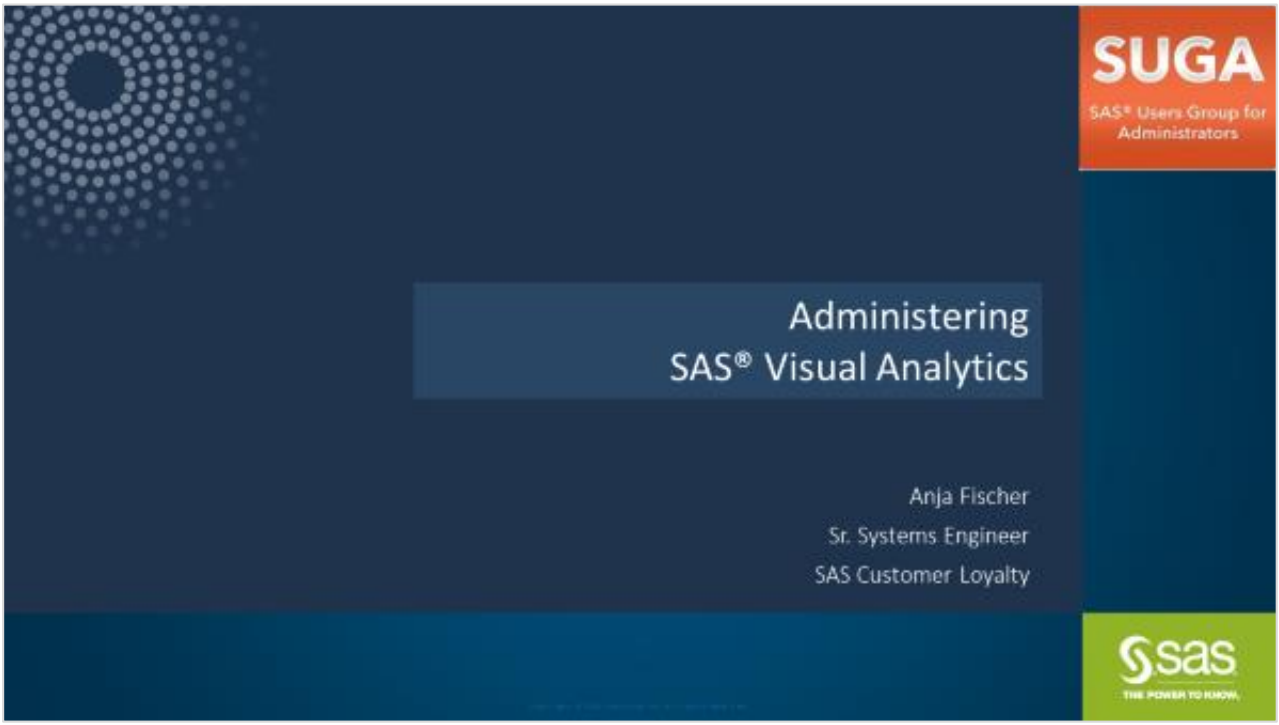

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What Does it Mean to Administer SAS Visual Analytics?

AGENDA

- SAS Visual Analytics Components
- Administration Tools
- Security in SAS Visual Analytics
- Operating the LASR Server
- Managing data load

Appendix

- SAS Backup and Restore

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Basic Administration Tasks you must know

Areas a SAS administrator must be familiar with:

- SAS software components and tools.
- User and groups management.
- Data management.
- Backup strategy.

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SAS Visual Analytics Software Components

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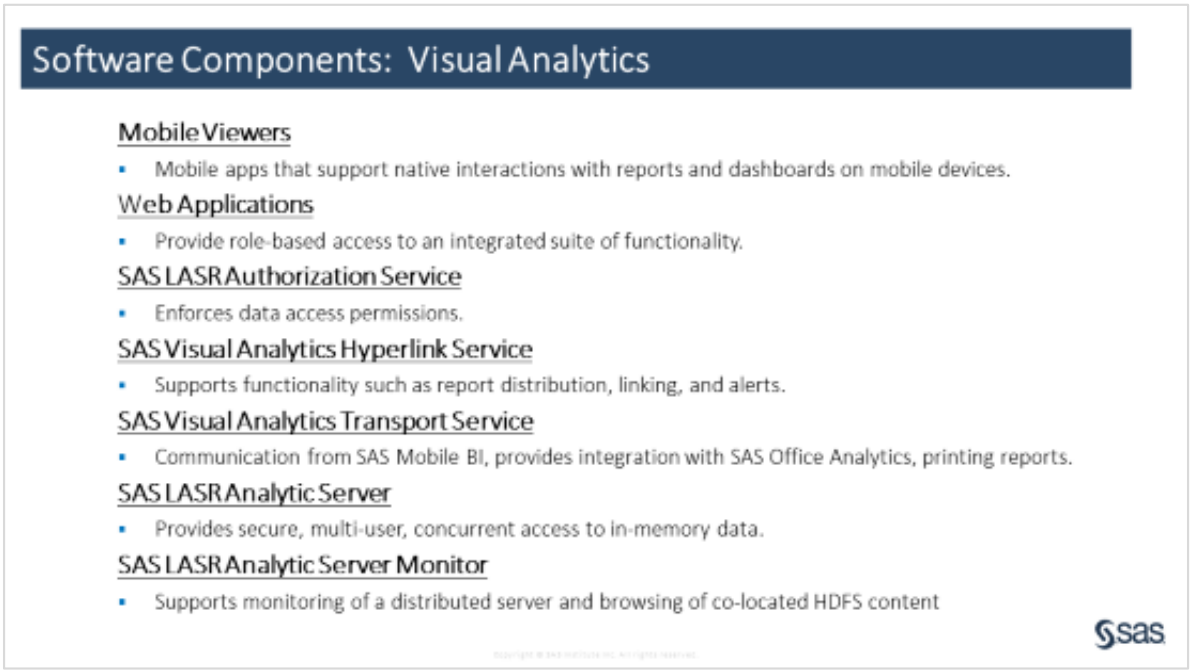

Here is an introduction to selected components:

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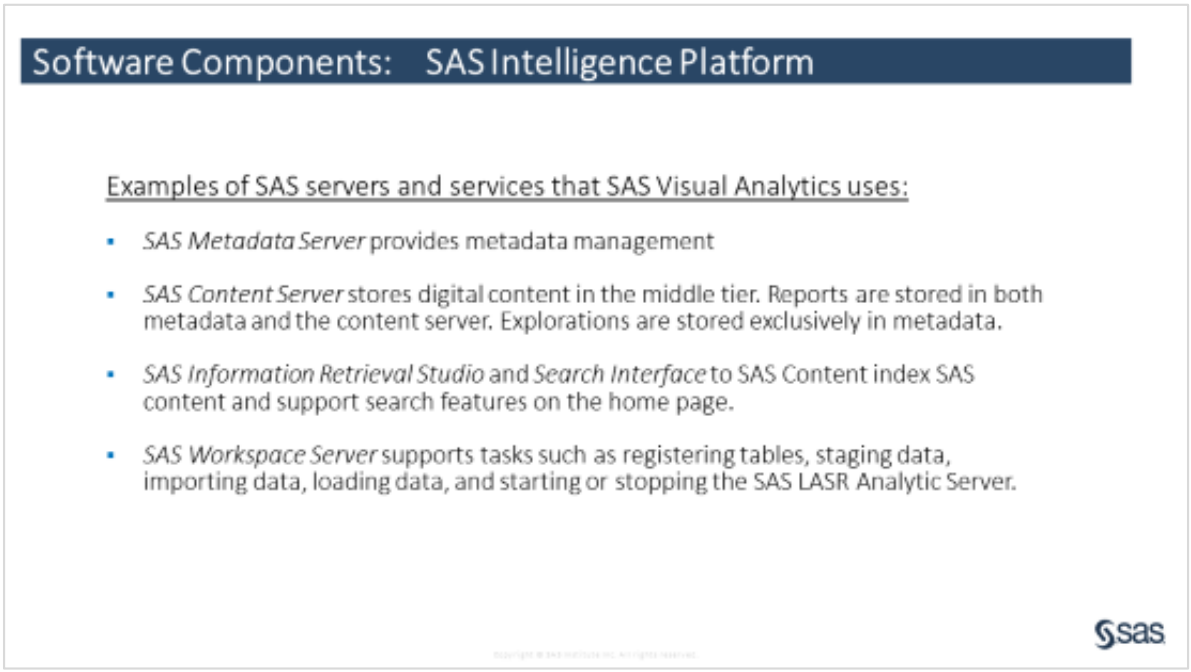

As important as SAS Visual Analytics components are, as important are your SAS Intelligence Platform components.

The reason why SAS Intelligence platform and SAS Visual Analytics components belong together and rely on each other, might be best viewed in a graph, see next page.

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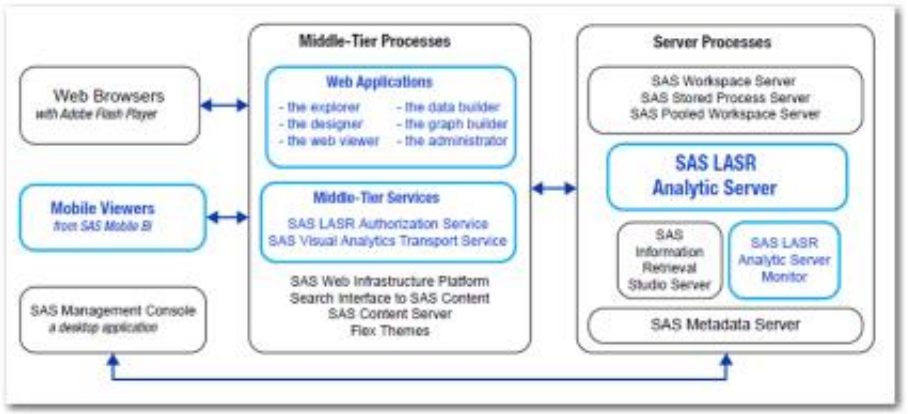
View of Components



The following picture provides you with a conceptual view of the components mentioned in the prior slides, showing components for the client tier, middle-tier, and servers tier

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Administration Tools

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Administration Tools

- SAS Management Console

Create Metadata: users, groups, libraries, folders, tables .... etc.

- The Administrator

Web application used for administration tasks within Visual Anallytics.

- SAS Environment Manager Administration

Web application that provides similar functionality as SASMC.

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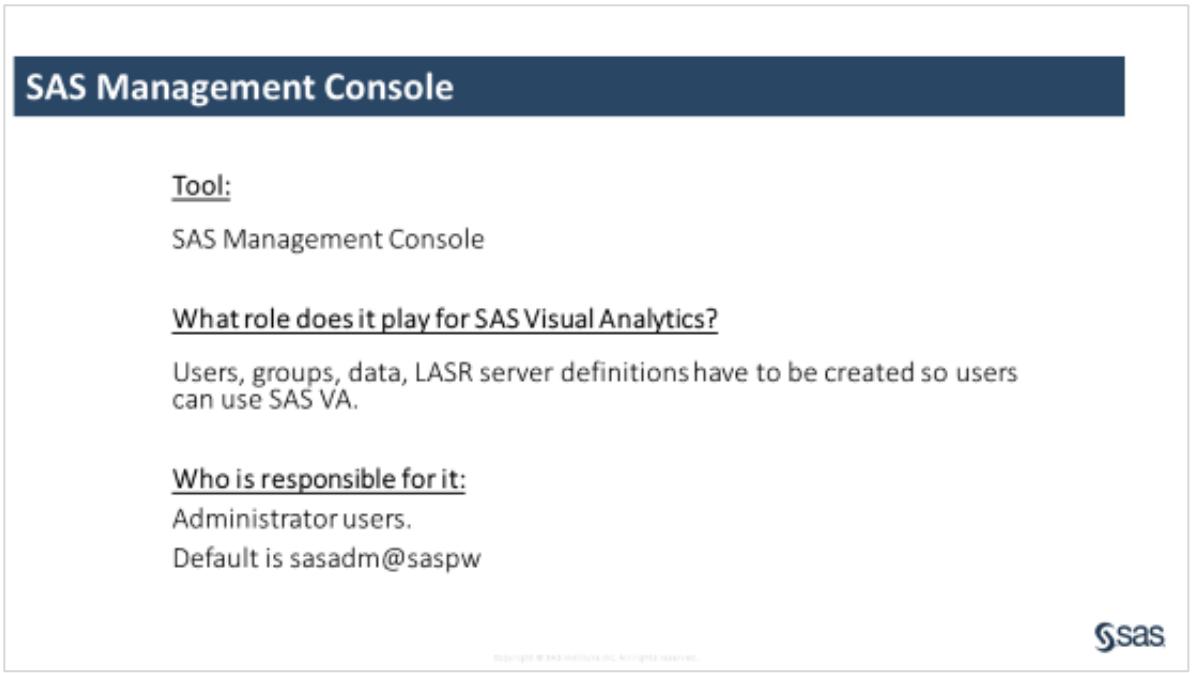

Administering SAS Management Console:

http://support.sas.com/documentation/cdl/en/bidaag/69847/HTML/default/viewer.htm#p1o5km9djceqann1excjd75wwzno.htm

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Getting Started:

http://support.sas.com/documentation/cdl/en/vaag/69958/HTML/default/viewer.htm#n17ccsfc5py3m8n16bunb81n3ud8.htm

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SAS Environment Manager Administration

Tool:
SAS Environment Manager

Requirement:
Know URL and admin pwd.
Familiarity with the basics of SAS Environment Manager.

What it does:

You can use it to create and manage metadata definitions for SAS LASR Analytic Servers and LASR libraries – instead or in addition to SAS Management Console.
You can manage and monitor platform resources.

Understanding the SAS Environment Manager

http://support.sas.com/documentation/cdl/en/evug/69029/HTML/default/viewer.htm#titlepage.htm

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Security in SAS Visual Analytics

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Permissions

- Important: SAS Visual Analytics uses the platform's metadata authorization layer to manage access to objects such as reports, explorations, tables, libraries, servers, and folders.
- SAS Visual Analytics supports row-level security. SAS Visual Analytics does not support column-level security.
- You can assign permissions on folders, libraries, tables by using either of the three administration tools addressed in prior slides. Use the SAS Visual Analytics Administrator for setting up row-level permissions.
- For simplicity, set permissions on folders, not on individual objects. Most objects (including tables) inherit permissions from their parent folders.
- For simplicity, assign permissions to groups, not to individual users. The broadest group is called PUBLIC. The SASUSERS group includes all registered users.

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The key points about permissions are described on this slide.

For further information, please take a look at the SAS 9.4 Security Administration Guide at: http://support.sas.com/documentation/cdl/en/bisecag/69827/HTML/default/viewer.htm#n0eps46eri6m4ln1igq8ry967iml.htm

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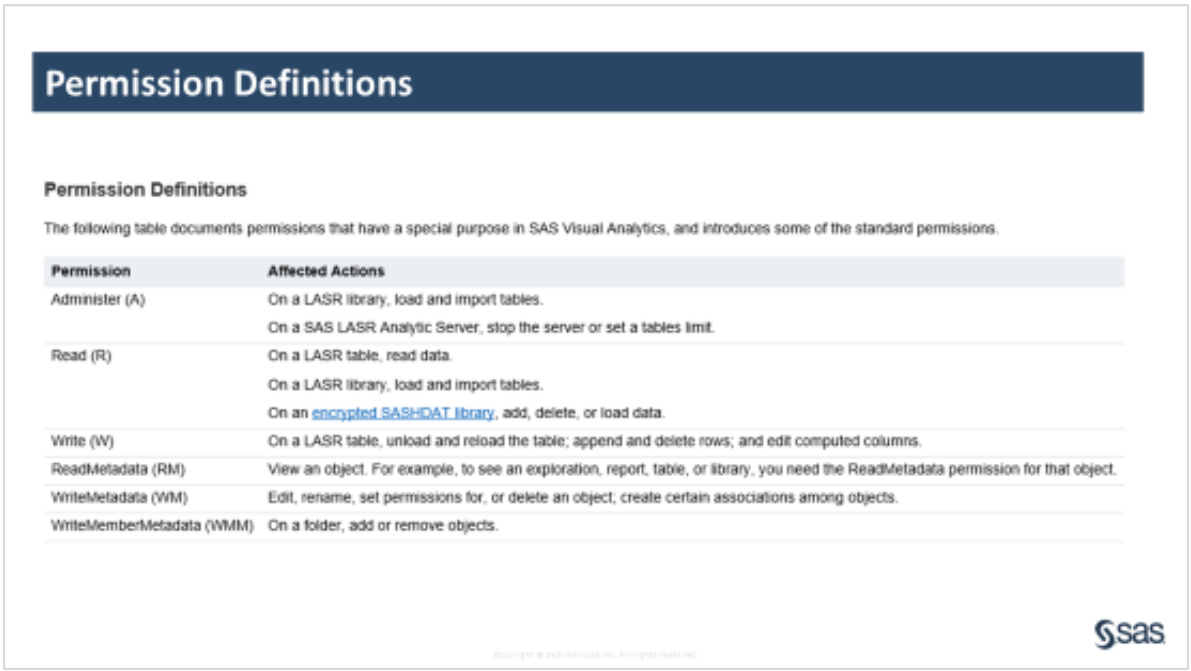
Permission Definitions



Permission Definitions

The following table documents permissions that have a special purpose in SAS Visual Analytics, and introduces some of the standard permissions.

Permission	Affected Actions
Administer (A)	On a LASR library, load and import tables.
	On a SAS LASR Analytic Server, stop the server or set a tables limit.
Read (R)	On a LASR table, read data.
	On a LASR library, load and import tables.
	On an encrypted SASHDAT library, add, delete, or load data.
Write (W)	On a LASR table, unload and reload the table; append and delete rows; and edit computed columns.
ReadMetadata (RM)	View an object. For example, to see an exploration, report, table, or library, you need the ReadMetadata permission for that object.
WriteMetadata (WM)	Edit, rename, set permissions for, or delete an object; create certain associations among objects.
WriteMemberMetadata (WMM)	On a folder, add or remove objects.

Permission Definitions:

http://support.sas.com/documentation/cdl/en/vaag/69958/HTML/default/viewer.htm#n1r98i0vpddhgnn1mie67wfx3t4z.htm

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Permissions by Tasks

Permissions for Working with LASR Tables and Servers

Task	Server	Library	Folder	Table
Read data	RM	RM	RM	RM, R
Append or delete rows	RM	RM	RM	RM, R, W
Edit computed columns	RM	RM	RM	RM, R, W
Load or import a table 1	RM	RM, R, WM, A	RM, R, WMM, W	-
Load a stop list	RM, WM	RM, R, WM, A	RM, R, WMM, W	-
Reload a table	RM	RM	RM	RM, R, WM, W
Unload a table	RM	RM	RM	RM, R, W
Start a server	RM	-	-	-
Stop a server	RM, A	-	-	-
Set a server's tables limit	RM, WM, A	-	-	-
Assign a library to a server	RM, WM	RM, WM	-	-
Register a table in metadata	-	RM, WM	RM, WMM	-
Update a table's metadata	-	RM	RM	RM, WM
Delete a table from metadata	-	RM, WM	RM, WMM	RM, WM

1 An initial load (or import) creates a new LASR table object. Read and Write permissions on the folder support actions against the new table.

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Explorations and Reports

Task	Server	Table	Folder	Report	Exploration
Open a report or exploration	RM	RM, R	-	RM	RM
Export a report or exploration	RM	RM, R	-	RM	RM
Modify a report or exploration	RM	RM, R	-	RM, WM	RM, WM
Save a new report or exploration	-	RM	RM, WMM	-	-
Delete a report or exploration	-	RM	RM, WMM	RM, WM	RM, WM

Data Queries and LASR Star Schemas

Task	Server	Table 2	Folder	Query or Schema
Save a new query or schema 1	RM	RM	RM, WMM	-
Run a query or schema 1	RM	RM	-	RM
Edit and save a query or schema	RM	RM	RM	RM, WM
Delete or rename a query or schema	RM	-	RM, WMM	RM, WM

1 These tasks create new LASR tables, so the permission requirements for loading a LASR table must also be met. See Permissions for Working with LASR Tables and Servers.

2 This column refers to any source tables that are represented in metadata. To run a query or schema against a LASR table, Read permission for the LASR table is also required.

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For information about Granting and Denying permissions, please take a look at:

http://support.sas.com/documentation/cdl/en/vaag/69958/HTML/default/viewer.htm#n1r98i0vpddhgnn1mie67wfx3t4z.htm

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Authorization in SAS Visual Analytics Administrator

To add, modify and view permissions in SAS Visual Analytics Administrator, go to the Folders pane, right-click on an object, and select Authorization. The tables shows descriptions of permissions:

Icon	Meaning
	Grant from an explicit control
	Grant from a directly applied ACT
	Grant from an indirect source (such as a parent group or parent object)
	Conditional grant from an explicit control
	Conditional grant from an indirect source (a parent group)
	Denial from an explicit control
	Denial from a directly applied ACT
	Denial from an indirect source (such as a parent group or parent object)

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Row-Level Security

Enables you to control who can access particular rows within a LASR table, using data filter expressions.

Access distinctions can be based on a simple attribute (such as security clearance level) or on a more complex expression that consists of multiple criteria.

Affects access to subsets of data within a resource.

To establish row-level security, you add constraints called permission conditions to explicit grants of the Read permission.

Each permission condition filters a particular LASR table for a particular user or group.

Each permission condition constrains an explicit grant of the Read permission so that the associated user or group can see only those rows that meet the specified condition.

When row-level security is used, there are three possible authorization decision outcomes for a user request to view data: ... next slide

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Row-Level Security

When row-level security is used, there are three possible authorization decision outcomes for a user request to view data:

- **Grant**
  The requesting user can see all rows.
- **Conditional grant**
  The requesting user can see only those rows that meet the specified filtering conditions.
- **Denial**
  The requesting user cannot see any rows.

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Precedence for Permission Conditions

Principle	Scenario	Outcome and Explanation
If there are multiple permission conditions that apply to a user because of the user's group memberships, then the identity that has the highest precedence controls the outcome.	A condition on TableA limits Read permission for GroupA. Another condition on TableA limits Read permission for the SASUSERS group. The user is a member of both GroupA and SASUSERS.	The user can see only the rows that GroupA is permitted to see. GroupA has a higher level of identity precedence than SASUSERS, so the filters that are assigned to GroupA define the user's access.
If there are multiple permission conditions at the highest level of identity precedence, then any data that is allowed by any of the tied conditions is returned.	A condition on TableA limits Read permission for GroupA. Another condition on TableA limits Read permission for GroupB. The user is a first-level member of both GroupA and GroupB.	The user can see any row that is permitted for either GroupA or GroupB.

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For all security related documentation for SAS Visual Analytics, please see:

http://support.sas.com/documentation/cdl/en/vaag/69958/HTML/default/viewer.htm#p0eq5aeingp2etn1kxmwmsz1tx2r.htm

Here you will find further information on permissions, authentication, encryption, server lock-down.

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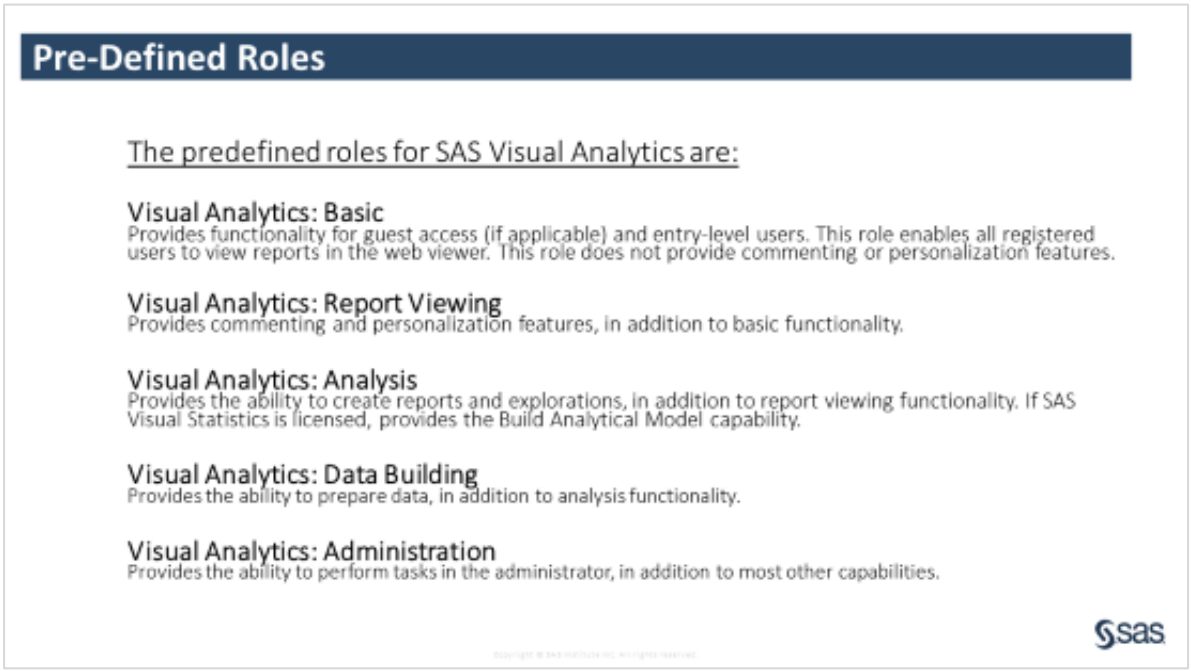

Roles provide capabilities to do something. Key points:

- Unlike permissions, which affect access to data, content, and metadata, capabilities affect access to features and functionality.
- Capabilities are assigned to roles. Users get their capabilities through their memberships.
- You cannot deny a capability to a user. Instead, make sure that user is not a member of any role that provides the capability.
- If the standard distribution of capabilities is not optimal for your environment, consider creating custom roles.

Tips:

- If you create a specialized administrative role, remember to provide the Manage Environment capability in addition to any specific functional capabilities.
- If you create a global administrative role, make the Visual Analytics: Administration role a contributing role for the new custom role. In addition, add the Build Data capability to the custom role.

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The SAS LASR Server

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SAS LASR Analytic Server

Overview of SAS LASR Analytic Server

- Analytic platform that provides a multi-user environment for concurrent access to data that is loaded into memory.
- In a distributed environment, the server distributes data and the workload among multiple machines, performing massively parallel processing.
- In a non-distributed deployment, the workload and data volumes do not demand multiple machines.
- By loading tables into memory for analytic processing, the server enables users to explore data and discover relationships in data at the speed of RAM.
- The server can perform text analysis on unstructured data.

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SAS LASR Analytic Server

- In distributed deployments, the server supports the Hadoop Distributed File System (HDFS) as a co-located data provider.
- HDFS is used because the server can read from and write to HDFS in parallel.
- HDFS stores data as blocks in distributed form on the blades and the replication provides failover capabilities.
- In a distributed deployment, the server also supports Teradata Data and Greenplum.

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How the SAS LASR Analytic Server Works

- The server provides a client/server environment where the client connects to the server, sends requests to the server, and receives results back from the server.
- After a client connection is authenticated, the server performs the operations requested by the client.
- Any request (for example, a request for summary statistics) that is authorized will execute.
- After the server completes the request, there is no trace of the request.

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LASR Analytic Server Deployment

During the SAS Visual Analytics deployment, SAS creates two LASR servers in metadata:

- LASR Analytic Server
- Public LASR Analytic Server

Additional LASR servers can be created.

Examples where creating additional LASR Servers might be beneficial:

- Security requirements
- Separation of environments (Dev / Test / Prod)
- Reflect your organization (Departments, projects, etc.)

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Default SAS LASR Analytic Server

- Distributed or Non-Distributed In-Memory Analytical Engine
- On-demand services
- If LASR Analytic Server is down,
  - all in-memory data attached to this server is lost.
  - Reports and Explorations based on this data are unavailable until server is restarted and the data are reloaded.

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The LASR server is independent from other VA Servers, but it is dependent on the Metadata Server. Reports and Explorations depend on a specific combination of LASR Analytic Server and table names.

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PUBLIC SAS LASR Analytic Server

- Installed and configured during the deployment.
- Allows all users to load their own tables in memory using the Public LASR Analytic Server library.
- Optional server – VA environment is not dependent on it.
- Public because the default AutoLoad LASR Analytic Server library is open to SASUSERS

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Operating the LASR Server

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Operate a LASR Server: Get Server Information

To get information for a SAS LASR Analytic Server:

- From the main menu in the administrator, select **LASR - Manage Servers**
- Select a server, right-click, and select **Get Status**

The **Status** column indicates whether the server is running , stopped , or over capacity .

A server that is over capacity accepts requests for activities such as data retrieval and analysis,

but rejects requests to load, import, append, or reload tables.

The **Tables Memory** column indicates how much memory is currently in use by loaded tables.

Values in this column are displayed as **0.00 (zero point zero)** until the number of megabytes of loaded data rounds up to at least **0.01**.

The **Tables Limit** column can constrain the amount of memory that the server can use to host tables.

By default, the cells in this column are blank, so no constraints are in effect.

For a distributed server, a **Virtual Memory** column (not depicted) indicates how much of the total cluster memory is currently in use by each server process.

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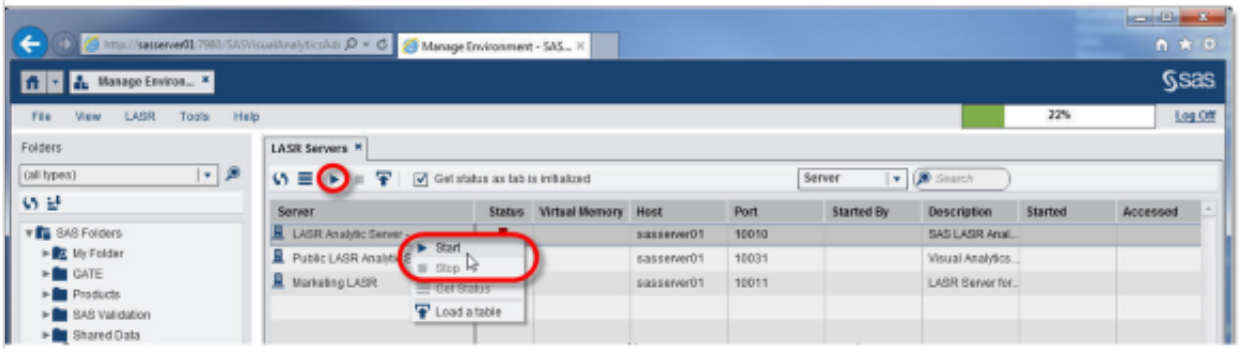
START LASR Analytic Server Interactively

Distributed Mode
Non-Distributed Mode



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START LASR Analytic Server programmatically

Distributed Environment

```
proc lasr create
        port=10011
        path="/opt/sas/config/Lev1/Applications/SASVisualAnalytics6.3
/LASR/Signatures"
        signer="sasserver01:7980/SASLASRAuthorization";
  performance host="sasserver01"
            install="/opt/sas/TKGrid_2.4/TKGrid"
            nodes=All;
run;
```

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START LASR Analytic Server programmatically

Non-Distributed

```
/* Start the LASR Analytic Server by defining the LASR library*/
libname LASRLIB SASIOLA
      startserver host="sasserver01" port=10011
      signer="sasserver01:7980/SASLASRAuthorization";

/* Keep the SAS session up until SERVERTERM received */
proc vasmp;
  serverwait port=10011;
quit;
```

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Notes:

The LIBNAME statement reports the port number of the LASR Analytic Server in the SAS log.

You can connect to the LASR Analytic Server using that port.

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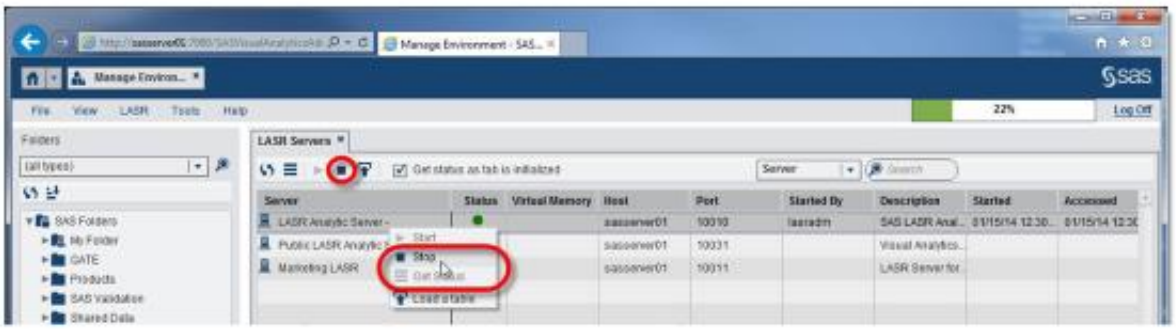
STOP LASR Analytic Server Interactively

Distributed Mode and
Non-Distributed Mode



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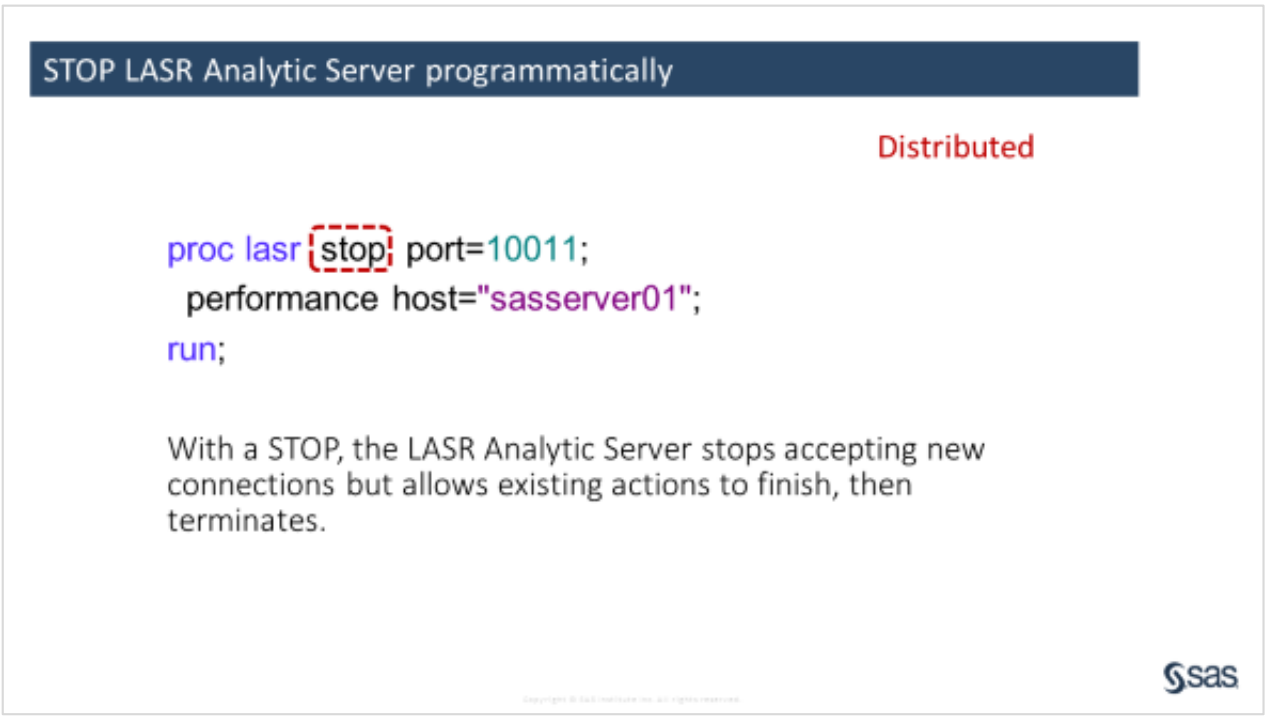

Notes:

As soon as an authenticated termination request (STOP or TERM options, aliases) has been received, the LASR Analytic Server stops accepting new connections.

When you send a termination request to a LASR Analytic Server, the request is "queued" in the sense that currently running actions are allowed to finish before server destruction takes place.

If you have a very long-running query, or a run-away query, then you might want to intervene more forcefully.
You can add the IMMEDIATE option to the termination request in PROC LASR to kill the server without waiting for running actions to finish.

```
proc lasr stop (immediate) port=10011;
  performance host="sasserver01";
run;
```


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STOP LASR Analytic Server programmatically

Distributed

```
/* Stop the LASR Analytic Server using the LIBNAME CLEAR Option */
libname LASRLIB clear;

OR

/* Stop the LASR Analytic Server using PROC VASMP*/
proc vasmp;
  serverterm  host="sasserver01" port=10011;
run;
```


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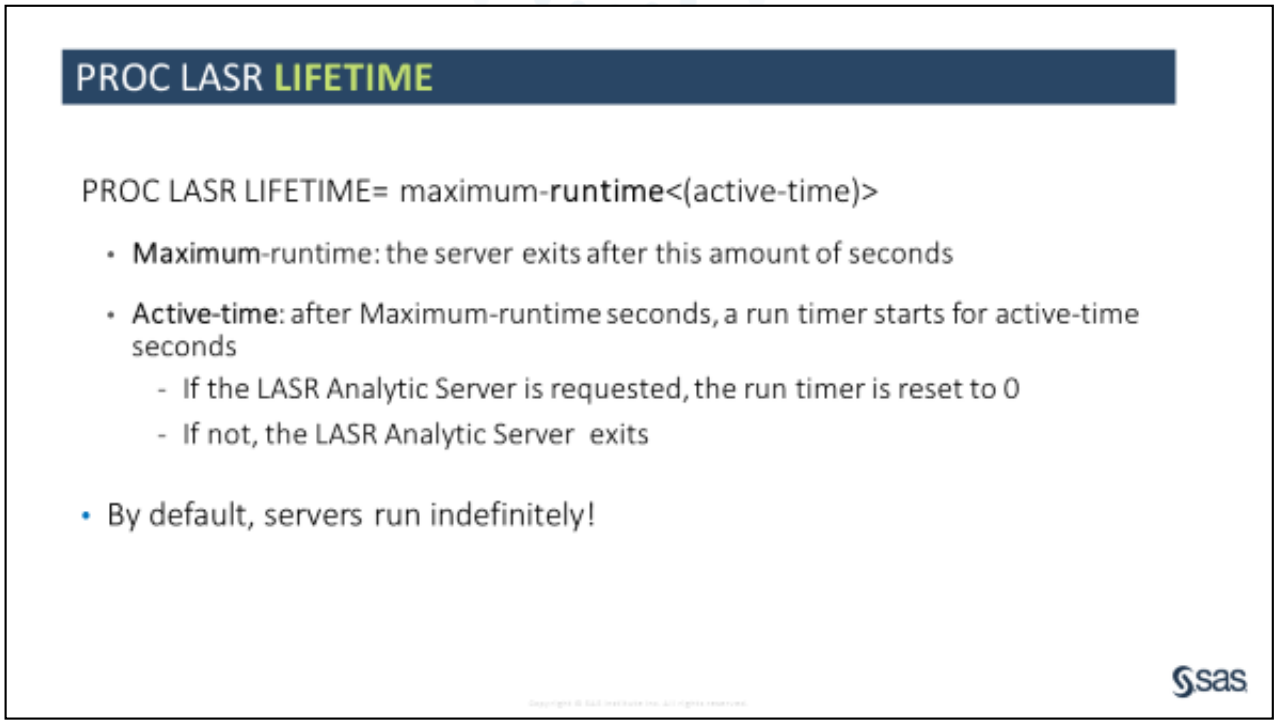

Option for modifying the default Server Run Time behavior

The LASR Analytic Server instances can be configured to exit after a period of inactivity using the LIFETIME= option of PROC LASR. Per default, the LASR Server runs indefinitely.

***maximum-runtime*<(*active-time*)>**

specifies the duration of the server process, in seconds. If you do not specify this option, the server runs indefinitely.

maximum-runtime:

When the *maximum-runtime* is specified without an *active-time* value, the server exits after *maximum-runtime* seconds.

active-time:

When the *maximum-runtime* and *active-time* values are specified, the server runs for *maximum-runtime* seconds and then starts a run timer with an inactivity time-out of *active-time* seconds. When the server is contacted with a request, the run timer is reset to zero. Each second that the server is unused, the run timer increments to count the number of inactive seconds. If the run timer reaches the *active-time*, the server exits.

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Managing Data Load

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Making Data Available to Users

SAS Visual Analytics and the SAS LASR Analytics Server

- Data is being made available by loading it into memory in a SAS LASR Analytic Server.
- Once loaded, the tables remain in memory until they are unloaded or until the LASR Server stops.
- A stop of the LASR server flushes the memory.

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Methods to Load Data

Load Methods

Load methods vary by data source.

Load Method	Data Source				
	Spreadsheet or Delimited	SAS Data Set	SASHDAT File*	Data Server	Other**
Interactive load		✓	✓	✓	
Run a data query		✓	✓	✓	
Import from server		✓		✓	✓
Import a local file	✓	✓			
Autoload	✓	✓			

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Methods to Keep Data Available

Feature	Trigger	Result (Automated Action)
Autoload	A time interval elapses	In-memory data synchronizes against a designated directory.
Autostart	A load or import is requested	The associated server starts.
Reload-on-start	A server starts	Participating tables reload.

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AUTOLOAD

- Keeps source tables in memory.
- Users place source tables in a dedicated host location (aka drop zone).
- Data in this drop zone is periodically updated which will keep the data available at any time.

Benefits of autoload:

- No worries about data unavailability, because stopping the LASR or unloading does not effect the data available. Content of drop zones is automatically reloaded.
- Tables handled with autoload do not have to be registered in metadata.

Autoload runs as scheduled task.

A new run of autoload is started every 15 minutes.

That timing is controlled by settings in OS config files. Timing can be changed

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AUTOSTART

- SAS LASR Analytic Server can start on demand.
- Requires LASR libraries to be set up with autostart being enabled.
- Autostart will not happen if …
  - LASR server is already running.
  - User wants to open, read or run data/data queries. Autostart is used for load and import.

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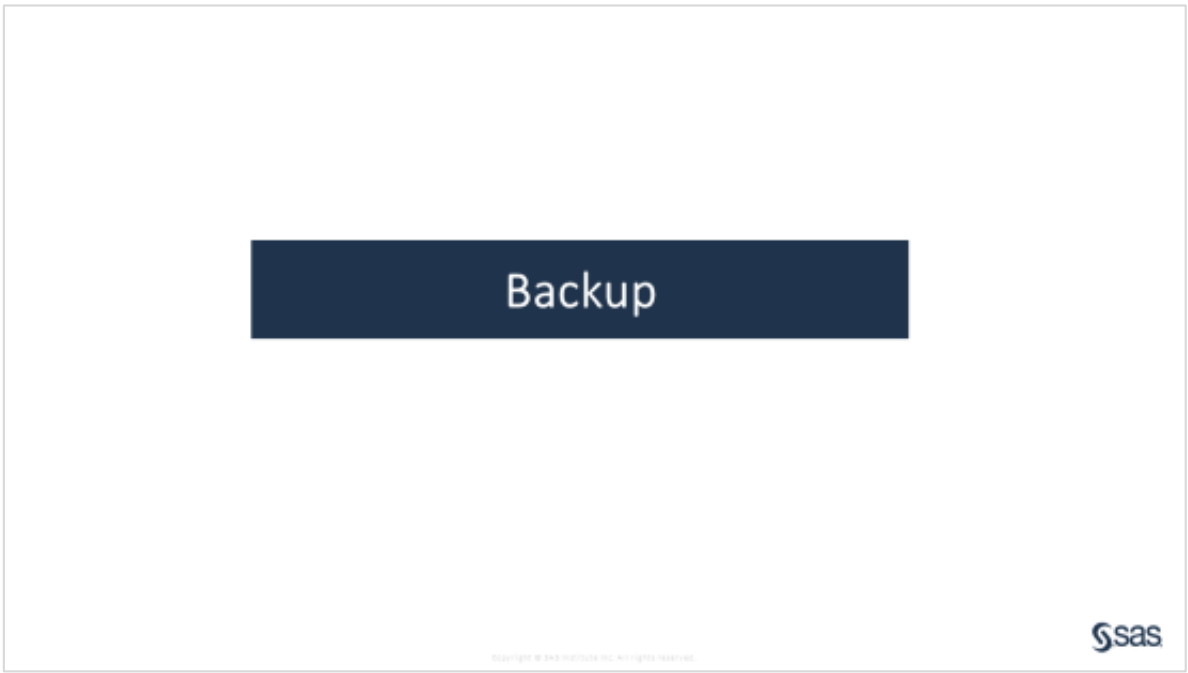

Not having a backup strategy in place is something we see all too often, unfortunately.

It is imperative to know about the SAS backup, and how it fits into your backup.

To make sure you do have a proper backup strategy in place, the following provides you with some information and best practices.

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Backup in SAS 9.4

It is important that the system backup or third party backup you are using includes SAS:

- Content, metadata, config files. Basically, everything you'll find underneath your SAS config dir, and the Content Server, all config files.
- SAS related data stored outside of the SAS config will not be backed up by the SAS backup!!

SAS performs metadata server backups automatically at 1:00 am every day except Sundays (default settings can be changed in SAS® Management Console)

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Why are Backups So Very Important ?

- The Metadata Server that stores all your metadata (users, groups, libraries, tables, web content, folders etc.) is an in-memory server.
- When users request metadata, a copy of the physical table is created and "put" into memory.
- It remains in memory until the metadata server is paused and resumed, or stopped and restarted.
- The pausing and or stopping flushes the content that is held in mem, to disk.
- Without pausing or stopping the Metadata Server, data in memory will not be flushed and therefore, will not be part of a backup!
- If you only run a sys backup without considering SAS, all data on disk is backed up, however, what is kept in memory will not be part of the backup and therefore a restore might not be successful.

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Options for Backing Up your SAS Environment

The following backup tools and functionalities are available to you:

- Metadata Server Backup Facility
- Operating System Commands to Back Up the Metadata Server
- Using the Export SAS Package Wizard to Back Up Specific SAS Folders
- Deployment Backup and Recovery Tool

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Metadata Server Backup Facility

- The SAS Metadata Server includes a server-based facility that performs metadata server backups automatically.
- This facility can also be used to perform ad hoc backups and to perform roll-forward recovery.
- It backups up all registered metadata repositories, the repository manager, and the metadata server's configuration directory.
- By default, metadata server backups are scheduled to run at 1:00 a.m. every day except Sunday.
- Metadata server backups can be launched from SAS Management Console, from the operating system command line, from SAS, or through third-party scheduling software.

Please familiarize yourself with the backup facility !

http://support.sas.com/documentation/cdl/en/bisag/68240/HTML/default/viewer.htm#p1th70gi35gymgn1120mknrp8ch7.htm

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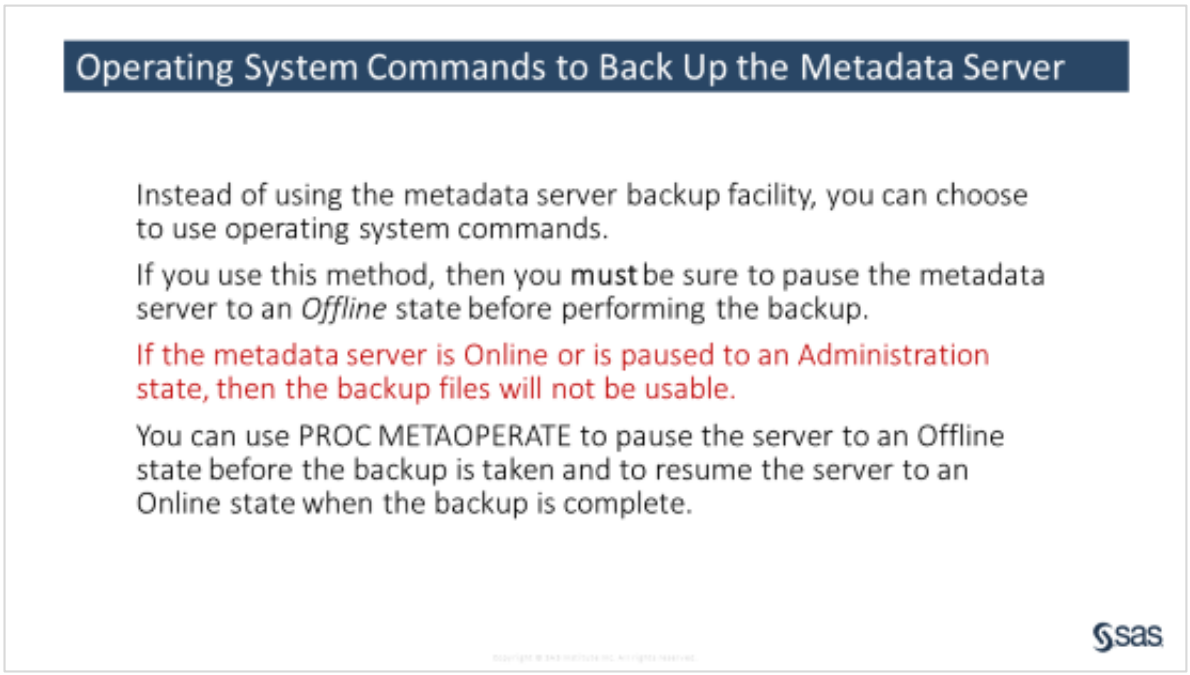

Using Operating System Commands to Back Up the Metadata Server

http://support.sas.com/documentation/cdl/en/bisag/68240/HTML/default/viewer.htm#n1f2l90i9hcsgpn1stlxyjtxyj3k.htm

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Using the Export SAS Package Wizard

In addition to performing regular full backups, it might be appropriate in certain situations to make backups of specific SAS folders that are used to organize user-created SAS content.

To perform selective backups and restores, you can use the following tools:

- Export SAS Package and Import SAS Package wizards, which are available in the Folders tab of SAS Management Console. The same wizards are also available in SAS Data Integration Studio and SAS OLAP Cube Studio.
- Batch export tool and the batch import tool, which enable you to perform exports and imports on a scheduled or repeatable basis.

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Situations in which you might want to back up individual folders:

If you are creating new content (for example, new information maps and new reports) in a development environment, you might want to periodically back up the folders and associated physical files that contain this content.

If you are about to import new content (for example, new information maps, stored processes, and reports) into production folders, you might want to first back up the current contents of the production folders and their associated physical files.

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Deployment Backup and Recovery Tool

New tool in SAS 9.4 that provides an integrated method for backing up and recovering your SAS content across multiple tiers and machines.

The tool is installed on the middle tier. It backs up the following components:

- Metadata server, including all registered metadata repositories, the repository manager, and the server's configuration directory.
- Contents of the Data directories, SASEnvironment directories, and server configuration directories for each server on the SAS server tier. (If symbolic links in these directories point to other locations, the referenced locations are not backed up.)
- SAS Content Server repository.
- Databases that are managed by the SAS Web Infrastructure Platform Data Server.
- Additional directories under SAS-configuration-directory/Levn as specified by the administrator.

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By default, the Deployment Backup and Recovery tool backs up these items automatically each Sunday at 1:00 a.m. Backup files are retained for a period of 30 days. Batch commands are available on each host machine to use in administering backups and recoveries.

If you are using a third-party vendor database (instead of the SAS Web Infrastructure Platform Data Server) for the SharedServices database, the Deployment Backup and Recovery Tool does not back up or recover the third-party vendor database. You must manually back up and restore the data

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Summary

- The SAS Visual Analytics architecture consists of VA components and SAS Platform components. The SAS LASR Analytic Server relies on the Metadata Server.
- The SAS LASR Analytic Server is the analytical engine in your SAS Visual Analytics environment. Its has LASR servers installed per default.
- The administration tools available to you are SAS Management Console, SAS Visual Analytics administrator, SAS Environment Manager.
- There are several ways to load data, choose what works best for your environment.
- Make sure you are familiar with the default roles in SAS Visual Analytics, and think about what permissions might make sense in your environment.
- Always remember:
  To make sure you can go back if a restore would ever become necessary, it is not enough to just backup your operating systems. You have to consider your SAS environment. SAS provides you with different backup tools and functionalities.

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Visual Analytics

Main product sas site

http://support.sas.com/software/products/va/index.html

Visual Analytics Troubleshooting
Chapter 8, Page 93
http://support.sas.com/software/products/va/index.html

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References:

SAS Visual Analytics Documentation
http://support.sas.com/software/products/va/index.html#s1=3

Troubleshooting SAS Visual Analytics; Chapter 8, page 89
http://support.sas.com/documentation/solutions/va/6.3/vaag.pdf

Getting Started: Cheat Sheet
http://support.sas.com/documentation/cdl/en/vaxnrgs/67193/HTML/default/viewer.htm#n1ujau0paihf1fn124ncnmu5p1dg.htm

Quick References
http://support.sas.com/documentation/cdl/en/vaxnrgs/67193/HTML/default/viewer.htm#n0f8gwr1nh69afn1piel6ptfr3rh.htm

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References:

Best Practices for Backing Up and Restoring
http://support.sas.com/documentation/cdl/en/bisag/68240/HTML/default/viewer.htm#p1u29z4y7j3spvn1gaqzlyx2narb.htm

Working with SAS Folders
http://support.sas.com/documentation/cdl/en/bisag/68240/HTML/default/viewer.htm#p1az7wj1xkvyqyn16526p7exxhyx.htm

Article on SAS Backups
http://support.sas.com/documentation/cdl/en/bisag/68240/HTML/default/viewer.htm#p1az7wj1xkvyqyn16526p7exxhyx.htm

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Good to Know:

Administration and Deployment Community

The Admin Community is dedicated to administrators.
https://communities.sas.com/t5/Administration-and-Deployment/bd-p/sas_admin

SAS Visual Analytics Community

Dedicated to users who are focused on exploratory visualization and analytical techniques, data preparation, dashboard reporting, and mobile BI.
communities.sas.com/visual-analytics.

In both communities you can share your experiences, discuss topics and ideas, seek help from your peers, and share information about upcoming events.

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