

The Latest Tuning Guidelines for Your Hardware Infrastructure

Margaret Crevar, Tony Brown, SAS Institute Inc.

ABSTRACT

We continually work with our hardware partners to establish best practices with regard to tuning the latest hardware components that are released each year. This paper goes over the latest tuning guidelines for your hardware infrastructure, including your host computer system, operating system, and complete I/O infrastructure (from the computer host and network adapters down through the physical storage). Our findings are published in SAS® papers on the SAS website, support.sas.com, with updates posted to the SAS Administration blog.

INTRODUCTION

There are many papers related to hardware setup, tuning, and architecture for optimal SAS System performance. They cover diverse areas of hardware, operating systems, file systems, and performance monitoring and improvement.

We have arranged the papers within common topic areas:

- Clustered/Shared File Systems
- Storage
- Virtual Server Components
- Computer Server Hardware and Operating Systems
- General Performance Tools

The papers within these topic areas are consolidated under the [List of Papers](#) link on the support.sas.com website. Papers on this site are regularly updated and maintained, with the latest copies in place at this location.

Announcements for new papers and updates to existing papers are made via the [SAS Administrators](#) blog.

CLUSTERED/SHARED FILE SYSTEMS

The use of clustered/shared file systems with SAS has expanded significantly with the onset of SAS Grid Computing, and with the requirement to support many SAS users residing on separate servers.

- Red Hat's GFS2 – there have been many changes incorporated in Red Hat's Linux operating system to support this clustered file system. The minimum release of Red Hat Enterprise Linux (RHEL) 6.4 and the mid-May errata due to various performance issues must be used to take advantage of the improvements and fixes. More details can be found in this paper: [Using SAS® 9 and Red Hat's Global File System2 \(GFS2\)](#)
- IBM's GPFS – there have been recent discoveries concerning GPFS behavior and performance that are noteworthy:
 - Performance issues with General Parallel File System (GPFS) – GPFS V3.5 has not been performing well with large-block pre-fetch routines. These issues have been corrected with GPFS V3.5.0.14. If the customer is unable to move to GPFS V3.5.0.14 or higher, then it is recommended to turn the “pre-fetch routine” off.
 - GPFS not honoring an I/O transfer size larger than a 64K block – this issue is due to a new I/O architecture that was introduced in GPFS 3.5. IBM is working on a fix that will be available in a GPFS patch following 3.5.0.16. As a work-around you can disable this new feature by setting “mmchconfig scatterBuffers=no”. Doing this should cause GPFS to start issuing full file system block-size requests to the storage.

STORAGE

Storage vendors are constantly introducing new storage architectures, technologies, and offerings to the marketplace. These technologies, architectures and forms represent both traditional spinning disk technology, as well as solid-state storage offerings (internal I/O cards, and traditional form-factor flash drives).

Storage subsystems typically have varying architectural forms and features, and subsequently initial tuning suggestions. Within the general marketplace, the initial architectural setup and tuning advice tends to have pre-disposition to optimize Input/Output Operations per Second (IOPs) oriented performance. Because the SAS I/O profile is large-block, sequential I/O, these out-of-the-box tuning optimizations can significantly curtail SAS I/O performance. The following papers cover requisite setup, architectural, and tuning optimization for the noted storage subsystems for SAS usage:

- EMC VNX Storage Arrays Tuning Guidelines
- IBM Storwize Storage Arrays Tuning Guidelines
- HP 3Par Storserv Storage Arrays Tuning Guidelines
- Fusion Host-based IO Flash Storage Tuning and Architecture
- Fusion Array-based IO Flash Storage Tuning and Architecture
- Violin Solid State Array Systems Tuning and Architecture

VIRTUAL SERVER COMPONENTS

When server and storage components are virtualized, careful attention must be paid to setup, provisioning, and tuning. Please consider the following topic areas of interest.

- If IBM Virtual IO Server (VIOS LPAR) is being used, customers must ensure that the VIOS LPAR is provisioned with adequate CPU and memory resources to handle their specific workload(s). IBM VIOS allows a customer to virtualize and share physical FC adapters among many LPARs (Virtual SCSI (vSCSI), Fibre Channel N_Port ID Virtualization (NPIV)). Please note, testing a 9 GB/sec IO intensive SAS use case, dual VIOS were configured with 2 dedicated processor cores and 4GB of memory resources each, to optimize performance
- AIX SAN Volume Controller Setup and Tuning Considerations
- VMWARE Provisioning Considerations

COMPUTER SERVER HARDWARE

The operation and provisioning of multiple logical partition servers needs to be carefully complied with in terms of vendor recommendation:

- AIX Power 7-Plus CPU Performance and Usage

TOOLS

There are some general tools included within the SAS System that can provide aid in determining what potential I/O throughput is for a given system, as well as monitor the pertinent aspects of a system for performance review and identification of issues or bottlenecks:

- IO Throughput Testing Tools – Windows and UNIX or LINUX
- Monitoring Capability from the SAS Environment Manager

We hope sharing this information with you will help you in your provisioning, architecture, and deployment considerations for your SAS Systems. The administration aspect of the SAS System has become a pre-eminent task that must be conducted properly to support modern operations of scale.

The medium we will be using to share this information with throughout the year is the SAS Administration blog that we referenced. In addition all of the above links, another one you should book mark is the [List of Papers](#) on the support.sas.com website. This is the primary place where we put new papers that fit into the new themes.

CONCLUSION

Many customers find that it's critical to share the information and guidelines provided by these resources within their organizations. Some organizations have intranets or SharePoint sites where they can post links and papers. Others create in-house SAS Users Groups to facilitate sharing of information. Still others rely on SAS for topics they can share in internal newsletters and lunch and learns. All of these are excellent ideas. Again, please note we announce new papers and updates to existing papers on the [SAS Administrators](#) blog.

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CONTACT INFORMATION

Your comments and questions are valued and encouraged. Contact the author:

Margaret Crevar
SAS Institute Inc.
100 SAS Campus Drive
Cary, NC 27513
919-531-7095
Margaret.Crevar@sas.com
<http://www.sas.com>

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