Experiences in Migration
James S. L. Cohen
Mecca Leisure Ltd
76 Southwark Street
London SE1 0PP

1. Introduction

Much has been written and said over the last eighteen months about the ease (or lack of ease) while migrating from a 'classic' HP3000 to a Precision Architecture HP3000. It is the intention of this paper to look at the steps taken at Mecca Leisure to complete a successful migration from an HP3000 Series 70 to an HP3000 Series 950 - in a true user environment.

The paper will discuss the hardware and software related issues of migration, and the preparations that should be made well prior to delivery of the HP3000 Series 900.

It is intended to answer as many of the questions, you might have regarding the ins and outs of migration, without clouding the issue by getting unnecessarily technical.

Since it is the intention to look at the experiences that Mecca actually had, it is necessary to undertake a very brief look at the configuration prior to the migration. Mecca Leisure was running two, HP3000 Series 70's, one being used for Office Automation and one being used for commercial applications, such as Accounts, Marketing Systems and Payroll. The intention was to upgrade the second of the two HP3000's. Figure 1.1 is a schematic of the configuration prior to the installation of the HP3000 Series 950 and Figure 1.2 the final configuration.

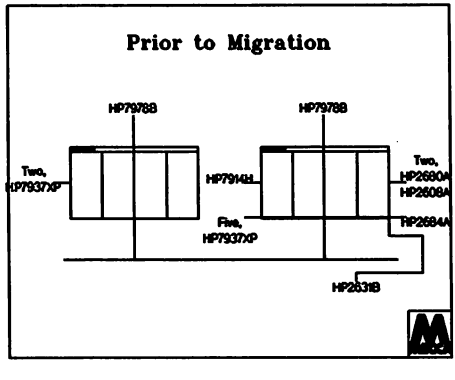


Figure 1.1

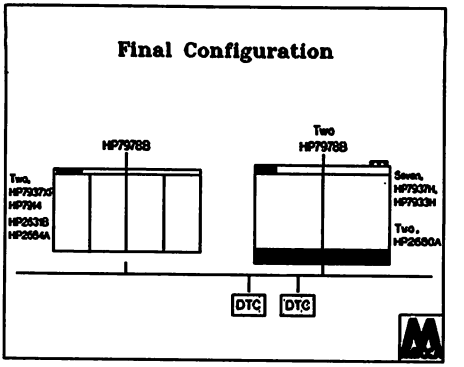


Figure 1.2

Connected to the machine that was to be migrated, were a number of devices that would not be supported on the HP3000 Series 950 (for example X.25 connected via INP's) and printers such as an HP2608A (these too would not be supported on the HP3000 Series 950).

When migrating from a 'classic' HP3000 to a Precision Architecture system, it is important that you decide what level of migration is acceptable in the first instance. Many of your application systems might not be best suited to migration. If there are many calls to subsystems that require compatibility mode segmented library calls, these programs might best be left in compatibility mode. Programs written in SPL, that do not require Privilege Mode, could be well left as they are, and your finite resources (programmers) made to concentrate on those programs that can be easily migrated to the maximum benefit of the company.

2. Prior to Order

Once you have decided that for what ever reasons you require to upgrade from a 'classic' HP3000 to a Precision Architecture HP3000, it is essential that you have a careful look at the peripherals you have hung off your current HP3000. There could well be a number of peripherals, that will not be supported at first (or subsequent) release of MPE/XL. Failure to list and check every single terminal type (sometimes with ROM release), every printer, every tape drive and every disc drive, could well result in you having to order peripherals at the last moment, which in turn could well escalate the costs significantly.

For example :-

- Have you invested in HP7933/37 XP disc drives ?

  These are not supported, but if you ask your Engineering Manager nicely, he will downgrade them to HP7933/37 H drives for you. In due course, when the XP drives are supported, they will be upgraded again for you.

- Have you any HP2624A's left ?

  These need upgrading. However, beware of the HP700 series terminals; these are not supported (but if you configure the terminal identifier to 2392A, they seem to work fine).

Why is it that so few current devices are supported on the HP3000 Series 900's ? Is it because they are so fundamentally different ? It is simply because Hewlett Packard, didn't have time to test every existing/emerging peripheral device, so although you should step with care, it is not impossible to use nominally unsupported peripherals. Similarly it would have been a waste of effort to write the necessary drivers for obsolete devices, rather than concentrate of optimizing MPE/XL for current peripherals.

If you have any doubts, as to peripheral support the best single point of reference is a document published by Interex following the Detroit conference in which all peripheral and their levels of support across the entire HP3000 range is listed.

3. After Order has been Placed

Now that you have finalised your order and convinced your management into the purchase of a Series 900, the fun really can start. Assuming that Hewlett Packard have given you a delivery date, you have little time to relax.

- You must analyse all the code you have currently running on your system, and if you use code developed and maintained by third parties you must get them to analyse their code.

- You must decide which applications (or part thereof) you are going to migrate fully or partially to Native Mode and which applications are going to remain in Compatibility Mode. Remembering of course that the only Hewlett Packard's supplied Native Mode compilers are COBOL (74 and 85 ANSI standard), Fortran '77 and Pascal. If you have code in SPL it either needs rewriting or the use of a third party product.

- You must develop a full migration plan, covering the installation, testing and final switch over to the new system.

What criteria should you use in determining whether or not to migrate to Native Mode ?

Below is a list of questions, that I believe has to be answered :-

- Is the program written in a supported Native Mode Language ?

- Does the program call any routines, that themselves cannot be migrated into Native Mode ?

- Is the program regularly run ?

- Is the program to be run on both Classic and Precision Architecture systems, perhaps at different sites ?

- What is your Disaster Plan ? Do you intend to utilize a Classic HP3000, as part of your Disaster Plan ?

- Are you making use of third party products, (that themselves remain in Compatibility Mode) ?

The answer to all these questions effects your decision in how far to go in migration, how many of the new features you are going to make use of in the short term.

In effect the question could be :

"How much RISC are you going to take ?"

because not only have you to decide as to how far you are to go with Native Mode, but also how many of the new features you are going to permit your programmers to use. These features are not just limited to new intrinsic calls (SORTINIT/HPSORTINIT) but also do you use SETVAR instead of SETJCW.

So now lets start looking at specific things for you to do.

4. Training

It may appear almost irrelevant, but get your training booked now, ensure that all relevant staff attend the two MPE/XL courses (Systems Manager and Programmers). Beware however, these courses are not suitable for staff who have not had considerable exposure to HP3000's, they are very much conversion courses. At time of writing no MPE/XL for beginners courses are available, although they must be under consideration by Hewlett Packard.

The two courses are a three day, MPE/XL Systems Manager Course and seven day MPE/XL Programmers Course. While the Systems Manager course is common across most HP3000 installations, the Programmers course covers a multitude of systems based applications that you may not need to know or migrate. For example, how to migrate Fortran'77 where real numbers are used, how to migrate SQL/V to SQL/XL. It is quite likely that many of the constituent parts of the course are not relevant to your installation, if this is the case consider getting Hewlett Packard to run your own subset of the Programmers course. In the case of Mecca the seven day course was reduced to three days, without any problems.

The reduction in length of the programmers' course to three days would only be cost efficient if you are running your own in house training.

5. Analysis of your Application Software

Now that you are aware of the new features and internal architecture of the Precision Architecture HP3000's, it is time to take a long clear look at the application software running on your HP3000.

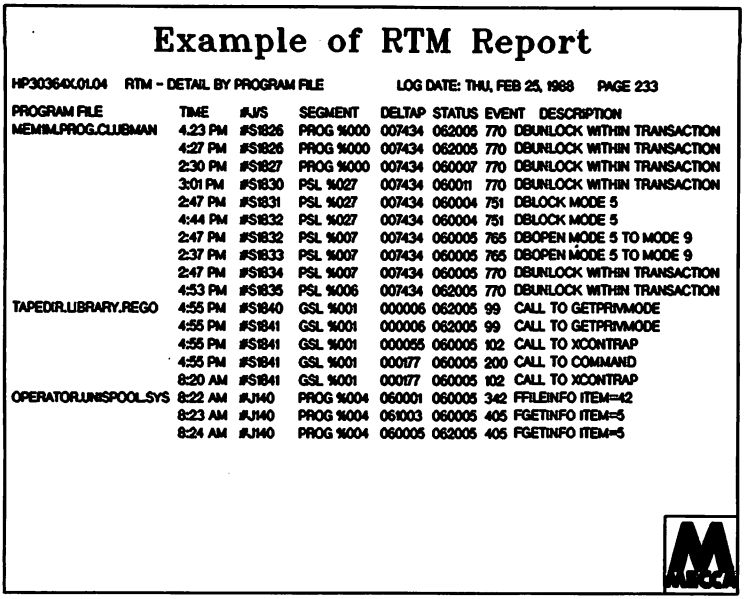
Hewlett Packard have produced a number of analysis tools to help you in the process (Product Number HP32428A) and you should arrange to have them installed as early as possible in your migration process on your classic HP3000.

There are a number of elements to the Migration Toolset, that will help you identify most, but not all, of the areas where some effort in migration is required. The Migration Toolset will find most of the code incompatibilities, such as intrinsics that are no longer available on the Precision Architecture HP3000's. The Run Time Monitor makes heavy use of the system log files. and it is essential that you have enough disc space to handle these.

5.1 Run Time Monitor

The RTM must be run for at least one full period (ie at least one calendar/accounting month), so that it has a chance to monitor all the events you expect to migrate, since it monitors executing applications recording events into the MPE log file. When starting RTM it is possible to determine which of eight events to monitor, however there is practically no system overhead in using RTM and I would recommend that all events be logged. Keep a close eye on the disc space being used by MPE log files, if you were using one 2046 sector log file a day, you could now be using four. Your system could soon clog up with MPE log files, if this is the case - then update your MPT database and then store the files to tape using LOGSNAP (from the TELESUP account). There is no noticeable overhead in running this product, although Hewlett Packard do warn you that you could overrun a stack (this was never experienced at Mecca, and can be avoided by running programs with NOCB at runtime).

A report program is provided to report directly on the MPE log files, but a more meaningful report can be generated by using the log files in conjunction with MPT (See 5.3). A quick look at a summary report from RTM is worth while and why it reports on certain events.



Example of RTM Report

HP30364X.01.04 RTM - DETAIL BY PROGRAM FILE LOG DATE: THU, FEB 25, 1988 PAGE 233

PROGRAM FILE	TIME	#JS	SEGMENT	DELTAP	STATUS	EVENT	DESCRIPTION
MEMIM.PROG.CLUBMAN	4:23 PM	#S1826	PROG %000	007434	062005	770	DBUNLOCK WITHIN TRANSACTION
	4:27 PM	#S1826	PROG %000	007434	062005	770	DBUNLOCK WITHIN TRANSACTION
	2:30 PM	#S1827	PROG %000	007434	060007	770	DBUNLOCK WITHIN TRANSACTION
	3:01 PM	#S1830	PSL %027	007434	060011	770	DBUNLOCK WITHIN TRANSACTION
	2:47 PM	#S1831	PSL %027	007434	060004	751	DBLOCK MODE 5
	4:44 PM	#S1832	PSL %027	007434	060004	751	DBLOCK MODE 5
	2:47 PM	#S1832	PSL %007	007434	060005	765	DBOPEN MODE 5 TO MODE 9
	2:37 PM	#S1833	PSL %007	007434	060005	765	DBOPEN MODE 5 TO MODE 9
	2:47 PM	#S1834	PSL %007	007434	060005	770	DBUNLOCK WITHIN TRANSACTION
	4:53 PM	#S1835	PSL %006	007434	062005	770	DBUNLOCK WITHIN TRANSACTION
TAPEDIR.LIBRARY.REGO	4:55 PM	#S1840	GSL %001	000006	062005	99	CALL TO GETPRIVMODE
	4:55 PM	#S1841	GSL %001	000006	062005	99	CALL TO GETPRIVMODE
	4:55 PM	#S1841	GSL %001	000055	060005	102	CALL TO XCONTRAP
	4:55 PM	#S1841	GSL %001	000177	060005	200	CALL TO COMMAND
	8:20 AM	#S1841	GSL %001	000177	060005	102	CALL TO XCONTRAP
OPERATOR.UNISPOOL.SYS	8:22 AM	#J140	PROG %004	060001	060005	342	FFILEINFO ITEM=42
	8:23 AM	#J140	PROG %004	061003	060005	405	FGETINFO ITEM=5
	8:24 AM	#J140	PROG %004	060005	062005	405	FGETINFO ITEM=5

Figure 5.1

5.2 Object Code Analyser

A second application called the Object Code Analyser should be run in conjunction with RTM. The main difference between RTM and OCA, is that RTM analyses object code as it is run, while OCA cannot determine run time parameters. The OCA scans designated accounts and analyses SL and files with the file code of 'PROG' and reports on potential incompatibilities in all object code, within the designated account(s). I would highly recommend that when you are running OCA that you logon into the DS queue, otherwise you might well grind your existing applications to a halt (or run OCA in batch).

Since OCA cannot determine run time parameters, it cannot be sure if an intrinsic call is incompatible in Native Mode or not. Therefore it reports on all suspect intrinsic calls.

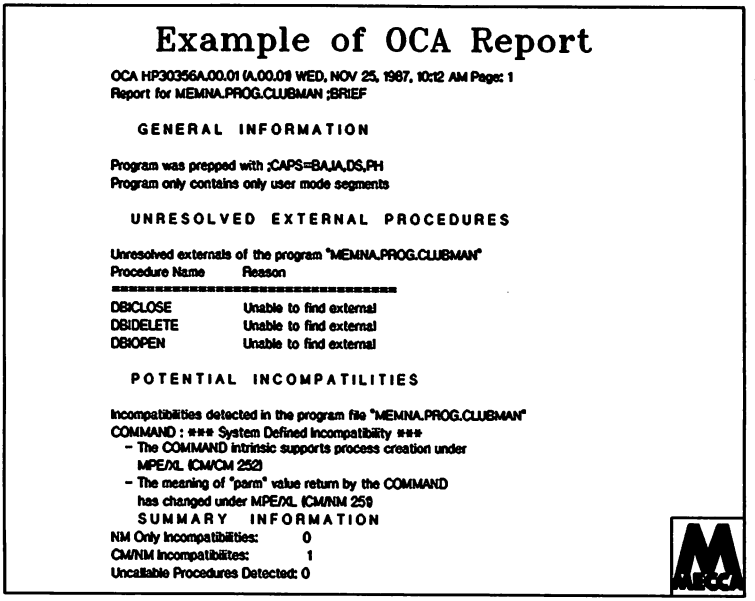


Figure 5.2

Figure 5.2 is extracted from an OCA report and as can be seen it produces a considerable amount of information, most of it is purely detail, however it is well worth the effort of checking as it reduces the amount of work required in migration, by identifying only those programs that require any effort.

5.3 Migration Planning Tool

The third application and the one that pulls all the migration toolset products together is called the Migration Planning Tool. MPT fulfils two issues, the first is predicts the disc requirements required for Native Mode (of which more later) and extracts from the MPE log files events recorded by RTM. All the information from MPT is recorded in an Image database and a number of reports can be generated from it. Each one serves a different purpose and it is worth having a brief look at each. There are seven levels of report and a General Information Report.

The General Information Report (Figure 5.3) gives you an estimate of the growth in disc space required. The growth in disc space assumes a fully Native Mode final system, if you have any Compatibility Mode code (that you have run through the Object Code Translator) your programs will occupy at least five times more disc space than they currently occupy. Some data files are also likely to grow, if you align all your data on 32 bit, rather than 16 bit word boundaries.

Example of MPT
General Information Report

```
MPT/3000 A.01.00 REPORT (GENERAL INFORMATION) ** Mecca Leisure PLC - HP3000 Series 70  02/09/88   **Page 1
8699     FILES WERE SELECTED
134      FILES WERE ADDED FOR MPE/XL  (75.398 MEGABYTES)
1328     FILES WERE DELETED           (103.459 MEGABYTES)
THE MPE/V  SYSTEM REQUIRED AT LEAST 2283.472 MEGABYTES OF DISC SPACE
THE MPE/XL SYSTEM WILL REQUIRE AT LEAST 2291.562 MEGABYTES OF DISC SPACE

FOR A GROWTH RATE OF 8.091 MEGABYTES OR 0.4%

THE FOLLOWING FILE SETS WILL BE INCLUDED IN THE REPORT :
@.@.@

THE FOLLOWING FILE SETS WILL BE EXCLUDED FROM THE REPORT:
@.@.SYS

THE MIGRATION OPTIONS FOR THIS REPORT ARE :
  0 DELETE     ;FNAME='@.CREATOR.SYS'
  1 DELETE     ;FNAME='@.@.SUPPORT'
  3 DELETE     ;FNAME='@.@.HPPL##'
  4 DELETE     ;FNAME='ERRORLOG.@.@'
  5 DELETE     ;FNAME='LOG#####.@.SYS'
  6 DELETE     ;CLASS='NLOG'
  7 USE CM     ;CLASS='SL';LANGUAGE='SPL'        etc
```

Figure 5.3

The Level 1 System Summary Report (Figure 5.4), will tell you something that you probably never knew before, namely how many programs you have are written in each language, it also gives you the file count by file code.

Given that TELESUP, PUB.SYS etc are ignored, this gives you a fairly clear picture of what object code you have on your system. In Figure 5.4 is an abstract of the actual report from Mecca Leisure's HP3000 Series 70, with the object code the report shows how many potential problems there may be when moving to Native Mode. The second page, dealing with non object code files, gives an indication of the growth in disc space required to handle the data files (not shown).

Example of part of MPT System Summary Report

MPT/3000 A.01.00 REPORT LEVEL 1 (SYSTEM SUMMARY) ** Mecca Leisure PLC - HP3000 Series 70 02/09/88 **Page 1

LANGUAGE	SL & FILES	PROGRAM V-MEM(MB)	SOURCE FILES FILES	#LINES	COMPATIBILITY MODE POSS	WARN	ERROR	NATIVE MODE POSS	WARN	ERROR
BASIC	12	1.382	0	0	7	0	0	8	13	0
COBOL	620	43.020	244	232,041	362	22	0	630	56	28
DBSCHEMA	0	.000	101	25,910	0	0	0	0	0	0
FORTRAN	88	4.499	20	1,603	95	0	0	205	9	10
PASCAL	71	4.062	13	18,258	58	1	0	117	9	0
RPG	0	.000	1	1	0	0	0	0	0	0
SPL	564	42.347	42	20,940	581	133	11	722	418	85
STREAM	0	.000	861	41,466	35	30	13	35	98	13
TDP FILE	0	.000	69	58,252	0	0	0	0	0	0
TRANSACT	9	.000	85	24,654	0	0	0	0	0	0
UDC	0	.000	150	9,630	25	34	32	25	37	32
UNCLASS	65	1.094	15	2,541	74	10	0	93	42	6

Figure 5.4

The Level 2 report is an account summary of the information given on a system wide scale in the Level 1 report, and the Level 3 report a group summary.

Level 4 is a file summary of all the files on the system, their file code, file size etc. If the file is a program it lists the number of possible inconstancies, the number of warnings and the number of errors likely to be encountered on a Compatibility and Native Mode basis. The report also includes such details as the stack size (Compatibility Mode only) and the likely increase in disc space in Native Mode. On a medium size system the Level 4 report runs to about 400 pages.

Level 5 of the MPT report is an even longer report, but reports by file each possible error encountered. For example, a job (or UDC) that compiles is likely to have reference to the PREP command, since this is replaced by the LINK command under MPE/XL, this file has as possible error reported on it.

However the report that was found to be the most useful, and only one hundred pages long for the full system, was the Level 6 report on event details. This contains a page per questionable event, and then lists all the files in which the event occurs.

Example of MPT
Event Details Report

MPT/3000 A.01.00 REPORT LEVEL 6 (EVENT DETAILS9 ** Mecca Leisure PLC - HP3000 Series 70 02/09/88 ** Page 54

* RTM EVENTS *

| EVENT 200 | COMMAND INTRINSIC - CHECK FOR USE OF OBSOLETE MPE COMMANDS

Compatibility Mode Severity Level is POSSIBLE
Native Mode Severity Level is POSSIBLE

The MPE XL command interpreter will not accept certain MPE V commands.
A program which calls the COMMAND intrinsic might attempt to execute one of the these commands.

ACTION : Examine the program's use of the COMMAND intrinsic to insure
that it executes only MPE XL commands.

ACCOUNT	GROUP	FILE(S)
CLUBMAN	PROG	MEM1M MEM5A MEMNA
DISC	PUB	DBINSTAL DBIUTIL
	TURBO	DBIUTIL
INFOSYS	DSN	DESIGNER DESIGNG
	GS	REACTOR
OSCAR	PUB	OSC2680 OSCPRN

Figure 5.5

The only slight problem with this report is that it was written with HPImage in mind. All 'DB' calls that cannot be directly changed to an 'HP' call are reported on. More usefully any program calling the COMMAND intrinsic is listed, since the formats of some MPE commands have changed and could affect programs (for example LISTF returns a slightly different result).

Using the information you have gathered you are now in a position to consider migrating. Hopefully Hewlett Packard would have assigned to you a migration trained AE, he will help you analyse the reports and advise you on what changes are required. For example, job streams that compile can be changed well in advance to any attempt to migrate.

Given that Mecca Leisure do not utilise any non standard code, what doesn't the MPT/OCA reports tell you ?

- There are problems (bugs) in linking Fortran'77 routines called from Cobol. In fact it appears easier either to recode the Fortran into Pascal or Cobol, or to leave the programs in Compatibility Mode.

- There is a change in the number of parameters when calling SORTINIT/XL. The sixteenth (called 'spare' on SORTINIT/V) no longer exists.

- Calls to the KSAM intrinsics from Cobol are suspect, but can easily be replaced by REWRITE etc.

- If you attempt a CKOPEN to a non KSAM file, on the MPE/V machines you will receive a warning tombstone, on an MPE/XL machine you will suffer an abort (with no tombstone).

- If you divide by zero in COBOL/V the result of the divide is zero ?! On COBOL/XL an attempt to complete a divide by zero results in an error, which can be either fixed by using the ON SIZE ERROR code or by setting a run time variable.

- Does not report on calls to COBOLLOCK/COBOLUNLOCK intrinsics which are obsolete on Precision Architecture HP3000's, as they are superseded by the EXCLUSIVE/UNEXCLUSIVE statements in Cobol.

- You might have heard that a file can be built of infinite size, yet occupy zero sectors and zero extents. This is true, so long as you call the HPFOPEN intrinsic programmatically. If you use the BUILD command, it calls the FOPEN intrinsic, and you remain restricted to current MPE/V file limitations.

5.4 Analysis from Migration Toolset

Using all this information, makes determining where effort is needed considerably easier, but the reports need careful filtering. Much of the information is hidden in a cloud of errors reported on many Image calls, that would have needed changing when and if you move from TurboImage to HPImage. It is a great shame that the effort was not made to remove the HPImage errors, once it had been decided to migrate TurboImage to Native Mode and to delay HPImage.

6. Suggested Steps in Migration

Now that you have the information necessary in determining what changes are required in migrating your system, you can make many of the changes prior to formal migration :-

- any SPL routines that you are going to rewrite, say into Pascal, should be rewritten and tested on an existing HP3000. This is important as it will ensure that any problems you have will be limited to purely migration issues. Any attempt to change code simultaneously with migration is liable to fail.

- when you come to migrate, migrate initially using 16 bit alignment (as used on the 'classic' HP3000), once you are sure that the application is fully migrated, then and only then consider recoding to utilise 32 bit alignment.

- never consider making program changes, as part of the migration process. Make any changes on a classic HP3000, fully test the changes, and then migrate.

6.1 Migration Steps

The steps to be followed, once you have access to a Precision Architecture HP3000, whether in a Migration Centre or your own utility, should be as follows :-

- Test Programs in Compatibility Mode

- Put any programs that are to remain in Compatibility Mode, through the Object Code Translator

- Test Programs in Native Mode, with no optimization

- Test Programs in Native Mode, with optimization

- Change data alignment

The decision as to whether or not to change the data alignment should be made based on the answers to the questions listed in Section 3. However, if there is any intention to run the same programs and data on a 'classic' HP3000 as on the Precision Architecture HP3000, then remember to keep Native Mode and CM mode programs (in separate groups).

To make the transfer of accounting and UDC information as simple as possible there is a program on the Precision Architecture HP3000's called DIRMIG that will migrate these. Using the DIRMIG command on a Precision Architecture HP3000, rebuilds your accounting structure and sets the UDC's. Restore the accounts and ensure that all your systems (with the possible exception of some Privilege Mode code) work in Compatibility Mode. Mecca's experience of this is

that all our own and third party applications work well. Before using DIRMIG use the opportunity to clean up your COMMAND.PUB.SYS file - over the years this file has probably become cluttered with UDC's from accounts that have been purged etc. Use the program UDCWHO.PUB.TELESUP to list all the UDC's that are recorded in the COMMAND file, then build the accounts/users and reset the UDC's. This will give a clean COMMAND.PUB.SYS file (at least to start with) on your new HP3000. One area that DIRMIG does not work, is in the moving of any groups you may have set up in the SYS or TELESUP accounts, therefore you will have to restore these separately from the main migration.

The next stage is to recompile into Native Mode, those programs for which you have source code. If you have third party products that are called as intrinsics, then ensure that the suppliers have provided you with Switch Stubs, that enable your Native Mode applications to call Compatibility Mode intrinsics (if they have not yet produced them you can produce the Pascal code yourself using the program SWAT).

The programs which are written in SPL (or any other language that is not available in Native Mode) and third party products that you do not have the source code for, should be run through the Object Code Translator (OCT). OCT adds to the end of the program code that would normally be produced at run time by the CM Emulator. For a program, this reduces considerably the time taken to load the program. Any program that has been run through OCT or compiled using the compatibility mode compilers, will still run on a 'classic' HP3000 - so long as you ensure that the program occupies one disc extent on the 'classic' HP3000 (the system does not automatically ensure this).

Compatibility Mode is clearly as good as Hewlett Packard suggest it is going to be, but how does it perform ? Our tests indicate that CM on an HP3000 Series 930 is very similar in performance to an HP3000 Series 70, with the HP3000 Series 950 running about 1.6 times faster. If object code is run through OCT then the CM program runs about 15% faster than before it was enhanced.

The area of real improvements are seen when code is run through a Native Mode compiler and where possible optimized to level 2 (Optimization level 2, at time of writing, does not work for Cobol). If performance is the be all and end all of life, then a number of small programming changes can be made to increase performance greatly. For example change all data definitions from 16 bit integers to 32 bit integers, and ensuring those 16 bit integers there are, are word aligned.

To give an example of what can be achieved on an HP3000/930, by making a number of small programming changes, a program was written in Fortran and Cobol to complete an iterative loop 4 million times. The performance figures are as follows :-

Test Description	Run Time in Milliseconds	
	Fortran	Cobol
Compatibility Mode	96,198	187,050
Compatibility Mode, with OCT	20,059	80,120
Native Mode, no code changes	9,034	12,537
Native Mode, Level 1 (Cobol)		11,535
Level 2 (Fortran)	3,020	
Native Mode, 32 bit aligned	6,031	11,037
with in line performs		8,034
Native Mode, 32 bit aligned level 2 optimization	1,010	

As can be seen 32 bit alignment is a slight benefit to Cobol, but of enormous benefit to Fortran (and Pascal).

6.2 Precautionary Step

At all times ensure that you maintain a copy of object code and job streams that will run on a 'classic' HP3000. Until such time that you are sure that you will never have to attempt a backwards migration, ensure that you maintain groups for true Compatibility Mode code and for job streams that do not include any of the MPE/XL extensions. While this is a management overhead, it is well worth the trouble.

Disaster Recovery must always be at the back of your mind, since no disaster service currently offers an HP3000 Series 900 as a backup. So if you have a disaster plan based on an HP3000 Series 70, remember that you must keep compatible programs, job streams and data. Only when you can be sure that you will never again need to recover onto an existing 'classic' HP3000 can you finally and fully migrate.

While looking at precautionary steps, remember that the format of store tapes has changed. If you are going to produce tapes for use on a 'classic' HP3000, then you must use the TRANSPORT option on the store command. The set back in using the 'transport' option is that you cannot make use of a number of the new features of the MPE/XL store command such as FULLSTORE (which makes partial stores, less easy), DIRECTORY (which stores the directory elements needed for the equivalent of an accounts reload) or STORESET, used when storing to multiple tapes simultaneously. Once you are sure that you need never move back to a 'classic' HP3000, then you can stop using the TRANSPORT option and make use of all the new features. This in turn will increase the time your system is available to users, by dramatically reducing store times.

6.3 Database Logging Migration

If you have database transaction logging in place, you may well have to reconsider your recovery strategy. Currently if you use a private volume for rollback recovery, this should not be used on an HP3000 Series 900, since the rollback recovery transaction log files has to be in the same disc class domain as

the database it is logging (because of the file recovery system, implemented under MPE/XL).

This gives you a number of options :

- Continue to use rollback recovery, but risk the fact that your log file could be lost - in a disc failure with your database.
- Use rollback recovery, but log to tape
- Continue using a private volume, but use roll forward recovery.

We chose to use roll forward recovery, since this maintained the integrity of keeping the transaction log file on a private volume. It had the added benefit of the use of autodefer at all times, with the performance benefits that autodefer implies.

6.4 Job Stream Migration

Linked with program migration is job stream migration. Jobs that complete stores, sysdump's etc have to be changed to reflect the changes in the store systems. Equally jobs that stream other jobs, just to switch logon groups can be changed to make use of the CHGROUP command.

Since it could well be that you need streams to run both on MPE/V and MPE/XL system, you may well not wish to make changes beyond those required by MPE/XL.

6.5 House Keeping Activities

Since FULLBACKUP and PARTBACKUP are not part of MPE/XL and there are numerous other changes to the SYSDUMP type functions :-

- You must very carefully document your revised house keeping instructions.
- You must ensure that cold boot tapes are regularly completed (using SYSGEN).
- That the accounting directory is regularly stored (using the DIRECTORY option on the MPE/XL store command).

I would recommend that any store that is not being prepared with the TRANSPORT mode option, is always prepared with the DIRECTORY option.

If you have more than one tape drive, and do not need to produce transport mode tapes at all times; the MPE/XL store command will allow concurrent backup across a number of tape drives. This would allow very fast backup's of the system and increase the time that your system is available to your users. Since transport mode tapes take much longer to produce, only cut them when it is absolutely necessary.

7. Conclusions

Migration is a complex process and should be planned, in conjunction with your migration application engineer. If it planned meticulously it should be relatively easy to achieve a successful migration, so long as you remember what I consider the three golden rules in migration :-

- any SPL routines that you are going to rewrite, say into Pascal, should be rewritten and tested on an existing HP3000.
- when you come to migrate, migrate initially using 16 bit alignment (as used on the 'classic' HP3000), then once you are sure that the application is fully migrated, and only then consider recoding to utilise 32 bit alignment.
- never consider making program changes, as part of the migration process. Make any changes on an classic HP3000, fully test the changes, and then migrate.

Expect there to be problems, so leave yourself plenty of time for the unexpected. So long as you test all your job streams, as well as the programs, there should be no insurmountable problems.

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