GLOBAL SAS ARCHITECT EVENT
SEPTEMBER 2019

ROSIE FOTI, SR. CUSTOMER SUCCESS
SHELLEY SESSOMS, SR. COMMUNICATION SPECIALIST

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AGENDA

09:25 – 09:30   **Kick-Off (Rosie Foti)**

09:30 – 10:15 **How to co-exist: SAS 9.4 and SAS Viya**
Margaret Crevar, Senior Manager, Software Development, Performance and Validation

10:15   **5 Minute Break**

10:20 – 11:00 **Top 10 pitfalls that Architects do**
Margaret Crevar, Senior Manager, Software Development, Performance and Validation

11:00 – 11:15 **General Question Period**

COMMUNITIES

The SAS Architecture community is the place to ask and answer questions related to planning, designing, and executing SAS within your organization.

https://communities.sas.com/architecture

*Please subscribe to both **messages** and **library articles** to receive the most up-to-date information.*

Library articles can be found at: https://communities.sas.com/t5/SAS-Communities-Library/tkb-p/library/label-name/Architecture

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SAS Global Forum

March 29th to April 1st, 2020
Washington DC

EVENTS PAPERS PRESENTED

SAS Global Forum

March 29th - April 1st, 2020
Washington, DC

Title	Topic	Viya?	Session Length	Presenter First Name	Presenter Last Name
Resources for SAS Administrators & Architects: What You Need to Know to Get the Job Done Hassle-Free	Administration Deployment	Both	20	Shelley	Sessoms
SAS System Elasticity in Amazon Web Services using SAS Grid Manager	Administration Cloud	SAS 9.4	20	Glenn	Horton
Diagnosing the Most Common SAS Viya Performance Problems	Administration Architecture	SAS Viya	20	Jim	Kuell
Important Performance Considerations When Moving SAS to a Public Cloud	Administration Cloud	Both	50	Margaret	Crevar
How to Maintain Happy SAS® Viya Users	Administration Architecture	SAS Viya	20	Margaret	Crevar
SAS® Viya 3.5 Kerberos Constrained Delegation: putting the dog on a leash	Administration Security	SAS Viya	20	Stuart	Rogers
SAS®, Cloud Native, and Containers The State of the Union 2020	Administration Cloud	SAS Viya	20	Paul	Kent

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SAS® Intelligent Decisioning: an approach to high availability for real-time integration	Administration Architecture	SAS Viya	20	Michael	Goddard
Essential Performance Tips for SAS Visual Analytics	Administration SAS® Administration	SAS Viya	20	Meera	Venkataramani
Migrating from SAS 9.4 to SAS® Viya®	Administration Deployment	Both	50	Mark	Schneider
SAS® Grid Manager and SAS® Viya®: a Strong Relationship	Administration Architecture	Both	20	Edoardo	Riva
Behind the Front Door: Authentication Options with SAS® Viya®	Administration Security	SAS Viya	20	Mike	Roda
CAS Sessions: Understanding Connection Options to Ensure Data Access Security	Administration Security	SAS Viya	20	Philip	Hopkins
SAS® Intelligent Decisioning: an approach to high availability for real-time integration	Administration Architecture	SAS Viya	20	Michael	Goddard

SOME HELPFUL LINKS

How To Maintain Happy SAS Users
http://support.sas.com/resources/papers/proceedings16/SAS6201-2016.pdf

Ensuring that Your SAS Infrastructure can meet your SAS Users' Needs
http://support.sas.com/resources/papers/proceedings16/SAS6207-2016.pdf

BP for Configuring IO for SAS
http://support.sas.com/resources/papers/proceedings16/SAS6761-2016.pdf

Tuning papers for operating systems:
http://support.sas.com/kb/53/873.html

Tuning papers for various storage arrays:
http://support.sas.com/kb/53/874.html

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SAS ADMIN HELP IS AT YOUR FINGERTIPS

My job can be tough. I'm responsible for my company's SAS environment and other enterprise software. That's why I am so glad I'm not on my own. I have a centralized source for all things SAS, which makes it easy to find SAS documentation, implementation support and platform road maps and, if I need additional help, I have a single SAS point of contact who responds to me immediately.

➢ SAS9.4 installation documentation
  http://support.sas.com/documentation/installcenter/94/index.html

➢ List of supported Operating systems
  http://support.sas.com/supportos/list

➢ Available hot fixes
  http://ftp.sas.com/techsup/download/hotfix/hotfix.html

➢ Intelligence platform deployment and administration
  http://support.sas.com/documentation/onlinedoc/intellplatform/index.html

➢ Administration and deployment community
  https://communities.sas.com/t5/Administration-and-Deployment/bd-p/sas_admin

➢ Training for the SAS Administrator
  http://support.sas.com/training/us/paths/admin.html

➢ Blogs for the SAS Administrator
  https://blogs.sas.com/content/topic/sas-administrators/

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HOW TO CO-EXIST:
SAS 9.4 AND SAS VIYA

MARGARET CREVAR, SENIOR MANAGER,
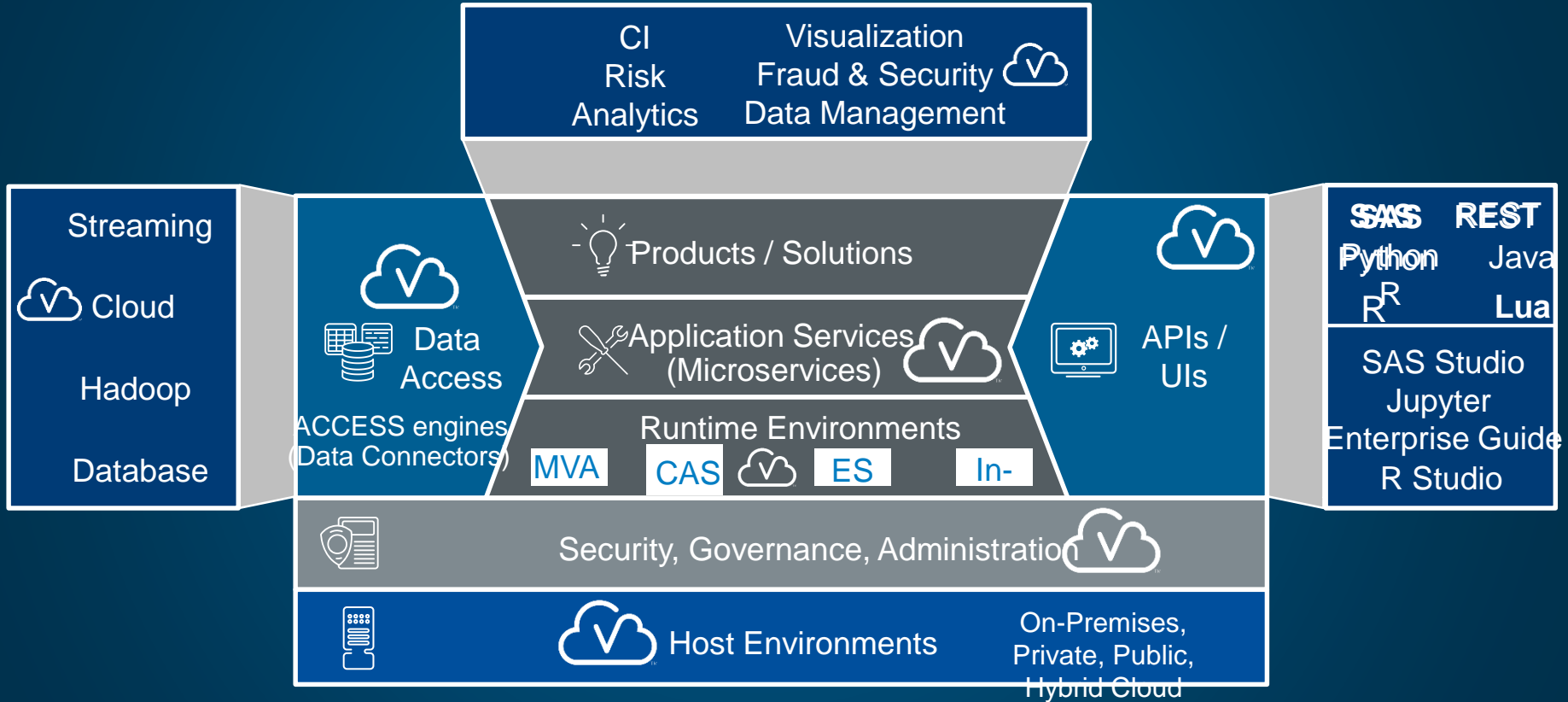## SOFTWARE DEVELOPMENT, PERFORMANCE VALIDATION

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AGENDA

- SAS Platform
- Analytics Life Cycle
  - Data Management
  - Visualization
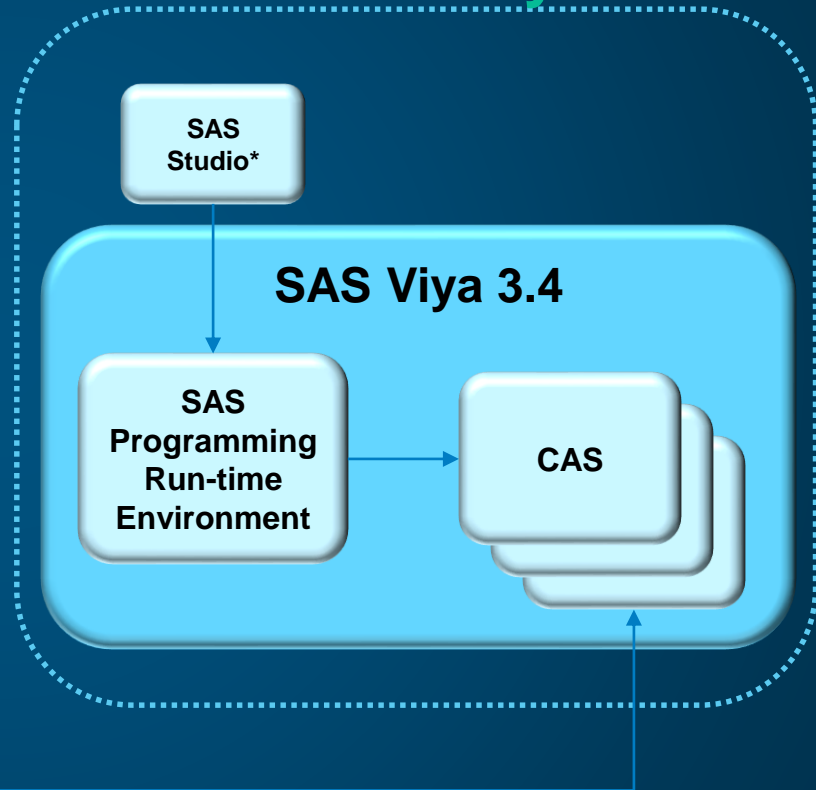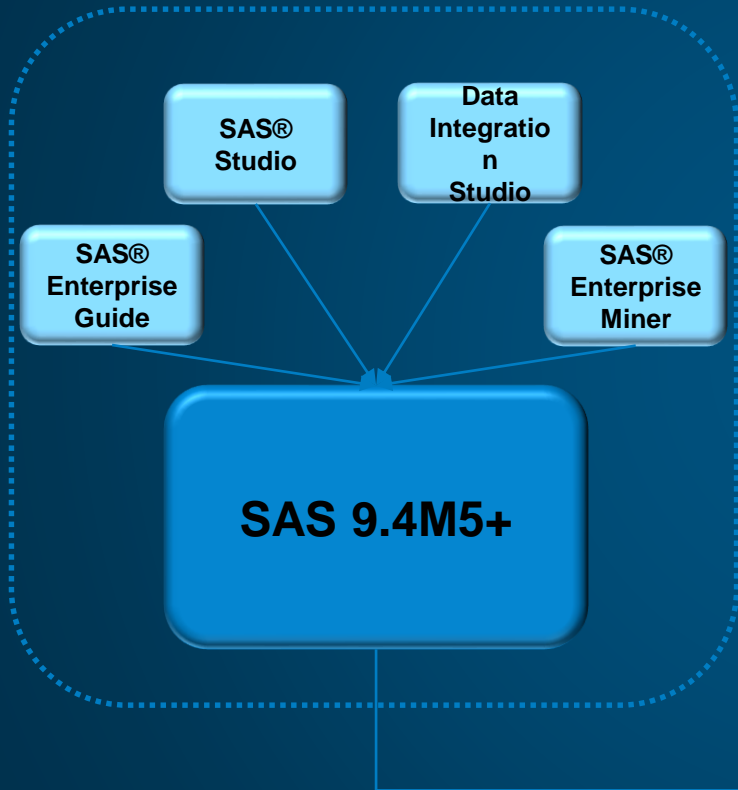 - Analytics
  - Decision Management

THE SAS PLATFORM

CI
Risk
Analytics

Visualization
Fraud & Security
Data Management

Streaming

Cloud

Hadoop

Database

Data Access

ACCESS engines
(Data Connectors)

Products / Solutions

Application Services
(Microservices)

Runtime Environments

MVA   CAS   ES   In-

APIs /
UIs

SAS   REST
Python   Java
R   Lua

SAS Studio
Jupyter
Enterprise Guide
R Studio

Security, Governance, Administration

Host Environments

On-Premises,
Private, Public,
Hybrid Cloud

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The SAS Platform
Base SAS

- All 9.4 Base in Viya 3.3+

- SAS Viya
  - [Procedures That Use CAS Actions](#) (16)
  - Multi-threaded DATA step
    - Rework code to leverage
    - Steven Sober's [SGF Paper #1710-2018](#)
      - SAS Viya Readiness Utility

- VA-only caveat

The SAS Platform
Language Execution

SAS 9.4

SAS Viya

- SAS® Studio
- Data Integration Studio
- SAS® Enterprise Guide
- SAS® Enterprise Miner

SAS 9.4M5+

- SAS Studio*

SAS Viya 3.4
- SAS Programming Run-time Environment
- CAS

*Many SAS Viya clients (e.g., SAS Visual Analytics) do not submit SAS code, but rather call CAS directly

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THE SAS PLATFORM

Distributed Processing

HPA

SAS 9.4

In-Memory
Data load per action
Action distribution

LASR

SAS 9.4

In-Memory
Data retain across actions
Action distribution

CAS

SAS Viya

In-Memory
Data retain across actions
Action distribution
Parallel loading
High availability
Open
Scalable
Shared libraries
Virtual memory
Resource management

Grid

Both

Disk I/O
Job distribution
High availability
Open (Python)
Scalable
Resource Management

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The SAS Platform
Operating Environments

SAS 9.4

POWER9

(2019Q4)

SAS Viya

docker

solaris ORACLE

hp UX

AIX

z/OS

kubernetes

docker

CLOUD FOUNDRY

Quick Starts

amazon web services™

Azure

openstack CLOUD SOFTWARE

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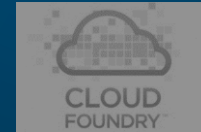
The SAS Platform

Interfaces

SAS 9.4

- Mixed bag of UIs
- SAS Home
- SAS Studio 3.x
- DMS
- EG
- AMO
- …
- HTML5 (May '19)

Both

- Jupyter / Python
- Batch
- Command Line

SAS Viya

- Integrated Web UI
- SAS Drive
- SAS Studio 5.x/4.x
- R, Java, Lua
- REST APIs
- HTML5

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The SAS Platform

Administration

SAS 9.4

May '19

VA Administrator

SAS Deployment Mgr

Environment Mgr

SAS Mgmt Console
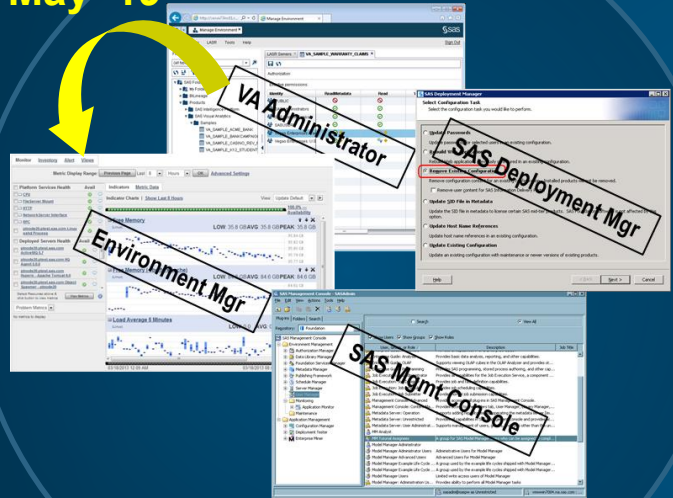
Metadata

CLIs
Auditing

SAS Viya
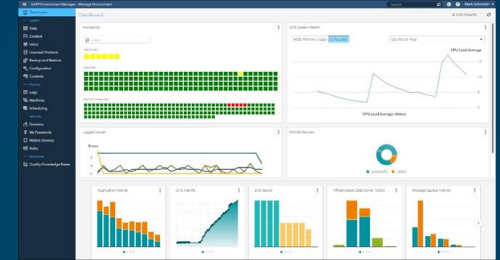
SAS Environment Manager

Event-driven Operations Infrastructure

LDAP

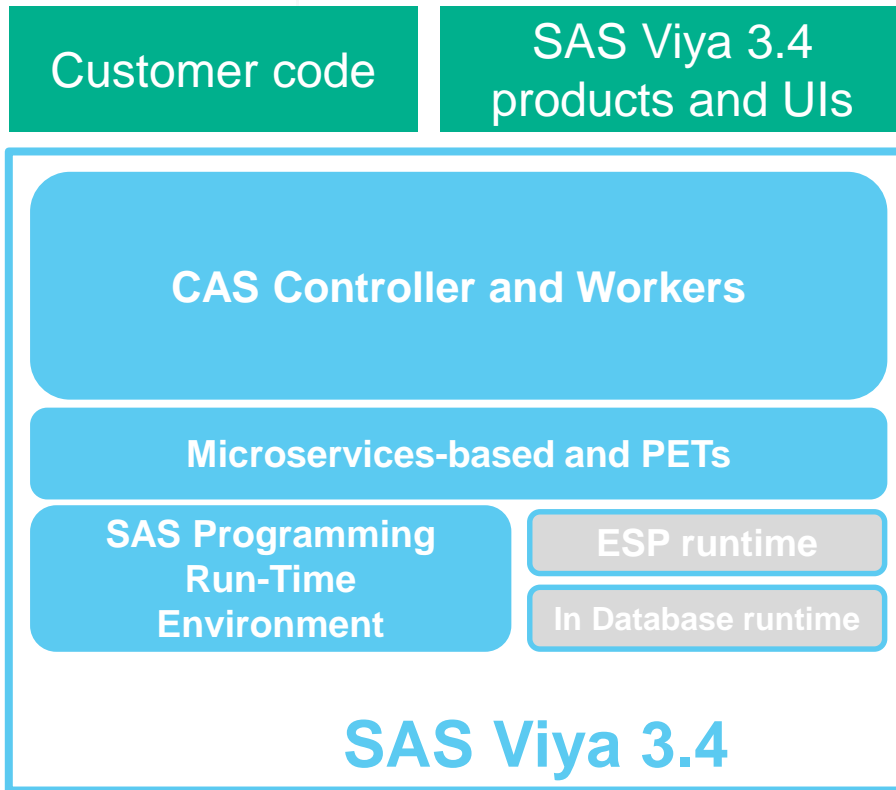§sas

The SAS Platform

Odds and Ends

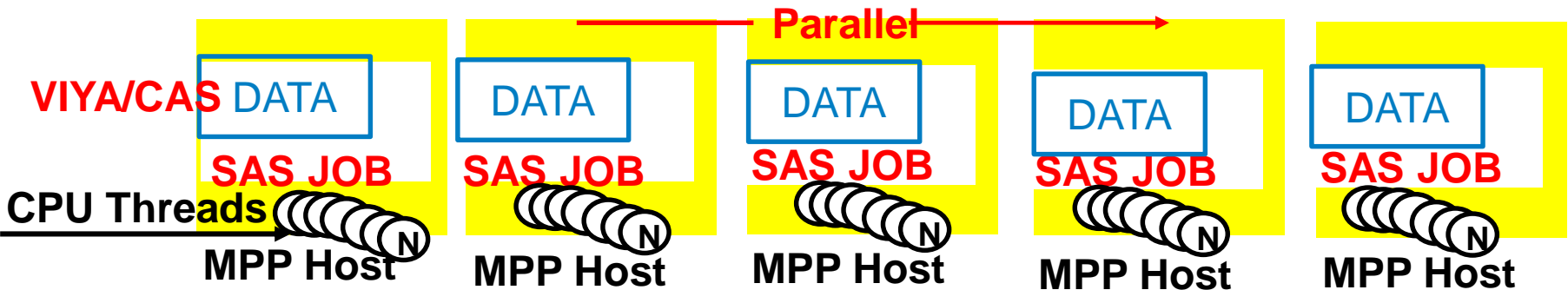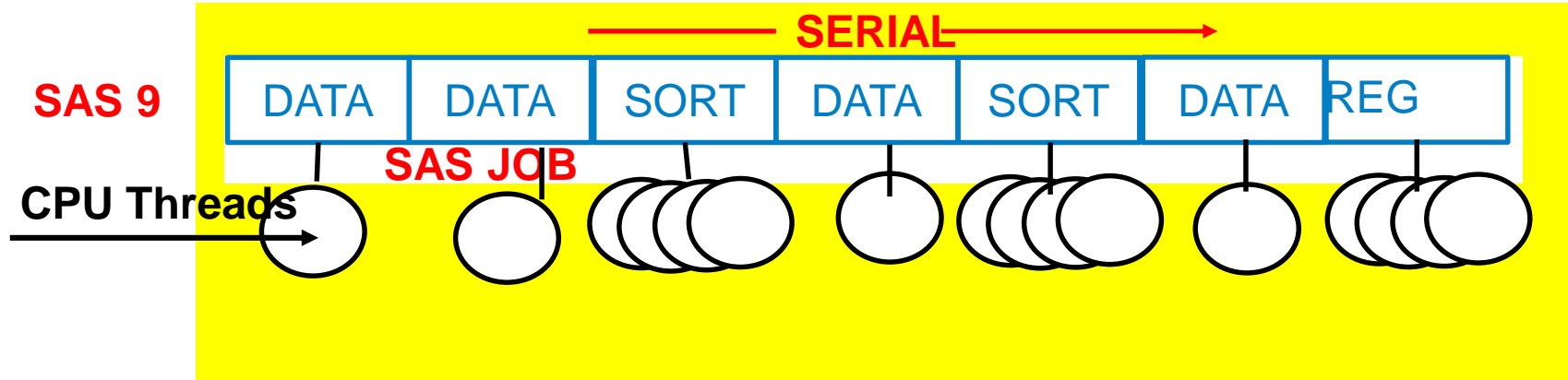| SAS 9.4	SAS Viya
Metadata Server	SAS Infrastructure Data Server SAS Configuration Server
Stored Process Server	Job Execution Services
IOM	REST APIs SAS Message Broker
Multi-tenancy (Grid)	Multi-tenancy (All)
Object Spawner/Workspace Server	Launcher/Compute Servers

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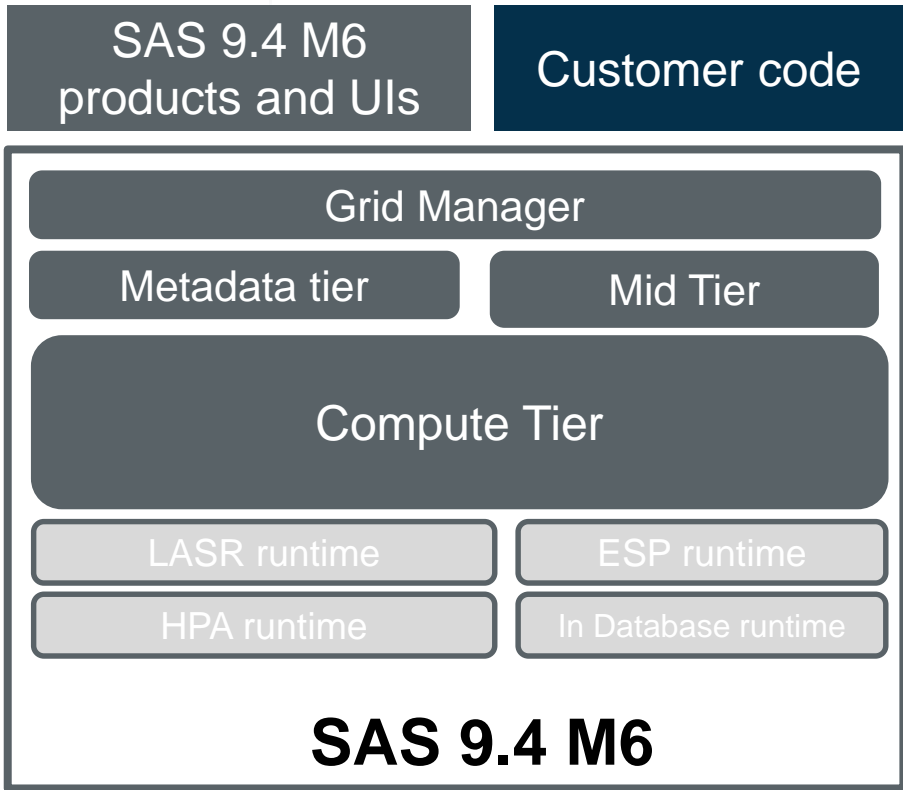
SERIAL SAS9 VS. PARALLEL VIYA ON CAS

Single Host

SERIAL

SAS 9

DATA | DATA | SORT | DATA | SORT | DATA | REG

SAS JOB

CPU Threads

Parallel

VIYA/CAS

DATA | DATA | DATA | DATA | DATA

SAS JOB | SAS JOB | SAS JOB | SAS JOB | SAS JOB

CPU Threads

MPP Host | MPP Host | MPP Host | MPP Host | MPP Host

PARALLEL RESOURCE DEMAND MEANS MORE... NOW...

CAS CONTROLLER

CAS WORKER   **CAS WORKER**   **CAS WORKER**

In-Memory Process (with memory mapped files)

*1SASHD AT

Serial CASLIB via CAS Controller

Source Data

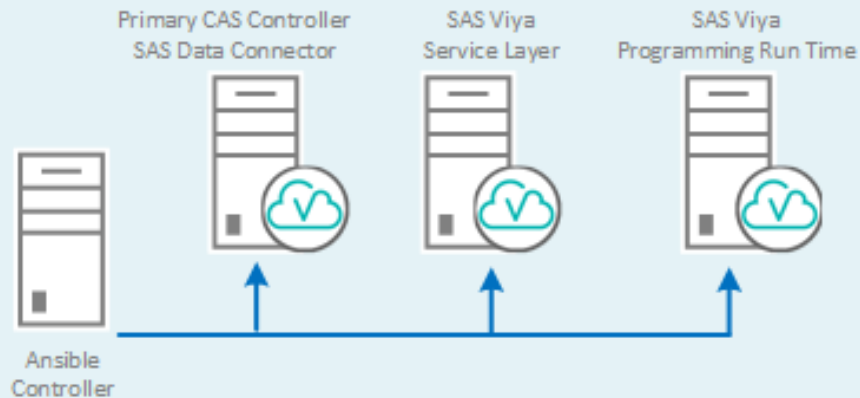High Instantaneous Demand on Fabric and Storage

… or in parallel (DNFS)

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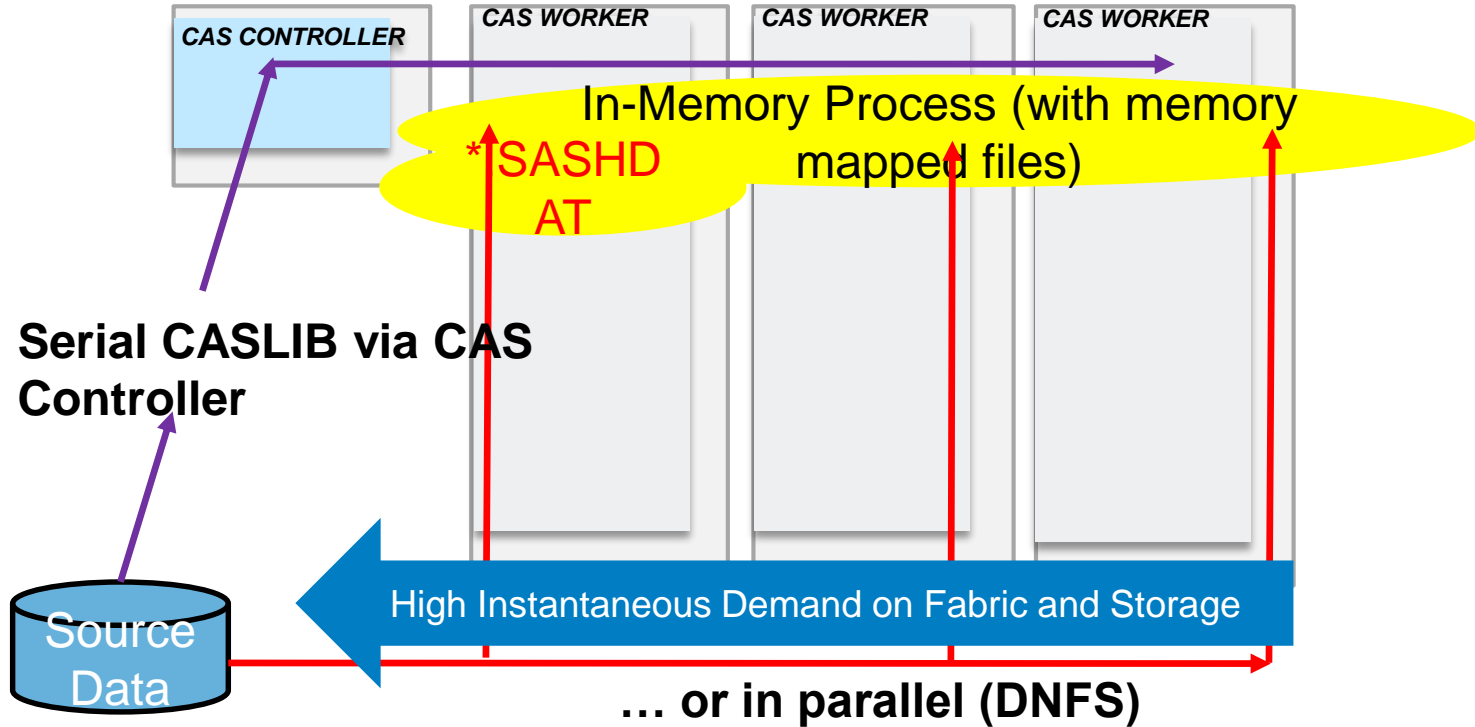
Baseline SMP Deployments

Dedicated Machine for the SAS Cloud Analytic Services Deployment (2 hosts)

Primary CAS Controller SAS Data Connector

SAS Viya Products and Solutions

Ansible Controller
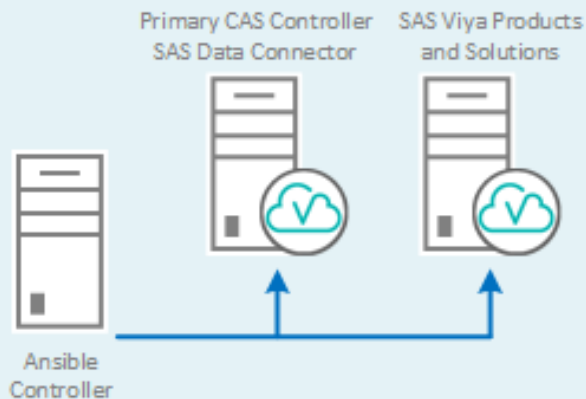
Dedicated Machine for the SAS Cloud Analytic Services Deployment (3 hosts)

Primary CAS Controller SAS Data Connector

SAS Viya Service Layer

SAS Viya Programming Run Time

Ansible Controller

BASELINE MPP DEPLOYMENTS
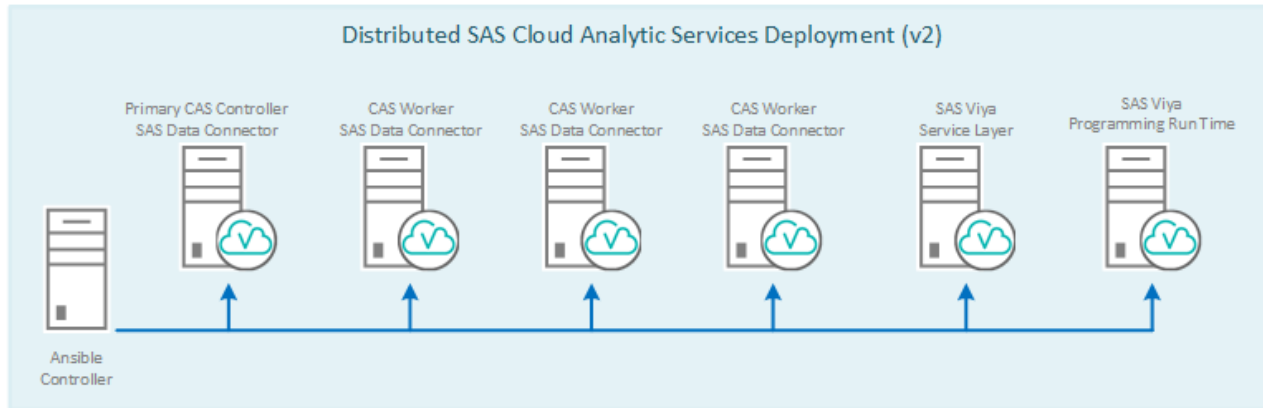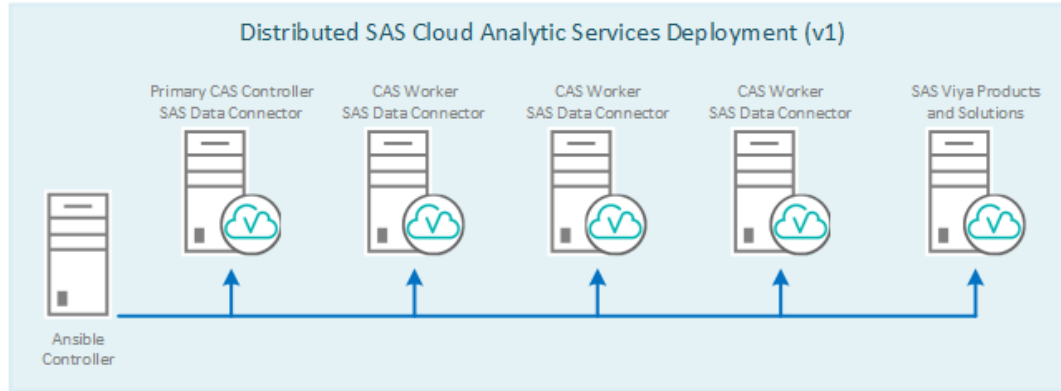
RESOURCES

- Comparing SAS 9 to SAS Viya
  https://support.sas.com/resources/papers/sas-94-sas-viya-functional-comparison
- Engineering CAS Performance Hardware Network, and Storage Considerations for CAS Servers
  https://www.sas.com/content/dam/SAS/support/en/sas-global-forum-proceedings/2019/3351-2019.pdf
- Seriously Serial or Perfectly Parallel Data Transfer with SAS Viya
  https://www.sas.com/content/dam/SAS/support/en/sas-global-forum-proceedings/2019/3479-2019.pdf

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5 MINUTE BREAK

TOP 10 PITFALLS THAT ARCHITECTS DO

MARGARET CREVAR

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- A good understanding of
  - the SAS application workload and their SLAs
  - all layers and components of the SAS infrastructure
  - security requirements
  - High availability requirements
  - source of data for SAS jobs
- Definition of success criteria

ARCHITECTURE

SAS 9.4 M6 products and UIs	Customer code	Customer code	SAS Viya 3.4 products and UIs

SAS 9.4 M6 side:

- Grid Manager
- Metadata tier
- Mid Tier
- Compute Tier
  - LASR runtime
  - ESP runtime
  - HPA runtime
  - In Database runtime

SAS 9.4 M6

SAS Viya 3.4 side:

- CAS Controller and Workers
- Microservices-based and PETs
  - SAS Programming Run-Time Environment
  - ESP runtime
  - In Database runtime

"bridge" to SAS Viya

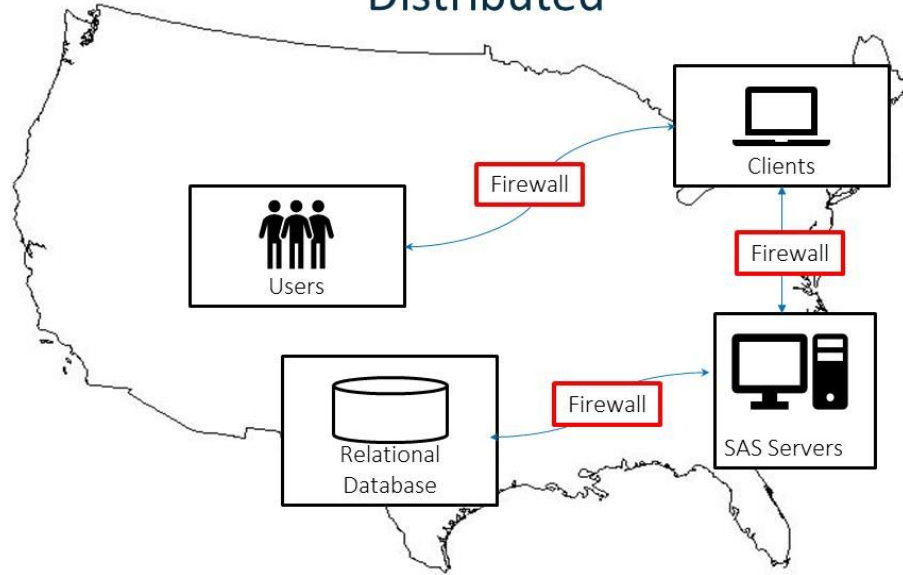## SAS Viya 3.4

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SAS infrastructure

- Source data
- SAS servers
- Authentication tools

Architecture
Distributed

Underlying Hardware

- Never overprovision your resources
  - Systems
  - Network
  - Storage
- Understand if you are sharing resources with other applications

Network bandwidth

- Communication between SAS components
- Communication to external source data files
- Other applications
- Backups

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Shared file systems

- There are pros and cons for each one
- NFS concerns
  - Cache coherency
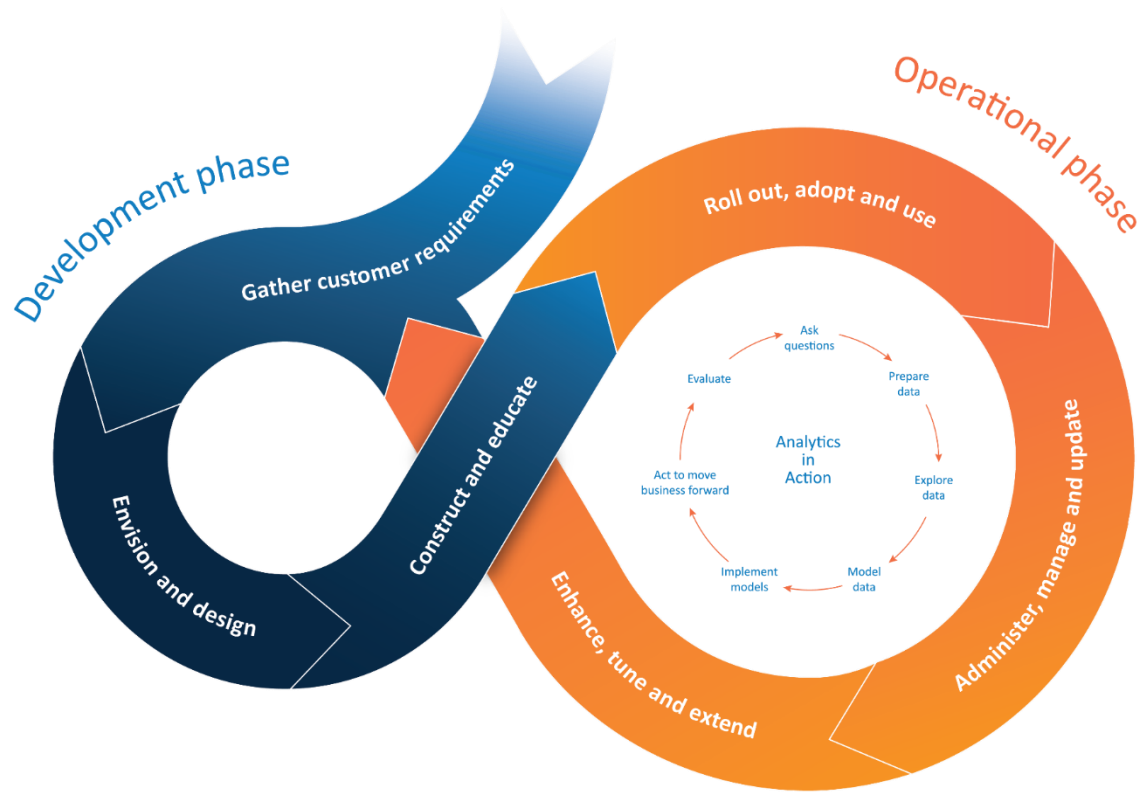 - Mount commands
  - Automounting

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TOP ARCHITECTURE PITFALLS

- Understanding virtualization
  - Hardware
  - Storage array
  - Thinly provisioning
  - Network resources

- Correct storage configuration
  - File system settings
  - FA ports
  - Is it shared with other applications
- Ample IO throughput

SAS ADMINISTRATION LIFECYCLE

SAS ADMINISTRATION & DEPLOYMENT COMMUNITY

Online. Everyday.

Communities.sas.com/deployment

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CONCLUSION

Need to:

- understand the complete workload and expected SLAs of the workload
- realize that SAS is not a turn-key application
- understand SAS usage and data volume is always increasing
- monitor infrastructure

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QUESTIONS

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