Technical Operations
ON-LINE

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LOGON:

A new Company name and a slighty new look but inside we are still the same. We have changed our company name and our logo. Our new name is **Novadyne Computer Systems, Inc.** and our logo is **Technical Operations.** Novadyne's Technical Operations brings you ON-LINE.

We also changed the color outline to match our new company color and we have included the issue and year at the top of each page. Now it will be possible to tell which issue an article came from when a page has been copied and distributed.

Remember, your correspondence to us is highly regarded and we always appreciate hearing from you. Please send any correspondence to:

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You might also want to make note of the address change for Novadyne Computer Systems, Inc.

- Terry Smithton

3600 Foot Tapes

Over the last several months, Product Support has been involved in an unusually high number of problem situations using 3600 foot tape reels. The most common symptom has been parity errors during VERIFY-SAVE and/or RESTORE.

The root of the problem is that to get 3600 feet of tape on a 10.5 inch reel requires that the tape be very thin, usually between 1.0 and 1.3 mils. One mil tape is very susceptible to stretching, especially when the tape drive is operating in a start/stop mode. The issue is further complicated by the fact that both Cipher and Kennedy have approved 1.0 mil tape for use on their streaming tape drives.

In order to **consistently** and **reliably** use 3600 foot tapes however, the tape drive must be consistently operating in a streaming mode. This, in turn, requires that the system be able to transfer or receive data to/from the tape fast enough to keep it in a streaming mode.

Accomplishing this is dependent on a number of factors such as the CPU capacity of the system, how many other processes are active during tape activity, and how well the files are sized. Any or all of these factors can cause the tape drive to go into a start/stop mode if the flow of data to the tape drive is too slow (when writing) or if the system is unable to receive and process the data from the tape fast enough (when reading).

As you may already have concluded, it is nearly impossible to guarantee that all the pertinent variables can be kept in check 100 percent of the time. Therefore, use of 3600 foot tapes cannot be recommended. Maintaining data integrity is far more important than reducing the number of reels used for a FILE-SAVE.

- Steve Gill

Editors Note: See "Goofies" for further explanation.

MARKETING

NOVADYNE™ COMPUTER SYSTEMS, INC. EMERGES FROM MCDONNELL DOUGLAS

On June 30, 1990, **Novadyne Computer Systems, Inc,** formerly McDonnell Douglas Field Service Company, was founded. **Novadyne Computer Systems, Inc.** remains one of the largest independent field service and computer systems distribution organizations in North America, with over 1000 professionals located in over 125 offices across the nation.

The management buyout, headed by president and chief executive officer Bert Novak, began 11

months ago with McDonnell Douglas Corp. Many financing alternatives were investigated, resulting in the selection of Menke Titolo Capital Corp. to lead the financial syndication. "The same strong management team that was formed approximately three years ago and helped put this company together will now be running Novadyne," Novak said.

Novadyne Computer Systems, Inc. products and services are marketed nationwide to companies in all facets of commerce including retailing, transportation, distribution, communications, health care, educational organizations and federal and local government agencies.

Novadyne -- whose motto is 'The Power of Many Combined as One'--represents the combined forces of the former Microdata®, MCAUTO®, and Tymshare® field service organizations.

Novadyne Computer Systems, Inc. is a single source for repair and maintenance service on mainframes, minis, CAD/CAM workstations, micros, peripherals and communications networks from manufacturers such as DEC®, Tandem®, Sun Microsystems®, McDonnell Douglas®, and many others.

Continuing its tradition of providing quality services to end-users, OEMs, VARs and dealers, Novadyne Computer Systems, Inc. delivers on-site services which are designed to meet specific user requirements with varying levels of response and coverage hours. Depot repair services are customized for the self-maintainer, reseller, independent service companies, and include repair, parts exchange, and parts sales and leasing.

Service Management, specializing in business partnering, offers more flexible services and value-added service solutions to OEMs, VARs and VADs and their own customers. This new service is provided directly to the customer on behalf of OEMs and resellers, allowing them the freedom to concentrate on manufacturing and distribution of products.

Novadyne Computer Systems, Inc. recently assumed all sales and marketing responsibility for McDonnell Douglas computer systems' products sold through dealers and VARs in North America. "This sets our company apart, as we are the only nationwide non-manufacturing distributor capable of offering total software and hardware support to its reseller network," Novak said.

Distribution products are currently based on the McDonnell Douglas series of super mini computers, utilizing unique modular architecture to deliver faster CPU performance. These product offerings also include a broad range of software packages such as office automation, PC connectivity applications, and distribution management systems for general business which are marketed through its reseller channel.

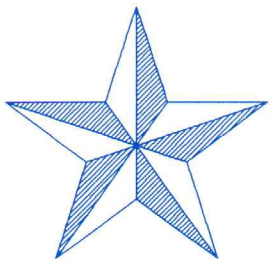
In the first quarter of 1990, the company announced the LX/2100 systems, the company's first entry into the UNIX® market. LX/2100 systems are based on Sun Microsystems' SPARC® architecture, the most popular UNIX platform in the world.

"We will continue to expand our computer and network maintenance services to our third and fourth party markets. We also intend to develop the distribution side of the business by attracting new OEMs and resellers, and from this strong foundation, we will continue our heritage of continuous growth and expansion," Novak said.

The company headquarters will remain at its present Santa Ana, Calif. location until nearby construction of its new facility is complete in mid-1991.

- Pat Dwight

STAR POWER



Correction:

In the last issue of ON-LINE, there was a slight error regarding the use of SP-PORTON in the QUEUE-SETUP proc. The SP-PORTON utility should be executed from the USER-SETUP proc leaving the creation of the spooler queues in the QUEUE-SETUP proc. The reasoning behind the proc change is that if the spooler is **NOT initialized** during a Coldstart, the QUEUE-SETUP proc is **NOT executed**. However, the USER-SETUP proc is executed.

The two procs should look like this:

```
SYSPROG-PL QUEUE-SETUP
HSP-CREATE QUEUE1 PORT 9
P
HSP-CREATE QUEUE2 PORT 10
P
RTN

SYSPROG-PL USER-SETUP

MV %2 "9"
[PROCLIB SP-PORTON]
MV %2 "10"
[PROCLIB SP-PORTON]
RTN
```

Thanks to the users who brought this to our attention!

- Susie Seipel

Port Hangs

The more information you can gather when a port hang occurs, the more quickly your analyst can resolve the problem. What follows is a discussion covering the information pertinent to port hangs and how that information can be found.

The first issue to resolve is whether the port is really hung. Although the port may not be visibly active, it may be busy waiting for another condition to occur before it can resume its task. To determine if the port is active, log to the SYSPROG account and type in at TCL:

```
WHERE port# (EB)
```

(port# is the suspected hung port). The terminal will wait 10 seconds before displaying information; in the elapsed 10 seconds, the system will display a "snapshot" of the port's activity. If the port is active, you will see a display similar to:

```
PORT PCBFID PS P3 ELAPSED-CPU ELAPSED-ACCT ELAPSED-RDS ...
001 000840 7E FF 11   4   1
```

If the port is hung, there will be no information under the column headings as shown above. On Operating System releases prior to 2.3, 5.3, and 6.0, the equivalent information is gathered by entering from SYSPROG at TCL:

```
WHERE port# (S)
```

The 10 second delay will not occur here and you will see a display similar to:

```
PORT PCBFID PS CPU MSEC #ACTS READS
001 000840 76FF     253   111   74
```

You now need to type in another WHERE (S) to compare it with the first display. If the values for CPU MSEC, #ACTS, or READS are different, the port is active; if the values remain the same, the port is hung.

You may find that what appeared to be a hung process is actually not hung at all. Although the net result of this changes nothing -- the port is still not responding -- your analyst will troubleshoot the problem differently than they otherwise would have.

There are other issues to consider if there is more than one hung port. Did all of the ports hang at the same time or did they start to hang one by one? Again, the net effect is the same to you -- ports are hung -- and ports hanging in domino fashion are symptomatic of a different problem than ports hanging simultaneously.

If several or all ports are hung, check port 0 for any abort messages on the screen. Is the prompt on the screen, indicating port 0 has entered the firmware debugger?

In such a case, port 0 has control of the system, causing all other ports to "hang".

Has any other port aborted? If so, it may be the cause of other ports subsequently hanging. An example of this would be a process that aborts with a system lock set; any other process that needs that lock also will hang, waiting for the lock to be released by the aborted process. In this situation, the hung port will be freed up once the abort is resolved. In many instances, a hung port is not an isolated event but is related to another, seemingly irrelevant process or condition on the system.

One of the single most important sources of information on a port's status is the PIB status. It is displayed under the PS column on a WHERE display for the port:

```
PORT PCBFID PS RTN STK
```

The PS is a hexidecimal representation of the port's status bytes which indicates the status of the port. A summary of common PIB status values and their associated significance is listed below.

Please note that since status bits are defined differently between Operating System releases, the PS values are categorized below according to Operating System release.

	4.X REALITY	1.X M9000	5.X M9000	2.X &1.X M6000	6.0 SERIES 18
Process sleeping	3F	3C	3EFF	7FFF	3EFF
Frame fault	5F	5C	5EFF	DFFF	5EFF
Output roadblocked	7B	74	76FF	F7FF	76FF
Input roadblocked	7D	78	7AFF	FBFF	7AFF
No roadblocks	7F	7C	7EFF	FFFF	7EFF
Waiting for lock	3F	3C	7EDF	FFDF	7EDF
Hibernating			7EF7	BFFF	7EF7
Process stopped			7E7F	FF7F	7E7F

A **process** can either **sleep** until a specific time (SLEEP 14:00) or for a specified length of time (SLEEP 60).

A process is **frame faulted** when the process is awaiting a frame from disc to be brought into main memory. Thus, the process will be deactivated until the requested frame is available. A process hung at a frame fault may indicate a problem with the disc controller or drive, a poorly sized file, or an I/O busy buffer.

An **output roadblocked** condition indicates that either the process is currently outputting to a device and should not be interrupted, or that the process cannot complete its output. It is the latter condition that results in a port hang. Very often a terminal will be output roadblocked because it has received an XOFF character, in which case the remedy is to issue it an XON character (<ctrl>Q from the keyboard). With a printer that is output roadblocked, you should ensure that the printer is on-line and that its cables are securely attached.

A process is **input roadblocked** when it is waiting for input from TCL, from within a proc or Data/Basic program, at a select prompt, etc. A process becomes input roadblocked until the required input is provided.

A condition of no **roadblocks** indicates the process is free to be activated.

When a process' PS indicates it is **waiting for a lock**, it generally is waiting for a system lock to be made available to it. System locks function to control access to tables that maintain system-wide information, such as on the Spooler. To determine which process has a system lock set, type in at TCL from SYSPROG LIST-SYSTEM-LOCKS.

A process **hibernating** is effectively one that has been put to sleep indefinitely until interrupted by an external process to do some work. A printer port will hibernate until there is a print job sent to it.

A **process stopped** is one that is having its I/O characteristics, such as baud rate and PCI, changed.

• Linda Denney

THINK TANK

A Shell for Data/Basic

Have you ever wanted to create a utility for operations on file items which would have an interface similar to what is offered via the TCL processor? Let's examine what this processor does and see how much of it can be emulated from Data/Basic.

First -- the TCL processor. It offers removal of redundant blanks, a check for balanced quotes, and parsing of options. It also verifies that the command entered is a valid one; which means of course, that the command be either a verb, a Proc, or a catalogued Data/Basic program.

Options are picked up from the entry in the input line beginning with an open parenthesis. They are both alphabetic or numeric and optional. At the system level a bit is set for each alphabetic option found. If a numeric is present, it is converted into binary and stored in a 32 bit field called D4. A second numeric option may be present and is stored in D5. For example, the TCL input line 'DUMP (X2000-2001)' would cause ABIT to be set, BBIT-ZBIT to be zero, and the D4/D5 pair to contain the range 2000-2001. This level of parsing is called TCL-I and is what is available to Data/Basic.

In Data/Basic we may get the options through SYSTEM(15) as a three attribute dynamic with the alphabetic options represented as a string of characters --one for each option set. These are found in attribute one of the dynamic. D4 and D5 are represented in the next two attributes of the dynamic. The rest of the input line is available via the SENTENCE() intrinsic on 7.0 or, most commonly, through the statement BUF = OCONV (",'U20E0'). (It is to be noted that SENTENCE() returns the entire input line, unparsed, while U20E0 returns the parsed input line, with spaces converted to attribute marks.)

TCL does one other thing: it transfers control to what is known as MODEID1. One very well known MODEID1 entry point is the TCL-II processor, which really acts as a pre-processor for another entry point in the verb, called MODEID2. An example of this sort of operation is seen in the ED verb, which is a TCL-II class verb.

TCL-II class verbs provide additional checking. They check for the presence of a valid filename, and then they check for the presence of either an item-list or a select-list. Most people who program on this system have, at one time or another, wanted to write a Data/Basic program which would function like this too. The main idea of this article is to provide you with an example of how this may be accomplished.

See the accompanying program listing called 'SHELL'. SHELL uses SYSTEM(15) and U20E0 to get the base information required to provide an

emulation of TCL-II pre-processing. It is designed to be the first thing put into a new utility program which requires a TCL-II interface from Data/Basic. Down on line 79 one adds in the actual program which one intended to write all along. This code acts as a main-line subroutine and is called with a GOSUB once for every item id found in the select-list or item-list provided. Options are added to the program with additional INDEX statements --such as the example given for the V option on line 26. The main-line code might begin with a statement like:

```
READ ITEM FROM TCL.FILE,ID ELSE PRINT ID:" not on file."; RMBIT = 0
```

This program may be easily modified to any number of tasks involving files and items in them. Use your imagination!

```
 SHELL
001 * A SHELL FOR DATA/BASIC TO ACT LIKE A TCL-II VERB
002 * Created: 31 May 1990
003 * Author: Garrett D. Hildebrand
004 VER = "1.0"
005 REV = "B"
006 REV.DATE = "900805"
007 REV.TIME = "11:35"
008 *
009 * LAST: *GDH 900806 @11:03 - Modified options interface.
010 * PREV: *GDH 900531 @11:35 - Program created.
011 *
012 PROMPT ' '
013 EQU AM TO CHAR(254)
014 SELECT.LIST = SYSTEM(11)
015 TCL.BUF=OCONV('','U20E0'); CAT.FLG=1-SYSTEM(20)
016 OPT.AR=SYSTEM(15); * D4, D5 and alphabetic options.
017 OPTIONS = OPT.AR; * alphabetic options.
018 OPTIONS.D4 = OPT.AR; * 1st numeric.
019 OPTIONS.D5 = OPT.AR; * 2nd numeric. (n-m) or (.nx.mx).
020 *
021 * Check desired options...
022 *
023 P.OPT = INDEX(OPTIONS,'P',1)
024 IF P.OPT THEN PRINTER OFF
025 REM - Other usable opts are: A,B,C; E; H; J,K,L,M; O; Q,R;
    U,V,W,X,Y,Z.
026 V.OPT = INDEX(OPTIONS,'V',1)
027 IF V.OPT THEN
028 PRINT "TCL shell Ver. ":VER:" Rev. ":REV:" ":REV.DATE:" ":REV.TIME:"
029 STOP
030 END
031 *
032 * Other initialization...
033 *
034 IF CAT.FLG THEN TCL.FIRST.IDX = 3 ELSE TCL.FIRST.IDX = 1
035 TCL.BUF.CTR = DCOUNT(TCL.BUF,AM)
036 *
037 * GET AND OPEN THE FILENAME
038 *
039 IF TCL.BUF    .FIRST.IDX = '' ! TCL.BUF.CTR  TCL.FIRST.IDX THEN
040 GO FN.MISSING
041 END
042 TCL.IDX = TCL.FIRST.IDX
043 FN = TCL.BUF .IDX; TCL.IDX = TCL.IDX + 1
044 DICT = ''
045 IF FN = 'DICT' THEN
046 DICT = 'DICT'
047 FN = TCL.BUF .IDX; TCL.IDX = TCL.IDX + 1
048 END
049 IF FN = '' THEN GO FN.MISSING
050 OPEN DICT,FN TO TCL.FILE ELSE
051 STOP 201,FN
052 END
053 IF TCL.IDX  TCL.BUF.CTR AND NOT(SELECT.LIST) THEN GO ID.MISSING
054 *
055 *
056 * Begin main operation loop (item-loop)...
057 *
058 EXIT.FLG = 0
```

```
059 IF SELECT.LIST THEN
060 TRUE = 1
061 LOOP
062 READNEXT ID ELSE TRUE = 0
063 WHILE TRUE AND NOT(EXIT.FLG) DO
064 GOSUB MAIN
065 REPEAT
066 END ELSE
067 FOR TCL.IDX = TCL.IDX TO TCL.BUF.CTR WHILE NOT(EXIT.FLG)
068 ID = TCL.BUF .IDX
069 GOSUB MAIN
070 NEXT TCL.IDX
071 END
072 STOP
073 *
074 * !*********!
075 * ! M A I N !
076 * !*********!
077 *
078 MAIN:
079 *
080 * Main program goes here...
081 *
082 RETURN
083 !--- END OF MAIN ---!
084 *
085 !
086 **********
087 ID.MISSING:
088 **********
089 PRINT "An item-id, item-list or select-list needs to be provided at
    TCL."
090 STOP
091 *
092 !
093 **********
094 FN.MISSING:
095 **********
096 PRINT "Like TCL-II verbs, filename must be provided."
097 STOP
098 END
```

• Garrett Hildebrand

ROS

Current OS Releases And Patches

The following table contains the most current Operating System (OS) revisions and patch levels for each supported system. Novadyne Computer Systems, Inc. has assumed the responsibility of installing all patch tapes for Dealer/VAR and branch customers.

If you do not have the current patch tape installed for your particular Operating System, please contact your Field Engineer (FE) through Central Dispatch to schedule a time for installation.

Series	Release	Patches (PP = Paper Patches)
4700	4.3RevD	PP1-2
6000	2.3RevD	RevC Tape (Includes PP1 175)
	1.1RevD	RevB Tape
9000	5.3RevD	RevD Tape (Includes PP1-157)
	1.3RevC	RevA Tape
18	6.0RevF	RevB Tape (Includes PP1-114)
	7.0RevI	Patch Tape 2 (Includes PP1-497)

Please note:

Patch Tape Rev D for M9000 Release 5.3RevD is now available.

• Mike Bingman

SYSTEM PERFORMANCE AND CPU SPEED

In this last performance article we will look at the effect that CPU speed has upon the composite speed of the system. Over the full range of Reality Systems, there are a variety of CPU speeds available ranging from 1.2 to 45 MIC. Before investing in applications modifications to ease CPU load or purchasing faster CPU hardware, it is important to understand the return that can be expected.

To do this it must be determined what proportion of the load is CPU work. If for example a transaction spends fifty percent of the time doing CPU processing and fifty percent of the time reading from disc, then application programing changes or hardware upgrades will halve the CPU work time. The transaction will not run twice the speed. The reason for this is the disc I/O which is half the work, has not been sped up at all. Really the transaction will now run in seventy-five percent of the time it used to, i.e., half the CPU time plus the unchanged disc I/O (50/2 + 50 = 75).

To show how this can be determined on your system we will study two examples. In both we will take a WHERE (EB) over the default 10 seconds (from TCL on the SYSPROG account) during a typical processing period.

Example 1

PORT	PCBFID	PS	P3	ELAPSED CPU	ELAPSED ACTS	ELAPSED RDS	TSLC	LOCK
001	000840	7F	FF	34	10	1	5	FF
002	000880	FB	FF	195	41	0	5	FF
004	000900	FB	FF	263	44	8	7	FF
005	000940	7F	FF	491	491	0	1	FF
006	000980	FB	FF	97	15	0	7	FF
007	0009C0	7F	FF	123	123	2	1	FF
008	000A00	FB	FF	406	85	0	5	FF
009	000A40	FB	FF	375	81	4	5	FF
010	000A80	FB	FF	97	27	3	5	FF
013	000B40	FB	FF	167	40	1	5	FF
014	000B80	FB	FF	1041	219	1	5	FF
023	000DC0	FF	FF	50	14	0	5	FF
024	000E00	7F	FF	69	32	0	5	FF
025	000E40	FB	FF	459	97	0	5	FF
080	001C00	7F	FF	97	28	0	5	FF
087	001DC0	7F	FF	4	2	0	5	FF
126	002780	DF	FF	1	1	1	5	FF

In this example, the total of the elapsed-CPU is 3969 ms (milliseconds) and the total number of elapsed-reads is 21. First, we need to estimate the total work done by the virtual processes. This is a simple addition of the total CPU time and the total disc read time. If we take an approximate disc I/O speed of 17 ms per read, then the total time used is:

3969 cpu ms + (21 reads * 17 ms/read) = 4326 ms ...(1)

Now supposing this was a 10 MIC M6000 system and the user considers upgrading to an 18 MIC Series 18 system. The CPU time would decrease by a factor of 10/18 and the total time would be given by:

(10/18 * 3969 cpu ms) + (21 reads * 17 ms/read) = 2562 ms ...(2)

The improvement would be the 10 MIC time from (1) taken as a percentage of the 18 MIC time from (2), i.e., ((4326 ms -2562 ms)/ 2562 ms * 100) a sixty-nine percent increase in system speed, for an eighty percent, (18- 10) / 10 * 100, increase in CPU speed.

This is probably a good return for the investment. Experience shows that you need a twenty percent increase in system speed before users of interactive programs notice an improvement. Obviously batch programs of significant length can be timed and any increase gauged.

Example 2

PORT	PCBFID	PS	P3	ELAPSED CPU	ELAPSED ACTS	ELAPSED RDS	TSLC	LOCK
001	000840	7F	FF	106	27	14	5	FF
002	000880	7F	FF	314	66	15	5	FF
004	000900	FF	FF	31	44	8	7	FF
008	000A00	FB	FF	61	41	20	5	FF
009	000A40	FB	FF	100	91	74	5	FF
010	000A80	FB	FF	36	9	3	5	FF
012	000B00	7F	FF	265	265	149	1	FF
013	000B40	FB	FF	22	6	0	5	FF
014	000B80	FB	FF	37	29	21	5	FF
023	000DC0	FF	FF	18	13	5	5	FF
024	000E00	7F	FF	69	32	6	5	FF
029	000F40	7F	FF	27	29	21	2	FF
080	001C00	7F	FF	95	28	6	5	FF
087	001DC0	7F	FF	4	2	1	5	FF

In this example the total of the elapsed-CPU is 1185 ms and the total number of elapsed-reads is 343. Using the same method as in example 1, we estimate the total work done by the processes:

1185 cpu ms + (343 reads * 17 ms/read) = 7016 ms

Now take the same case where the user considers upgrading from a 10 MIC M6000 to an 18 MIC Series 18 system. The CPU time would decrease by a factor of 10/18 and the total time would be given by:

(10/18 * 1185 cpu ms) + (343 reads * 17 ms/read) = 6489 ms

The improvement would be eight percent given by (7016 ms-6489 ms) / 6489 ms* 100. As in example (1) there is an eighty percent increase in CPU speed.

In this second case, the CPU upgrade would not yield anything like the return on the investment that example (1) did. If the user in example (2) were to upgrade (which from these figures, they do not need to) they would be best advised to look into enhancing their disc subsystem speed.

This method of calculating performance improvement for differing CPU speeds can be done on individual processes. For instance, taking port 4 in example (1) the elapsed-CPU time is 263 ms and the elapsed-reads are 8. Therefore the total time used is:

263 CPU ms + (8 reads * 17 ms per read) = 399 ms

The time taken by this task after upgrading from a 10 MIC to an 18 MIC system would be:

(10/18 * 263 cpu ms) + (8 reads * 17 ms per read) = 282 ms

The speed improvement would be forty-one percent for this task: (399 ms-282 ms) / 282 ms* 100.

All the examples we have studied use just one 10 second snapshot to obtain the performance data. Be sure when using this technique to obtain many representative samples since any one sample can be totally uncharacteristic of the normal system. Anything less than 10 samples a day over a full normal working week will not provide valid data. When studying a single job, take at least 50 samples of that job running.

There are many hardware solutions to the problems of multiuser system performance: high speed discs, disc controllers, and multiple CPU machines which provide an elegant solution to the queueing bottleneck problems of conventional systems. These are all available and within the price range of most commercial users. Still, all systems must have at their core a well designed and maintained database and application programs. Without this the system will never perform at its best and will cost its user more in terms of hardware upgrades and software maintenance. Since performance problems are not easy to identify, Novadyne Central Support does offer a billable service to help in their determination and possible courses of resolution.

Over the series of performance articles in ON-LINE, the Central Support group has covered many topics including File Sizing, Timeslice Setting, Queueing Theory, and Disc Performance. There are other areas of performance analysis such as memory sizing, specific applications areas, and database design, to mention only three, that have not been covered in this series. If you have a specific area you would like addressed, please do not hesitate to let us know either by writing or by opening a software call.

- Will Edwards

Disk Analysis Utility

This DISK utility Data/Basic program will run on Operating System levels 2.3, 5.3, 6.0, and 7.0 and will provide you with information about your disk space. It will show how much disk is being used for user workspace, how much disk is being used for spooled jobs and how much disk is not currently being used. It is stored in the SYSPROG Account for use by the System Manager.

```
001 * Disk Analysis Utility
002 *
003 REC=''
004 EQU AM TO CHAR(254)
005 PRINT
006 PRINT "Now Analyzing your
    disk space"
007 PRINT
008 *
009 * Check WORKSPACE
010 *
011 PERFORM "WORKSPACE" CAPTURING
     REC
012 S1=0
013 FINI=DCOUNT(REC,AM)
014 FOR X=3 TO FINI
015 ANS=REC
016 ANS=ANS[25,3]
017 S1=S1+ANS
018 NEXT X
019 S1=S1*3
020 *
021 * For the 7.0 release you
    must comment out the line
    "S1=S1*3"
022 * because it lists all the
    workspace. Earlier releases
    showed
023 * only one third of the ac-
    tual workspace.
024 *
025 PRINT "You currently have
    ":S1:" frames used for
    WORKSPACE"
026 PRINT
027 *
028 * Check SPOOLER
029 *
030 REC=SPOOLER(2)
031 FINI=DCOUNT(REC,AM)
032 S1=0
033 FOR X=1 TO FINI
034 S1=S1+REC,9
035 NEXT X
036 PRINT "You currently have
    ":S1:" frames in SPOOLER
    jobs"
037 PRINT
038 *
039 * Check OVERFLOW Table
040 *
041 SYS.INFO=SYSTEM(22)
042 MFID=SYS.INFO
043 PERFORM "POVF" CAPTURING REC
044 S1=INDEX(REC,"LINKED",1)
045 S1=S1+6
046 L=REC[S1,17]
047 L1=TRIM(L,CHAR(32),'A')
048 S2=INDEX(REC,"=",1)
049 S2=S2+1
050 C=REC[S2,8]
051 C1=TRIM(C,CHAR(32),'A')
052 TC=L1+C1
053 ANS=(TC/MFID)*100
054 PRINT "You currently have
    ":ANS'R0#2':" percent of your
    disk space available"
055 PRINT
056 END
```

- Frank DiCarlo

PORT DESPOOLING

This article offers additional information about the ability to port despool using the **REALITY** Operating System. The 2.3 and 5.3 Enhancement Manuals deal briefly with the topic; however what is required is a more detailed discussion.

Port Despooling .

Port Despooling is the process of using a terminal and a slave printer attached to that terminal in order to print jobs that are sent to the system Spooler. Prior to the x.3 releases, this was not possible if the printer was not on a separate port. While PORT-DESPOOL is the current correct command there is an older command, PORTOUT, which can be used as well. PORT-DESPOOL is a verb while PORTOUT is a cataloged DATA/BASIC program.

When can it be used?

One example is a remote site where the connection to the system is done over a single phone line with modems. This allows only one port to be utilized for one device (usually a terminal). Later there is a need for printing at that site. If the jobs to be printed are of sufficient volume, then the user should replace the asynchronous modems with synchronous modems, and to add multiplexors to the line to allow multiple devices to be run independently on the one phone line. If the jobs are not of sufficient volume to warrant that expenditure, then the user must connect a slave printer to that single terminal and use Port Despooling.

While the monetary expenditure is not as great, neither is the flexibility. Using Port Despooling may require two people to work together. Two possible scenarios are outlined below. The first will look at the instance when the print jobs are to be prepared at the main site but printed by the remote site. The second scenario will look at the instance when the remote site both prepares and prints the print jobs.

Scenario # 1

The spooler form queue has been set up assigning the printer to a device type of "port" and a device number of the remote terminal port number. Joan (at the main site) then sends some jobs to that form queue that John will want printed at the remote site. She calls John and tells him that the jobs are out there and waiting for him.

John finishes what he is doing and gets to TCL. He ensures that the flow control is set properly on his port and on the slave printer port, then types in a "< Ctrl > R" (holds down the "Ctrl" key and presses a capital "R" at the same time) which enables the slave printer. Note that the terminal has to be aware that a slave printer is attached as well. On a PRISM 7 terminal this means you must set the slave printer parameter on. John presses the return key to clear the input buffer, then types at the TCL prompt "PORT- DESPOOL (X)" and presses the return key again. The printer prints the characters that John has typed in. The printer then begins printing the jobs that Joan put into the form queue.

After all the jobs have been printed, because we used the "X" option , the port will exit Despooling and return to TCL. If we had not used the "X" option it would remain in Port Despooling until Joan went into the "SP-STATUS" menu, selected number 9 (Stop Port Despool), and entered the port number of John's terminal. It may be desirable to leave the terminal in Port Despool if other jobs are going to be sent very soon.

The last thing John should do is disable the slave printer by typing "< Ctrl > T". If he does not do this, anything entered at or displayed on the terminal will also print on the slave printer.

Scenario # 2

The Spooler form queue has been set up assigning it to a device type of "port" and a device number of the remote terminal port number. John sends some jobs to that form queue that he will want printed at the remote site. John finishes what he is doing and gets to TCL. He ensures that the flow control is set properly on his port and on the slave printer port. Then he types "< Ctrl > R" thus enabling the slave printer. Remember that the terminal must be enabled for a slave printer. John presses the return key to clear the input buffer, types at the TCL prompt "PORT-DESPOOL (X)" and presses the return key again. The printer prints the characters that John has typed. Then the printer starts printing the jobs that he put into the form queue.

The port will exit Despooling and return to TCL. John disables the slave printer by typing "< Ctrl > T".

These two scenarios describe the most common uses of Port Despooling and should clarify the basics for you.

***** NOTE:**

Different terminal firmware versions operate differently. On a PRISM 7 terminal with firmware version 2.5, you must hit the "Ctrl" key and the "F15" key then hit the "F16" key instead of the "Ctrl" "R" or the "Ctrl" "T".

- Frank Di Carlo

PGM

DATA/BASIC PROGRAMS

The 2.3, 5.3 and 6.0 Operating Systems have given us many new enhancements. However, there are always needs that arise from day to day, and as a result we try to fill those needs by offering utilities whenever possible. The following two utilities were developed as a result of a customer's request, so please contact us if you have further requests.

Both PORTJOBS and ACCTJOBS are Data/Basic programs. PORTJOBS reveals all the jobs that were created by your own port. ACCTJOBS reveals all the jobs that were created by your current account. It also gives you the option to change from your current account to any other account name. Due to the use of some enhanced commands, **this will only run on 2.3, 5.3, and 6.0 Operating Systems.** With the 7.0 Operating System the SPOOLER has been modified to allow these capabilities.

```
PORTJOBS
  PORT=SYSTEM(18)
100 SPJOBS=SPOOLER(2)
  CNTR=DCOUNT(SPJOBS,CHAR(254))
  FLAG=0
  GOSUB 300
  FOR A=1 TO CNTR
  IF SPJOBSA,4=PORT THEN
  PRINT SPJOBSA,2"R#3":" ":
   SPJOBSA,1"L#16":" ":
  PRINT SPJOBSA,3"L#15":" ":
   SPJOBSA,5'D0/'"R#5":" ":
  PRINT SPJOBSA,6'MT'"R#5":" ":
   SPJOBSA,7"L#7":" ":
  PRINT SPJOBSA,9"R#5":" ":
   SPJOBSA,8"R#2":" ":
   SPJOBSA,10"R#2"
  LNCT=LNCT+1
  IF LNCT=20 THEN GOSUB 200
  END NEXT A
  FLAG=7
  GOSUB 200
  GOTO 100
200 PRINT
  PRINT "Enter job#,<RETURN> to
   continue or 99 to exit ":
  INPUT JOB
  IF JOB=99 THEN STOP
  IF JOB="" THEN
  IF FLAG=7 THEN RETURN
  GOSUB 300
  RETURN
  END
  IF NUM(JOB) THEN
  STMT="SP-EDIT"
  STMT=STMT:JOB
  PERFORM STMT
  RETURN TO 100
  END
  GOTO 200
```

```
300 PRINT @(-1)
  LNCT=4
  PRINT "SPOOLED JOBS FOR PORT ":
   PORT"L#4":SPACE(11):TIMEDATE()
  PRINT
  PRINT "JOB  QUEUE NAME   ACCOUNT
   DATE TIME STATUS SIZE OP CP"
  PRINT
  RETURN
  END
ACCTJOBS
  ACCT=SYSTEM(19)
100 SPJOBS=SPOOLER(2)
  CNTR=DCOUNT(SPJOBS,CHAR(254))
  FLAG=0
  GOSUB 300
  FOR A=1 TO CNTR
  IF SPJOBSA,3=ACCT THEN
  PRINT SPJOBSA,2"R#3":" ":
   SPJOBSA,1"L#16":" ":
  PRINT SPJOBSA,4"L#5":" ":
   SPJOBSA,5'D0/'"R#5":" ":
  PRINT SPJOBSA,6'MT'"R#5":" ":
   SPJOBSA,7"L#7":" ":
  PRINT SPJOBSA,9"R#5":" ":
   SPJOBSA,8"R#2":" ":
   SPJOBSA,10"R#2"
  LNCT=LNCT+1
  IF LNCT=20 THEN GOSUB 200
  END
  NEXT A
  FLAG=7
  GOSUB 200
  GOTO 100
200 PRINT
  PRINT "Enter job#, New Account
   Name,<RETURN> to continue or
   99 to exit ":
  INPUT JOB
  IF JOB=99 THEN STOP
  IF JOB="" THEN
  IF FLAG=7 THEN RETURN
  GOSUB 300
  RETURN
  END
  IF NUM(JOB) THEN
  STMT="SP-EDIT "
  STMT=STMT:JOB
  PERFORM STMT
  RETURN TO 100
  END ELSE
  ACCT=JOB
  GOTO 100
  END
  GOTO 200
300 PRINT @(-1)
  LNCT=4
  PRINT "SPOOLED JOBS FOR
   ACCOUNT ":ACCT"L#11":SPACE(11)
   :TIMEDATE()
  PRINT
  PRINT "JOB QUEUE NAME PORT DATE
   TIME STATUS SIZE OP CP"
  PRINT
  RETURN
  END
```

- Frank Dicarlo

APPS

Reality Integrated Office -- New Printer Definitions

Reality Integrated Office uses WordMate when creating, modifying, or printing documents. With the release of the WordMate 2.1C Overload Rev. B patch tape, the HP LaserJet II printer is now supported.

In order for the HP LaserJet II to function with Reality Integrated Office, the following steps must be taken. Logon to the OA account, enter a USERID with Administrator privileges, exit to TCL and enter the following:

```
:ED DEVICE-INTERFACE-FILE HPLZR
001 HP Laser Jet Printer
002 Q,M
```

While you're at it, you can also define the Genicom Laser printer.

```
:ED DEVICE-INTERFACE-FILE LASER
001 Genicom Laser Printer
002 Q,J
```

The System Administrator will now be able to list all five types of printers (LPTR, NEC-A, NEC-B, LASER and HPLZR) when a plus (+) sign is entered at the 'Device Interface' prompt.

Please note that the above printers need to be defined in WordMate, as well, in order for Reality Integrated Office to pass the proper print options to WordMate.

- Janet Altman

RealLink

Installing 2.0

When installing RealLink 2.0 on an M6000 1.1, the M9XXX version of MODE2 must be loaded instead of the M6000 version. If this is not done then the PASS-DOS and SPASS-DOS verbs will not function and will abort with an Illegal Opcode abort at 1484.1 or 594.1.

The procedure for loading the M9XXX version of MODE2 is fairly simple. First of all, the M9XXX version of MODE2 is the $RL.MODE2.R.S item in the RL.BP file. Make sure the FRAME statement in $RL.MODE2.R.S reflects the mode where you have loaded RealLink. For example, if the frame statement in $RL.MODE2.R.S looks as follows:

```
001 FRAME 1484] FRM: 1484\000
    7FF005CC
```

then both occurrences of 1484 should be replaced with the frame number which $RL.MODE2.R.S is to be loaded into. Also, the one occurrence of 5CC (which is the hexadecimal representation of 1484) needs to be replaced with the hexadecimal representation of the frame that $RL.MODE2.R.S is to be loaded into. Just as an aside, the above frame statement is what the frame statement for $RL.MODE2.R.S will usually look like if there have been no modifications to RealLink since it was loaded.

Next copy $RL.MODE2.R.S to RL.MODE2.OBJ in the RL.BP file. This is accomplished by:

```
COPY RL.BP $RL.MODE2.R.S (O)
TO: RL.MODE2.OBJ
```

Finally MLOAD RL.MODE2.OBJ in the RL.BP file:

```
MLOAD RL.BP RL.MODE2.OBJ
```

Using PASS-DOS And SPASS-DOS

When using PASS-DOS and SPASS-DOS to convert REALITY data into DOS files, one can determine whether the data is to be treated as numeric or alphanumeric by the DOS program. If the attribute being converted is to be treated as an alphanumeric by the DOS program, an 'L' should be used on line 9 of the dictionary item that defines that attribute. If the attribute being converted is to be treated as a numeric, an 'R' should be used on line 9 of the dictionary item.

- Bryan Glassick

TRACTORS VS BINS

When you set up your printers through the WordMate Utilities you have a choice between 1-BIN and TRACTOR for Forms Device. The TRACTOR is used for a continuous feed printer. The 1-BIN is used on the NEC Printer Cut Sheet Feeder. Use of the 1-BIN generates three additional linefeeds at the top of form to position paper in the 'home' position of the feed unit.

If you are installing a LASER printer, the choice for a Forms Device should be TRACTOR unless you want text printed three lines lower on the page.

- Terry Smithton

Current Application Overlays

The following matrix provides you with the release level of Application Overlays required by each supported Series and OS. It is important that you know which Overlay you should obtain prior to a planned upgrade. For example, if you are upgrading a Series 9000 from 5.1 to 5.3, which uses REALCALC, then you will need to obtain the corresponding Overlay release (REALCALC 2.1C) before upgrading.

Application Overlay	Series 4700	Series 6000	Series 9000	Series 18	**Series 14/100**
A*L*L 1.1	4.3	1.1	1.3	N/A	N/A
A*L*L 1.2 (Paper Patches 1-59)	N/A	2.3	5.3	6.0	2.3 D.4
PCmicroREALITY 2.0B	N/A	1.1	N/A	N/A	N/A
PCmicroREALITY 2.1	4.3	2.3	1.3,5.3	6.0	N/A
REALCALC 2.1C	4.3	1.1,2.3	1.3,5.3	6.0	2.3 D.4
REALGRAPH 1.0C	4.3	1.1,2.3	1.3,5.3	6.0	2.3 D.4
REALLINK 2.0	4.3	1.1,2.3	1.3,5.3	6.0	N/A
REALLINK 2.1	N/A	2.3	5.3	6.0	N/A
REALISM DEVELOPER 1.0A	N/A	2.3	5.3	6.0	2.3 D.4
REALISM SHELL 1.0A	N/A	2.3	5.3	6.0	2.3 D.4
REALITY Integrated Office 2.3	4.3	1.1,2.3	1.3,5.3	6.0	N/A
WORDLINK 1.4	N/A	1.1	N/A	N/A	N/A
WORDLINK 1.4C	N/A	2.3	1.3,5.3	6.0	N/A
WORDMATE 2.1C (Overload Patch Tape Rev A and Paper Patches 1-7) (Overload Patch Tape Rev B -- 2.3, 5.3 and 6.0 O/S only)	4.3	1.1,2.3	1.3,5.3	6.0	2.3 D.4
TRANSACTION LOGGING 1.2	N/A	2.3	5.3	6.0	N/A

• Janet Altman

14/100

14/100 and the BBS

For all users, software developers, and dealers with an interest in the Series 14/100, members of the Novadyne Computer Systems, Inc. Technical Support staff have established an additional PC DOS based electronic bulletin board support (BBS) to exchange information with customers, and to support the products for which it provides service. There is no cost for this service other than the charges from your telephone company for the call.

The bulletin board will operate 24 hours a day, seven days a week. The board will be down from time to time on a schedule, and you will be notified as much in advance as possible. The only other reason for the board to be down will be those circumstances beyond our control, e.g., power failures, hardware failures, etc. Unless it is a weekend, we will get the system back up as soon as humanly possible.

For users of the BBS who will need equipment, Novadyne has a BBS KIT available through its catalog sales. This kit includes modems, both internal and external, any cables you may need to connect your modem, and the necessary software to access the bulletin board. John Dvorak's book PC TELECOMMUNICATIONS is provided at a substantial savings over the price in your local book or computer store. The book includes the communications software "Telix" to access the bulletin board. To order any part of the BBS KIT, call the catalog sales department at 800-632-2667.

The telephone number for the BBS is 216-779-4598. Set your communications software for 2400 or 1200 bps, no parity, 1 stop bit, and 8 data bits. In order to register on the BBS, and if you are unfamiliar with the BBS, answer the prompts with the following entries:

Without pressing any keys the BBS gives an opening message
"Press any key to continue" - enter <cr>
First Name - enter your first name
Last Name - enter your last name
If your name is entered correctly type Y, or N to repeat
Enter your City, St (only two characters for state)
If you do not want to 'C'hange name, address enter 'R' to register
Enter the password you will want to use to access the system

This password will be the means by which the BBS will distinguish between one John Smith and another. You must remember your password. You will need your password to gain access to the BBS again.

Since you will be working at a PC, your terminal can display lowercase. Answer "Y" to the prompt. If you are new to BBS answer "N" to the graphics and colorized prompts. Press any key to continue. Users new to BBS answer "X" to the prompt to select protocol and "N" to TurboKeys.

Bulletin Menu press <rtn>
Main Menu respond "F" to enter the files menu
Files Menu enter "D" to download
Download what file(s)? LHARC.COM

It will be necessary for all users to download LHARC.COM. This is the file compression utility used by this BBS. New users or those unfamiliar with using a BBS should download the file NEWUSER.LZH.

When you are finished with your session on the board, you may enter "G" at the file command to disconnect and "Y" to end the session. You must enter a "Y" at this prompt to continue the disconnect process. The bulletin board will log you off and drop the connection, reinitializing your modem. This may take a few seconds, so please be patient.

The next step is for you to run LHARC, which will give you the files LHARC.EXE and LHARC.MAN. These are the executable and documentation files, respectively, for LHARC.

At your PC, you may extract the compressed file as follows: LHARC E C:\dir\newuser.lzh which will uncompress the text file.

Any comments you have about the bulletin board and any suggestions to make it a better service to you will be appreciated and are considered important. Please make your comments and give us those suggestions.

- Sam Craghead

COMMS

Current COMMS Releases

Shown below is a Product/Release matrix describing the current release of software for the various communications products.

Any software fixes which may be required will only be produced for the most current release.

If you plan to upgrade your McDonnell Douglas computer system to the next hardware system or Operating System release, contact your local dealer or VAR to make sure you have the required communications software prior to the upgrade. If in doubt, have your dealer or analyst contact the Novadyne Computer Systems Inc. Communications Support Group at (800) 678-3399.

COMMS PRODUCT RELEASE	Series 4700	Series 6000	Series 9000	Series 14	Series 18
MCC 3.1 (Rev 4)	N/A	1.1	N/A	N/A	N/A
MCC (2.3) 3.1 (Rev 5)	N/A	2.3	N/A	N/A	N/A
MCC (6.0) 3.1 (Rev 3)	N/A	N/A	N/A	N/A	6.0
FTU 1.2 (Rev I)	4.3	1.1, 2.3	1.3, 5.3	2.3	6.0
FTU 1.3 (Rev G)	N/A	N/A	N/A	N/A	7.0
M3800 (2780) 1.3 (A)	4.3	N/A	1.3, 5.3	N/A	N/A
M3800 (SNA) 5.3 (A)	4.3	2.3	1.3, 5.3	N/A	N/A
5750 (TCL COMMS) Rev 2	N/A	N/A	1.3, 5.3	N/A	N/A
2602 BISYNC	4.3	N/A	N/A	N/A	N/A

NOTES:

5750 Communications Software no longer resides on the Sysgen tapes. If you require this software, then have your dealer or VAR contact the Novadyne Computer Systems Communications Support Group.

2602 Bisync runs only on Series 4700 systems. The software is included on the Series 4700 4.3 Sysgen tape.

- Richard Yeh

COMMUNICATIONS GLOSSARY

Welcome to the first of a continuing *ON-LINE* segment intended to bring you the most commonly used terms in data communications. In each issue we will add new words, making this a complete reference glossary.

This list will be of benefit to you in communicating with Product Support. If there are terms or phrases that you would like to have discussed or explained further, please drop us a note with your request.

ACK0, ACK1
Affirmative Acknowledgement 0,1. In Bisync protocol, this is a reply indicating that the previous transmission block was accepted by the receiver and that the receiver is ready to accept the next block. Using ACK0 and ACK1 alternately provides sequential checking control for a series of replies. ACK0 is also an affirmative (ready to receive) reply to a multipoint station selection or to an initialization sequence (line bid) in point-to-point operation.

ADDRESS
1. A character or group of characters that identifies a register, a particular part of storage, or some other data source of destination.
2. To refer to a device or data by its address (its source, location, or destination).

ALGORITHM
A prescribed set of well-defined rules or processes for finding a solution to a problem.

ALPHANUMERIC
Consisting of letters and numbers.

ANALOG
A varying, non-discrete function, usually applied to electronic signals. An analog function can take any value within a given range and change value with a smooth transition. This is the opposite of a digital signal which jumps from one discrete value to another.

ASCII
Americal Standard Code for Information Interchange -- A 7-bit (plus parity) code used for data transmission, established to maintain compatibility between data services.

ASYNCHRONOUS
1.Having a variable time interval between successive bits, characters, or events. In asynchronous data transmission, each character is individually synchronized, usually by a start and stop bit.
2.Descriptive of the transmission method or the terminal equipment employed, which demands that timing information be included in the transmitted character, rather than by a separate clocking signal

SERIES 7000

M7000 - EFFICIENT BASIC PROGRAMMING

Here are a few tips on how to make your BASIC programs more efficient:

OVERLAYS

Overlaying is a technique in which, during the operation of a program, the same storage area of memory is used to successively contain different parts of the program which have been called from disk. Two overlay areas are available and are called by specific statements as shown below. The way these statements are used can affect program efficiency. Care should be taken not to use conflicting overlays in loops because this will increase the run time of the program. For example, if you use OCONV (2) in a loop, don't use STORE (2) in the same loop since Overlay Area (2) will be continually overwritten.

OVERLAY STATEMENT	OVERLAY AREA
OPEN	2
OPENPROG	1
CLOSPROG	1
ICONV	1
OCONV	2
STORE	2
RETRIEVE	2

Note: Interactive Debug uses areas 1 and 2.

TO REDUCE RUN TIME

* ALL OPEN(s) should be together at the beginning of a program.

* VARIABLES

  -- Keep contents of variables less than three characters when possible
  -- Null any variables of more than two characters that are not currently being used
  -- Re-use variable names -- use arrays sparingly

* PRINTING

  -- Use variables to store print data
  -- Put substring information into predefined variable
  -- Avoid using CAT
  -- Make PRINT lines as long as possible -- using CRLF ()

* PRINTER USE

  -- PRINTER ON is faster than OPEN
  -- DIRECT ACCESS does not use the file processor; spooling does

TO REDUCE COMPILE TIME

-- Vary the length of the variable names

• Ann Connelly

CUSTOMER ED.

Profile on Instructor Joan McWilliams

In May, Novadyne Computer Systems, Inc. (then McDonnell Douglas Field Service Company) assumed the responsibility for customer education and is now part of our highly competent Technical Training department.

The following is a profile on one of the Senior Instructors, Joan McWilliams:

Joan has been an instructor and developer of customer education courses since 1984. She went from customer education to technical education in 1986 and taught classes to the Field Engineers (FE). This provided an excellent opportunity to have access to the engineers who wrote the programs.

In 1988, Joan was back with the customers bringing with her this indepth technical knowledge. "I strongly believe that the more a customer knows about the REALITY systems, the more productive their reports and the more efficient their record keeping will be," McWilliams said. Now Joan instructs Customers, Inhouse Users, and the Field Engineers.

Customer education is very important because it is customer satisfaction that makes a company successful. Proper and efficient use of the system can save more than the cost of educational courses.

Courses are being offered in Santa Ana, Dallas, and various locations along the East Coast. Give Joan a call at (714) 566-5089 and discuss your education needs.

• Editor

CUSTOMER EDUCATION

As the ad says in several trade publications: "On June 30, 1990, we left McDonnell Douglas. NOVADYNE has landed." Among the services that NOVADYNE has landed with is one of the most comprehensive customer training programs on the REALITY Operating System. While the company name has changed, the same high quality educational service provided to our customers has not. We are committed to providing the best value for the training dollar. All of our courses are at least 50% "hands-on". Which means students learn by doing and not just by listening to lectures. Students, in our training environment, get the opportunity to make mistakes and to learn from them without fear of corrupting data or crashing a system. Our expert instructors welcome actual problems and in almost all cases can provide solutions as well. The following comments are from students who were in senior instructor Joan McWilliams' recent Introduction to REALITY Operating System class, the first ever NOVADYNE customer education class:

"I started this course not knowing A to Z and Joan took me through it."

"Even beats IBM's customer training center, which I thought was impossible to do."

NOVADYNE still continues its agreement with Discovery Consultant Services as an authorized provider of training on the REALITY Operating System. Please contact our registrar at (714) 566-5100 for more information and/or to enroll in one of the classes indicated in the schedule below.

- Jim Lau

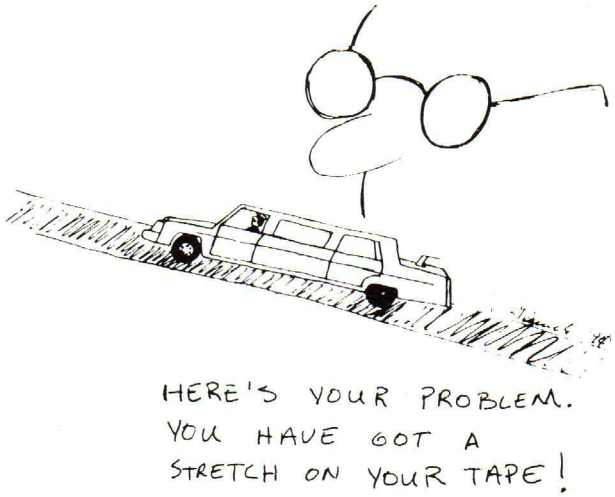
CUSTOMER EDUCATION SCHEDULE

		OCT.					NOV.				DEC.					JAN.				FEB			
	COURSES OFFERED	1	8	15	22	29	5	12	19	26	3	10	17	24	31	7	14	21	28	4	11	18	25
NOVADYNE	INTRO TO REALITY O/S 5 Days $1000/Person			SA													SA						
	REALITY O/S 7.0 4 Days $800/Person							SA															
	INTRO TO DATA/BASIC 5 Days $1000/Person											SA											
	ADVANCED DATA/BASIC 5 Days $1000/Person				SA																		
	PROC PROGRAMMING 3 Days $600/Person										SA 5-7											SA 18-20	
	SYSTEM TROUBLESHOOTING 5 Days $1000/Person						SA																
	REALISM SHELL 4 Days $800/Person																SA						
	REALISM DEVELOPER 4 Days $800/Person				SA																SA		
	LX2100 MODULE I 5 Days $1000/Person																		SA				
	LX2100 MODULE II 5 Days $1000/Person																			SA			
DISCOVERY	INTRO TO PICK/REALITY 4 1/2 Days $800/Person			TA				AT			DC												
	ADVANCED PICK/REALITY 4 Days $800/Person															DC					AT		
	ACCELERATED PICK/REALITY 4 Days $800/Person																						DC
	SYSTEM INTERNALS 4 Days $900/Person											DC					TA						
	APPLICATION PROGRAMMING 4 Days $800/Person	DC																					
	ADVANCED APP. PROGRAMMING 4 Days $800/Person						DC																
	ACCEL. APP. PROGRAMMING 5 Days $900/Person																						
	ASSEMBLER PROGRAMMING 4 Days $950/Person		DC																				

LOCATION CODES: AT = ATLANTA, GA; DC = WASHINGTON, DC; SA = SANTA ANA, CA; TA = TAMPA, FL.

NOTES: All classes begin on Monday unless otherwise indicated. The following courses are available upon request: ALL 1.2, PCmicro-REALITY, REALCALC, REALGRAPH, REALLINK, REALITY Integrated Office, WORDMATE, M7000 Reformatting and Quickstarts, M7000 Basic Programming and Data Communications. Please call Jim Lau at (714) 566-5086 for more information.

GooFiEs



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