z/OS Performance: SVC Dump

Introduction

Recently a series of SVC dump measurements were conducted by the zSeries performance team using the LSPR (Large Systems Performance Reference) CICS/DB2 workload. The purpose of the measurements were to establish a baseline for SVC dump performance in terms of dump collection time, and IPCS initialization time at the latest software levels.

Measurement variables were:

- Placement of the dump output data sets on an IBM Enterprise Storage Subsystem (ESS) vs non-ESS DASD (IBM 3390 mod 3)
- Use of SMS data set striping across the dump volumes
- ESCON vs FICON channels
- SMS compression usage
- Variable numbers of page data set volumes

The LSPR CICS/DB2 workload was run on a zSeries z900-112 configured with approximately 13 GB central storage running z/OS 1.3. The system was run in z/Architecture mode at approximately 90% CPU utilization to establish the dump environments. When the desired CPU utilization was reached, an SVC dump was taken with the following parameters:

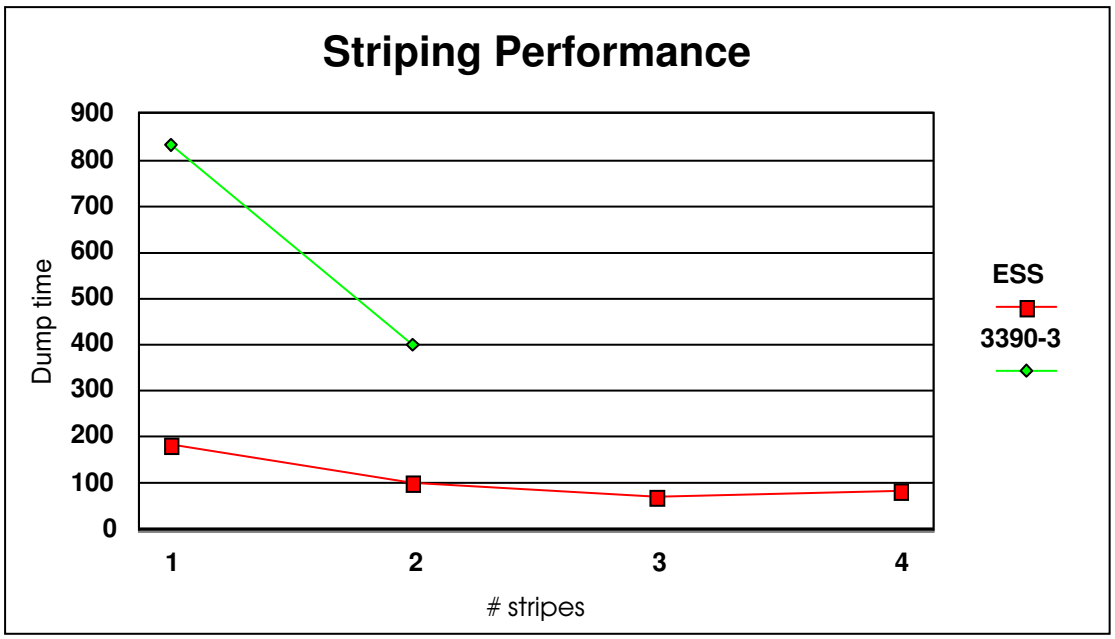
JOBNAME=(*MASTER*,XCFAS,IRLM8,CD61MSTR,CD61DBM1),SDATA=(RGN,CSA,SQA,LPA,SWA,PSA,ALLNUC,XESDATA,TRT,GRSQ,SUM),END

This resulted in a dump size of about 490k 4k blocks.

There seemed to be some inherent variability in the timings for these tests, and any particular number could easily change by +/- 10%, and at times more. Some of this variation is due to the impacts of the live workload running which was running, with the z/OS image at times well above 90% CPU utilization. The SVC dumps were taken at various points during the workload run, and it is possible system transaction rates and CPU utilization varied somewhat from dump to dump. Therefore, absolute timings should be read within the context of the rest of the test points. General trends are probably more valid than any individual measured time.

SMS Data set Striping Performance and IBM ESS vs IBM 3390-3

The most dramatic SVC dump time improvements were seen with ESS and SMS Striping, as can be seen in the following chart.



For both cases, where the dump data set resided on ESS and when it did not, utilizing striping (i.e. 2 stripes) reduced elapsed time by 50%. More than 2 stripes seemed to provide a bit more improvement, but not nearly as much as the initial use of 2 stripes. Also, the striping benefits seemed to flatten out as more stripes were utilized. Striping benefits for other environments and configurations may be different. There was also some measurement data which suggested utilizing more than 2 stripes on 3390-3 devices for dump data sets could cause an significant increase in dump time. These points are not reflected in the above chart.

Simply placing the dump data set on an ESS device (vs 3390-3), reduced elapsed dump times by 75% in the measured cases. This is primarily because the ESS was able to sustain a higher data rate (3-4 times), at better response times (75% less), than the 3390-3 devices.

It is anticipated the dump times would scale linearly as the size of the dump increased.

Multiple Page Data sets, SMS Compression, ESCON vs FICON

The benefits of using SMS Compression, ESCON vs FICON channels, and Multiple Page data sets did not provide the same dramatic improvement in these tests as the use of ESS and striping.

With over 13 GB of central storage configured, and no real storage constraint, little use was made of the page data sets in this environment. Hence, adding more page data sets did nothing to reduce elapsed dump times. In fact, there was some evidence dump times became somewhat worse as more page data sets were added, when not needed. Though on average the change was around the measurement error rate (+/-10%). However, in other environments where there may well be central storage constraint, there could be definite advantages to configuring extra page data sets.

SMS compression was enabled for the dump data set via SMS STROLLS and CATALS settings for some of the measurement points, and these changes did appear to provide some reduction in dump elapsed times. However, this reduction in dump elapsed time was, on average, within measurement error (i.e. 10%). However, use of SMS compression can reduce the amount of DASD space consumed by a dump.

Placing the dump volumes on FICON channels did provide some elapsed time benefits over comparable configurations on ESCON. Dump elapsed time reductions averaged about 20% with FICON vs ESCON channels.

IPCS Initialization Time

IPCS initialization of the dump was done on the same system as the dump collection was done. Hence, the dump initialization elapsed times generally reflect the same trends and benefits as did the collection times. For example, lower IPCS dump initialization times would be seen with the dump data sets implementing SMS striping on ESS devices. It is recommended, as far as possible, volume and striping counts be made equal.

Though varying sized dumps were not specifically measured, it is anticipated initialization time would grow fairly linearly with the size of the dump.

Conclusions

Based on this data it is strongly recommended ESS DASD be used to hold the SVC dump data sets and for SMS data set striping to be used for the SVC dump data sets, probably 2 or 3 stripes. It is also advisable to use FICON channels to further reduce dump times.

SMS compression may provide some added benefits, especially in reducing DASD dump storage used, and multiple page data sets could help in storage constrained environments.

Special Notices

Performance data contained in this document was determined in a controlled environment; therefore the results which may be obtained in other operating environments may vary significantly. No commitment as to your ability to obtain comparable results is any way intended or made by this release of information.