Modernization

SAS9 + SAS Viya

SAS9 → SAS Viya

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February 2020
Agenda

• SAS Content Assessment tool
  • Assess inventory of your SAS 9 environments

• SAS Viya Readiness tool
  • Assess readiness of your SAS 9 programs to run in Cloud Analytic Services (CAS).

• Transitioning into SAS Viya
  • Roadmaps & selected SAS Applications
    - SAS Enterprise Guide, SAS Studio, SAS Data Integration Studio
Steps for Modernization

Plan
Prepare
Execute
Validate
Rollout

Document your business and technical goals
Assess your current environment
Design your target environment
Develop and document your plan for each phase
Assess Your Current Environment

SAS Content Assessment tool for a SAS 9 environment inventory overview
Purpose of SAS Content Assessment

• A collection of applications designed to inventory your SAS 9.4 system.
  • SAS 9.4 deployments vary greatly in terms of what products are installed and configured, how the products are used, and what & how much content has been produced.

• 3 important outcomes
  1. Help you understand your environment
     • Content and System Inventory
  2. Help SAS and you understand how you have used SAS features
     • Content Profiling
  3. Start a dialog with SAS about migration to SAS Viya
     • Determine what we can automatically convert, based on your priorities
SAS Content Assessment Applications

- **inventoryContent**
  - Counts SAS artifacts and content on your system.
    - SAS Metadata Server objects contained in SAS folders
    - SAS server and SAS application server contexts
    - Content produced by SAS products located on the file system
    - Content produced by SAS products located on the SAS Content Server
    - SAS Deployment Registry information
    - SAS licensing status and information
  - Can be run as needed on multiple SAS deployments.
  - Creates a data mart for each SAS deployment that is inventoried.
SAS Content Assessment Applications

- **publishAssessedContent**
  - Aggregates the data marts produced during the inventory process and creates a single, unified data mart.

- **Pre-defined Visual Analytics reports**
  - Reports enable you to visualize and drill into the inventoried content and share knowledge with stakeholders.
SAS Content Assessment Applications

Getting started

- Download and unzip tool
- Modify metaparms.sas, pathlist.txt, setenv.yaml
- Run inventoryContent.exe
- Run publishAssessedContent.exe with parameters
- Import inventory data to Viya
- Import VA json file to Viya
- View inventory in VA report
## Inventory of SAS Environment

### Content Items Found

<table>
<thead>
<tr>
<th>Portfolio</th>
<th>Sellable_Offering</th>
<th>Frequency</th>
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<tbody>
<tr>
<td>Analytics</td>
<td>SAS Enterprise Guide</td>
<td>21</td>
</tr>
<tr>
<td>Business Intelligence</td>
<td>SAS Enterprise BI Server</td>
<td>1</td>
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<tr>
<td>Business Intelligence</td>
<td>SAS Visual Analytics</td>
<td>14</td>
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<tr>
<td>Data Management</td>
<td>SAS Data Management</td>
<td>104</td>
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<tr>
<td>Data Management</td>
<td>SAS DI Studio</td>
<td>87</td>
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<td>SAS Federation Server</td>
<td>1</td>
</tr>
<tr>
<td>Data Management</td>
<td>SAS/ACCESS</td>
<td>1</td>
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<tr>
<td>Items not yet Scannable</td>
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### Servers Found

<table>
<thead>
<tr>
<th>Server Definitions</th>
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<tr>
<td>Connect and Grid Servers</td>
<td>5</td>
</tr>
<tr>
<td>Database Servers</td>
<td>2</td>
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<tr>
<td>SAS Data Servers</td>
<td>8</td>
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<tr>
<td>Integration Technology Servers</td>
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### Detailed Server Types Found

<table>
<thead>
<tr>
<th>Type</th>
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<tr>
<td>ApplicationServer</td>
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<tr>
<td>LogicalServer.DataStepBatch</td>
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</tr>
<tr>
<td>LogicalServer.JavaBatch</td>
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<tr>
<td>LogicalServer.Metadata</td>
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</tr>
<tr>
<td>LogicalServer.PooledWorkspace</td>
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<tr>
<td>LogicalServer.StoredProcess</td>
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</table>

### Types of Items Found

<table>
<thead>
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<td>ExternalFile</td>
<td>MetadataServer</td>
<td>4</td>
</tr>
<tr>
<td>ConditionActionSet</td>
<td>MetadataServer</td>
<td>18</td>
</tr>
</tbody>
</table>
Inventory of SAS Environment

Overview of SAS DI Studio jobs!
Inventory of SAS Environment

Overview of SAS EG projects!
Inventory of SAS Environment

Overview software version & hotfixes
Live Demo

SAS Content Assessment Tool
Assess Your Current Environment

SAS Viya Readiness tool to assess your SAS 9 programs
What is Viya Readiness?

SAS

CAS

The two engines of the SAS Viya Platform
What is Viya Readiness?

Enable all or parts of a SAS program to run in CAS, if it makes sense to do so.

```sas
cas;
caslib _all_ assign;
libname test '/sasfolders';

%data test.class;
set sashelp.class;
run;

%data casuser.class;
set test.class;
run;

%data casuser.class1;
set casuser.class;
ratio=height/weight;
run;
```
When it Makes Sense to Run in CAS

A Case Study – DATA Step

• Financial Use Case
  • Monte Carlo Simulations for Delinquency
    • DATA Step
      • ~20,000 line
      • Source table ~1TB
      • Target table ~50GB
    • Multiple Iteration of DATA Step
      • SAS Workspace Server - 1 hour per iteration
  • Business Benefit
    • Quicker time to offer
    • No other processes were allowed to run while Monte Carlo simulation runs
      • 26 Hours (Workspace Server)
      • 2 ½ Hours (CAS)

• To CAS Enable DATA Step
  • Changed multiple RANUNI functions (SPRE – Viya’s Compute Server) to RAND function (CAS Enabled)
  • Changed source and target tables in DATA Step to use CASLIB instead of 9.4 LIBREF
  • Commented out PROC APPEND
  • Created CAS enabled DATA Step to emulate append process
  • Multiple iteration of CAS enabled DATA Step
    • CAS - 6 minutes per iteration
When it Makes Sense to Run in CAS

A Case Study – DATA Step – PROC LOGISTIC

• **US Government Use Case**
  - **51 Iterations** of program for Analytical Base Table creation for Modeling and Scoring
    - **DATA Step and Base PROCS**
  - Source tables: ~220GB – 230GB
  - Target tables: ~44GB – 46GB

• **Business Benefit**
  - Faster time to results which allows for increased frequency of process execution.
  - Maintaining accuracy of results between 9.4 and Viya
  - **Workspace server (SAS 9)**
    - 56 hours
  - **CAS**
    - 9 hours
  - **To CAS Enable the Process - Little to no changes required!**
    - Changed source and target tables in DATA Step to use CASLIB instead of 9.4 LIBREF
    - *Run BY statements with high cardinality variables (~50 million unique ids) in SPRE (Viya’s Compute Server)*
      - PROC SORT (SPRE, source CAS table, target WORK table)
      - DATA Step (SPRE, source WORK table, target WORK table)
      - PROC CASUTIL to lift WORK table into CAS
    - Changed PROC SQL to PROC FEDSQL for CAS execution
    - Changed PROC FREQ to PROC FREQTAB for CAS execution
    - Converted PROC LOGISTIC to PROC LOGSELECT for CAS execution.
    - Added subsequent DATA Step to call score code using %INCLUDE statement.
    - **CAS Enabled DATA Step and Base PROCS**
      - 18 hours -> 7 hours
    - **CAS Enabled PROC LOGISTIC (PROC LOGSELECT)**
      - 38 hours -> 2 hours
About the SAS Viya Readiness Tool

- Assists with identifying SAS source code capable of executing in SAS or CAS.
- Provides NO estimate for the effort of converting SAS programs to SAS or CAS.
- Provides NO indication whether a SAS program will perform better.
SAS Viya Readiness Utility Tool

Reports

• Report types
  • LIBNAME report
  • Four summary reports
  • One detail report for each SAS program processed

• Reports are in the application root directory within the `report` and `report\detail` sub directories.
SAS Viya Readiness Utility Tool

Libname report

- This report is grouped by LIBNAME and displays all files that contain LIBNAME.
- Useful in identifying SAS 9 LIBNAMEs that cannot be processed in SAS Viya
  - SAS 9 LIBNAME with authentication domains, SASIOLA and META engines, as well as SAS/Share LIBNAME.
SAS Viya Readiness Utility Tool
Frequency Report

- A count of all data steps and procedures.
- Indicates which data steps and procedures are CAS enabled, candidates for conversion into a CAS Action Set, or programs that must run in a workspace server.

<table>
<thead>
<tr>
<th>Step</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Frequency</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS Enabled - PROC MEANS</td>
<td>1</td>
<td>3.03</td>
<td>1</td>
<td>3.03</td>
</tr>
<tr>
<td>CAS Enabled - PROC TABULATE</td>
<td>2</td>
<td>6.06</td>
<td>3</td>
<td>9.09</td>
</tr>
<tr>
<td>Candidate for CAS - DATA STEP</td>
<td>4</td>
<td>12.12</td>
<td>7</td>
<td>21.21</td>
</tr>
<tr>
<td>Candidate for CAS - PROC RANK</td>
<td>4</td>
<td>12.12</td>
<td>11</td>
<td>33.33</td>
</tr>
<tr>
<td>Candidate for CAS by Converting to PROC FEDSQL - PROC SQL</td>
<td>2</td>
<td>6.06</td>
<td>13</td>
<td>39.39</td>
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<tr>
<td>Candidate for CAS by Converting to PROC FREQTAB - PROC FREQ</td>
<td>2</td>
<td>6.06</td>
<td>15</td>
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<tr>
<td>Candidate for Commenting Out - PROC SORT</td>
<td>4</td>
<td>12.12</td>
<td>19</td>
<td>57.58</td>
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<tr>
<td>Workspace Server - OPEN CODE</td>
<td>8</td>
<td>24.24</td>
<td>27</td>
<td>81.82</td>
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</tbody>
</table>
# SAS Viya Readiness Utility Tool

## Program summary

### sspg38

**SAS Viya Code Readiness**

9 SAS Programs

<table>
<thead>
<tr>
<th>Program Name</th>
<th>LOC</th>
<th>Steps</th>
<th>CAS</th>
<th>Macro</th>
<th>Include</th>
</tr>
</thead>
<tbody>
<tr>
<td>sp01a03.sas</td>
<td>33</td>
<td>10</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>sp01a03_s.sas</td>
<td>33</td>
<td>10</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>sp01a07.sas</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
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<tr>
<td>sp01d01.sas</td>
<td>6</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>sp01d02.sas</td>
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<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>sp01d02_s.sas</td>
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<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>sp01p02.sas</td>
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<td>2</td>
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<td>sp01p02_s.sas</td>
<td>13</td>
<td>3</td>
<td>2</td>
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<td>0</td>
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<tr>
<td>sp02d03.sas</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

### Column Description

- **Program Name**: Name of the program processed by the utility.
- **LOC**: Lines of code within the program processed.
- **Steps**: Number of program steps. A data step, procedure and a libname statement would be considered a step.
- **CAS**: Number of keywords that are not supported in CAS.
- **Macro**: Number of macro statements. Any keyword that begins with a % is counted except macro statements that can be used outside of a data step or procedure, %PUT statement for example. This information is included since unresolved macro code could not be assessed by the utility and will need to be manually evaluated by the reviewer.
- **Include**: Number of include statements. Any %include statement is counted. This information is included since source code referenced by the %include statement could not be assessed by the utility and will need to be manually evaluated by the reviewer.
## SAS Viya Readiness Utility Tool
### Step Summary

**sspg38**

**SAS Viya Code Readiness**

**9 SAS Programs**

<table>
<thead>
<tr>
<th>Line Number / Step</th>
<th>CAS</th>
<th>Macro</th>
<th>Include</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 PROC SORT</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4 PROC TABULATE</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Column</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Name</td>
<td>Name of the program processed by the utility. Appears at the top of each page.</td>
</tr>
<tr>
<td>Line Number / Step</td>
<td>Line number each step begins on and the step type. Line numbers correspond to source code found in the ‘detail directory and not the original code processed.</td>
</tr>
<tr>
<td>CAS</td>
<td>Number of keywords that are not supported in CAS.</td>
</tr>
<tr>
<td>Macro</td>
<td>Number of macro statements. Any keyword that begins with a % is counted except macro statements that can be used outside of a data step or procedure. %PUT statement for example. This information is included since unresolved macro code could not be assessed by the utility and will need to be manually evaluated by the reviewer.</td>
</tr>
<tr>
<td>Include</td>
<td>Number of include statements. Any %include statement is counted. This information is included since source code referenced by the %include statement could not be assessed by the utility and will need to be manually evaluated by the reviewer.</td>
</tr>
</tbody>
</table>
# SAS Viya Readiness Utility
## Category Summary

### sp01a03_s.sas

<table>
<thead>
<tr>
<th>Category</th>
<th>Keyword</th>
<th>CAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>procedure</td>
<td>PRINT</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>RANK</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>SORT</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>SQL</td>
<td>1</td>
</tr>
</tbody>
</table>

**Legend:**
- **CAS:** Number of keywords that are not supported in CAS.
**SAS Viya Readiness Utility Tool**

**Detail Reports**

- One report for each source code file processed.
- Contain the detail information used in all summary reports and can be used to determine specific instances where a keyword, `%macro` statement or `%include` statement was identified.

```sas
|sp01p02_s.sas

Flags: M=%macro I=%include D=Data Related

<table>
<thead>
<tr>
<th>Category</th>
<th>Search Type</th>
<th>Restriction</th>
<th>Keyword</th>
<th>Flags</th>
<th>Line</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROCEDURE</td>
<td>procedure</td>
<td>CAS</td>
<td>CATALOG</td>
<td>D</td>
<td>1</td>
<td>proc catalog catalog=mylib.formats;</td>
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<td>PROCEDURE</td>
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<td></td>
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<td>contents;</td>
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<tr>
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<td></td>
<td></td>
<td></td>
<td>3</td>
<td>run;</td>
</tr>
<tr>
<td>PROCEDURE</td>
<td>procedure</td>
<td>CAS</td>
<td>SORT</td>
<td>D</td>
<td>4</td>
<td>proc sort data=sashelp.shoes out=work.shoeProducts;</td>
</tr>
<tr>
<td>PROCEDURE</td>
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<td></td>
<td></td>
<td></td>
<td>5</td>
<td>by Region Product;</td>
</tr>
<tr>
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<td>No Matching Keywords</td>
<td></td>
<td></td>
<td></td>
<td>6</td>
<td>run;</td>
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<td>PROCEDURE</td>
<td>No Matching Keywords</td>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td>proc tabulate data=work.shoeproducts format=comma10.;</td>
</tr>
<tr>
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<td>No Matching Keywords</td>
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<td></td>
<td></td>
<td>8</td>
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<td></td>
<td></td>
<td></td>
<td>9</td>
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<tr>
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<td>No Matching Keywords</td>
<td></td>
<td></td>
<td></td>
<td>10</td>
<td>class Product / order=formatted missing;</td>
</tr>
</tbody>
</table>
```
Are you Viya Ready?

- You have working knowledge of base SAS programming
- Brush up on Proc FEDSQL, Proc DS2
- Learn about new CAS procs and CAS proc equivalents to SAS9 procs
- Get a grip on how a data step works in a distributed environment
- Up your game and learn CASL (it is all about CAS actions)
Live Demo

SAS Viya Readiness Utility Tool
Assess Your Current Environment

Transitioning into SAS Viya - roadmaps & selected SAS applications
All SAS Viya native applications are browser applications.

There are no plans to build desktop applications for SAS Viya.

You can work on SAS Viya CAS server thru SAS9 browser applications (SAS Studio etc.) and SAS9 desktop applications (SAS Data Integration Studio, SAS Enterprise Guide etc.).

SAS Viya 4.0 is released 2020 - fully cloud native, supported by continuous integration and continuous development.

SAS continues to support SAS9 many years ahead.
SAS Enterprise Guide Roadmap

2020

- SAS Enterprise Guide will not be developed specifically for SAS Viya
- SAS Enterprise Guide 8.2 (19W47) can connect directly to SAS Viya without SAS 9 (prereqs apply)
  - This is a limited availability option for users who love SAS Enterprise Guide and want to continue working with SAS Enterprise Guide on Viya.
- Minor updates/fixes beyond release 19W47
  - Focus is on enhancing SAS Studio to provide replacement functionality.
- The ability to migrate SAS Enterprise projects to SAS Studio coincides with a 2020 SAS Studio release containing visual flows.
  - In the meantime use your SAS EG projects directly on SAS Viya or continue in SAS 9.
- SAS is committed to supporting SAS Enterprise Guide many years ahead
SAS Enterprise Guide/SAS Studio etc.

• Git integration
  • Using Git functions in SAS programming
  • Fully integrated in SAS Studio & SAS Enterprise Guide
2020

- Current release of Studio on Viya 3.5 is 5.2
- New release scheduled for SAS Viya 4 mid-2020
- Current release of Studio on SAS 9 is 3.8
  - Only minor updates/fixes ahead
Planned features in this future SAS Viya release include:

- Data Integration – SAS Studio Flow
  - Common data flow design environment combining capabilities from SAS Studio, SAS Data Integration Studio, and SAS Enterprise Guide
  - Ability to access advanced capabilities will be controlled through roles
  - Ability to move data in and out through SAS Compute (MVA SAS) runtime on SAS Viya
Planned features in this future SAS Viya release include:

- Data Integration (continued)
  - Tentative transformation list
    - User Written
    - Join, Set, Append, Sort
    - Extract
    - SQL related transforms
    - Expression builder
    - File read/write
    - Generated transform
Planned features in this future SAS Viya release include:

- Data Integration (continued)
  - Data Viewer
  - Git integration
- Design Flow Diagram features:
  - Run progress and status
  - Run options (Run/Stop) and run mode
  - Error handling and logs
  - Control/show transform order
  - Variable management
  - Drag and drop transforms
  - Undo/redo
  - Move objects around and save placement
Planned features in this future SAS Viya release include:

- Data Cataloging
  - Metadata Search
  - All Viya Data Assets (Sources, Tables, Columns)
  - Integration with Lineage
  - Metadata Crawlers and Analyzers
  - ODPI Egeria Connector