

PROPOSAL
FOR THE DEVELOPMENT OF
A PATIENT DATABASE SYSTEM

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INTRODUCTION

In keeping with trends in commerce and industry, computers are being utilized more and more in health care settings, as pressure increases on health care providers to improve efficiency and quality of service delivery, and to cut costs. This trend has been less apparent in mental health, for a variety of reasons. This is on the point of changing, as more powerful hardware and software becomes available at fractions of the cost of earlier systems.

I propose to develop a patient information system for Douglas Hospital, based on the use of relatively inexpensive and powerful "off-the-shelf" software and computer equipment. This approach minimizes development time, reduces risks, and exploits the "user-friendliness" of products which have been developed for the very large and highly competitive personal computer market.

The proposed system will be based on a network of personal computers, as opposed to a centralized computer with multiple terminals. This approach has been chosen for a number of reasons: improved reliability of distributed systems; lower cost; availability of better software in terms of functionality, flexibility, and ease of use; and probably most important, the ability to start with a minimal system at minimal cost and expand easily as resources become available.

Another very important advantage of an approach based on personal computers is their multipurpose design. In other words, the computer hardware can be used for various other tasks important to hospital administrators and clinicians, including word processing, desktop publishing, searching of online data bases, electronic mail, data management and statistical analysis for research, digital voice messaging and dictation using the telephone system, and so on.

This proposal describes a minimal configuration, sufficient to develop, test, and demonstrate a pilot system. Such a system could be used in an emergency room or an inpatient setting. It would also be suitable for day hospitals and intensive care units, but less so for outpatient clinics which are likely to have more therapists.

DESCRIPTION OF SYSTEM

A minimal patient database system would consist of three personal computers, interconnected via a network. In an inpatient setting, the three units would be deployed as follows:

1. One computer, installed in my office, would serve as the development computer as well as the "file server" for the network. The "master copy" of the patient data would be stored in this computer, available for transmission to the other computers in the network.
2. A second unit, less powerful than the first, would be stationed in the secretary's office. It would be used for word processing in addition to its function of producing reports of patient data.
3. The third computer, still less powerful, would be installed in the nurses' station, where it would be regularly used by the ward clerk for entry of information, to print out various forms which go into patient charts, etc.

The software to be used for the patient database system is R:Base V, a fourth generation database language. This relational database supports multiple users connected via a network. In addition to all the usual relational database commands, this software includes the following:

1. A menu-driven program which allows non-programmers to create databases;
2. A menu-driven program which allows non-programmers to create complete menu-driven systems for using databases and creating reports. The screens and menus used in the Functional Description which appears subsequently in this proposal were created using this program, which is called "Applications Express";
3. A natural-language interpreter, which permits queries for information to be stated in natural English. For example, one could type the following directly into the computer: "Give me the names, chart numbers, age, and sex of all patients under Dr. So-and-so's care, who were admitted in 1986. Also tell me the length of stay."
4. A compiler, which allows programs to be converted into a form which is safer from tampering and which speeds up operation.
5. One of the most interesting features of R:Base V is that it permits text "notes" to be appended to any database record. These notes, which can be up to 3200 characters (ie about 1 1/2 typewritten pages) long, are stored in such a way that only the actual amount of information is stored. This means that expansion of a patient database system to also include such things as admission notes, anamneses, progress or nursing notes, and discharge summaries, would be relatively easy.

HARDWARE REQUIREMENTS

1. IBM PC XT or compatible, equipped with Hercules monochrome graphics adaptor, a high-resolution monochrome monitor, 20 megabyte hard disk, mouse, and an 80-column dot-matrix printer. This unit would be stationed in a secretary's office.	
computer w/ 20 Mb.....	3000.00
mouse.....	200.00
printer.....	600.00
2. As above, but without mouse. This unit would be installed in the nursing station, accessible to the ward clerk.	
computer w/ 20 Mb.....	3000.00
printer.....	600.00
3. IBM PC AT or compatible, with a 40-megabyte hard disk, tape backup system, extended graphics adaptor, high-resolution colour monitor, mouse, and a 132-column dot matrix printer. This unit would be placed in the system developer's office.	
computer w/40 Mb.....	6000.00
tape backup system.....	1500.00
printer.....	1000.00
4. Network hardware for each of the above units.	
3 boards @ 1000.00.....	3000.00
5. Hardware to interface the AT to the hospital's Sperry System 11 minicomputer.	
.....	500.00
6. A modem to permit the AT to communicate with computers outside of the hospital.	
.....	300.00
TOTAL HARDWARE	\$19700.00

SOFTWARE REQUIREMENTS

1. R:Base V (Microsoft) Relational Database, for network use.	600.00
2. Network software (usually provided with the network hardware).	
3. Microsoft Word word processing software.	400.00
4. Microsoft Windows screen management software.	160.00
5. Communications software, eg CrossTalk.	200.00
6. DOS 3.2 Operating System 3 copies @ 140.00.....	420.00
TOTAL SOFTWARE	\$1780.00
TOTAL HARDWARE AND SOFTWARE.....	\$21480.00

FUNCTIONAL DESCRIPTION OF PATIENT DATABASE SYSTEM

The following is an example of a Patient Database System, written using R:Base 5000, which permits various categories of staff to enter data, update and correct information, query the system (ie look up information which is displayed on the screen), or get reports printed out.

This example is by no means complete. Not all the options shown are available as yet; security precautions, such as the user entering his or her name, code, and password, have not been implemented; and this example does not gear the menus as specifically to the user classification as is possible and desirable.

To demonstrate how such a patient database system might be used, we will step through several examples.

Example 1: Registering a New Patient

The first example is that of an Admissions Clerk in the Admitting Office, who wishes to enter data for a new patient who has just been admitted to this hospital for the first time:

The Admissions Clerk turns on the computer, which displays the following screen (after the clerk has entered name, code, and password):

```
-----Patient Database - Access by Job Classification-----
(1) Admissions Clerk
(2) Ward Secretary
(3) Emergency Room Nurse
(4) Ward Nurse
(5) Emergency Room Physician
(6) Emergency Room Nurse
(7) Medical Records Technician
(8) Program Administrator
```

The clerk types in "1" to select choice number 1 on this menu. This results in the following screen being displayed:

```
-----Admissions Clerk - Select a Patient-----
(1) Douglas Hospital patient - chart number known
(2) Douglas Hospital patient - chart number is UNKNOWN
(3) New patient
```

Because the patient has never before been registered at this hospital, the clerk types "3" to select the choice "New patient". This results in the following screen being displayed:

Press [ESC] when done with this data

***** PATIENT INDEX - NEW PATIENT REGISTRATION:

Chart Number:

Last Name:

First Name:

Initials:

Sex:

Date of Birth: dd/mm/yr

Social Insurance Number: - -

Medicare Number:

Mother's Maiden Name:

Place of Birth (City, Province, Country):

Maternal language:

The clerk now fills in the blanks, using information provided by the patient or by the individuals accompanying him or her. The computer checks to ensure that the data being entered meets certain rules of validity; for example, the patient's name cannot have numbers in it; the social insurance number and medicare number must fit certain mathematical formulas, and so on. When completed, the clerk presses the "esc" key to go on to the next screen:

Press [ESC] when done with this data

***** PATIENT INDEX - ENTER / CHANGE PATIENT DATA:

Chart Number: Date of Entry of Change: dd/mm/yr

 Religion:
 Scolarity:
 Occupation:

Marital Status: (enter C for single, D for divorced, S for separated)

Spouse:- Last Name:
 First Name:

Although the clerk has had to input a great deal of information about this new patient, all the data which does not change, need never be re-entered in the future. For example, if the patient were to move, only his or her address would need to be re-entered; if he became separated, only the marital status field should be changed.

Example 2: Emergency Room Visit

As a second example, suppose the same clerk wishes to record a patient's visit to the Emergency Room. When on the second screen above:

Admissions Clerk - Select a Patient
(1) Douglas Hospital patient - chart number known
(2) Douglas Hospital patient - chart number is UNKNOWN
(3) New patient

The clerk knows that this patient was previously in the hospital, but does not know the Chart Number. It is therefore necessary to select choice number 2 in the above menu. This results in the following screen being displayed:

Obtain Patient's Chart Number

Please enter any or all of the following items. Press [enter] to go on to the next item.

patient's last name:
First name:
Date of Birth:

As indicated on this screen, the clerk can enter any or all items of information requested. Suppose only the first name is known; once entered, the computer can find and then display all patients with that first name. If the clerk is unsure of the spelling, the computer can look up all names that sound the same but have alternate spellings.

The computer will display, for all the patients whose names or dates of birth match the values entered, enough additional information to permit the clerk to positively identify which patient's chart is being referred to. When the clerk selects the patient, the computer will use that patient's chart number for all additional entries.

Of course, if the chart number is already known, then the clerk would simply have selected choice number 1 in the above menu. From this point on, the actions to be taken will be the same, starting with the next menu:

Admissions Clerk - Choices
(1) Emergency Room Visit
(2) Admission
(3) Update Patient Information
(4) Close Treatment / Cure Fermée

To record the ER visit, the clerk selects choice 1, which results in the following screen being displayed:

Example 3: Admitting a Patient

For the next example, we will take the instance of a Emergency Room Nurse who wishes to update the Patient Database to indicate that a patient is being admitted. We assume that the Emergency Room Nurse has already gotten access to the system by correctly identifying him- or herself with name, code, and password. The computer provides the following menu:

- | |
|---------------------------------|
| Emergency Room Nurse - Choices |
| (1) Record ER visit |
| (2) Update ER visit information |
| (3) Update patient information |
| (4) Book OPD appointment |
| (5) Book a consultation |
| (6) Record an admission |
| (7) Record a patient's absence |

The nurse will select choice 6 on this menu, resulting in the following screen being displayed:

Press [ESC] when done with this data

***** PATIENT INDEX - REGISTRATION OF PATIENT ADMISSION:

Chart Number: Date of Admission: dd/mm/yr

Name of Admitting Referred By Doctor:
Unit: Patient Arrived From:

Treating Person (eg med student, resident, psychologist):
 Attending Psychiatrist:
 Primary Nurse:

Patient's Status:- Under Court Order (enter y or n): n
 Cure Fermee: n
 Lieutenant Governor's Orders: n
 Incompetent: n

Other:

Discharge Date: dd/mm/yr

The default choices (ie those data values that the system will assume if nothing new is entered, will be shown on the screen. This includes "n" for the items in the patient's status, and today's date for the date of admission.

Example 4: Recording Patient Movements

In this example, a Ward Secretary will record the fact that a patient is being placed on authorized leave, to another hospital. The secretary begins with the following menu, after the patient's chart number has been entered:

- | |
|-----------------------------------------------------|
| Ward Secretary's Choices |
| (1) Record a patient movement (transfer, ALH, etc.) |
| (2) Record a consultation |
| (3) Verify an inpatient chart |
| (4) Print reports |
| (5) Update patient information |
| (6) Current statistics |

After selecting choice number 1, the following is displayed:

- | |
|---------------------------------------------|
| Ward Secretary - Record a Patient Movement |
| (1) Transfer to another unit |
| (2) Authorized Leave (Vacation or Hospital) |
| (3) Unauthorized Leave |

Selecting choice number 2 results in the following screen:

Examples 7 and 8: Other Users

The choices which such a system might provide for other categories of personnel using the system are shown in the two menus below:

Medical Records Technician - Choices
(1) Locate incomplete data records
(2) Update a patient's data records
(3) Print reports

Program Administrator - Choices
(1) Print reports
(2) Enter / Update ward data
(3) Enter / Update therapist data
(4) Obtain current statistics

APPENDIX
Data Dictionary for
Patient Database System

Tables in the Database PATIENT

Name	Columns	Rows	Name	Columns	Rows
Ident	11	7	Relative	12	0
Address	9	5	Emergency	8	0
CurrStat	8	1	Diagnos	12	0
Medicatn	8	0	InptChrt	14	0
Consults	6	0	VisitOPD	8	0
FORMS	2	409	CensuRpt	18	1
STRPunit	10	3	Admissn	14	0
Absence	9	0	Treatmnt	13	0
Therapst	7	0	cureferm	9	0
reports	2	31	RULES	8	26

Table: Ident

#	Name	Type	Length	Key
1	ChartNum	INTEGER	1 value(s)	yes
2	LastName	TEXT	16 characters	
3	FirstNam	TEXT	12 characters	
4	initials	TEXT	2 characters	
5	sex	TEXT	1 characters	
6	BirthDat	DATE	1 value(s)	
7	BirthLoc	TEXT	32 characters	
8	SocInsNo	TEXT	11 characters	
9	medicare	TEXT	14 characters	
10	MomsName	TEXT	16 characters	
11	MatLang	TEXT	12 characters	

Table: Relative

#	Name	Type	Length	Key
1	ChartNum	INTEGER	1 value(s)	yes
2	LastName	TEXT	16 characters	
3	FirstNam	TEXT	12 characters	
4	initials	TEXT	2 characters	
5	address1	TEXT	24 characters	
6	address2	TEXT	24 characters	
7	city	TEXT	12 characters	
8	province	TEXT	3 characters	
9	PostCode	TEXT	7 characters	
10	HomeTel	TEXT	12 characters	
11	WorkTel	TEXT	12 characters	
12	relnship	TEXT	12 characters	

Table: Address

#	Name	Type	Length	Key
1	ChartNum	INTEGER	1 value(s)	yes
2	HomeTel	TEXT	12 characters	
3	WorkTel	TEXT	12 characters	
4	ChngeDat	DATE	1 value(s)	
5	address1	TEXT	24 characters	
6	address2	TEXT	24 characters	
7	city	TEXT	12 characters	
8	province	TEXT	3 characters	
9	PostCode	TEXT	7 characters	

Table: Emergncy

#	Name	Type	Length	Key
1	ChartNum	INTEGER	1 value(s)	yes
2	ArrvDate	DATE	1 value(s)	yes
3	ArrvTime	TIME	1 value(s)	yes
4	BroughtBy	TEXT	24 characters	
5	ReffrgMD	TEXT	20 characters	
6	ArrFrom	TEXT	16 characters	
7	disposn	TEXT	24 characters	
8	SeenByMD	TEXT	20 characters	

Table: CurrStat

#	Name	Type	Length	Key
1	ChartNum	INTEGER	1 value(s)	yes
2	ChngeDat	DATE	1 value(s)	
3	religion	TEXT	16 characters	
4	scolarty	TEXT	24 characters	
5	occuptn	TEXT	24 characters	
6	SpouLNam	TEXT	16 characters	
7	SpouFNam	TEXT	12 characters	
8	MarStat	TEXT	1 characters	

Table: Diagnos

#	Name	Type	Length	Key
1	ChartNum	INTEGER	1 value(s)	yes
2	date	DATE	1 value(s)	yes
3	DxByMD	TEXT	20 characters	yes
4	Axis1Dx1	TEXT	48 characters	
5	Axis1Dx2	TEXT	48 characters	
6	Axis1Dx3	TEXT	48 characters	
7	Axis2Dx	TEXT	48 characters	
8	Axis3Dx1	TEXT	48 characters	
9	Axis3Dx2	TEXT	48 characters	
10	Axis3Dx3	TEXT	48 characters	
11	DSMaxis4	TEXT	64 characters	
12	DSMaxis5	TEXT	64 characters	

Table: Medicatn

#	Name	Type	Length	Key
1	ChartNum	INTEGER	1 value(s)	yes
2	date	DATE	1 value(s)	yes
3	RxByMD	TEXT	20 characters	yes
4	Meds1	TEXT	64 characters	
5	Meds2	TEXT	64 characters	
6	Meds3	TEXT	64 characters	
7	Meds4	TEXT	64 characters	
8	Meds5	TEXT	64 characters	

Table: InptChrt

#	Name	Type	Length	Key
1	ChartNum	INTEGER	1 value(s)	yes
2	AdmsnDat	DATE	1 value(s)	yes
3	AdmNote	DATE	1 value(s)	
4	Anamnes	DATE	1 value(s)	
5	Physical	DATE	1 value(s)	
6	ProgWk1	DATE	1 value(s)	
7	ProgWk2	DATE	1 value(s)	
8	ProgWk3	DATE	1 value(s)	
9	ProgMo1	DATE	1 value(s)	
10	ProgMo2	DATE	1 value(s)	
11	ProgMo3	DATE	1 value(s)	
12	ProgMo6	DATE	1 value(s)	
13	AnnExam	DATE	1 value(s)	
14	DschgSum	DATE	1 value(s)	

Table: Consults

#	Name	Type	Length	Key
1	ChartNum	INTEGER	1 value(s)	yes
2	CnsltReq	DATE	1 value(s)	yes
3	CnsltgMD	TEXT	20 characters	yes
4	ApptDate	DATE	1 value(s)	
5	ApptTime	TIME	1 value(s)	
6	RprtRecd	DATE	1 value(s)	

Table: VisitOPD

#	Name	Type	Length	Key
1	ChartNum	INTEGER	1 value(s)	yes
2	ApptDate	DATE	1 value(s)	
3	therapst	TEXT	20 characters	yes
4	AttendMD	TEXT	20 characters	
5	ApptTime	TIME	1 value(s)	
6	Injectn	TEXT	1 characters	
7	LabTests	TEXT	48 characters	
8	NoShow	TEXT	1 characters	

Table: CensuRpt

#	Name	Type	Length	Key
1	units	TEXT	12 characters	
2	date	DATE	1 value(s)	yes
3	ChartNum	INTEGER	1 value(s)	yes
4	LastName	TEXT	16 characters	
5	Admissns	INTEGER	1 value(s)	
6	BedsOcc	INTEGER	1 value(s)	
7	BedsOccF	INTEGER	1 value(s)	
8	BedsOccM	INTEGER	1 value(s)	
9	BedsStUp	INTEGER	1 value(s)	
10	BedsVacF	INTEGER	1 value(s)	
11	BedsVacM	INTEGER	1 value(s)	
12	BedsVacN	INTEGER	1 value(s)	
13	CnstCars	INTEGER	1 value(s)	
14	Deaths	INTEGER	1 value(s)	
15	Dischrgs	INTEGER	1 value(s)	
16	SerIlls	INTEGER	1 value(s)	
17	Transfrs	INTEGER	1 value(s)	
18	ULcens#	INTEGER	1 value(s)	

Table: STRPunit

#	Name	Type	Length	Key
1	UnitName	TEXT	12 characters	yes
2	BedsM/F	INTEGER	1 value(s)	
3	BedsMale	INTEGER	1 value(s)	
4	BedsFem	INTEGER	1 value(s)	
5	ServChif	TEXT	20 characters	
6	AttndMD1	TEXT	20 characters	
7	AttndMD2	TEXT	20 characters	
8	UnitGP	TEXT	20 characters	
9	HdNurse	TEXT	20 characters	
10	AsstHdNs	TEXT	20 characters	

Table: Admissn

#	Name	Type	Length	Key
1	ChartNum	INTEGER	1 value(s)	yes
2	PriNurse	TEXT	20 characters	
3	AdmsnDat	DATE	1 value(s)	yes
4	unit	TEXT	16 characters	
5	ReffrgMD	TEXT	20 characters	
6	AttendMD	TEXT	20 characters	
7	therapst	TEXT	20 characters	yes
8	ArrFrom	TEXT	16 characters	
9	CourtOrd	TEXT	1 characters	
10	CureFerm	TEXT	1 characters	
11	LGO	TEXT	1 characters	
12	Incompt	TEXT	1 characters	
13	PtStatus	TEXT	12 characters	
14	DschgDat	DATE	1 value(s)	

Table: Absence

#	Name	Type	Length	Key
1	ChartNum	INTEGER	1 value(s)	yes
2	LeaveDat	DATE	1 value(s)	yes
3	LeaveTim	TIME	1 value(s)	
4	RetrnDat	DATE	1 value(s)	
5	RetrnTim	TIME	1 value(s)	
6	LocnALV	TEXT	24 characters	
7	HospALH	TEXT	24 characters	
8	Pavilion	TEXT	24 characters	
9	UL	TEXT	1 characters	

Table: Treatmnt

#	Name	Type	Length	Key
1	ChartNum	INTEGER	1 value(s)	yes
2	date	DATE	1 value(s)	yes
3	RxByMD	TEXT	20 characters	yes
4	ConstCar	TEXT	1 characters	
5	FreqOObs	INTEGER	1 value(s)	
6	RstrUnit	TEXT	1 characters	
7	RstrHosp	TEXT	1 characters	
8	SeclPRN	TEXT	1 characters	
9	RestrPRN	TEXT	1 characters	
10	OtherRx1	TEXT	64 characters	
11	OtherRx2	TEXT	64 characters	
12	OtherRx3	TEXT	64 characters	
13	Clothes	TEXT	1 characters	

Table: Therapst

#	Name	Type	Length	Key
1	employID	INTEGER	1 value(s)	
2	therapst	TEXT	20 characters	yes
3	TherStat	TEXT	12 characters	
4	unit	TEXT	16 characters	
5	suprvisr	TEXT	20 characters	
6	ArrvDate	DATE	1 value(s)	yes
7	LeaveDat	DATE	1 value(s)	yes

Table: cureferm

#	Name	Type	Length	Key
1	ChartNum	INTEGER	1 value(s)	yes
2	StartDat	DATE	1 value(s)	
3	MD:Exam1	TEXT	20 characters	
4	Exam2Dat	DATE	1 value(s)	
5	MD:Exam2	TEXT	20 characters	
6	ContnDat	DATE	1 value(s)	
7	MD:contn	TEXT	20 characters	
8	StopDate	DATE	1 value(s)	
9	MD:Stop	TEXT	20 characters	

Report	Table
-----	-----
censurpt	CensuRpt

Form	Table
-----	-----
ABSENCE	Absence
ADDRESS	Address
admissn	Admissn
CONSULTS	Consults
CURRSTAT	CurrStat
DIAGNOS	Diagnos
EMERGNCY	Emergncy
ident	Ident
INPTCHRT	InptChrt
MEDICATN	Medicatn
RELATIVE	Relative
SEL-PT	
show-pt1	
treatmnt	Treatmnt
VISITOPD	VisitOPD