A DESIGN OF A DATA BASE SYSTEM
FOR AN ACADEMIC DEPARTMENT

A THESIS

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BY

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R. i-iii
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ABSTRACT

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A DESIGN OF A DATA BASE SYSTEM FOR AN ACADEMIC DEPARTMENT

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This thesis describes the design of an on-line data base management system for an academic department. The implementation uses dBASE II to create a full information system containing student records, course listing, course scheduling, fiscal management, statistical data, faculty records, and inventory of textbooks and equipment. Application programs to maintain the data base are also included.

TABLE OF CONTENTS

CHAPTER

INTRODUCTION

Everyone living in the world is affected by computers. All areas of our society have been and are being touched by computers. From the time we get up and read the morning news (which is typeset by computer), until we retire in the evening watching TV (computer allocated programs), we are constantly affected by computers either directly or indirectly. Computer are no longer the exclusive tool of mathematicians and scientists. Now they are used in business, education, government, and families.

The purpose of this effort is to design a data base as a management system, which includes student record file, fiscal management file, statistical data file, course listing file, equipment control file and textbooks management file, to simplify all the information processing functions. There are several advantages of using this database management system such as time saving, decreased expense, increased efficiency, and ease of maintenance and manipulation of the information in the data files.

There are three chapters in this thesis, the first chapter discusses the structure of each data file and the relationship between files. Chapter two contains a general overview of dBASE II. Chapter three contains a description of programs created to carry out the functions of this database management system.

An appendix includes a listing from a test run and also programs.

CHAPTER 1

DEFINITION AND STRUCTURE

In designing a data base as a management system to computerize the manual functions for an academic department, first, we consider what would be the assumptions for this environment and what data files would be in the data base. Here, the Mathematical and Computer Sciences Departemnt of Atlanta University is used as a practical case. We consider specific assumptions and functions after we described the data base kept by the system.

We assume the data files of student records, faculty records, course catalogs, course schedules, class listings, graduates, students on financial aid, object and sub-object budget codes of grants, textbook listings and equipment control constitute this data base. All the information for each data file will be stored in this data base and will be manipulated by this system. The structure of each data file and definition of each data item is considered in following sections.

1.1 Definition and Structure of Data Base Files

Student record file: This file stores information on all students. A data record contains 14 items as follows, the SSNO (social security number) is the primary key of a record.

SSNO	:	social security number
NAME	:	name of student
ADDRS	:	address of student
CITY	:	name of city
STATE	:	name of state
ZIP	:	zip code
BIR:DAT	:	date of birth
SEX	:	male/female
ENTRY	:	date student enrolled
MAJOR	:	student's major (computer science, mathematics and applied mathematics)
TEL	:	telephone number
NATION	:	nationality, foreign or domestic
GRADUATE	:	expected date of graduation

This file is sorted by student's major and his social security number.

Course catalog file: This is a catalog of all courses offered by the Mathematical and Computer Sciences Department. There are four elements in a record, the data item of COR:NUM (course number) is unique.

COR:NUM	:	course number (i.e. MCS-575)
COR:NAME	:	course name
CREDIT	:	credit hours of this course
DESCRIP	:	brief description of this course

Course schedule file: This file contains all courses offered in a specific semester. Contents of each record are as follows. At the end of the semester, we delete all records so a clean file can be ready for next semester. The CORNO is the primary key.

SEMTR	:	semester course is offered
YEAR	:	year course is offered
CNO	:	course number
TIME	:	from when to when course will be met
DAY	:	days course will be met
INSTR	:	instructor of course

Class enrollment file: This is a list of each offered course and information of students enrolled in it. Each record contains seven data ietms. Semester, year, course number, student name and social security number are entered at the beginning of the semester. The course grade will be entered at the end of the semester. Like the course schedule file, a listing of this file will be put in file when the semester is over and clean up all records from on-line for use next semester.

SEMTR	:	semester course is offered
YEAR	:	year course is offered
CORNO	:	course number
STUNT	:	student name
SSNO	:	student social security number
GRADE	:	course grade
POINT	:	point of grade (using a 4 point scale)

Financial Aid file: The information on students who have received financial aid are stored in this file. There are three types of aid : teaching assistantship, research assistantship and tuition scholarship. Student social security numberis unique, if we want to see students with a same type of aid, we can use the type of aid as a secondary key. The contents of record are as below.

SSNO	:	student social security number
NAME	:	student name
TYPE	:	type of aid
GRANTIT	:	grant title of aid
BUDGTNO	:	budget number of aid
AMT	:	amount of aid
TIME	:	when this student receives aid

Object budget file: This file stores current totals for department budgets. Each budget has a budget code which is the primary key. A budget record contains seven data items.

BUDG:TIT	:	grant title
BUDG:NO	:	grant number
CODE	:	budget code
SOURCE	:	budget source
DIRTOR	:	director of budget project
AULOG	:	Atlanta University log number
AMT	:	Amount of budget

Sub-object file: A object budget will have several sub-object codes for a budget. The current totals for all sub-objects are stored in a seperate file (sub-object data file). There are three items in each record. The sub-object code is unique.

SUB:CODE	:	code number of sub-object
SUB:TIT	:	title of sub-object

SUB:AMT	:	amount of sub-object

Faculty record file: All the information on faculty and staff in the department are in this file. The employees social security number is the primary key.

F:SSNO	:	social security number
F:NAME	:	name
F:TIT	:	title or position
F:ADDRS	:	address of faculty/staff member
F:CITY	:	city name
F:ST	:	state name
F:ZIP	:	zip code
F:TEL	:	telephone number

Textbook file: This file contains all information concerning textbooks which are used by department. Each book has a unique bookcode. The contents of record are:

BKCODE	:	book code
BKNAME	:	book name
COURSE	:	course using this book
PUBSHER	:	publisher of book
BKTIME	:	semester and year this book used

Equipment data file: This is an inventory of equipment and machines in the department. Each record contains following data items. Equipment code is the primary key.

CODE	:	equipment code
CMY	:	manufacturer
LOC	:	location of equipment
SERV	:	service representative
TEL	:	telephone number of representative

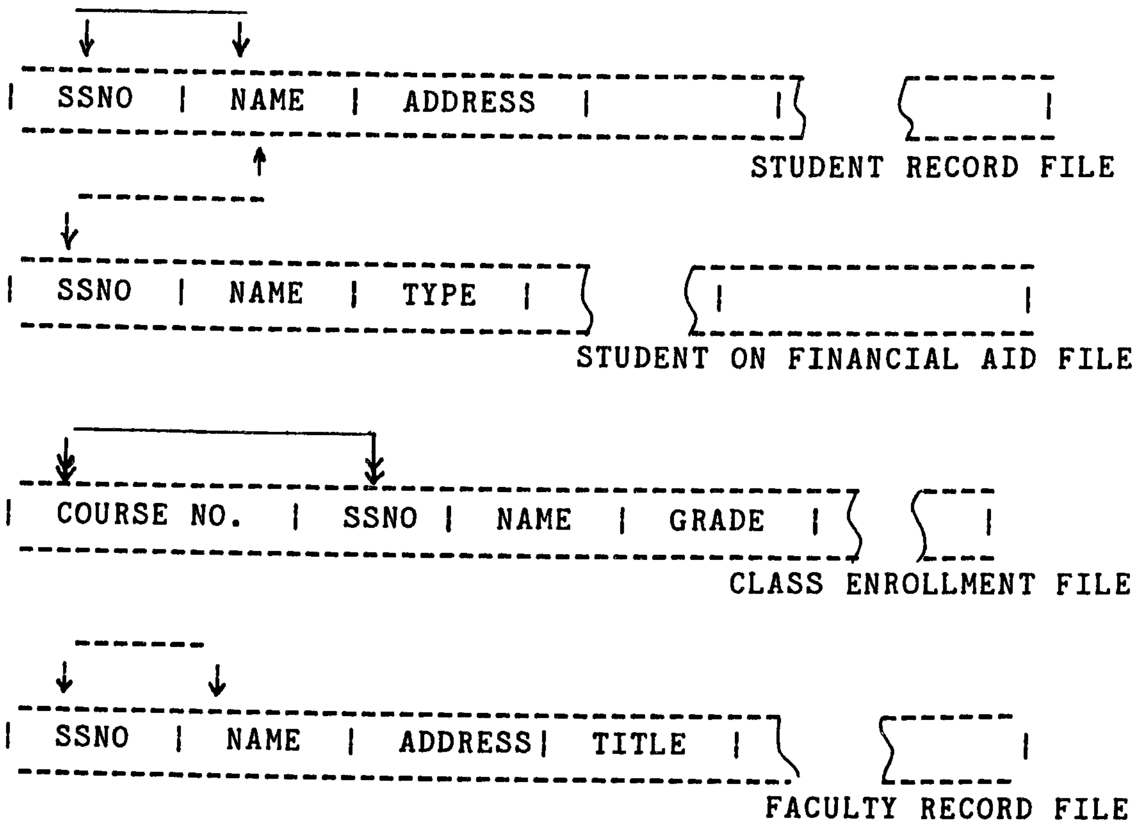
We now consider the assumptions used in setting up a database management system of the above data base files for this environment.

1. Student information may be changed and updated.
2. Student record may be deleted.
3. Student academic records and GPA (average of grade point) results can be calculated and printed out.
4. Produce a course schedule listing for a specific semester.
5. Course schedule may be changed and updated.
6. Produce a class listing for each offered course and students who are taking the course.
7. Students may add or drop courses, class listing files need to be changed and updated.
8. There are three majors in Mathematical and Computer Sciences Department (Computer Science, Mathematics and Applied Mathematics).
9. There are three types of financial aid (Teaching Assistantship, Research Assistantship and Tuition Scholarship).
10. Produce statistics table including number of male and female, foreign and domestic, graduates, students on financial aid, and students of each major.

11. How to access a object budget and its sub-object.
12. Balance of budget amount may be changed and updated.
13. Faculty records may be deleted, added or modified.
14. A textbook is used for a specific course and semester.
15. Information about a book may be added, deleted, changed and updated.
16. Equipment can be classified into computer, terminal and others.
17. Equipment information may be added, changed and updated.

In chapter three, we discuss how these assumptions affect the functional design of this information management system.

In the data base files, some data items have relationships (associations) with other data items. Generally, there are four relationships between data items: one to one, one to many, many to many and conditional mapping. For example, every social security number has one and only one name associated with it, so between social security number and name, there is one to one mapping. Each object budget code has several sub-object codes associated with it, but each sub-object code has only one object budget code, this is one to many mapping between object budget code and sub-object code. The student name and course number are a many to many mapping relationship, because a student may take several courses and a course may be taken by a number of students. A conditional mapping means there may have one or no association between two data items. For instance, each offered course has a course number associated with it, but not every course is offered, some courses are offered in the current semester, some are not. Fig. 1-1 is a diagram to show the relationships of the conceptual model for those data files described above.



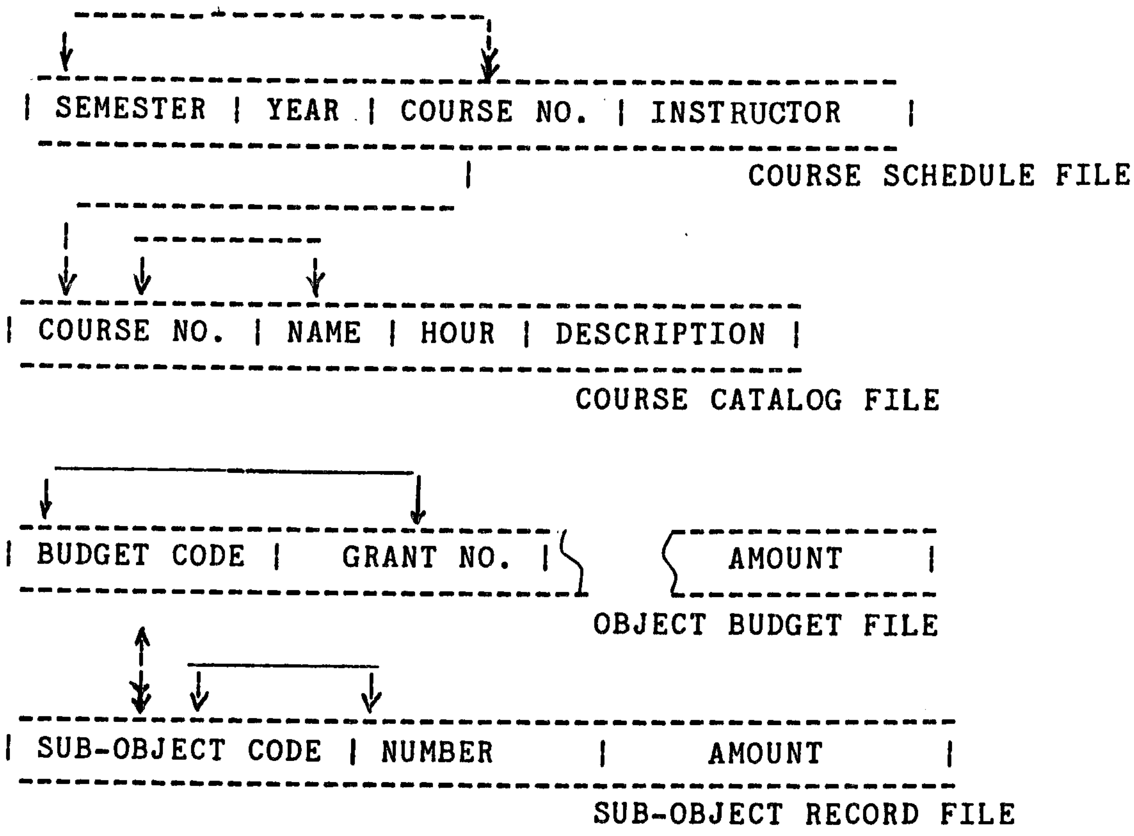

| SEMESTER | YEAR | COURSE NO. | INSTRUCTOR |
COURSE SCHEDULE FILE
| COURSE NO. | NAME | HOUR | DESCRIPTION |
COURSE CATALOG FILE
| BUDGET CODE | GRANT NO. |
AMOUNT |
OBJECT BUDGET FILE
| SUB-OBJECT CODE | NUMBER | AMOUNT |
SUB-OBJECT RECORD FILE

Fig. 1-1 A diagram to show the relationships between data items, <-----> one to one, <----->> one to many, <<----->> many to many, -----> conditional mapping.

1.2 Definition of Technical Terms

Some terminology of data base organization which have been used in this thesis are described in this section.

1.2.1 Logical and physical data:

Logical data refers to a unit of data which is operated on by the computer programmer. Physical data is the data which is stored on a disk. A physical data record might contain several logical records, these records can be blocked and chained together in order to save memory space or access time. The programmer or user does not need to know how data records are chained. The conversion of how the data stored on disk from logical to physical record is done by operating system.

1.2.2 Data description:

Usually, we use BYTE, FIELD (DATA ITEM), RECORD, FILE, or DATA BASE to describe data. A byte is the smallest individually addressible group of bits[1], one byte consists of eight bits. Data item also called 'field', it is the smallest unit in data base; a field may consist of numbers of bytes. A record is composed of one or several data items. File is a collection of records that have the same given type and every record has the same number of data items, as in figure 1-2, a whole set of student records is a data file.

A data base is a collection of stored operational and interrelated data used by the application system of some particular enterprise[2]. The 'enterprise' is a generic term for any commercial, educational, scientific or other operations, such as school, bank, hospital, business company and government. Any enterprise must maintain a lot of data about its operation, this is its 'operational data'. The operational data for an enterprise could be such things as account data (for bank), patient data (for hospital), student data (for school), or inventory data (for business company).

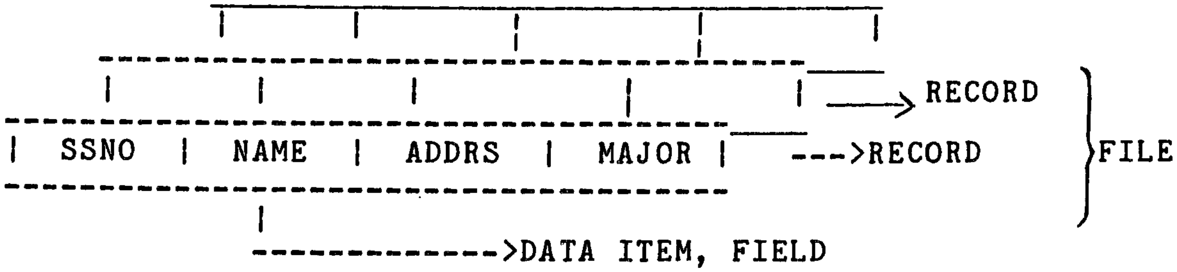


Fig. 1-2 A view of data from a programmer.

A key is the data item or field which can identify a record. In figure 1-2, both social security number (SSNO) and NAME can be used as key to identify a record. We discuss primary key and secondary key[3] here.

1. Primary key: A primary key is a data item or group of data items used to uniquely identify one record. Usually, it is used by the computer in searching the record by means of an index or other addressing technique. As in the student record, the SSNO (social security number) is the item that can identify a record uniquely, for it is a primary key.

2. Secondary key: Computer may use a key which does not identify a record uniquely, but can identify all records which have a same certain property. This kind of key is referred to as a secondary key. Figure 1-3 is an example using data item STATE as a scondary key to see all those students from the state of Georgia.

SSNO	NAME	ADDRESS	CITY	STATE	ZIP
245355078	Joe	6, 10th Ave.	Atlanta	GA	30030
254138987	Liz	101 Bolton Dr.	Marrietta	GA	30316
897037846	Lee	90 P'tree St.	Atlanta	GA	30038
871140983	Lin	10 Oak Pl.	Dallas	TX	90015
753478659	Dan	7 P'dmont Rd.	Atlanta	GA	30016

Fig. 1-3 We can use the data item 'STATE' as a secondary key to see those students from state of Georgia.

From the structure of data, we can find relationships between the files of a data base. There are three best-known structure types of data models: tree (hierarchical), network and relational. Since the writer used dBASE II in designing this system of a data base, and dBASE II uses the relational data structure, only the relational data model is discussed here.

To design a data base by relational structure, we need to find a way of describing the data. First, it can be understood easily by users with no training in programming; and secondly, it makes it possible to add new data items, records, and associations to the data base without changing the existing structure and application programs; and to permit the flexibility of handling unanticipated uses of data or casual inquireries at terminals.

The most natural way to represent data to a nonprogramming user is with a two-dimensional table such as in figure 1-3. Both the tree and network structure data base can also be reduced to a group of two-dimensional tables. It has the following properties:

1. Each entry in a table represents one data item, there are no repeating groups.
2. They are column-homogeneous, that means all items in the same column are of the same type.
3. Each column is assigned a different name.
4. All rows are distinct, each row is called a record, and duplicate rows are not allowed.
5. Both the rows and the columns can be viewed in any sequence at any time without affecting the contents.

Any data table as in figure 1-3 which has the properties above, is referred to as a relation. A data base constructed by using relations is referred to as a relational data base.

Figure 1-4 is an example to explain how to represent a relational structure data file from a tree structure data file. A file which is flat except for a repeating group of fields can be normalized by removing the repeating group into a seperate table or flat file. The new file or relation so formed is given a name. The records in it must have keys to uniquely identify them, as in figure 1-4, the data item SSNO is repeated in the new file and combined with SEM:YR and COURSE# to form a unique identifier (primary key).

When two relations share a data item (field) type, they can be joined together. The join operation will put rows together from different relations, figure 1-5 is an example to show some join operations on three relations. When relations are joined on a given data item type, only those records which share the same value of that data item appear in the result. The result relation may contain fewer records than either of the original relations.

A disadvantage sometimes cited for relational data bases is machine performance.[4] If the fields are millions of bytes long, the join operation will take substantial machine time. It is important to know that the relations and the operations such as join are a part of logical view and do not necessarily exist physically. The advantage of a relational data base are ease of use, flexibility in files, ease of implementation, and data independence (which means that the data and the application programs which use those data are independent, so that either one may be changed without changing the other).

Student Record File:

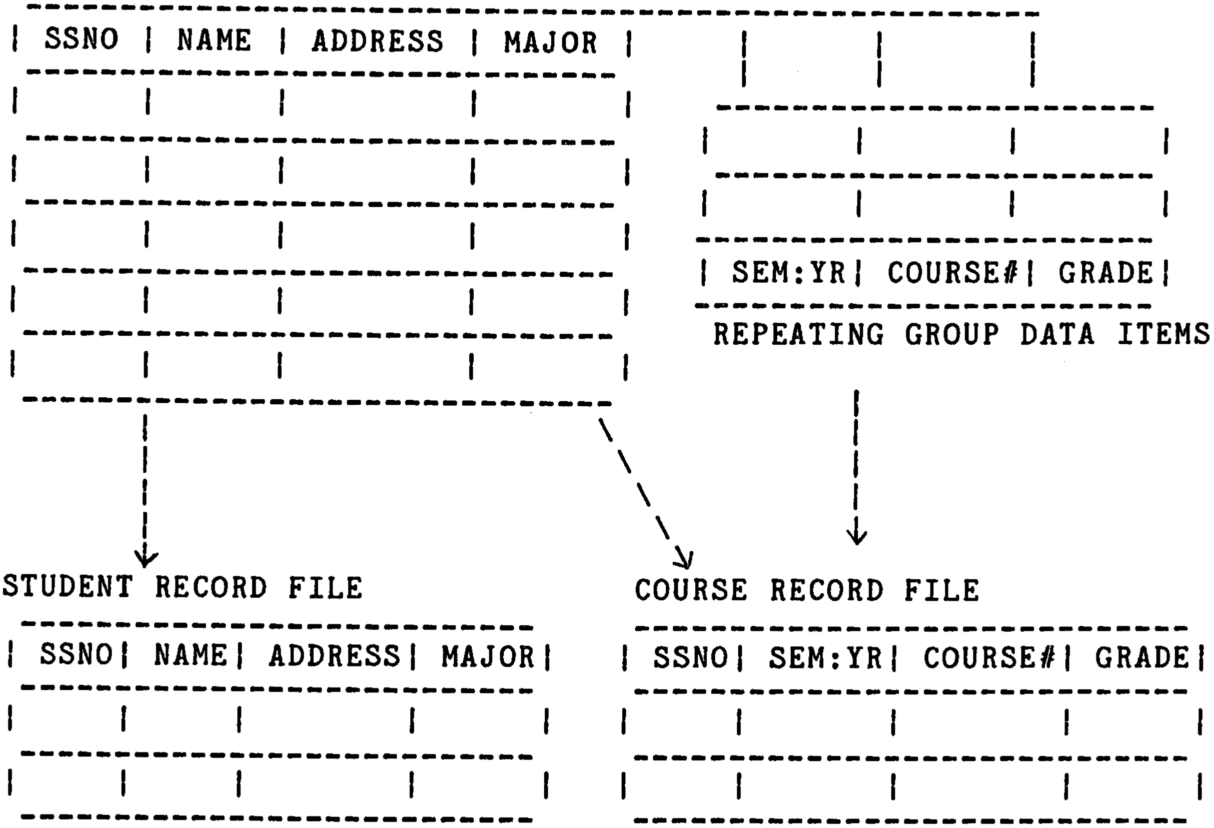


Fig. 1-4 A repeating group is removed by splitting the file into two relational table files.

A1

SSNO	NAME	ADDRESS	
817-52-3093	Joseph Wan	22 Bolton Dr. Atl. GA	30318
544-56-0893	Smith Lee	3400 P'tree St. Atl. GA	30030
352-76-0936	Ben Fung	6 North Ave. Atl. GA	30016
817-42-8923	John Chen	10 Oakwood Pl. Atl. GA	30340

A2

SSNO	SEX	TEL.
252-45-9845	M	998-4500
352-76-0936	M	352-2144
879-74-8746	F	998-2766

A3

SSNO	OCCUPATION
352-76-0936	Student
245-89-7256	Cashier
834-85-0923	Lawyer

JOIN = A1*A2*A3 (NAME, SSNO, TEL AND OCCUPATION)

Ben Fung	352-76-0936	352-2411	Student

Fig. 1-5 A join operation with three relations.

CHAPTER 2

dBASE II OVERVIEW AND FEATURE

dBASE II was developed by Ashton Tate, with an English based, high level command language. It is widely used to creat data base management systems (DBMS). DBASE II is very useful in establishing and maintaining a data base, and easy to manage small or medium sized data bases. A user can quickly learn how to create a full information system, and to add, delete, edit, display, print, and manipulate the information in the system. By the meantime, dBASE II data and programs are independent, a user can change either one without changing the other.

dBASE II requires 8080, 8050 or Z80 based microprocessor system with CP/M, CDOS, or CROMIX operating systems, or 8086, 8088 based microprocessor system with CP/M-86 or MS-DOS[5] operating systems.

When using dBASE II as a data base management system, it is considerably different from a file handling system. The diagram following is an example of a file handling system, each program processes its own file (i.e. student record program processes student file). If the user wants to get a report that combines data from different data files, a new program need to be written. But with a DBMS (such as dBASE II), data can be integrated from different data files and make it much easier to get useful information from different dat files. The difference between a file handling system and a data base management system can be shown obviously in figure 2-1. In diagram 2-1a, it shows all data files are monitored and manipulated by the DBMS and not by the individual application programs.

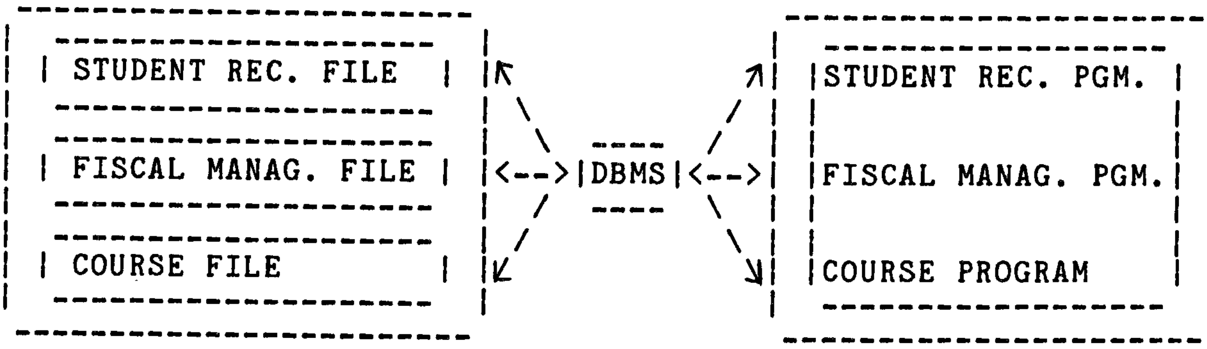
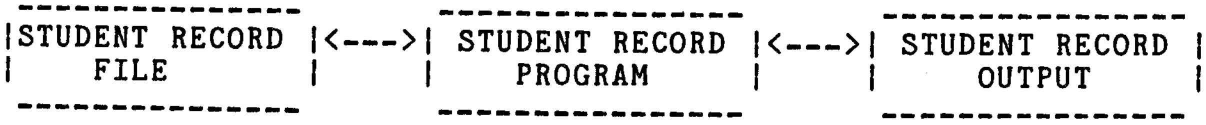


Fig. 2-1a A data base management system.



```
 ---------------     ----------------     ----------------
|FISCAL MANAGE. |<--->| FISCAL MANAGE. |<--->| FISCAL MANAGE. |
|    FILE       |     |    PROGRAM     |     |     OUTPUT     |
 ---------------     ----------------     ----------------

 -------------      ----------------      ----------------
|COURSE FILE  |<--->| COURSE PROGRAM |<--->| COURSE OUTPUT  |
 -------------      ----------------      ----------------
```

Fig. 2-1b A file handling system.

The sequence of events when an application program needs a record by using a data base management system can be explained by figure 2-2.[6] The meaning of each step is described as following:

1. An application programmer issues a call to the DBMS to read a record in a file; the program has to give the value of the key of that record the programmer wants.
2. The DBMS obtains the program data description (subschema) that is used by the application program and looks up the description of the data in question.
3. The DBMS obtains the global logical data description (schema) and decides which logical data types are needed.
4. The DBMS searches physical database description and finds the physical record.
5. The DBMS issues a command to the operating system to read the requisite record.

6. The operating system interacts with the physical storage where the data records are kept.

7. The required data is then transferred to a system buffer.

8. The DBMS derives from the data, the logical record needed by the application program.

9. The DBMS transfers the data from the system buffer to a work area.

10. The DBMS shows information to the application program on the outcome of its call, including error indicatons.

11. The application program can then operate with the data in the work area.

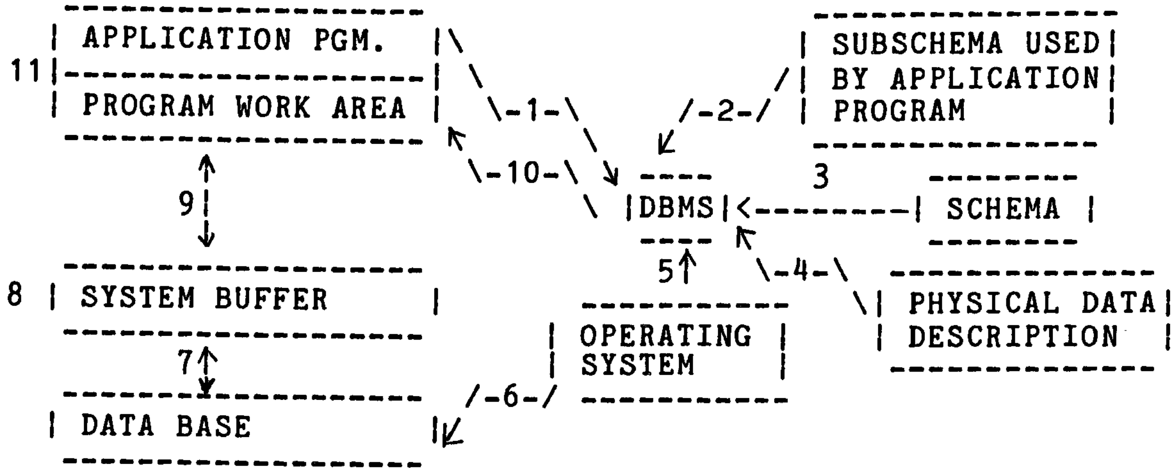


Fig. 2-2 A sequence events for an application program to call a record by DBMS.

As we said earlier, a relational data base like dBASE

II is a great deal simpler. Data is repeated as it is , and the relation between data elements can be considered a two dimensional table like in figure 2-3. Each row going across the table is called a record. Each columm is called a field of the record. Each entry in the table must be a single value (no sets, no arrays, etc.). All the entries in a column must be of the same type. Each record (row) is unique, and the order of records (rows) in formal writing use doesn't matter.

2.1 dBASE II RECORDS, DATA TYPES, AND FILES

dBASE II was designed to run on a micro-computer so its scope stops short of infinity. A dBASE II data file can be stored up to 65,535 records,[8] but with the memory and mass storage limitations of a microcomputer, the memory space is really no limitation at all. A record can be as large as 32 fields and 1,000 characters long, with a maximum of 254 characters for each field. Every data field has a name defined by the user, and must contain a single type of data. In dBASE II, there are three kinds of data types:[9] character type (for all ASCII characters), numeric type (between 1.8*10<63> to 1.0*10<-63>), logical type (a value of of true or false, yes or no, occupies a field one character long). Each field name can be up to 10 characters long.

There are six different file types in dBASE II, the file name being limited to 8 characters with a 3 character extension,[10] they are '.DBF' (data base file), '.FRM' (report form file), '.CMD' (command file), '.NDX' (index file), '.MEM' (memory file). '.TXT' (text output file).

2.2. HOW TO USE dBASE II ?

To execute a dBASE II program, place dBASE II system disk into any available disk drive. Set that drive to be the default drive (i.e. if the disk is in B drive, type in B:), then enter 'dBASE', the system program will be loaded into memory and request an option to enter the date (screen shows as MM/DD/YY). After the date is typed in, press the return key and the screen will display a dot '.', which means you are in dBASE II mode and the computer is ready to accept a dBASE command. We will see how to create a data base file and how to set up a command file (dBASE II program) in the following.

For example, suppose we want to create a data file for storing student's information and each record will contain student's name, social security number, address, city, state, zip code, telephone number and major. First, we type 'CREATE',[11] dBASE II will respone with: 'ENTER FILENAME:'.[12] The user then enters a filename (defined by user), string starting with a letter and up to 8 characters. Let us say the filename is called STUREC.DBF. Since each record has eight fields as we wanted, dBASE II needs to know the name of each data field, data type, length of field, and how many decimal places if that data is numeric. The screen shows as:

```
.CREATE
ENTER FILENAME: STUREC
ENTER RECORD STRUCTURE AS FOLLOWS:
FIELD, NAME, TYPE, WIDTH, DECIMAL
001
```

A field name can be up to 10 characters long, starting with a letter and no spaces. Data type is specified by a single letter, C - character, N - numerical, and L - logical. The decimal point also takes one character position if the field is numberic and the decimal place is specified. We can now type in the record structure as follows:

```
001 NAME,C,20
002 SSNO,C,12
003 ADDRESS,C,30
004 CITY,C,20
005 STATE,C,2
006 ZIP,C,5
007 TEL,C,15
008 MAJOR,C,10
009
```

When dBASE II asks for a ninth field, press the return key to end the data definition. All the data structures typed in will be saved and the data file STUREC.DBF is ready for data entry.

To set up a command file, the programmer lists all the dBASE II commands he wants to be performed and saves those commands. dBASE II starts at the top of the program list and processes one command at a time from left to right untill it is done with the list. dBASE uses the carriage return to terminate a command line (BASIC uses a line number, PASCAL uses a semi-column ';' to seperate program lines). If we want to create a command file called TEST, we simply type: 'MODIFY COMMAND TEST', and enter the program commands. When we want to run this command file, we type 'DO TEST' to execute the program.

Since its inception, dBASE II has been regarded as a high quality product. Although it is not particularly fast by today's microcomputer standards, there are very few things that dBASE II can not do.

CHAPTER 3

DESCRIPTION OF PROGRAM DESIGN

In this chapter, the writer uses the Mathematical and Computer Sciences Department of Atlanta University as a practical environment in discussing the design of a data base management system for an academic department. We determine a method of accomplishing the major tasks to be done and divide them into five components: Student Records, Course Listing, Fiscal Management, Statistical Summary, and Department Information files. By using a database management system as dBASE II, we can design a main program as a user friendly menu to control and handle all problems of these five components. The description of each program design is listed below. A simulation program and list of test run of programs are attached in the appendix.

Program -- MAIN

This is a controlling program consisting of five modules: student records, course listing, fiscal management, statistical summary, and department information. To execute this program, type " DO MAIN ". A menu-driven code table will display on the screen as on the next page:

```
COMMAND NUMBER

     1 - STUDENT RECORDS
     2 - FISCAL MANAGEMENT
     3 - COURSE LISTING
     4 - STATISTICAL SUMMARY
     5 - DEPARTMENT INFORMATION
     6 - PRINT MODULE

     X - DBASE MODE
     Z - SYSTEM MODE

PLEASE ENTER A NUMBER:
```

The user may input a number indicating the module to be examined or input 'X' to back to dBASE mode, or input 'Z' to exit to system mode. A input number '1' will execute module of STU program, '2' will execute FIS module, '3' will execute COUR module, '4' will execute STA module, '5' will execute DPT module. Each module is discussed in following sections. Figure 3-1 is a structure chart of this program.

Program -- STU

The function of this program is to create and enter, modify, edit, delete, and extract information of a student record from the data base of the student record file. It can also execute and print a student's academic record report, which includes the grades of all courses he has been taken and the grade point average. A menu-driven code table will show on the screen like this:

```
COMMAND NUMBER

   1 - ENTER DATA
   2 - EDIT A RECORD
   3 - DELETE A RECORD
   4 - BROWSE DATA FILE
   0 - MAIN MENU

PLEASE ENTER A NUMBER --
```

Figure 3-2 is a visual table of the structure of this program. To change and delete information of a record, we manipulate the program using EDFIELD and DELEREC. After a command number is selected, the computer will ask the user to enter the student's security number (SSNO), then uses this SSNO as a search key and searches the student record in the data base file. If it can not be found, which means that is a new student, the screen gives the message : ' * NOT IN FILE, IS A NEW STUDENT -- ENTER PERSONAL DATA :' and creates a record in the data file for the user to type the student data in. If the SSNO is found in the file, then that student is an old student. The user can then follow the screen command and go to the next procedure to see all course taken and grades received, or see the courses being taken in the current semester.

Program -- EDFIELD

This program is to change and edit the information of a student record if the personal data is not correct or out-dated. The screen will show:

'* Enter the SSNO need to EDIT or 0 to exit : '

The screen then gives a full screen for the user to edit the record if the SSNO was found in the data file, otherwise the computer will ask the user to enter again.

Program -- DELEREC

The function of this program is to delete a student (or faculty) record from data file. Use the social security number as the search key to delete a record. If the key is found in the file, the screen will ask:

' * Record is found, do you want to delete (y/n) ? '

When you mark a record for deletion, dBASE II will place an '*' by that record. Until you purge that file, the record will remain. It will also delete the whole course record of this student in the class enrollment file (CORLIS.DBF), otherwise the record will be unchanged.

Program -- COUR

This is a sub-control module. The prompts are allowed to set up a course schedule, a class enrollment listing, to add and drop course, and enter grade. A menu-driven code table will display on the screen as:

```
COMMAND NUMBER

    1 - ENTER COURSE SCHEDULE
    2 - DELETE COURSE FROM COURSE SCHEDULE
    3 - LIST A COURSE SCHEDULE
    4 - ADD / DROP, CLASS LISTING, ENTER GRADE
    0 - EXIT TO MAIN MENU

ENTER A CODE YOU WANT --
```

The user can select a number to indicate the program to be executed. Figure 3-3 is an example of contents of this module. The computer will create a record, and give a full screen for the user to enter a course record in the course schedule file. A selection of number '2', dBASE II will execute DELECOUR program. A number of '3' will print out a course schedule of the current semester. Enter number '4' to execute CORLST program.

Program -- DELECOUR

This program is to delete a course record from the course schedule file. The computer will ask the user to enter the course number (i.e. MCS-575) and use this course number as a search key to locate in the data file. After a course has been deleted, and the file has been purged, it can not be brought back.

Program -- CORLST

The functions of this program is to set up and produce a class enrollment listing for the each course listed on the course schedule. Each record of a class listing file includes course name, semester and year, student name, S.S.NO., grade, and grade point average. The student's name and S.S.NO. are entered at the very beginning of a semester. At the end of that semester, after the grade has been submitted by the instructor, the student's grade will be entered accordingly and the grade point average is calculated. The prompts are set up as below:

```
COMMAND NUMBER

   1 - ENTER STUDENT DATA
   2 - CALSS ENROLLED LISTING
   3 - ADD / DROP
   4 - ENTER STUDENT'S GRADE
   0 - SUB-MENU

ENTER A NUMBER ----
```

The user enters a number indicating the program to be executed.

Program -- ADDROP

This procedure is to update the calss enrollment listing file, Some students might add a course or drop a course after registration. The class listing file then needs to be updated. When we want to add a student and course he added, the procedure is the same as in setting up a calss listing file. To drop a course, we enter the student's S.S.NO. and the course number he wants to drop as the search key. The record will then be deleted from the data file.

Program -- FIS

The functions of this program is to create, modify, edit, extract information and make transactions of an object budget record. A menu-driven code table as below will display on the screen:

```
COMMAND NUMBER

    1 - ENTER BUDGET DATA
    2 - BROWSE DATA FILE
    3 - MAKE TRANSACTION (DEPOSIT / SUBSTRACT)
    0 - MAIN MENU

PLEASE ENTER A NUMBER ----
```

Figure 3-4 is a structure chart for this program. Each budget has a budget code which is the primary key, so the user can call a certain budget up by enterring its budget code. A main object budget code represents the funding source of that budget record, and the sub-budget codes are the representatives of the sub-divisions (categories) with the main object budget. Program FISSUB is a procedure to make account transactions in a budget.

Program -- FISSUB

This program is to make account deposits or withdrawal transactions in a budget. If we want a certain budget account, we enter the budget code, then dBASE II searches the budget data file and asks to input the information of transaction if it is found in the data file. The ending balance will also be calculated and show up on the screen.

Program -- STA

The functions of this program include: creating records and enterring required information for the students on financial aid and graduates of the current semester, editing or deleting a record or listing the data files. The statistical summary will calculate the number of male and female, foreign and domestic students; and students with Computer Science, Mathematics, and Applied Mathematics majors. A menu-driven table as below will show on the screen.

```
COMMAND NUMBER

    1 - STUDENT ON FINANCIAL AID
    2 - GRADUATES
    3 - STATISTICAL SUMMARY
    0 - MAIN MENU

PLEASE ENTER A NUMBER ----
```

A visual table contents of this program is in figure 3-5.

PROGRAM -- DPT

This program is to set up files for the faculty, textbooks, and equipment in the department of Mathematical and Computer Sciences. Screen will display as on nex page.

```
COMMAND NUMBER

   1 - FACULTY
   2 - TEXTBOOKS
   3 - EQUIPMENT
   0 - MAIN MENU

PLEASE ENTER A NUMBER ----
```

The user can enter, change, and delete information of records, and browse these three data files (faculty, textbooks, and equipment) from on the screen. An example of the table contents of this program are in figure 3-6.

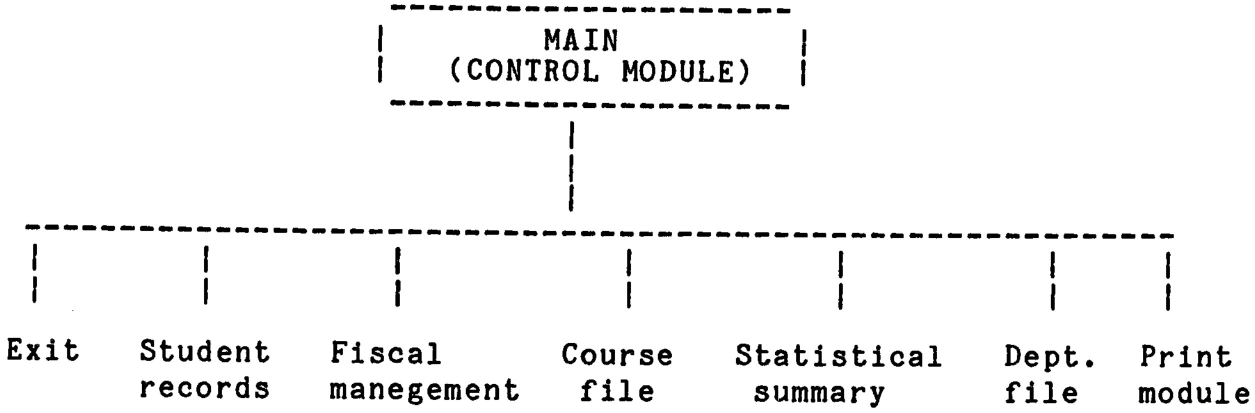


Figure 3-1 An example of the table contents of MAIN program.

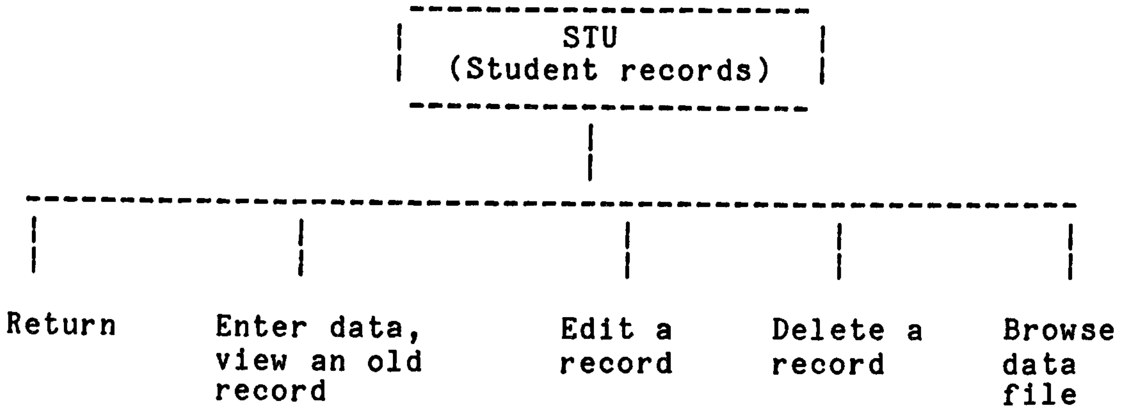


Figure 3-2 An example of the table contents of STU program.

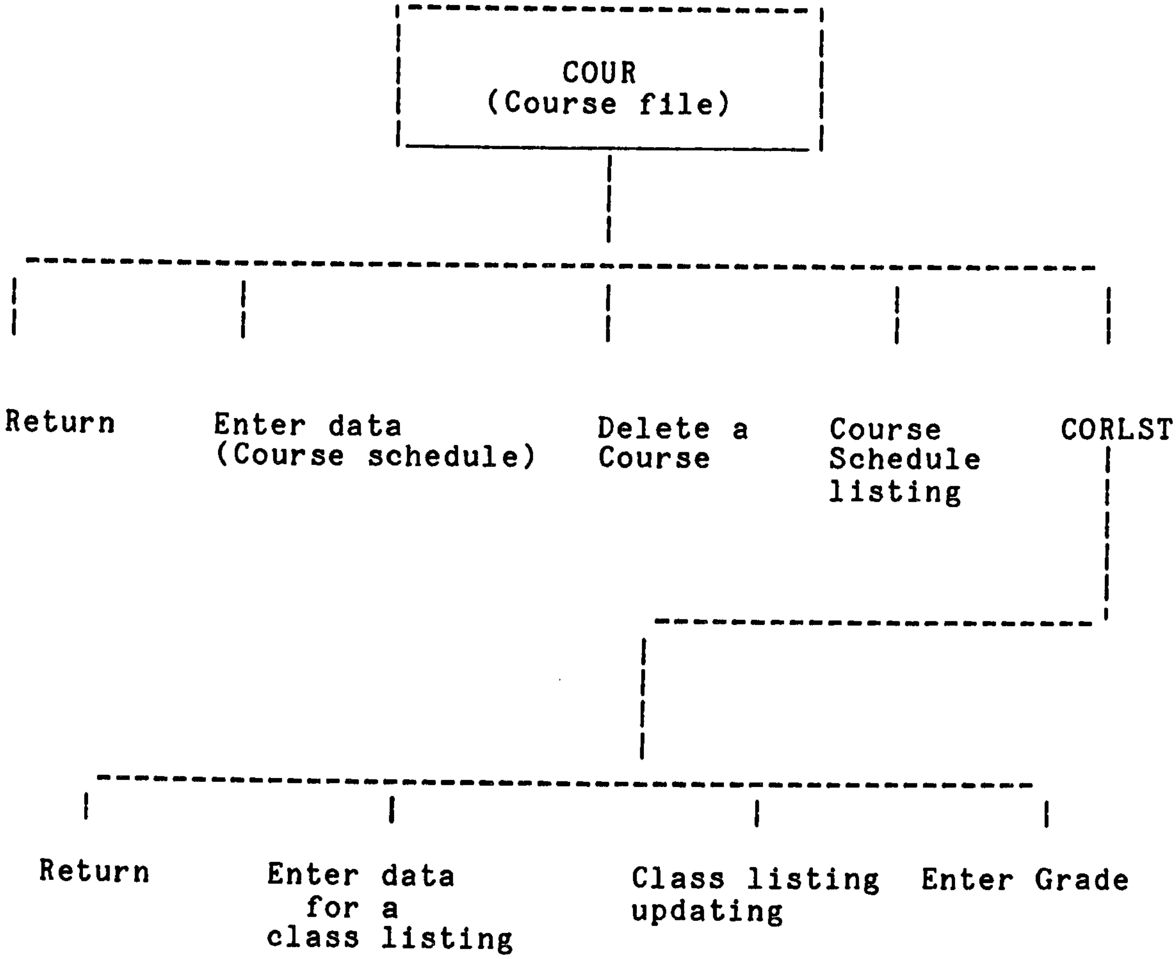


Fig. 3-3 An example of table contents of COUR program.

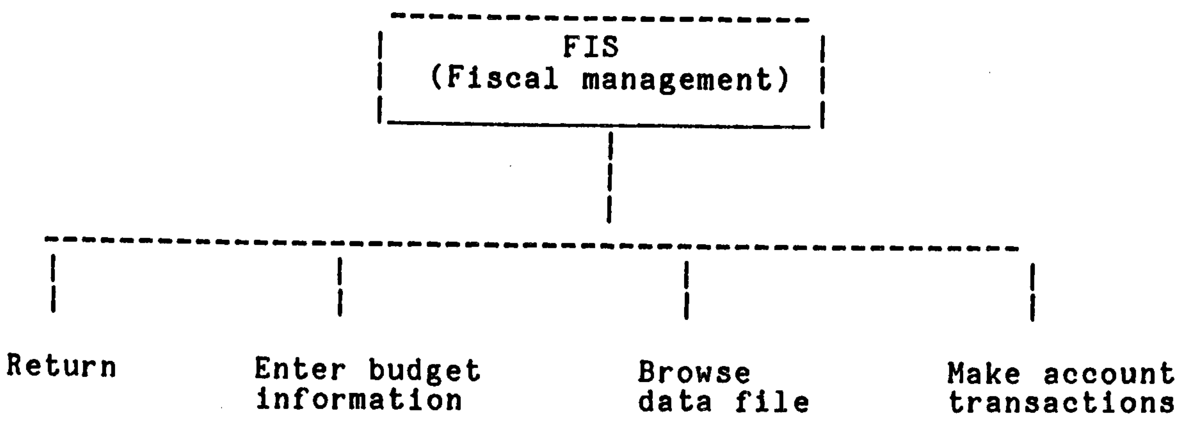


Figure 3-4 An example of table contents of FIS program.

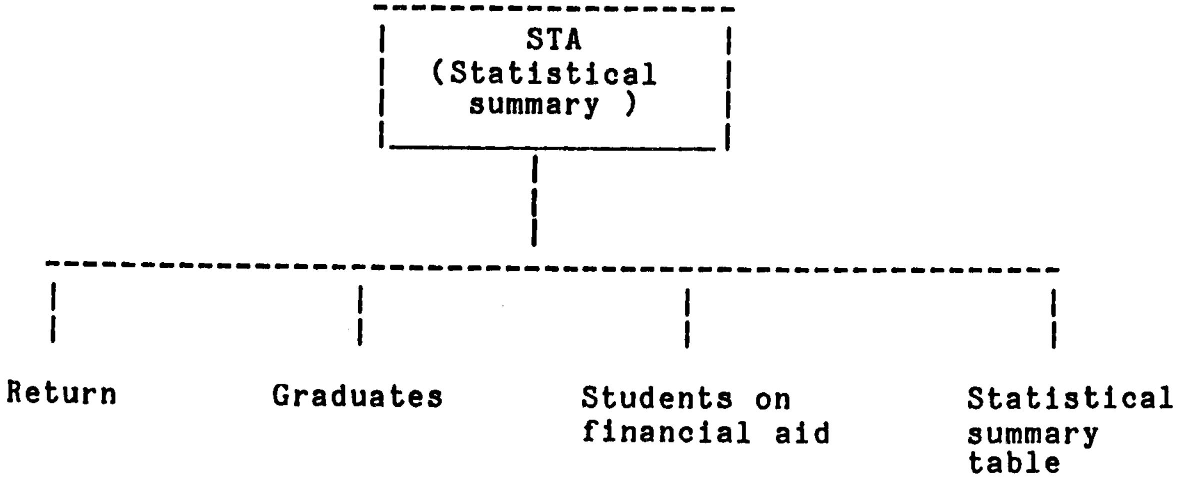


Figure 3-5 An example of table contents of STA program

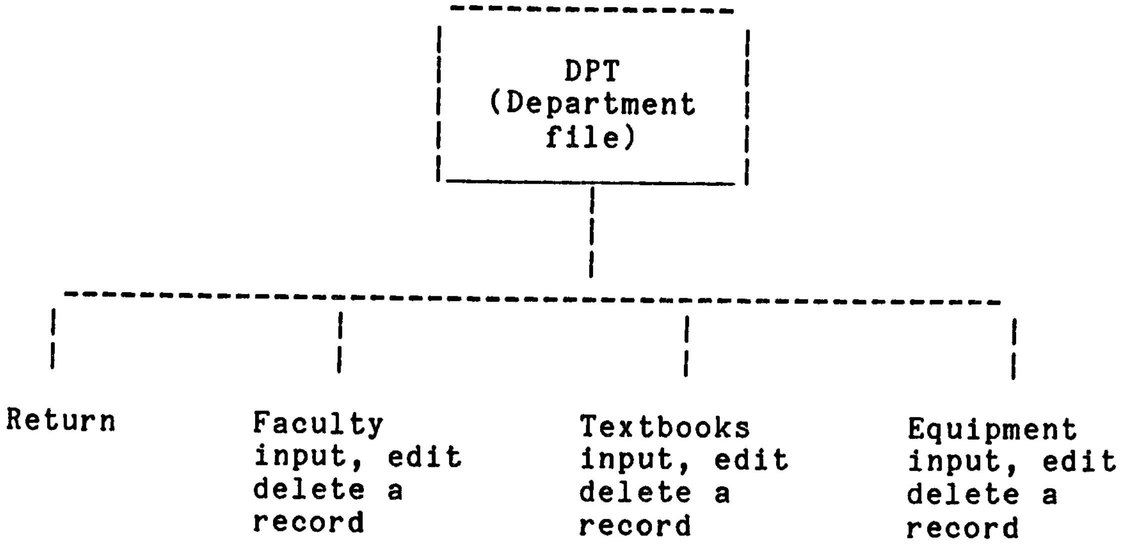


Figure 3-6 An example of table contents of DPT program.

CONCLUSION

Since software applications have become more and more sophisticated, thousands of jobs are replaced by computers which were done by manual systems before. Approximately thirty years ago, computers were limited to large scale systems because of the high cost. But, with the advent of mini-computers and micro-computers in the 1960's - 1970's, the cost of computers has decreased. Now small organizations, even a family, can afford computers. Microcomputers are more and more widely used now in business applications.

Computers have invaded the schools, not only universities and colleges, but also secondary and elementary schools. These machines are used not only as a source of instruction or instructional purpose, but also to perform information processing operations, such as student registration, grade recording, payroll, course scheduling, student transcript updating, and other administrative tasks. Years ago, teachers and administrators had no choice, they had to squeeze these chores into an already busy schedule. Today, however, the application of computer technology to these routines has freed many teachers and administrators from having to do them. The results: schools are improving the level of their service, teachers are devoting more time to teaching, administrators are spending more time with critical problems, and school records are more accurate and appear without fuss in standardized formats.

FOOTNOTES

1. James Martin, "Computer data base organization", N.J. Prentice Hall, 1977, p.11-12
2. C.J. Date, "An introduction to data base system", Eddison Wesley Publishing Comp., N.Y. 1977, p.4-6
3. James Martin, op.cit., p.55-57
4. Ibid., p. 225-226
5. Ashton Tate and Wayne Patlife, "dBASE II user manual", L.A. CA, 1981, Part-I, p.99
6. James Martin, op.cit., p.81-83
7. Ashton Tate, op.cit., p.99
8. Ibid., p.91
9. Ibid.,
10. Ibid., p.93, Part-II, p.5-8
11. Ibid., Part-II, p.57-58
12. Ibid.,

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1. James Martin, Computer data base organization, 2nd ed. Englewood Cliffs, N.J. Prentice Hall, 1977

2. C.J. Date, An introduction to data base system, Edison Wesley Publishing Company, N.Y. 1977

3. Ellis Hurowitz and Sartajsahni, Fundamentals of data structure, Computer Science Inc., Maryland, 1976

4. Ashton Tate and Wayne Patlife, dBASE II user manual, L.A. CA, 1981

5. Tod Katz, dBASEing, the 'DBRUN' time package, PC magazine, Vol. 2, No. 1, pp. 547-552, June, 1983

6. David Jenkins, dBASE II V-2.4, A view of the latest update of dBASE II, PC world, Vol. 1, No. 10, pp. 139-144, Dec. 1983.

APPENDIX A STRUCTURE OF DATA FILES

```
STRUCTURE FOR FILE:   A:STUREC    .DBF
NUMBER OF RECORDS:    00011
DATE OF LAST UPDATE: 01/01/80
PRIMARY USE DATABASE
FLD        NAME       TYPE WIDTH    DEC
001       SSNO         C    011
002       NAME         C    045
003       ADDRS        C    035
004       CITY         C    015
005       STATE        C    002
006       ZIP:CODE     C    005
007       BIRDAT       C    008
008       BPLCE        C    025
009       SEX          C    002
010       ETRY         C    008
011       MAJOR        C    008
012       TEL          C    008
013       NATION       C    002
014       G:SEM        C    008
015       G:YR         C    004
016       ADVIOR       C    020
017       THESIS       C    050
018       APPON        C    020
019       THDATE       C    008
** TOTAL **               00285
.
```

```
STRUCTURE FOR FILE:   A:FACTY     .DBF
NUMBER OF RECORDS:    00007
DATE OF LAST UPDATE: 04/15/83
PRIMARY USE DATABASE
FLD        NAME       TYPE WIDTH    DEC
001       NAME         C    025
002       SSNO         C    011
003       FTIT         C    015
004       FADDRS       C    030
005       FCITY        C    015
006       FSTATE       C    002
007       FZIP         C    005
008       FTEL         C    013
** TOTAL **               00117
.
```

```
STRUCTURE FOR FILE:  A:FISCMG  .DBF
NUMBER OF RECORDS:   00003
DATE OF LAST UPDATE: 04/15/83
PRIMARY USE DATABASE
FLD       NAME      TYPE WIDTH   DEC
001      G:TIT       C    025
002      G:NO        C    025
003      B:CODE      C    025
004      FD:SOUCE    C    020
005      PRODIR      C    017
006      AUHG        C    010
007      AMT         N    010    002
** TOTAL **              00133
.
```

```
STRUCTURE FOR FILE:  A:SUBPRO  .DBF
NUMBER OF RECORDS:   00007
DATE OF LAST UPDATE: 04/15/83
PRIMARY USE DATABASE
FLD       NAME      TYPE WIDTH   DEC
001      SNO         C    025
002      S:CODE      C    025
003      S:TIT       C    025
004      S:AMT       N    010    002
** TOTAL **              00086
.
```

```
STRUCTURE FOR FILE:  A:CORSCH  .DBF
NUMBER OF RECORDS:   00003
DATE OF LAST UPDATE: 04/15/83
PRIMARY USE DATABASE
FLD       NAME      TYPE WIDTH   DEC
001      SEMTR       C    008
002      YEAR        C    004
003      CTIT        C    025
004      CNO         C    008
005      CHUR        N    003
006      TIME        C    011
007      RM          C    005
008      DAY         C    006
009      CINSTR      C    020
** TOTAL **              00091
.
```

```
STRUCTURE FOR FILE:  A:EQUIP   .DBF
NUMBER OF RECORDS:   00003
DATE OF LAST UPDATE: 04/15/83
PRIMARY USE DATABASE
FLD      NAME      TYPE WIDTH   DEC
001     CODE        C    010
002     NAME        C    020
003     CMY         C    030
004     SERV        C    025
005     LOC         C    010
006     TEL         C    012
** TOTAL **           00108
.
```

```
STRUCTURE FOR FILE:  A:FINCE   .DBF
NUMBER OF RECORDS:   00002
DATE OF LAST UPDATE: 04/15/83
PRIMARY USE DATABASE
FLD      NAME      TYPE WIDTH   DEC
001     FNAME       C    025
002     FSSNO       C    011
003     TYPE        C    002
004     GRANT:NO    C    020
005     BUDGT:NO    C    020
006     AMOUNT      N    008    002
007     SEMTR       C    008
008     YR          C    004
** TOTAL **           00099
.
```

```
STRUCTURE FOR FILE:  A:CORLIS  .DBF
NUMBER OF RECORDS:   00003
DATE OF LAST UPDATE: 04/15/83
PRIMARY USE DATABASE
FLD      NAME      TYPE WIDTH   DEC
001     SEMTR       C    008
002     YR          C    004
003     CNO         C    008
004     CNAME       C    030
005     SNAME       C    025
006     SSSNO       C    011
007     GRADE       C    001
008     POINT       N    005    002
** TOTAL **           00093
.
```

```
STRUCTURE FOR FILE:  A:TEXTB   .DBF
NUMBER OF RECORDS:   00001
DATE OF LAST UPDATE: 04/15/83
PRIMARY USE DATABASE
FLD       NAME      TYPE WIDTH   DEC
001     B:NAME       C    032
002     B:COUR       C    007
003     PUBSHER      C    035
004     B:TIME       C    012
005     CODE         C    050
** TOTAL **             00137
.
```

```
STRUCTURE FOR FILE:  A:TRANSFIL.DBF
NUMBER OF RECORDS:   00001
DATE OF LAST UPDATE: 04/15/83
PRIMARY USE DATABASE
FLD       NAME      TYPE WIDTH   DEC
001     CODE         C    020
002     CHKNO        C    005
003     TIME         C    008
004     TO:WHO       C    020
005     AMT          N    010    002
006     PURPOSE      C    050
007     PURPOSE1     C    050
** TOTAL **             00164
.
```

```
STRUCTURE FOR FILE:  A:COURFIL .DBF
NUMBER OF RECORDS:   00000
DATE OF LAST UPDATE: 04/15/83
PRIMARY USE DATABASE
FLD       NAME      TYPE WIDTH   DEC
001     NUMBER       C    008
002     COR:NAME     C    030
003     CREDIT       C    002
004     DESCRIP      C    120
** TOTAL **             00161
.
```

APPENDIX B PROGRAMS

```
NOTE - THIS IS THE MAIN PROGRAM AND THE CONTROL MODULE
SET TALK OFF
SET DELETED ON
ERASE
DO WHILE T
ERASE
@ 5,2 SAY 'COMMAND'
@ 7,5 SAY '1 - STUDENT RECORDS'
@ 8,5 SAY '2 - FISCAL MANAGEMENT'
@ 9,5 SAY '3 - STATISTICAL SUMMARY (GRADUATES,';
         'FINANCIAL AID)'
@ 10,5 SAY '4 - COURSE LISTING (COURSE SCHEDULING,';
           'CLASS LISTING,';
           'ADD-DROP'
@ 11,10 SAY 'GRADE UPDATING)'
@ 12,5 SAY '5 - DEPARTMENT DATA (FACULTY, TEXTBOOK,';
           'EQUIPMENT)'
@ 13,5 SAY '6 - PRINT MODULE'
@ 15,5 SAY 'X - DBASE MODE'
@ 16,5 SAY 'Z - SYSTEM MODE'
STORE ' ' TO ACT
@ 19,2 SAY '*  PLEASE ENTER A NUMBER ' GET ACT
READ
STORE !(ACT) TO ACT
IF ACT='X'
   * exit to dBASE prompt **
   ? ' **   ENTER dBASE COMMAND   ***'
   CANCEL
ENDIF
IF ACT='Z'
 * exit to system
 ? '**********************************'
 ? '       PROCESS FINISHED '
 ? '**********************************'
 QUIT
ENDIF
IF ACT='6'
 DO B:PRT
ENDIF
IF ACT='1'
 DO B:STU
ENDIF
IF ACT='2'
 DO B:FIS
ENDIF
IF ACT='3'
 DO B:STA
ENDIF
```

```
IF ACT='4'
 DO B:COUR
ENDIF
IF ACT='5'
 DO B:DPT
ENDIF
ENDDO
```

```
NOTE - B:STU   THIS PROGRAM IS TO CREATE A NEW STUDENT
NOTE - RECORD OR VIEW STUDENT RECORD FILE
*
ERASE
SET TALK OFF
DO WHILE T
ERASE
@ 2,2 SAY ' COMMAND NUMBER '
@ 4,5 SAY ' 0 - MAIN MENU'
@ 5,5 SAY ' 1 - ENTER DATA / SEE STUDENT GRADE  RECORD'
@ 6,5 SAY ' 2 - EDIT A RECORD'
@ 7,5 SAY ' 3 - DELETE A RECORD'
@ 8,5 SAY ' 4 - BROWSE FILE '
STORE ' ' TO A
@ 11,2 SAY '* PLEASE ENTER A NUMBER '  GET A
READ
IF A='0'
  * ( back to main menu ) *
  RETURN
ENDIF
IF A='2'
 * edit a record *****
  USE B:STUREC
  DO B:EDFIELD
ENDIF
IF A='3'
 ** delete a record  **
 USE B:STUREC
 DO B:DELEREC
ENDIF
IF A='4'
   STORE ' ' TO D
   ACCEPT ' > DO YOU WANT SORT THE FILE ?(Y/N)' TO  ASW
   IF !(ASW) = 'Y'
    USE
    USE B:STUREC
    INDEX ON SSNO TO B:STUREC
    USE B:STUREC INDEX B:STUREC
   ENDIF
   IF !(ASW)='N'
    USE B:STUREC
   ENDIF
   DO WHILE .NOT. EOF   .AND. D # 'Q'
     DISP NEXT 7
     ?
     ? " ENTER 'Q' TO QUIT"
     ?
     WAIT TO B
     IF !(B) = 'Q'
        STORE 'Q' TO D
     ENDIF
    ENDDO
ENDIF
 ****** IF = 4 browse data file
IF A='1'
 ***** enter or pull up a record   ****
 STORE ' ' TO SEE
 STORE ' ' TO SES
 DO WHILE !(SEE) <> 'Q'
   ERASE
   STORE ' ' TO OLD
   STORE '           ' TO T:SSNO
   @ 5,5 SAY '* ENTER STUDENT ID NO, 0 TO EXIT ';
     GET T:SSNO PICT '###-##-####'
   READ
   IF $(T:SSNO,1,1)='0' .AND. $(T:SSNO,2,10)='  -  -    '
    STORE 'Q' TO SEE
    STORE 'Q' TO SES
    RETURN
   ENDIF
   IF LEN(TRIM(T:SSNO)) < 11
    ?
    ? ' *******   BAD INPUT, INPUT AGAIN  ********'
    STORE 1 TO B
       DO WHILE B < 20
       STORE B+1 TO B
       ENDDO
       release B
    LOOP
    ** back and enter again  **
   ENDIF
    ********** ID INPUT IS RIGHT  ************
    IF SES <> 'Q'
     STORE '                        ' TO T:NAME
     @ 7,5 SAY '   STUDENT NAME ' GET T:NAME
     READ
     USE  B:STUREC
     *** search record  ****
     LOCATE FOR SSNO=T:SSNO.AND.!(TRIM(T:NAME)) $(!(NAME))
     IF SSNO=T:SSNO .AND. !(TRIM(T:NAME)) $(!(NAME))
       STORE 'Y' TO OLD
       ERASE
       @ 3,2 SAY ' *** RECORD IS IN FILE ****'
     ELSE
      ERASE
      ******  A NEW STUDENT ******
      @ 3,2 SAY ' * A NEW STUDENT, PLEASE ENTER HIS DATA *'
      APPEND BLANK
      REPLACE SSNO WITH T:SSNO
 REPLACE NAME WITH TRIM(T:NAME)
ENDIF
STORE 'MAJOR: CS-COMPUTER SCI.    MATH-MATHEMATICS';
 '   APM-APPLIED MATH.' TO L
STORE 'NATIONALITY: D - DOMESTIC STUDENT, ';
    '   F - FOREIGN STUDENT ' TO L1
 @ 5,0
 @ 20,1 SAY '*' + L
 @ 21,1 SAY '*' + L1
 @ 5,3 SAY  'SSNO' GET SSNO
 @ 5,25  SAY 'NAME' GET NAME
 @ 7,3 SAY 'ADDRESS' GET ADDRS
 @ 8,3  SAY ' CITY' GET CITY
 @ 8,30 SAY 'STATE' GET STATE
 @ 8,45 SAY 'ZIP CODE' GET ZIP:CODE
 @ 9,3 SAY 'BIRTH DAY ' GET BIRDAT  PICT'##-##-##'
 @ 9,30 SAY ' BIRTH PLACE ' GET BPLCE
 @ 11,3 SAY 'SEX ' GET SEX
 @ 11,12 SAY ' ENTRY DATE ' GET ETRY PICT '##-##-##'
 @ 13,3 SAY  'MAJOR ' GET MAJOR
 @ 13, 30 SAY ' TEL ' GET TEL PICT '###-####'
 @ 13,50 SAY 'NATIONALITY(F/D)' GET NATION
 READ
 ERASE
 @ 1,5 SAY ' *** GRADUATION INFORMATION ***'
 ?
 *** enter semester and year of graduation  ****
 STORE '*  1- FALL,   2 - SPRING,   3 - SUMMER  *' TO L
 @ 3,3 SAY L
 STORE ' ' TO TIME
 ACCEPT   '* ENTER SEMESTER CODE OR RETURN ' TO TIME
 ? CHR(7)
 ?
 IF TIME='1'
  REPLACE G:SEM WITH 'FALL    '
 ENDIF
 IF TIME='2'
   REPLACE G:SEM WITH 'SPRING  '
 ENDIF
 IF TIME='3'
   REPLACE G:SEM WITH 'SUMMER  '
 ENDIF
 ****  enter graduate information  ****
 ?
 @ 6,0
 @ 6,3 SAY 'SEMESTER OF GRADUATION ' GET G:SEM
 @ 6,39 SAY 'YEAR ' GET G:YR
 @ 8,3 SAY 'ADVISOR ' GET ADVIOR
 @ 10,3 SAY 'THESIS TITLE ' GET THESIS
 @ 12,3 SAY 'APPROVED BY ' GET APPON
```

```
   @ 12, 40 SAY 'DATE ' GET THDATE PICT '##/##/##'
   READ
 ENDIF
IF OLD='Y' .OR. OLD='y'
 @ 20,0
 @ 21,0
 STORE ' ' TO B
 @ 20,1 SAY " ** DO YOU WANT STUDENT'S GRADE";
        "REPORTING?(Y/N)" GET B
 READ
 IF !(B) ='N'
   STORE 'Q' TO SEE
 ELSE
   ERASE
   USE B:CORLIS
   ?
   STORE '1 - CURRENT SEMESTER   2 - WHOLE RECORDS' TO L
   @ 4,2 SAY '*' +   L
   STORE ' ' TO SEC
   @ 8,3 SAY ' ENTER A NUMBER' GET SEC
   READ
   IF SEC= '1'
    STORE '1 -FALL,  2 -SPRING,  3 - SUMMER ' TO L1
    @ 6, 2 SAY '*' +   L1
    STORE ' ' TO SE
    STORE '    ' TO YEAR
    @ 9,3 SAY ' * YEAR ' GET YEAR
    @ 9,20 SAY '* SEMESTER CODE ' GET SE
    READ
    STORE '        '    TO SEM
    IF SE= '1'
      STORE 'FALL    ' TO SEM
    ENDIF
    IF SE ='2'
      STORE 'SPRING  ' TO SEM
     ENDIF
     IF SE='3'
       STORE 'SUMMER  ' TO SEM
     ENDIF
     ?
     COUNT TO X FOR !(TRIM(SEMTR))=TRIM(SEM);
     .AND.YR=YEAR.AND.SSSNO=T:SSNO .AND.!(GRADE) <> 'I';
     .AND. !(GRADE)<>'W' .AND. GRADE <>' '
     ?
     SUM POINT TO SUMT FOR !(TRIM(SEMTR))=TRIM(SEM);
        .AND. YR=YEAR;
     .AND. SSSNO=T:SSNO
     STORE SUMT/X TO GPA
    ENDIF
   IF SEC='2'
```

```
        COUNT TO X FOR SSSNO=T:SSNO .AND. !(GRADE)#'I';
        .AND. !(GRADE)#'W'  .AND. !(GRADE) # ' '
        SUM POINT TO SUMT FOR SSSNO=T:SSNO
        STORE SUMT/X TO GPA
      ENDIF
      STORE 'YR=YEAR .AND. SEMTR=SEM' TO STING
      ?
      ? '      SEMESTER          S.S.NO        COURSE';
        '     GRADE     '
      ? ' ==============================================';
        '=================='
      ?
      IF SEC='1'
        DISP '  ', SEMTR, YR, SSSNO, ' ', GRADE;
        FOR SSSNO=T:SSNO .AND. &STING OFF
      ENDIF
      IF SEC='2'
      DISP '  ',SEMTR, YR, SSSNO, ' ', GRADE;
        FOR SSSNO=T:SSNO  OFF
      ENDIF
      ?
      DISP OFF ' *------ GPA = ', STR(GPA,4,2)
    ENDIF
    ?
    ? '  Q  - QUIT   or   <Return> - CONTINUE '
    ?
    WAIT TO SEE
    STORE !(SEE) TO SEE
    ERASE
    ENDIF
  ENDDO
 ENDIF
ENDDO
```

```
NOTE EDFIELD.PRG  THIS PROGRAM IS TO EDIT A RECORD IN
*                 STUDENT OR FACULTY FILE.
*
SET TALK OFF
ERASE
DO WHILE T
  ERASE
  @ 3,5 SAY '****   EDIT A RECORD   ******'
  STORE '           ' TO KEY
  @ 6,5 SAY 'ENTER SSNO (0 TO EXIT)' GET KEY PICT '###-##-####'
  READ
  IF $(KEY,1,1)='0' .AND. $(KEY,2,10)='  -  -    '
    RETURN
  ENDIF
  IF LEN(TRIM(KEY))<11
    ? '********  BAD INPUT, ENTER AGAIN  *********'
    LOOP
  ENDIF
  LOCATE FOR SSNO=KEY
  IF SSNO=KEY
   @ 9,5 SAY '**  RECORD IS FOUND  **'
   ?
   DISP OFF '* RECORD NUMBER IS--',#,'     ',SSNO,NAME
   ACCEPT ' * ENTER  RECORD NUMBER ' TO K
   STORE ' >>>  PRESS    CTRL^W   TO EXIT  <<< ' TO P
   @ 15,2 SAY '* NOTE :' GET P
   STORE 1 TO X
   DO WHILE X < 30
    STORE X+1 TO X
   ENDDO
   EDIT &K
  ELSE
   @ 9,5 SAY '**   RECORD IS NOT IN FILE   ****'
  ENDIF
  STORE ' ' TO ANO
   ERASE
  @ 12,3 SAY '* DO YOU WANT EDIT ANOTHER RECORD?(Y/N)' GET ANO
  READ
  STORE !(ANO) TO ANO
  IF ANO='N'
    RETURN
  ENDIF
ENDDO
```

```
* DELEREC.PRG THIS PROGRAM IS TO DELETE A RECORD IN
* STUDENT FILE OR FACULTY FILE
*
SET TALK OFF
ERASE
DO WHILE T
 ERASE
 STORE '           ' TO KEY
 @ 5,2 SAY '**********  DELETE A RECORD  ****************'
 @ 7,3 SAY '* ENTER SSNO WANT TO DELETE, O TO EXIT';
           GET KEY PICT '###-##-####'
READ
IF $(KEY,1,1) ='0' .AND. $(KEY,2,10)='  -  -    '
   RETURN
ENDIF
LOCATE FOR SSNO=KEY
IF SSNO=KEY
  @ 10,3 SAY ' **** RECORD FOUND  *********'
  ?
  DISP
  STORE ' ' TO SEC
  @ 17,3 SAY '* IS THIS THE RECORD YOU WANT';
         'TO DELETE?(Y/N)' GET SEC
  READ
  IF !(SEC) = 'Y'
   DELETE
   @ 19,3 SAY '* RECORD HAS BEEN DELETED *'
  ENDIF
ELSE
  @ 10,3 SAY ' ****  RECORD IS NOT IN FILE  *****'
  STORE 1 TO X
  DO WHILE X < 20
   STORE X+1 TO X
  ENDDO
ENDIF
 STORE ' ' TO SEC
@ 22,2 SAY '* DO YOU WANT DELETE ANOTHER RECORD ' GET SEC
READ
IF !(SEC)='N'
  RETURN
ENDIF
ENDDO
```

```
* STASUB.PRG STATISTICAL SUMMARY OF GRADUATES
  SET TALK OFF
  USE B:STUREC
  STORE "G:SEM # '        '   " TO D
  COUNT TO X1 FOR TRIM(MAJOR)='CS' .AND. &D
  COUNT TO X2 FOR TRIM(MAJOR)='MATH' .AND. &D
  COUNT TO X3 FOR TRIM(MAJOR)='APM' .AND. &D
  ERASE
  ? '    GRADUATES SUMMARY '
  ? '  ======================'
  DISP OFF  ' COMPUTER SCI. ' +STR(X1,4)
  DISP OFF  ' MATHEMATICS   ' +STR(X2,4)
  DISP OFF  ' APPLIED MATH. ' +STR(X3,4)
  DISP OFF   ' ** TOTAL : '+STR(X1+X2+X3,3)
  ?
  WAIT
```

```
* ADDROP.PRG   ADD AND DROP COURSE TO CLASS LISTING FILE
SET TALK OFF
ERASE
DO WHILE T
  ERASE
  @ 5,5 SAY 'COMMAND NUMBER '
  @ 7,8 SAY '0 - MENU '
  @ 8,8 SAY '1 - ADD '
  @ 9,8 SAY '2 - DROP'
  STORE ' ' TO AD
  @ 11,5 SAY '* ENTER A NUMBER ---' GET AD
  READ
  IF AD='0'
   RETURN
  ENDIF
  DO B:SEMTYR
  IF AD='2'
   USE B:CORLIS
   STORE ' ' TO COLIST
   DO WHILE COLIST <> 'N'
    ERASE
    @ 3,5 SAY '****  DROP COURSE  *****'
    STORE '           ' TO TSNO
    @ 5,5 SAY '* ENTER STUDENT SSNO ' GET TSNO;
              PICT 'XXX-XX-XXXX'
    STORE '        ' TO TCO
    @ 7,5 SAY '* COURSE WANT TO DROP ' GET TCO;
              PICT 'XXX-XXXX'
    READ
    LOCATE FOR SSSNO=TSNO .AND. CNO=TCO;
               .AND. SEMTR=TSEMR .AND. YR=TYR
    IF SSSNO=TSNO .AND. CNO=TCO .AND. SEMTR=TSEMR;
       .AND. YR=TYR
     ?
     ? '******  RECORD FOUND AND BEEN DELETED  *****'
     ?
     GOTO #
     DELETE
     PACK
     STORE 1 TO X
     DO WHILE X < 15
      STORE X+1 TO X
     ENDDO
    ELSE
     ? '***** STUDENT HAS NOT TAKEN THIS COURSE ******'
     STORE 1 TO X
     DO WHILE X < 16
       STORE X+1 TO X
     ENDDO
    ENDIF
    ?
    ACCEPT ' * MORE TO DROP?(Y/N) ' TO COLIST
    STORE !(COLIST) TO COLIST
  ENDDO
ENDIF
IF AD ='1'
 STORE ' ' TO COLIST
 USE B:CORLIS
 GOTO BOTTOM
 DO WHILE COLIST <> 'N'
  ERASE
  @ 5,5 SAY '****  ADD A COURSE  *****'
  APPEND BLANK
  REPLACE SEMTR WITH TSEMR
  REPLACE YR WITH TYR
  @ 7,5 SAY 'SEMESTER : '+TSEMR
  @ 7,35 SAY ' YEAR : '+TYR
  @ 9,5 SAY 'SSNO ' GET SSSNO PICT '###-##-####'
  @ 9,35 SAY 'NAME' GET SNAME
  @ 11,5 SAY 'COURSE NO. ' GET CNO PICT 'XXX-XXXX'
  READ
  STORE ' ' TO CONT
  @ 15,5 SAY ' * MORE TO INPUT ---' GET CONT
  READ
  STORE !(CONT) TO CONT
  IF CONT = 'N'
   STORE 'N' TO COLIST
  ENDIF
 ENDDO
ENDIF
ENDDO
```

```
NOTE CORLST.PRG    CLASS LISTING PROGRAM
* SET UP A CLASS LISTING, ADD/DROP COURSE, AND ENTER
* STUDENT GRADE
SET TALK OFF
ERASE
DO WHILE T
  ERASE
  @ 5,5 SAY 'COMMAND NUMBER '
  @ 7,8 SAY '1 - ENTER DATA FOR A CLASS'
  @ 8,8 SAY '2 - CLASS LISTING '
  @ 9,8 SAY '3 - ADD / DROP'
  @ 10,8 SAY '4 - ENTER GRADE '
  @ 11,8 SAY '0 - MENU '
  STORE ' ' TO RESP
  @ 14,5 SAY '* ENTER A NUMBER  ' GET RESP
  READ
  IF RESP = '0'
    *( return to menu )*
    RETURN
  ENDIF
  IF RESP='3'
    DO B:ADDROP
  ENDIF
  IF RESP='4'
    DO B:GRADE
  ENDIF
  IF RESP='1'
   ERASE
   USE B:CORLIS
   STORE ' ' TO TSE
   STORE '    ' TO TYR
   STORE '* 1 - FALL,   2 - SPRING,   3 - SUMMER *' TO P
   @ 3,1 SAY P
   @ 5,0 SAY 'CURRENT SEMESTER IS ' GET TSE
   @ 5,30 SAY 'YEAR ' GET TYR
   READ
   IF TSE='1'
    STORE 'FALL    ' TO TSEM
   ENDIF
   IF TSE='2'
     STORE 'SPRING  ' TO TSEM
   ENDIF
   IF TSE='3'
     STORE 'SUMMER  ' TO TSEM
   ENDIF
   STORE ' ' TO NLIST
```

```
 DO WHILE NLIST <> 'N'
  STORE '        ' TO TCO
  * ( enter course number ) *
  @ 7,5 SAY 'ENTER COURSE NO. ( 0 EXIT ) ';
    GET TCO PICT 'XXX-XXXX'
  READ
  IF TCO='0  -    '
    STORE 'Q' TO NLIST
    RETURN
  ENDIF
  STORE ' ' TO COLIST
  DO WHILE COLIST <> 'N'
  *( create a new record )*
  APPEND BLANK
  REPLACE SEMTR WITH TSEM,YR WITH TYR, CNO WITH TCO
  @ 7,0
  @ 7,5 SAY 'COURSE NO. : ' + TCO
  @ 9,5 SAY 'STUDENT ID.NO ' GET SSSNO PICT '###-##-####'
  @ 10,5 SAY 'NAME             ' GET SNAME
  READ
  @ 13,5 SAY '* MORE STUDENT TAKING THIS';
             'COURSE?(Y/N) ' GET COLIST
  READ
  STORE !(COLIST) TO COLIST
  ENDDO
  @ 15,5 SAY '* WANT INPUT ANOTHER COURSE CLASS ?(Y/N)';
             GET NLIST
  READ
  STORE !(NLIST) TO NLIST
  ERASE
 ENDDO
ENDIF *********** = 1 INPUT DATA
IF RESP ='2'
 STORE ' ' TO COLIST
 DO WHILE COLIST <> 'N'
  USE B:CORLIS
  ERASE
  @ 1,5 SAY ' *  CLASS LISTING  *** '
  STORE ' ' TO TSEM
  STORE '    ' TO TYR
  STORE '        ' TO TCO
  @ 3,5 SAY ' * 1 - FALL     2 - SPRING   3 - SUMMER * '
  @ 5,5 SAY ' * ENTER SEMESTER (NUMBER) ' GET TSEM
  @ 5,37 SAY ' YEAR ' GET TYR
  @ 7,5 SAY ' * ENTER COURSE NO.( 0 EXIT ) ';
          GET TCO PICT 'XXX-XXXX'
```

```
READ
IF TCO='0  -    '
  RETURN
ENDIF
IF TSEM='1'
 STORE 'FALL    ' TO TSETR
ENDIF
IF TSEM='2'
 STORE 'SPRING  ' TO TSETR
ENDIF
IF TSEM='3'
 STORE 'SUMMER  ' TO TSETR
ENDIF
LOCATE FOR CNO=TCO .AND. SEMTR=TSETR .AND. YR=TYR
IF CNO=TCO .AND. SEMTR=TSETR .AND. YR=TYR
 COPY TO B:TEMP FOR CNO=TCO.AND.SEMTR=TSETR.AND.YR=TYR
ELSE
  ?
  ? '******  NOT IN FILE, CHECK YOUR INPUT  *****'
STORE 1 TO X
DO WHILE X < 19
 STORE X+1 TO X
ENDDO
LOOP
ENDIF
USE
USE B:TEMP
COUNT TO X
DISP OFF TSETR, TYR, '    COURSE NO. : '+CNO
STORE 1 TO NUM
DO WHILE NUM <=X
  GOTO NUM
  ? '---------------------------------------------------'
  DISP OFF '       ',SNAME,SSSNO,GRADE
  STORE NUM+1 TO NUM
ENDDO
WAIT
USE
ERASE
STORE ' ' TO CO
@ 12,2 SAY '* WANT ANOTHER CLASS LISTING ?(Y/N)' GET CO
READ
STORE !(CO) TO CO
IF CO='N'
 STORE 'N' TO COLIST
ENDIF
```

```
  ENDDO
ENDIF
ENDDO
```

```
* STASUB.PRG STATISTICAL SUMMARY
  SET TALK OFF
  COUNT TO X1 FOR !(TRIM(TYPE))= 'RA'
  COUNT TO X2 FOR !(TRIM(TYPE))= 'TA'
  COUNT TO X3 FOR !(TRIM(TYPE))= 'TS'
  ERASE
  ?
  ? '   STUDENT ON FINANCIAL AID '
  ? ' ============================== '
  DISP OFF  ' RESEARCH ASSISTANTSHIP ' +STR(X1,4)
  DISP OFF  ' TEACHING ASSISTANTSHIP ' +STR(X2,4)
  DISP OFF  ' TUITION  SCHOLARSHIP   ' +STR(X3,4)
  DISP OFF   '* TOTAL : '+STR(X1+X2+X3,4)
  ?
  USE
```

```
NOTE DPT.PRG  THIS PROGRAM IS TO SET UP FILES FOR FACULTY,
*    TEXTBOOKS, EQUIPMENT.  FUNCTIONS : CREATE, ENTER,
*    EDIT, AND DELETE A RECORD, ALSO LIST THE FILE
SET TALK OFF
ERASE
DO WHILE T
ERASE
? '    COMMAND '
?
? '       0 - EXIT '
? '       1 - FACULTY FILE'
? '       2 - TEXT BOOK FILE '
? '       3 - EQUIPMENT FILE '
?
ACCEPT ' * SELECT A NUMBER PLEASE -------   '  TO W
? CHR(7)
IF W = '0'
 RETURN
ENDIF
IF W = '1'
 USE B:FACTY
 STORE T TO AX
 DO WHILE AX
 ERASE
@ 1,5 SAY 'COMMAND NUMBER '
@ 3,10 SAY '1 - ENTER DATA'
@ 4,10 SAY '2 - EDIT RECORD'
@ 5,10 SAY '3 - DELETE RECORD'
@ 6,10 SAY '4 - SEE FILE'
@ 8,10 SAY '0 -  EXIT'
?
ACCEPT '* ENTER A NUMBER ---' TO MOVE + CHR(7)
IF MOVE='0'
  STORE F TO AX
ENDIF
IF MOVE='2'
DO B:EDFIELD
ENDIF
IF MOVE='3'
  DO B:DELEREC
ENDIF
IF MOVE='4'
ERASE
?
? ' ****    FACULTY / STAFF LISTING FILE    ****'
?
```

```
? '       TITLE          NAME                    SSNO';
  '           TEL.     '
? '------------------------------------------------';
  '-------------------'
DISPLAY ALL ' '+FTIT, NAME, SSNO,'    ',  FTEL OFF
?
? ' ENTER <RETURN> TO CONTINUE'
WAIT
ENDIF
IF MOVE='1'
ERASE
? ' **** FILE OF DEPARTMENT FACULTY MEMBERS ****'
? '---------------------------------------------'
?
STORE ' ' TO CONTINUE
DO WHILE CONTINUE <> 'Q' .AND. CONTINUE <> 'q'
APPEND BLANK
@ 3,0 SAY '* ENTER THE FOLLOWING INFORMATION '
@  5,0  SAY ' NAME '        GET NAME
@  6,0  SAY ' S.S.NO '      GET SSNO PICT '###-##-####'
@  8,0  SAY ' TITLE '       GET FTIT
@ 10,0  SAY ' ADDRESS '     GET FADDRS
@ 11,0  SAY ' CITY '        GET FCITY
@ 11,30 SAY ' STATE '       GET FSTATE
@ 11,40 SAY ' ZIP:CODE '    GET FZIP
@ 13,0  SAY ' TEL. '        GET FTEL PICT '###-####'
READ
@ 15,0
ACCEPT ' ** WANT TO CONTINUE, (Y/N)  ' TO CONT
? CHR(7)
STORE !(CONT) TO CONT
IF CONT = 'N'
  STORE 'Q' TO CONTINUE
ENDIF
ERASE
ENDDO
ENDIF
ENDDO
ENDIF
*****  END OF IF SELECT='1' <FACULTY FILE> *****

IF W='2'
ERASE
USE B:TEXTB
STORE T TO CBOOK
DO WHILE CBOOK
```

```
ERASE
@ 5,5 SAY 'COMMAND NUMBER'
@ 7,7 SAY ' 0 - EXIT'
@ 8,7 SAY ' 1 - SEE FILE'
@ 9,7 SAY ' 2 - ENTER DATA'
@ 10,7 SAY ' 3 - EDIT or DELETE A RECORD '
?
ACCEPT  ' ENTER A NUMBER--' TO BOOK
? CHR(7)
IF BOOK='0'
  STORE F TO CBOOK
ENDIF
IF BOOK='1'
  USE B:TEXTB
  COUNT TO X
  STORE 1 TO NUM
? '---------------------------------------------------'
DO WHILE NUM <= X
GOTO NUM
DISPLAY OFF ' RECORD NO: ',STR(NUM,3)
DISP OFF ' COURSE NUME: ',B:NAME, '    CODE : '+CODE
DISP OFF ' SEMESTER USING THIS BOOK: ' + B:TIME
DISP OFF ' PUBLISHER: '+PUBSHER
 ? '----------------------------------------------------'
STORE NUM+1 TO NUM
IF NUM > X
  ?
  ? '**** END OF FILE ****'
  WAIT
  STORE F TO CBOOK
ENDIF
ENDDO
ENDIF
IF BOOK='3'
 ERASE
 USE B:TEXTB
 COUNT TO LAST
 GOTO TOP
 STORE ' ' TO CONT
 DO WHILE CONT <> 'N'
 ? ' ***   EDIT or DELETE A RECORD  ****'
 INPUT ' ** RECORD NUMBER YOU WANT -- ' TO NUM
 IF NUM > LAST
    ?
    ? '  ****   RECORD OUT OF RANGE   ****'
    LOOP
  ELSE
    GOTO NUM
    @ 10,5 SAY 'BOOK ' GET B:NAME
    @ 11,5 SAY 'CODE ' GET CODE
    @ 12,30 SAY 'COURSE USE ' GET B:COUR
    @ 14,5 SAY 'PUBLISHER  ' GET PUBSHER
    @ 15,5 SAY 'SEMESTER USE ' GET B:TIME
    ?
    ACCEPT ' ** EDIT or DELETE ( E or D ) ' TO CH
    ? CHR(7)
    IF !(CH) = 'E'
     READ
    ELSE
     IF !(CH)='D'
      ACCEPT ' ** ARE YOU SURE (Y/N) ' TO SURE
      IF !(SURE)='Y'
       DELETE
      ENDIF
     ENDIF
    ENDIF
   ENDIF
  ACCEPT ' ** DO YOU WANT ANOTHER RECORD (Y/N) ';
         TO CONT + CHR(7)
  STORE !(CONT) TO CONT
  ENDDO
ENDIF
IF BOOK='2'
ERASE
? ' *****  TEXT BOOK FILE  *****'
?
STORE ' ' TO CONTINUE
?
DO WHILE CONTINUE <>  'Q' .AND. CONTINUE <> 'q'
APPEND BLANK
@ 5,0 SAY '* INFORMATION OF TEXTBOOK *'
@  8,0  SAY ' NAME OF BOOK ' GET B:NAME
@  9,0  SAY ' COURSE USE '   GET B:COUR  PICT '   -   '
@ 10,0  SAY ' SEMESTER/YR  ' GET B:TIME  PICT 'XXXX/XXXX'
@ 11,0  SAY ' PUBLISHER    ' GET PUBSHER
@ 12,0 SAY ' ADDRESS ' GET CODE
@ 15,0 SAY '*** MAKE SURE YOUR INPUT IS CORRECT ***'
READ
?
? ' Q TO STOP THE PROCEDURE'
? ' <RETURN> TO CONTINUE.'
?
```

```
WAIT TO CONTINUE
ERASE
ENDDO
ENDIF
ENDDO
ENDIF
**********END OF IF SELECTION='2' (TEXTBOOK FILE)  ****
*  ( Equipment control )
*
IF W='3'
DO WHILE T
ERASE
?
? ' * EQUIPMENT ( COMPUTER, TERMINALS, AND OTHERS ) '
?
? '    0 - EXIT '
? '    1 - ENTER DATA'
? '    2 - SEE FILE '
? '    3 - EDIT or DELETE A RECORD '
?
ACCEPT '* PLEASE ENTER  A NUMBER' TO SELECT
USE B:EQUIP
IF SELECT ='0'
 RETURN
ENDIF
IF SELECT='2'
ERASE
?
? '             ***** EQUIPMENTS OF DEPARTMENT *****'
COUNT TO X
STORE 1 TO NUM
STORE ' ' TO CONT
DO WHILE NUM <= X .AND. CONT <> 'N'
GOTO NUM
? '-------------------------------------------------------'
DISPLAY OFF ' RECORD # '+STR(NUM,3),'   MODEL CODE : '+CODE
DISP OFF ' NAME : '+NAME
DISP OFF ' COMPANY : '+CMY
DISP OFF ' SALES REPRESENTATIVE : '+SERV
DISP OFF ' LOCATION : '+LOC, '       TEL. '+TEL
? '-------------------------------------------------------'
STORE NUM+1 TO NUM
IF NUM > X
 ?
 ? '**** END OF FILE ****'
 STORE 'N' TO CONT
```

```
  WAIT
 ENDIF
 ENDDO
 ENDIF
 IF SELECT = '3'
  *( Change information or delete a record )
  ERASE
  STORE ' ' TO CONT
  DO WHILE !(CONT) <> 'N'
   ERASE
   @ 3,0
   ? ' ****   EDIT or DELETE A EQUIPMENT RECORD    **** '
   ?
   INPUT     ' ** ENTER RECORD NUMBER ---' TO X
   GOTO X
   * ( pull record out ) *
   @ 8,5 SAY 'MODEL CODE ' GET CODE
   @ 8,40 SAY ' NAME ' GET NAME
   @ 10,5 SAY 'EQUIPMENT COMPANY ' GET CMY
   @ 11,5 SAY 'SERVICE REPRESENTATIVE ' GET SERV
   @ 12,5 SAY 'LOCATION ' GET LOC
   @ 14,5 SAY ' TEL. NO. ' GET TEL
   ?
   ACCEPT ' **  EDIT or DELETE --( E or D) ' TO CH
   STORE !(CH) TO CH
   IF CH='E'
    * change data *********
    READ
   ENDIF
    *  delete record  ******
   IF CH='D'
    ACCEPT ' ** ARE YOU SURE ? (Y/N) ' TO SURE
    IF !(SURE) = 'Y'
     DELETE
     ? ' **** do not interrupt **** '
     pack
    ENDIF
   ENDIF
   ?
   ACCEPT ' *  DO YOU WANT ANOTHER RECORD (Y/N)? ' TO CONT
  ENDDO
ENDIF
IF SELECT='1'
?
? ' * EQUIPMENT IN DEPARTMENT *'
? ' ------------------------------'
?
STORE ' ' TO SEE
DO WHILE SEE <> 'Q'
ERASE
```

```
APPEND BLANK
@ 5,5 SAY '**** INFORMATION OF EQUIPMENT  ******'
@  7,0  SAY '  EQUIPMENT NAME '          GET NAME
@  7,37 SAY '  CODE ' GET CODE
@  9,0  SAY '  EQUIPMENT COMPANY '       GET CMY
@ 11,0  SAY '  SERVICE REPRESENTATIVE ' GET SERV
@ 13,0  SAY '  EQUIPMENT LOCATION '      GET LOC
@ 15,0 SAY ' SERVICE PHONE NUMBER ' GET TEL PICT '###-####'
READ
? '     Q - Quit '
? '    <RETURN> TO CONTINUE'
?
WAIT TO SEE
ERASE
ENDDO
ENDIF
ENDDO
ENDIF
ENDDO
```

```
* STA.PRG STATISTICAL SUMMARY
SET TALK OFF
ERASE
DO WHILE T
ERASE
@ 5,0 SAY 'COMMAND NUMBER'
@ 7,3 SAY '0 - MAIN MENU'
@ 8,3 SAY '1 - STUDENT ON FINANCIAL AID'
@ 9,3 SAY '2 - GRADUATES'
@ 10,3 SAY '3 - STATISTICAL SUMMARY '
STORE ' ' TO NOIN
@ 12,1 SAY '* ENTER A NUMBER YOU WANT ' GET NOIN
READ
IF NOIN='0'
  RETURN
ENDIF
IF NOIN='1'
 USE B:FINCE
 ************************
 STORE ' ' TO ANS
 ERASE
 @ 4,4 SAY 'COMMAND NUMBER'
 @ 7,5 SAY ' 1 - ENTER DATA '
 @ 9,5 SAY ' 2 - LOOK FILE LISTING '
 @ 11,5 SAY ' 3 - EDIT or DELETE A RECORD '
 @ 15,4 SAY ' * ENTER A NUMBER ---' GET ANS
 READ
 IF ANS='2'
  * ( browse data file ) ********
  LIST OFF
  WAIT
 ENDIF
 IF ANS='3'
   * ( delete or change information of a record ) *
   DO B:STAFIN
 ENDIF
 IF ANS = '1'
 ERASE
 STORE ' ' TO CONT
 STORE ' ' TO SEMNO
 STORE '    ' TO TYR
 ?
 STORE ' 1 - FALL,    2 - SPRING,     3 - SUMMER ' TO P
 ERASE
 * ( enter semester and year ) *****
 @ 5,3 SAY P
 @ 8,3 SAY ' * SEMESTER ( CODE ) ' GET SEMNO
 @ 8,35 SAY ' * YEAR ' GET TYR PICT '####'
 READ
 IF SEMNO='1'
```

```
  STORE 'FALL     ' TO TSEMTR
 ENDIF
 IF SEMNO='2'
  STORE 'SPRING   ' TO TSEMTR
 ENDIF
 IF SEMNO='3'
  STORE 'SUMMER   ' TO TSEMTR
 ENDIF
 ?
 STORE ' RA-RESEAECH ASSISTANTSHIP,  TA-TEACHING ASSISTANT';
  +'SHIP  TS-TUITION SCHOLARSHIP' TO D
 DO WHILE CONT  <> 'Q'
  APPEND BLANK
  REPLACE YR WITH TYR
  REPLACE SEMTR WITH TSEMTR
  @ 10,5 SAY 'STUDENT NAME ' GET FNAME
  @ 11,12 SAY 'SSNO ' GET FSSNO PICT '###-##-####'
  @ 12,5 SAY 'AID TYPE ' GET TYPE
  @ 12,18 SAY '(RA, TA, TS )'
  @ 13,5 SAY 'GRANT NO. ' GET GRANT:NO
  @ 14,5 SAY 'BUDGET NO. ' GET BUDGT:NO
  @ 15,5 SAY 'TOT AMOUNT ' GET AMOUNT
  @ 17,5 SAY 'SEMESTER : '+SEMTR
  @ 17,27 SAY 'YEAR : '+YR
  @ 20 ,1 SAY D
  READ
  STORE ' ' TO REINP
  @ 22,1 SAY '* ANOTHER RECORD ?(Y/N)' GET REINP
  READ
  ?
  IF !(REINP)='N'
    STORE 'Q' TO CONT
  ENDIF
  ERASE
 ENDDO
 ENDIF
ENDIF
***** end of financial aid *****
IF NOIN='2'
  *****    for graduates file    ******
  USE B:STUREC
  ERASE
  ACCEPT ' * FOR A CERTAIN SEMESTER OR WHOLE ( C/W ) ' TO CW
  IF !(CW)='C'
   *  enter semester and year *
   DO B:SEMTYR
  ENDIF
  ACCEPT ' * DO YOU WANT TO PRINT ' TO PNT
  ?
  IF !(PNT)='Y'
```

```
   ? ' *****   SET TOP OF PAGE   *****'
   ?
   WAIT
   SET PRINT ON
  ENDIF
  ?
  DISP OFF '           **** GRADUATES LIST ****'
  DISP OFF '           ________________________'
  IF !(CW)='C'
  LIST OFF SSNO,NAME,G:SEM,G:YR FOR G:SEM=TSEMR.AND.G:YR=TYR
  ELSE
  LIST OFF SSNO,NAME,G:SEM,G:YR FOR G:SEM # '        ';
          .AND. G:YR # '    '
  ENDIF
  SET PRINT OFF
  WAIT
ENDIF

IF NOIN='3'
  ****  statistical summary list  ****
  STORE "G:SEM = '        ' .AND. G:YR='    ' " TO L
  ERASE
  USE B:STUREC
  COUNT TO X1 FOR 'M' $(!(SEX))  .AND. &L
  COUNT TO X2 FOR 'F' $(!(SEX))  .AND. &L
  COUNT TO X3 FOR 'D' $(!(NATION))  .AND. &L
  COUNT TO X4 FOR 'F' $(!(NATION))   .AND. &L
  COUNT TO X5 FOR 'CS' $(!(MAJOR))  .AND. &L
  COUNT TO X6 FOR 'MATH' $(!(MAJOR))   .AND. &L
  COUNT TO X7 FOR 'APM' $(!(MAJOR))  .AND. &L
  ?
  ? '                   SUMMARY LIST'
  ? '====================================================='
  @ 4,3 SAY 'MALE: '+STR(X1,4)
  @ 4,30 SAY 'FEMALE: '+STR(X2,4)
  @ 6,3 SAY 'DOMESTIC: '+STR(X3,4)
  @ 6,30 SAY 'FOREIGN: '+STR(X4,4)
  @ 8,3 SAY 'MAJOR: '
  @ 9,5 SAY 'CS: '+STR(X5,3)
  @ 9,25 SAY 'MATH: '+STR(X6,3)
  @ 9,50 SAY 'APM: '+STR(X7,3)
  COUNT TO X
  @ 12,3 SAY ' * TOTAL : '+STR(X,4)
  ?
  ? ' * ENTER ANY KEY '
  ?
 WAIT
 USE
 USE B:FINCE
  COUNT TO X1 FOR TRIM(TYPE) = 'RA'
  COUNT TO X2 FOR TRIM(TYPE) = 'TA'
  COUNT TO X3 FOR TRIM(TYPE) = 'TW'
  ERASE
  ?
  ? '                   STUDENT ON FINANCIAL AID '
  ? '             ==================================  '
  @ 5,5 SAY ' RESEARCH ASSISTANTSHIP ' +STR(X1,4)
  @ 7,5 SAY ' TEACHING ASSISTANTSHIP ' +STR(X2,4)
  @ 9,5 SAY ' TUITION  SCHOLARSHIP   ' +STR(X3,4)
  @ 12,5 SAY '* TOTAL : '+STR(X1+X2+X3,4)
  ?
  ? '*  ENTER ANY KEY '
  WAIT
  USE
  USE B:STUREC
  STORE "G:SEM <> '        '   " TO D
  ?
  COUNT TO X1 FOR TRIM(MAJOR)='CS' .AND. &D
  COUNT TO X2 FOR TRIM(MAJOR)='MATH' .AND. &D
  COUNT TO X3 FOR TRIM(MAJOR)='APM' .AND. &D
  ERASE
  @ 3,0
  ? '* IF YOU WANT THE GRADUATES FOR A PARTICULAR SEMESTER'
  ? '  PLEASE GO BACK TO MAIN MENU, AND ENTER NUMBER "6"  '
  STORE 1 TO X
  DO WHILE X < 25
   STORE X+1 TO X
  ENDDO
  ? '               GRADUATES SUMMARY '
  ? '         =============================='
  @ 5,5 SAY ' COMPUTER SCI. ' +STR(X1,4)
  @ 7,5 SAY ' MATHEMATICS   ' +STR(X2,4)
  @ 9,5 SAY ' APPLIED MATH. ' +STR(X3,4)
  @ 12,4 SAY ' ** TOTAL : '+STR(X1+X2+X3,3)
  ?
  WAIT
ENDIF
ENDDO **********LAST
```

```
NOTE FISEE.PRG
* THIS PROGRAM IS TO SEE THE CONTENTS OF BUDGET FILE
*
SET TALK OFF
ERASE
USE B:FISCMG
COUNT TO X
STORE 1 TO CT
DO WHILE T
  USE B:FISCMG
  IF CT > X
  @ 22,3 SAY '********* END OF FILE ************'
  STORE 1 TO ZO
  DO WHILE ZO < 20
   STORE ZO+1 TO ZO
  ENDDO
  RELEASE ZO
  RETURN
  ENDIF
  GOTO CT
  ERASE
  STORE STR(CT,3) TO I
  @ 5,5 SAY ' ** THIS IS RECORD &I '
  @ 7,0 SAY 'GRAND TITLE' GET G:TIT
  @ 7,40 SAY 'NUMBER ' GET G:NO
  @ 9,0 SAY 'BUDGET CODE ' GET B:CODE
  @ 9,40 SAY 'AMOUNT ' GET AMT
  @ 11,0 SAY 'FUNDING SOURCE ' GET FD:SOUCE
  @ 11,40 SAY 'DIRECTOR ' GET PRODIR
  @  12,0 SAY 'AU hg# ' GET AUHG
  STORE B:CODE TO TNO
  **** TNO will be stored to SUB-OBJECT file  ****
  USE
  USE B:SUBPRO
  ****   search record   *****
  LOCATE FOR TRIM(SNO)=TRIM(TNO)
  IF TRIM(SNO)=TRIM(TNO)
   **** record found ****
   @ 14,0 SAY '----- SUB BUDGET :'
   @ 16,2 SAY '        CODE                 TITLE ';
              '                 AMOUNT'
   @ 17,2 SAY '====================================';
              '=========================='
   @ 18,0
   LIST OFF ALL S:CODE, S:TIT, S:AMT FOR TRIM(SNO)=TRIM(TNO)
  ELSE
   @ 16,0 SAY '-------- NO SUB BUDGET IN THIS OBJECT BUDGET'
   *******  go to next object  *****
   STORE 1 TO ZO
   DO WHILE ZO < 15
```

```
    STORE  ZO+1 TO ZO
   ENDDO
  ENDIF
STORE ' ' TO NEX
ACCEPT  '   * DO YOU WANT NEXT RECORD?(Y/N) ' TO  NEX
STORE !(NEX) TO NEX
IF NEX='N'
  RETURN
ELSE
 STORE CT+1 TO CT
ENDIF
ENDDO
```

```
NOTE SEMTYR THIS PROGRAM IS TO ENTER THE SEMESTER WHICH
* THE USER WANTS
*
SET TALK OFF
ERASE
@ 5,3 SAY '* 1 - FALL     2 - SPRING     3 - SUMMER * '
STORE ' ' TO TSEM
STORE '    ' TO TYR
@ 7, 3 SAY '* ENTER A SEMESTER NUMBER ' GET TSEM
@ 7,38 SAY 'YEAR ' GET TYR
READ
IF TSEM='1'
  STORE 'FALL    ' TO TSEMR
ENDIF
IF TSEM='2'
  STORE 'SPRING  ' TO TSEMR
ENDIF
IF TSEM='3'
  STORE 'SUMMER  ' TO TSEMR
ENDIF
RELEASE TSEM
```

```
NOTE STASUB1   STATISTICAL SUMMARY LIST FOR STUDENTS
* ENROLLED IN CURRENT SEMESTER
SET TALK OFF
  COUNT TO X1 FOR !(TRIM(SEX))='M'
  COUNT TO X2 FOR !(TRIM(SEX))='F'
  COUNT TO X3 FOR !(TRIM(NATION))='D'
  COUNT TO X4 FOR !(TRIM(NATION))='F'
  COUNT TO X5 FOR !(TRIM(MAJOR))='CS'
  COUNT TO X6 FOR !(TRIM(MAJOR))='MATH'
  COUNT TO X7 FOR !(TRIM(MAJOR))='APM'
  SET PRINT ON
  ? '   STUDENT SUMMARY LIST (CURRENT SEMESTER) '
  ? '  =========================================='
  ?
  DISP OFF ' MALE : '+STR(X1,4), '          ';
           'FEMALE : '+STR(X2,4)
  DISP OFF ' DOMESTIC: '+STR(X3,4), '       FOREIGN : ';
           +STR(X4,4)
  DISP OFF ' MAJOR: '
  DISP OFF ' CS : '+STR(X5,3), '   MATH : '+STR(X6,3);
           '    APM : '+STR(X7,3)
  DISP OFF   ' * TOTAL : '+STR(X5+X6+X7,4)
  ?

  WAIT
```

```
NOTE * THIS IS A PRINT MODULE *
*
SET TALK OFF
ERASE
DO WHILE T
ERASE
? '    * WHICH FILE OF FOLLOWING YOU WANT ? '
? '      **************************************************'
? '      *                                                *  '
? '      *          0.  EXIT                              *'
? '      *          1.  STUDENT FILE (CURRENT ENROLLED)   *'
? '      *          2.  GRADUATES FILE                    *'
? '      *          3.  STUDENTS ON FINANCIAL AID         *'
? '      *          4.  TEXTBOOKS FILE                    *'
? '      *          5.  EQUIPMENT FILE                    *'
? '      *          6.  FACULTY/STAFF FILE                *'
? '      *          7.  STATISTICAL SUMMARY               *'
? '      *          8.  COURSE SCHEDULE                   *'
? '      *          9.  CLASS LISTING                     *'
? '      *          A.  OBJECT BUDGET FILE                *'
? '      *          B.  SUB-OBJECT BUDGET FILE            *'
? '      *          C.  BUDGET ACCOUNT TRANSACTIONS       *'
? '      *          D.  STUDENT DRADE REPORT              *'
? '      *                                                *'
? '      **************************************************'
?
ACCEPT ' * ENTER A NUMBER YOU WANT ---' TO NUM
? CHR(7)
IF NUM='0'
  RETURN
ENDIF
IF !(NUM)='D'
 DO B:STUPRT
ENDIF
IF NUM='1'
 USE B:STUREC
 COPY TO B:STUTEMP FOR G:SEM = '        '.AND.G:YR = '    '
 USE B:STUTEMP
 IF EOF
  ? ' ********   NO RECORD IN FILE   ********'
  WAIT
 ENDIF
 ? '  *******   DO NOT INTERRUPT !   ********'
 ? CHR(7)
 INDEX ON SSNO TO B:STUTEMP
 USE B:STUTEMP INDEX B:STUTEMP
 COPY TO B:STEMP
 USE
 DELE FILE B:STUTEMP
 USE B:STEMP
```

```
  STORE 1 TO X
  COUNT TO LAST
  GOTO TOP
  DO WHILE X <= LAST
   SET PRINT OFF
   ? '  ** Ready to print ( set top of page ) ----- '
   wait
   set print on
   ? '      *********   STUDENT RECORDS LISTING   *********'
   ?
   STORE 1 TO REC
   ? '-------------------------------------------------------';
     '------------------'
   DO WHILE REC <= 5
   GOTO X
   DISP OFF 'S.S.NO.: '+SSNO, '       Name : '+TRIM(NAME);
            +'   TEL. : '+TEL
   DISP OFF 'Address : '+TRIM(ADDRS)+'       '+CITY,STATE;
            ZIP:CODE
   DISP OFF 'Birth date :',birdat,  '   Sex :',sex;
            '    Nationality :', NATION
   disp off 'Major : '+MAJOR, '       Advisor : '+ADVIOR
   ? '-------------------------------------------------------';
     '------------------'
store X+1 TO X
STORE REC+1 TO REC
IF X > LAST
 WAIT
 DO B:STASUB1
  ?
  ** CALCULATE THE STATISTICAL SUMMARY
  ?
 STORE 100 TO REC
 SET PRINT OFF
 ?
 ? '*************   END OF FILE   ***************'
 WAIT
ENDIF
ENDDO
ENDDO
ENDIF
IF NUM='2'
 USE B:STUREC
 ERASE
 ACCEPT ' * C - A CERTAIN SEMESTER  W - WHOLE LIST *' TO CW
 IF !(CW)='C'
  DO B:SEMTYR
  COPY TO B:GRADU FOR G:SEM=TSEMR .AND. G:YR=TYR
 ELSE
 COPY TO B:GRADU FOR G:SEM # '       ' .AND. G:YR # '    '
```

```
  ENDIF
  USE B:GRADU
  COUNT TO LAST
  STORE 1 TO REC
  STORE 1 TO X
  DO WHILE REC <= LAST
  SET PRINT OFF
  ?
  ? ' **  Ready to print (set to top of page) ? ----'
  wait
  set print on
  ?
  ? '      **********     GRADUATES  LISTING     **********'
  ?
  ? '-----------------------------------------------';
    '-----------------------'
 do while X <= 5
 GOTO REC
 disp off 'S.S.NO. :',SSNO,'       Name :',trim(NAME);
          '      TEL. : '+TEL
 DISP OFF 'Address : '+trim(ADDRS),'      '+CITY+STATE,ZIP:CODE
 DISP OFF 'Major : '+MAJOR,'      Date of graduation : ';
          +G:SEM,G:YR
 DISP OFF 'Thesis title :'+THESIS
 disp off 'Approved by :'+appon,'       Date :',THDATE
 ? '-----------------------------------------------';
   '-----------------------'
 store x+1 TO X
 STORE REC+1 TO REC
 IF REC > LAST
   WAIT
   ?
   ***  CALCULATE THE STATISTICAL SUMMARY   ***
   DO B:STASUB3
   STORE 100 TO X
   SET PRINT OFF
   ? ' *************     END OF FILE     ************'
   WAIT
 ENDIF
ENDDO
ENDDO
ENDIF **********=2 GRADUATES FILE
IF NUM='3'
 USE B:FINCE
 SET PRINT ON
 ?
 ? '     ******* STUDENT ON FINANCIAL AID LISTING   ******* '
 ?
 ? ' S.S.NO     | NAME                   | AID TYPE |';
   ' BUDGET NO.  | AMOUNT  '
  ? '======================================================';
    '==================='
  LIST ALL FSSNO,'|',FNAME, '|',TYPE, BUDGT:NO,'|';
           AMOUNT,'|',SEMTR,YR OFF
  IF EOF
   WAIT
   ?
   ***  CALCULATE THE STATISTICAL SUMMARY  ***
   DO B:STASUB2
  ENDIF
  SET PRINT OFF
  WAIT
 ENDIF
 IF NUM='4'
   USE B:TEXTB
   COUNT TO LAST
   STORE 1 TO X
   STORE 1 TO REC
   DO WHILE REC <= LAST
    ?
    ? ' ******  Ready to PRINT ? ( Set top of page ) ******'
    wait
    STORE 1 TO X
    SET PRINT ON
    ?
    ? '        ***  LISTING OF TEXTBOOKS  ***      '
    ? '================================================='
    DO WHILE X <=10
     GOTO REC
     DISP OFF 'BOOK:',B:NAME
     DISP OFF 'COURSE USING: '+B:COUR;
              '     SEMESTER USING : '+B:TIME
     DISP OFF 'PUBLISHER : '+PUBSHER
     DISP OFF 'SEMESTER USING : '+B:TIME
     ? '=================================================='
     STORE X+1 TO X
     STORE REC+1 TO REC
     IF REC > LAST
      STORE 100 TO X
      SET PRINT OFF
      ? '   *******   END OF FILE   *******'
      WAIT
     ENDIF
    ENDDO
   ENDDO
ENDIF
 ********* =4 TEXTBOOK FILE
IF NUM='5'
  USE B:EQUIP
  STORE 1 TO X
  COUNT TO LAST
  GOTO TOP
  ? '  ****    READY TO PRINT ? (SET TO TOP OF PAGE ) --'
  WAIT
  SET PRINT ON
  DO WHILE X < LAST
   ? '    ****   LISTING OF EQUIPMENT    *****'
   ? '-------------------------------------------';
     '----------'
   STORE 1 TO REC
   DO WHILE REC <= 10
    GOTO X
    DISP OFF 'Modle name :',NAME, ' Modle nomber : '+CODE
    DISP OFF 'Company : '+CMY,'  Service : '+SERV
    DISP OFF 'Location :',loc, '      Tel. : '+TEL
    ? '-------------------------------------------';
      '----------'
    store x+1 to x
    STORE REC+1 TO REC
    IF X > LAST
     SET PRINT OFF
     ? ' ******   END OF FILE   *******'
     WAIT
     STORE 100 TO REC
    ENDIF
   ENDDO
 ENDDO
ENDIF ***********=5 EQUIPMENT FILE
IF NUM='6'
 USE B:FACTY
 COUNT TO LAST

 STORE 1 TO X
 ? ' READY TO PRINT ?'
 WAIT
 ? CHR(7)
 SET PRINT ON
 DO WHILE X <= LAST
 STORE 1 TO REC
 ? '     *******     FACULTY/STAFF LISTING     *********'
 ? '--------------------------------------------------';
   '--------'
 DO WHILE REC <= 10
 GOTO REC
 DISP OFF 'NAME : '+NAME, '    S.S.NO.:',SSNO
 DISP OFF 'ADDRESS : '+TRIM(FADDRS)+ '    ';
    +FCITY+FSTATE+FZIP
 DISP OFF 'TITLE : '+FTIT, '            TEL. '+FTEL
 ? '---------------------------------------------';
   '----------'
 STORE REC+1 TO REC
 STORE X+1 TO X
 IF X > LAST
  STORE 100 TO REC
  SET PRINT OFF
  ? ' *****    END OF FILE    ********'
  WAIT
 ENDIF
ENDDO
ENDDO
ENDIF ******=6 FACULTY FILE
IF NUM='7'
 SET PRINT ON
 USE B:STUREC
 COPY TO B:STUTEM FOR G:SEM = '        '
 USE B:STUTEM
 DO B:STASUB1
 USE
 USE B:STUREC
 COPY TO B:GRADU FOR G:SEM # '        '
 DO B:STASUB3
 USE
 USE B:FINCE
 DO B:STASUB2
 USE
 WAIT
 SET PRINT OFF
ENDIF
IF NUM='8'
 USE B:CORSCH
 STORE 1 TO X
 COUNT TO LAST
 GOTO TOP
 ? ' ****  READY TO PRINT ? ( SET TO TOP OF PAGE ) ****'
 WAIT
 SET PRINT ON
 DO WHILE X <= LAST
  STORE 1 TO REC
  ? '            ***      COURSE SCHEDULE     ***'
  ?
  DISP OFF '  SEMESTER : '+SEMTR,YEAR
  ? '----------------------------------------------';
    '-------------------'
  ? '   COURSE                     Hr. Rm.    Time ';
    '             Instr '
  ? '-----------------------------------------------';
    '------------------'
  DO WHILE REC <= 20
  DISP OFF'  ',CNO, $(CTIT,1,15),CHUR,RM,TIME,DAY;
          TRIM(CINSTR)
```

```
   STORE X+1 TO X
   STORE REC+1 TO REC
   IF X > LAST
    SET PRINT OFF
    ?
    ? '    *****   EOF   ******    '
    STORE 100 TO REC
    WAIT
   ENDIF
   ENDDO
  ENDDO
 ENDIF
 IF NUM='9'
  USE B:CORLIS
  STORE ' ' TO ANS
  DO WHILE ANS # 'N'
  ERASE
  STORE '        ' TO KEY
  DO B:SEMTYR
  @ 13,0 SAY '  *** ENTER THE COURSE YOU WANT  ';
             GET KEY PICT 'XXX-XXXX'
  READ
  LOCATE FOR CNO=KEY .AND. SEMTR=TSEMR .AND. YR=TYR
  IF CNO=KEY .AND. SEMTR=TSEMR .AND. YR=TYR
   USE B:CORLIS
   COPY TO B:KEY FOR CNO=KEY .AND. SEMTR=TSEMR .AND. YR=TYR
   USE
   USE B:KEY
   ? 'READY TO PRINT ? (SET TO TOP OF PAGE ) -- '
   WAIT
   SET PRINT ON
   DISP OFF '         *****   CALSS LISTING   *****'
   DISP OFF ' SEMESTER :',SEMTR,YR ,'         COURSE : '+CNO
   ? '-------------------------------------------------------'
   ? ' STUDENT S.S.NO      NAME             GRADE    POINT'
   ? '-------------------------------------------------------'
   LIST OFF ALL SSSNO,' '+SNAME, GRADE, '    ',POINT
   ?
   COUNT TO TOT
   DISP OFF '* TOTAL ='+STR(TOT,3)
   ?
   ELSE
    ? ' *** NOT IN FILE, CHECK YOUR INPUT *** '
  ENDIF
ACCEPT '* WANT ANOTHER COURSE CLASS LISTING (Y/N)?' TO ANS
 STORE !(ANS) TO ANS
ENDDO
SET PRINT OFF
ENDIF ********** ='9' CALSS LISTING FILE
IF NUM='A'
```

```
  USE B:FISCMG
  STORE 1 TO X
  COUNT.TO LAST
  ? '  ** READY TO PRINT ? (SET TO TOP OF PAGE) '
  WAIT
  SET PRINT ON
  DO WHILE X <= LAST
  STORE 1 TO REC
  ? '             ** OBJECT BUDGET FILE **'
  ?
  ? '--------------------------------------------------';
     '------------'
  DO WHILE REC <= 4
   GOTO X
   DISP OFF 'OBJECT BUDGET CODE : '+B:CODE
   DISP OFF 'GRANT TITLE : '+G:TIT+'    NUMBER : '+G:NO
   DISP OFF 'SOURCE :',FD:SOUCE, '     PROJECT DIRECTOR :';
            +PRODIR
   DISP OFF 'AU HG# : ',AUHG, '              AMOUNT :$';
            +STR(AMT,8,2)
   ? '--------------------------------------------------';
     '-------------'
   STORE X+1 TO X
   STORE REC+1 TO REC
   IF X > LAST
    STORE 100 TO REC
    SET PRINT OFF
    ?
    ? '  ********    EOF    **********'
    WAIT
   ENDIF
 ENDDO
ENDDO
ENDIF **********  ='A'  OBJECT BUDGET FILE
IF NUM='B'
 USE B:SUBPRO
 STORE 1 TO X
 COUNT TO LAST
 GOTO TOP
 SET PRINT ON
 DO WHILE X<= LAST
  DISP OFF '     ******    SUB-OBJECT BODGET FILE    ******'
  ? '-------------------------------------------------------';
    '-------'
  ? '   SUB-OBJECT CODE         BUDGET TITLE       ';
    '  BALANCE AMOUNT '
  ? '-------------------------------------------------------';
    '--------'
  STORE 1 TO REC
  DO WHILE REC <= 40
```

```
   GOTO X
  DISP OFF '     ',$(S:CODE,1,15),'  ',S:TIT, STR(S:AMT,9,2)
  STORE X+1 TO X
  STORE REC+1 TO REC
  IF X > LAST
   STORE 100 TO REC
   SET PRINT OFF
   ?
   ? '********   EOF   **********'
   WAIT
  ENDIF
 ENDDO
 ENDDO
ENDIF
IF NUM='C'
 USE B:TRANSFIL
 IF EOF
  RETURN
 ENDIF
 STORE 1 TO X
 COUNT TO LAST
 GOTO TOP
 ? '*** READY TO PRINT ? (SET TO TOP OF PAGE) ---'
 WAIT
 SET PRINT ON
 DO WHILE X <= LAST
 ? '             ***  TRANSACTION LISTING  ***'
 ?
 ? '------------------------------------------------';
   '-----------'
 STORE 1 TO REC
 DO WHILE REC <= 9
 GOTO X
 DISP OFF ' Check No. '+CHKNO,'     Amount :$', AMT;
          '      '+TIME
 DISP OFF ' To / From :',TO:WHO
 DISP OFF ' Memo :',PURPOSE
 IF $(PURPOSE1,1,10) # '           '
 DISP OFF '        '+PURPOSE1
 ENDIF
 ? '-------------------------------------------------';
    '------------'
 STORE X+1 TO X
 STORE REC+1 TO REC
 IF X > LAST
  SET PRINT OFF
  STORE 100 TO REC
  ? '  *****   EOF   *******'
  WAIT
 ENDIF
```

```
ENDDO
ENDDO
ENDIF
SET PRINT OFF
ENDDO ********************  LAST ENDDO
```

```
NOTE FIS.PRG
* THIS PROGRAM IS TO SET UP BUDGET FILE AND MAKE TRANSACTIONS
ERASE
SET TALK OFF
DO WHILE T
  ERASE
  @ 4,5 SAY 'COMMAND NUMBER'
  @ 6,7 SAY '0 - MAIN MENU'
  @ 7,7 SAY '1 - ENTER INFORMATION'
  @ 8,7 SAY '2 - SEE FILE CONTENTS'
  @ 9,7 SAY '3 - ADD / SUBTRACT TRANSACTION'
  @ 10,7 SAY '4 - TRANSACTION RECORDS'
  STORE ' ' TO ANSWER
  @ 13,5 SAY '* ENTER A NUMBER ' GET ANSWER
  READ
  IF ANSWER = '0'
    RETURN
  ENDIF
  IF ANSWER='2'
   DO B:FISEE
  ENDIF
  IF ANSWER='3'
   DO B:FIS3
  ENDIF
  IF ANSWER='4'
   USE B:TRANSFILE
   ? '      CHK #       ISSUE DATE     PAY-TO   ';
     '       AMOUNT'
   ? ' ------------------------------------------';
     '-------------'
   DISP OFF ALL ' NO.'+TRIM(CHKNO),'        ',TIME;
      '  ', TO:WHO, AMT
   ?
   WAIT
  ENDIF
  IF ANSWER = '1'
   STORE ' ' TO A
   USE B:FISCMG
   APPEND BLANK
   DO WHILE A <> 'Q'
    ERASE
    @ 3,3 SAY ' ****  MAKE SURE YOU INPUT IS CORRECT  ****'
    @ 7,3 SAY 'GRANT TITLE ' GET G:TIT
    @ 7,44 SAY 'GRANT NO ' GET G:NO
    @ 9,3 SAY 'BUDGET CODE ' GET B:CODE
    @ 11,3 SAY 'FOUNDING SOURCE ' GET FD:SOUCE
    @ 12,3 SAY 'PROJECT DIRECTOR' GET PRODIR
    @ 14,3 SAY 'AU HG NO' GET AUHG
    @ 14,30 SAY 'AMOUNT ' GET AMT
    READ
```

```
STORE ' ' TO TW
@ 16,3 SAY '** IS ALL INFORMATION CORRECT?(Y/N)' GET TW
READ
IF !(TW) = 'N'
 LOOP
ENDIF
STORE ' ' TO TW
DO WHILE TW = ' '
@ 16,2 SAY '* DOES THIS OBJECT HAVE SUB-OBJECT?';
           ' (Y/N)' GET TW
READ
ENDDO
IF !(TW) = 'Y'
 *** OPEN SUB-OBJECT FILE ***
 STORE B:CODE TO TNO
 USE B:SUBPRO
 APPEND BLANK
 STORE ' ' TO TS
 DO WHILE TS <> 'Q'
   REPLACE SNO WITH TNO
   @ 18,5 SAY ' OBJECT CODE ' +   SNO
   @ 19,5 SAY ' SUB-OBJECT CODE ' GET S:CODE
   @ 20,5 SAY ' BUDGET TITLE ' GET S:TIT
   @ 21,5 SAY ' AMOUNT ' GET S:AMT
   READ
   @ 23,5 SAY ' * MORE SUB-OBJECT BUDGET?(Y/N)' GET TS
   READ
   IF !(TS)='N'
      STORE 'Q' TO TS
   ELSE
   APPEND BLANK
   ENDIF
 ENDDO
ENDIF
ERASE
*
@ 5,5 SAY '***** BACK TO MAIN OBJECT PROCEDURE ****'
@ 8, 5 SAY '* DO YOU WANT ANOTHER OBJECT BUDGET';
        'RECORD?(Y/N)' GET A
READ
STORE !(A) TO A
IF A='N'
  ** BACK TO MENU  ***
  STORE 'Q' TO A
ELSE
 USE
 USE B:FISCMG
 APPEND BLANK
ENDIF
```

```
  ENDDO
ENDIF
ENDDO
```

```
NOTE FIS3.PRG
* MAKE TRANSACTIONS TO A BUDGET ACCOUNT
*
SET TALK OFF
ERASE
STORE ' ' TO FINDM
STORE ' ' TO FINDS
DO WHILE T
 *
 @ 2,3 SAY '******   TO ADD / SUBSTRACT   *******'
 STORE '                         ' TO KEY
 @ 5,3 SAY '* ENTER BUDGET ACCOUNT CODE YOU';
     'WANT( 0 TO EXIT) ' GET KEY
 READ
 STORE !(TRIM(KEY)) TO KEY
 IF KEY='0'
  RETURN
 ENDIF
 USE B:FISCMG
 LOCATE FOR !(TRIM(B:CODE))=KEY
 IF !(TRIM(B:CODE))=KEY
  STORE 'Y' TO FINDM
  STORE # TO MNUM
  @ 8,3 SAY ' **  FIND IN OBJECT BUDGET FILE  **'
  STORE 1 TO X1
  DO WHILE X1 < 20
   STORE X1+1 TO X1
  ENDDO
  RELEASE X1
 ELSE
  USE
  USE B:SUBPRO
  LOCATE FOR !(TRIM(S:CODE))=KEY
  IF !(TRIM(S:CODE))=KEY
  STORE 'Y' TO FINDS
  @ 8,3 SAY ' ** FIND IN SUB BUDGET FILE  **'
  STORE # TO SNUM
  STORE SNO TO TKEY
  USE
  USE B:FISCMG
  LOCATE FOR !(TRIM(B:CODE)) = TRIM(TKEY)
  IF !(TRIM(B:CODE))=TRIM(TKEY)
    STORE # TO MNUM
  ENDIF
  ELSE
   @ 8,3 SAY '  *** CAN NOT FIND, NO THIS BUDGET CODE **'
   STORE 1 TO ZO
    DO WHILE ZO < 20
      STORE ZO+1 TO ZO
    ENDDO
  LOOP
ENDIF
ENDIF
ERASE
USE B:TRANSFILE
STORE ' ' TO TRANS
STORE 0 TO T:OUT
APPEND BLANK
DO WHILE TRANS <> 'Q'
ERASE
@ 3,4 SAY '*** ENTER TRANSACTION AMOUNT ***'
REPLACE CODE WITH KEY
@ 5,0 SAY 'Budget code:' +KEY
@ 7,0 SAY 'Check No. ' GET CHKNO
@ 7,30 SAY  'Pay to or Receive from ' GET TO:WHO
@ 9,0 SAY 'Check Amount  ' GET AMT
@ 9,40 SAY 'Date ' GET TIME PICT '##/##/84'
@ 10,4 SAY '(Note: 20.00 or -20.00)'
@ 11,0 SAY 'What use ' GET PURPOSE
@ 12,10 GET PURPOSE1
READ
STORE AMT TO D:OUT
IF FINDS ='Y'
 USE
 USE B:SUBPRO
 GOTO SNUM
 STORE S:AMT TO T:AMT
 @ 12,0 SAY 'SUB OBJECT CODE ' GET S:CODE
 @ 12,40  SAY 'BUDGET TITLE ' GET S:TIT
 @ 13,0 SAY 'AMOUNT ' GET S:AMT
 REPLACE S:AMT WITH T:AMT+D:OUT
 WAIT
 @ 13,0 SAY 'AMOUNT ' GET S:AMT
 USE
ENDIF
IF FINDS='Y' .OR.  FINDM='Y'
 USE B:FISCMG
 GOTO MNUM
 STORE AMT TO T:AMT
 @ 15,0 SAY 'OBJECT BUDGET ' GET B:CODE
 @ 15,40 SAY 'GRANT NO ' GET G:NO
 @ 16,0  SAY 'DIRECTOR ' GET PRODIR
 @ 16,40 SAY 'AMOUNT ' GET AMT
 REPLACE AMT WITH T:AMT+D:OUT
 WAIT
 @ 16,40 SAY 'AMOUNT' GET AMT
 USE
ENDIF
?
ACCEPT ' * MORE CHECKS FOR THIS ACCOUNT?(Y/N) ' TO ANS
```

```
  STORE !(ANS) TO ANS
  IF ANS='N'
    STORE 'Q' TO TRANS
  ELSE
    USE B:TRANSFILE
    APPEND BLANK
  ENDIF
ENDDO
STORE ' ' TO ANS
ACCEPT ' * DO YOU WANT ANOTHER ACCOUNT?(Y/N) ' TO  ANS
IF !(ANS)='N'
  RETURN
ELSE
 USE
 USE B:TRANSFILE
  APPEND BLANK
ENDIF
ERASE
ENDDO
```

```
NOTE DELECOUR.PRG
* THIS PROGRAM IS TO DELETE A COURSE
*
SET TALK OFF
ERASE
USE B:CORSCH
DO WHILE T
ERASE
STORE '         ' TO TEMPCOURSE
@ 4,5 SAY '* ENTER COURSE WANT TO DELETE *'
@ 6,5 SAY '* COURSE NUMBER ( MCS-000, 0 EXIT )';
      GET TEMPCOURSE PICT 'XXX-XXXX'
READ
IF TEMPCOURSE='0  -    '
  RETURN
ENDIF
LOCATE FOR  CNO=TEMPCOURSE
IF  CNO=TEMPCOURSE
GOTO #
?
ACCEPT ' > COURSE FIND IN FILE, REALLY WANT';
       'TO DELETE?(Y/N)' TO ANSW
STORE !(ANSW) TO ANSW
IF ANSW='Y'
DELETE
PACK
ENDIF
ELSE
?
? '**** NOT IN FILE, CHECK YOUR INPUT  ******'
STORE 1 TO X
 DO WHILE X < 20
  STORE X+1 TO X
 ENDDO
LOOP
ENDIF
ERASE
ENDDO
```

```
*  COUR.PRG THIS PROGRAM IS TO SET UP A COURSE SCHEDULE,
*           CLASS LISTING, AND STUDENT GRADE RECORDING
*
SET TALK OFF
DO WHILE T
  ERASE
  @ 5,5  SAY ' COMMAND NUMBER '
  @ 7,8 SAY ' 0 - MAIN MENU '
  @ 8,8 SAY ' 1 - COURSE SCHEDULING '
  @ 9,8 SAY ' 2 - ADD/DROP, CLASS LISTING, GRADE UPDATING '
  @ 10,8 SAY ' 3 - DELETE COURSE FROM COURSE SCHEDULE'
  STORE ' ' TO NOIN
  @ 13,5 SAY '* ENTER A NUMBER ---' GET NOIN
  READ
  IF NOIN='0'
    RETURN
  ENDIF
  IF NOIN='2'
    DO B:CORLST
  ENDIF
  IF NOIN='3'
    DO B:DELECOURSE
  ENDIF
  IF NOIN='1'
    ERASE
    @ 3,3 SAY ' 1 - ENTER COURSE DATA '
    @ 5,3 SAY ' 2 - SCHEDULE LIST '
    STORE ' ' TO ANS
    @ 7,2 SAY '* ENTER A NUMBER ' GET ANS
    READ
    IF ANS = '2'
     USE B:CORSCH
     DISP OFF '     ',SEMTR+','+YEAR
     ? '------------------------------------';
       '-------------------------------'
     STORE 1 TO RECNO
     COUNT TO X
     STORE ' ' TO CNT
     DO WHILE RECNO <= X .AND. CNT <> 'N'
     DISP OFF '   ',CNO,' ',CHUR,' ',TIME,' ',DAY;
               ' ',RM,' ',  CINSTR
     STORE RECNO+1 TO RECNO
     IF RECNO > X
       STORE 'N' TO CNT
     ELSE
       GOTO RECNO
     ENDIF
     ? '--------------------------------------';
       '------------------------------'
     ENDDO
```

```
 WAIT
ENDIF
IF ANS='1'
  ERASE
  USE B:CORSCH
  STORE ' ' TO ANSO
  @ 5,5 SAY '* ENTER <Y> TO CLEAR DATA FILE';
            ' FOR A NEW SCHEDULE ' GET ANSO
  READ
  IF !(ANSO)='Y'
    DELETE ALL
    PACK
  ENDIF
  STORE ' 1 - FALL,     2 - SPRING,     3';
      +'- SUMMER  ' TO P
  ERASE
  STORE ' ' TO SEM
  STORE '    ' TO YR
  @ 5,0 SAY P
  @ 7,2 SAY 'ENTER SEMESTER ( 1,2,3) ' GET SEM
  @ 8,2 SAY 'YEAR ' GET YR
  READ
  IF SEM='1'
    STORE 'FALL' TO SEMT
  ENDIF
  IF SEM='2'
     STORE 'SPRING' TO SEMT
  ENDIF
  IF SEM='3'
    STORE 'SUMMER' TO SEM
  ENDIF
  STORE ' ' TO CONW
  DO WHILE CONW # 'N'
   ERASE
   APPEND BLANK
   REPLACE SEMTR WITH SEMT,YEAR WITH YR
   @ 10,2 SAY '    '+SEMT
   @ 10,15 SAY YR
   @ 11,2 SAY 'COURSE NO ' GET CNO PICT 'XXX-XXXX'
   @ 11,35 SAY 'HOUR ' GET CHUR
   @ 13,2 SAY 'TIME ' GET TIME
   @ 13,30 SAY 'DAY ' GET DAY
   @ 13,45 SAY 'ROOM ' GET RM
   @ 15,2 SAY 'INSTRUCTOR ' GET CINSTR
   READ
   @ 17,2 SAY '* ANOTHER COURSE TO INPUT ?(Y/N)' GET CONW
   READ
  ENDDO
ENDIF
```

```
 ENDIF
ENDDO
```

```
* THIS PROGRAM IS FOR ENTERRING STUDENTS GRADE
SET TALK OFF
*
STORE ' ' TO COLIST
DO B:SEMTYR
DO WHILE COLIST <> 'N'
ERASE
USE B:CORLIS
@ 5,5 SAY '****  ENTER GRADE  ****'
COUNT TO X
GOTO TOP
STORE '        ' TO TCO
@ 7,5 SAY '* ENTER COURSE NO. (O EXIT) :';
     GET TCO PICT 'XXX-XXXX'
READ
IF TCO='0  -    '
  RETURN
ENDIF
STORE 0 TO J
DO WHILE J < X
  ERASE

  STORE J+1 TO J
  GOTO J
  IF CNO=TCO .AND. SEMTR=TSEMR .AND. YR=TYR
   @ 8,5 SAY '--- ENTER GRADE '
   @ 11,8 SAY 'SSNO : '+SSSNO
   @ 11,40 SAY 'NAME :'+SNAME
   @ 13,8 SAY 'COURSE :',CNAME
   @ 15,8 SAY 'GRADE : ' GET GRADE
   READ
   DO CASE
    CASE GRADE='A'
      STORE 4.0 TO P
    CASE GRADE = 'B'
     STORE 3.0 TO P
    CASE GRADE = 'C'
     STORE 2.0 TO P
    CASE GRADE = 'D'
      STORE 1.0 TO P
    CASE GRADE = 'F'
      STORE 0.0 TO P
    OTHERWISE
      STORE 0.0 TO P
    ENDCASE
    REPLACE POINT WITH P
  ENDIF
  IF J=X
   ? ' **** END OF FILE  *****'
  ENDIF
ENDDO
```

```
?
ACCEPT '* MORE TO INPUT? (Y/N) ' TO COLIST
STORE !(COLIST) TO COLIST
ENDDO
```

```
* STAFIN.PRG STATISTICAL SUMMARY
*
SET TALK OFF
COUNT TO LAST
GOTO TOP
STORE ' ' TO CONT
DO WHILE CONT <> 'Q'
 INPUT ' * ENTER RECORD RUMBER WANT TO EDIT';
       '  or DELETE ' TO NUM
 IF NUM > LAST
  ? ' *** RECORD OUT OF RANGE ***'
  ACCEPT ' *** WANT CONTINUE ? (Y/N) ' TO ACC
  IF !(ACC) = 'N'
   RETURN
  ELSE
   LOOP
  ENDIF
 ENDIF
 GOTO NUM
 ACCEPT ' * EDIT or DELETE, ( E or D ) ' TO CHAR
 ? CHR(7)
 IF CHAR = 'D'
  ACCEPT ' * ARE YOU SURE (Y/N) ' TO SURE
  IF !(SURE) = 'Y'
   DELETE
   ? ' ** DO NOT INTERRUPT ! **'
   PACK
  ENDIF
 ENDIF
 IF !(CHAR)='E'
  ERASE
  @ 5,5 SAY ' ***   EDIT A RECORD   **** '
  @ 7,5 SAY 'NAME ' GET FNAME
  @ 7,40 SAY 'SSNO ' GET FSSNO
  @ 9,5 SAY 'TYPE ' GET TYPE
  @ 10,5 SAY 'GRANT TITLE ' GET GRANT:NO
  @ 11,5 SAY 'BUDGET NO ' GET BUDGT:NO
  @ 13,5 SAY 'AMOUNT ' GET AMOUNT
  @ 15,5 SAY 'SEMESTER ' GET SEMTR
  @ 15,25 SAY 'YEAR ' GET YR
  READ
 ENDIF
 ACCEPT ' * DO YOU WANT ANOTHER RECOIRD? (Y/N) ' TO MORE
 ? CHR(7)
 IF !(MORE) = 'N'
  STORE 'Q' TO CONT
 ELSE
 LOOP
 ENDIF
ENDDO
```

```
NOTE - STUPRT.PRG  THIS PROGRAM IS TO PRINT STUDENT
*      TRANSCRIPT
*
DO WHILE T
 ERASE
 STORE '           ' TO T:SSNO
 @ 5,5 SAY '* ENTER STUDENT ID NO, 0 TO EXIT ';
   GET T:SSNO PICT '###-##-####'
 READ
 IF $(T:SSNO,1,1)='0' .AND. $(T:SSNO,2,10)='  -  -    '
  RETURN
 ENDIF
 IF LEN(TRIM(T:SSNO)) < 11
    ?
    ? ' *******   BAD INPUT, INPUT AGAIN   ********'
    STORE 1 TO B
       DO WHILE B < 20
       STORE B+1 TO B
       ENDDO
    LOOP
 ENDIF
 ********** ID INPUT IS RIGHT  ************
 STORE '                         ' TO T:NAME
 @ 7,5 SAY '   STUDENT NAME ' GET T:NAME
 READ
 USE  B:STUREC
 LOCATE FOR SSNO=T:SSNO
 IF SSNO=T:SSNO
   ? ' * STUDENT IS IN FILE '
 ELSE
   ? ' ** STUDENT NOT IN FILE, CHECK YOUR INPUT **'
   STORE 1 TO X
   DO WHILE X < 20
    STORE X+1 TO X
   ENDDO
    loop
   endif
 USE B:CORLIS
 STORE '  1 - CURRENT SEMESTER     2 - WHOLE RECORDS' TO L
 @ 4,2 SAY '*' +   L
 STORE ' ' TO SEC
 @ 8,3 SAY ' ENTER A NUMBER' GET SEC
 READ
 IF SEC= '1'
 STORE '  1 -FALL,    2 -SPRING,    3 - SUMMER   ' TO L1
 @ 6, 2 SAY '*' +   L1
 STORE ' ' TO SE
 STORE '    ' TO YEAR
 @ 9,3 SAY ' * YEAR ' GET YEAR
 @ 9,20 SAY '* SEMESTER CODE ' GET SE
 READ
 STORE '        '    TO SEM
 IF SE= '1'
  STORE 'FALL     ' TO SEM
 ENDIF
 IF SE ='2'
  STORE 'SPRING   ' TO SEM
 ENDIF
 IF SE='3'
   STORE 'SUMMER   ' TO SEM
 ENDIF
 COUNT TO X FOR !(TRIM(SEMTR))=TRIM(SEM);
   .AND.YR=YEAR.AND.SSSNO=T:SSNO;
   .AND.!(GRADE) <> 'I' .AND. !(GRADE)<>'W';
   .AND. GRADE <>' '
  SUM POINT TO SUMT FOR !(TRIM(SEMTR))=TRIM(SEM);
   .AND. YR=YEAR .AND. SSSNO=T:SSNO
  STORE SUMT/X TO GPA
 ENDIF
 IF SEC='2'
   COUNT TO X FOR SSSNO=T:SSNO .AND. !(GRADE)#'I';
.AND. !(GRADE)#'W'   .AND. !(GRADE) # ' '
   SUM POINT TO SUMT FOR SSSNO=T:SSNO
   STORE SUMT/X TO GPA
 ENDIF
 STORE 'YR=YEAR .AND. SEMTR=SEM' TO STING
 SET PRINT ON
  ?
  ? '     SEMESTER       S.S.NO        COURSE       GRADE'
  ? '    =================================================='
  ?
  IF SEC='1'
  DISP '  ', SEMTR, YR, SSSNO, ' ', GRADE FOR SSSNO=T:SSNO;
   .AND. &STING OFF
  ENDIF
  IF SEC='2'
  DISP '  ',SEMTR,YR,SSSNO,' ', GRADE FOR SSSNO=T:SSNO OFF
  ENDIF
   ?
  DISP OFF ' *------ GPA = ', STR(GPA,4,2)
  SET PRINT OFF
  ?
  ACCEPT ' * WANT ANOTHER RECORD (Y/N) ? ' TO SEE
  STORE !(SEE) TO SEE
ENDDO
```

APPENDIX C OUTPUT EXAMPLES

```
*********   STUDENT RECORDS LISTING   *********

------------------------------------------------------------------
  S.S.NO.: 000-00-0001  Name : CHEN, LIEN-BON    TEL. : 892-9484
  Address : 244 14TH ST.      ATLANTA         GA
  Birth date : 01-10-54     Sex : MA     Nationality : FO
  Major : CS                Advisor :
------------------------------------------------------------------
  S.S.NO.: 000-00-1222  Name : CHIENGCHAICHAN, LADDAPORN   TEL. : 892-0484
  Address : 244 14TH ST, NE      ATLANTA          GA 30309
  Birth date : 09-10-51     Sex : FE     Nationality : FO
  Major : CS                Advisor :
------------------------------------------------------------------
  S.S.NO.: 234-56-0987  Name : J.C. Jackson   TEL. : 998-2766
  Address : 1000, Acon st.       Atlanta          GA 30336
  Birth date : 09-02-50     Sex : M      Nationality : D
  Major : MATH              Advisor :
------------------------------------------------------------------
  S.S.NO.: 252-23-7872  Name : BONNER, PHYLLIS L.   TEL. : 758-4491
  Address : 1991 DELOWE DR #F-6      ATLANTA          GA 30311
  Birth date : 09-26-60     Sex : FE     Nationality : FO
  Major : CS                Advisor :
------------------------------------------------------------------
  S.S.NO.: 254-35-5078  Name : JOSEPH WAN    TEL. :352 -0752
  Address :2234 Bolton Dr., #3
  Birth date :10 -21- 1953  Sex :M       Nationality :F
  Major :CS                 Advisor : Dr. Martin
------------------------------------------------------------------
  S.S.NO.: 255-80-5443  Name : BROWN, FRANCES L.    TEL. : 691-5506
  Address : 1256 BROOKSIDE COURT       MABLETON        GA
  Birth date : 01-16-52     Sex : FE     Nationality : DO
  Major : CS                Advisor :
------------------------------------------------------------------

  CS :  5
  MATH :   1
  APM :  0

  TOTAL :  6
```

```
**********    GRADUATES  LISTING    **********

 -----------------------------------------------------------------------
 S.S.NO. : 491-74-5077   Name : WALLACE, SHARON M.   TEL. : 874-6899
 Address : 960 GREENWOOD AVENUE APT. 5   ATLANTA        GA 30306
 Major : CS              Date of graduation : SPRING   1985
 Thesis title :DATABASE FOR DEPARTMENT RECORDS
 Approved by :B. MARTIN/SMW                Date : 05/15/85
------------------------------------------------------------------------
 S.S.NO. : 254-35-5078   Name : JOSEPH Y. WAN   TEL. : 352-0752
 Address : 2234, BOLTON DR. #3   ATLANTA        GA 30318
 Major : CS              Date of graduation : SPRING   1984
 Thesis title :DESIGN A DATA BASE SYSTEM FOR DEPARTMENT
 Approved by :DR. MARTIN                   Date :   / /
------------------------------------------------------------------------


COMPUTER SCI.    2
MATHEMATICS      0
APPLIED MATH.    0
** TOTAL :   2
```

```
    ***  LISTING OF TEXTBOOKS  ***
======================================================
 BOOK: DATA BASE ORGANIZATION
 COURSE USING: MCS-570      SEMESTER USING : 1984/FALL
 PUBLISHER :
 SEMESTER USING : 1984/FALL
======================================================
 BOOK: PROGRAMMING LANGUAGE DESIGN
 COURSE USING: MCS-550      SEMESTER USING : 1984/FALL
 PUBLISHER :
 SEMESTER USING : 1984/FALL
======================================================
******     FACULTY/STAFF LISTING     ********

---------------------------------------------------------
 NAME : MARTIN, BENJAMIN J.           S.S.NO.: 258-66-0650
 ADDRESS : 337 LYNHURST DR.   ATLANTA        GA30331
 TITLE : CHAIRMAN, PROF.              TEL. 691-1383
----------------------------------------------------
 NAME : WARSI, NAZIR A.               S.S.NO.: 111-11-1111
 ADDRESS : 1234 NELBY DRIVE   STONE MOUNTAIN GA30332
 TITLE : PROFESSOR                    TEL. 555-1213
----------------------------------------------------
 NAME : Mr. John Kao                  S.S.NO.: 254-38-9056
 ADDRESS : 2022, Bolton Dr., #5   Atlanta        Ga30318
 TITLE : Ass. Professor               TEL. 352-3738
----------------------------------------------------
```

```
** OBJECT BUDGET FILE **

-----------------------------------------------------
OBJECT BUDGET CODE : 1-12-472-101-000
GRANT TITLE : dynamic programming          NUMBER : 1234567
SOURCE : NASA                         PROJECT DIRECTOR : WARSI
AU HG# :  202020                      AMOUNT :$26577.00
-----------------------------------------------------
OBJECT BUDGET CODE : 1-12-472-202-000
GRANT TITLE : STELLAR MOTIONS              NUMBER : 123467
SOURCE : NASA                         PROJECT DIRECTOR : MARTIN
AU HG# :  778899                      AMOUNT :$44800.00
-----------------------------------------------------
OBJECT BUDGET CODE : T-100
GRANT TITLE : BUSINESS ICC                 NUMBER : ICC-192-01
SOURCE : TV-CABLE                     PROJECT DIRECTOR : TOM
AU HG# :                              AMOUNT :$19699.30
-----------------------------------------------------
```

```
***    SUB-OBJECT BUDGET FILE   ***

-----------------------------------------------------
 SUB-OBJECT CODE       BUDGET TITLE           BALANCE
-----------------------------------------------------
   201                                            0.00
   706               DYNAMIC PROGRAMMING         20.00
   304               DYNAMIC PROGRAMMING      15140.00
   404               STELLAR MOTIONS            456.00
   906               STELLAR MOTIONS            350.00
   896               STELLAR MOTIONS            345.00
   T-100-01          AUDITOR EXPENSE           2999.30
   T-100-02          FIELD GAS                  700.00
```

```
     ***  TRANSACTION LISTING  ***

----------------------------------------------------
Check No. 101      Amount :$     -100.00       09/18/84
To / From : Book store
Memo : expense
-----------------------------------------------------
Check No. 102      Amount :$    20000.00       02/02/84
To / From : NASA
Memo : Research
-----------------------------------------------------
Check No. 105      Amount :$    -5000.00       11/14/84
To / From : Dr. Martin
Memo : Research expense
-----------------------------------------------------
Check No. 107      Amount :$     -200.00       11/09/84
To / From : Dr. Warsi
Memo : Office supply
-----------------------------------------------------
Check No. 204      Amount :$      500.00       09/27/84
To / From : JARY
Memo : PAYROLL
-----------------------------------------------------
Check No. 205      Amount :$     -500.70       09/28/84
To / From : JOE
Memo : PAYROLL
-----------------------------------------------------
Check No. 201      Amount :$     -300.00       11/02/84
To / From : Mr. bk
Memo : Power
-----------------------------------------------------
```