Welcome

While your waiting for the webinar to begin

Write suggestion for future webinar topics

During the presentation:

• Ask questions
• Provide suggestions
• Give feedback

Use the tools in the upper right corner of your screen
SAS Visual Analytics Working with data

- Get Data into LASR and keep data in LASR
  - The many approaches for loading data
    - GUI, programmatically (LASR/BASE), Autoload
    - Load, unload, reload
- Make Data Fast
  - What affect performance
  - General principles for optimizing data size
- The SAS Visual Analytics Environment
- #LifeLearner
  - More information

Not about security today!
Do not postpone proper sizing!
Not looking specific into Hadoop/HDFS, partitioned data or distributed MPP environments
Poll

What topic is of most interest for you?

- Loading data using user interface
- Autoload of data
- Load using code
- Optimize data size
- Monitor the load of data

Percent

0 20 40 60 80 100
Get Data into LASR and keep data in LASR

Import data from user interface

- **User Self-service**
  - Report Designer
    - Import data from a file
    - Import SAS data set on a server
    - Import a database table (SAS/ACCESS engine)
    - Import data from Facebook, Google Analytics, or Twitter

- **Administrator**
  - Import using Data Builder (prepare data)

Build Data capability

For deployments on Microsoft Windows, the host account must have the **Log on as a batch job** Windows privilege. For deployments on Linux that use a distributed SAS LASR Analytic Server, the host account must be configured for passwordless SSH.
Poll

What is your primary role using SAS Visual Analytics

- Administrator
- Data builder
- Report designer
- Report viewer/consumer
- All of the above

Data import

Data imports that are performed in the designer, the explorer, or the data builder are referred to as self-service imports.
SAS Visual Data Builder

- You can perform the following operations to add data to memory in the server:
  - load an existing table directly into memory
  - load the results of a data query into memory (or stage the data and then load it into memory)
  - append rows to an in-memory table
- After the data is in memory, you can perform the following operations with in-memory tables:
  - join in-memory tables to form a LASR star schema
  - append entire in-memory tables to another in-memory table
  - save in-memory tables to SASHDAT for persistence and fast reloads

Autoload

https://blogs.sas.com/content/sgf/2016/04/04/sas-visual-analytics-autoload-configuration-made-easy/
After a SAS LASR Analytic Server Restart

When an administrator restarts a SAS LASR Analytic Server, all the tables on the server are removed from memory as the server stops. Tables that you import with the self-service features remain in memory so long as the server is running. However, administrators cannot interactively reload imported tables for you. If you want to use a table that you imported after a server restart, then you must repeat the import action.

Tip

Your administrator can configure a server to automatically reload tables that were imported from local files after a restart.

### Availability Cycle: Methods by Data Type

<table>
<thead>
<tr>
<th>Data Type</th>
<th>Cycle of Data Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAS data set</td>
<td>import local → unload ≡ reload-on-start</td>
</tr>
<tr>
<td></td>
<td>import server → unload ≡ manual reload</td>
</tr>
<tr>
<td></td>
<td>autoload → unload ≡ autoload</td>
</tr>
<tr>
<td>Delimited file or spreadsheet</td>
<td>import local → unload ≡ reload-on-start</td>
</tr>
<tr>
<td></td>
<td>autoload → unload ≡ autoload</td>
</tr>
<tr>
<td>Database table</td>
<td>import server → unload ≡ manual reload</td>
</tr>
<tr>
<td>Google Analytics, Twitter, or Facebook</td>
<td>import other → unload ≡ reload-on-start</td>
</tr>
</tbody>
</table>

https://support.sas.com/documentation/cdl/en/vapdbgwin/68972/HTML/default/viewer.htm#p1kmnunllk4fxun1pk1jl0lk3zo9.htm
• Server-side performance
  • Is affected by the structure of the data table (or data tables) in the SAS LASR Analytic Server
• Client-side performance
  • Refers to the number and type of objects to render etc.
• Design performance
  • Includes things like the number of custom calculations and concatenation of strings etc.
• Network performance
  • Involves network topics like the distance from the web browser to the server etc.

Note: Server configuration regarding cpu, ram specifications etc, number of concurrent users etc also affects performance

Tables

ANALYTICAL BASE TABLES
The structure of an analytical base table is as follows:
- Flat, fully materialized (that is, pre-joined)
- Atomic (that is, at the lowest level of granularity for reporting)
- Dimensions, facts, and measure variables all in one table
This is the standard format for analytics.

STAR SCHEMAS
A star schema is a simple representation of a data mart where relations are defined between a fact table and one or more dimension tables either to create a LASR Star Schema View or to materialize a full LASR physical table in an analytical base table structure
LASR likes wide data

- do you always need all that data?
- Use a flat materialized table as your source
- Eliminate any unnecessary columns
- Reduce character field lengths where possible
- Reducing the decimal places in numeric data
- Consider moving hierarchy columns to another table (Star Schema View)
- Pivoting/transpose rows into columns to save space
- Combine multiply rows into aggregated rows
- Custom formats have a performance overhead that can be quite high on high cardinality fields
- Computed columns are virtual and exist as code that executes when the table is accessed. They take up no memory for storage.
- If possible move calculations and row-level transformations to the data preparation layer

### Transpose / pivot data

<table>
<thead>
<tr>
<th>Order date</th>
<th>region</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>01-jan-17</td>
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<td>124</td>
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<tr>
<td>01-feb-17</td>
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<td>01-mar-17</td>
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<td>01-jan-17</td>
<td>South</td>
<td>247</td>
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<tr>
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<td>East</td>
<td>863</td>
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<td>01-mar-17</td>
<td>West</td>
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<td>01-feb-17</td>
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<tr>
<td>01-feb-17</td>
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<tr>
<td>01-feb-17</td>
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</tr>
</tbody>
</table>

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<td>01-apr-17</td>
<td>918</td>
<td>764</td>
<td>857</td>
<td>142</td>
</tr>
</tbody>
</table>

TRANSPOSE_WIDE | 160.00 bytes

| TRANSACTIONS_TALL | 384.00 bytes | 60%
Data Compression

Sample 24804: %SQUEEZE-ing
Before Compressing Data, Redux


Formats

- The preferred method for making user-defined formats available to a SAS Application Server is to name the custom format catalog formats.sas7bcat, and to place it in SAS-config-dir/Lev1/SASApp/SASEnvironment/SASFormats

https://support.sas.com/documentation/cdl/en/inmsref/70021/HTML/default/viewer.htm?p0mnevys7e2h1yn186w7nv78y99r.htm
Assuming that dimensions do not change very frequently, new rows can be appended to the fact table of the star schema, and the star schema quickly recreated to provide access to the newly added rows.

Star Schema views carry a modest performance impact, space savings can be dramatic.

Data refresh strategy

- Complete overwrite with new data OR an append/update/delete process.
- A complete overwrite is a simple and easy solution, while an append/update/delete process is more complicated.

- Large Batch window might make overwrite possible using Data Step code (end users experience unavailable reports/data)

- If you do not have an adequate batch window, you should use the functionality available in the IMSTAT procedure.
- IMSTAT is primarily used for two tasks:
  - data and server management of LASR data
  - executing analytics
- (Advantage of PROC IMSTAT is that end users experience no down time)
Unload/load

Unload

PROC IMSTAT;
  table <libref>.<clasr table>:
  droptable;
run;
quit;

Load

PROC LASR add
  data = <libref>.<clasr table>
  port = <clasr port>
  noclass;
  performance host = "<clasr server host>";
run;

https://support.sas.com/documentation/cdl/en/inmsref/70021/HTML/default/viewer.htm#n1u5nf5kx7osnen1memir8pfzomr.htm

Tableinfo

PROC IMSTAT is used, in part, to manage in-memory tables and SAS LASR Analytic Server Instances

proc imstat;
  tableinfo/host="sasva.demo.sas.com" port=10031;
run;
VA Environment
Admin Space

Poll

What is your strategy for memory management?

- Only few users are allowed to upload
- Schedule unload of tables regularly
- We only take action when available memory is low
- Data best practice when designing tables (squeeze etc.)
- No strategy

Percent

[Bar chart showing the distribution of strategies]
Limit Self-service import

Requirement: User Privileges

The "Import and Load Data capability" is a prerequisite for all self-service imports. For example, users who perform self-service imports from Oracle should have both of the following capabilities:

- Import and Load Data
- Import from Oracle

Self-service import actions load data to memory, so users must have appropriate metadata-layer access to the target LASR library, server, and folder. See Permissions for Working with LASR Tables and Servers.

Self-service import actions use a workspace server and a SAS LASR Analytic Server, so users must have appropriate host-layer access. See Host Account Privileges.

How to Protect Imported Data

- Unless permissions are set directly on a LASR table, permissions on the LASR table's parent folder determine access

How to Limit Import Size

- **Row Limit** - To prevent users from importing extremely large DBMS tables, you can set a maximum number of rows for self-service imports of DBMS tables. See va_SelfService_ImportRowsHardCap.
- **File Size Limit** - To set the maximum file size (in megabytes) that a user can import, see va_SelfServe.MaxUploadSizeInMegabytes.
- **Tables Limit** - To limit the total amount of space that a SAS LASR Analytic Server can use to host tables, see Limit Space for Tables.

http://support.sas.com/documentation/cdl/en/vaag/69958/HTML/default/viewer.htm#nlauv14kyfl84nlx615nv72alp.htm
Remove Self-service import capabilities

Limit size of tables

How to Limit Space for Tables:

1. From the main menus, select LAIS > Manage Servers.
2. Click in the server’s Tables Limit cell and enter a number.
3. Save your changes, press the mouse (or click outside of the cell).
More ways to Limit users

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 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
Variables in Audit_VisualAnalytics table

<table>
<thead>
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<th>Object_type</th>
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<tr>
<td>Table</td>
<td>Add</td>
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<tr>
<td></td>
<td>Delete</td>
</tr>
<tr>
<td></td>
<td>Read</td>
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<tr>
<td></td>
<td>Release</td>
</tr>
<tr>
<td></td>
<td>Update</td>
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</tbody>
</table>

Getting started with SAS Visual Analytics 7.1 Audit Reports for Administrators
by AnnaBrown on 05-01-2015 07:31 PM - edited on 05-10-2015 10:23 PM by BeverlyBrown

Managing Audit Data in SAS Visual Analytics 7.1 and 7.2
by catherine_sas on 09-06-2015 01:13 PM - edited on 05-10-2015 10:17 PM by BeverlyBrown

Performance Debugging Window

- In SAS Visual Analytics Designer start with the performance debugging window
  - Identify long running queries
  - Test and compare different data table structures
- Press CTRL+ALT+P to open the performance debugging window
#LifeLearner
Experience your new possible

- Papers
- Documentation
- Blogs
- SAS Communities
- SAS Education

Reference papers

**Paper SAS734-2017**
Designing for Performance – Best Practices for SAS® Visual Analytics Reports
Kerri L. Rivers, SAS Institute Inc., Cary, NC

**Paper SAS635-2017**
The SAS® Visual Analytics Environment: Behind the Scenes
Amy Gabri, Beena Mathew, and Zuza Williams, SAS Institute Inc.

**Paper SAS684-2016**
Reeling Them Back in—Keeping SAS® Visual Analytics Users Happy, Behind the Scenes
David Franklin, SAS Institute Inc.

**Paper SAS1965-2015**
Tips and Techniques for Efficiently Updating and Loading Data into SAS® Visual Analytics
Keri L. Rivers and Christopher Redpath, SAS Institute Inc., Cary, NC

**Paper SAS347-2014**
Big Data Everywhere! Easily Loading and Managing Your Data in the SAS® LASR™ Analytic Server
Gary Metter and Donna Bennett, SAS Institute Inc., Cary NC

**Paper SAS567-2017**
Wrangling Your Data into Shape for In-Memory Analytics
Gary Mehler, SAS Institute Inc., Cary, NC

Transform Data Using Expression Builder in SAS® Visual Analytics
Data Management and Access Considerations for SAS® Visual Analytics

Blogs

How to shrink LASR tables

By Stephen Foester on SAS Users | October 30, 2015
https://blogs.sas.com/content/sgf/2015/10/30/how-to-shrink-lasr-tables/

Data visualization: first, prepare your data

By Steve Neelgren on SAS Voices | December 5, 2014
https://blogs.sas.com/content/sascom/2014/12/05/data-visualization-first-prepare-your-data/
<table>
<thead>
<tr>
<th>Communities</th>
<th>SAS Communities Library</th>
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<tbody>
<tr>
<td>LASR Memory – The Round Up</td>
<td>by MarkThomas on 07-12-2017 02:10 PM</td>
</tr>
<tr>
<td>Labels: Administration and Deployment, SAS Visual Analytics</td>
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<tr>
<td>Minimal Down-time LASR Table Data refresh (LASR Table &quot;Swap Out&quot;)</td>
<td>by UttamKumar 3 weeks ago - edited 3 weeks ago</td>
</tr>
<tr>
<td>Labels: Data Management, SAS Visual Analytics</td>
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</table>


https://communities.sas.com/t5/SAS-Communities-Library/Minimal-Down-time-LASR-Table-Data-refresh-LASR-Table-Swap-Out/ta-p/393277

https://communities.sas.com/t5/SAS-Visual-Analytics/Monitoring-Table-Memory-Use-T-TABLEMEMORY/m-p/288936/highlight/true#M4954

Almost at the end...
## FANS Event Series
### August - December 2017

To join FANS Event Series, you or your company needs to be a member of FANS.

Sign up for an interactive webinar tailored to your specific needs. For detailed agenda and more information on SAS Online Community.

<table>
<thead>
<tr>
<th>Date</th>
<th>Title</th>
<th>City</th>
<th>Time</th>
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<td>Espoo</td>
<td>12:00</td>
</tr>
<tr>
<td>6/10</td>
<td>Network Analytics Programming</td>
<td>Copenhagen</td>
<td>09:00</td>
</tr>
<tr>
<td>9/10</td>
<td>Network Decision - Visual Analytics</td>
<td>Copenhagen</td>
<td>08:30</td>
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<tr>
<td>10/10</td>
<td>Network Decision - Visual Analytics</td>
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<td>SAS Intro Tour</td>
<td>Stockholm</td>
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### SSE Nordic User Group

For more information, visit: https://www.sas.com/profile/ui/#/subscribe?subcode=521
See you at our next #SASNordicFANS events