

## MIIS, THE INCISAL EDGE

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After ten years of development and evolution the flexibility of MIIS has continued to show its capacity as an effective operating system in meeting the educational, clinical, research, financial, and managerial needs of the Loma Linda University School of Dentistry. Loma Linda is in the top ten percent of dental schools in the implementation of computerization and the existing system only took an actual twelve person years to develop, program, and maintain. This paper describes a few of the more general features of the system including hardware configuration, usage of the MIIS virtual port, integration of micros with the Schools' minis, the 'universal' device handler, a text editor, and 'smorgasbord' routines; all implemented in MIIS.

### Hardware Update

As previously reported, the School of Dentistry at Loma Linda University began computerization in a limited capacity in 1977; time sharing on a Data General Nova computer running MIIS.<sup>1</sup> In January 1983 the entire School came on line with a Data General Eclipse S/250 of its own. In July of 1986 a Data General Eclipse S/280 was added. The S/280 was configured with 1MB of main memory, two 592MB 6239 disk drives, a 1600/6250 50 IPS 6300 tape drive, and four ALM-16 4257 boards. It was decided to purchase the additional Eclipse rather than a MV 8000 Model II computer for the following reasons:

1. the S/250 had very little resale value,
2. using ALM boards from the S/250 would decrease the cost of the S/280,
3. the S/250 could be used to support non-clinical uses and as a back-up system,
4. Meditech gave approximate relative processor rating (speed) with MIIS of 0.8 for a S/250, 1.7 for a S/280 and 2.0 for the MV 8000, thus there appeared little increased processor speed with the 8000, and
5. the cost of the S/280 was \$120,000 and the MV 8000 would have been about \$180,000 with monthly maintenance costs being approximately equal.

Thus a refurbished S/280 was purchased even though Data General was and continues to de-emphasize its Eclipse line in favor of its MV series. Even today a used S/280 could be a cost effective choice for an institution or business not needing the power of the 32 bit processor. Currently there are some 95 terminals and printers connected to the Eclipses includ-

ing Printronix 300 and 600 lpm printers and in excess of 100 users that access the two computers

### The Bridge

Subsequent to the purchase of the S/280, the various computerized functions were divided between the two Eclipses. The majority of the clinical, financial, text editor and departmental functions were transported to the S/280 while the S/250 supported Dental Supply (inventory and financial), Continuing Education, test grading and grades, private practice support, and assorted other processes. The virtual port feature of MIIS was implemented in order that operators on the S/280 could have access to programs and data via menus on the S/250 and visa versa. Some six ports on each machine are reserved for this function and are connected via RS 232 cabling. The rudimentary yet effective virtual port routine is accessed by the user via an option selection from their main menu. The virtual port transfer routine is shown as Figure 1.

```
%VP ;VIRTUAL PORT TRANSFER ROUTINE;072186;GSS
M X @7(10) W SP($T(%VP);2):20
D S W !!?19,"You are currently on the ",$E(S,3,7)
W !!!"1=S/250 SIGN-ON",!,"2=S/280 SIGN-OFF"
R !!"Option: ",*IN Q:IN=46 G M:IN'=49&(IN'=50),H:IN=
50
N K vp
NXT S vp=$N(^%VP(vp)) G FND:$J(vp)=01'vp,NXT
FND I 'vp X @7(24) W *7,"No free Virtual Port available
at this time." H 2 Q
X @7(10)
W "NOTE: Your S/250 cipher may not be the same as yo
ur S/280 cipher!"
W !"You may now sign-on to the S/250.",!
S $P(ZL:16)=vp A vp:F=1:N=1,0:V=vp
S:$P(ZL:16) vp=$P(ZL:16),$P(ZL:16) U vp Q
H W *13,*4 H
S V I F I=$W($K+14)*2:1 Q:$B(I)=0 S S=S_&C($B(I))
K I Q
```

Figure 1. Virtual Port Transfer Routine.  
where X @7(10) homes cursor, clears the screen, and enables full intensity  
X @7(24) clears line 24 and positions cursor at the beginning of the line  
^%VP(vp)=vpx where vp is a port # on the originate computer and vpx is the corresponding port # on the destination machine  
ZL is a user information and security variable

### Micro Integration

The usage of the micro computer in the office was not a salient issue in 1984 but certainly has become one. Many of the departmental offices within the Dental School now have at least one micro and are primarily using them for word processing, though there is some spread sheet and specialized uses, e.g., graphics, cephalometrics, etc. Due to limited desk and office space and as a matter of convenience, some of the departments are using their micro as a dumb terminal connected to one of the minis. Mirror II, a product of Softklone Distributing Corporation, is being used to turn the micro into a 'dumb' terminal emulating a TeleVideo 925. The micro is connected to the Data General using com1 or com2 on the IBM (or clone) and a RS 232 port on the mini. On relatively rare occasions users need to transfer data files between the Data General and the users micro data base. Mirror II is also used to accomplish this transfer via RS 232 protocol. If the data being transferred is simply to be used with the text editor on the Data General, i.e., text only, then additional programming is unnecessary. Otherwise custom programming is needed to properly deal with the filing of the incoming data.

### Device Handler

As with most systems developed in-house, the Schools computer system has evolved. Included in this evolution was the use of various terminals as input devices including, Mini-Tecs, Hazeltine 15xx series, Hazeltine Esprits, Televideo 9xx series, various printers, and now PCs. The flexibility of MIIS facilitated the creation and use of a simple routine and global that enables just about any CRT or KSR (keyboard send receive) printer to be used as an input device. The 'universal' device handler routine is called when a user first signs on to the system and defines namespace seven dependant upon a terminal type assigned to that port. That is,  $N\ 7=\%DDV(\%DDV($I))$  is executed where  $\%DDV($I)$  has been previously defined (see Figure 2) depending upon the terminal type the system should expect signing on to the system via that port. It would also be possible to redefine the terminal type on 'fly' in case more than one terminal type is attached to a port but, to date, this has not been necessary. Thus namespace seven is now defined to a terminal type, e.g., an 'ESPRIT' and in order to home the cursor, clear the screen, and enable half intensity the programmer would simply code 'X @7(2)' where appropriate (see Figures 3 & 4.) This has proved to be a relatively painless method to support multiple terminal types accessing the same I/O routines using formatted screens.

### Text Editor

The text editor, written in MIIS in 1982, is a line orientated 'word processor' which was written to 1. minimize the impact on system through put and 2. to serve the needs of secretarial staff for word processing like capabilities, in that order of importance. The text editor has generally been used

```
'%DDV(2)=PRINTRONIX
10)=TI820
11)=TV925
12)=TV925
13)=TV925
14)=TV925
15)=TV925
16)=TV925
17)=TV925
18)=TV925
19)=TV925
20)=TV925
21)=TV925
22)=TV925
23)=TV925
24)=TV925
25)=TV925
26)=TV925
27)=TV925
```

Figure 2. Port Device Type

```
*%DDV("ESPRIT",0)=W *126,*17,*x,*y,*126,*24,*126,*25
1)=W *126,*28,*126,*25
2)=W *126,*17,*x,*y,*126,*15
3)=W *126,*29,*126,*31
4)=W *126,*17,*x,*y
5)=W *126,*17,*x,*y,*126,*24
6)=W *126,*31,*126,*17,*x,*y,*126,*15
7)=W *126,*31
8)=W *126,*15
9)=W *126,*24
10)=W *126,*28,*126,*31
11)=W *126,*25
12)=W *126,*17,*x,*y,*126,*25
13)=W *126,*17,*x,*y,*126,*31
14)=W *126,*17,*x,*y,*126,*24,*126,*12
15)=W *126,*17,*x,*y,*126,*15,*126,*25
16)=W *126,*18
17)=W *126,*17,*x,*y,*126,*24,*126,*25
18)=W *126,*28
20)=W *126,*29
21)=W *126,*29,*126,*25
22)=W *126,*28,*126,*31,*126,*17,*x,*y
23)=W *126,*17,*x,*y,*126,*19
24)=W *126,*17,*0,*23,*126,*15
25)=H 0
26)=H 0
27)=H 0
28)=H 0
29)=H 0
30)=W *126,*26
31)=W *126,*19
```

Figure 3. Screen Formatting Codes for 'ESPRIT'

```
*%DDV(0,0)=Address Cursor, Clear to EOP, Half Intensity (Write Protect) C
1)=Home Cursor, Clear to EOP, Half Intensity (WP) Cn
2)=Home Cursor, Clear to EOP, Half Intensity On
3)=Clear Full Intensity, Full Intensity On
4)=Address Cursor
5)=Address Cursor, Clear to EOP
6)=Full Intensity On, Address Cursor, Clear to EOL
7)=Home Cursor, Clear to EOP, Half Intensity On
8)=Clear to EOL
9)=Clear to EOP
10)=Home Cursor, Clear to EOP, Full Intensity On
11)=Half Intensity On, Address Cursor
12)=Address Cursor, Half Intensity On
13)=Address Cursor, Full Intensity On
14)=Address Cursor, Clear to EOP, Cursor Up
15)=Address Cursor, Clear to EOL, Half Intensity On
16)=Home Cursor
17)=Address Cursor, Clear to EOP, Half Intensity On
18)=Home Cursor, Clear to EOP
19)=Home Cursor, Clear to EOP, Half Intensity On, Address Cursor
20)=Clear Full Intensity
21)=Clear Full Intensity, Half Intensity On
22)=Home Cursor, Clear to EOP, Full Intensity On, Address Cursor
23)=Address Cursor, Delete Line
24)=Cursor to Line 24 Column 1, Clear to EOL
25)=Protect Mode Off
26)=Load User Line, Display User Line
27)=Home Cursor, Clear to 25th Line
28)=Blank Screen
29)=Normal Screen
30)=Protect Mode Off, Line Insert
31)=Protect Mode Off, Line Delete
```

Figure 4 Documentation of Formatting Code Numbers

for creation of short documents and course tests, though many paged theses have been entered. The editor, in addition to the system printers, also supports use of the Canon AP 400 (or similar) typewriter attached to TeleVideo CRTs, using the typewriter as a printer. The relatively recent wide spread usage of micro computers as word processors has decreased the need/use of the text editor. Even so, there are specific functions which remain the editors forte.

The text editor, via a data dictionary, is able to insert data from the various globals into a document. For example, by just entering (when prompted) the patients chart number a letter can be customized to insert the patients name, address, account balance owing, etc. where appropriate. Additionally, the text editor enables a department secretary to create a master course question document (MCQD) which contains all the test questions that are used in a course. From the MCQD the instructor selects the appropriate questions for a particular test. The secretary then enters only the question numbers from the MCQD, in the order specified by the instructor, into the actual test document. The text editor then transfers the specified questions into the test document (including possible multiple choice answers), rennumbers the questions sequentially, and spaces appropriately. A great time saver over transferring each question manually or retyping tests. The instructors also get feed back from their test questions since the test grading routines on the Data General S/250, in addition to other statistics, give validity coefficients for all the test questions. If the coefficient is quite low or negative then the instructor may rewrite that question and replace the previously existing question in the MCQD with the revised version.

#### A Veritable Smorgasbord

The Dental School's system was initially written so that all user routines were accessed via menus. Menus were designed to be specific for a department, clinical area or function. As more and more routines were placed in these menus, additional personnel were added to the system, and user functionality became less specific it became a bit confusing to some individuals as to which menu(s) contained the option they wished to access. Additionally, when in the appropriate menu there was the question as to which option to access (even though entering a '?' would give the user a list of the options.) Smorgasbord was written to address this problem for the infrequent, naive, or impaired user. Smorgasbord is a set of routines which enable the user to specify with key words or phrases the process that they wish to execute. Key words and/or phrases may be selected from the screen or entered directly by the user. The system then responds with a list of the corresponding routines with descriptions. The user may select the appropriate routine and the system informs the user which menu(s) and options the routine may be called from (to expedite the use of the menus), checks the users security, and executes the routine if appropriate. This smorgasbord feature plus the continued use of menus makes a somewhat

involved system more 'user friendly'

#### Summary and Conclusion

The flexibility of MIIS has, over a period of some ten years, enabled Loma Linda University to achieve a position in the fore front of the computer usage in dental schools. In addition to the necessary educational, clinical, research, financial, and managerial needs of the School, MIIS has been effective in the implementation of more general functionality including the transfer of data between computers, supporting multiple terminal types, and a text editor with data dictionary increasing the 'user friendliness' of the system. MIIS comes highly recommended for use in the dental education environment.

#### References

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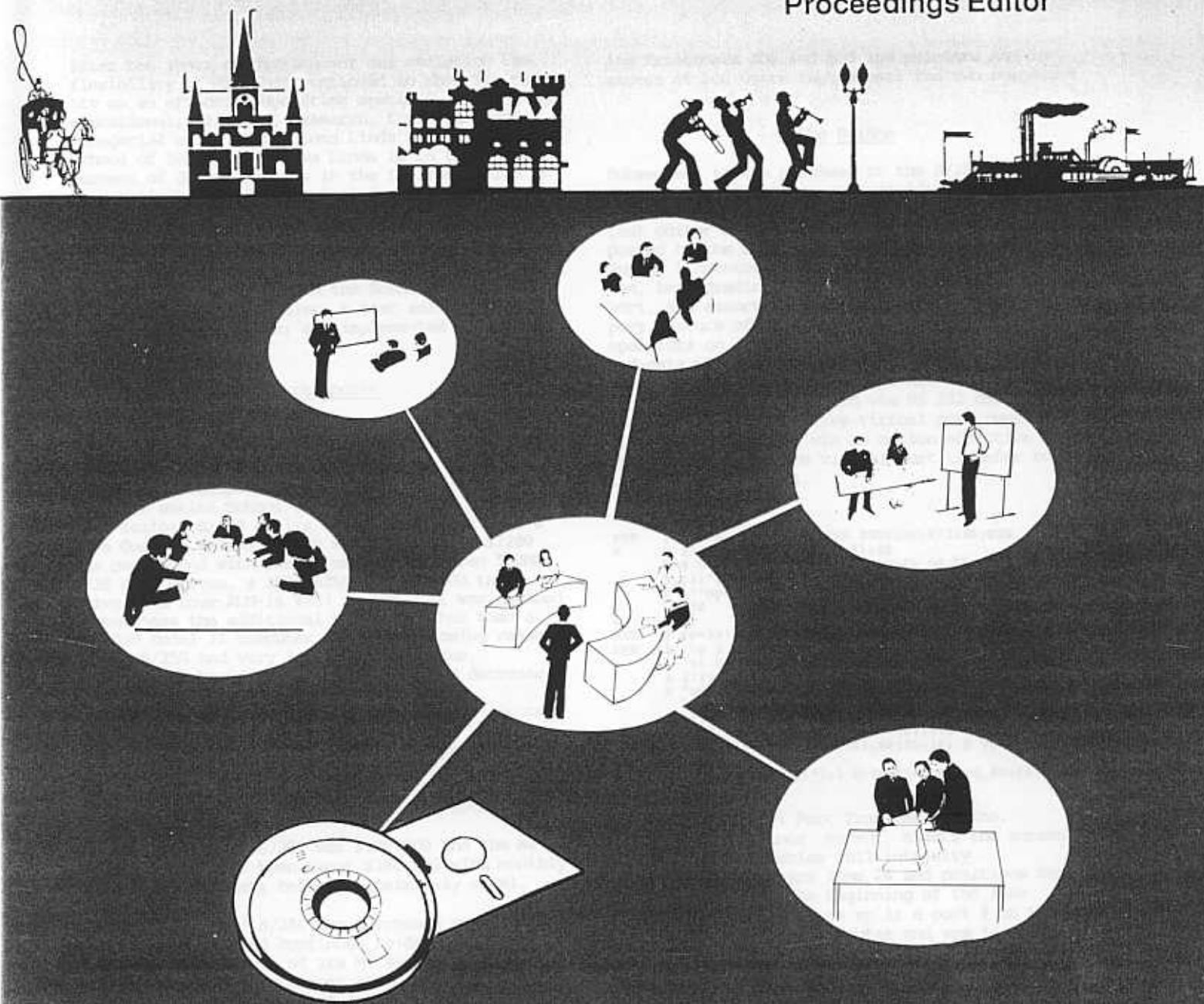
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