
# Manage SAS® Metadata Server Availability with IBM Technology

The Power to Know®

A SAS White Paper

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## The SAS and IBM Relationship

Since its founding in 1976, SAS has had a technological relationship with IBM that has expanded to include joint solution development and marketing. The SAS partnership with IBM is a true win-win situation for both SAS and IBM. SAS benefits from IBM's experience in integrating technologies, and IBM aligns itself with a market leader in business intelligence. As a result, mutual customers benefit from getting the most complete set of business intelligence and analytical solutions on the market.

## Introduction

**SAS Metadata Server**, one of the key technology applications in SAS®9, manages and protects information that is shared across the SAS®9 framework, and can be used with various third-party monitoring tools. The ability to surface metadata from one or more repositories and serve it to applications via SAS Open Metadata Architecture allows companies to gather and store data in multiple formats and locations without losing the ability to derive consistent business intelligence from the data. The benefits of metadata are numerous, and the ability of the SAS Metadata Server to provide a centralized and easily managed system for consistent data repositories means that customers know where their data is located, what it's made up of, and how it's been modified. The SAS Metadata Server enables companies to, quickly and efficiently, get the right answers for all their strategic business intelligence needs.

This paper offers guidelines that enable you to build a resilient environment to support and manage the SAS Metadata Server by using IBM technology.

## Fault Tolerance of the SAS Metadata Server

The SAS Metadata Server is a vital element of the SAS®9 architecture that benefits from being deployed in a resilient environment. Data protection such as that provided by Redundant Arrays of Independent Disks (RAID) file systems, and system monitoring such as that provided by the IBM Virtualization Suite support a fault-tolerant strategy.

The SAS Metadata Server uses "in-memory" architecture to process queries and updates, which means that all queried and updated metadata is held in memory by the server. To avoid paging, the server should have sufficient RAM to hold all active metadata entries.

In addition, all metadata changes are written to a permanent metadata repository on disk. Each time a write is issued for the in-memory metadata repository, file buffers are flushed to disk with a SYNC command to ensure that the "on-disk" repository is updated.

Because the SAS Metadata Server relies on back-end metadata, it is essential that the location where the back-end metadata is written is as fault-tolerant as possible. There are two ways to accomplish fault tolerance. The first way is to ensure that the file system where the back-end data is written is always available, for example, by using a RAID 0+1 file system. The second way is to use a third-party tool to ensure that the computer stays available, that is, that the processing power, memory, and disks are available.

IBM Director Multiplatform is a systems management application that is central to a fault-tolerant strategy. IBM Director Multiplatform, which is provided as part of the IBM Virtualization Engine Suite for Servers V1.1 (Figure 1), is based on industry standards and designed to be easy to use.

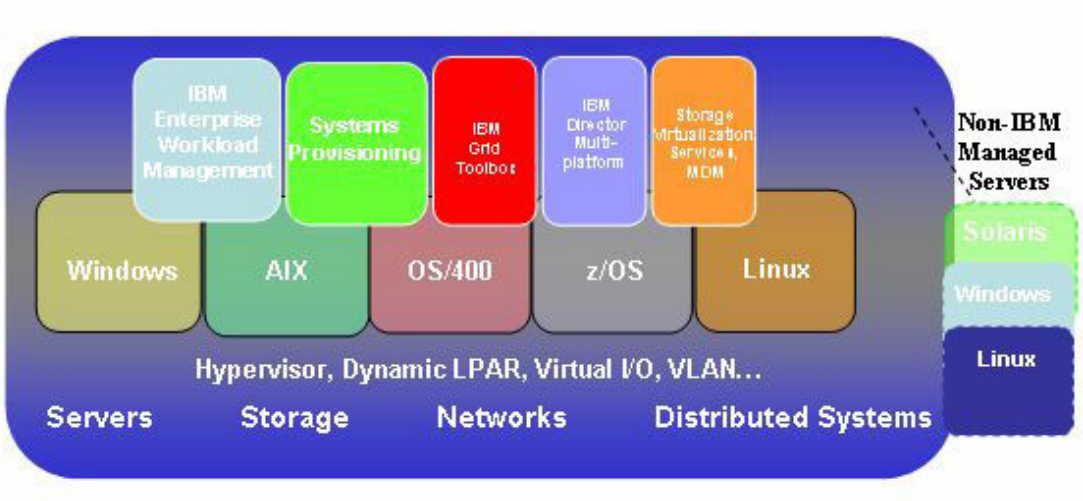


***Figure 1 - Components of the IBM Virtualization Engine Suite for Servers V1.1***

IBM Director Multiplatform is the component of the IBM Virtualization Engine that provides a simplified view of IBM eServer hardware from a centralized server. It delivers a comprehensive systems management solution for heterogeneous environments such as support for the IBM eServer BladeCenter, iSeries, pSeries, and xSeries servers. IBM Director Multiplatform's core infrastructure is designed to provide a single point of control for managing up to 5,000 systems.

IBM Director Multiplatform consists of three components: the Management Server, the Agent, and the Console.

The **Management Server** is the main component or aggregation point for managing the Agents. The **Agent** provides management data and function to the Management Server. The capabilities of the Agent will vary based on the operating environment and hardware platform being used. The **Console** provides a graphical user interface (GUI), which has a consistent look-and-feel, for all the servers and devices that are maintained by the Management Server.

By leveraging industry standards, IBM Director Multiplatform provides an extensible architecture that enables solutions to easily integrate with other systems management tools and applications, for example, the IBM Tivoli Enterprise and Tivoli NetView, HP OpenView, Microsoft SMS, CA Unicenter, BMC Patrol, and NetIQ.

The collection of IBM Director Multiplatform tools enables administrators to automate many manual tasks and to proactively and remotely manage systems such as discovery, event logs and action plans, file transfer, inventory collection, process management, resource monitors and thresholds, and more. The predictive and proactive capabilities that are associated with alerts and real-time system diagnostics help maximize server uptime and reduce the costs of service downtime. Finally, and perhaps most importantly, the ability of IBM Director Multiplatform to support cross-platform IBM and non-IBM systems (Intel-based) means customers can protect existing infrastructure investments and can manage heterogeneous environments.

For IBM eServer xSeries servers and IBM eServer BladeCenter, IBM Director Multiplatform provides additional exploitation of the hardware through inventory alerts, asset tracking, diagnostic monitoring, capacity management, and troubleshooting.

## Monitoring the SAS Metadata Server

To monitor the SAS Metadata Server, you can use a third-party monitoring tool such as IBM Director Multiplatform. If IBM Director Multiplatform determines through user-defined policies that the SAS Metadata Server is not functioning, there are a number of remedial actions available. IBM Director Multiplatform can automate the re-start of the SAS Metadata Server. Depending on which operating environment a customer is using, remedial actions can be implemented that include checkpointing, back-up procedures, and system administration to manually verify if there is a hardware issue before re-starting the SAS Metadata Server.

The IBM Director Multiplatform can perform the following tasks:

- Hardware and software inventory scans of each managed system —scans are stored in an IBM Director Multiplatform database on the IBM Director Management Server.
- Event management — generates alerts according to a customized plan.
- Process management — tracks important processes and alerts you if any monitored process starts, fails to start, or stops.
- Resource management — monitors system resources, sets individual or group thresholds for these resources, and alerts you if a resource threshold is exceeded.
- Remote management — manages any managed system, remotely. In addition, the Remote Control task in IBM Director Multiplatform enables you to take control of any managed system in your managed environment.
- Mass configuration — makes some specific configuration changes on multiple managed systems, concurrently.
- Simple Network Management Protocol (SNMP) management — discovers and manages any SNMP. IBM Director Multiplatform can send and receive SNMP traps and convert these traps into native IBM Director Multiplatform alerts, which deliver more helpful information than raw SNMP traps can usually provide.

## Backing Up the SAS Metadata Server

In order to back up the SAS Metadata Server, you have to temporarily stop execution to the server. While the SAS Metadata Server is stopped for writes, you can use the SAS Metadata Server back-up utility to copy to another location the metadata repository that has been flushed to disk or back it up with your normal back-up system. When the back up is completed, you can resume execution to the metadata server for normal operation.

Using IBM Tivoli Storage Manager is an alternative way to quickly back up the on-disk metadata repository.

IBM Tivoli Storage Manager is the core product of the IBM Tivoli Storage Management product set. It provides a solution for distributed data and storage management in an enterprise network environment. IBM Tivoli Storage Manager protects and manages data from more than 30 operating environments, including mobile, desktop, and server systems over the entire distributed world. It supports hundreds of storage devices (including disk, tape, and optical) as well as LAN, WAN, and SAN infrastructures. IBM Tivoli Storage Manager data protection includes operational back up and restoration of data and disaster recovery.

- The operational back-up process creates a copy of the data to protect against the possible operational loss or destruction of file or application data. The customer specifies how often to back up (frequency) the data and how many copies (versions) to hold. The restoration process places a back-up copy of the data into a customer-designated system or workstation if data is lost.
- Disaster recovery includes all activities that are required in order to organize, manage, and automate the recovery process from a major loss of IT infrastructure and data across an enterprise. Disaster recovery also includes processes for moving data off-site into a secured vault location, rebuilding IT infrastructure, and reloading data successfully in an acceptable time frame.

IBM Tivoli Storage Manager is implemented as a client/server software application that consists of an IBM Tivoli Storage Manager server software component, an IBM Tivoli Storage Manager back-up or archive client, the IBM Tivoli Storage Manager storage agent, and other complementary Tivoli and other vendor software products.

The IBM Tivoli Storage Manager server is available on a wide range of major operating environments. See the IBM Software Support Web site (http://www-306.ibm.com/software/sysmgmt/products/support/IBMTivoliStorageManager.html) for the most up-to-date information about supported levels and fixes.

## Conclusion

The SAS Metadata Server provides a foundation for increased sharing of metadata to support more advanced and lucrative analytical intelligence. Integrated metadata (information about data sources, how it was derived, business rules, and access authorizations) is crucial for producing accurate and consistent information. If metadata from all applications can be stored in an open, centralized, and integrated repository, then data changes need to be documented in only one

place, there are fewer systems to support, and business users can count on high-quality information. The SAS Metadata framework delivers the power to integrate, share, centrally manage, and leverage metadata across the enterprise, resulting in lower cost of ownership and a single version of enterprise truth.

These guidelines will help you keep the SAS Metadata Server available for your SAS applications.

## To Find Out More

For more information about fault tolerance and back-up solutions for SAS®9, contact your SAS or your IBM Sales Representative, or the IBM International Competency Center at SAS (ibmsas@us.ibm.com).

The following documentation offers additional information:

*SAS 9.1 Open Metadata Architecture: Best Practices Guide*, SAS Institute, Cary, NC (2004). Available http://support.sas.com/rnd/eai/openmeta/v9/bestpractices/index.html.

*Virtualization and the On Demand Business*, IBM Redpaper REDP-9115-00 (August 2004). Available http://publib-b.boulder.ibm.com/abstracts/redp9115.html.

*IBM Tivoli Storage Manager – A Technical Introduction,* IBM Redpaper REDP-0044-00 (August 2003). Available http://www.redbooks.ibm.com/redpapers/pdfs/redp0044.pdf.

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