금융권 엔터프라이즈 머신러닝 활용을 위한 분석 플랫폼
: How to solve the issues of machine learning?

Dec 2017

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THE POWER TO KNOW.

Age of “Analytic Platform"

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Analytics Trend

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Enterprise platforms

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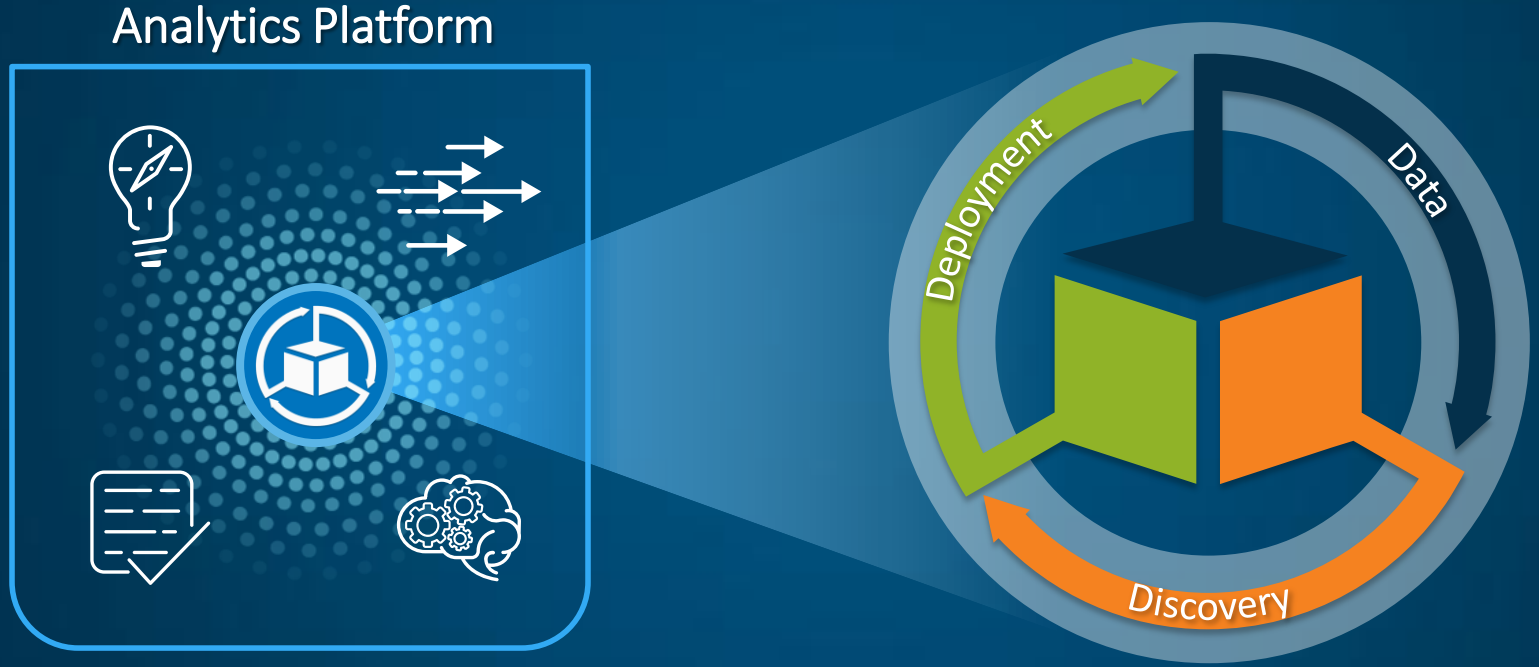
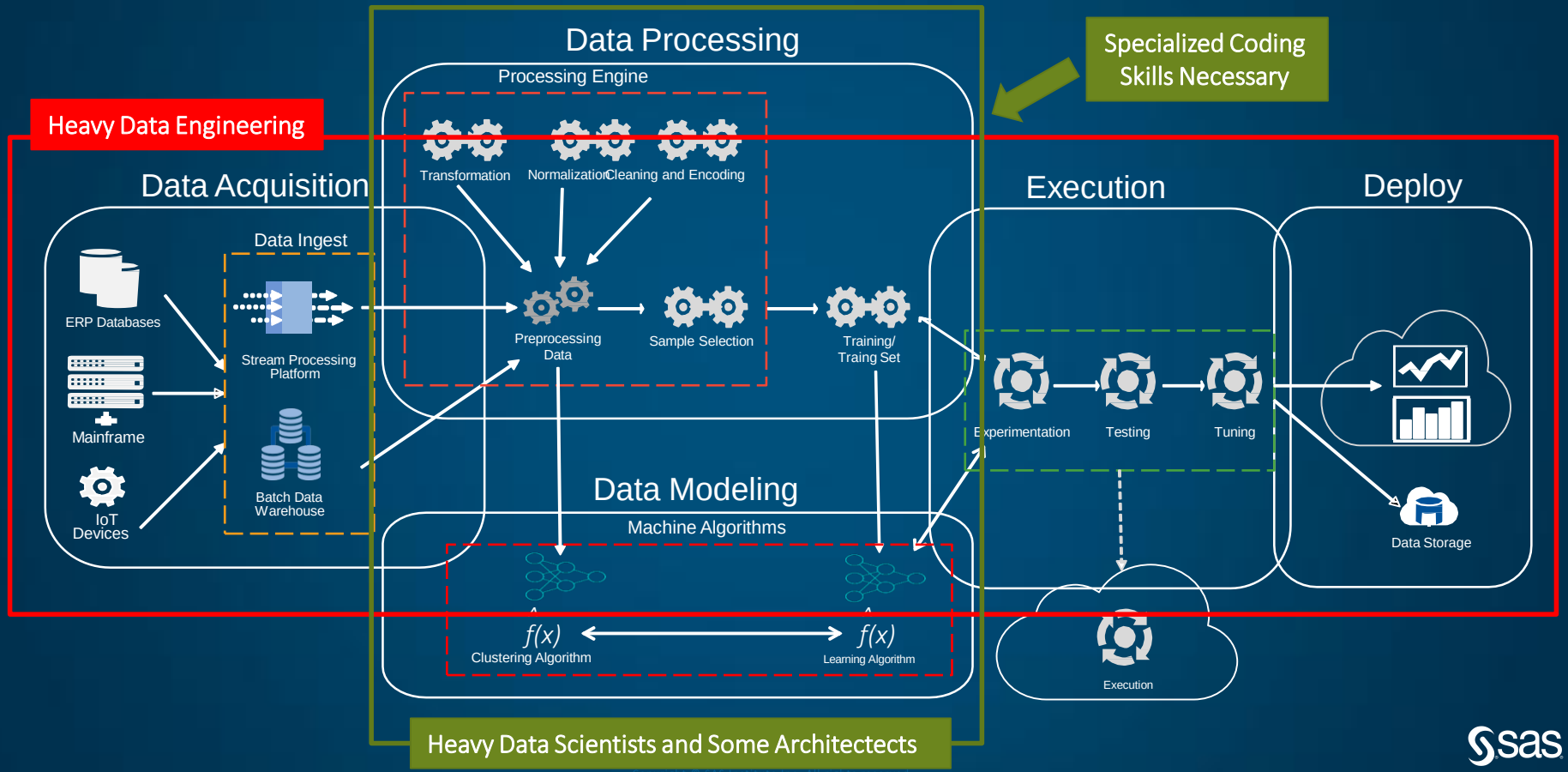
Analytics Lifecycle – Data, Discovery, Deployment



Basic Machine Learning Architecture

Gartner



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Open Source Ecosystem Issues

1. Silos

2. Lack of oversight

3. Delay in execution

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1. Silos : Best of Breeds ?

- MapReduce, SQL, ETL
- Machine Learning
- Graph Processing
- Streaming

ModelDB

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2. Lack of oversight -> Hidden Technical Debt

Analytics is more than the sum of its parts

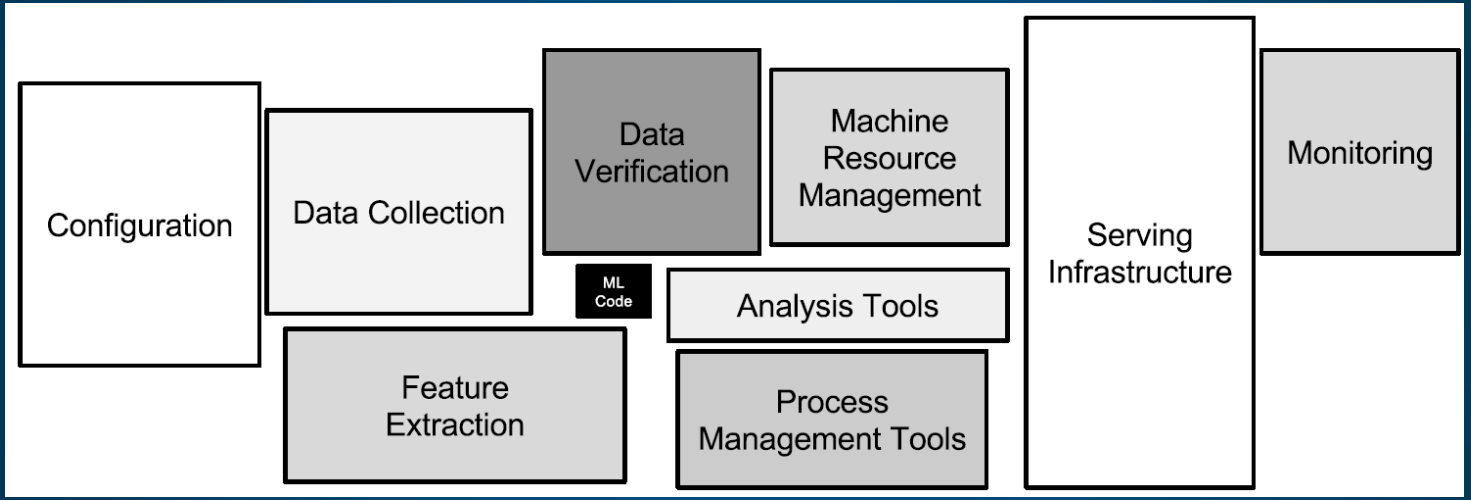

Figure 1: Only a small fraction of real-world ML systems is composed of the ML code, as shown by the small black box in the middle. The required surrounding infrastructure is vast and complex.

Source : "Hidden Technical Debt in Machine Learning Systems " , Google NIPS 2015

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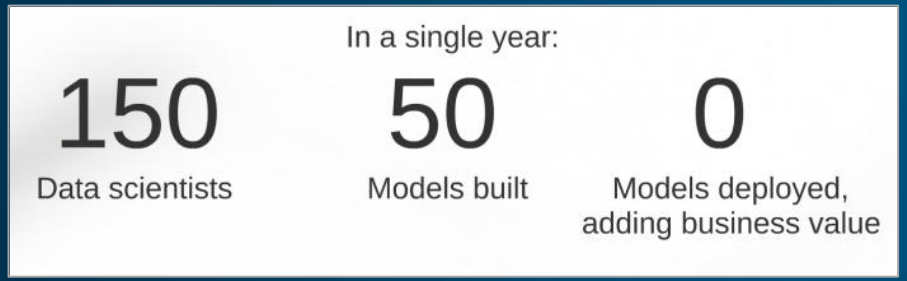
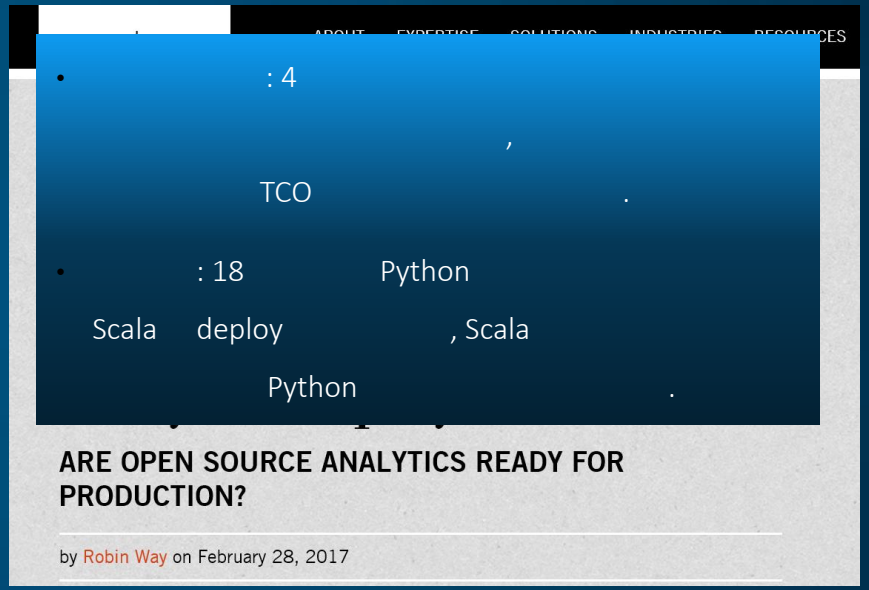
3. Delay in execution -> Time to Value

Are open source analytics ready for production?

It's common that both analytics teams and technology teams forget to spend time working out their plans for deploying these assets in the field, before they complete their exploratory analytics and model development.



Source : "Why You're Not Getting Value from Your Data Science" , HBR, 7 Dec. 2016
https://hbr.org/2016/12/why-youre-not-getting-value-from-your-data-science



https://coriosgroup.com/financial-services-cdo-feedback-on-open-source-analytics-deployment/

* Chief Data Officers (CDOs)

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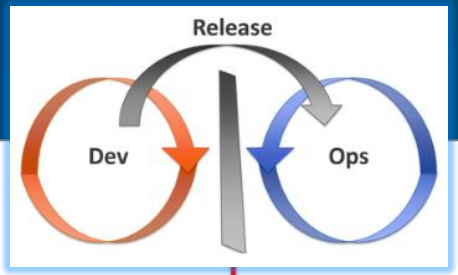
Apache Spark Model Deployment



Data Science

Prototype (Python/R)
Create Pipeline

- Extract raw features
- Transform features
- Select key features
- Fit multiple models
- Combine results to make prediction

Software Engineering

Re-implement Pipeline for production (Java)
Deploy Pipeline

- Extra implementation work
- Different code paths
- Synchronization overhead

✓ 개발 생산성 이슈

✓ 코드 변환 이슈

✓ 운영 환경 및 성능 이슈

* databricks, 2017

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How does SAS Viya solve the issue?

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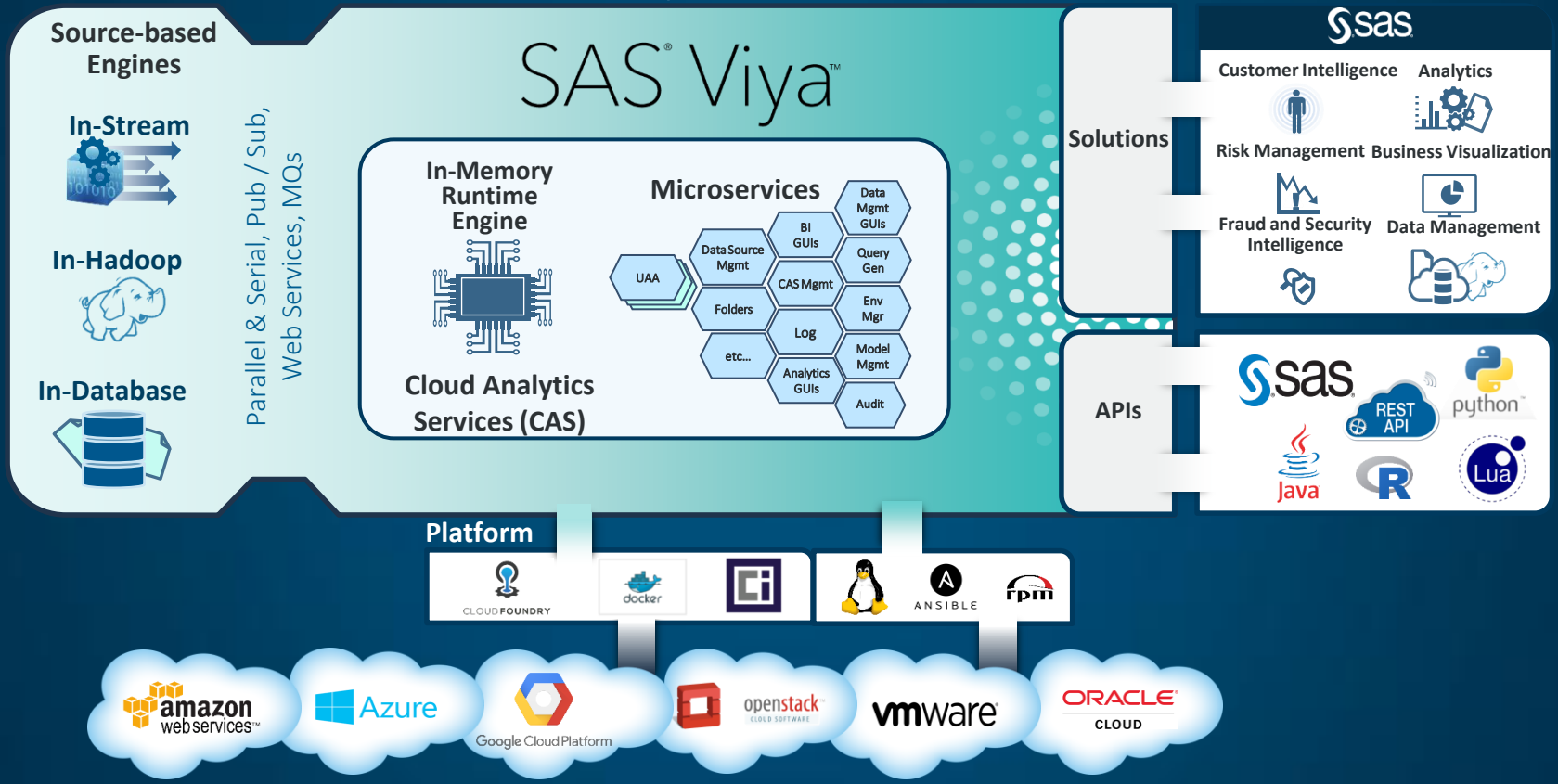
SAS® Viya™
One Environment
One User Experience

SAS Viya Architecture



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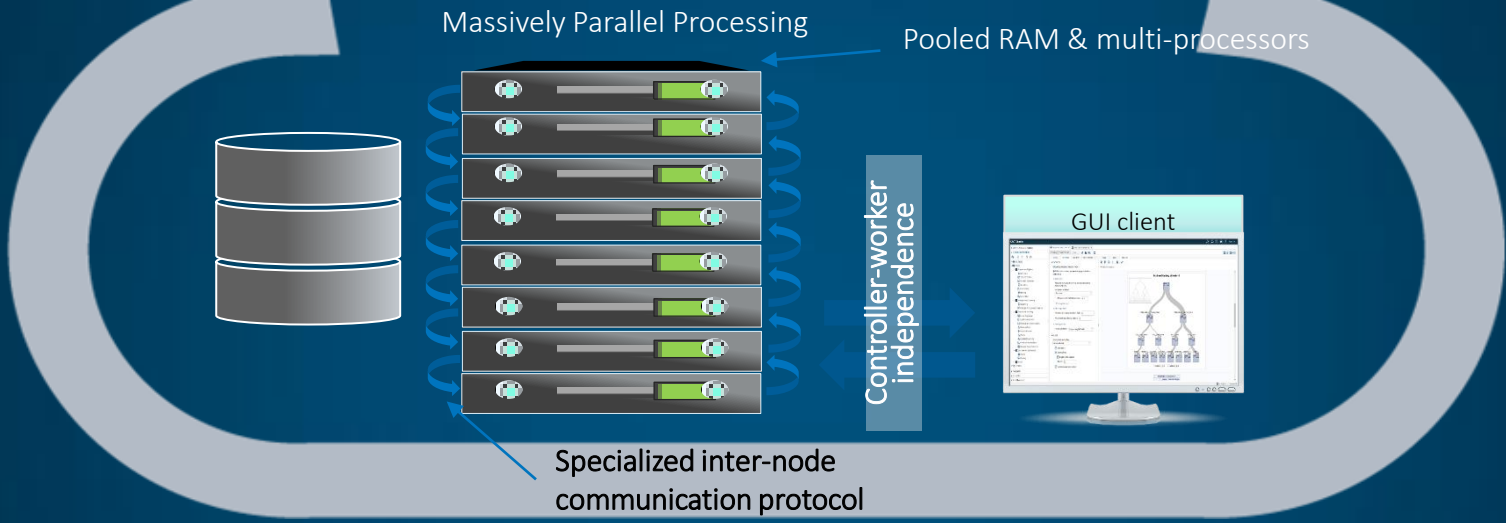
Performance Acceleration – MPP, GPU



Fast

- Multi-threaded
- Distributed In-Memory
- Inter-node Communication

Scalable

- Single Machine to Distributed MPP
- Scale-out
- On-Premise to Cloud

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Data Management

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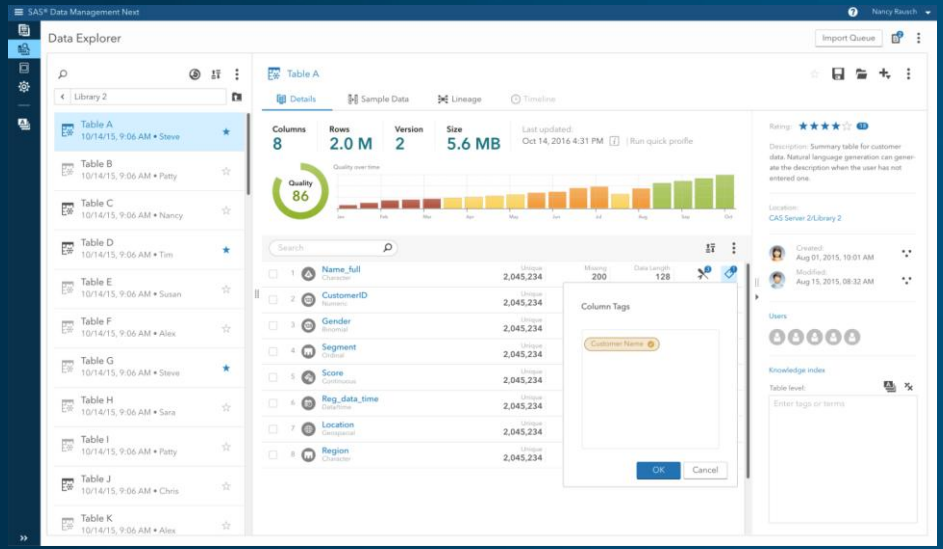

Point and click GUI based

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Non-Technical User

Coding interfaces

Data Scientist

SAS
R
Python
Lua
REST

MPP 분산 서버 In-Memory Engine

- ✓ SQL
- ✓ Data Step
- ✓ Transpose …

Visual Analytics

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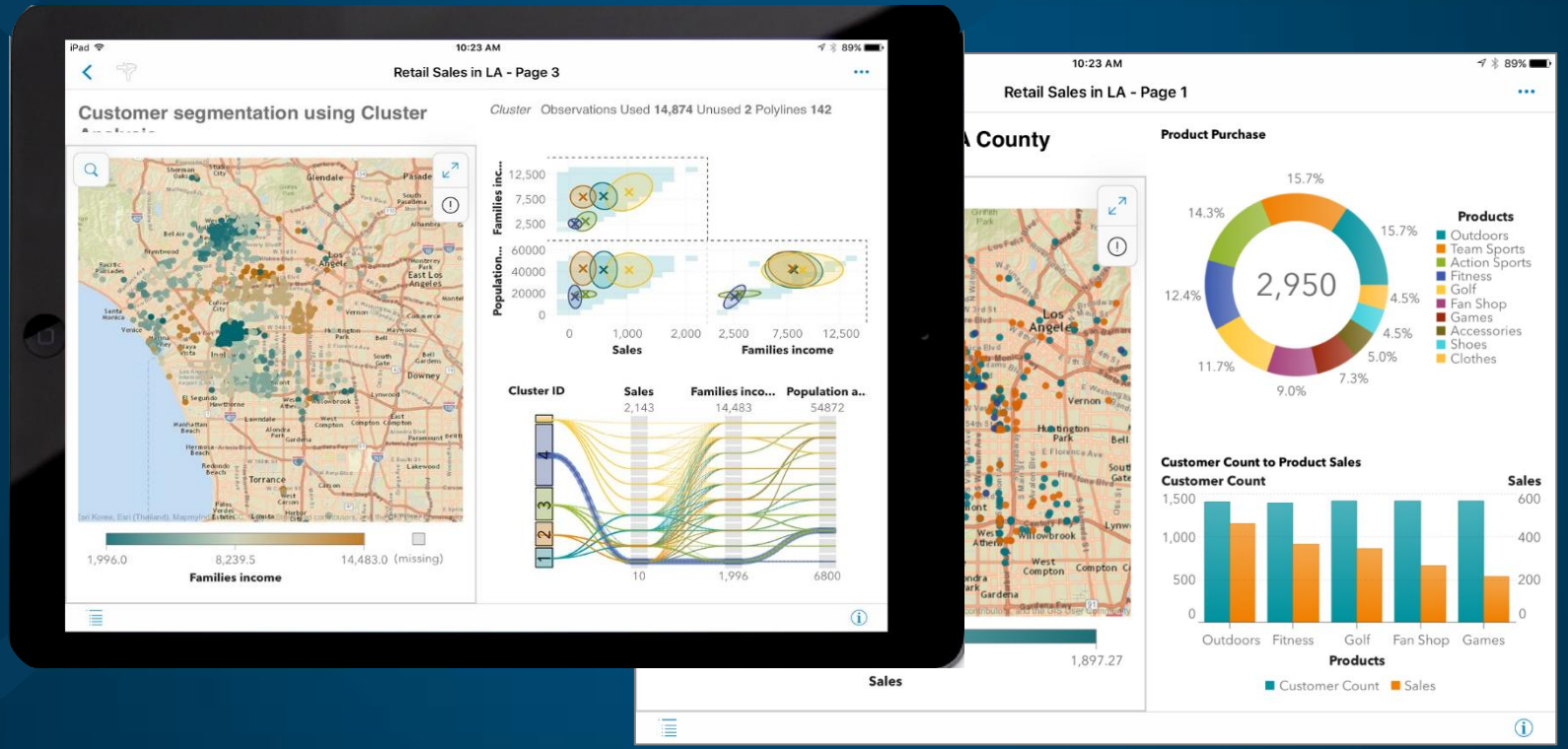

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Machine Learning / Deep Learning

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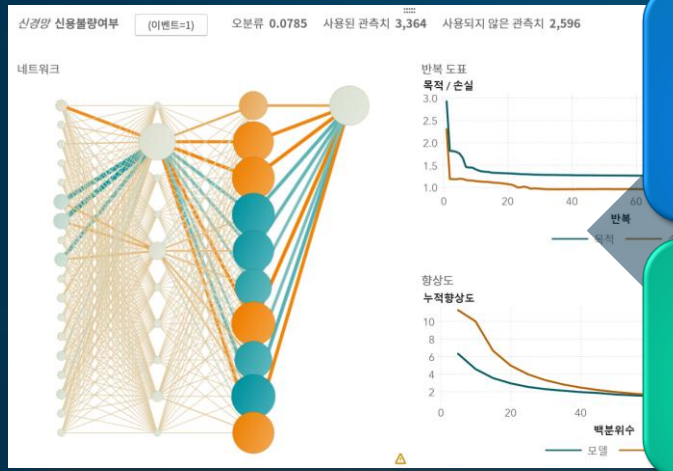
Ability to analyze various machine Learning on a single platform

Visual Modeling



- Algorithm : Neural Network
- Hidden Layer : 2

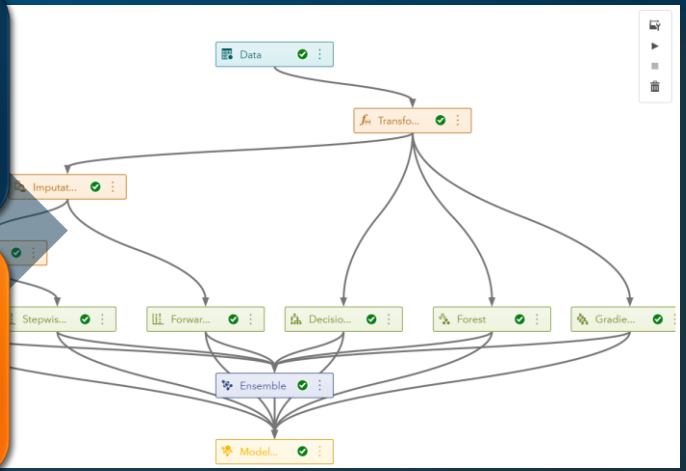
Machine Learning

Deep Learning

Text Analytics

Image Processing

Visual Pipeline



- Model build process
  Feature engineering →Gradient Boosting , Forest
  →Model comparison
- Visual pipeline template

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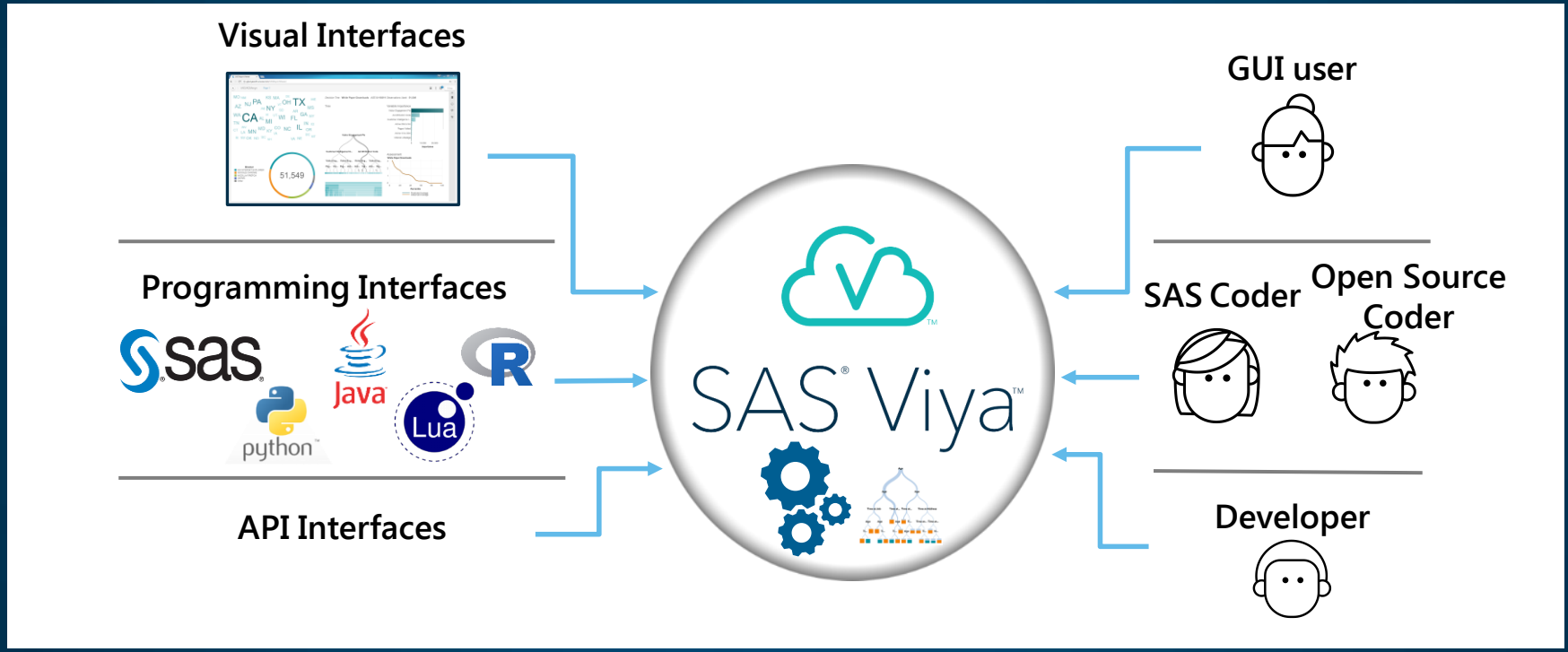
Open & Collaboration

API's Expand the SAS ecosystem to other coding languages



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Viya : 4 types of Deployment

SMP

MPP

Hadoop Co-located

Cloud Native

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How does SAS Viya solve the issue?

1. Silos

2. Lack of oversight

3. Delay in execution

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1. Silo --> One User Experience

SAS Viya

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1. Silo --> Collaboration

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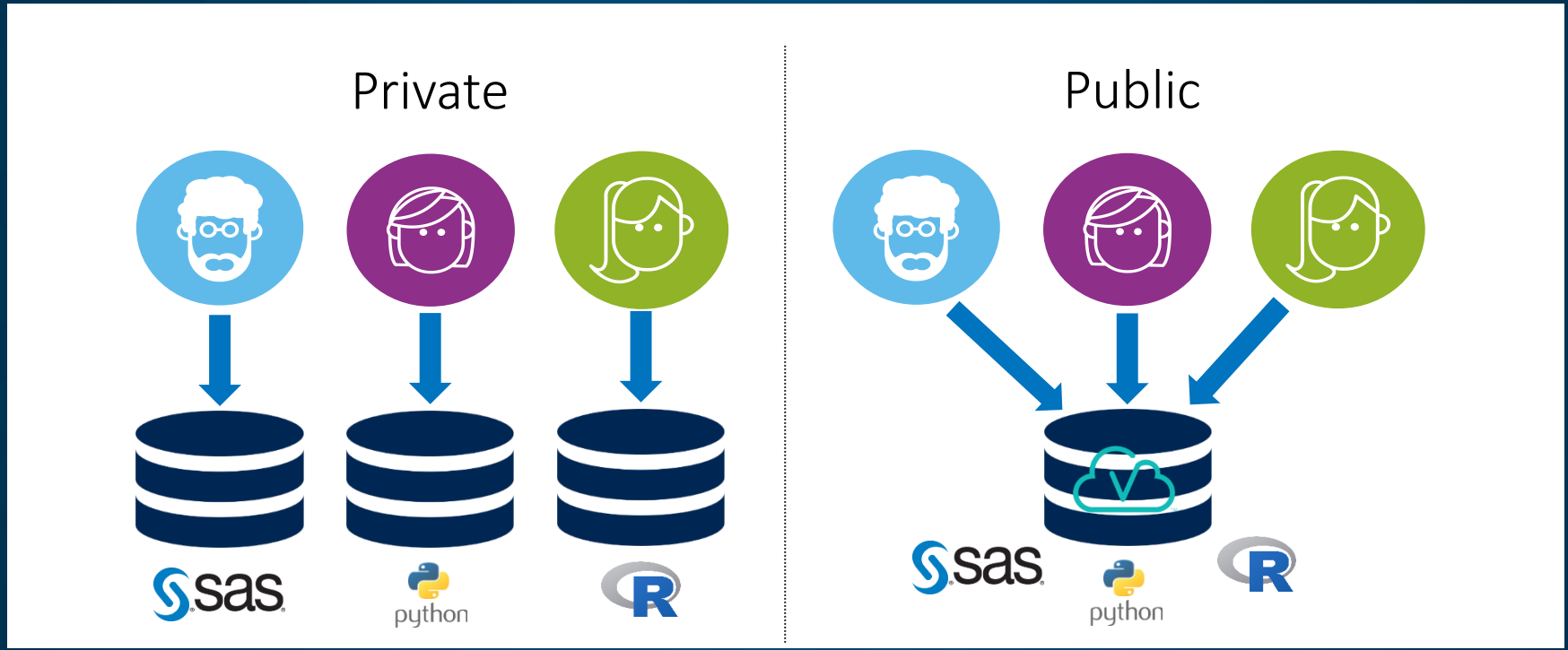

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APIs

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

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

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

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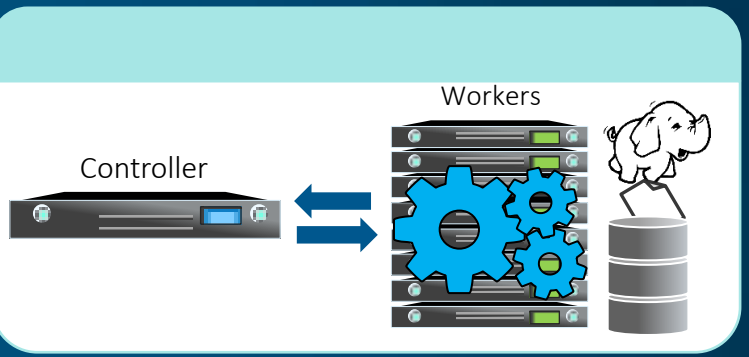

CAS Action

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

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2. Lack of oversight --> Integration & Governance

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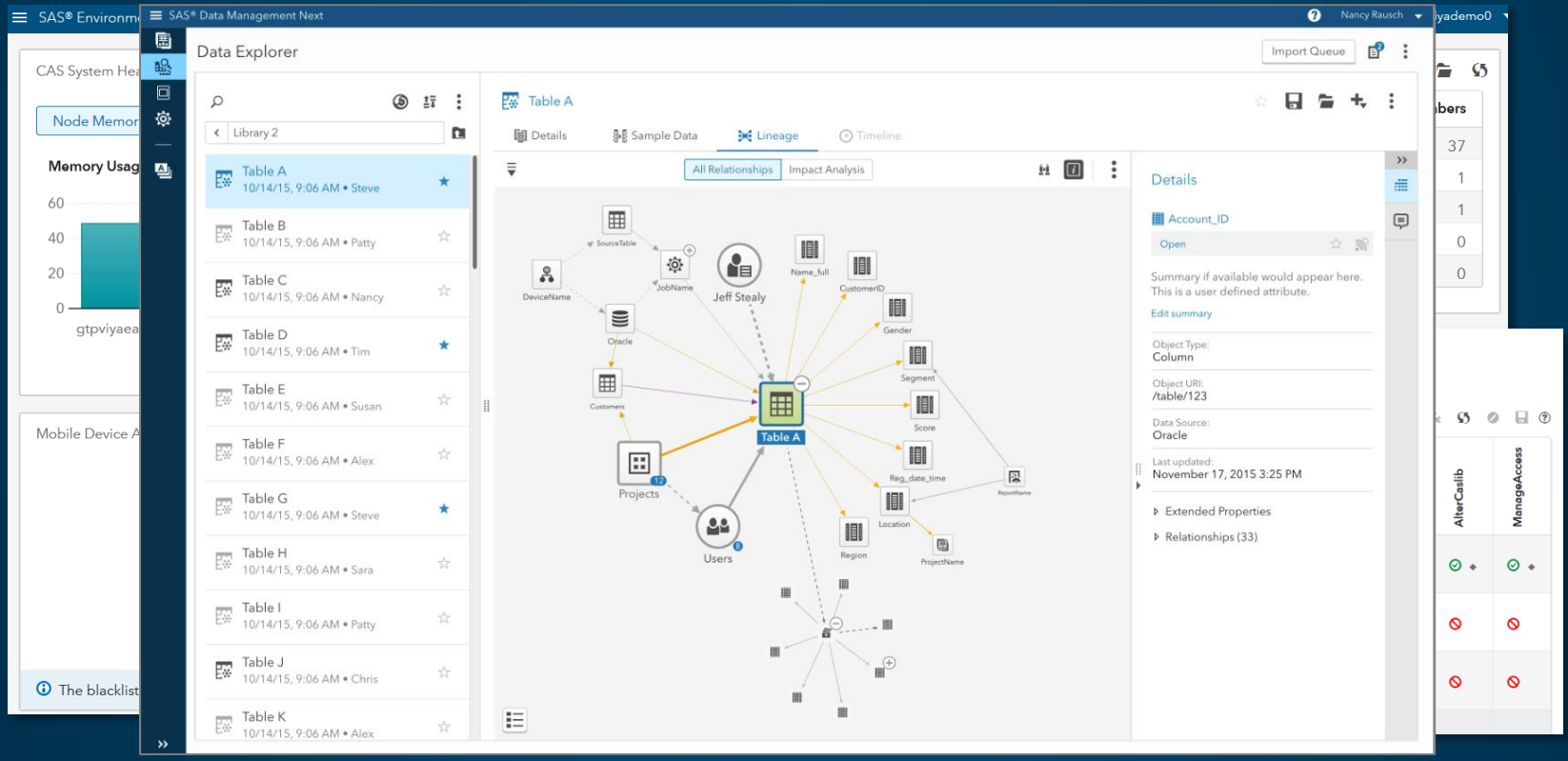
Environment Manager & Lineage



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3. Fast in execution --> DevOps

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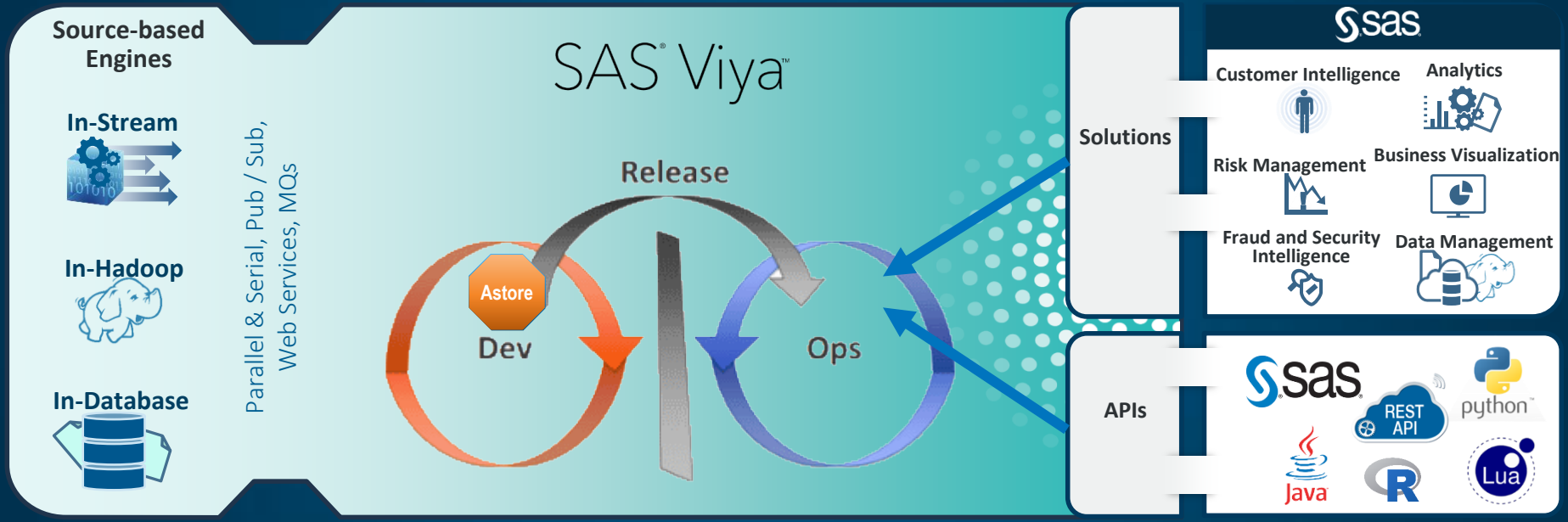

- Performance
- High Quality
- Low cost to deploy
- Time to Value

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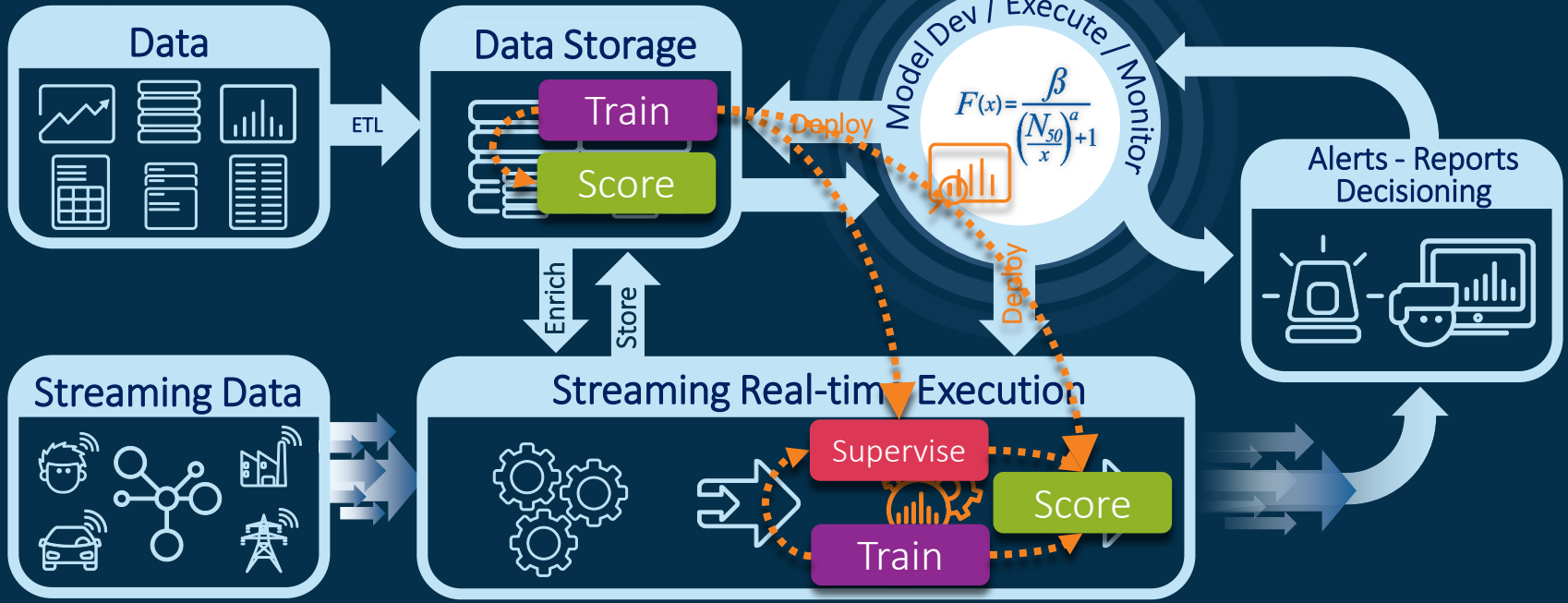
3. Fast in execution --> Streaming Analytics



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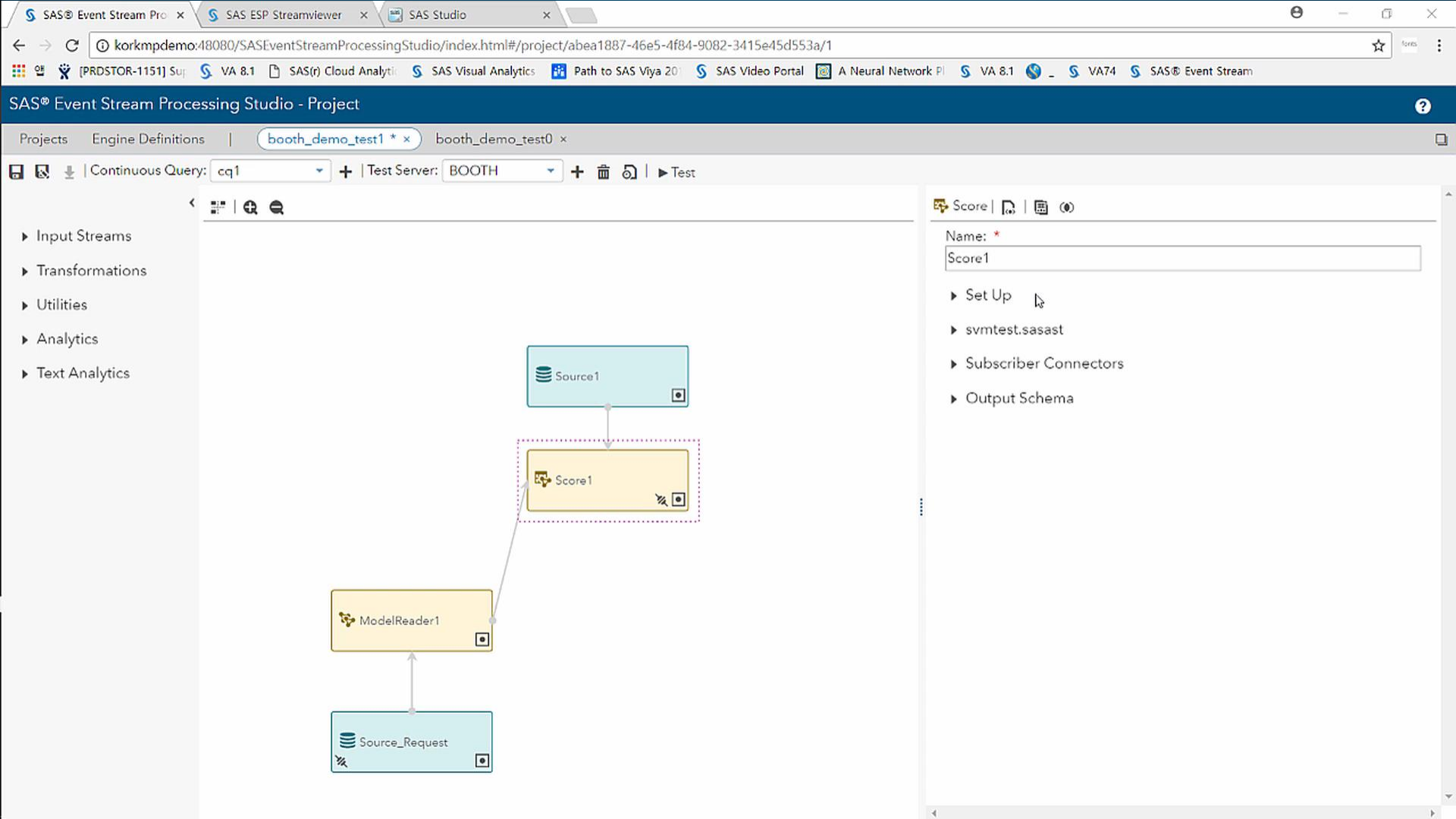
SAS® Event Stream Pro
SAS ESP Streamviewer
SAS Studio
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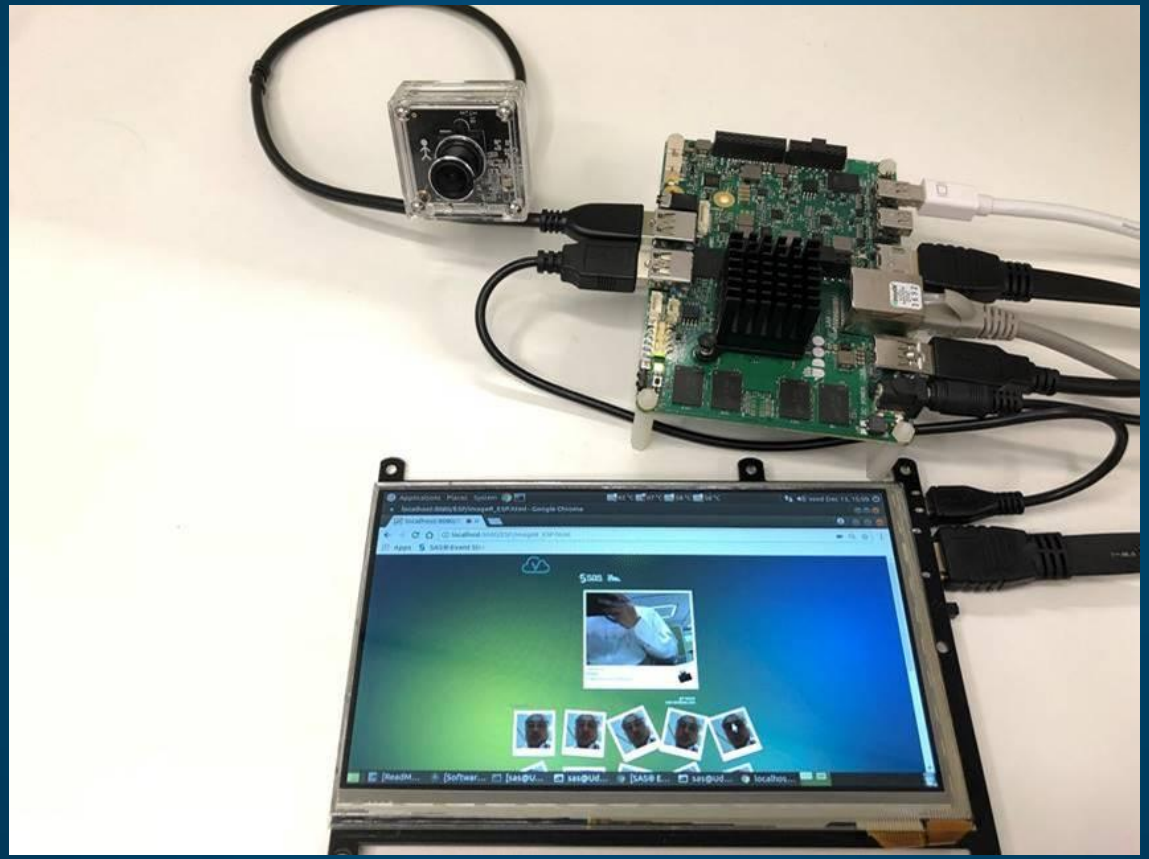
SAS® Event Stream Processing Studio - Project
Projects
Engine Definitions
booth_demo_test1 *
booth_demo_test0
Continuous Query: cq1
Test Server: BOOTH
Test
Input Streams
Transformations
Utilities
Analytics
Text Analytics
Source1
Score1
ModelReader1
Source_Request
Score
Name: *
Score1
Set Up
svmtest.sasast
Subscriber Connectors
Output Schema

Image categorization on an edge device



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3. Fast in execution --> DevOps

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DevOps for Machine Learning

DevOps

Communication

Collaboration

Integration

Agile Development

Efficient Operations

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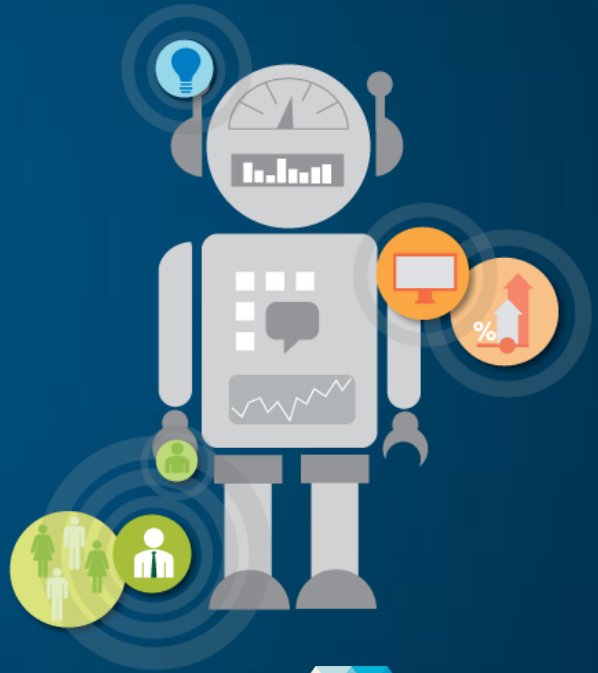
좋은 머신러닝 플랫폼이 되려면?

What's required to create good machine learning platform?

- ✓ User Environments.
- ✓ Data preparation capabilities.
- ✓ Algorithms – basic and advanced.
- ✓ Performance & Scalability.
- ✓ Governance.
- ✓ Data – Discovery – Deployment (Time to Value)



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