

VA File Manager DataBase Management System

*VistA, FileMan, Kernel, Broker
CPRS, and Medical Data*

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What is FileMan?



- An open system architecture, public domain, vendor independent, 4th generation language for managing large databases on personal computers, minicomputers and mainframes – Richard Davis 1987
- FM consists of a set of M routines from 1978 to present. The principle author of those routines is George Timson, but contributions from countless people have strengthened and enhanced this product
- It allows end user computing ala James Martin (1981) this was a rather novel concept back then



CLINICAL PATIENT RECORD

VISTA SOFTWARE PACKAGES

Vista
IMAGING

INTEGRATED DATABASE

PATIENTS

PERSONS

DRUGS

WARDS

KERNEL

LAB RESULTS

PRESCRIPTIONS

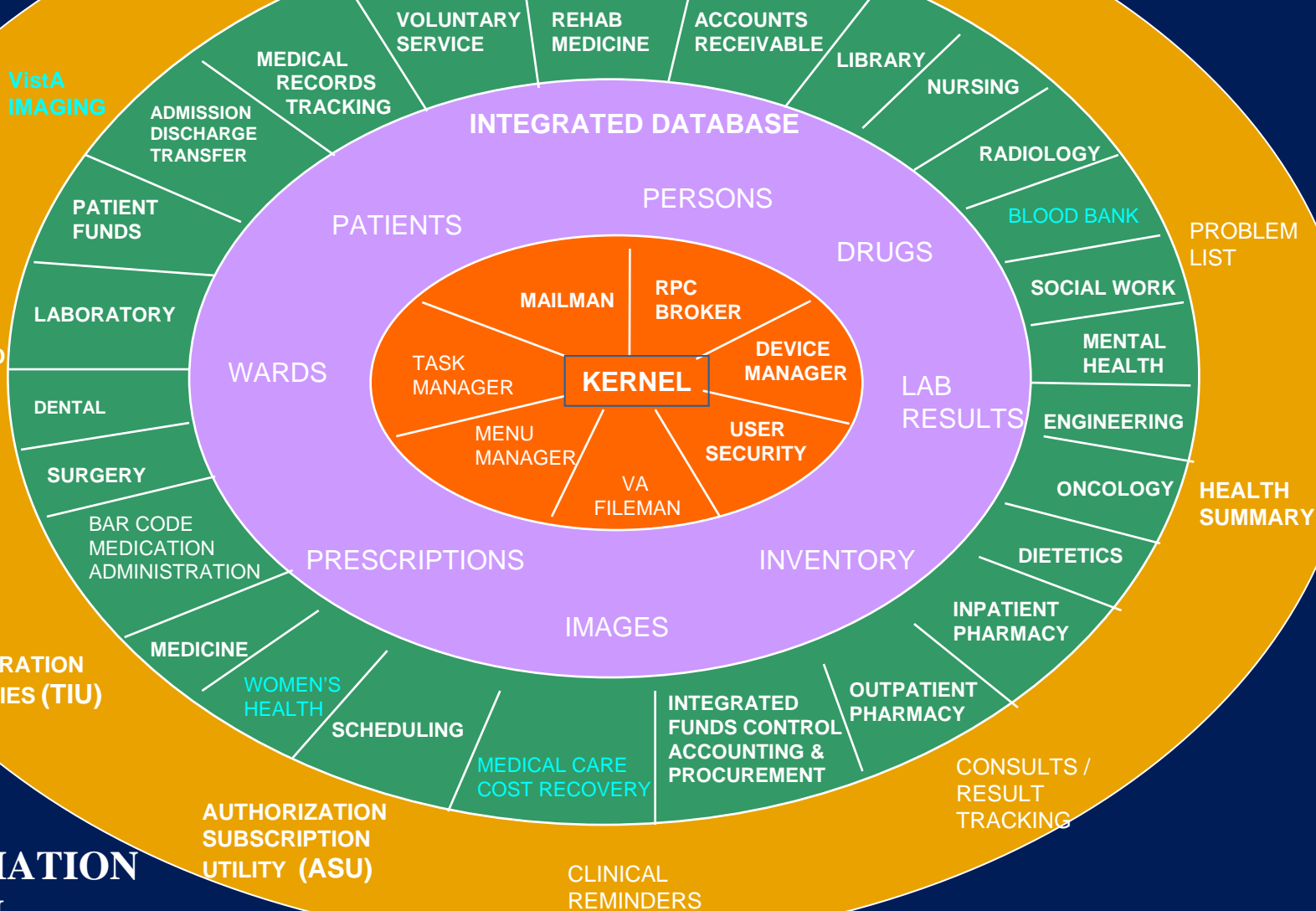
INVENTORY

IMAGES

COMPUTERIZED
PATIENT
RECORD
SYSTEM
(CPRS)

TEXT
INTEGRATION
UTILITIES (TIU)

VISTA INFORMATION SYSTEM





- Functions like any DBMS put since it is built with M is uses sparse storage mechanism internally
 - Add
 - Edit
 - Delete
- Roll and Scroll but has API's for GUI interaction
- Machine independent
- Hierarchical Storage
- Access privileges can be controlled down to data element level (column)



Why is the FM important to VistA?

It provides:

- Persistent storage via M
- Data Dictionary
- Audits
- Triggers
- Data validation



What We will do:

- Create a File Manager file
- Enter and edit data using File Manager
- Print and interpret the file structure
- Retrieve data from an existing database
- Sort the database using keys and indexes
- Custom reports using File Manager
- Construct reports and save print templates
- Learn some of the many API's and program functions

FM versus SQL Server



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SQL

- 1) Database
- 2) Table
- 3) Fields/columns
- 4) Records
- 5) Log Journal
- 6) Join
- 7) TSQL
- 8) Triggers
- 9) Replication
- 10) Log Shipping

FM

- 1) Globals
- 2) File
- 3) Fields
- 4) Nodes
- 5) Journal
- 6) Pointers (or multiple field)
- 7) M (object script)
- 8) Triggers
- 9) Global replication (M)
- 10) Shadow Journal (M)

(M)=M utility functionality

FM Functions



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- A report writer
- A data dictionary manager
- Data entry
- Text editor
- Programming utilities
- File archiving

FM is hierarchical and M is Sparse



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- FM stores data in files
- Each file contains fields
- Each field can contain a data type or be a multiple field
- A multiple field is a hierarchical arrangement that can be thought of as a fields inside a field. For example you might have a visit date, and under visit date you might have the fields {problem, physician, treatment}

Installing FM ^DINIT



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- DINIT routine must be run on your system to initialize VA FileMan.
- VA FileMan requires a %ZIS routine for device IO

FM Data Types



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- DATE/TIME
- NUMERIC
- SET OF CODES
- FREE TEXT
- COMPUTED
- POINTER TO A FILE – Relational navigation
- VARIABLE-POINTER - `vpfield:file:element`



How does FM store date/time?

- Why didn't the VA have a Year 2000 problem???
- Internal storage 3040107.1241 what does this decode to? 3=century (2000), 04=year, 01=January, 07 date
- Time is 1241=12:41pm on a 24 hour clock
- FM utilities handle date/time manipulations, ^%DT, ^%DTC



What Programs to what??

- Select
- Update
- Delete
- Retrieve
- Display
- List
- Append
- DIC
- DIE
- DIK
- DIP and DIQ
- DIP and DIQ
- DIP
- DIC



Main

Enter/Edit File Entries

Print File Entries

Search File Entries

Modify File attributes

Inquire to File Entries

Utility Functions

Other options

Data dictionary Utilities

Transfer File Entries

Utility Functions



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- Verify Fields
- Cross reference a field
- Identifier
- Re-index file
- Input transform
- Edit file
- Output Transform
- Template edit
- Uneditable data
- Mandatory/required field check
- Key definition

Data Dictionary



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- List file attributes
- Map Pointer Relations
- Check Fix DD structure

Package Wide Variables



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- DUZ – user ID
- DUZ(0) - defines user access
- DT – Current date in VA FM format
- DTIME – integer value in seconds for timed reads
- U - ^ a common delimiter
- ^DD("OS") what operating system is being used

Global definitions



- ^DD – data dictionary
- ^DIBT – stores results and template for searches
- ^DIC – stores dictionary of files
- ^DIE – stores input templates
- ^DIPT – output templates
- ^DISV – lookups
- ^DIZ- user defined data files
- ^DOPT – options
- ^DOSV – statistics

Creating Files



- Modify a File (Option 4)
- Select name and optional storage location
- Start to name fields and describe the data types
- Input data (option 1)
- Print data (Option 2)
- Searches (Option 3)
- Inquire on an entry (Option 5)



Defaults and Stuffing Values

- EDIT WHICH FIELD: **SEX//MALE** – default value
- **Stuff/Delete Field Value (3///)**
- VA FileMan offers a way to force a value to be inserted into the database (i.e., "stuff"), Simply use three slashes ("///") instead of two



Other FM Actions

- **Deleting a Value from a Field in the Database**
 - EDIT WHICH FIELD: **SEX///@**
- **Unvalidated Stuffs:** EDIT WHICH FIELD: **SEX////m** - only if you are a programmer
- **Looping (^LOOP)** - allows you to loop through a group of entries, without having to select each entry individually.

EDIT WHICH FIELD: **FOLLOW-UP DATE//JUNE 1, 1982**

THEN EDIT FIELD: **<RET>**

Select PATIENT NAME: **^LOOP**

EDIT ENTRIES BY: **NAME// LAST VISIT DATE**

START WITH LAST VISIT DATE: **FIRST// 1900**

GO TO LAST VISIT DATE: **LAST// DEC 31, 1976**

WITHIN LAST VISIT DATE, EDIT ENTRIES BY: **<RET>**

...HOLD ON, PLEASE...

JONES,SAM

SMITH,SALLY

JOHNSON,BILL

Input templates



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- Store actions for input:
Select OPTION: **ENTER OR EDIT FILE ENTRIES**
INPUT TO WHAT FILE: **PATIENT**
EDIT WHICH FIELD: **ALL// NAME**
THEN EDIT FIELD: **DATE OF BIRTH**
THEN EDIT FIELD: **]**
THEN EDIT FIELD: **<RET>**
STORE THESE FIELDS IN TEMPLATE: **UPDATE**

Branching on Input



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Select OPTION: **ENTER OR EDIT FILE ENTRIES**

INPUT TO WHAT FILE: **ADMISSIONS**

EDIT WHICH FIELD: **ALL// NAME**

THEN EDIT FIELD: **DIAGNOSIS**

THEN EDIT FIELD: **ADMITTING PHYSICIAN**

THEN EDIT FIELD: **DATE OF DISCHARGE**

THEN EDIT FIELD: **S:X="" Y="@1"**

THEN EDIT FIELD: **DISCHARGING PHYSICIAN**

THEN EDIT FIELD: **FOLLOW-UP DATE**

THEN EDIT FIELD: **@1**

THEN EDIT FIELD: **BILLING METHOD**

THEN EDIT FIELD: **<RET>**

STORE THESE FIELDS IN TEMPLATE: **EDIT ADMISSION**

Are you adding 'EDIT ADMISSION' as a new INPUT TEMPLATE? **Y**
<RET> (YES)

Computed Fields



Select FIELD: AGE

Are you adding 'AGE' as a new FIELD (the 3RD)? No// Y (Yes)

FIELD NUMBER: 2//

DATA TYPE OF AGE: TODAY-DOB\365.25 ??

DATA TYPE OF AGE: COMPUTED

'COMPUTED-FIELD' EXPRESSION: TODAY-DOB\365.25

TRANSLATES TO THE FOLLOWING CODE:

```
S Y(660006,2,1)=$S($D(^DIZ(660006,D0,0)):^(0),1:""),X=DT S
  X=X,X1=X,X2=$P(Y(660006,2,1),U,2),X="" D:X2 ^%DTC:X1 S
  X=X\365.25
```

TYPE OF RESULT: STRING//

LENGTH OF FIELD: 8//

-

Sorting



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Select OPTION: **PRINT FILE ENTRIES**
OUTPUT FROM WHAT FILE: **PATIENT**
SORT BY: **RELIGION="BAPTIST"**
WITHIN RELIGION="BAPTIST", SORT BY: **<RET>**
FIRST PRINT FIELD: **NAME**

Basic Statistics



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- # Count, mean, standard deviation, minimum, and maximum
- + Count and mean
- Add this to a print field



List File Attributes

- The structures of VA FileMan files are stored in the data dictionary (DD).
- The Data Dictionary Utilities submenu contains the following utilities that show information about files:
 - List File Attributes
 - Map Pointer Relations
 - Check/Fix DD Structure



- You have your choice of the following formats for the listing:
 - Brief
 - Condensed
 - Standard (or Modified Standard)
 - Custom-Tailored
 - Templates Only
 - Global Map
 - Indexes and Cross-References Only
 - Keys Only

DD Global Map



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GLOBAL MAP DATA DICTIONARY #16026 -- PATIENT FILE 05/31/91 PAGE 1
STORED IN ^DIZ(16026, (1 ENTRY) SITE: KDEMO V7 UCI: VAH,KXX

CROSS

REFERENCED BY: NAME(B)

^DIZ(16026,D0,0)= (#.01) NAME [1F] ^ (#1) SEX [2S] ^ (#2) DATE OF BIRTH [3D]

==> ^ (#3) RELIGION [4P] ^

^DIZ(16026,D0,1,0)= ^16026.04A^^ (#4) DIAGNOSIS

^DIZ(16026,D0,1,D1,0)= (#.01) DIAGNOSIS [1F] ^ (#1) AGE AT ONSET [2N] ^

^DIZ(16026,D0,1,D1,1,0)= ^16026.42^^ (#2) HISTORY

^DIZ(16026,D0,1,D1,1,D2,0)= (#.01) HISTORY [1W] ^

^DIZ(16026,D0,2)= (#5) PROVIDER [1V] ^ (#6) SSN [2F] ^

INPUT TEMPLATE(S):

^DIE(30)= ZZUPDATE

PRINT TEMPLATE(S):

^DIPT(.01)= CAPTIONED

^DIPT(60)= ZZDIAGPRINT

SORT TEMPLATE(S):

FM Internal Numbering



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- All files have unique numbers associated with each of their entries.
- Defining the NUMBER field allows you to use the Internal Entry Number (IEN, also called the record number) NUMBER (.001) is always matched with each entry

Cross References



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Select OPTION: **UTILITY FUNCTIONS**

Select Utility Functions Option: **CROSS-REFERENCE A FIELD OR FILE**

What type of cross-reference (Traditional or New)? Traditional// **<RET>**

MODIFY WHAT FILE: **TEST**

Select FIELD: **.01 <RET>** NAME

CURRENT CROSS-REFERENCE IS REGULAR 'B' INDEX OF FILE

Choose E (Edit)/D (Delete)/C (Create): **E**

NO DELETION MESSAGE: **NO, DON'T DELETE THIS X-REF!**



- **READ** Controls use of the file by Print File Entries, Search File Entries, Inquire to File Entries, Statistics, List File Attributes, and TransferFile Entries (transfer-from file) options.
- **WRITE** Controls use of Enter or Edit File Entries and Transfer File entries (transfer-to file) options.
- **DELETE** Controls deletion of an entire entry in the Enter or Edit File Entries or the Transfer Entries options.
- **LAYGO** Controls creating a new entry within the Enter or Edit File Entries option. You must have LAYGO as well as WRITE access to a file to add new entries. Additionally, you must have WRITE access on the field level to all required identifiers.
- **DD** Controls use of the Modify File Attributes and Utility Functions (Data Dictionary) options.
- **AUDIT** Controls the setting of auditing characteristics and the deletion of audit trails.

Global DD Structure



^DD(3,,01,0)="NAME^FR^^0;1^I X'?1A.AP1", ".AP K X"

^DD(3,,01,,1)="EMPLOYEE NAME"

^DD(3,,01,1,0)="^.1^1^1"

^DD(3,,01,1,1,0)="3^B"

^DD(3,,01,1,1,1)="S ^EMP("B", \$E(X,1,30), DA)=""

^DD(3,,01,1,1,2)="K ^EMP("B", \$E(X,1,30), DA)"

^DD(3,,01,3)="NAME MUST BE 3-30 CHARACTERS, IN THE
FORMAT LAST,FIRST"

^DD(3,1,0)="SEX^RS^M:MALE;F:FEMALE^0;2^Q"

^DD(3,2,0)="DOB^D^^0;3^S %DT="EX" D ^%DT S X=Y I
X<1400000 K X"

^DD(3,2,,1)="DATE OF BIRTH"

^DD(3,3,0)="DEPARTMENT^P13'^DIZ(13,^0;4^Q"



Contacts

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VistA Links

VistA-CPRS Demo - <http://www1.va.gov/CPRSdemo/>

CMS - VistA Office EHR –
<http://www.cms.hhs.gov/quality/pfqi.asp#Vista-Office%20EHR>

Indian Health - RPMS - <http://www.ihs.gov/Cio/RPMS/index.cfm>

DoD - CHCS <http://www.tricare.osd.mil/peo/citpo/projects.htm>

Pacific Hui - <http://www.pacifichui.org/>

WorldVistA - <http://www.worldvista.org>

Hardharts.org - <http://www.hardhats.org/>

Vista Software Alliance- <http://www.vistasoftware.org>



VistA Reading

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3. [The Veterans Health Administration: Quality, Value, Accountability, and Information as Transforming Strategies for Patient-Centered Care](#), The American Journal of Managed Care, November, 2004. <http://www1.va.gov/cprsdemo/docs/AJMCnovPrt2Perlin828to836.pdf>
4. [Comparison of Quality of Care for Patients in the Veterans Health Administration and Patients in a National Sample](#), Annals of Internal Medicine, December, 2004. http://www1.va.gov/cprsdemo/docs/Internal_Medicine_Article_on_VistA.pdf
5. [The Best Care Anywhere](#), Washington Monthly, January/February, 2005. http://www1.va.gov/cprsdemo/docs/Article_Washington_Monthly_Jan_Feb_2005.doc
6. Brown, Lincoln, Groen, Kolodner, "VistA – US Department of Veterans Affairs National Scale HIS," International Journal of Medical Informatics. February 2003 http://www1.va.gov/cprsdemo/docs/VistA_Int_Jrnl_Article.pdf
7. Munnecke, Tom, "Personal Health: From Systems to Space," July 19, 2002



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