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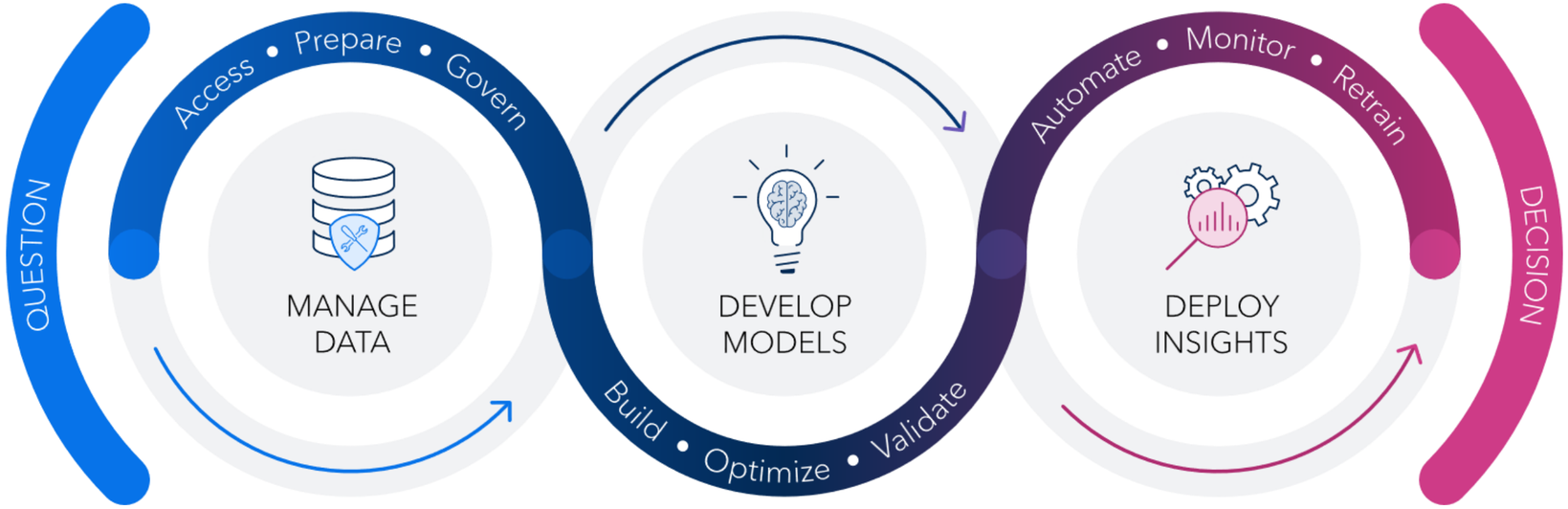
Putting Intelligent Decisions into Action with SAS Visual Analytics

Renato Luppi
renato.luppi@sas.com

Decisioning Across the Entire AI Lifecycle

End to End Lifecycle Support



Data for Analytics and Decisioning	Analytical Visualization	Advancing with AI	Automate Modeling	Operationalizing Analytics

Accelerate data storytelling and increase speed to value.

Thread automation and intelligence throughout the analytics life cycle.

Deliver fast, self-service power to every user—and deliver embedded smart insights.

DataOps + ModelOps + DecisionOps

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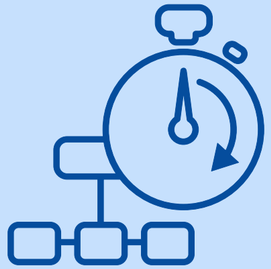
SAS Intelligent Decisioning

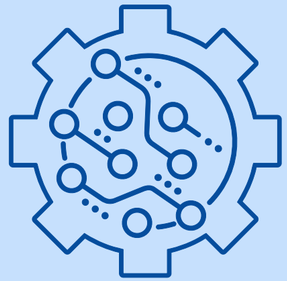
SAS® Intelligent Decisioning

Automate decisions at scale to drive the best possible real-time interactions and outcomes with stakeholders

Deliver Trusted Decisions



Make Confident Decisions Faster



Increase Operational Agility

SAS® Intelligent Decisioning

What are Decisions?

Decisions are a combination of rule sets, analytical models, conditional logic, custom code, and other objects in a workflow that are used to evaluate data and help make real-world business decisions.

Should a mortgage loan be approved?

Is a transaction fraudulent?

Is a machine about to fail?

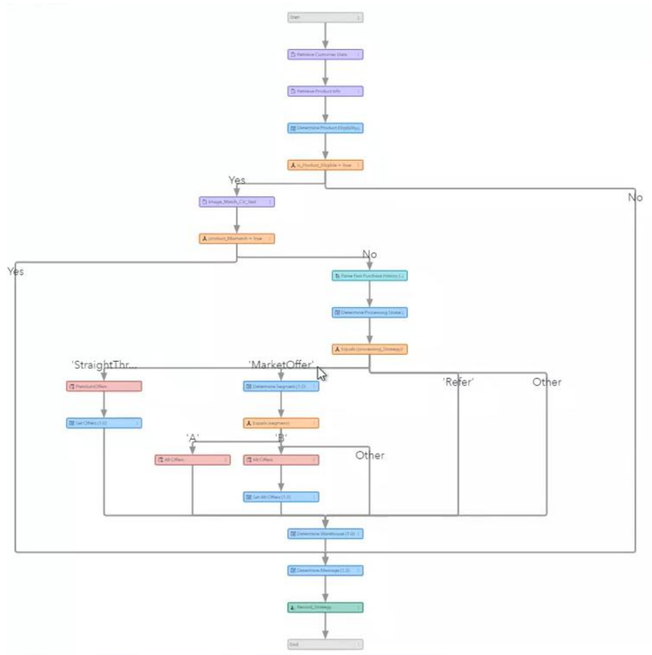
Is a medical claim valid?

Which offer should be sent to a customer?

SAS® Intelligent Decisioning

Deploying Decisions

Decision Flow



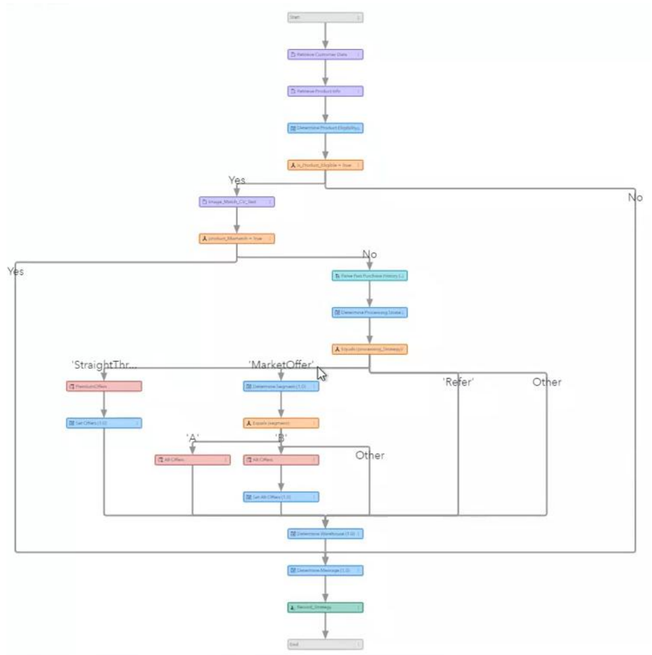
Publish

Publishing Destination

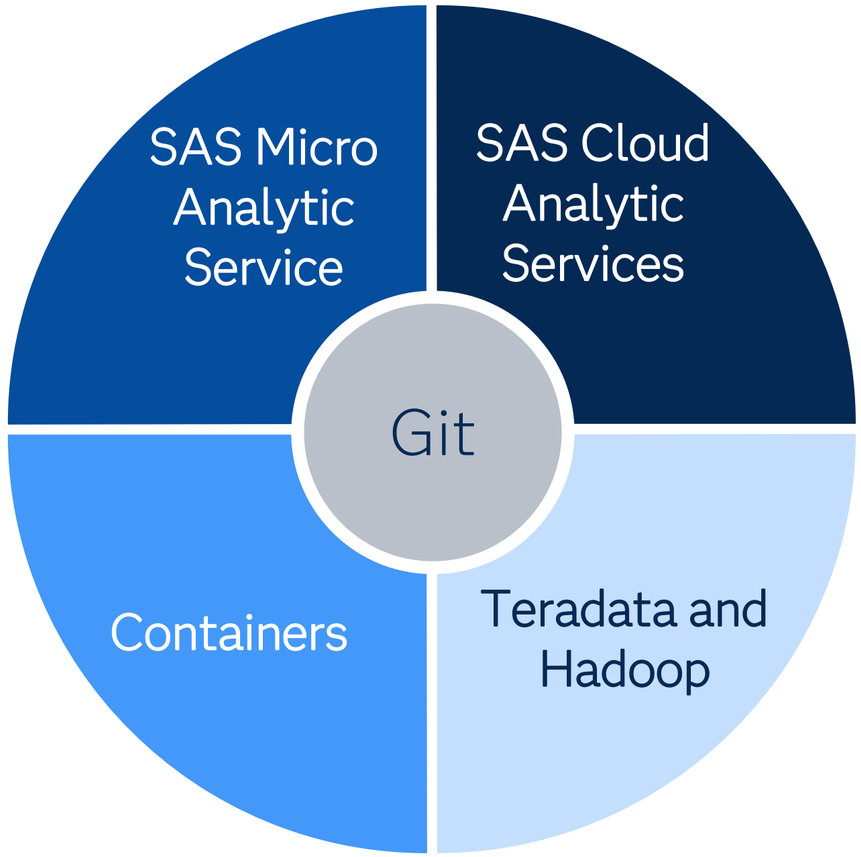
SAS® Intelligent Decisioning

Deploying Decisions

Decision Flow



Publish



Executing on Micro Analytic Service (MAS)

microanalyticScore API endpoint

Python example

```
...
# Define the request URL
masModuleURL = "/microanalyticScore/modules/" + moduleID
requestURL = baseURL + masModuleURL + "/steps/execute"
# Execute the decision
masExecutionResponse = post(requestURL, contentType, acceptType,
                            accessToken, requestBody)
...
```

JavaScript example

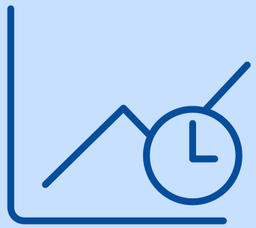
```
...
// Define the request URL
const masModuleURL = "/microanalyticScore/modules/" + moduleID
const requestURL = baseURL + masModuleURL + "/steps/execute"
// Execute the decision
const masExecutionResponse = await fetch(requestURL, requestOptions)
...
```

SAS Visual Analytics

SAS® Visual Analytics

Analyze massive datasets, identify hidden patterns, and create interactive dashboards via drag-and-drop tools

Self Service, Interactive Visualizations



Fast Data Discovery

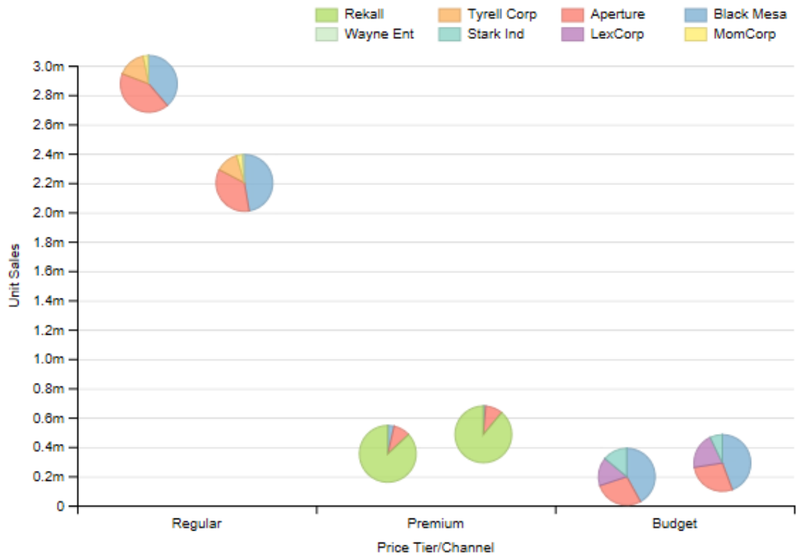
Integrated Augmented Analytics

SAS® Visual Analytics

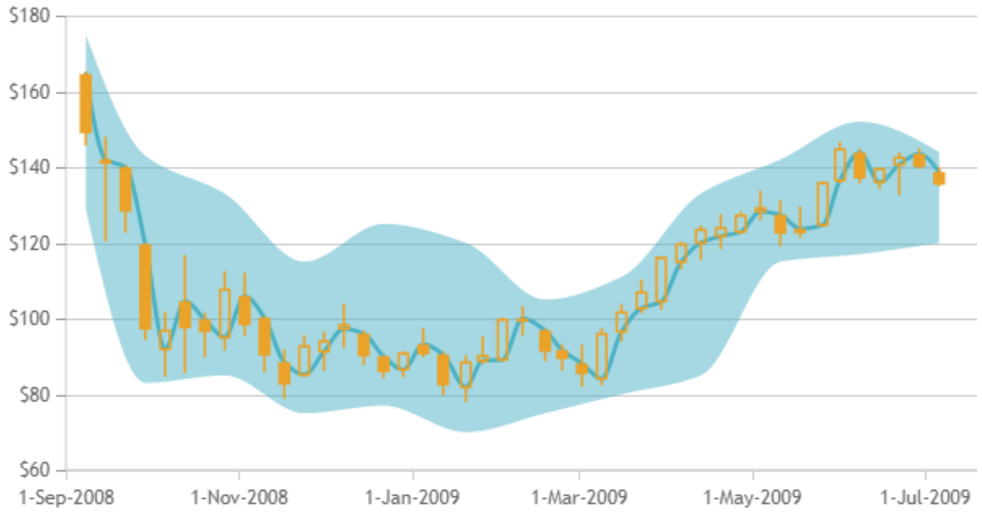
Objects

- Tables
  - Crosstab
  - List table
- Geo Maps
  - Geo bubble
  - Geo cluster
  - Geo contour
  - Geo coordinate
  - Geo line
  - Geo line-coordinate
  - Geo network
  - Geo pie
  - Geo region
  - Geo region-coordinate
- Graphs
  - Bar chart
  - Box plot
  - Bubble change plot
  - Bubble plot
  - Butterfly chart
  - Comparative time series plot
  - Correlation matrix
  - Dot plot
  - Dual axis bar chart
  - Dual axis bar-line chart
  - Dual axis line chart
  - Dual axis time series plot
  - Gauge
  - Heat map
  - Histogram
  - Key value
  - Line chart
  - Needle plot
  - Numeric series plot
  - Parallel coordinates plot
  - Pie chart
  - Scatter plot
  - Schedule chart
  - Step plot
  - Targeted bar chart
  - Time series plot
  - Treemap
  - Vector plot
  - Waterfall chart
  - Word cloud
- Controls
  - Button bar
  - Drop-down list
  - List
  - Slider
  - Text input
- Analytics
  - Automated explanation
  - Automated prediction
  - Forecasting
  - Network analysis
  - Path analysis
  - Text topics
- Containers
  - Precision container
  - Prompt container
  - Scrolling container
  - Stacking container
  - Standard container
- Content
  - Data-driven content
  - Image
  - Job content
  - Text
  - Web content
- Statistics
  - Cluster
  - Decision tree
  - Generalized additive model
  - Generalized linear model
  - Linear regression
  - Logistic regression
  - Model comparison
  - Nonparametric logistic regression
- Machine Learning
  - Bayesian network
  - Factorization machine
  - Forest
  - Gradient boosting
  - Neural network
  - Support vector machine

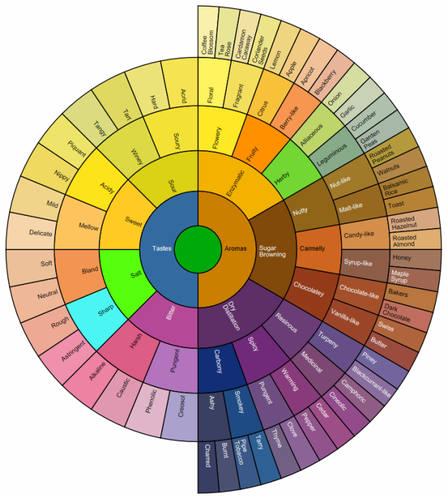
Dimple



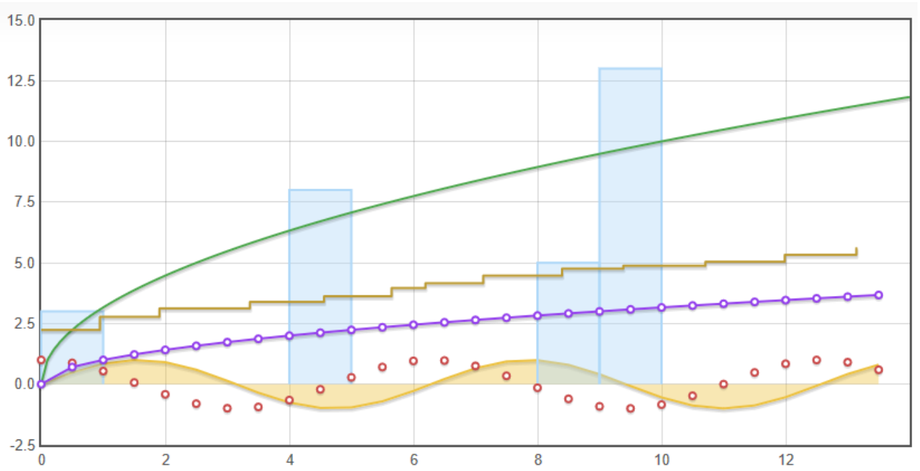
jqPlot



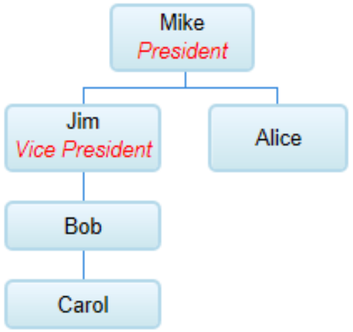
D3.js



Flot



Google Charts



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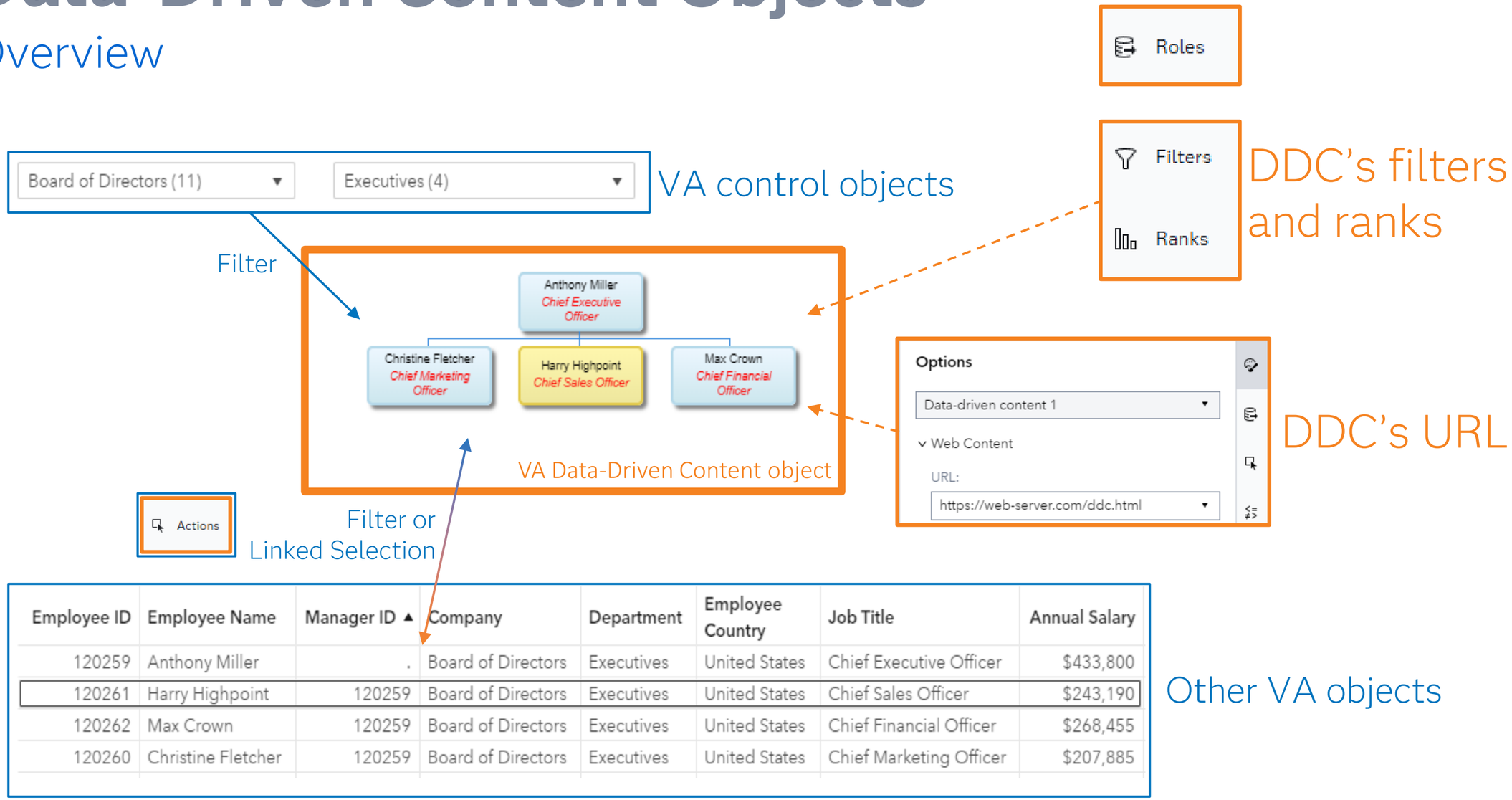
Data-Driven Content Objects

Overview

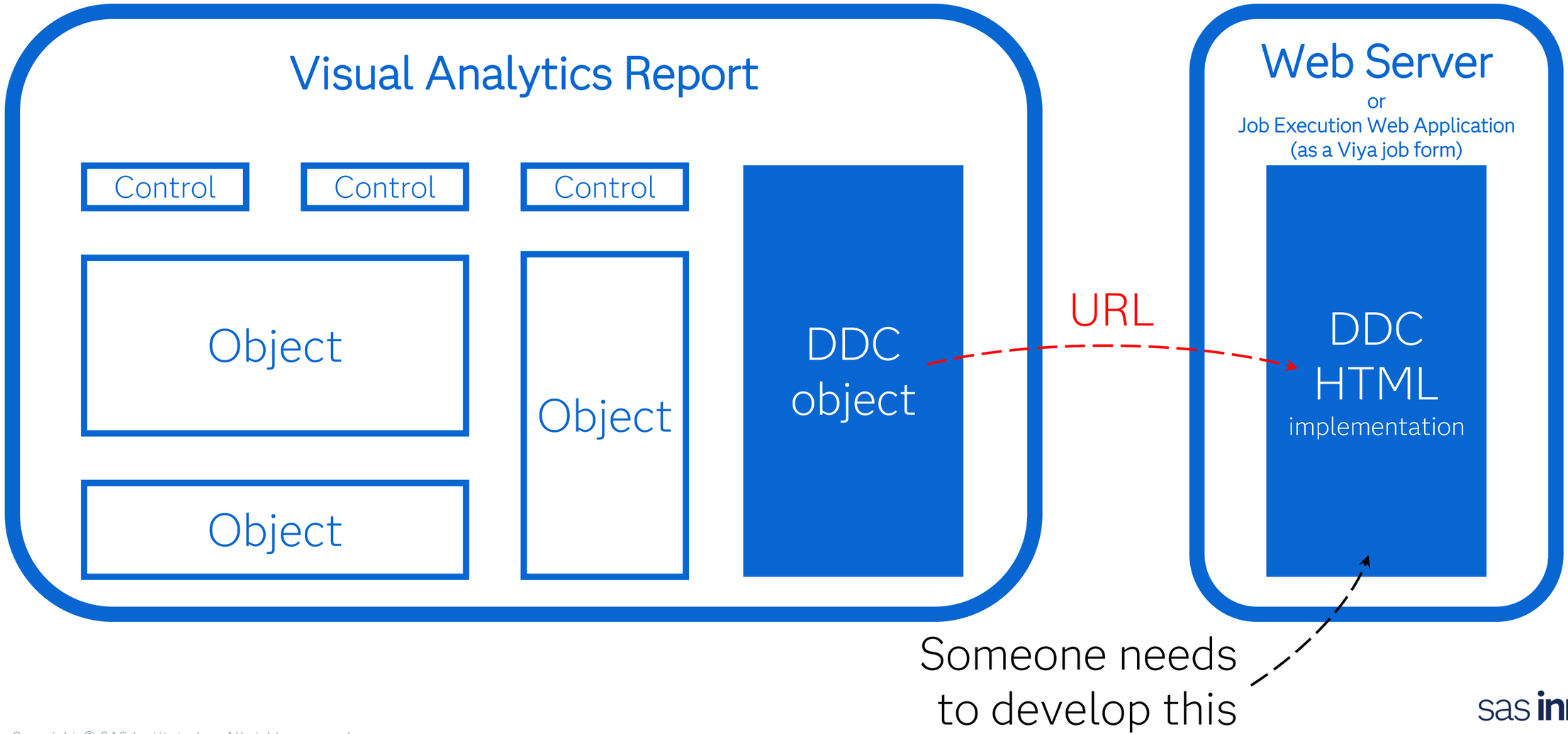


Employee ID	Employee Name	Manager ID ▲	Company	Department	Employee Country	Job Title	Annual Salary
120259	Anthony Miller	.	Board of Directors	Executives	United States	Chief Executive Officer	$433,800
120261	Harry Highpoint	120259	Board of Directors	Executives	United States	Chief Sales Officer	$243,190
120262	Max Crown	120259	Board of Directors	Executives	United States	Chief Financial Officer	$268,455
120260	Christine Fletcher	120259	Board of Directors	Executives	United States	Chief Marketing Officer	$207,885

Other VA objects

Data-Driven Content Objects

They are like custom objects

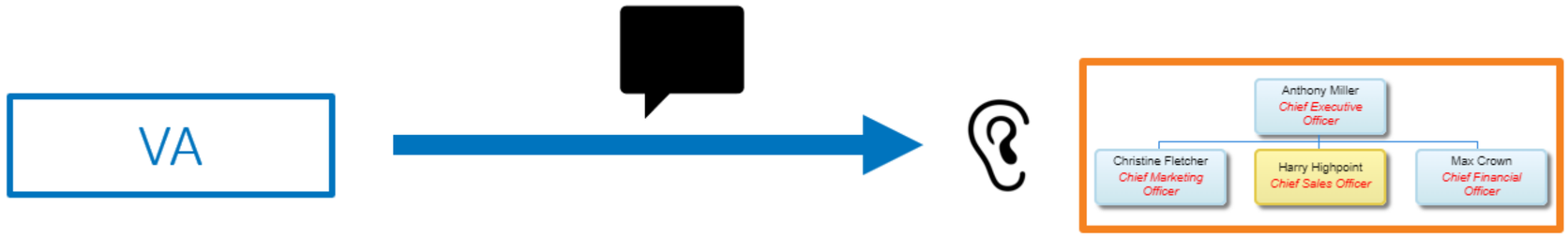


Incoming Message

Message that DDC HTML receives from VA

One type of message that mainly contains:

- Data (rows and columns)
- Columns metadata
- Parameters
- Info about selected data points



Changes in …

- DDC role assignments
- Data (such as aggregation, format, etc.)
- VA objects that filter or select the DDC object

… will send a new message to the DDC

You must add code for the **event listener** and **event handler** to properly process the message and refresh the content

Example of message received from VA

Closer look into the JSON message received from VA

Needed for sending messages back to VA

Number of rows of data

Second row has been selected in this example

Name	Month	Total	
Jim	Jan	$ 6,543,621	0
John	Feb	$ 4,719,279	1
Mary	Mar	$ 4,234,726	0


```
{
    "version" : "1",
    "resultName" : "dd26",
    "rowCount" : 3,
    "availableRowCount" : 3,
    "data" : [ [ "Jim", "Jan", 6543621, 0 ], [ "John", "Feb", 4719279, 1 ], [ "Mary", "Mar", 4234726, 0 ] ],
    "columns" : [ {name: "bi366", label: "Name", type: "string"},
                  {name: "bi162", label: "Month", type: "date", usage: "categorical", format: {name: "MONTH", width: 3, precision: 0, formatString: "MONTH3"}},
                  {name: "bi441", label: "Total", type: "number", usage: "quantitative", aggregation: "sum", format: {…}},
                  {name: "ri1", type: "number", usage: "brush", format: {…}}
                ]
}
```


Measures are not formatted, e.g. 6543621
Dates, times, and datetimes are formatted, e.g. “Jan”

Attribute that indicates “selection”

Note:
There is also a **parameters** attribute (array of objects) that is not present in this example

Integrating SAS Visual Analytics with Intelligent Decisioning Flows

SAS Visual Analytics Executing Decision Flow

DDC making API calls to decision deployed in MAS

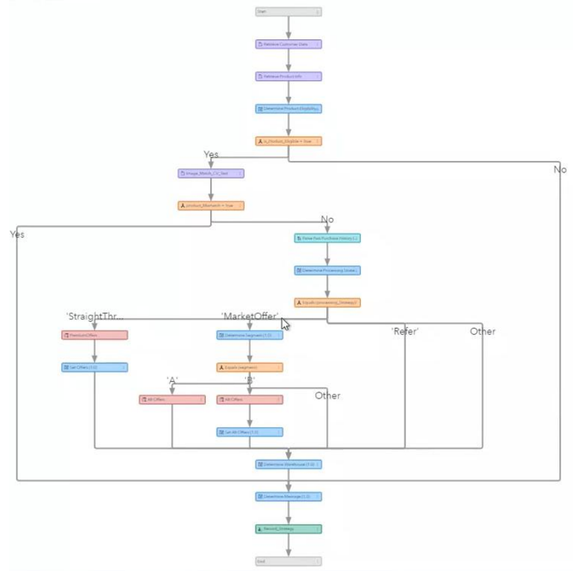
Visual Analytics Report

DDC Object

API call

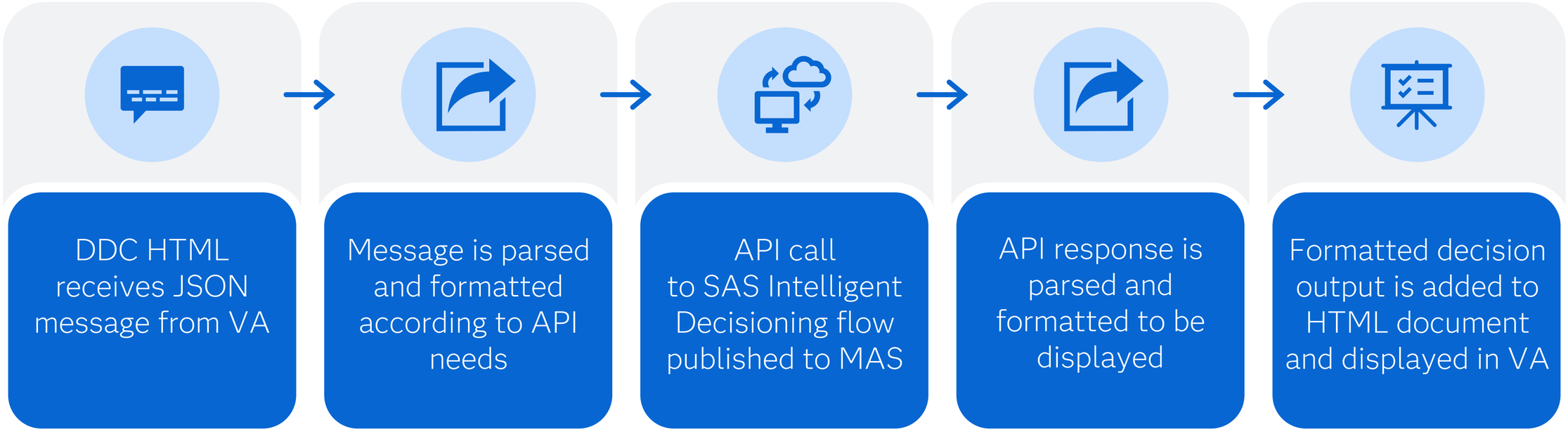
response

MAS



Workflow

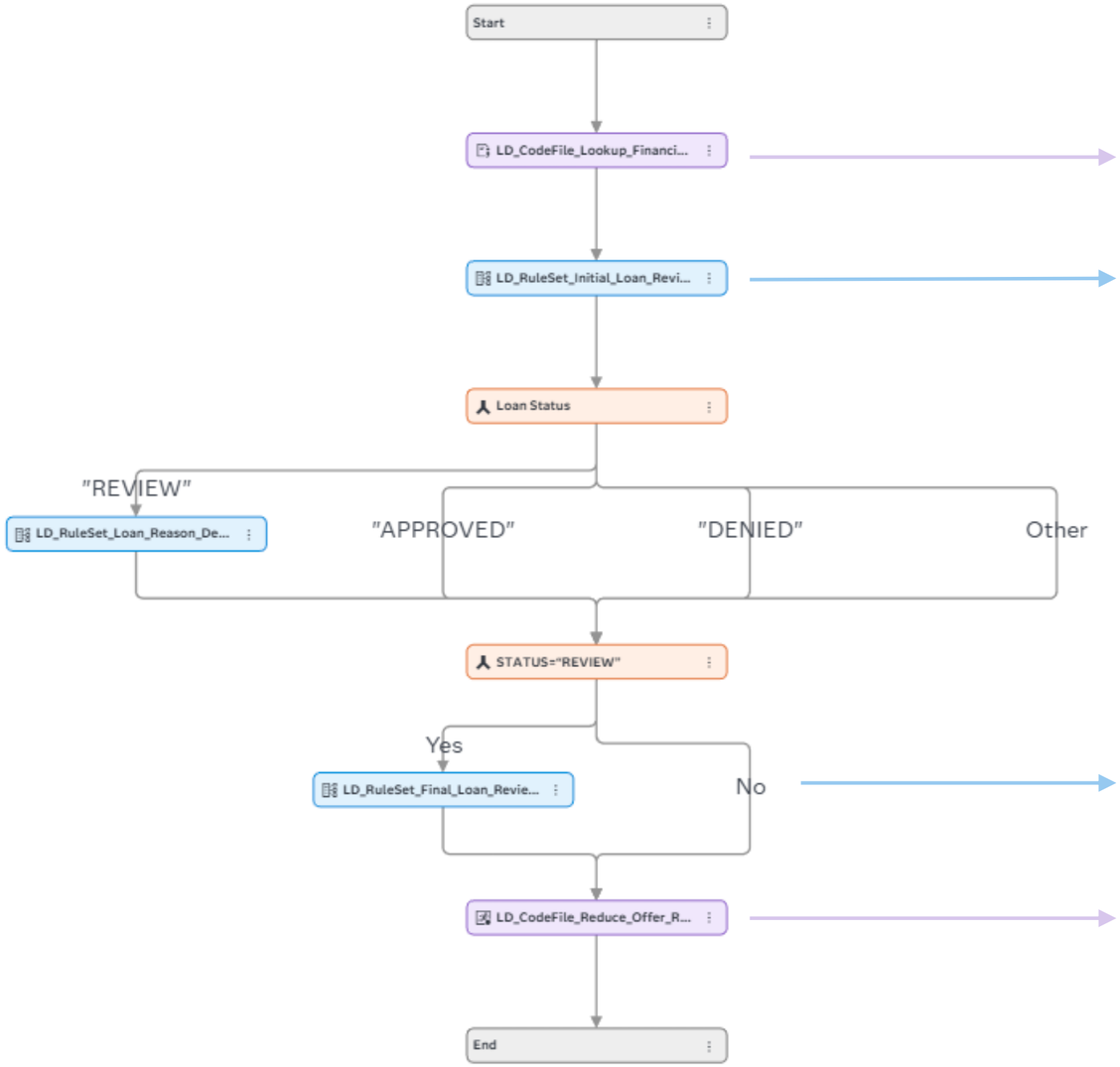
Inside the DDC implementation



Demo

Intelligent Decisioning Flow #1

Loan review



Retrieve client information from database such as yearly income, credit score, and whether the client has checking, savings, and investment accounts.

Apply rules to determine if client is automatically approved or denied the loan based on certain attributes.

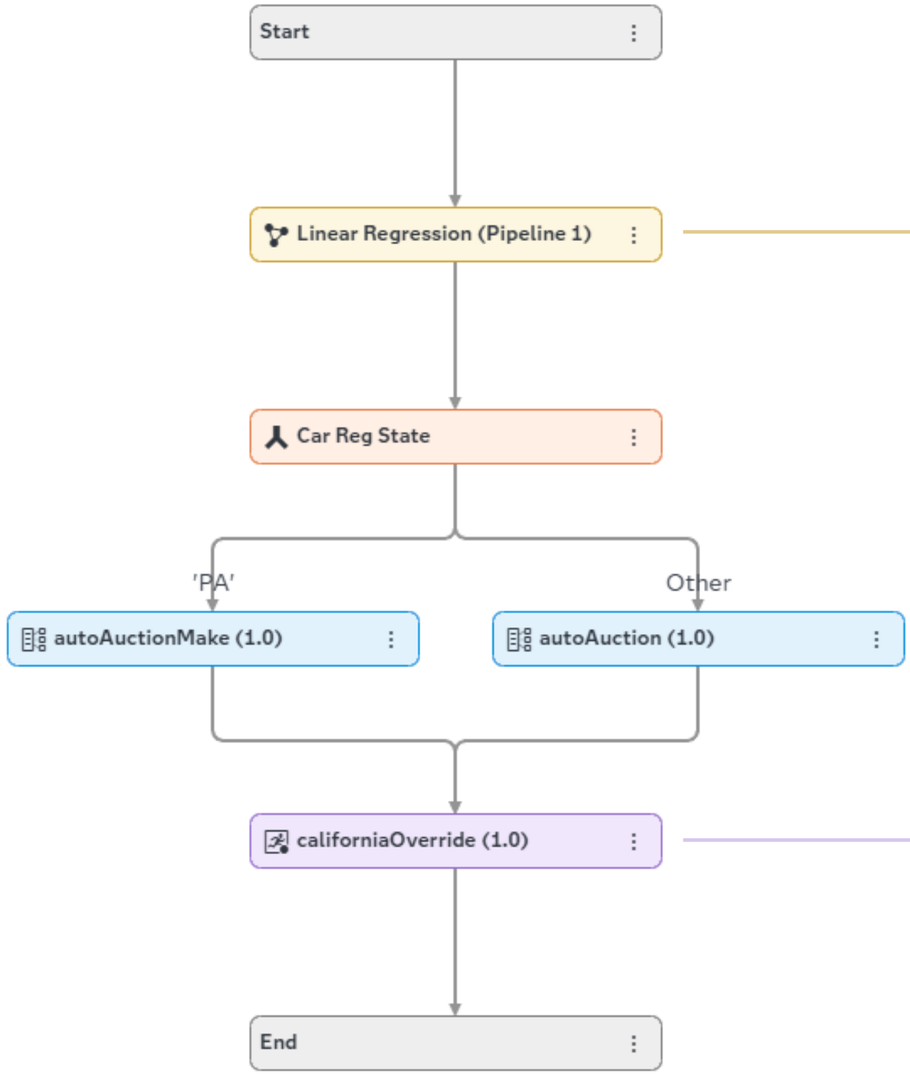
If loan request is still under review, evaluate especial cases for wedding and medical expenses where the denial is certain.

If loan request is still under review, check combined values of credit score and loan amount for approval or denial.

If loan is approved, overwrite the offer rate for current customers based on relationship with the bank.

Intelligent Decisioning Flow #2

Auto auction



Linear regression model predicts the car value

If car is registered in Pennsylvania, the rule checks if it's an unwanted make from a lookup table

If the car is not from Pennsylvania, the rule applies logic that takes into consideration the current bid value, its Blue Book price, and the mileage on the car

If the car is from California, bid on it no matter what!

References

Programming Considerations for Data-Driven Visualizations (Viya 2060.03 documentation)

https://go.documentation.sas.com/doc/en/vacdc/v_038/varef/n109mqtyl6quiun1mwfgtcn2s68b.htm

Data-Driven Content: leveraging third-party visualizations in SAS Visual Analytics (two-part blog)

https://communities.sas.com/t5/SAS-Communities-Library/Data-Driven-Content-leveraging-third-party-visualizations-in-SAS/ta-p/437303

Introduction to Integration of SAS Visual Analytics with SAS Jobs via Data-Driven Content-Part (five-part blog)

https://communities.sas.com/t5/SAS-Communities-Library/Introduction-to-Integration-of-SAS-Visual-Analytics-with-SAS/ta-p/670823

Deploy DDC Implementation Files in SAS Content Server via SAS Viya GUIs

https://communities.sas.com/t5/SAS-Communities-Library/Deploy-DDC-Implementation-Files-in-SAS-Content-Server-via-SAS/ta-p/825559

GitHub project (utility files, examples)

https://github.com/sassoftware/sas-visualanalytics-thirdpartyvisualizations

Scoring using Models Deployed into MAS over REST API: A Step-by-Step Guide

https://communities.sas.com/t5/SAS-Communities-Library/Scoring-using-Models-Deployed-into-MAS-over-REST-API-A-Step-by/ta-p/876429

Micro Analytic Score REST API Documentation

https://developer.sas.com/rest-apis/microanalyticScore

Key Takeaways

1. What we saw here today emphasizes the openness of SAS Viya. Even though we called an API to an endpoint that has been created with SAS Viya using a no-code/low-code interface like SAS Intelligent Decisioning, and the calling application was also a SAS Viya interface like SAS Visual Analytics, that API could have reached out to an external service provided by a third-party solution, or an external application could have called the SAS Intelligent Decisioning API, showing that SAS Viya is open to interact with the external world.
2. The Data-Driven Content object, although designed to expand SAS Visual Analytics visual capabilities, can be used for a lot more that that. It really opens a door for SAS Visual Analytics to perform virtually anything that you can do with code.
3. Visit the Try-Zone booth for hands-on experiences

Questions?

Renato Luppi
renato.luppi@sas.com

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