Worldwide Response Center

HP 3000 APPLICATION NOTE #79

Conquest Of Disc Space

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RESPONSE CENTER APPLICATION NOTES

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CONQUEST OF DISC SPACE

There is one notion that all people in charge of computer operations, no matter what the size, are familiar with the notion of disc space.

For the most part, the correct operation of a system, its availability as well as its performance all depend on how well this space is used. We shall go into a certain number of notions within in the framework of MPE XL.

As with any other operating system, MPE XL also manages disc space.

Under MPE V, two notions apply to disc management.

1. Part of the disc is reserved for virtual memory which can be seen as an extension of main memory.

2. The remainder of the disc is used for storing files.

Under MPE XL, equivalent notions are used. In this Application note we will describe them in the theoretically and the practical aspects of their use. We shall address the different types of files that may be found under MPE XL, the domain in which they are installed and how they affect occupied disc space.

Presented next is a description of several utilities related to these notions. We shall compare the various points covered concerning the notion of private volume and finally, we shall give some hints on how to solve some of the most frequently encountered problems.

SOME NOTIONS:

-Disc space, permanent space, transient space.

A disk contains programs, databases, etc. There are also DIRECTORIES, files used by TRANSACTION MANAGEMENT, tables of FILE LABELS and EXTENT descriptors.

File labels (not to be confused with USER LABELS) and EXTENT descriptors are actually grouped together at the beginning of a volume and because of this are not contiguous with data in the file. This is done mainly to simplify a certain number of maintenance operations such as RECOVER LOST DISC SPACE.

Finally, a small section of the disc contains areas reserved for the system. This makes up the disc's permanent space. The items which we have just mentioned are intended to remain for a long time on the disc. It is therefore essential to have a system to maintain these items. This maintenance is provided by a DIRECTORY, just as they are handled under MPE V.

We shall not go into details on the internal structure of MPE XL DIRECTORY here, however remember that this structure is different from the one used under MPE V.

When main memory is full, the system must be able to manage saturation and remove what is not used.

Under MPE V, virtual memory is used. This is a disc area configured only once.

Under MPE XL, there is no predefined system area. Instead, there is the notion of transient space. Transient space is defined as the disc space occupied by data that the system had to remove from main memory. Transient space is therefore a dynamic notion and not a fixed one as under MPE V. The pages removed from the system's main memory will be placed on the disc in free space and not in a predefined area.

It is obvious that the sum of permanent space, transient space and free space must equal the total disc space.

-Disc space allocation:

As far as files are concerned there is no problem. They are always allocated to permanent space whether they are permanent files, temporary files or NEW files.

The following objects are also allocated to permanent space: TRANSACTION MANAGEMENT files (approximately 400,000 sectors per VOLUME SET), DIRECTORIES, tables of FILE LABELS and EXTENT descriptors.

Transient space contains objects that the system has removed from main memory, in other words, basically data areas, STACKS and other control blocks of the FILE SYSTEM or TurboIMAGE.

It is clear that the notion of transient space replaces that of virtual memory used under MPE V which was very static. However, certain limits must nevertheless be set down so that the system will run satisfactorily. This is why each volume is provided with a maximum percentage of transient space and a maximum percentage of permanent space. Do not forget that these percentages represent maximum values, which means their sum total may be greater than 100%. For example, default configurations anticipate maximum values of 75% permanent space and 75% transient space per configured volume. It is obvious that both these maximum values cannot be reached simultaneously.

However, using dynamic space allocation provides a certain amount of flexibility to disc space management. Certain activities are transient-space-intensive (system startup or certain applications which handle large volumes of data) whereas, others require a large amount of permanent space in the form of files. There are also some special cases.

We shall cover two of them.

1. The system considers SPOOL files as permanent objects and are therefore allocated to permanent disc space just like any other file. They are installed on discs with SPOOL class whether these discs are system or private domain volumes.

2. Private volumes are used exclusively in permanent space. The system never places transient objects in them and this way does not know the maximum percentage configured for transient space.

With the basic notions defined, we shall now describe some very useful programs.

UTILITIES : VOLUTIL, DISCFREE, FSCHECK

We have touched on the maximum limit in terms of permanent and transient disc space which can be reached on a given volume.

Only the values set using VOLUTIL are used. The ones included in SYSGEN are ignored by the system.

VOLUTIL

The commands NEWVOL and ALTERVOL are used, with their key words PERM- and TRANS-, to define or change values. By default, in other words, if nothing is specified when using NEWVOL, the system allocates a maximum of 75% to permanent space and 75% to transient space.

Once again, the notion of disc size requirements is a dynamic one and in no way sets the physical allocation of space. For the exact syntax of these commands, refer to the MPE XL· VOLUME MANAGEMENT manual, (Hewlett-Packard p/n 32650-90045).

It is important to know the actual space used, so that disc space can be correctly managed. The utility which performs this is called DISCFREE which replaced FREE5 under MPE V.

DISCFREE

This program uses two parameters, A and B. DISCFREE A provides a sort of histogram, similar to the one in FREE5. DISCFREE B provides the total space, the permanent space, the transient space, the free space and the maximum remaining space which can be allocated to permanent and transient space for each volume.

:DISCFREE B

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ALL MEASUREMENTS ARE IN SECTORS.

```
-------------------------------------------------------------------
LDEV :      1 -- (MPEXL_SYSTEM_VOLUME_SET:MEMBER1)

          DEVICE SIZE :  1579904
          TRANS SPACE :   338896          PERM SPACE :  1151888
      MAX TRANS SPACE :  1184928      MAX PERM SPACE :  1200720

           FREE SPACE :    89120
 AVAIL TO TRANS SPACE :    89120  AVAIL TO PERM SPACE :    48832
```

DEVICE SIZE is the physical size of the disc. It is an HP7935 with 404 megabytes, therefore 1579904 sectors.

TRANS SPACE and PERM SPACE are the transient and permanent space occupied when the command was initiated.

FREE SPACE is of course the volume's free available space.

AVAIL TO TRANS and AVAIL TO PERM are the transient and permanent space available depending on the MAX TRANS SPACE and MAX PERM SPACE values which are the maximum values assigned under VOLUTIL (refer to VOLUTIL Section presented above).

In the example shown, AVAIL TO PERM SPACE is less than FREE SPACE, because if we allocate the 89120 sectors (free space), which are physically available, to permanent space, we get a total of 1241008 sectors (Perm space + Free space) which is greater than the maximum configured value of 1200720 (Max perm space).

The LDEV 1 system disc represents a special case. For all the other volumes we can define maximum values of 100% for both permanent and transient space.

For LDEV 1, however, we cannot define more than 76% for permanent space.

VOLUTIL accepts the value 77% but only takes 76% into account. The reason for this difference is that in order to ensure system startup and correct operation in SINGLE DISC mode (if a single disc is available at startup) or if only one disc is configured, a certain amount of transient space must be available.

NOTE

Regardless of the type of startup, this required transient space must not be confused with the permanent and contiguous space which must be available for startup from an UPDATE or UPDATE CONFIG tape.

FSCHECK

FSCHECK is another utility which may be very useful. The only usable version of FSCHECK is the one installed in the PRVXL group in the TELESUP account which is recognized by its EOF at 810. Any other version must not be used as it may be dangerous and should be purged.

The most frequently used command is SYNCACCOUNTING. This command has a single parameter, which is a VOLUME SET name, and is used to update the disk space information provided by the REPORT command to the actual situation. The reason for this is that when certain actions are taken, such as a massive purge of IPC files, the information provided by REPORT may be wrong. For the system domain, there is no need to specify a parameter since the MPE domain XL_SYSTEM_VOLUME_SET is taken by default.

SOME USEFUL REMARKS

We have already mentioned the fact that a certain amount of disc space must be available for an UPDATE or UPDATE CONFIG in order to install a PATCH or update the MPE XL. It is important to keep this requirement and its' required values in mind.

In all cases you must have 55,000 contiguous sectors in permanent space on the LDEV 1. Moreover, a total permanent space of 500,000 sectors, not necessarily contiguous, is required for all the volumes of the system domain in permanent space. By observing this simple rule, UPDATE or UPDATE CONFIG startups can be done without the risk of having the procedure stopped by an "OUT OF DISC SPACE" error.

The following message may sometimes be displayed on the system console:

"WARNING - DISC SPACE IS LOW - ONLY JOBS/SESSIONS WITH HIPRI MAY LOGON".

This message means that disc space has reached a low point and should not be decreased any more by creating new objects. The answer is to restore free space by any means available, such as by deleting certain sessions or jobs or by purging some permanent files.

You will note that the system reverts to normal operation when the console displays the following message:

"JOBS AND SESSIONS MAY LOGON NORMALLY".

As you have seen, the use and management of disc space under MPE XL are governed by a few simple rules: transient space and permanent space are two of the main facets.

We hope we have clarified a certain number of simple, however essential points so that your systems will run smoothly and users are fully satisfied.

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HP 3000 (continued)

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26	5960-2865	HP 2680A, 2688A Error Trailers
27	5960-2866	HP Trend: An Installation and Problem Solving Guide
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29	5960-2868	A Programmer's Guide to VPLUS 3000
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66	5960-1818	Using the Feedback Feature of HP SupportLine
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71	5960-2918	Asynchronous Cabling
72	5960-2919	BRW Tips and Tricks
73	5960-2998	SNA NRJE Configuration
74	5960-2999	SNA IMF Configuration
75	5060-3000	XL NRJE Configuration
76	5960-4301	XL IMF Configuration
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