



# Webinar: Open Source Follow-Up and QA

26/8-2020 – in Teams

8/26-2020 – in Teams

Webinar:  
Open Source  
Follow-Up and  
Q&A

# Agenda

- Introduction
- Follow-up and summary of presentation
- Q&A

# Whom am I

Host:

Frans Holm



Presenter

Daniel Ringqvist



- Responsible for FANS in Denmark
- Working +15 years in SAS

- Responsible for FANS in Sweden
- + 25 years experience of SAS

# Open Source Follow-Up 26aug2020

Summary slides

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# Summary - Open Source in Viya

- Why Open Source code, what are we trying to solve?
  - Data Management
  - Analytics
  - Results (plots, lists, ...)
- We learned
  - what we CAN do (and some what we can not)
  - How we set things up on server, for this to work
- Great documentation in the end of the slide deck

# Summary - Open Source in Viya

- What CAN we do
  - Code nodes in Pipelines for R and Py
    - Data prep, analytics and results
  - SWAT in Jupyter Notebooks for R and Py
  - Model Manager
  - REST APIs
  - Proc FCMP to build functions running Py
  - Base SAS Java Object
  - Calling R from SAS/IML (SAS9 and possibly Viya)

# Model Studio Pipelines

Open Source Code Node

# Open Source Code node

## CAN

- Support execution of Python/R code
  - Downloads data sample from Cloud Analytic Services (CAS)
- Display results from Python/R code execution
- Produce assessment statistics of Python/R models
- Enable comparison of Python/R models within Model Studio pipeline





# Open Source Code node CAN NOT

Be part of an  
Ensemble

Support Register,  
Publish or  
Download score  
code or score API



# SWAT

## For R and Python



APIs



```
proc print data = x.hmeq (obs = 10);  
run;
```

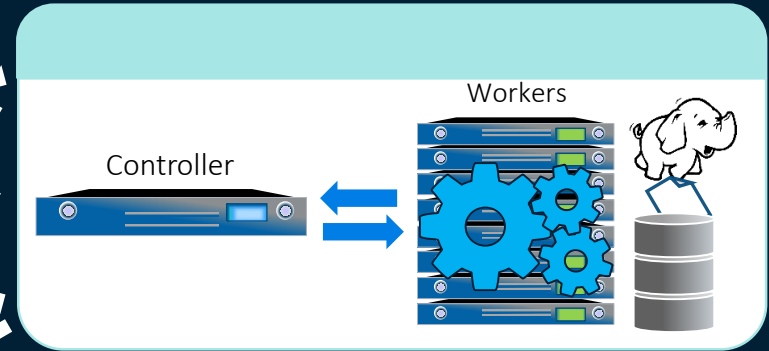


python

```
df = s.CASTable('hmeq')  
df.head(10)
```



```
df <- defCasTable(s, 'hmeq')  
head(df, 10)
```



CAS Action

```
[table.fetch]  
table.name = "hmeq"  
from = 1 to = 10
```

# SWAT CAN



- Support execution of Python or R code
  - Connects to SAS CAS to run SAS Actions

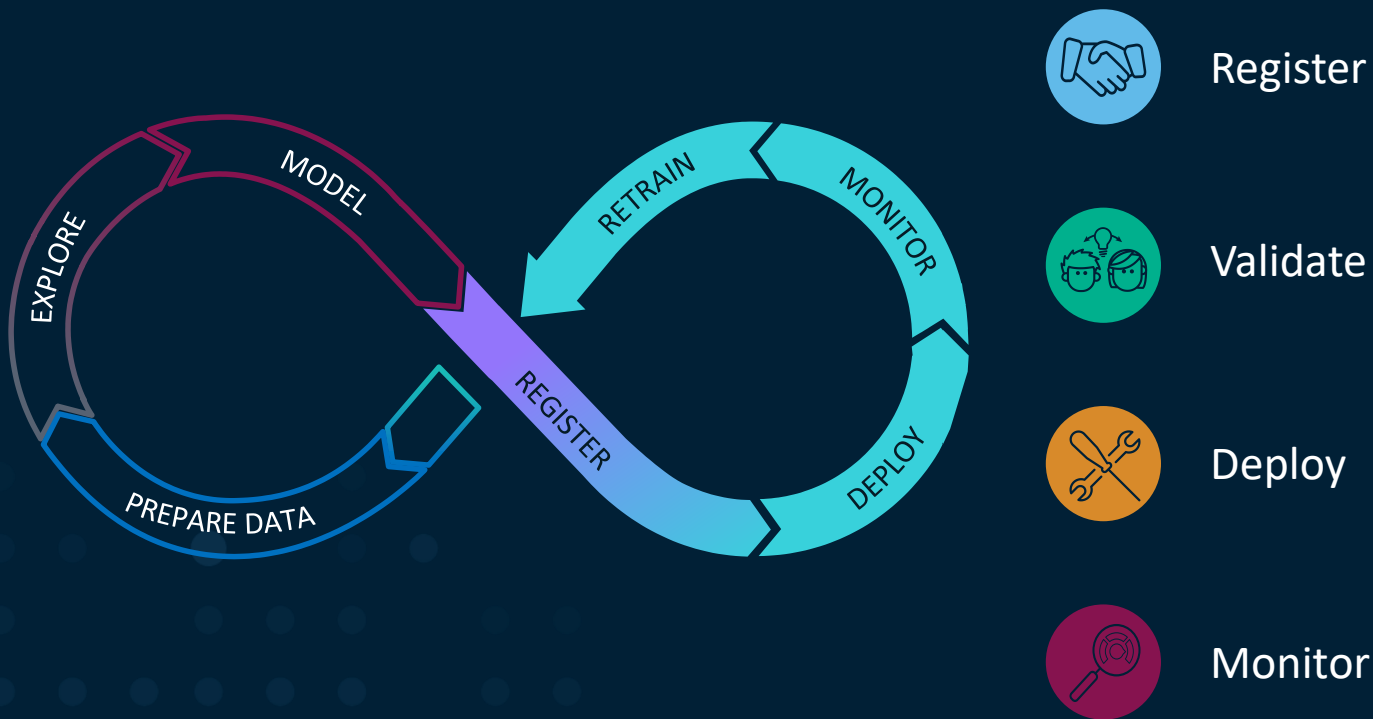


- Can be used with IDE's such as Jupyter Notebooks and R Studio
- Python/R runs where IDE's are configured either locally or on compute server
- Mix SAS programming with Open Source (Python or R)

# SAS Model Manager

And SAS Open Model Manager

# SAS Model Manager



# SAS Model Manager

## CAN

- Supports the registration, validation, deployment and monitoring of Python and R models
- Available using both the point and click in the visual interface and through programming using packages sasctl and pzmm





# Other Integration

REST APIs, PROC FCMP, SAS JAVA Object



## REST APIs

# REST APIs

## What is a REST API?

An API is the messenger that takes a request, tells a system what you want to do and then returns the response back to you.

- A **RESTful API** is an application program interface (**API**) that uses HTTP requests to GET, PUT, POST and DELETE data. An **API** for a website is code that allows two software programs to communicate with each other.
- *“REST stands for REpresentational State Transfer”*
- *“API means Application Programming Interface”*

# REST APIs

## Two entry points into SAS Viya

### APIs for application developers and admins

- designed for enterprise application developers
- intend to build on the work of model builders and data scientists, to deliver apps based on SAS Viya technology

### APIs for analysts and data scientist

- Designed for data scientist, programmers and administrators who need to interact with CAS directly
- Used to executing CAS actions, managing CAS sessions, monitoring the system and inspecting the CAS grid

# REST APIs

## Scoring API

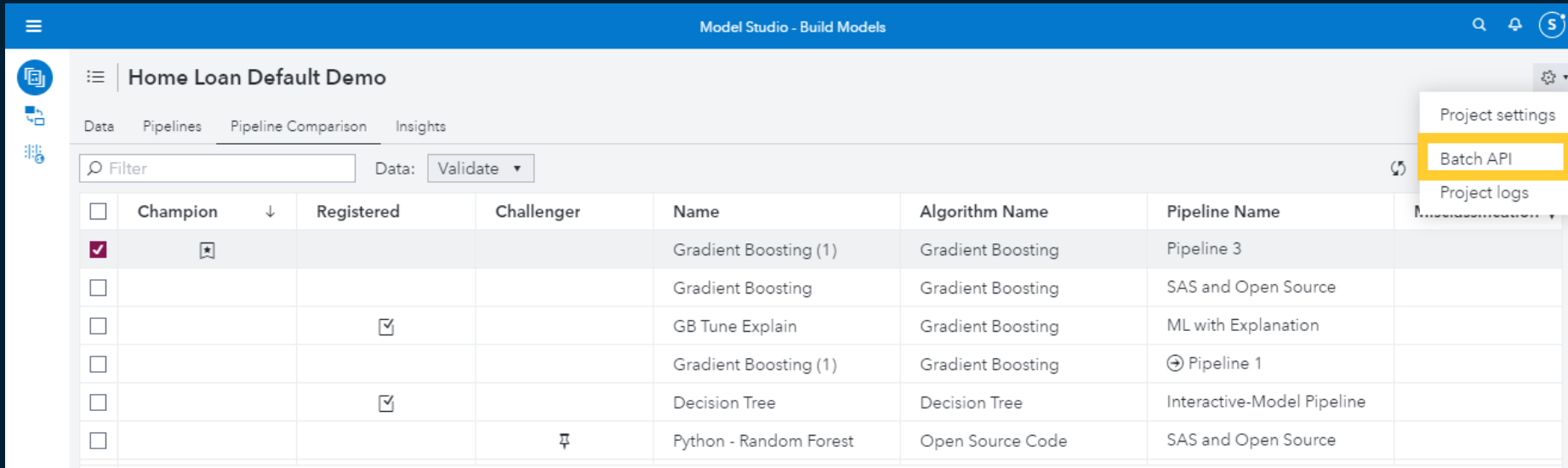
The screenshot shows the SAS Model Studio interface for a project named "Home Loan Default Demo". The interface includes a navigation bar with "Data", "Pipelines", "Pipeline Comparison", and "Insights" tabs. A table lists several models, and a context menu is open over the "Pipeline 1" row, with the "Download score API" option highlighted in yellow.

<input type="checkbox"/>	Champion	Registered	Challenger	Name	Algorithm Name	Pipeline Name
<input checked="" type="checkbox"/>				Gradient Boosting (1)	Gradient Boosting	Pipeline 3
<input type="checkbox"/>				Gradient Boosting	Gradient Boosting	SAS and Open Sou
<input type="checkbox"/>		<input checked="" type="checkbox"/>		GB Tune Explain	Gradient Boosting	ML with Explanation
<input type="checkbox"/>				Gradient Boosting (1)	Gradient Boosting	Pipeline 1
<input type="checkbox"/>		<input checked="" type="checkbox"/>		Decision Tree	Decision Tree	Interactive-Model
<input type="checkbox"/>				Python - Random Forest	Open Source Code	SAS and Open Sou

- Set as champion
- Remove challenger models
- Register models
- Publish models
- Score holdout data
- Download score API**
- Download score code
- Manage Models

# REST APIs

APIs for analysts and data scientist



The screenshot displays the SAS Model Studio interface for a project titled "Home Loan Default Demo". The interface includes a navigation bar with "Data", "Pipelines", "Pipeline Comparison", and "Insights" tabs. A search filter and a "Data: Validate" dropdown are visible above the table. The table lists several pipelines with columns for Champion, Registered, Challenger, Name, Algorithm Name, and Pipeline Name. A dropdown menu is open over the table, showing options for "Project settings", "Batch API" (highlighted in yellow), and "Project logs".

<input type="checkbox"/>	Champion	Registered	Challenger	Name	Algorithm Name	Pipeline Name	
<input checked="" type="checkbox"/>				Gradient Boosting (1)	Gradient Boosting	Pipeline 3	
<input type="checkbox"/>				Gradient Boosting	Gradient Boosting	SAS and Open Source	
<input type="checkbox"/>		<input checked="" type="checkbox"/>		GB Tune Explain	Gradient Boosting	ML with Explanation	
<input type="checkbox"/>				Gradient Boosting (1)	Gradient Boosting	➔ Pipeline 1	
<input type="checkbox"/>		<input checked="" type="checkbox"/>		Decision Tree	Decision Tree	Interactive-Model Pipeline	
<input type="checkbox"/>				Python - Random Forest	Open Source Code	SAS and Open Source	



# PROC FCMP

# PROC FCMP

## Using Python Functions in 5 Steps

### Python Function Workflow

1. Declare a Python object & a dictionary object
2. Insert Python source code into SAS
3. Publish Python source code
4. Call the Python source code
5. Return results from the dictionary

### Results

```
MyResult=50
```

```
proc fcmp;
declare object py(python);
submit into py;
def PyProduct(var1, var2):
    "Output: MyKey"
    newvar = var1 * var2
    return newvar,
endsubmit;
rc = py.publish();
rc = py.call("PyProduct", 5, 10);
MyResult =py.results["MyKey"];
put MyResult=;
```





# Base SAS Java Object

# Base SAS Java Object

Executes a Python or R file

```
/* Execute Python script */  
data _null_;  
    length rtn_val 8;  
    declare javaobj  
        j("com.sas.analytics.datamining.servertier.SASPythonExec",  
          "&dm_nodedir&dm_dsep.dm_srcfile.py");  
    j.callVoidMethod("setOutputFile",  
                    "&dm_nodedir&dm_dsep&lang._output.txt");  
    j.callIntMethod("executeProcess", rtn_val);  
    j.delete();  
    call symput('javaobj_rtnval', rtn_val);  
  
run;
```

# Calling R from SAS/IML

## Comparison of matrix operations in IML and R

```
proc iml;
```

```
x = 1:3; /* vector of sequence 1,2,3 */
```

```
m = {1 2 3, 4 5 6, 7 8 9}; /* 3 x 3 matrix */
```

```
q = m * t(x); /* matrix multiplication */
```

```
print q;
```

```
submit / R;
```

```
rx <- matrix( 1:3, nrow=1) # vector of sequence 1,2,3
```

```
rm <- matrix( 1:9, nrow=3, byrow=TRUE) # 3 x 3 matrix
```

```
rq <- rm %*% t(rx) # matrix multiplication
```

```
print(rq)
```

```
endsubmit;
```

# Q & A

FANS

# Program 2020

[sas.com/fans](https://sas.com/fans) -> Events -> Webinars

## Webinars

- 18/9 Webinar – Migration to Viya
- 1/10 Webinar – Visual Analytics for Viya
- 11/11 Webinar – Enterprise Guide with Viya



# Thank you!

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