

US CONNECT 2022 IN ATLANTA



When to CASL and not to CASL, SAS programming in SAS Viya

- Pritesh Desai

Principal Strategic Advisor @ SAS HLS

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Agenda

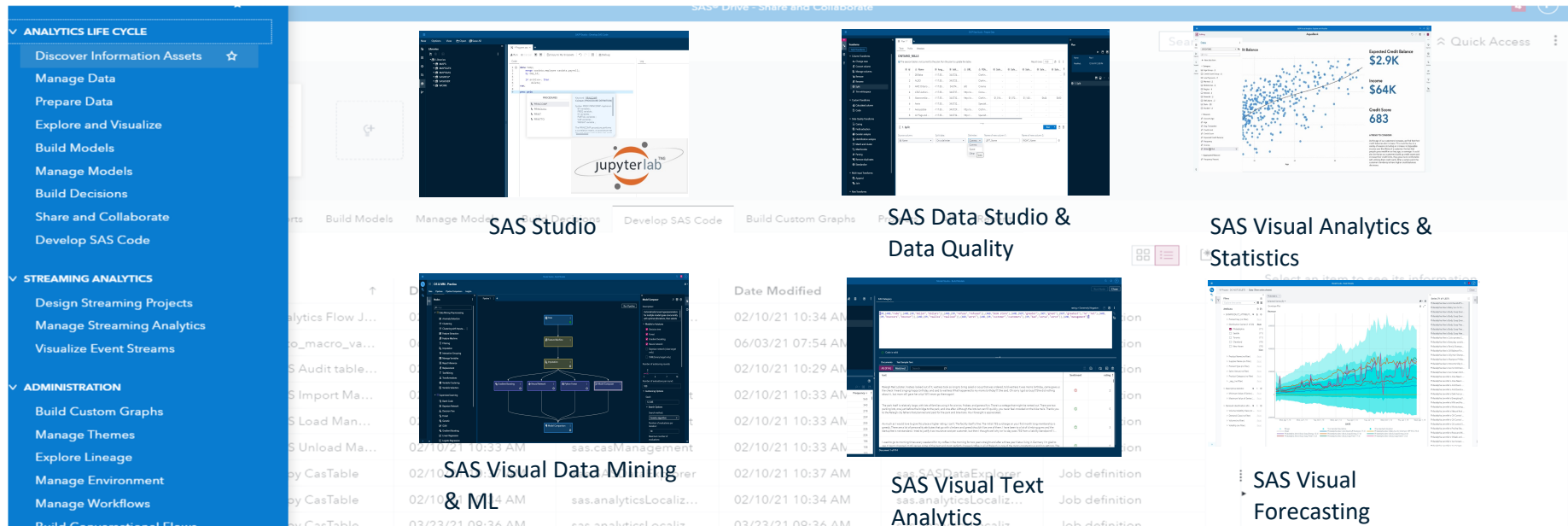
- Introduction about what we will cover and not cover in this presentation.
- Introduction to SAS Viya.
- Where are you going to do CASL Programming?
- Introduction to CASL Programming.
- When to CASL and not to CASL best practices.
- References and exercise by peers.

What we will cover and not cover in this presentation

- This presentation will NOT cover how to do CASL Programming, open-source programming, how to improve your code, code optimization, code migration or how to use Rest API when doing CASL Programming.
- This presentation will cover What is CASL programming, Where are you going to do CASL programming and what are the best practices, should you choose to do CASL Programming.

Introduction to SAS Viya

SAS Viya is the latest architecture release from SAS. SAS Viya is your one-stop-shop for all your analytic needs, all running on a very powerful **in-memory engine**.



The screenshot displays the SAS Viya user interface. On the left is a blue sidebar menu with the following sections:

- ANALYTICS LIFE CYCLE**
 - Discover Information Assets ☆
 - Manage Data
 - Prepare Data
 - Explore and Visualize
 - Build Models
 - Manage Models
 - Build Decisions
 - Share and Collaborate
 - Develop SAS Code
- STREAMING ANALYTICS**
 - Design Streaming Projects
 - Manage Streaming Analytics
 - Visualize Event Streams
- ADMINISTRATION**
 - Build Custom Graphs
 - Manage Themes
 - Explore Lineage
 - Manage Environment
 - Manage Workflows
 - Build Conversational Flows

The main content area shows several tool tiles:

- SAS Studio**: A tile showing a JupyterLab interface with a code editor and a file browser.
- SAS Data Studio & Data Quality**: A tile showing a data table with columns like 'NAME', 'AGE', 'GENDER', 'SALARY', and 'CITY'.
- SAS Visual Analytics & Statistics**: A tile showing a scatter plot with a regression line and summary statistics: Expected Credit Balance \$2.9K, Income \$64K, Credit Score 683.
- SAS Visual Data Mining & ML**: A tile showing a flowchart of a machine learning model.
- SAS Visual Text Analytics**: A tile showing a document with text and a sidebar with a list of documents.
- SAS Visual Forecasting**: A tile showing a time series plot with a trend line and a shaded confidence interval.

SAS
Programmer



Business
Analyst



Data
Scientist



Open-Source
Programmer

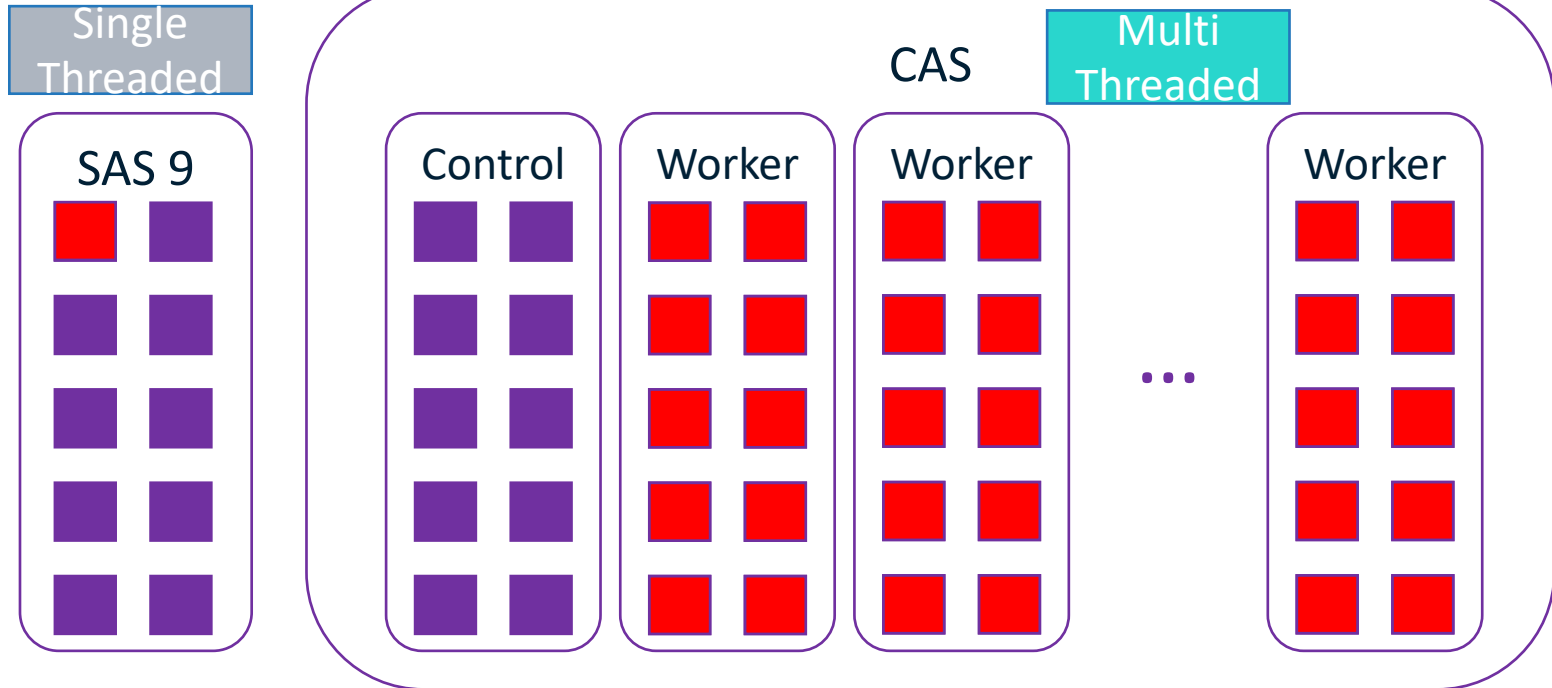


Executive

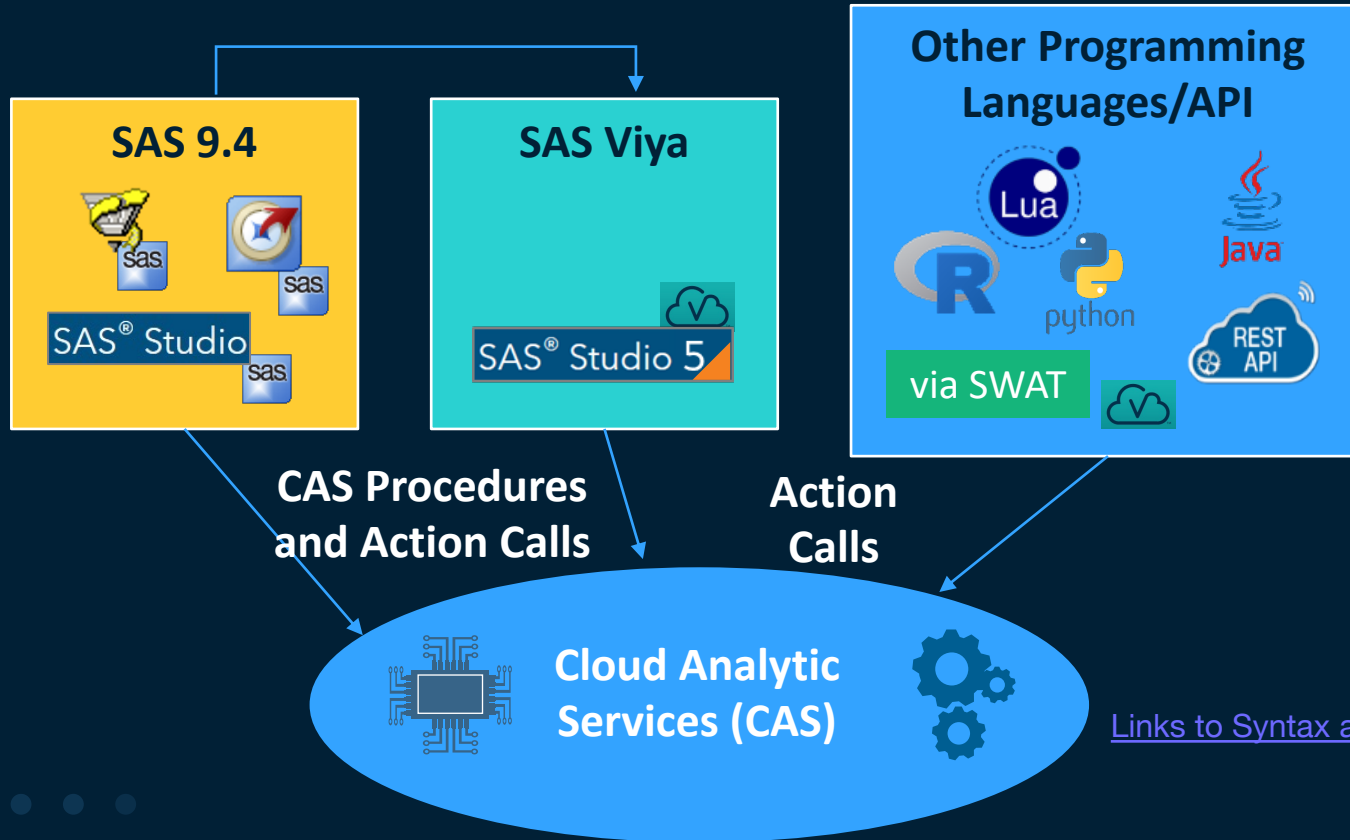


Introduction to SAS Viya

SAS Viya Execution



Where are you going to do CASL Programming?



Introduction to SAS CASL Programming

-SAS CAS (Cloud Analytic Services) Language.

Characteristics of the CAS language (CASL)

- CASL is a statement-based language.
- The language is case insensitive.
- CASL is a scripting language for running actions, working with results, developing analytic pipelines etc.
- Statements can include keywords like actions, functions, expressions & terminated with a semicolon (;).

Uses for CASL

- Develop analytic pipelines.
- Use actions to submit requests to the CAS server and return results.
- Evaluate and manipulate results returned by actions.
- Create the arguments to an action.
- Create user-defined actions and functions

[Getting Started with SAS Viya](#)

Introduction to SAS CASL Programming

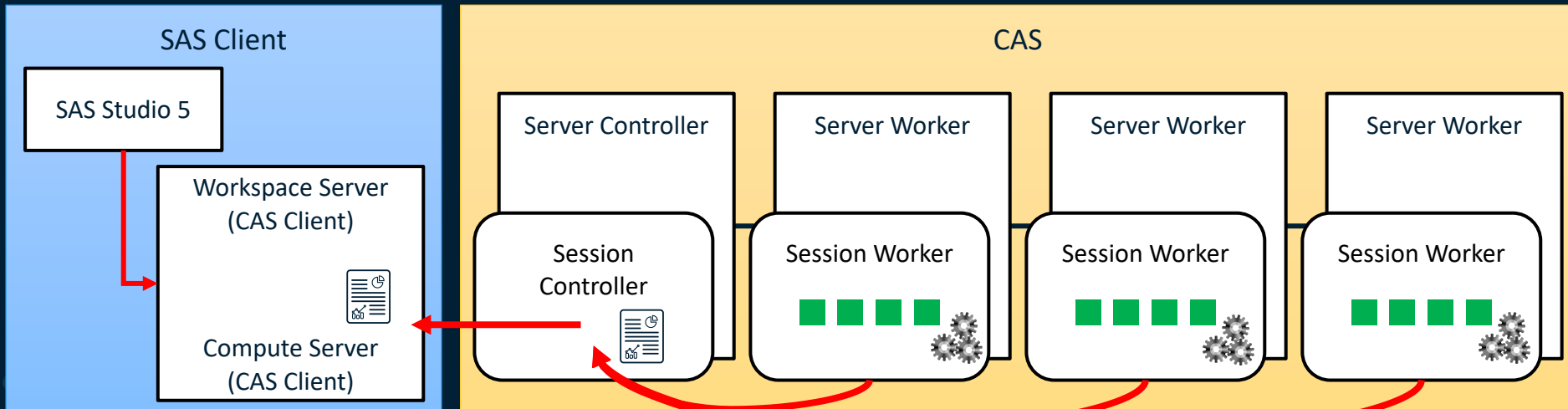
-SAS CAS (Cloud Analytic Services) Language.

Interface	Start CAS Session
SAS Studio	<pre>session s; Proc CAS; table.columnInfo / table="iris"; Quit;</pre>
Python	<pre>results = s.table.columnInfo(table="iris")</pre>
Lua	<pre>results = s:table_columnInfo{table="iris"}</pre>
R	<pre>Results <- cas.table.columnInfo(s,table=list("iris"))</pre>
REST	End Point: https://cloud.example.com:8777/cas/sessions/session-uuid/actions/table.columnInfo Request: <pre>{"table": { "caslib": "casuser" "name": "table1" }}</pre>
Java	<pre>//com.sas.cas.actions.table //public ColumnInfoOptions columnInfo() //Set our options Castable tableParms = new Castable(); tableParms.setName("iris"); //Invoke the action CASActionResults<CASValue> results = client.invoke(tableParms);</pre>

Introduction to SAS CASL Programming

-SAS CAS (Cloud Analytic Services) Language.

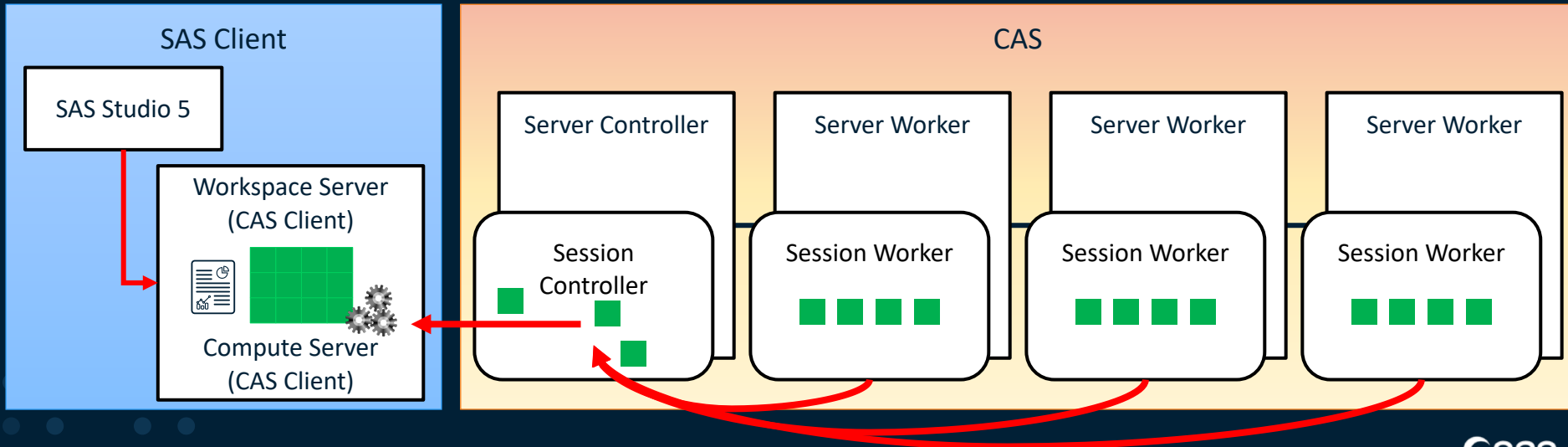
CAS-enabled data processing



Introduction to SAS CASL Programming

-SAS CAS (Cloud Analytic Services) Language.

Non-CAS enabled data processing



When to **CASL** and **not to CASL** best practices.

- You can bring your SAS code as is and run it in SAS Viya platform with only modification to a pointer (libname) and if you are happy with the results and performance. You do **not have to CASL** your code.
- If you start or modify a SAS code, and SAS BASE/STAT/GRAPH data steps and procedure, meets all your requirement, you do **not have to CASL** your code. Run your code as is in Viya platform.
- If you have built extensive macro libraries and depend on a lot of macro variable processing and if your data size is small (<50GB), you do **not have to CASL** your code. Run your code as is in Viya platform.
- If your sas code has extensive proc sql steps and you are okay with overall performance and results. You do **not have to CASL** your code. Run your code as is in Viya platform.
 - Proc Fedsql for CAS and Proc SQL for SAS 9 are similar but not the same. If you opt to start converting, FEDSQL works better in both SMP and MPP even on a small data size.
- If you think, you are bored with above steps and want something new, paradigm shifting, in-memory programming language to try then **CASL**. Just benchmark your performance with SAS 9 compute engine and let us know.

When to CASL and not to CASL best practices.

- If Data Steps are CPU intensive, CASL your code. E.g. 25mins or above run time, then casl. Data step is CAS enabled.
- If Procs are taking long-time to finish and you have equivalent option available in CAS, CASL your code. E.g. 25mins or above run time, then casl.
- If you do not have data science and machine learning procs in SAS 9, you have to CASL.
- Even if you have data science and machine learning equivalent procs of CAS in SAS 9, you can benefit to CASL.
- If your data size is 50GB or above start to CASL your code. SAS professional service delivery team have noted with datasize 25GB or above can also benefit from multithreaded processing.

When to CASL and not to CASL best practices.

- If you have lot of By Group processing, sorting, merging etc. Test your code to benchmark to CASL or not to CASL.
 - Think about refactoring your code to take advantage of multithreaded processing.
 - Reduce some sort or by group processing or take advantage of fedsql like CAS proc.
- Check if you have SMP (single server) or MPP (multiple or distributed server) Viya server. For SMP based, not to CASL might be a good strategy.
 - Check for long run-time, size of the data and movement between CAS and SAS9 compute as your next measure.
 - SMP is multithreaded in Viya. You can benefit to CASL for non-performant jobs.
- During the data prep, if you can, try to avoid, a lot of to and fro data movement between CAS and SAS 9 engine. Plan a good strategy for a section of your code that can take advantage of CASL processing. Not everything needs to be CASL.

References and exercise by peers

Special Thanks to Xavier Bizoux, Teri Patsilaras and Beth Ebersole for conducting a SAS Workshop on [Programming](#) with CAS on SAS Viya 4.

SAS Documentation: [Getting Started with CASL Programming](#)

SAS Documentation: [Learning SAS Viya](#)

Lexjansen.com: [Search for SAS Viya Programming](#)

Steven Sober, Brian Kinnebrew, SAS Institute Inc.: [Best Practices for Converting SAS® Code to Leverage SAS® Cloud Analytic Services](#)

David Shannon, Amadeus Software, UK: [Come On, Baby, Light my SAS® Viya®: Programming for CAS](#)

Jerry Pendergrass, SAS Institute Inc: [CASL, a Language Specifically Designed for Interacting with SAS® Viya®](#)

Charu Shankar, SAS Institute Inc.: [Coding in SAS® Viya®](#)

Nicolas Robert, SAS Institute Inc.: [Data Quality Programming Techniques with SAS® Cloud Analytic Services](#)

Mark Schneider, Susan Pearsall, SAS Institute Inc.: [Migrating from SAS® 9.4 to SAS® Viya® 3.5](#)

[Communities.sas.com](#)

Ryo Kiguchi, Katsunari Hirano, Yoshitake Kitanishi; SHIONOGI & CO., LTD: [Make SAS Viya Realize Strategic Data Science ~Data Governance, AI platform and AI SAS programmer~](#)

Questions

Contact: Pritesh.Desai@sas.com



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