICS PLANNING
37	LOGISTICS SUPPORT (GENERAL)
38	LOGISTICS-SYSTEM, HISTORY
39	MAINTENANCE MANAGEMENT
40	MANPOWER

Printout B.12 (Continued)

Listing of Relation KEYLIST

KETNUM	KEYWORD
41	MAN/MACHINE INTERFACE
42	MICROPROCESSOR/COMPUTER CONTROLLERS
43	MISSILES (ICBM)
44	MODELING
45	MODELING: PHYSICAL + CONTROL
46	NATIONAL POLICY
47	OPERATIONS RESEARCH
48	OPERATIONS STRATEGY AND TACTICS
49	OPTIMAL ESTIMATION AND STOCHASTIC CONTROL
50	ORGANIZATIONAL THEORY AND BEHAVIOR
51	OVERPRICING
52	PERFORMANCE MEASUREMENT
53	PERSONNEL SYSTEMS
54	PRODUCTION MANAGEMENT
55	PRODUCTIVITY
56	PROJECT MANAGEMENT
57	QUALITY
58	RAILROAD LOGISTICS
59	RELIABILITY
60	RESEARCH METHODS
61	RESOURCE ALLOCATION (EMPLOYMENT OF FORCES)
62	SOIL/PAVEMENTS
63	SYSTEMS MANAGEMENT
64	SYSTEMS SIMULATION TECHNIQUES
65	TECHNICAL ORDER ACQUISITION
66	TECHNICAL WRITING
67	TECHNOLOGY, DUAL PURPOSE
68	TELEVISION, INSTRUCTIONAL
69	TRAINING
70	TRANSPORTATION MANAGEMENT
71	VEHICLE DESIGN
72	VEHICLE MAINTENANCE
73	WOMEN IN THE MILITARY
99	-0-

Printout B.13

Listing of RESEARCH.RPT

```
SET ECHO ON
*(THIS PROGRAM GENERATES A LIST OF RESEARCH INTERESTS AND +
  ADVISORS)
*( )
REMOVE ARES5
PROJECT ARES1 FROM ADVISOR USING ADVNUM LNAME AREA1 WHERE +
  AREA1 EXISTS AND STATUS EXISTS
PROJECT ARES2 FROM ADVISOR USING ADVNUM LNAME AREA2 WHERE +
  AREA2 EXISTS AND STATUS EXISTS
PROJECT ARES3 FROM ADVISOR USING ADVNUM LNAME AREA3 WHERE +
  AREA3 EXISTS AND STATUS EXISTS
RENAME AREA1 TO AREA IN ARES1
RENAME AREA2 TO AREA IN ARES2
RENAME AREA3 TO AREA IN ARES3
UNION ARES1 WITH ARES2 FORMING ARES4
UNION ARES3 WITH ARES2 FORMING ARES5
REMOVE ARES1
REMOVE ARES2
REMOVE ARES3
REMOVE ARES4
DELETE DUPLICATES FROM ARES5
PRINT ARES.RPT SORTED BY AREA LNAME
*( )
*(IF YOU WISH A PRINTED COPY TYPE:    )
*(OUPUT PRINTER                       )
*(PRINT ARES.RPT SORTED BY AREA LNAME)
*(OUTPUT TERMINAL                     )
*( )
SET ECHO OFF
INPUT TERMINAL
```

Printout B.14

Listing of TOPIC.RPT

```
SET ECHO ON
*(THIS PROGRAM CREATES THE RELATION TOPOUT)
*( )
REMOVE TOPOUT
PROJECT ATEMP1 FROM ADVISOR USING ADVNUM LNAME FNAME RANK +
  OFFSYM SORTED BY ADVNUM
JOIN TOPIC USING FAC1 WITH ATEMP1 USING ADVNUM FORMING +
  TTEMP1
RENAME ADVNUM TO F1ADVNUM IN TTEMP1
RENAME LNAME  TO F1LNAME  IN TTEMP1
RENAME FNAME  TO F1FNAME  IN TTEMP1
RENAME RANK   TO F1RANK   IN TTEMP1
RENAME OFFSYM TO F1OFFSYM IN TTEMP1
JOIN TTEMP1 USING FAC2 WITH ATEMP1 USING ADVNUM FORMING +
  TTEMP2
REMOVE TTEMP1
RENAME ADVNUM TO F2ADVNUM IN TTEMP2
RENAME LNAME  TO F2LNAME  IN TTEMP2
RENAME FNAME  TO F2FNAME  IN TTEMP2
RENAME RANK   TO F2RANK   IN TTEMP2
RENAME OFFSYM TO F2OFFSYM IN TTEMP2
JOIN TTEMP2 USING FAC3 WITH ATEMP1 USING ADVNUM FORMING +
  TTEMP2
REMOVE TTEMP2
RENAME ADVNUM TO F3ADVNUM IN TTEMP3
RENAME LNAME  TO F3LNAME  IN TTEMP3
RENAME FNAME  TO F3FNAME  IN TTEMP3
RENAME RANK   TO F3RANK   IN TTEMP3
RENAME OFFSYM TO F3OFFSYM IN TTEMP3
REMOVE ATEMP1
PROJECT ATEMP2 FROM ADVISOR USING ADVNUM LNAME FNAME RANK +
  OFFSYM PHONE SORTED BY ADVNUM
JOIN TTEMP3 USING BACK1 WITH ATEMP2 USING ADVNUM FORMING +
  TTEMP4
REMOVE TTEMP3
RENAME ADVNUM TO B1ADVNUM IN TTEMP4
RENAME LNAME  TO B1LNAME  IN TTEMP4
RENAME FNAME  TO B1FNAME  IN TTEMP4
RENAME RANK   TO B1RANK   IN TTEMP4
RENAME OFFSYM TO B1OFFSYM IN TTEMP4
RENAME PHONE  TO B1PHONE  IN TTEMP4
JOIN TTEMP4 USING BACK2 WITH ATEMP2 USING ADVNUM FORMING +
  TTEMP5
REMOVE TTEMP4
RENAME ADVNUM TO B2ADVNUM IN TTEMP5
RENAME LNAME  TO B2LNAME  IN TTEMP5
RENAME FNAME  TO B2FNAME  IN TTEMP5
```

Printout B.14 (Continued)

Listing of TOPIC.RPT

```
RENAME RANK   TO B2RANK   IN TTEMP5
RENAME OFFSYM TO B2OFFSYM IN TTEMP5
RENAME PHONE  TO B2PHONE  IN TTEMP5
JOIN TTEMP5 USING EXP1 WITH ATEMP2 USING ADVNUM FORMING +
  TTEMP6
REMOVE TTEMP5
RENAME ADVNUM TO E1ADVNUM IN TTEMP6
RENAME LNAME  TO E1LNAME  IN TTEMP6
RENAME FNAME  TO E1FNAME  IN TTEMP6
RENAME RANK   TO E1RANK   IN TTEMP6
RENAME OFFSYM TO E1OFFSYM IN TTEMP6
RENAME PHONE  TO E1PHONE  IN TTEMP6
JOIN TTEMP6 USING EXP2 WITH ATEMP2 USING ADVNUM FORMING +
  TOPOUT
REMOVE ATEMP2
REMOVE TTEMP6
RENAME ADVNUM TO E2ADVNUM IN TOPOUT
RENAME LNAME  TO E2LNAME  IN TOPOUT
RENAME FNAME  TO E2FNAME  IN TOPOUT
RENAME RANK   TO E2RANK   IN TOPOUT
RENAME OFFSYM TO E2OFFSYM IN TOPOUT
RENAME PHONE  TO E2PHONE  IN TOPOUT
*( )
*(RELATION TOPOUT IS READY TO PRINT OUT)
SET ECHO OFF
INPUT TERMINAL
```

Printout B.15

Sample Output from ADV.RPT1 and ADV.RPT2

STATUS: Q
TEL#: 5-3944
ROOM: 213
BLDG: 641
SYMBOL: LSP

NAME & RANK: JOEL E. ADKINS , MAJ

ACADEMIC RANK/
JOB TITLE: Assistant Professor of Production Management

EDUCATION:

1971 MS Industrial Management
University of North Dakota TH/DIS:
Independent Research Paper
1966 BBA Industrial Management TH/DIS:
University of New Mexico

19
TH/DIS:

RELEVANT EXPERIENCE:

1983- Assistant Professor, Department of Contracting Management, AFIT
1980-83 Instructor, Department of Contracting Management, AFIT
1976-80 Chief of Govt Furn Prop Mgt Div, Strat Systems SPO, WPAFB
1975-76 AFIT Education withIndustry, Lockheed Missile and Space Co
1971-75 Programs Planning Mgr, Space and Missile Center, Vandenberg AFB

PROFESSIONAL ACTIVITY:

PUBLICATIONS:
None

PROFESSIONAL SOCIETIES:
Member National Contract Mgmt Assoc
Member Air Force Association

RESEARCH INTERESTS: PRODUCTIVITY

Printout B.16

Sample Output from ADV.RPT3

LIST OF QUALIFIED THESIS ADVISORS (Q), ADJUNCT READERS (A),

INTERNS (I), OR COMMITTEE MEMBERS (C)

LAST NAME	FIRST NAME	RANK	STATUS	OFFICE SYMBOL
ADKINS	JOEL E.	MAJ	Q	LSP
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Sample Output from ARES.RPT

RESEARCH AREA:	LAST NAME:
ACQUISITION	ASKREN
ACQUISITION	BATES
COMMUNICATION	BATES
COMMUNICATION	BECK
COMPUTER AIDED DESIGN	FENNO
COMPUTER BASED TRAINING	ASKREN
COMPUTER BASED TRAINING	BATES
CONTRACT ADMINISTRATION/MANAGEMENT	BENOIT
DECISION MAKING	ASKREN
ECONOMICS	ALLEN
ECONOMETRIC APPLICATIONS	ALLEN
INDUSTRIAL ENGINEERING	BABIARZ
INITIAL PROVISIONING	BABIARZ
INITIAL PROVISIONING	BARNES
INTERNATIONAL LOGISTICS	BABIARZ
INTERNATIONAL LOGISTICS	BARNES
LABOR RELATIONS	BENOIT
LOGISTICS PLANNING	BARNES
ORGANIZATIONAL THEORY AND BEHAVIOR	BECK
PERFORMANCE MEASUREMENT	*BOWMAN*
PRODUCTION MANAGEMENT	BENOIT
PRODUCTIVITY	ADKINS
PRODUCTIVITY	ALLEN
RESEARCH METHODS	BECK
RESEARCH METHODS	FENNO
TRANSPORTATION MANAGEMENT	ANNESSER

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Sample Output from TOP.RPT1 and TOP.RPT2

THESIS RESEARCH TOPIC PROPOSAL

TOPIC NUMBER: 0001 CATEGORY NUMBER: 01 SEQUENCE NUMBER: 002

FACULTY CONTACT: TUCKER ALAN E.M. MAJ LS

OTHER FACULTY:

TITLE: Evaluation: Effect of Bare-base Layout Patterns on Base Survivability

ABSTRACT: Several recent speakers in the contingency area have noted that current bare-base layout plans call for the tent cities to be organized in neat, predictable patterns. Many people are beginning to question the wisdom of these procedures in terms of their impact on base survivability. Assuming there is no natural cover (SW Asia), what is the optimum set up of tents in an open area? Air and ground attacks should be considered along with fire and expediency of construction.

INFORMATION SOURCES

BACKGROUND:

DATA:

EXPERTISE: TUCKER ALAN E.M. MAJ LS

KEY NUMBERS: 11
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99

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VITA

Major Joseph D. Perkumas was born on 7 November 1949 in Philadelphia, Pennsylvania. He graduated from high school in 1967 and attended Temple University, from which he received the degree of Bachelor of Arts in Biology in May 1972. Upon graduation, he entered the Air Force and received a commission through OTS. He completed navigator training in November 1973 and electronic warfare officer (EWO) training in June 1974. Major Perkumas has served as an EWO on AC-130 aircraft and as an EWO flight instructor and examiner on MC-130E and EC-130H aircraft. He also attended Chapman College, from which he received the degree of Bachelor of Science in Computer Science in May 1984. He entered the School of Systems and Logistics, Air Force Institute of Technology, in June 1984.

Permanent Address: 2145 Evergreen Street
Cedar Rapids IA 52402

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Thesis Advisor: Dr. Robert B. Weaver
Associate Professor of Communication

Approved for public release: IAW AFR 190-1.
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The purpose of this research was to evaluate the feasibility of implementing a computerized database management system to support the AFIT thesis process.

The methodology consisted of both logical and physical database design. User requirements were determined through an analysis of the existing system and interviews, and a system-independent description of the database was developed. The database was implemented using R:base Series 6000, a relational database management system, on a Burroughs microcomputer system. A guide to the database is included.

END

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