GLOBAL SAS ADMIN EVENT
SEPTEMBER 2019

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

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AGENDA

08:30 – 09:00   Breakfast & networking

09:00 – 09:10   Kick-Off (Rosie Foti)

09:15 – 10:00   **Common Administration Tasks: Monitoring and Maintaining your SAS Environment**
Margaret Crevar, Senior Manager, Software Development, Performance and Validation

10:00   **15 Minute Break**

10:15 – 10:45   **SAS in the Cloud**
Jocelyn Gascon-Giroux, Principal Solutions Specialist, Customer Advisory

10:45 – 11:15   **Solving SAS performance Issues: Our Methodology**
Margaret Crevar

11:15 – 11:45   **General Question Period** *(Bring your Admin questions with you and we will answer them)*

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COMMUNITIES

SUGA

The SAS Users Group for Administrators (SUGA) is open to all SAS administrators who install, update, manage or maintain a SAS deployment.

https://communities.sas.com/deployment

About SUGA
Upcoming Webinar
Enterprise Session Monitor for SAS
Presenter: Nikola Markovic, Boemskats
October 8th, 3:00 - 4:00pm ET

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FREE LIVE AND ON-DEMAND WEBEX

https://www.sas.com/en_us/learn/ask-the-expert-webinars.html#sas-administrator

ASK THE EXPERT

Hear it from the experts. SAS experts will hold live events presenting a variety of topics. For the opportunity to ask a specific question, you can register to participate in the live sessions. You can also view previously recorded sessions on-demand at your own convenience to get in-depth information about a particular topic

➢ Understanding Hot Fixes
➢ Understanding User Authentication
➢ Understanding your software order and how to use the SAS deployment wizard to manage your software depot
➢ Creating and Scheduling SAS Job Flows with the Schedule Manager Plugin in SAS Management Console
➢ Introduction to SAS Administration Tasks in SAS 9.4
➢ SAS Grid Manager: An overview of Grid Manager Module in SAS Environment
➢ SAS Environment Manager – An Introduction
➢ What Does It Mean to Administer SAS Visual Analytics
➢ Scheduling SAS Programs and Jobs for a Grid Environment

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

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

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EVENTS
CUSTOMER
INVITED PAPERS

SAS Global Forum
Admin program

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

Best Practices for enabling SAS Analytics in the Cloud - at Scale	Administration: Cloud	Heather	Burnette	Teradata
Exploring DataOps in the brave new world of agile and cloud delivery	Administration: Cloud	Shane	Gibson	PitchBlack Ltd
SAS© Metadata frameworks and tools for data governance	Administration: Security	Mathieu	Gaouette	Prospective MG

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EVENTS
ADMIN PAPERS

SAS Global Forum
Admin program

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
SAS® Grid Manager: Inside Look into Grid Launched Servers	Administration: Deployment	SAS 9.4	20	Murali	Srinivasan
SAS Viya® Monitoring using Open Source Tools	Administration: SAS® Administration	SAS Viya	20	Bryan	Ellington
Delay Analysis in the SAS® Middle Tier	Administration: SAS® Administration	Both	20	bob	Celestino
Essential Performance Tips for SAS Visual Analytics	Administration: SAS® Administration	SAS Viya	20	Meera	Venkataramani

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Title	Topic	Viya	Session Length	Presenter First Name	Presenter Last Name
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
SAS® Intelligent Decisioning: an approach to high availability for real-time integration	Administration: Architecture	SAS Viya	20	Michael	Goddard

EVENTS
ADMIN PAPERS

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Title	Topic	Viya	Session Length	Presenter First Name	Presenter Last Name
Making Administration Easier by Scripting the SAS Viya Command-Line Interfaces	Administration: SAS® Administration	SAS Viya	20	James	Holman
SAS® Grid Manager and SAS® Viya®: a Strong Relationship	Administration: Architecture	Both	20	Edoardo	Riva
Optimize your SAS Viya platform by dividing load through the use of multiple CAS Servers	Administration: SAS® Administration	SAS Viya	20	Brandon	Kirk
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

TRAINING FOR SAS ADMINISTRATORS

http://support.sas.com/training/us/paths/admin.html

➢ **SAS Platform Administration: Fast TraCk**
https://support.sas.com/edu/schedules.html?ctry=ca&crs=SPAFT

➢ **Installing and Configuring the SAS 9.4 Intelligence Platform**
https://support.sas.com/edu/schedules.html?ctry=ca&crs=SPAIC

➢ **SAS Viya Administration Essentials**
https://support.sas.com/edu/schedules.html?ctry=ca&crs=SAVI

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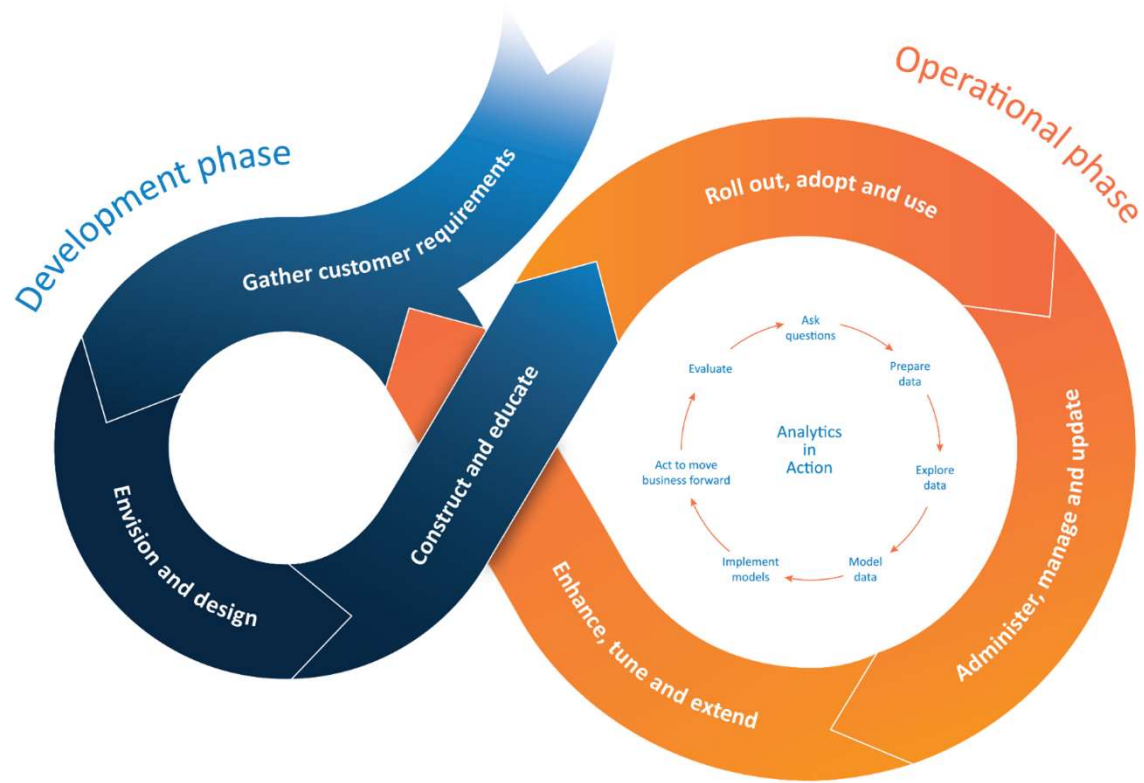# COMMON ADMINISTRATION TASKS: MONITORING AND MAINTAINING YOUR SAS ENVIRONMENT

MARGARET CREVAR, SENIOR MANAGER, SOFTWARE DEVELOPMENT, PERFORMANCE VALIDATION

AGENDA

- Understand SAS Needs

- Prepare

- Anticipate Growth

- Monitor Your SAS Infrastructure

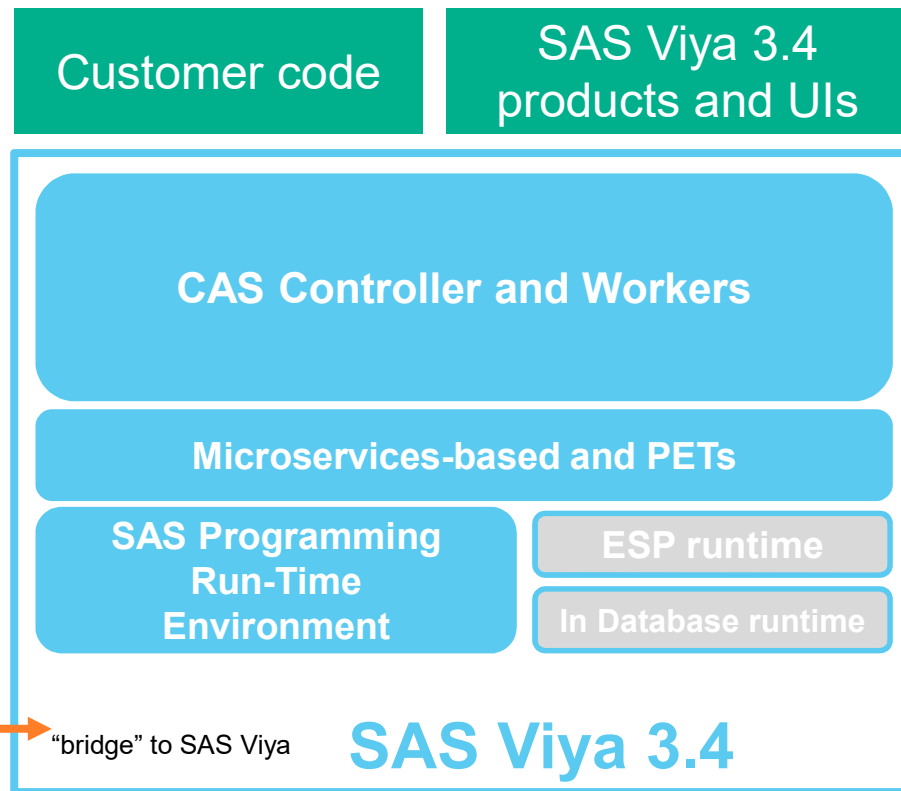- Support and Maintenance

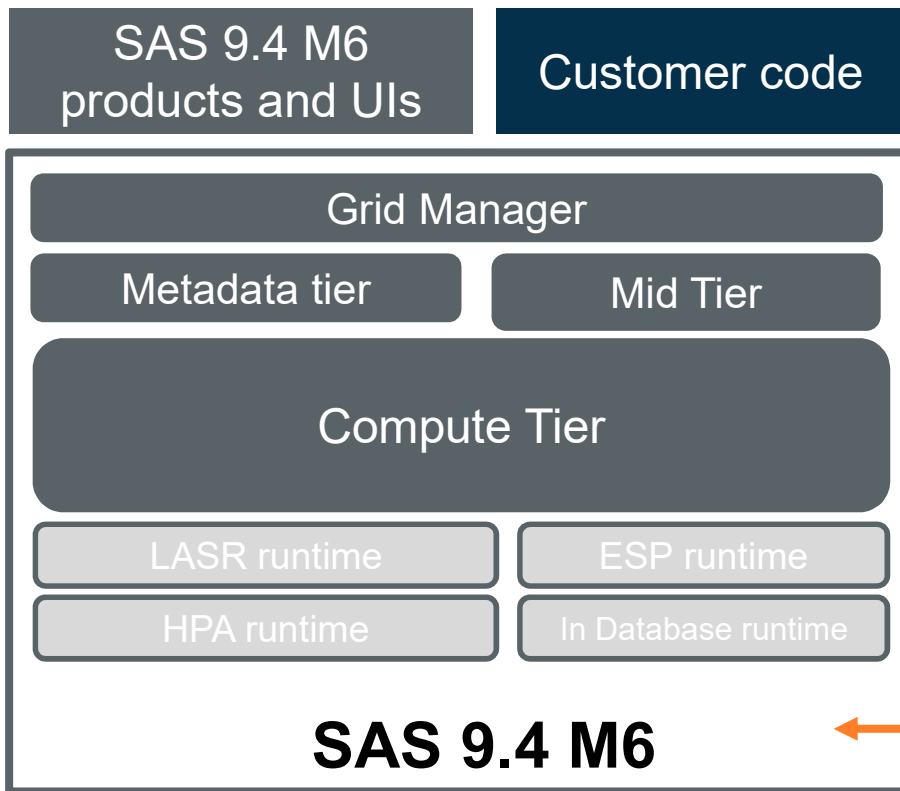§sas | THE POWER TO KNOW.

SAS ADMINISTRATION LIFECYCLE

UNDERSTAND SAS NEEDS

- Planned Use
  - Number of Concurrent SAS sessions
  - What are they doing?
  - With how much data?

- Service Level Agreements

- Security Needs

- Is Failover or High Availability Needed

- Backup Strategy

ARCHITECTURE

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

SAS 9.4 M6

Grid Manager

Metadata tier | Mid Tier

Compute Tier

LASR runtime | ESP runtime

HPA runtime | In Database runtime

SAS Viya 3.4

CAS Controller and Workers

Microservices-based and PETs

SAS Programming Run-Time Environment | ESP runtime

In Database runtime

"bridge" to SAS Viya

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PREPARE

- *Checklist of SAS Administration Tasks*

- Pre-Installation Resource Document
  - Operating System
  - File systems and their IO throughput needs
  - Planned storage
  - Virtualization
  - Shared/clustered file systems

IS FAILOVER OR HIGH AVAILABILITY REQUIRED?

- Can the SAS application be down? For how long?

- Are you planning to failover to a data center in a different geographical location?

- Using hardware redundancy for failover?

- Are the SAS applications you are running HA aware?

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SAS FILES TO BACK UP AND WHEN

- Which files?
  - Only mission critical files
  - Only if they can not be reproduced quickly
  - Only if they have been updated/touched in xx weeks

- Never SAS WORK, UTILLOC or CAS_Disk_Cache file systems

- *Backing up SAS Content in Your SAS 9 Enterprise Intelligence Platform*

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ANTICIPATE GROWTH

- Expanded use of the SAS application

- Regulatory demands

- Company growth

- Elasticity

MONITOR YOUR SAS INFRASTRUCTURE

- What do you need to monitor?
    - CPUs
    - Memory
    - Network
    - File systems – available space and IO throughput
    - Shared resources

- Where to look?
    - SAS logs
    - Hardware monitor tools
    - SAS supplied tools

- What are Users Perspective?

SUPPORT AND MAINTENANCE

- What is your plan to apply maintenance for SAS, operating system, other hardware?

- Do you know how to contact SAS Technical Support and the SLAs associated with various contact methods?

- Are you aware of:
  - *Ask the Expert* web site
  - *Top 10 SAS Support Resources* paper
  - *SAS Administration community*
  - *SAS Users Group for Administrators*

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CONCLUSION

- Do your homework before you install SAS

- Monitor your hardware to proactively look for computer resource bottlenecks or issues

- Determine what needs to be backed up

- Determine if Failover/HA is needed

- Remember SAS Administration community

QUESTIONS

15 MINUTE BREAK

Global SAS Admin Event
Configuring SAS in the Cloud
25 August 2019

Jocelyn Gascon-Giroux, ing., M.Sc.
Architecte principal de solutions @ SAS
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514-918-7397

GLOBAL SAS® ADMIN EVENT

Sept. 25, 2019
Live and via Webex

REGISTER NOW

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What *do* customers want?

a. Only pay for what they use.

b. Flexible, cloud-based applications.

c. Divest from data centers.

d. All of the above.

Cloud-first strategies are growing globally.

Our current packaging and offerings are designed to meet our customers' needs today.

SAS® addresses a. and b. and it is evolving very fast!

What does SAS do *in the cloud*?

SAS

SAS Cloud

The **SAS® Cloud** combines software, infrastructure, and services that are *designed and managed by SAS* for optimal performance and value.
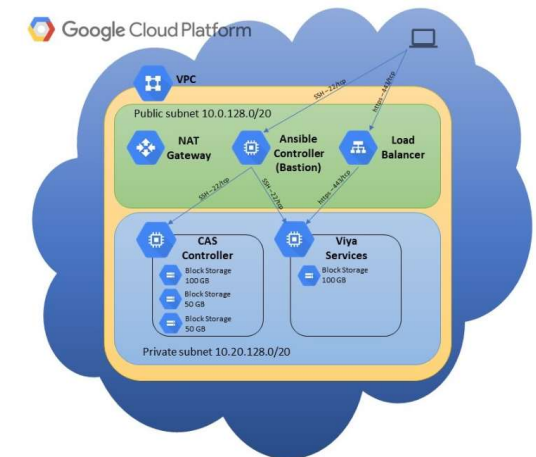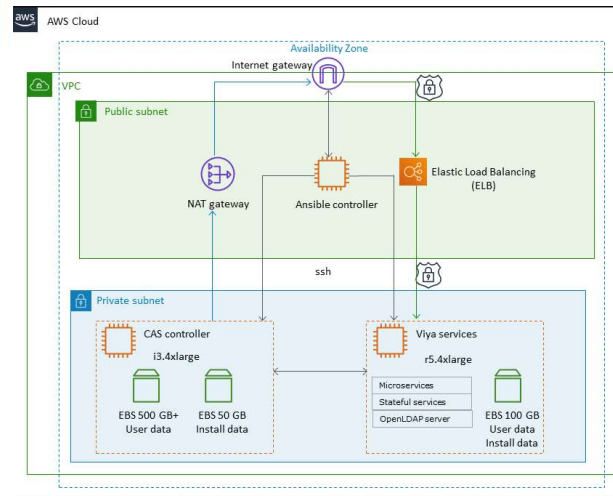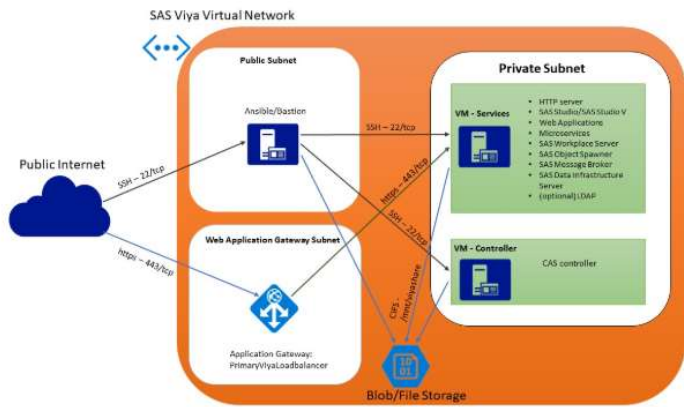
SAS® on Cloud Providers

SAS provides *cloud-deployable* options that allow our customers to run SAS on almost any private, public, or hybrid cloud infrastructure.

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SAS® and Cloud Computing

Categories Overview

SAS Cloud

Results as a Service

Software as a Service

Managed Services

SAS® on Cloud Providers

Cloud-Specific Offerings

Cloud Deployment Patterns

General Support for Cloud Providers
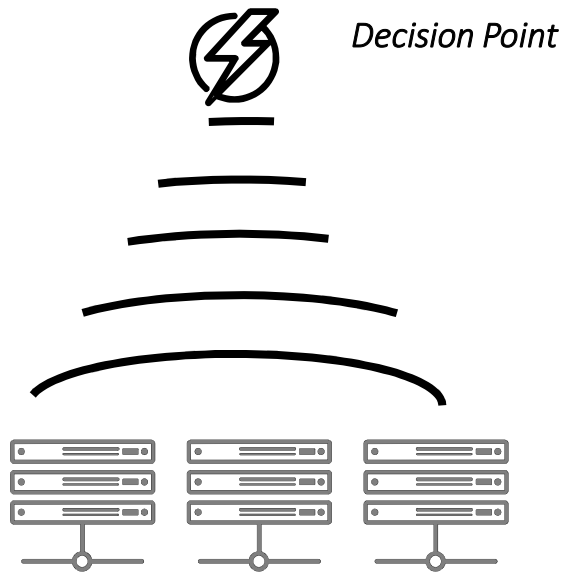
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SAS Viya Quickstart Templates for Azure, AWS, GCS

For details, see SAS Viya 3.4 for Linux: Deployment Guide.

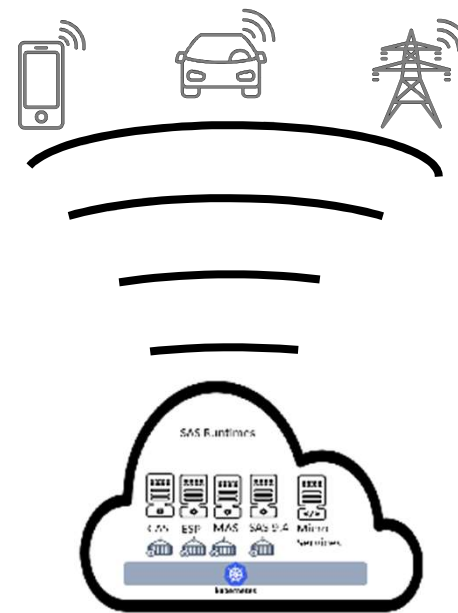# Emerging architectures to support Digital Transformation

Growth Rate

6%

30%+

Decision Point

Multi-Phase Analytics

Edge Decisions

API

Augmented Decisions

SAS Runtimes

CAS ESP MAS SAS 9.4 Micro Services

Centralized Pre-defined Infrastructure

Reactive/Adaptive Infrastructure

Traditional

Emerging
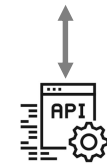
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EVOLVE YOUR ANALYTICS PLATFORM

virtual machines

containers
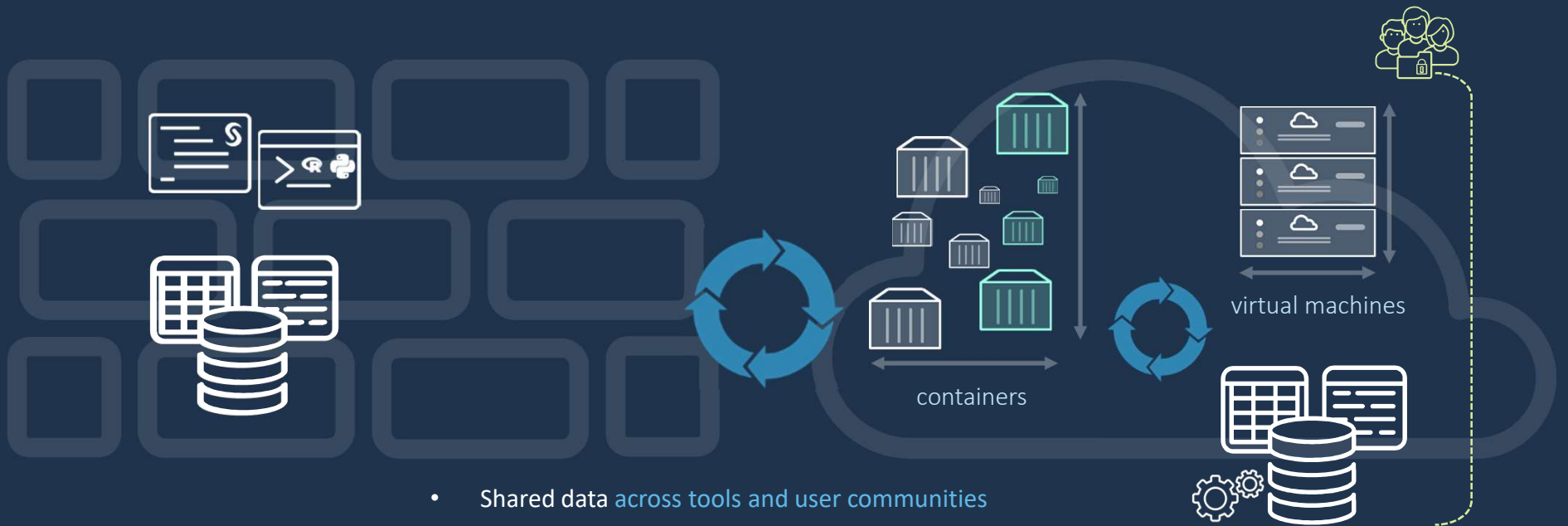
- Shared data across tools and user communities
- SW Deployment optimized for cloud for agility and scalability
- Maintain choice and control of tools and execution engines
- Hybrid cloud ecosystem

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« Only about 8% of Fortune 500 companies 1 000 respondants are successful today at scaling their analytics programs. »
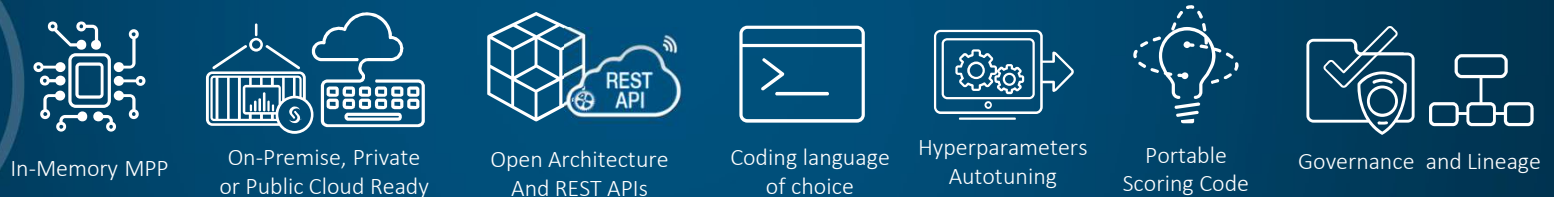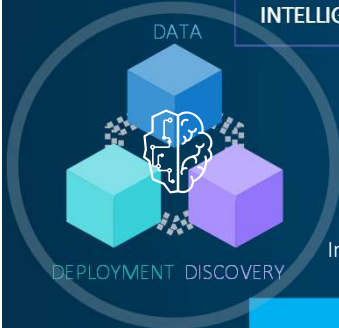
McKinsey May 2018

https://www.mckinsey.com/business-functions/mckinsey-analytics/our-insights/ten-red-flags-signaling-your-analytics-program-will-fail

The SAS® Platform

EXPLORE		FORECAST	EXPLAIN	PREDICT		OPTIMIZE	DEPLOY
BUSINESS INTELLIGENCE	DATA VISUALIZATION	TIME SERIES FORECASTING	STATISTICS	DATA & TEXT MINING	MACHINE LEARNING & AI	OPTIMIZATION	INSIGHT TO DECSIONS AND ACTION

Natural Language Interactions

Computer Vision

Robotics

Text Processing

DATA

DEPLOYMENT DISCOVERY

In-Memory MPP

On-Premise, Private or Public Cloud Ready

Open Architecture And REST APIs

REST API

Coding language of choice

Hyperparameters Autotuning

Portable Scoring Code

Governance and Lineage

DATA ACCESS ENGINES

RELATIONAL / STRUCTURED

EXTERNAL / THIRD PARTY

WEB LOGS

YouTube SOCIAL

DOCUMENTS / NOTES / IMAGES

Big Data /HADOOP /SPARK

IoT

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Workloads Spectrum (from Planned to On-Demand)

Current	Evolving	Emerging

- **Current Workload Weights**
- **3-year out Workloads Weights**

Containers

5-10%
30-40%

Serverless

Servers

FaaS

1-5%
5-10%

Virtual Machines

50-60%
20-40%

Bare Metal

10-25%
10-20%

Containers are:
- Faster to boot - > speed up development process
- Take less space than VMs - > Support more applications and workloads than VMs
- More portable than VM -> Easier to move from Cloud to OnPrem and vice versa and deploy everywhere
- Easily scale (spin up/down, elasticity)

Evolution of the "Cloud First" approach

On-Prem
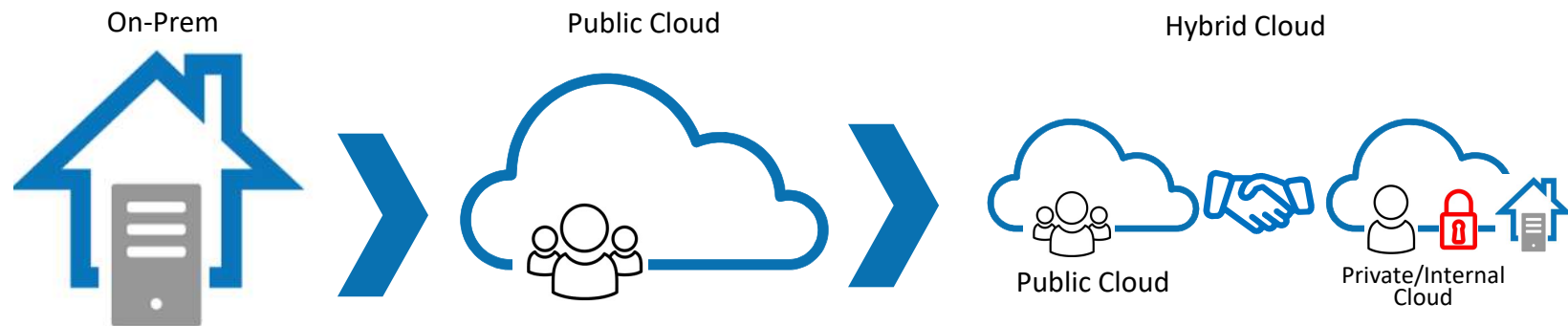
- Cost Intensive
- Full control of data sources
- Multiple operational systems and ERPs
- Need for centralization

Public Cloud

- Agility
- Cost Savings
- Scalability
- Data Movement/Latency
- Need for Centralization
- Security

Hybrid Cloud

Public Cloud   Private/Internal Cloud

- Best of both worlds
- Use of cloud platforms (to build internal marketplaces)
- Don't need to centralize your data
- Driven by improvements in network data fabric (fast, secure and scalable)
- IT Back in control (centralized)

NEED: Portability/Openness/Central Management/ Scalability

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Analytical Life Cycle Transformation

Manage and Deploy Models in a DevOps Environment
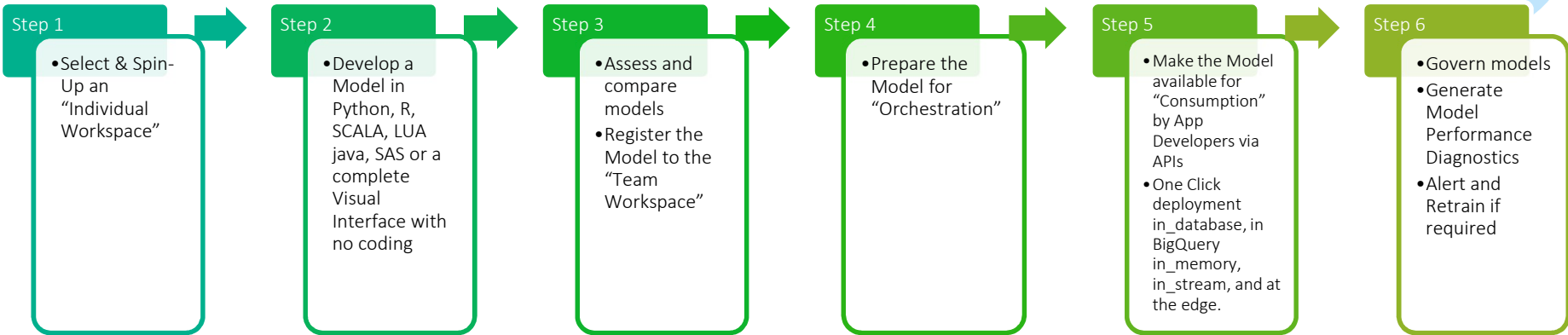
Step 1
- Select & Spin-Up an "Individual Workspace"

Step 2
- Develop a Model in Python, R, SCALA, LUA java, SAS or a complete Visual Interface with no coding

Step 3
- Assess and compare models
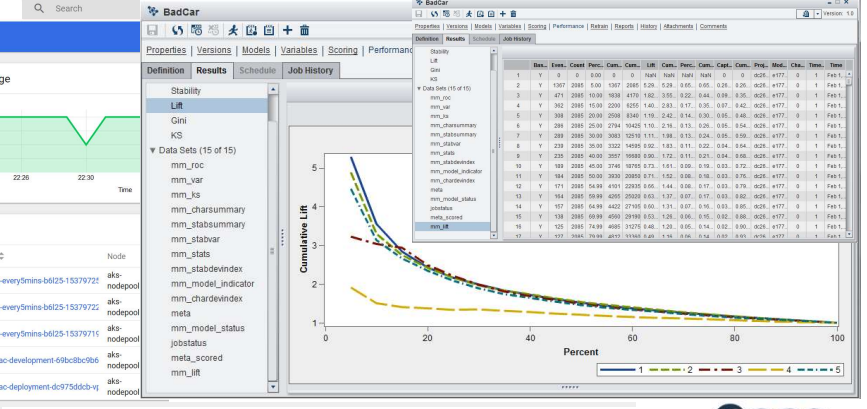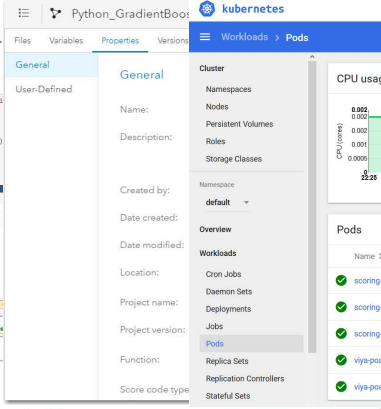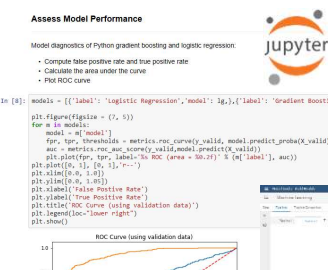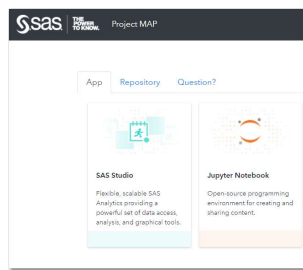- Register the Model to the "Team Workspace"

Step 4
- Prepare the Model for "Orchestration"

Step 5
- Make the Model available for "Consumption" by App Developers via APIs
- One Click deployment in_database, in BigQuery in_memory, in_stream, and at the edge.
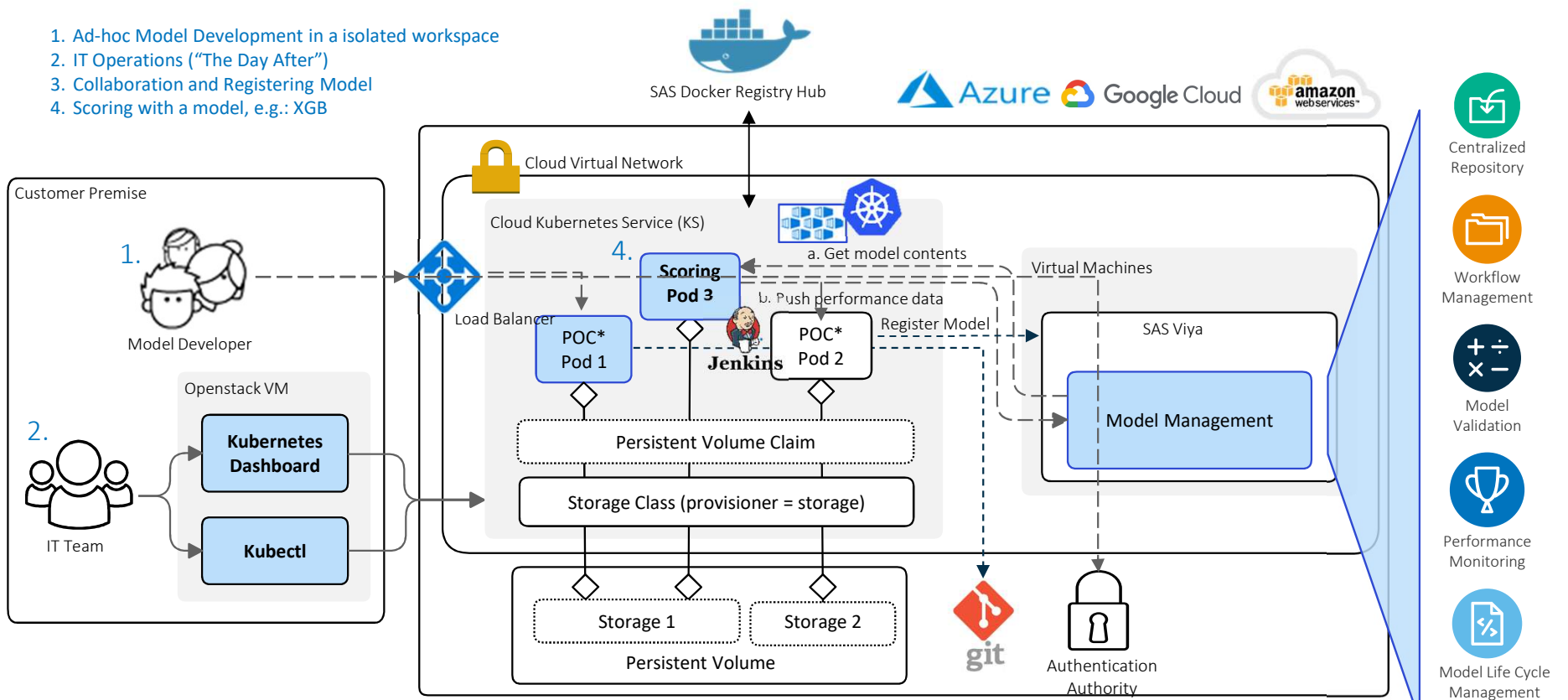
Step 6
- Govern models
- Generate Model Performance Diagnostics
- Alert and Retrain if required

Deploying Analytics DevOps exemple with SAS Viya on Cloud
With Container and Kubernetes

1. Ad-hoc Model Development in a isolated workspace
2. IT Operations ("The Day After")
3. Collaboration and Registering Model
4. Scoring with a model, e.g.: XGB

SAS Docker Registry Hub

Azure   Google Cloud   amazon web services™

Cloud Virtual Network

Customer Premise

1. Model Developer

Openstack VM

2. IT Team

Kubernetes Dashboard

Kubectl

Load Balancer

Cloud Kubernetes Service (KS)

a. Get model contents

4. **Scoring Pod 3**

b. Push performance data

POC* Pod 1

Jenkins

POC* Pod 2

Register Model

Virtual Machines

SAS Viya

Model Management

Persistent Volume Claim

Storage Class (provisioner = storage)

Storage 1   Storage 2

Persistent Volume

git

Authentication Authority

*POC = SAS Viya Programming Only ML/DL Container: Python, R, SAS

Centralized Repository

Workflow Management

Model Validation

Performance Monitoring

Model Life Cycle Management

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4. DevOps Testing Process with SAS Model Manager RestAPI (Jenkins & Synced Git_repo)

Container Recipe vs Image

SAS "stuff" in a Docker Container
- Build your own
- Whether you *should or not*, is up to you
- Not tested, limited support
- Our customers are *trying* this today

Container Recipe from SAS
- Instructions for building your own
- Tested and supported
- Can be modified to some extent

Container Image from SAS
- Already created
- Tested and supported
- Limited customizations

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What's available?

SAS 9
- Single Container Programming Only
  (SAS Analytics for Containers)
- Recipe-based

SAS Viya
- Single Container – For a Single User
  - Programming Only (SMP)
  - Recipes and Docker Image with Linux Order

- Multi-Container – For One or More Users
  - Programming Only (SMP or MPP)
  - Full Deployment (SMP or MPP)

Docker recipes publicly available on GitHub

SAS® Viya® Container Recipes

Framework to build SAS Viya Docker images and create deployments using Kubernetes.

https://github.com/sassoftware/sas-container-recipes
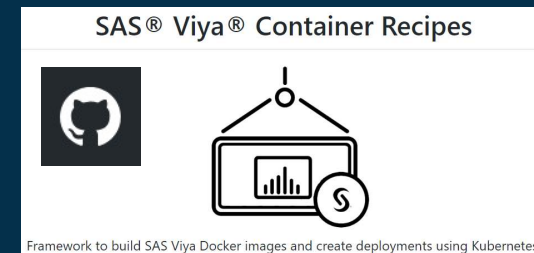
Summary of what is available @ support.sas.com: SAS for Containers Focus Area

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SAS PLATFORM FOR CLOUD – CONCEPTUAL FRAMEWORK

Data

- Files & Objects
- Database
- Hadoop / Spark
- IoT/Stream

Cloud Services

- Authentication
- Version Control
- CI/CD

Virtual Machines

Collaborative Workspaces

Visual & Programming UIs

Data Management
Batch Processing
Data Science
Model Management

MANUAL SCALE

| SAS Machine Learning MPP |
| SAS VA/VS/VDMML |
| SAS Model Manager |
| SAS Decision Manager |

SAS 9.4 Grid

Single Containers

Individual Workspaces
Runtime Engines

Programming UIs only

Data Science
Batch Processing
Analytic Applications

INSTANTIATE

SPIN

SAS VS/VDMML/TA/VF CAS actions
MAS, ESP

SAS 9.4 Programming Only

SCALE

Multi-Container

EXPERIMENTAL

Collaborative Workspaces

Visual & Programming UIs

Data Science
Data Visualisation
Big Data Analytics

DYNAMIC SCALE

SAS Viya VA/VS/VDMML
SAS Model Manager
SAS Decision Manager

SCALE

User Interfaces

- SAS Visuals
- SAS Studio
- Jupyter Notebook
- R Studio

APIs

- Python
- Java
- REST

IaaS

Docker + Kubernetes

Private Cloud (Internal or Hosted)   Public Cloud

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On-Premises, Public Cloud, Private Cloud, Hybrid

SAS Viya

Local data

SAS Visual Analytics

SAS/ACCESS Data Connector

Oracle DB Client

Teradata TTU Client

Shared File System with SAS Datasets

Internet

MSSQL: Port #1433   Oracle: Port #1521   Teradata: Port #1025

On-Premises or Cloud

SAP HANA

SAP

HIVE

IBM DB2

ODBC

amazon REDSHIFT

PostgreSQL

Microsoft SQL Server

ORACLE

SAS Datasets

TERADATA

SAS Federation Server

SAS
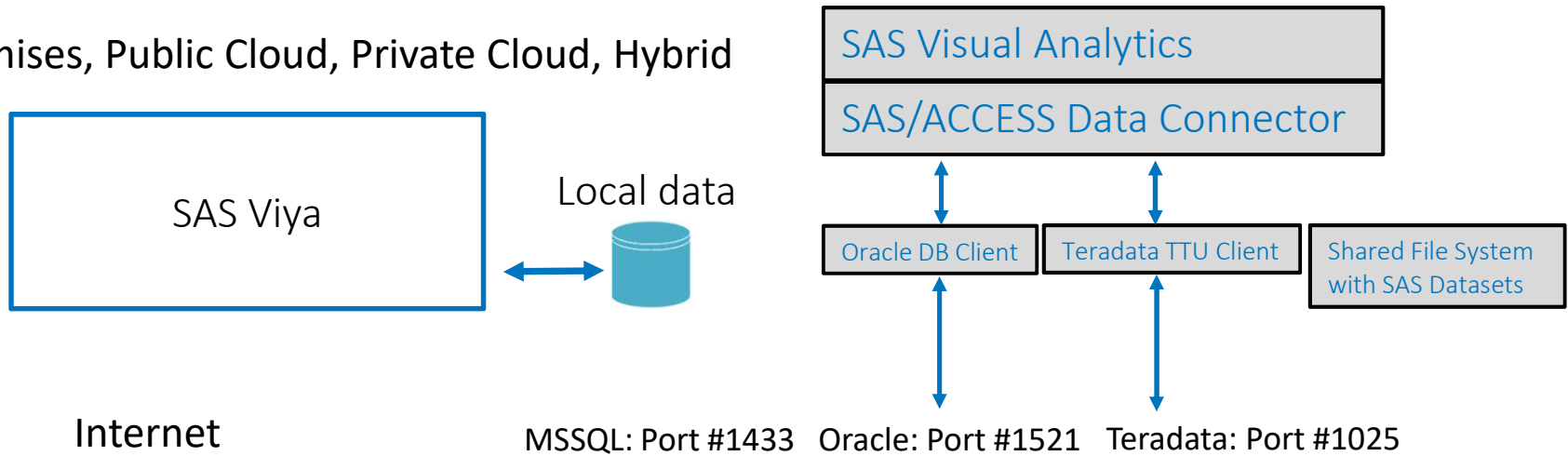
A better way using SAS Data Preparation…

SAS Viya

Local data

SAS Visual Analytics

SAS/Access

SAS Data Preparation

Internet

F I R E W A L L   (H T T P S)

Data Infrastructure
On-Premises or Cloud

SAS Data Agent

Data Agent Driver

SAP HANA

SAP

HIVE

APACHE Spark

IBM DB2.

amazon REDSHIFT

ODBC

PostgreSQL

Microsoft SQL Server

ORACLE

SAS Datasets

TERADATA

SAS Federation Server

Ssas
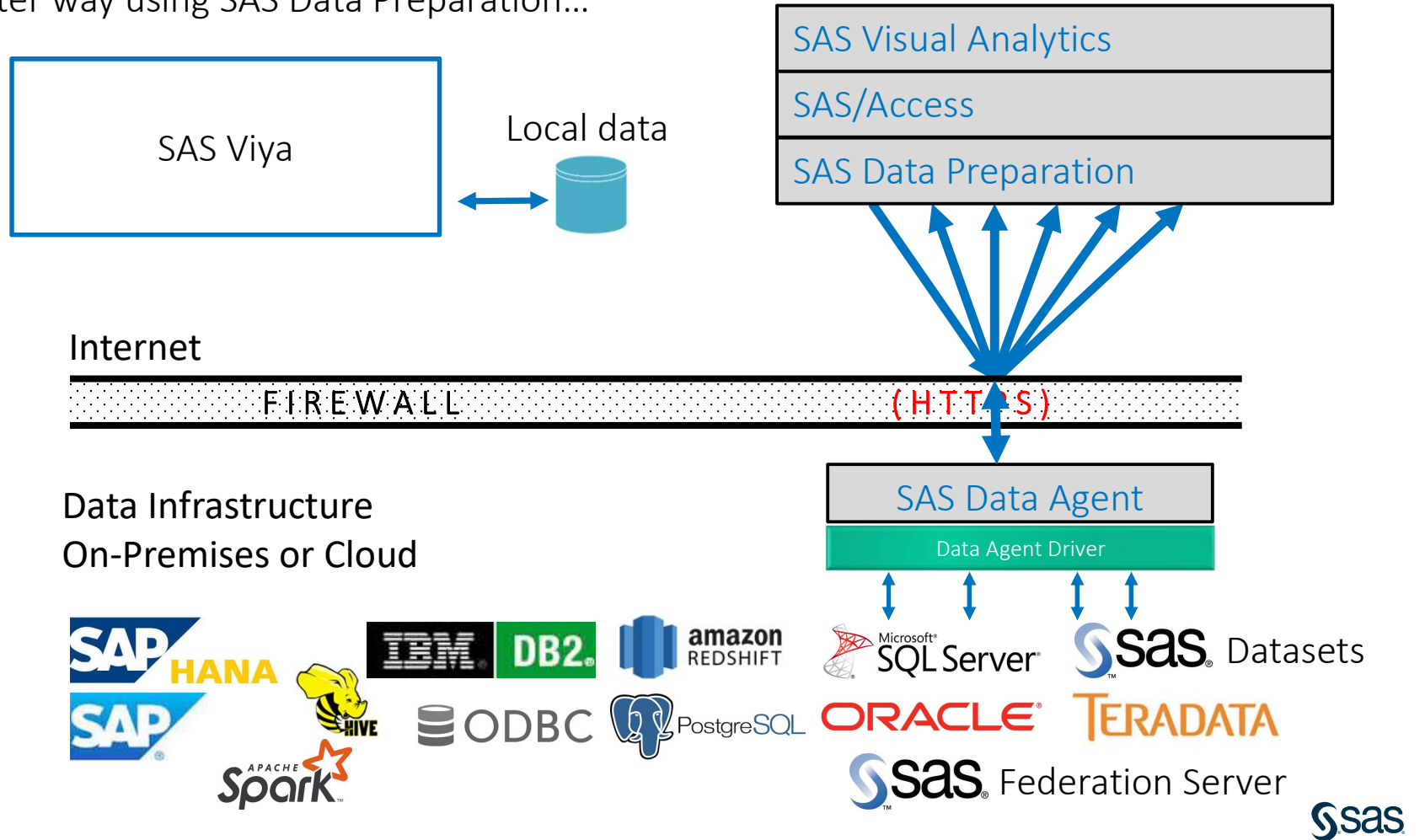
IN THE NEW WORLD,
IT IS NOT THE BIG FISH WHICH
EATS THE SMALL FISH,
IT'S THE *FAST FISH* WHICH
EATS THE SLOW FISH

KLAUS SCHWAB
FOUNDER AND EXECUTIVE CHAIRMAN
WORLD ECONOMIC FORUM

Transform a World of Data into a World of Intelligence

Jocelyn Gascon-Giroux, ing., M.Sc.
Architecte principal de solutions @ SAS
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514.918.7397

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48

SOLVING SAS® PERFORMANCE PROBLEMS: OUR METHODOLOGY

MARGARET CREVAR

AGENDA

- The Most Common Causes of Performance Problems
- Our Methodology
- Gathering Information
- Analyzing the Information
- Real-Life Scenarios

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THE MOST COMMON CAUSES OF PERFORMANCE PROBLEMS

- I/O infrastructure bandwidth

- Server hardware or network provisioning

- Overprovisioning hardware resources

- Application or data management

- Location of resources

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OUR METHODOLOGY

- Clear definition of performance problems and what the desired resolution is
- Gather data
- Analyze data
- Make changes – a few at a time
- Repeat until you overcome the performance problem

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WHAT INFORMATION TO GATHER

- Problem definition
  - First time usage
  - Was fine before but not now
- Application definition
  - Make sure to identify the specific SAS applications exhibiting problems
  - Understand where all the data resides
- Infrastructure definition
  - Server and network information
  - OS-level information
  - I/O subsystem information
- Location of all source data
- What changes have been made to the above recently?

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- SAS logs
  - Add the following to your SAS program

```
options fullstimer source source2 msglevel=i mprint notes;
options sastrace=",,,dsa" sastraceloc=saslog nostsuffix;
proc options;
run;
libname _all_ list;
/*  YOUR EXISTING PROGRAM goes here   */
```

SAS LOG FULLSTIMER OPTION

- Most useful metrics
  - What do these mean?
- Real Time vs Total CPU Time
- File systems
- Isolate and overlay with other information

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WHAT INFORMATION TO GATHER

- Output from tools
  - RHEL Gather Information script
  - RHEL I/O Test script
  - IBM's nmon script

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RHEL GATHER INFORMATION SCRIPT

- What information is collected
- We want what's best for you (and your entire SAS deployment)
- My system doesn't follow all of the best practices – help!

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RHEL I/O TEST SCRIPT

- SAS 9's I/O pattern
- What to test…
- Ideal results
- How do I fix poor results?

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NMON

- How do I make sense of it?
- Correlate with SAS log
- Most useful areas of information
  - Server specifications and information
  - CPU
  - Memory
  - I/O
  - Network

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CONCLUSION

- Clear definition of performance issue
- Clear definition of preferred resolution
- Only make changes based on data
- Make a few changes at a time
- Understand it may take many weeks to resolve the issue

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QUESTIONS