Reeling Them Back In—Keeping SAS® Visual Analytics Users Happy, Behind the Scenes

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ABSTRACT

SAS® Visual Analytics offers many new and exciting ways to look at your data. Users are able to load data at will to explore and ask questions of their data. But what happens if you need to prevent users from viewing all data? What can you do to prevent users from loading too much data? What happens if a user loads data that exceeds the hardware capacity of your environment? This session covers practical ways to limit available resources and secure SAS® LASR™ Analytic Server data. Real-world scenarios are covered and attendees can participate in an open discussion.

INTRODUCTION

SAS® Visual Analytics has been on the scene for a few years now. As the product continues to grow and mature, the customer usage advances too. The following concepts are real-world solutions that can improve the user experience within a SAS Visual Analytics environment.

These thoughts have been collected from conversations and engagements with real customers. They are intended to encourage you to think outside of the default installation and configuration of SAS Visual Analytics. Before you start anything, it is always a good idea to get your bearings and know what needs help. Who better to ask than from your user community?

KNOW YOUR USERS

Whether you are familiar with SAS and its architecture or are new to SAS®, having a clear grasp of the intended use of the product, especially from the user perspective, can help forge your path to support and maintain a happy user base. Stay in communication with users and develop strategies to support their endeavors. If you have multiple groups that will use one environment, think about the security model. Look at how metadata permissions can help, but also consider other logical steps that can be taken. There have been numerous times in the field where customers have asked for ways to separate and isolate their data in SAS Visual Analytics. In some cases it is to keep the public out, but in other cases it is to create work areas for different projects or departments. Next, we will step through some strategies to insulate data in SAS Visual Analytics from different groups.

NOW YOU SEE ME—NOW YOU DON'T

Security is always a challenging topic. Too much open access can cause confusion, misinterpretation, and potentially inappropriate data access. If one has too much security in place, no one can access data, or people feel that there are too many barriers in the way, making it not worth the effort. Both extremes can lead to poor user experience and a less than "warm fuzzy" about their data and reporting. As stated before, being in communication with your user base will help determine the best course of action. The following ideas are to help maintain an environment that is more secure around the data and allows the flexibility of user-driven data loading, while at the same time keeping user expectations and data creep within the boundaries of the environment.

MORE THAN ONE LASR SERVER?

An "out of the box" deployment for any SAS Visual Analytics solution will come with two SAS® LASR™ Analytic Servers. One is marked "PUBLIC" while the other is a standard SAS LASR Analytic Server. Most of my experience has been that customers think they have to stay within these two SAS LASR Analytic Server buckets. Did you know you can create more SAS LASR Analytic Server definitions? Absolutely you can! And with this option you are able to separate the data loaded, by SAS LASR Analytic Server, and you can apply metadata security more easily. But how do you add a SAS LASR Analytic Server?

I'm glad you asked… the following steps are some high-level screen captures to walk you through the process.

Create users and groups that represent the permission structure you want to create. For this scenario, we will have three individual users and three departments (A, B, and C) to maintain separate access, as shown in Figure 1.
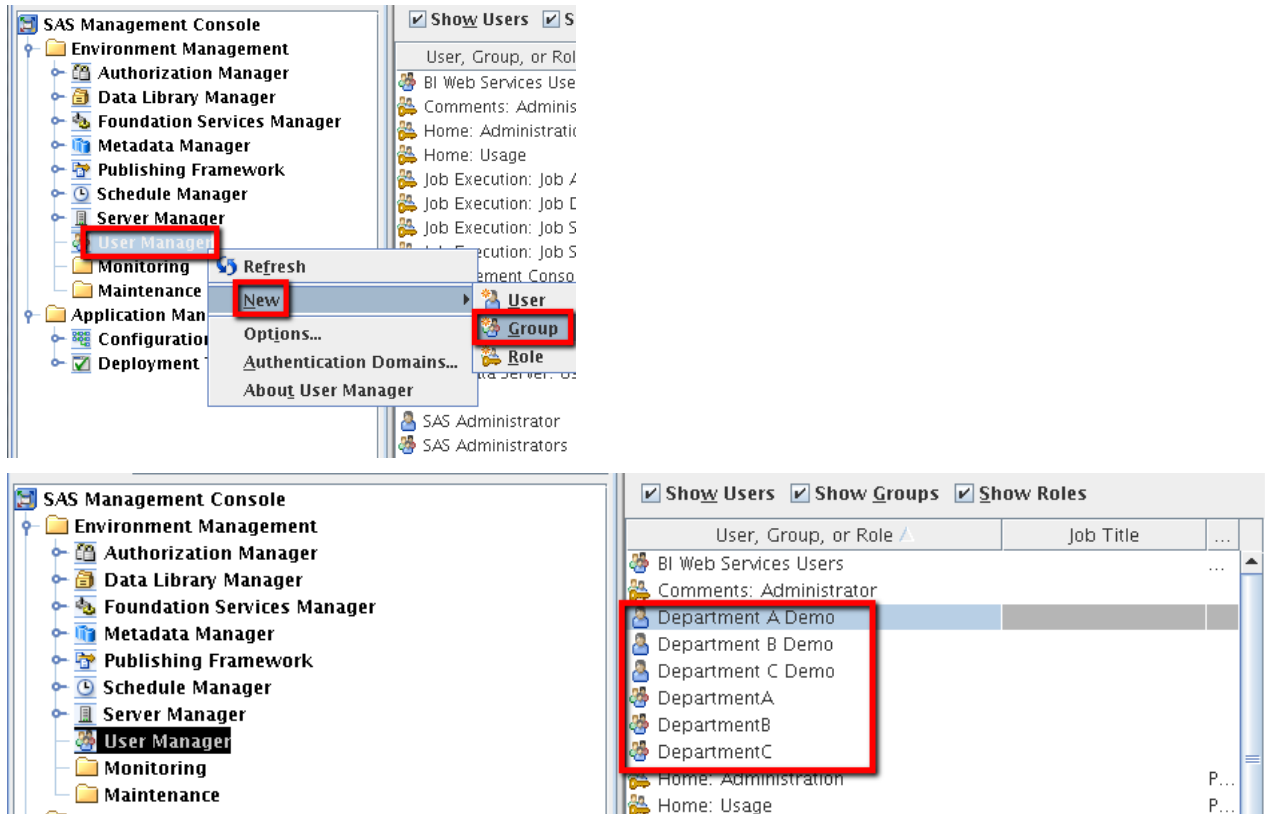

Figure 1. Show Departments A, B, and C

With the users and groups in place, we can start creating SAS LASR Analytic Server definitions for each group.

From SAS® Management Console, click **Server Manager,** and then right-click and select **New Server,** as shown in Figure 2.
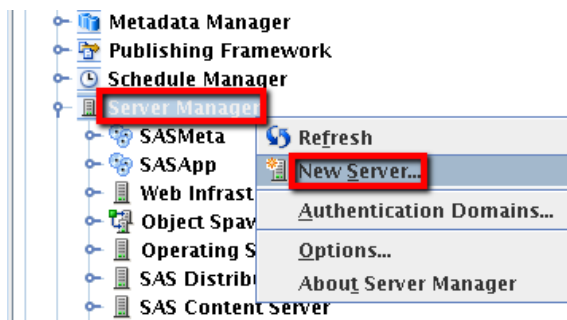
Figure 2. Select New Server Option in SAS Management Console

You will want to scroll down to the SAS Servers and select the SAS LASR Analytic Server definition, as shown in Figure 3Figure 3
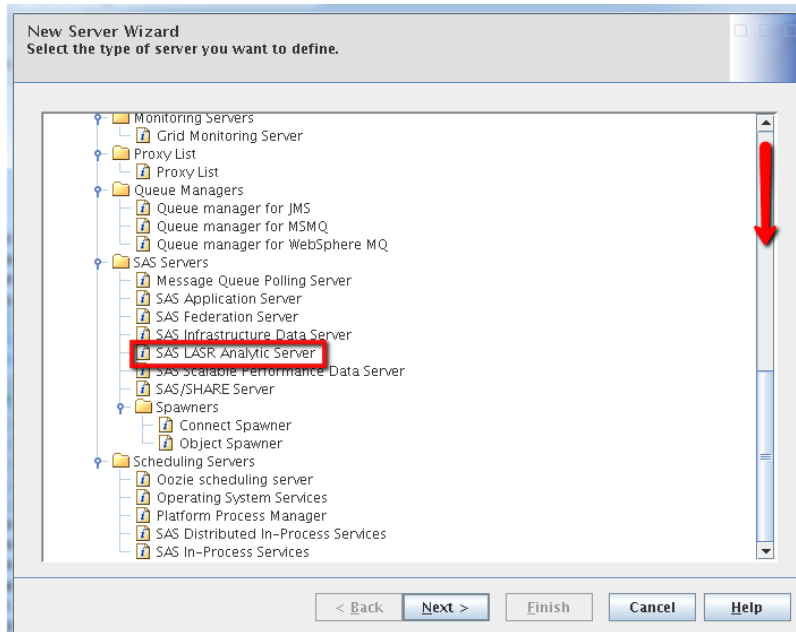
Figure 3. Select SAS LASR Analytic Server from New Server Wizard

Define your SAS LASR Analytic Server name, as shown in Figure 4.
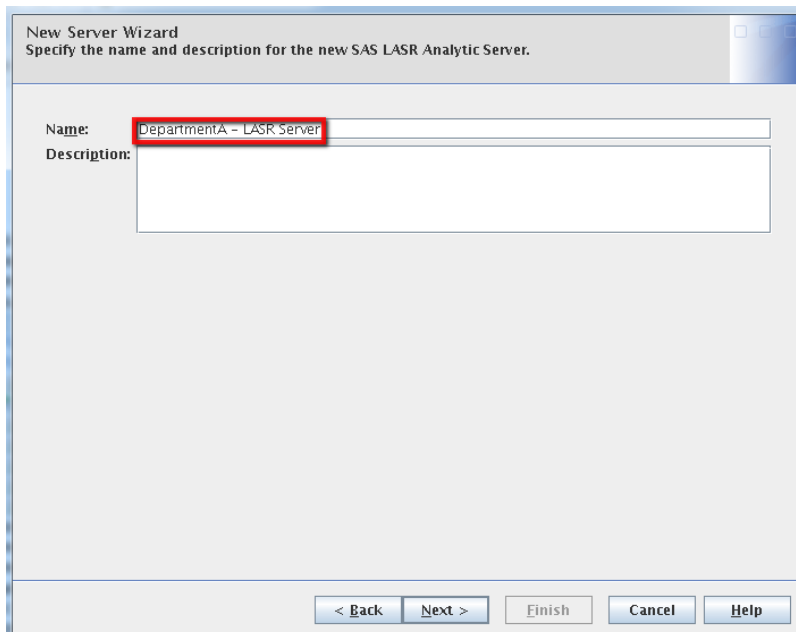
Figure 4. Define Your SAS LASR Analytic Server Name

Depending on your architecture, the next few screens will vary.

Select whether this is a single machine server (non-distributed) or a multi-machine platform (distributed).

Also specify the location of the SAS® High-Performance Analytics environment location, as shown in Figure 5.

- Linux—default location is /opt/TKGrid

- Windows—default location is /opt/TKGrid (yes, this is correct slashes and all)
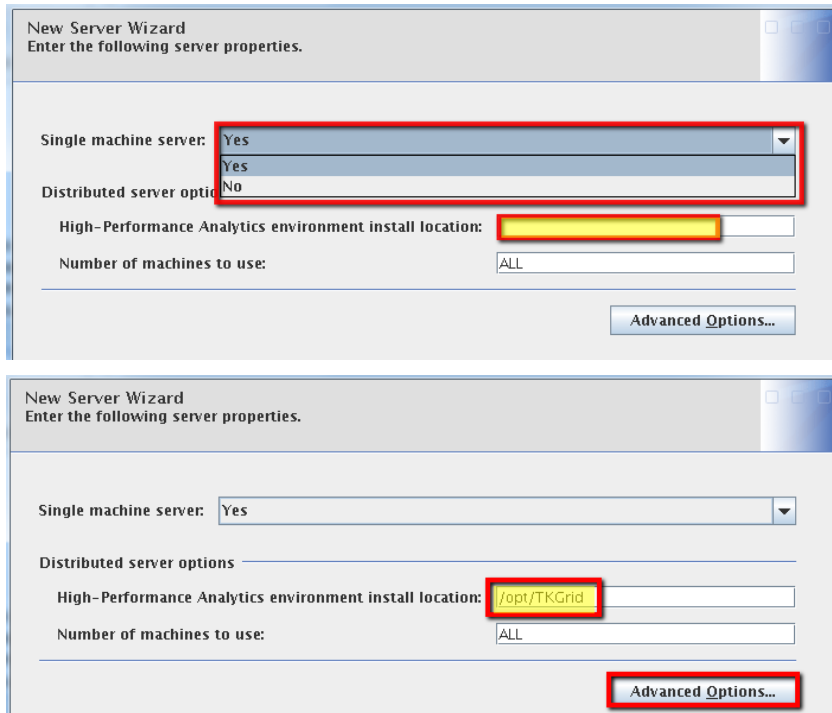
Figure 5. Type Server Properties

Choosing the Advanced Options, you can specify the location of the SAS LASR Analytic Server signature files, as shown in Figure 6.

The default location can vary. It depends on the version of SAS Visual Analytics. If the default location is /tmp this can be problematic with Linux, as in some cases, the OS will routinely clean out the /tmp directory. It is recommended that you place the signature files in another location that is also secured appropriately on the OS. The new version will place the signature files in the SAS Configuration. The Windows location is also under the SAS Configuration, similar to below:

```
<SAS CONFIG>/Lev1/AppData/SASVisualAnalytics/VisualAnalyticsAdministrator/sigfiles
```
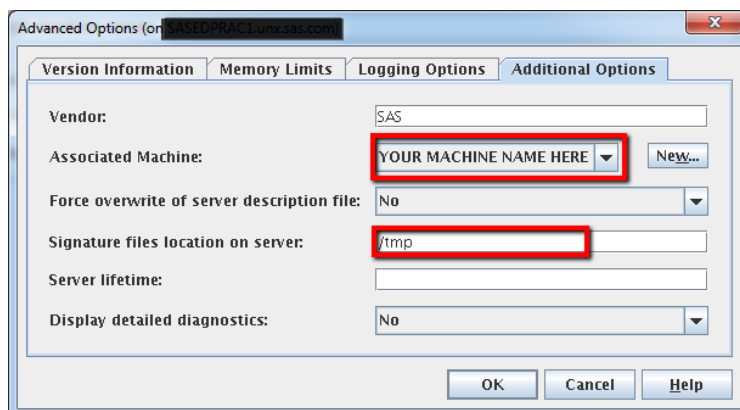

Figure 6. Define the Location of SAS LASR Analytic Server Signature Files

At this next point, you will determine your new SAS LASR Analytic Server port number, as shown in Figure 7.

There can be only one port per one SAS LASR Analytic Server.

The **High-Performance Analytics environment host** is your machine name or SAS Visual Analytics head node.
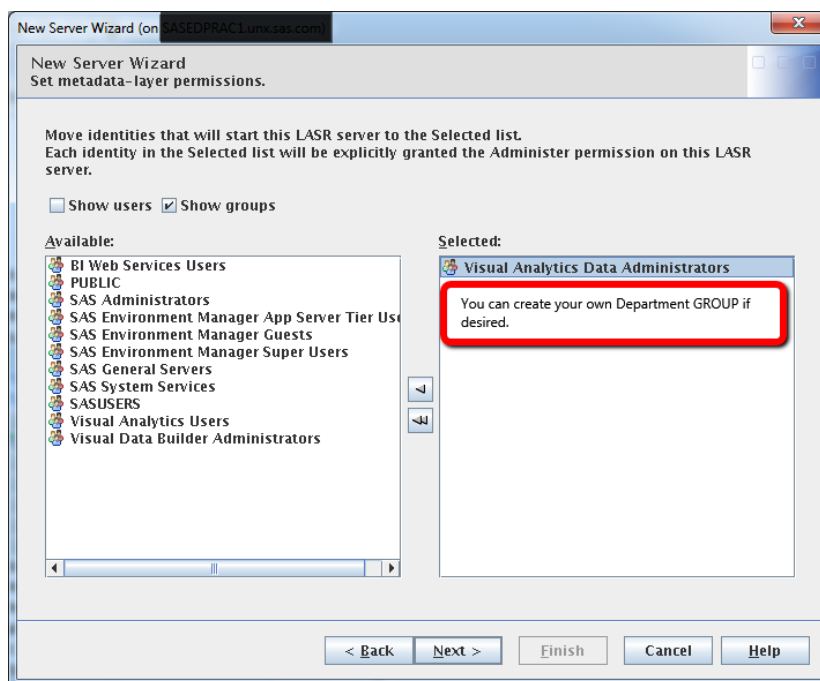
The **LASR authorization service location** should be pre-defined based on your configuration.
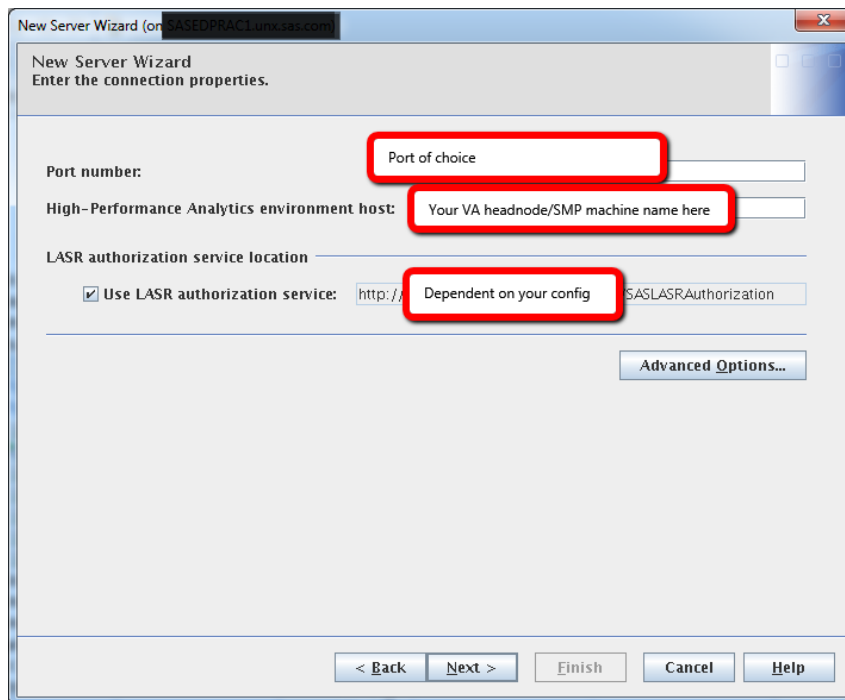
**Figure 7. Set the Port for the SAS LASR Analytic Server**

After setting the port, you will determine the group ownership of this SAS LASR Analytic Server, as shown in Figure 8.

This is where you can separate access by a departmental group or by individual users.

Figure 8. Determine Group Ownership of SAS LASR Analytic Server

After the SAS LASR Analytic Servers are created, you will find them under the Server Manager, as shown in Figure 9.
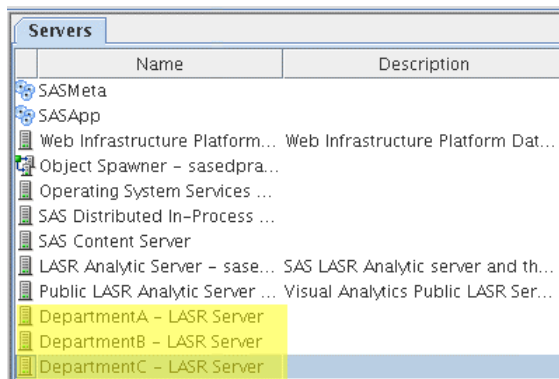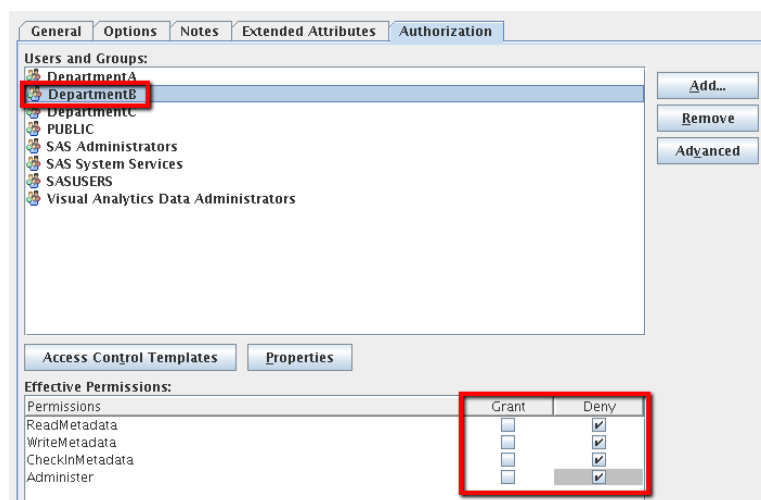

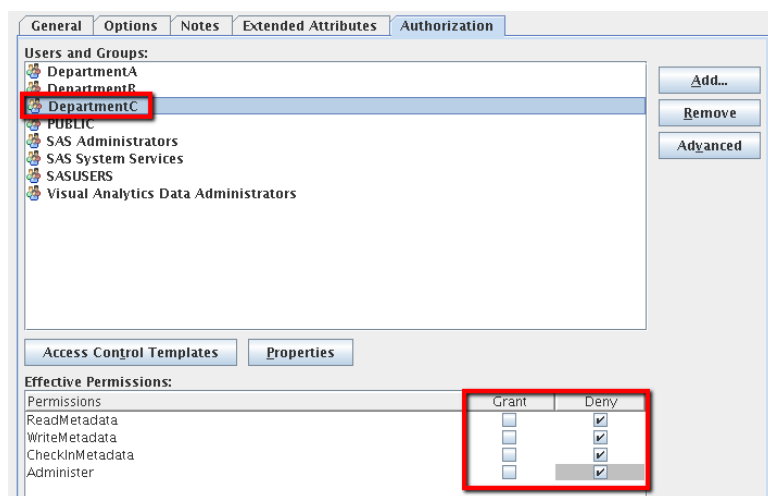**Figure 9. See List of SAS LASR Analytic Servers**

If you didn't define the permissions set for the groups, be sure to go back and define the appropriate group permissions to each SAS LASR Analytic Server, as shown in Figure 10.
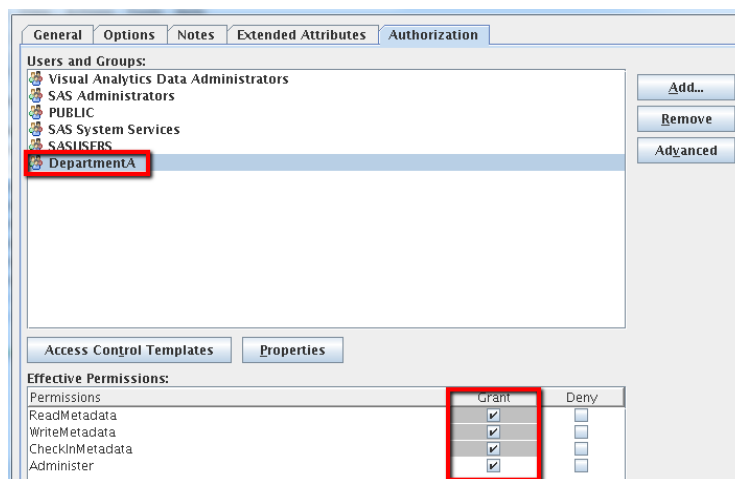
Figure 10. Define Appropriate Group Permissions

To prevent users who are not in Department A from seeing the SAS LASR Analytic Server, remove permissions by adding the other department groups and denying access, as shown in Figure 11.

Figure 11. Remove Permissions from Groups

Note: If you choose to remove permissions from SASUSERS, it will impact your other group permissions, so be careful which path you choose!
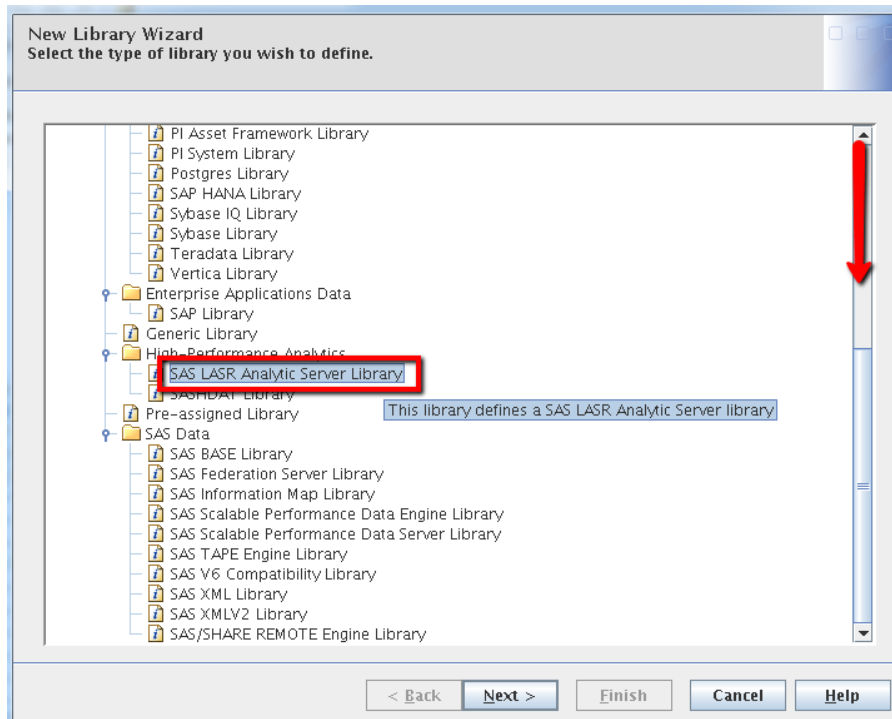
With the SAS LASR Analytic Servers in place, don't forget to create the appropriate LASR libraries, since we want to keep the data separate.

From SAS Management Console, click **Data Library Manager -> Libraries.** Right-click and select **New Library**, as shown in Figure 12.
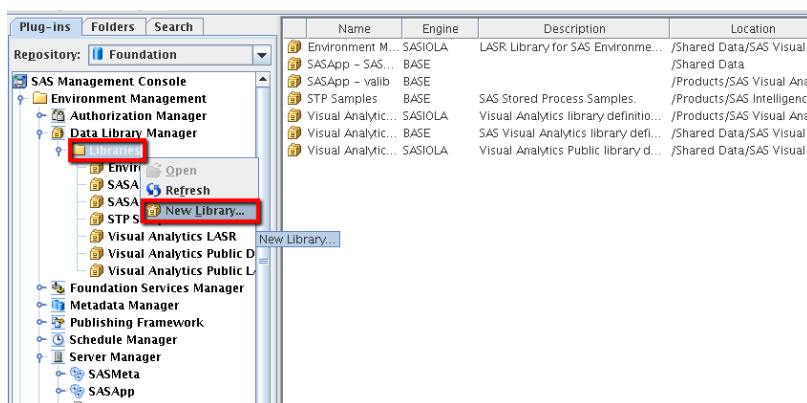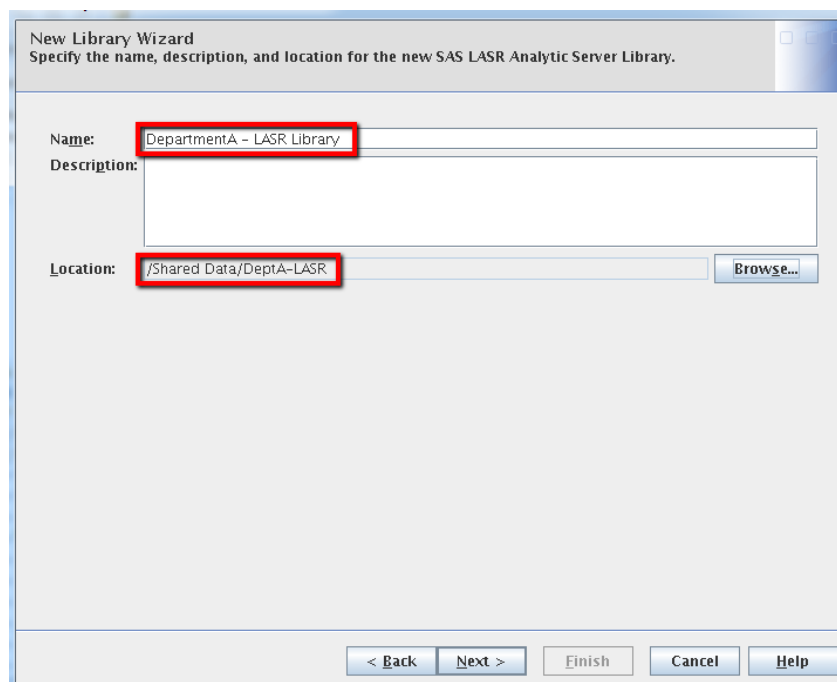

Figure 12. Select New Library

Scroll down to find **High-Performance Analytics** and **SAS LASR Analytic Server Library**, as shown in Figure 13.

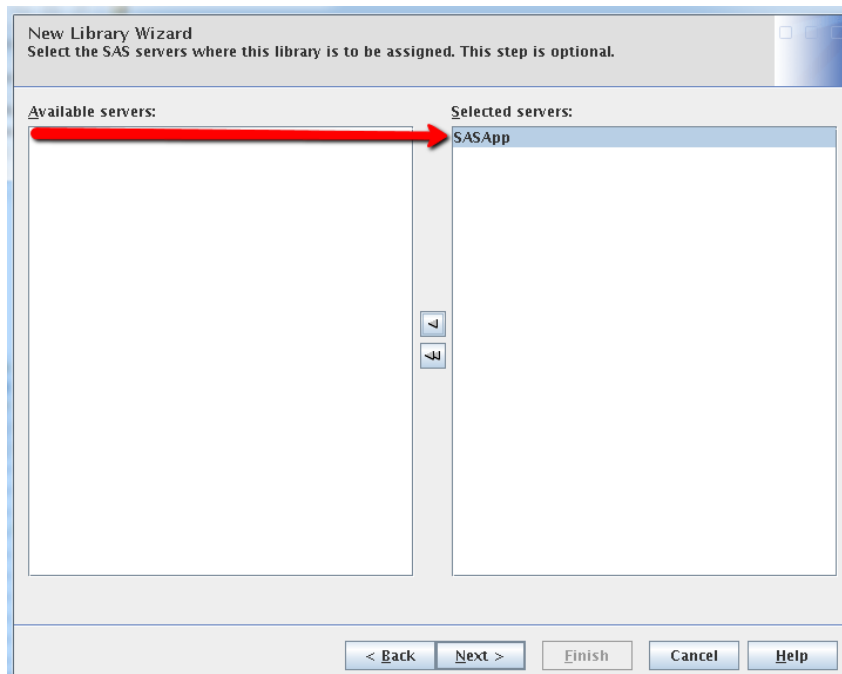**Figure 13. Select SAS LASR Analytic Server Library**

Name your LASR library and create a SAS folder to help with the permissions, as shown in Figure 14.

Figure 14. Define Name and Folder Location for LASR Library

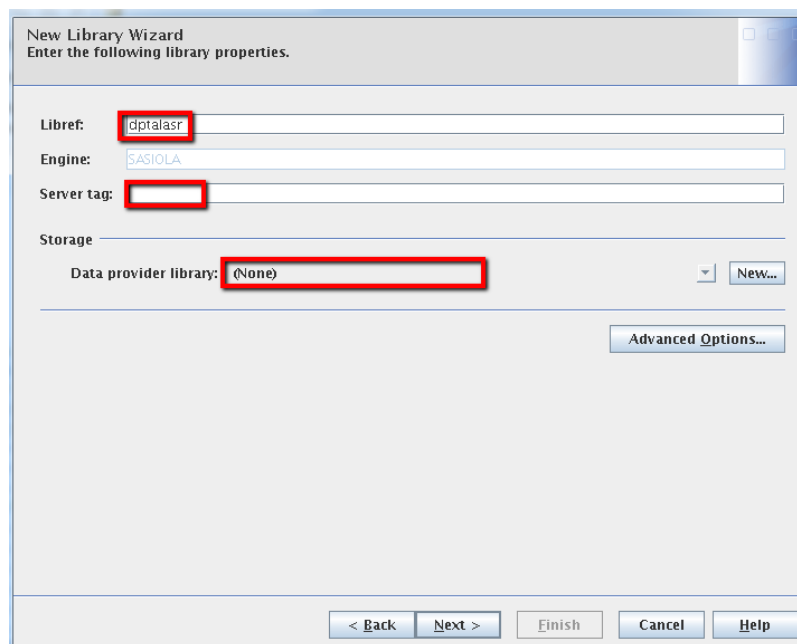Choose the appropriate SAS Application Server Context, as shown in Figure 15.

**Figure 15. Choose the SAS Application Server Context**

Define your libref, as shown in Figure 16. Note that the **Server tag** is not necessary in non-distributed environments. This setting is needed when you want to access data that is in a Hadoop Distributed File System (HDFS).

The **Data provider library** is necessary when you want to re-load tables when the SAS LASR Analytic Server starts. This is the library where SAS will place a copy of the source data. The library is a Base SAS® library.
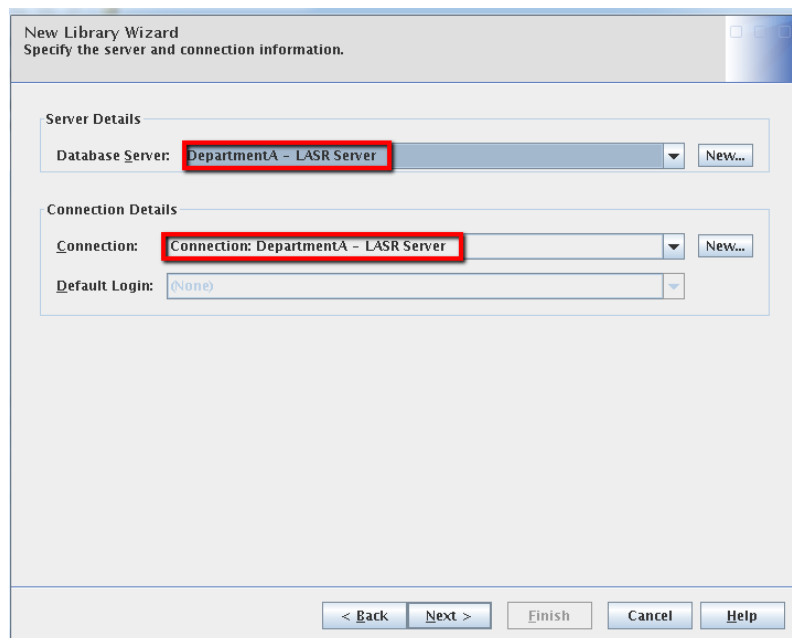

Figure 16. Define Your Libref

Now choose the appropriate SAS LASR Analytic Server for your **Database Server** definition, as shown in Figure 1Figure 17.
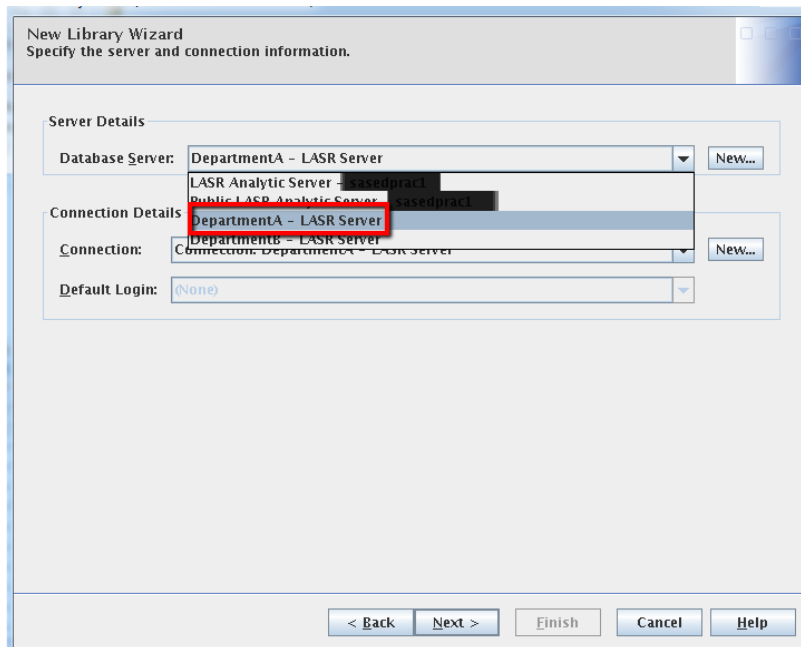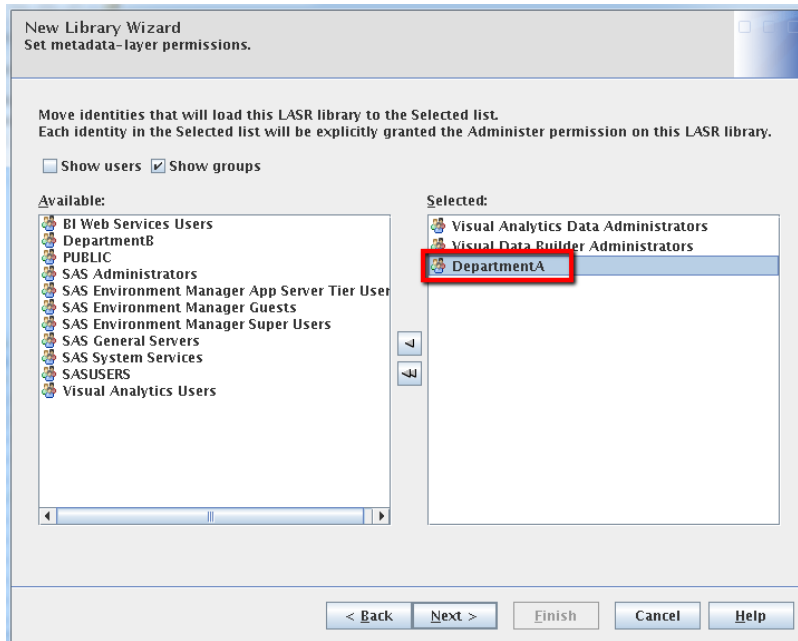
Figure 17. Choose the SAS LASR Analytic Server

The appropriate connection should auto-populate, as shown in Figure 18.

Figure 18. Allow the Field to Autopopulate

Next you can add groups or users to the permission layer to allow the groups and users to administer the LASR library, as shown in Figure 19.

Figure 19. Set Permissions for Groups

These LASR libraries show up as libraries under the **Data Library Manager**, as shown in Figure 20.
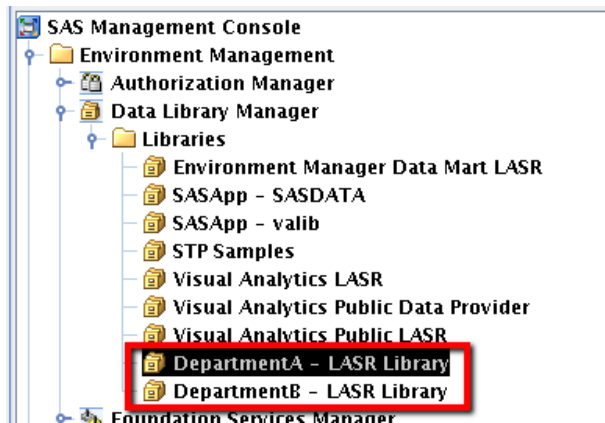
Figure 20. Find the LASR Libraries in the List

Confirm the correct permissions structure for the LASR library and the associate SAS folder location, as shown in Figure 21.
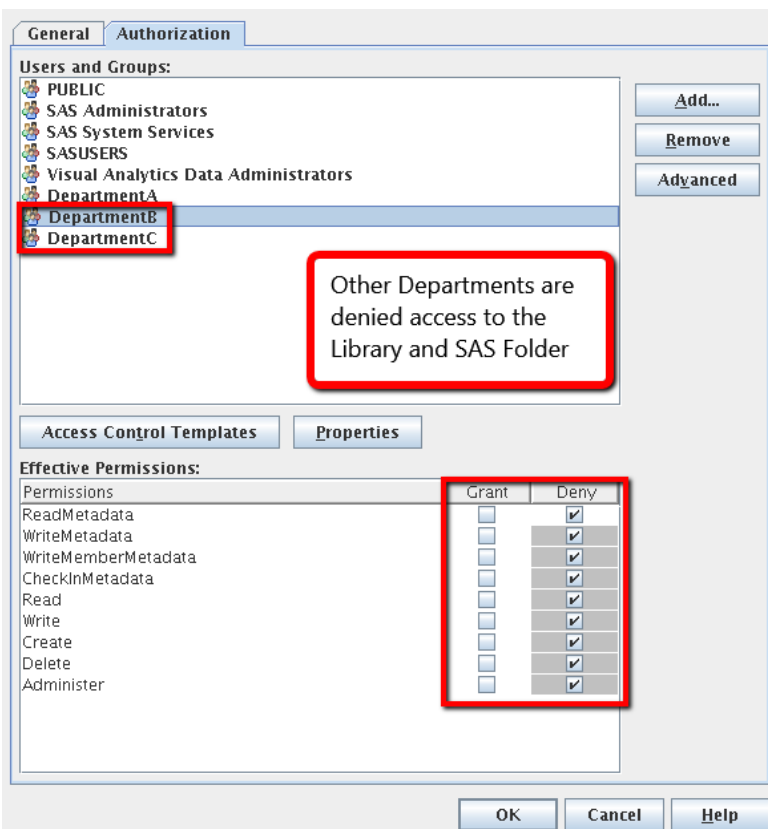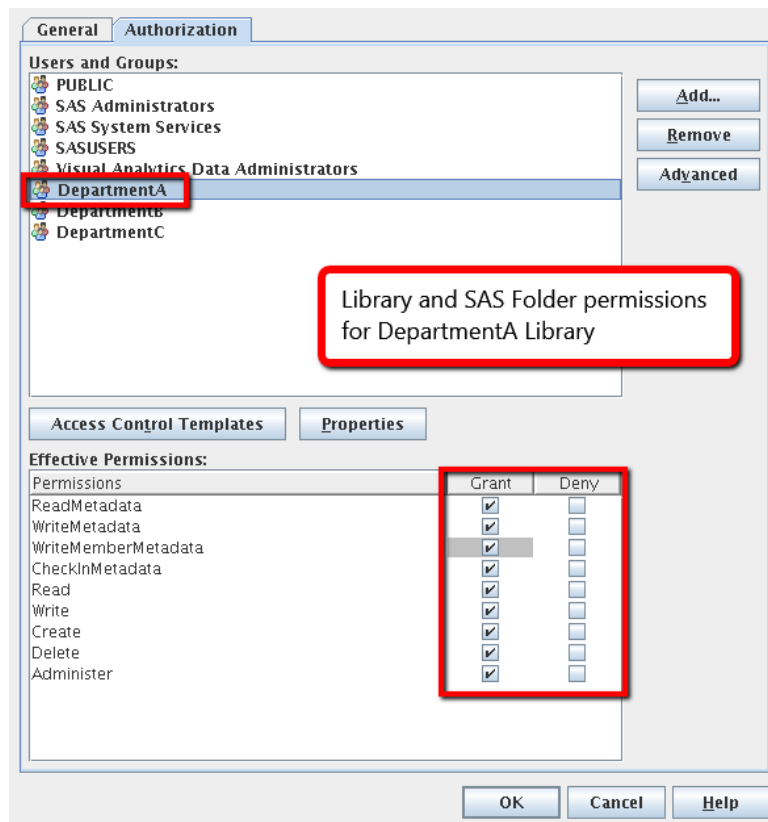
Figure 21. Confirm the Correct Permissions

The SAS LASR Analytic Server and LASR library are in place with specific permissions to separate the data. Now when you log on as a member of the DepartmentA group, you will see only your department-appropriate SAS LASR Analytic Server, as shown in Figure 22.
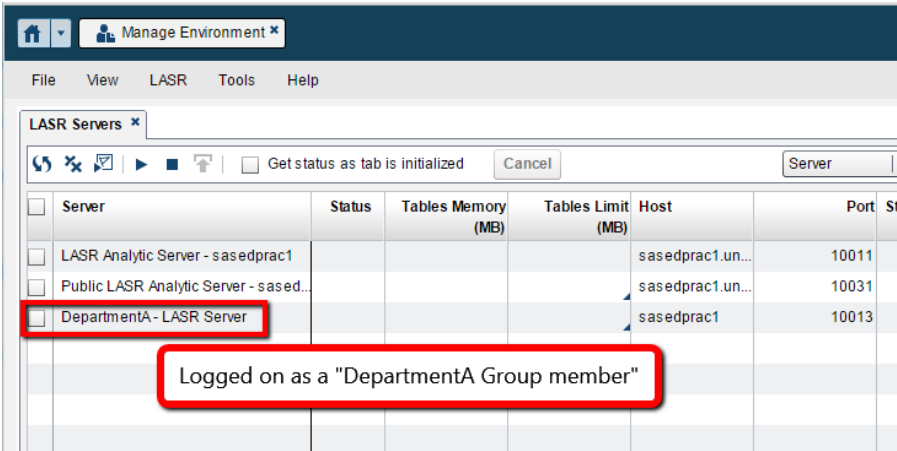

Figure 22. See Only Appropriate Servers

You should also be able to start the SAS LASR Analytic Server, as shown in Figure 23. If you are unable to start the server, check group permissions in SAS Management Console.
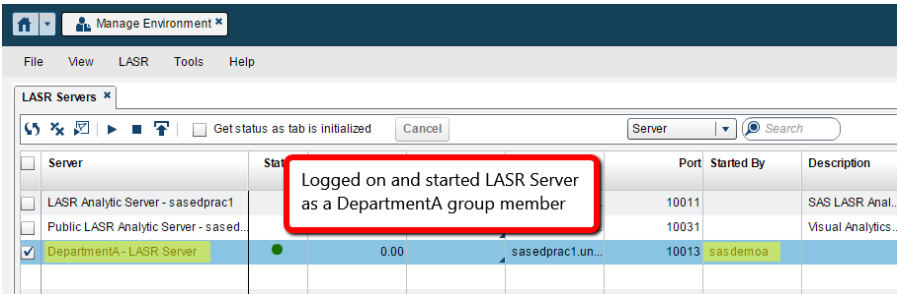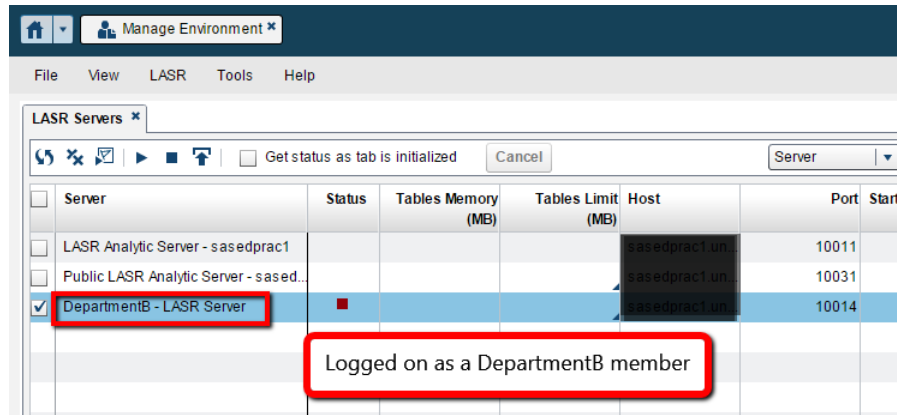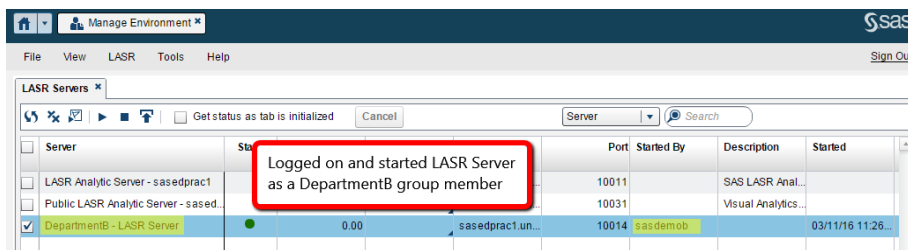

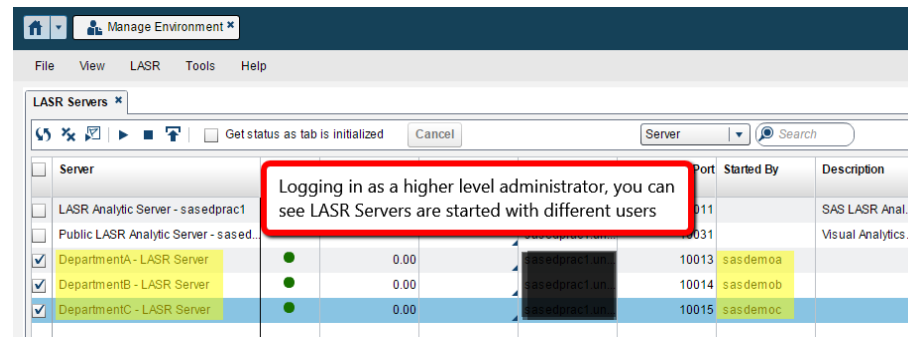**Figure 23. Start the SAS LASR Analytic Server**

Replicate the permissions for the other SAS LASR Analytic Servers, as shown in Figure 24.

Figure 24. Replicate Permissions for Other Servers

Notice all SAS LASR Analytic Servers are started with different users from different departments, as shown in Figure 25.

Figure 25. Notice Different Users in Started By Column

Note: The table name needs to be unique per SAS LASR Analytic Server. You can't have the same LASR table name twice in a SAS LASR Analytic Server.

Now your users are able to load data to their own SAS LASR Analytic Server. The process is still manual for users to get data into the system. They must go through the SAS Visual Analytics Administrator interface to load data, or import directly into SAS Visual Analytics. You have also given some "extra" administrative permissions to your users. If manually loading is not enough to get a grin from your users, or if the additional administrative permissions causes you to cringe, use the autoload option for SAS LASR Analytic Servers.

SELF-SERVICE AUTOLOAD

What's better than having your own SAS LASR Analytic Server? Having your own SAS LASR Analytic Server load your data for you! Time and again, the autoload process for SAS LASR Analytic Servers comes up on customer implementations. This is a great tool to keep users happy by giving them the power to load data into SAS LASR Analytic Server but keep the administration of the server to the SAS administrators. One major difference is that the users do not see the administration application, but rather have a physical file system folder where the users are allowed to save their data. As of now, you can autoload only SAS data sets, delimited files, and Microsoft Excel spreadsheets.

A great YouTube video produced by Bobbie Wagoner, "How to Auto Load Data to Memory in SAS Visual Analytics 7.1," walks you through the autoload process and is a great reference. (SAS Software 2015).

Some high-level screen shots are gathered below. Continuing with the multi-department groups, set up an autoload process for each group's SAS LASR Analytic Server.

You can start with the physical data location where users will be allowed to add and remove data. The default location for the autoload data folders is under the SAS Configuration

```
<SAS CONFIG>/Lev1/AppData/SASVisualAnalytics/VisualAnalyticsAdministrator/AutoLoad
```

Add autoload folders for each department, as shown in Figure 26. (Since we will allow users to save their own data, you will want to specify the most appropriate group permissions to the folders on the OS.)
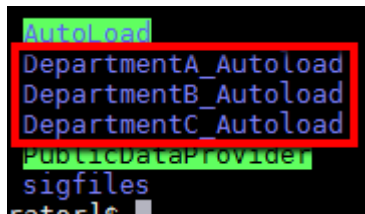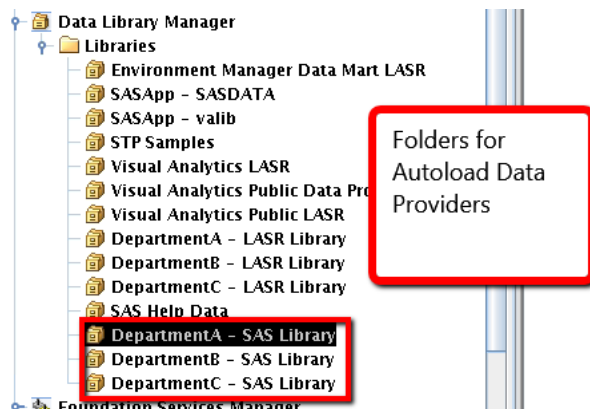
Figure 26. Add Autoload Folders

Each autoload folder will contain these subfolders shown in Figure 27:
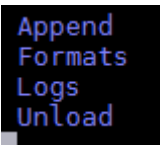
Figure 27. Subfolders under Autoload Folders

With the physical data locations set, you can create Base SAS library definitions in SAS Management Console, as shown in Figure 28.

Figure 28. Create SAS Library Definitions

To finish the work needed for metadata, adjust the LASR library definitions to reflect the upcoming autoload setup.

Edit each definition and set the matching data provider library (the Base SAS libraries just created), as shown in Figure 29.
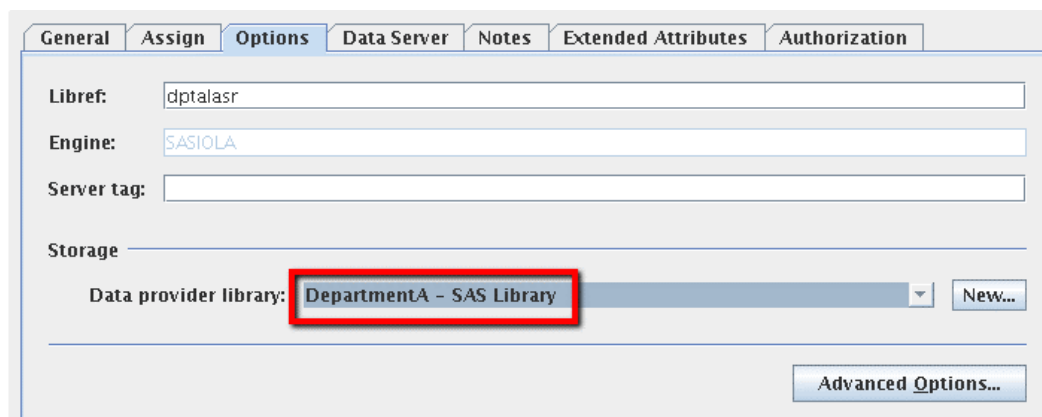
Figure 29. Set the Matching Data Provider Library

Adjust the **Extended Attributes** to match the metadata folder and the physical autoload location, as shown in Figure 30.

Figure 30. Set Extended Attributes

Double-check the attributes to ensure that the correct flags are marked "Yes" to enable the autoload options you want, as shown in Figure 31.

	General	Assign	Options	Data Server	Notes	Extended Attributes	Authorization	

#	Field Name	Value	Description
1	VA.Default.MetadataFolder	/Shared Data/DeptB-LASR/AutoLoad	Metadata location of autoloaded LA...
2	VA.AutoLoad.AutoStart	Yes	Automatically start the LASR server f...
3	VA.AutoLoad.Enabled	Yes	Enable autoload for this library (ad...
4	VA.AutoLoad.Location	/opt/sasinside/config/Lev1/AppDat...	Host location of the autoload data d...
5	VA.AutoLoad.Sync.Enabled	Yes	The parent attribute for autoload sy...
6	VA.AutoLoad.Sync.Import	No	Import spreadsheets and delimited ...
7	VA.AutoLoad.Sync.Load	No	Load new tables from the autoload ...
8	VA.AutoLoad.Sync.Refresh	No	Refresh LASR tables whose source t...
9	VA.AutoLoad.Sync.Append	No	Append tables that are in the Appe...
10	VA.AutoLoad.Sync.Unload	No	Unload tables that are in the Unload...
11	VA.AutoLoad.Debug.Enabled	No	Enable autoload debugging
12	VA.ReloadOnStart.Enabled	No	Controls if load on start is enabled f...
13	VA.ReloadOnStart.TableDefault	No	Determines if new tables added to t...
14	VA.ReloadOnStart.Method	All	Determines if load on start applies t...
15	VA.AutoLoad.Import.Delimiter.T...	TAB	Specifies the delimiter for TXT files
16	VA.AutoLoad.Compress.Enabled	No	Enable data compression
17	VA.AutoLoad.Import.RowsToScan	500	Number of rows to scan to determi...
18	VA.AutoLoad.ExpandChars.Ena...	No	Expand character variable lengths t...
19	VA.TableFullCopies		Number of complete single-node in...

	General	Assign	Options	Data Server	Notes	Extended Attributes	Authorization	

#	Field Name	Value	Description
1	VA.Default.MetadataFolder	/Shared Data/DeptB-LASR/AutoLoad	Metadata location of autoloaded LA...
2	VA.AutoLoad.AutoStart	Yes	Automatically start the LASR server f...
3	VA.AutoLoad.Enabled	Yes	Enable autoload for this library (ad...
4	VA.AutoLoad.Location	/opt/sasinside/config/Lev1/AppDat...	Host location of the autoload data d...
5	VA.AutoLoad.Sync.Enabled	Yes	The parent attribute for autoload sy...
6	VA.AutoLoad.Sync.Import	Yes	Import spreadsheets and delimited ...
7	VA.AutoLoad.Sync.Load	Yes	Load new tables from the autoload ...
8	VA.AutoLoad.Sync.Refresh	Yes	Refresh LASR tables whose source t...
9	VA.AutoLoad.Sync.Append	Yes	Append tables that are in the Appe...
10	VA.AutoLoad.Sync.Unload	Yes	Unload tables that are in the Unload...
11	VA.AutoLoad.Debug.Enabled	No	Enable autoload debugging
12	VA.ReloadOnStart.Enabled	Yes	Controls if load on start is enabled f...
13	VA.ReloadOnStart.TableDefault	Yes	Determines if new tables added to t...
14	VA.ReloadOnStart.Method	All	Determines if load on start applies t...
15	VA.AutoLoad.Import.Delimiter.T...	TAB	Specifies the delimiter for TXT files
16	VA.AutoLoad.Compress.Enabled	No	Enable data compression
17	VA.AutoLoad.Import.RowsToScan	500	Number of rows to scan to determi...
18	VA.AutoLoad.ExpandChars.Ena...	No	Expand character variable lengths t...
19	VA.TableFullCopies		Number of complete single-node in...

Figure 31. Ensure the Correct Flags Are Marked Yes

This should complete the steps for the metadata objects. Now it is time to focus on the scripts and prepare for scheduling the autoload process.

The default location for the SAS LASR Analytic Server autoload scripts is under the SAS Configuration.

```
<SAS CONFIG>/Lev1/Applications/SASVisualAnalytics/VisualAnalyticsAdministrator/
```

Create new folders for each department's autoload scripts, as shown in Figure 32.

Figure 32. Create New Folders for Autoload Scripts

Copy the files from the VisualAnalyticsAdministrator folder to each department autoload folder, as in this example in Figure 33.

Figure 33. Copy Files to Each Autoload Folder

Edit the scripts for locations and SAS LASR Analytic Server definitions, as shown in Figure 34.

Figure 34. Edit Scripts for Locations and Servers

Edit the runsas.sh schedule and unscheduled.sh to reflect the new autoload ROOT location, as shown in Figure 35.

```
#!/bin/bash
#
# runsas.sh
#
# syslog      Run AutoLoad.sas
#

# Source level_env
. /opt/sasinside/config/Lev1/level_env.sh

SERVER_CONTEXT=SASApp
APPSERVER_ROOT=$LEVEL_ROOT/$SERVER_CONTEXT
AUTOLOAD_ROOT=/opt/sasinside/config/Lev1/Applications/SASVisualAnalytics/VisualAnalyticsAdministrator/DepartmentA_Autoload

FILENAME="$AUTOLOAD_ROOT/AutoLoad.sas"
LOG_FILE="$AUTOLOAD_ROOT/Logs/AutoLoad_#Y.#m.#d_#H.#M.#s.log"
LST_FILE="$AUTOLOAD_ROOT/Logs/AutoLoad.lst"
PID_FILE=$AUTOLOAD_ROOT/autoload.pid
CFG_FILE="$AUTOLOAD_ROOT/AutoLoad.cfg"
MOD_FILE="$AUTOLOAD_ROOT/AutoLoad_usermods.cfg"

# Set config file path
export SASCFGPATH="$APPSERVER_ROOT/sasv9.cfg, $APPSERVER_ROOT/sasv9_usermods.cfg, $CFG_FILE, $MOD_FILE"

# Function to run the autoload.sas program and save the pid
fnRunSAS()
{
cd $APPSERVER_ROOT
$SAS_COMMAND -sysin $FILENAME -log $LOG_FILE -print $LST_FILE -batch -noterminal -logparm "rollover=session" &
   echo $! > $PID_FILE
```

Figure 35. Edit the Runsas Script

Edit the schedule script, as shown in Figure 36.

```
#!/bin/bash
#
# schedule.sh
#
# syslog      Schedule AutoLoad.sas
#

RUNSAS_PATH="/opt/sasinside/config/Lev1/Applications/SASVisualAnalytics/VisualAnalyticsAdministrator/DepartmentA_Autoload/runsas.sh"
TIME_INTERVAL_MINUTES=15


#call to runsas.sh
cat <(fgrep -i -v $RUNSAS_PATH <(crontab -l)) <(echo "*/$TIME_INTERVAL_MINUTES * * * * $RUNSAS_PATH > /dev/null ") | crontab -
~
```

Figure 36. Edit the Schedule Script

Edit the unscheduled script, as shown in Figure 37.

```
#!/bin/bash
#
# unschedule.sh
#
# syslog      Unschedule AutoLoad.sas
#

RUNSAS_PATH="/opt/sasinside/config/Lev1/Applications/SASVisualAnalytics/VisualAnalyticsAdministrator/DepartmentA_Autoload/runsas.sh"

crontab -l|fgrep -i -v $RUNSAS_PATH|crontab
```

Figure 37. Edit the Unscheduled Script

The final steps are to choose the right user to start your autoload process. Log on to the machine as the user and run the schedule.sh script under the applicable Department*x* folder, as shown in Figure 38.

```
PRAC1 VisualAnalyticsAdministrator]$ cd DepartmentA_Autoload/
PRAC1 DepartmentA_Autoload]$ ./schedule.sh
  for .as
PRAC1 DepartmentA_Autoload]$ crontab -l
 * /opt/sasinside/config/Lev1/Applications/SASVisualAnalytics/VisualAnalyticsAdminis
PRAC1 DepartmentA_Autoload]  cd ../DepartmentB_Autoload/
PRAC1 DepartmentB_Autoload]  ./schedule.sh
PRAC1 DepartmentB_Autoload]  cd ../DepartmentC_Autoload/
PRAC1 DepartmentC_Autoload]  ./schedule.sh
PRAC1 DepartmentC_Autoload]$ crontab -l
 * /opt/sasinside/config/Lev1/Applications/SASVisualAnalytics/VisualAnalyticsAdminis
 * /opt/sasinside/config/Lev1/Applications/SASVisualAnalytics/VisualAnalyticsAdminis
 * /opt/sasinside/config/Lev1/Applications/SASVisualAnalytics/VisualAnalyticsAdminis
PRAC1 DepartmentC_Autoload]$
```

Figure 38. Choose the Right User to Start the Autoload Process

With the SAS LASR Analytic Server autoload process in place, users will have ownership over their data and keep the potential of multiple iterations of manual administrative data loading to a minimum. Some allow users to SFTP the data to their designated folder. Stay mindful of the allocated disk space and add a separate disk volume to keep data from impacting application and operating system needs. Left to their own devices, isn't there a potential that users can overload their SAS LASR Analytic Server? Worry not! By default there is a limit on the amount of memory a SAS LASR Analytic Server will try to use. This default is set to 80% of the total memory and can be adjusted in the configuration if necessary. Now that you can catch your breath again, you might still want to restrict the separate SAS LASR Analytic Servers to meet your usage needs. So the question is, can you throttle up or down the SAS LASR Analytic Server capacity at will?

LIMITING SAS LASR ANALYTIC SERVER CAPACITY

With the user base now happy that they can load data on their own—be it manually through the SAS Visual Analytics Administrator interface, an import directly from the application, or through the autoload process—what can you do to keep the SAS LASR Analytic Servers from consuming too much RAM, or prevent a user from loading a table that is larger than your machine capacity? You can use the SAS option of MEMSIZE to ensure that your users are loading data within their allocated boundaries. The SAS LASR Analytic Server is still a SAS process and follows the SAS configuration files in the environment. If you have set up the autoload process, there will be individual scripts used to start the SAS LASR Analytic Server. This autoload script is pointing to an autoload_usermods.cfg file. In this configuration file, the desired MEMSIZE for that SAS LASR Analytic Server can be hard set. This will keep the users from loading more than their designated capacity.

You can set the autoload process to use all available RAM, as shown in Figure 39.

Figure 39. Specify the Autoload Process Is to Use All RAM

You can set the autoload process to use only 5 GB, which would limit the total table size in this particular SAS LASR Analytic Server to 5 GB, as shown in Figure 40.

Figure 40. Limit the Memory Available to the Autoload Process

After making any adjustments, be sure to restart the SAS LASR Analytic Server and the autoload process.

But wait, how does this option make users happy, you say? I'm limiting the amount of data they can load. Great point, but you are also setting boundaries so that the user community will not overwhelm another group, or make the SAS Visual Analytics environment a "first come, first served only" situation. I'm not promoting this idea, but some customers have even toyed with thoughts of monitoring the SAS LASR Analytic Servers and capacity, and charging the designated group for the LASR "footprint" on the system.

TO COMPRESS OR NOT TO COMPRESS?

Are you out of room and RAM for your SAS LASR Analytic Server? Do you just need more cow bell… I mean capacity? You might want to consider compressing the data. The SAS LASR Analytic Server allows the data to be compressed in-memory, which would allow more data to be loaded into memory. This does sounds great. However, it does come at a price. Please be aware there is some performance impact as the data must be uncompressed by the SAS LASR Analytic Server as it performs its calculation or action on the data. Please consider your individual scenario when thinking of compressing your SAS LASR Analytic Server data.

For more information, check out the article, "Tips and Techniques for Efficiently Updating and Loading Data into SAS® Visual Analytics." (Rivers and Redpath 2015)

In addition, the latest SAS documentation is available on support.sas.com.

Data compression is not an option? Well, there are more physical measures that can be made.

TIME FOR AN ARCHITECTURE CHANGE?

Your user community is happy with what they have, but they want more. Perhaps the server where SAS Visual Analytics is installed just needs more resources. Maybe it is just time for an upgrade. Be aware; just throwing more resources on a machine is not always the best answer. Depending on the operating system and the hardware, adding more processors and RAM could actually hurt your memory speed, which would hinder performance.

With an understanding of how to keep SAS LASR Analytic Server data in check, what happens if more capacity is needed? An excellent question. You can explore the resources in the "References" section. In particular, see the article "Thoughts on SAS Visual Analytics Architecture for Multiple Customer Groups" (Bigalke, 2015) and "Great Performances: SAS® Visual Analytics Performance Monitoring and Enhancement" (Pletzke and Franklin 2015)

Before jumping into new hardware, I implore you to go through a "sizing exercise" with the SAS Enterprise Excellence Center (EEC). This free service will take into account your current and anticipated usage, user count, and data load. The EEC can generate a recommendation based on your information. This information can be invaluable when contemplating the need to move to new hardware or a different architecture all together.

After receiving your hardware estimate, it is also recommended that you speak to your Account Executive in case you need further information or assistance to upgrade your environment or completely change your architecture.

CONCLUSION

As I hope you have found, there are many ways to help keep your SAS Visual Analytics users happy. Reaching out to your users and understanding their anticipated needs and uses of SAS Visual Analytics is a great place to start.

- Consider creating groups and roles specific to departments or groups. Wrap security around these groups for SAS folders and SAS LASR Analytic Server data

- Add additional SAS LASR Analytic Servers to split the data based on groups, projects, or other security needs.

- Also hide the other SAS LASR Analytic Servers from outside members.

- It might not fit all scenarios, but keep in mind the benefits of allowing users to autoload their own data.

- Limit the SAS LASR Analytic Server capacity to help resource contingency. Keep sizes realistic and negotiate with users, if needed.

- Data compression is not for everyone. If you're in a real pinch, it can be handy.

- The only constant is change. Add resources, refresh, or start a new architecture endeavor.

While each project and interaction can be different, these examples are intended to give ideas to help push the limits and exposure to SAS Visual Analytics. Keeping an eye on the SAS Visual Analytics environment and considering a few tweaks cannot only keep your user base happy, but they can help you, as an administrator, be happy too.

As SAS Visual Analytics continues to add features and functionality, future installments will cover new discoveries and experience gained in implementing with customers.

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