

Allocating DASD Space

- Trace data files
- Image libraries
- NLS files.

Allocating Space for CP Hard Abend Dumps

CP hard abend dumps and CP snapdumps share spooling space with other spool files. Dumps can be sent to spool as long as enough spool space is available to contain the dump. The amount of spool space required for a dump is directly related to the amount of real storage used by the following:

1. The CP nucleus.

The size of the CP nucleus is fairly constant but grows with each release of z/VM. Specifying the HCPLDR PAGEB operand, usually done only on test systems, can significantly increase the size of the CP nucleus. To find the size of the CP nucleus, look in the CLOAD MAP file for the address of @LOADEND. For example, for z/VM V6.3, it is approximately X'BE9000' if the HCPLDR PAGEB operand is not specified. This value means that X'BE9' four-kilobyte (4 KB) pages (or 3049 four-kilobyte pages) are used by the CP nucleus. That is about 11.9 MB.

2. The CP Frame Table.

The CP Frame Table is directly proportional to the real storage size of the machine in which CP is executing. Its size is 1/128th the size of real storage.

Every 1 MB of data that must be dumped requires 256 four-kilobyte (4 KB) pages of spool. On a system with 512 MB of storage, $512 / 128 = 4$ MB. This means 1024 pages of spool are required to dump the CP Frame Table.

As the size of real storage increases, the size of the CP Frame Table becomes increasingly important to the size of the dump. On a system with 8 GB of storage, $8192 \text{ MB} / 128 = 64$ MB. This means 16384 pages of spool are required just to dump the CP Frame Table.

Note: In systems with multiple noncontiguous storage extents, the CP Frame Table must map the highest real storage address. The CP Frame Table will contain entries for storage that is not configured. In this environment, the CP Frame Table is not proportionate to the amount of storage as it is for environments with contiguous online storage.

3. System Execution Space data structure.

The System Execution Space Page Management Table will account for a significant portion of the dump. Its size is 1/128th the size of real storage up to 2 GB. It is constant at 4096 pages for real storage sizes above 2 GB.

4. CP control blocks and structures based on your system's workload.

During system initialization, CP tries to set aside enough spool space to contain a dump. This space changes dynamically as the system operates. As users log on, more CP control blocks are used and the pages required for dump space increases. Different types of production workloads could require significantly different CP control blocks and therefore have different requirements for dump space.

Because workloads can vary from system to system, the amount of spool space required for a dump also varies. Table 35 on page 661 provides a method to estimate how much spool space to provide for each dump. Other information to consider:

- Dumps from various z/VM systems were analyzed and used to generate these estimates. Use the low percentage if you are estimating for a system with low utilization. Use the high percentage if you are estimating for a busy production system.

It is important that you periodically check the amount of dump space allocated on your running system and make adjustments as necessary.

A privilege class B user can display the current dump setting with the QUERY DUMP command. A privilege class D user can display the current spool space status with the QUERY ALLOC SPOOL command. A privilege class D user can determine if any dump SPOOL files (spool class D) exist by issuing "CP QUERY RDR ALL CLASS D SHORTDATE".

- You should provide space for more than one dump. Space for three dumps is recommended -- space for the next dump and space for two dumps that you may not have yet processed with DUMpload or DUMPLD2. It is recommended you purge dumps from spool after loading them to disk and successfully transmitting them to IBM Support, or when you are sure they are no longer needed.

Table 35. Amount of Dump Space Based on Real Storage and Type of DASD. An aid to estimating how much spool space to allow.

Real Storage Size	Percent of Real Storage that will be dumped			
	4 KB Pages of Spool Space	3390 Cylinders	FBA 512-byte Blocks	
256 MB	35 to 45%	22938 to 29491	127 to 164	183504 to 235928
512 MB	22 to 34%	28836 to 44564	160 to 248	230688 to 356512
1 GB	12 to 25%	31457 to 65536	175 to 364	251656 to 524288
2 GB	7 to 18%	36700 to 94372	204 to 524	293600 to 754976
4 GB	5 to 13%	52429 to 136315	291 to 757	419432 to 1090520
8 GB	4 to 9%	83886 to 188744	466 to 1049	671088 to 1509952
16 GB	3 to 8%	125829 to 335544	699 to 1864	1006632 to 2684352
32 GB	2 to 6%	167772 to 503316	932 to 2796	1342176 to 4026528
64 GB	2 to 6%	335544 to 1006633	1864 to 5592	2684352 to 8053064
128 GB	2 to 5%	671089 to 1677722	3728 to 9321	5368712 to 13421776
256 GB	2 to 5%	1342177 to 3355443	7457 to 18641	10737416 to 26843544
512 GB	2 to 4%	2684355 to 5368709	14913 to 29826	21474840 to 42949672
1 TB	2 to 4%	5368709 to 10737418	29826 to 59652	42949672 to 85899344

Estimates in this table are based on a V630 system running in a busy, storage-constrained environment. For some workloads where storage is not constrained, the dump space required may exceed these percentages because the ratio of CP frames to guest frames is greater. The fix for APAR VM65382 reduces the number of CP frames included in a dump.

As stated above, it is important that you periodically check the amount of dump space allocated on your running system and make adjustments as necessary.

Information in this table is based on the following:

- Every 1 MB of data that must be dumped required 256 pages of spool space.
- There are 180 four-kilobyte (4 KB) pages per 3390 cylinder. If you are using 3380 DASD, there are 150 four-kilobyte (4 KB) pages per cylinder and you will need to adjust the estimate accordingly.

Allocating DASD Space

- One 4 KB page is 8 FBA 512-byte blocks.

To illustrate how the values in the table were calculated, suppose your system is not very busy and has 4 GB of storage.

$$4 \text{ GB} \times 1024 \text{ (MB per GB)} \times 4\% \times 256 \text{ (pages per MB)} = 41943 \text{ pages}$$

$$41943 \text{ pages} / 180 \text{ (pages per 3390 cylinder)} = 233 \text{ cylinders}$$

$$41943 \text{ pages} \times 8 \text{ (blocks per page)} = 335544 \text{ FBA 512-byte blocks}$$

For real storage amounts not listed in the table, find the line that is closest to your amount of real storage and perform the above calculations.

A class B user can change the dump setting with the SET DUMP command. The SET DUMP command also allows the class B user to specify a preferred order of multiple disk volumes to be used for allocation of the dump space.

IBM strongly recommends the following practices in respect to dump space allocation:

1. Use the DUMP option on the CP_OWNED system configuration file statement to reserve certain spool volumes to be used for dump space only. Also, fully allocate these DUMP volumes as SPOL space. These practices reduce spooling space fragmentation and will enable dump space allocation to find large clusters of available space.
2. When assigning devices for dump space, remember to consider that the speed of the device directly influences dump time.

Named Saved System

To save a copy of an operating system running in a virtual machine, space must be reserved on a CP-owned volume for the named saved system. Named saved systems require one page of spool space for each page saved, plus an additional information page or pages. CP uses the information pages to save the virtual machine's register contents, PSW, and storage keys. The number of information pages required depends on the number of virtual machine pages being saved. The following formula shows this relationship:

$$\text{information pages} = 1 + \text{virtual machine pages} / 4096$$

Round up the result of this calculation to the next whole number.

For example, to save a 32 MB virtual machine, you need 8195 pages on disk (8192 virtual machine pages plus 3 information pages).

Spool Space Example

The following table shows you how much spooling space in files per pack you need to specify for CKD DASD based on the type of DASD you have and the average spool file size on your system. Three average spool file sizes are given: small (2 KB), medium (50 KB), and large (100 KB).

Device	Small (2 KB)	Medium (50 KB)	Large (100 KB)
3390-1	100,170	15,411	8,014
3390-2	200,340	30,822	16,028*
3390-3	300,510	46,233	24,042
3390-9	901,530	138,696	72,122