"It is better to finish something than to start it."

50 Developing a Database Package

DBMS (Database Management System) is a vast area. In DBMS we have many theories and algorithms for managing data. This book does not deal the DBMS basics. So I recommend you to go through a good book on DBMS for indepth knowledge in that area. Indepth knowledge on DBMS is necessary for developing our own Database Package. In this chapter I won't describe the DBMS fundamentals instead I am going to present the file organization of database files.

50.1 Basic Idea

Database Package will have its own set of keywords, operators and statements. So you have to come out with the grammar for your new database package. It is similar to the development of a new programming language. It must also respond to queries. You can use YACC for developing the compiler for the database package. The important thing here is, the organization or file format of the database.

50.2 File format for DBF file

Following is the file format for .dbf file. (Courtesy: **Peter Mikalajunas**)

DBF FILE STRUCTURE	
BYTES	**DESCRIPTION**
00	FoxBase+, FoxPro, dBaseIII+, dBaseIV, no memo - 0x03 FoxBase+, dBaseIII+ with memo - 0x83 FoxPro with memo - 0xF5 dBaseIV with memo - 0x8B dBaseIV with SQL Table - 0x8E
01-03	Last update, format YYYYMMDD **correction: it is YYMMDD**
04-07	Number of records in file (32-bit number)
08-09	Number of bytes in header (16-bit number)
10-11	Number of bytes in record (16-bit number)
12-13	Reserved, fill with 0x00
14	dBaseIV flag, incomplete transaction Begin Transaction sets it to 0x01 End Transaction or RollBack reset it to 0x00
15	Encryption flag, encrypted 0x01 else 0x00
	Changing the flag does not encrypt or decrypt the records
16-27	dBaseIV multi-user environment use
28	Production index exists - 0x01 else 0x00

BYTES	DESCRIPTION
29	dBaseIV language driver ID
30-31	Reserved fill with 0x00
32-n	Field Descriptor array
N+1	Header Record Terminator - 0x0D
FIELD DESCRIPTOR ARRAY TABLE	
BYTES	**DESCRIPTION**
0-10	Field Name ASCII padded with 0x00
11	Field Type Identifier (see table)
12-15	Displacement of field in record
16	Field length in bytes
17	Field decimal places
18-19	Reserved
20	dBaseIV work area ID
21-30	Reserved
31	Field is part of production index - 0x01 else 0x00
FIELD IDENTIFIER TABLE	
ASCII	**DESCRIPTION**
C	Character
D	Date, format YYYYMMDD
F	Floating Point
G	General - FoxPro addition
L	Logical, T:t,F:f,Y:y,N:n,?-not initialized
M	Memo (stored as 10 digits representing the dbt block number)
N	Numeric
P	Picture - FoxPro addition
Note all dbf field records begin with a deleted flag field. If record is deleted - 0x2A (asterisk) else 0x20 (space) End of file is marked with 0x1A	

50.3 Security

Applying security to the database file is considered to be hard. Oracle came out with a very good security system. So we cannot look into the database file created from Oracle! And thus stealing of data is restricted. This is considered to be a tough task. By the way, you won't find any difficulty in creating FoxPro like Database Package. I hope this information would help you to develop your own Database Package.