

Money Launderers Beware! Catching You is Just a Point and Click Away

Renee Elizabeth Palmer, SAS Institute Inc.

ABSTRACT

Wouldn't it be fantastic to develop and tune scenarios in SAS® Visual Scenario Designer and then smoothly incorporate them into your SAS® Anti-Money Laundering solution with just a few clicks of your mouse? Well, now there is a way. SAS Visual Scenario Designer is the first data-driven solution for interactive rule and scenario authoring, testing, and validation. It facilitates exploration, visualization, detection, rule writing, auditing, and parameter tuning to reduce false positives; and all of these tasks are performed using point and click. No SAS coding skills required! Using the approach detailed in this white paper, we demonstrate how you can seamlessly port your SAS Visual Scenario Designer scenarios into the SAS Anti-Money Laundering solution. Rewriting the SAS Visual Scenario Designer scenarios in Base SAS is no longer required! Furthermore, the SAS Visual Scenario Designer scenarios are executed on the lightning speed SAS LASR Analytic Server, reducing the time of the SAS Anti-Money Laundering scenario nightly batch run. The results of both the traditional SAS Anti-Money Laundering alerts and SAS Visual Scenario Designer alerts are combined and available for display on the SAS Enterprise Case Management interface. This white describes the different ways that the data can be explored to detect anomalous patterns and the three mechanisms to translate these patterns into rules. It also documents how to create the scenarios in SAS Visual Scenario Designer; test and tune the scenarios and parameters; and how the alerts will be ported seamlessly into SAS Anti-Money Laundering alert generation process and available for management in the SAS Enterprise Case Management System.

INTRODUCTION

We want to annihilate the bad guys: the terrorists, the drug cartels, the human traffickers, the thieves. But, how can this be accomplished when it is extremely time consuming to develop the anti-money laundering scenarios? When the pool of domain experts is limited due to scarcity of programming skills? When faced with the challenge of tuning scenario parameters to reduce the number of false positives while not missing the outliers? Wouldn't it be fantastic to develop and tune scenarios through an easy-to-use graphical interface that lets you create scenarios with just a few clicks of the mouse? Well, now there is a way. SAS Visual Scenario Designer allows you to create and tune scenarios and then smoothly incorporate them into your SAS Anti-Money Laundering solution.

As analysts, we want our scenarios to be spot on to catch the criminals. Nevertheless, many banks struggle to keep up with the ever changing compliance laws and, as a result, are faced with the possibility of astronomical fines. Banking management cringe when they read news such as:

- *The Financial Conduct Authority fined Barclays GBP72 million for "failing to minimize risk".*
- *FinCEN Fines Oppenheimer & Co. Inc. \$20 Million for Continued Anti-Money Laundering Shortfalls.*
- *The Wall Street Journal reports that Citigroup Inc expects to spend \$2.7 billion on legal charges tied to continuing investigations including probes into how the bank has handled anti-money laundering compliances.*

How can scenarios be developed efficiently and tuned accurately; incorporated into the SAS Anti-Money Laundering alert generation process and front end Case Management interface; while harnessing the in-memory parallel and distributed computing capacity of the SAS LASR server? Now there is a solution. SAS Visual Scenario Designer integrated with SAS Anti-Money Laundering.

With the point and click interface backed by the in-memory computing power of SAS Visual Scenario Designer, you can perform data preparation, scenario rule creation, tuning, and deployment. The audit trail generated by the scenario tuning process will satisfy the auditors and reduce the probability of being slapped with costly non-compliance fines. The scenarios can be seamlessly incorporated into the SAS Anti-Money Laundering solution and used by alert generation process to create alerts. The alerts generated by the scenarios developed in SAS Visual Scenario Designer can be combined with the alerts generated from the traditional SAS Anti-Money Laundering alert generation process. The SAS Enterprise Case Management interface can then be used to view and triage alerts, analyze subjects, incidents, cases, reports, and e-files giving the investigators the tools they need to catch the criminals.

SAS VISUAL SCENARIO DESIGNER OVERVIEW

Criminals are constantly altering how they perpetrate their crimes in an effort to stay one step ahead of the law. Consequently, it is up to the analyst to scrutinize the prolific amounts of data to find these ever changing trends of suspicious behavior. In addition, the parameters must be fine-tuned so that false positives are minimized while not allowing outliers to slip through unnoticed. SAS Visual Scenario Designer has the tools to do this.

DATA EXPLORATION

The Exploration Scenario Window provides visual design tools that facilitate the ability to explore the data and discover and establish conditions that aid in identifying anomalous patterns of nefarious activities. This tool is beneficial when you are searching for trends, rather than having a predefined criteria.

For more complex exploration SAS Visual Scenario Designer offers the capacity to create decision trees using a straightforward, yet comprehensive drag and drop feature. The decision tree's structure enables you to determine the most effective rules and corresponding thresholds within the data. As before, this tool is beneficial when you are searching for trends, rather than having predefined criteria for the scenario.

You may be tasked to create scenarios with concrete, predefined rules. SAS Visual Scenario Designer has a custom tool for this as well. Decision tables enable you to drag and drop the relevant columns and easily create the associated rules and actions that comprise the scenario.

Once you are satisfied with the results of your data exploration, you can then finalize the actual scenario creation. An overview of the required steps are detailed in the next section.

SCENARIO RULE DEVELOPMENT

SAS VISUAL SCENARIO DESIGNER COMPONENTS

SAS Visual Scenario Designer consists of four main components: windows, scenarios, deployments, and simulations. In order to create and tune scenarios and integrate them into the SAS Anti-Money Laundering solution, you use all four of these components.

DATA PREPARATION USING SAS VISUAL SCENARIO DESIGNER WINDOWS

A SAS Visual Scenario Designer window is a palette used to create a data table. The SAS Visual Scenario Designer window provides the capacity to join one or more LASR tables together and gives the ability to select the columns from these tables to be included in the output table that is generated. Custom columns can be created and various types of aggregations can be performed. In addition, date-based lookbacks and filters can be applied at both the window and column levels.

Each entity type requires its own package, referred to as a deployment. Examples of entity types are *Account*, *Customer* and *Bank*. For each entity, you must construct two different windows as part of the scenario creation process. If you require the associated triggering transactions, an additional window needs to be created.

INTRODUCTION TO SCENARIO DEVELOPMENT

To give you an overview of the process, we use two different *Account*-based scenarios as examples. Both of these scenarios have been simplified so that the explanation is more tangible.

SAS10016 scenario looks for a pattern of cash deposits, each less than \$10,000, within a short timeframe. This scenario applies exclusively to personal bank accounts and analyzes only successful transactions. If the sum of the deposits and the number of different branches and deposits made exceed their thresholds, then the alert indicator is set to 1 for this account. The scenario requires three different threshold parameters:

- *Number of branches*
- *Number of transactions*
- *Total amount of transactions*

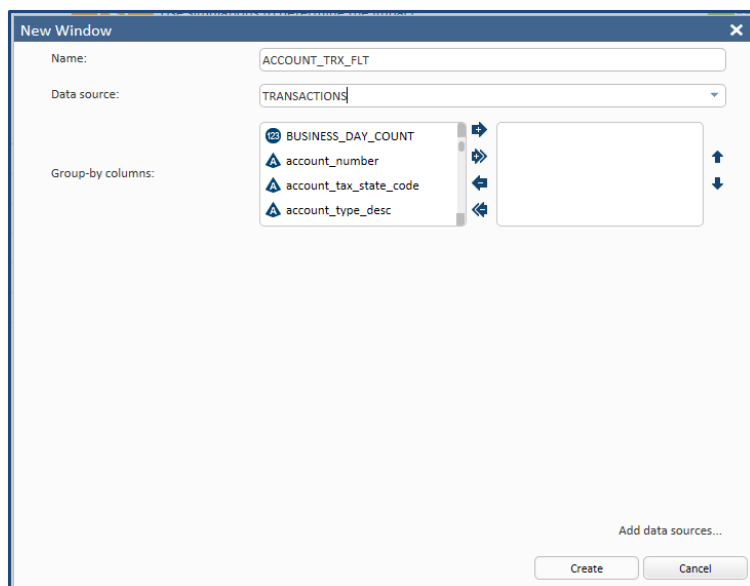
SAS10019 scenario calculates the total amount of an account's wire-in and wire-out transactions for the day. If the wires out divided by the wires in exceeds the percentage threshold, then the alert indicator is set to 1 for this account. This scenario also applies exclusively to personal bank accounts and analyzes only successful transactions.

- *Total amount in*
- *Total amount out*

The process of creating both of the scenarios is documented in detail in *Chapter 5 – Visual Scenario Designer* in the *SAS Anti-Money Laundering 6.3: Scenario Administration User's Guide, Second Edition*.

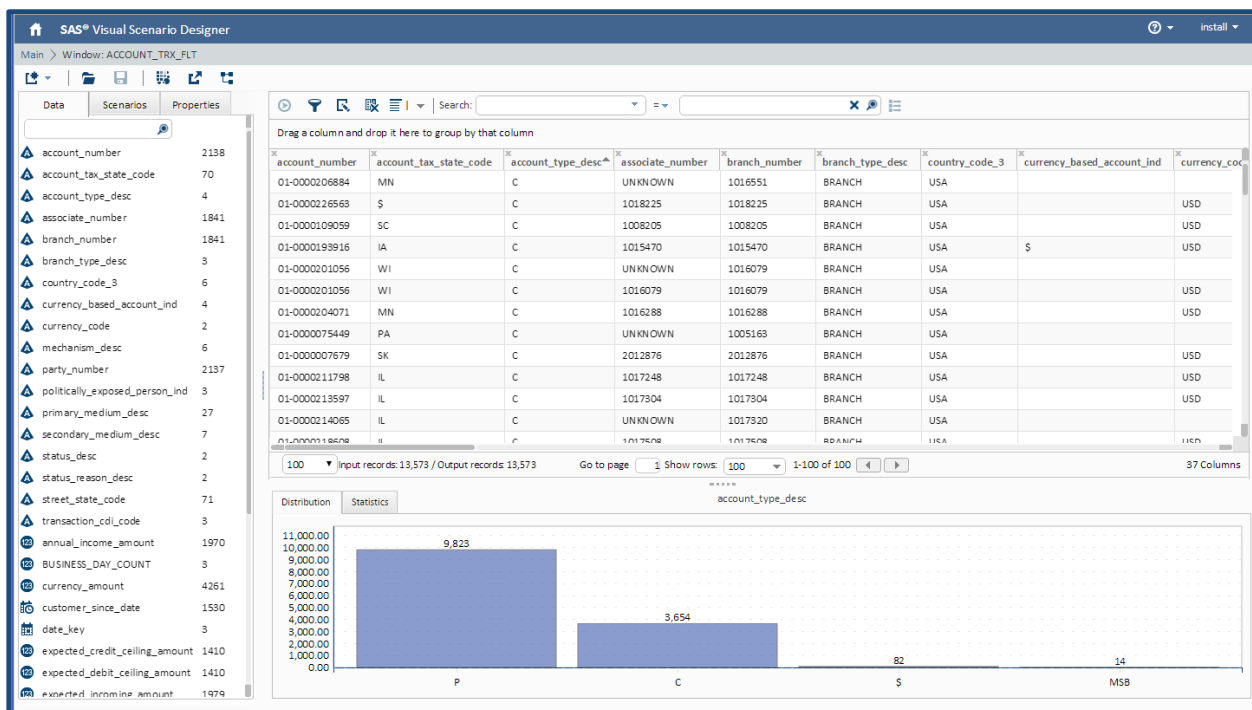
WINDOW 1 – TRANSFORMATION

Select the appropriate table or tables from the list that have been loaded into LASR. Grouping should not be done within this window, therefore, there is only one row per transaction as shown from the screenshot below.



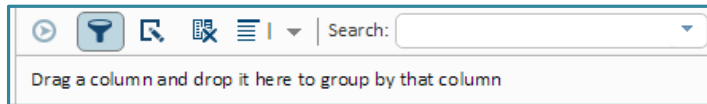
Display 1. New Window #1

The output table generated by this window is created by clicking on the available and relevant columns in the data tab and dragging them into the window interface. You can view the data distribution by clicking on any of the columns in the window and the corresponding distribution is displayed in the *Distribution* tab. In addition, you can view statistics about a particular numeric column by clicking on the column and then clicking on the *Statistics* tab. An example of a transaction based window is shown in the screenshot below.



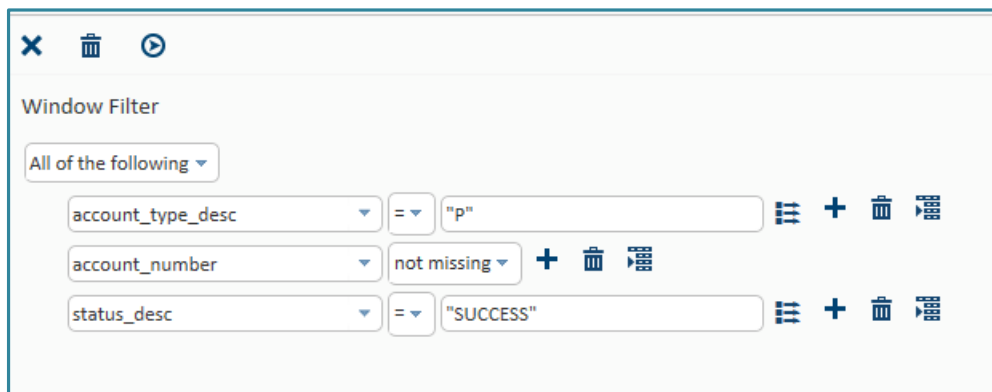
Display 2. Window View

SAS Visual Scenario Designer provides the capability to filter data at both the window level and the column level. In this case, both the scenarios we create only analyze successful transactions where the Account type is Personal, 'P' and where the account number is not missing. We can filter the data channeled into the initial window. This can be done by clicking on the filter icon, which is highlighted in the screen shot below.



Display 3. Filter

You can easily enter the filter criteria using the point and click interface provided as shown in the screenshot below.



Display 4. Window level Filter

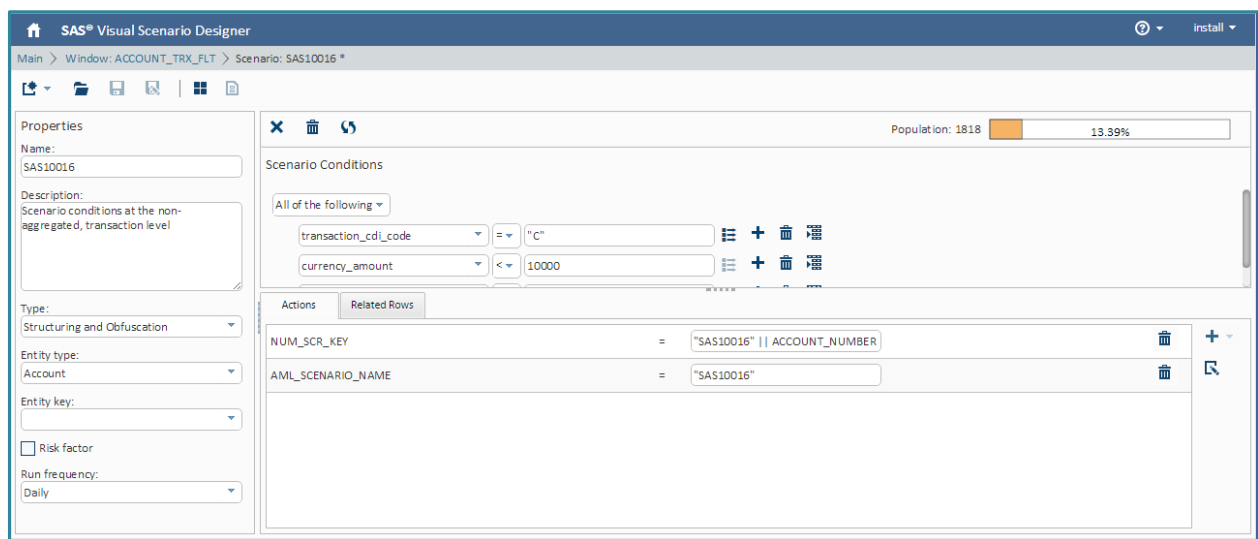
The two sample scenarios require rules to be applied at both the transaction level and at the aggregated Account level. Therefore, scenario rules are created in both window 1 and window 2.

Scenarios are comprised of conditions and actions. In order to create the scenario rule(s), you need to create the condition(s) that define the rule(s) as well as the corresponding action(s) that occur as a result of the condition(s) of the rule(s) being met. An action dictates the name of the new column that is added to the output window along with the value it is populated with if the condition is met. This value could be a numeric value or a string value.

As part of the first window, you are required to create the scenario conditions and actions listed in the bullets below. If the conditions are met, the columns noted in the *Actions* tab are populated with their corresponding values. In this case, `NUM_SCR_KEY` is populated with `SAS10016 || ACCOUNT_NUMBER` and `AML_SCENARIO_NAME` with `SAS10016`. The `NUM_SRC_KEY` is used to determine which transactions are aggregated and analyzed in the input data table of the next window. The `AML_SCENARIO_NAME` is used to identify the triggering transaction in a third window, should they be required. The use of these two columns is discussed in detail later in this paper.

SAS10016

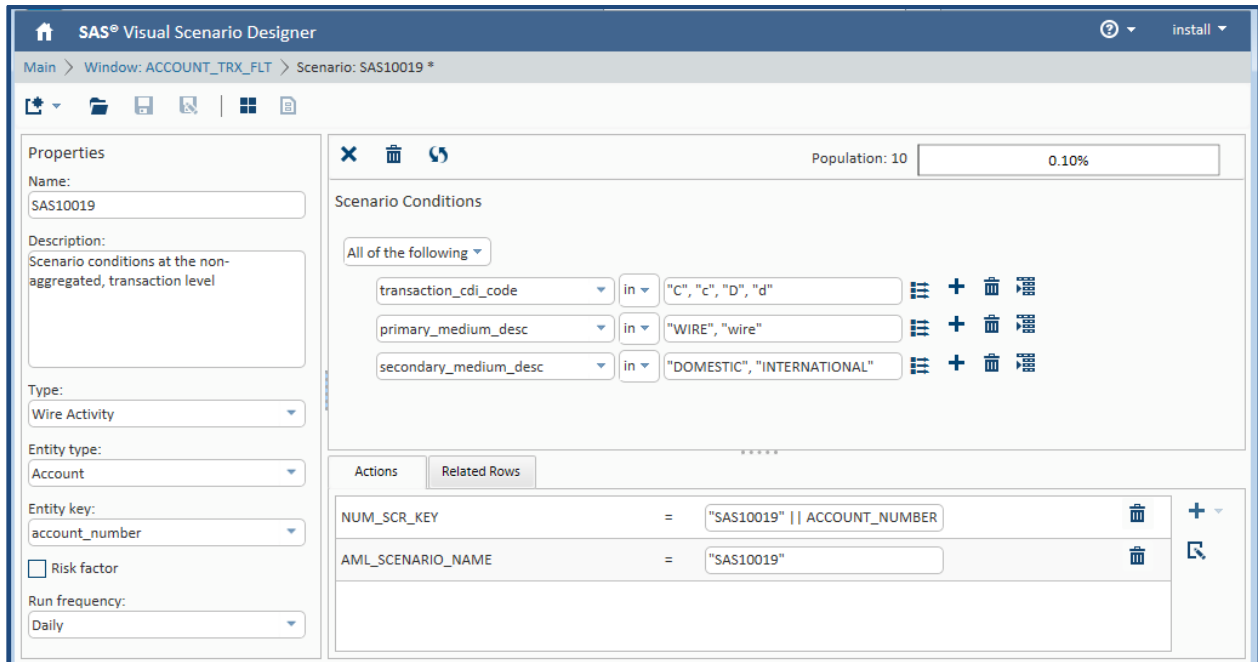
- Conditions applied at the transaction level:
 - *Transaction_cdi_code* = "C"
 - *Currency_amount* <= 10000
- Actions when conditions are met:
 - **AML_SCENARIO_NAME**: This action populates the *AML_SCENARIO_NAME* column with the string *SAS10016*, when the corresponding conditions are met.
 - **NUM_SRC_KEY**: The action populates the *NUM_SRC_KEY* column with the scenario name concatenated with the entity number, when the corresponding condition is met. The column will be populated with *SAS10016 || Account_number*.



Display 5. Scenario Conditions – SAS10016

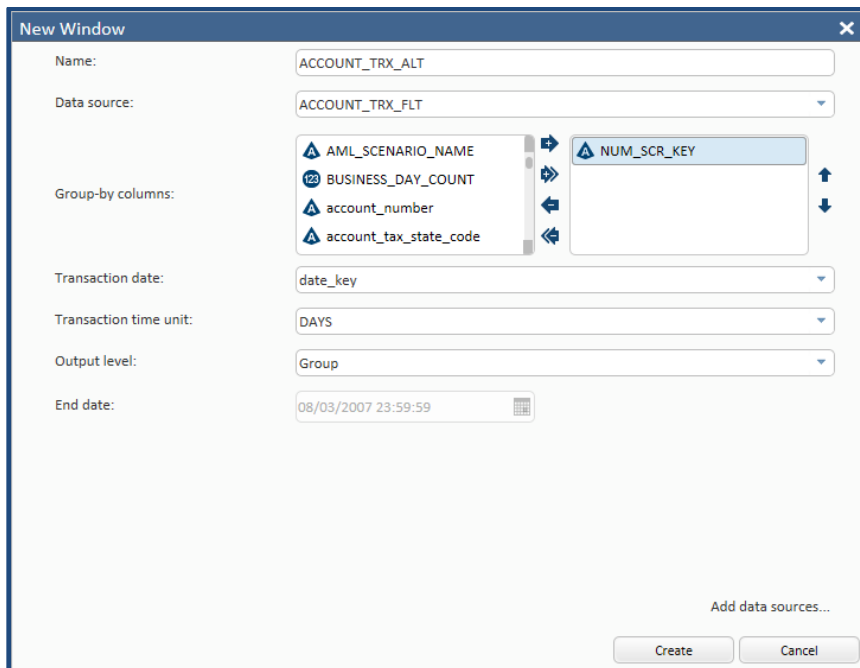
SAS10019

- Conditions applied at the transaction level:
 - *Transaction_cdi_code* in "C", "c", "D", "d"
 - *Primary_medium_desc* in "WIRE", "wire"
 - *Second_medium_desc* in "DOMESTIC", "INTERNATIONAL"
- Actions when conditions are met:
 - **AML_SCENARIO_NAME**: The action populates the *AML_SCENARIO_NAME* column with the string *SAS10019*, when the corresponding condition is met.
 - **NUM_SRC_KEY**: The action populates the *NUM_SRC_KEY* column with the scenario name concatenated with the entity number, when the corresponding condition is met. The column will be populated with *SAS10019 || Account_number*.



Display 6. Scenario Conditions – SAS10019

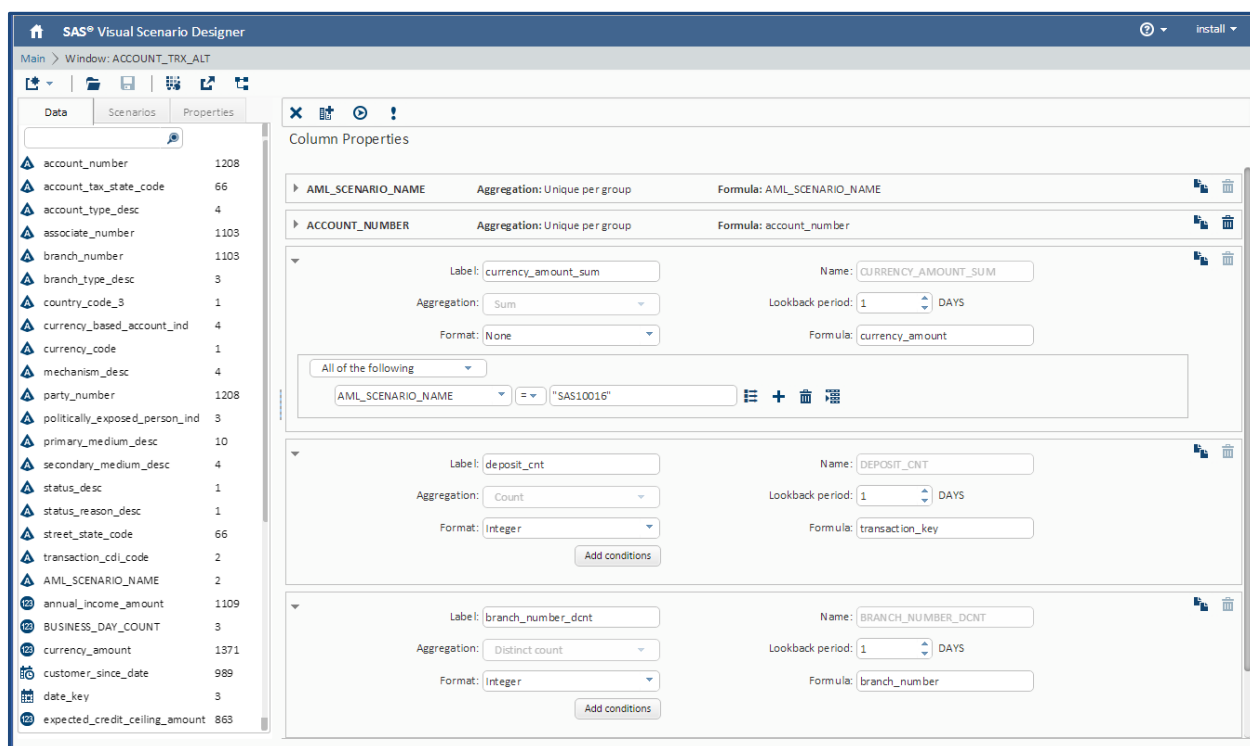
When configuring the output of the second window, select *Group by NUM_SRC_KEY* as shown in the screen shot below. This causes the output of the second window to be the aggregated data from the output of the first window. The aggregation is calculated at the scenario-entity number level stored in the *NUM_SRC_KEY* column, in this case *SAS10016 || Account* and *SAS10019 || Account* described earlier.



Display 7. New Window #2

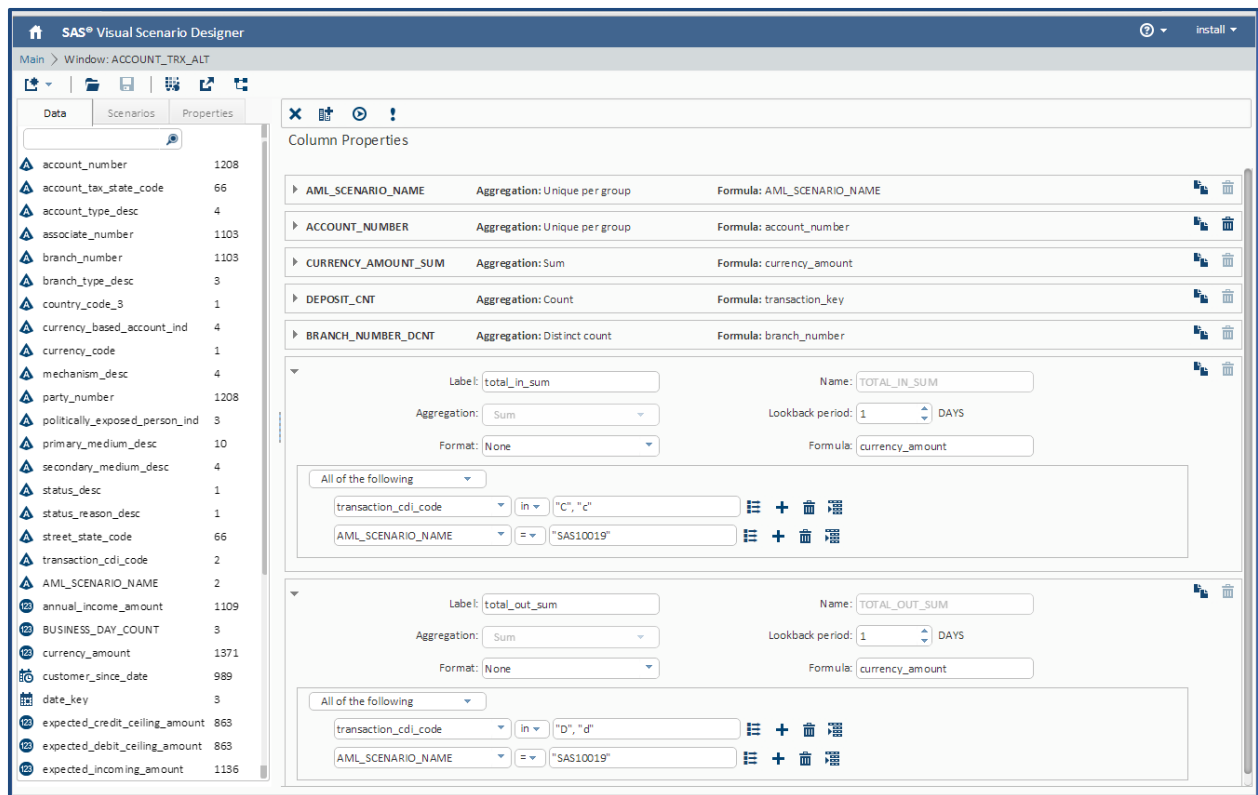
Since the input data from the first window contains transactions that match the conditions dictated by more than one scenario, we must devise a way to funnel the transactions to the second window's scenarios appropriately. We can accomplish this by creating a new column for each rule and applying a filter. By doing so, that column receives only the transactions relevant for the corresponding scenario as rule gets applied and the column gets aggregated. For scenario *SAS10016*, we need the aggregated amount of the transactions, the number of branches where the deposits were made, and the number of deposits. To satisfy the rules, we create three columns for this scenario. Each column applies one of the scenario conditions along with a filter where *AML_SCENARIO* = *SAS10016*.

As you can see in the screen shot below, filtering on the scenario prior to the aggregation process can be accomplished by adding a condition to the relevant columns. In this case, Scenario *SAS10016* has three columns that require aggregation: *currency_amount_sum*, *deposit_cnt*, and *branch_number_dcnt*. By applying this filter, their corresponding results include only the transactions that met the criteria for *SAS10016* from the previous window.



Display 8. Column Properties – SAS10016

For scenario *SAS10019*, we want to aggregate the currency amount of type *Wire in* and *Wire out*. We have already filtered data from the first window such that it contains only wire based transactions for *SAS10019*. To calculate the total *Wire in* amount, we create a column *total_in_sum* that aggregates the *currency_amount* only when the transaction type is "C", indicating credit activities. To calculate the total *Wire out* amount, we create a column *total_out_sum*, where the transaction type is "D", indicating debit activities. As you can see from the screen shot below, two new columns have been created with the corresponding conditions applied. We can see that we are only aggregating the transactions for *SAS10019* that met the criteria for *SAS10019* in the previous window.



Display 9. Column Properties – SAS10019

Now that each scenario has aggregated data matching the criteria for the scenario, we can take the second step in the scenario creation process. The conditions are created by dragging over the columns of interest and setting their corresponding thresholds.

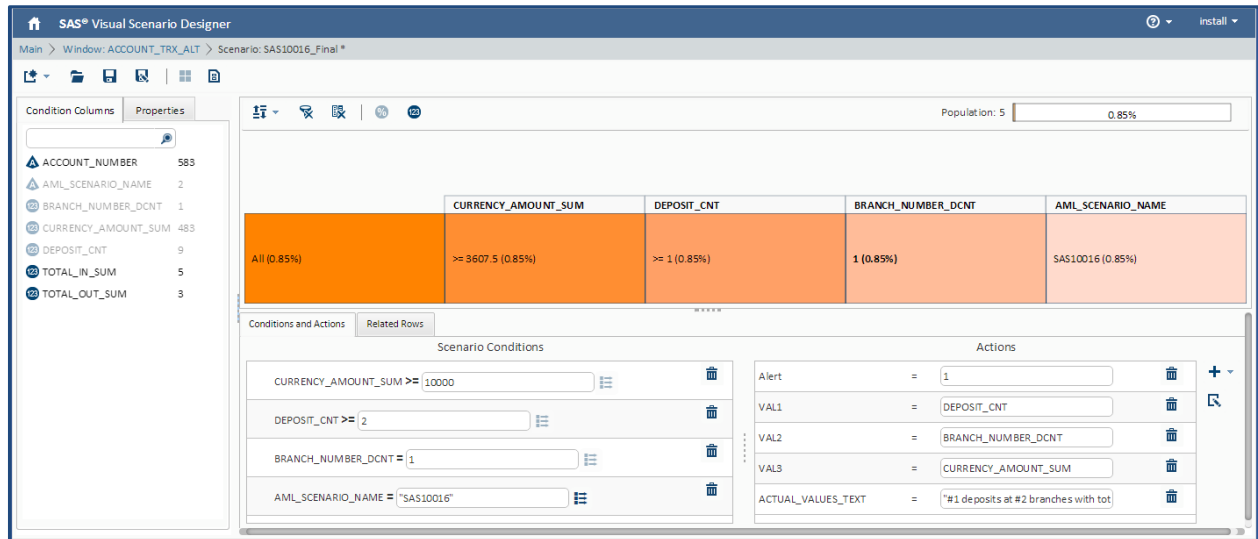
Next, you need to create the actions that should occur when all of the condition are met. At a minimum, you need to create *Alert* and *Actual_Values_Text* actions. *Alert* is set to 1 if the conditions are met, otherwise, it is 0.

- **Alert = 1** : this is used to indicate whether or not the alert was generated
- **ACTUAL_VALUES_TEXT = "#1 deposits at #2 branches with total amount \$#3"**

The *Actual_Values_Text* is the message that gets displayed in the SAS Anti-Money Laundering interface. You have the freedom to create any message you like, however, best practices recommend that it describes the scenario and includes the actual triggering values. For each triggering value, you need to add a *#n* to indicate which parameter needs to be included, where *#1* would be a place holder for the first triggering value, *#2*, the second and so forth. An example of this would be: *#1 deposits at #2 branches with total amounts \$#3*.

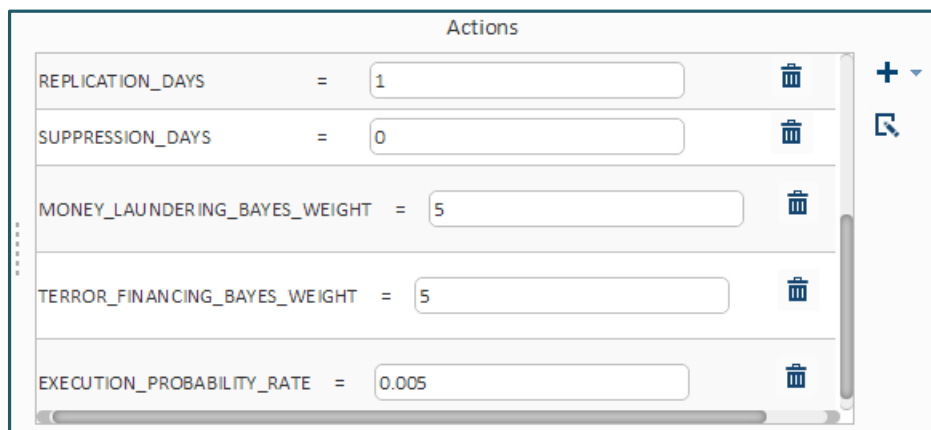
You are required to create an action for each parameter that is embedded in the *Actual_Values_Text*. Each action contains the actual triggering transaction value. Based on the *Actual_Values_Text* example provided, we are required to create three additional parameters. Use the naming convention of *VAL#* for this.

- **VAL1** = DEPOSIT_CNT : aggregated sum of number of deposits
- **VAL2** = BRANCH_NUMBER_DCNT : aggregated sum of branches
- **VAL3** = CURRENCY_AMOUNT_SUM : aggregated sum of deposits



Display 20. Scenario Conditions and Actions – SAS10016

There are other parameters that can be set that affect the alert generation and the scoring process. An action can be created for any or all of these, otherwise, the default value is used.



Display 31. Optional Actions

These values are displayed in the SAS Anti-Money Laundering Scenario Administrator below.

SAS Anti-Money Laundering • Scenario: SAS10016

Scenario | Alert Routing | Scenario Source | Test Scenario | Notes | Audit Info

Name: SAS10016

Short Description: Structured Deposits Across Location

Long Description: An account's deposits have been st

Product Type: Anti-Money Laundering

Type: Manual

Risk Factor: No

Order In A Header: (none selected)

Entity Level (Overrides Header): (none selected)

Alert Primary Entity Number Variable (Overrides By Variable): (none selected)

Header: account_header | Edit | Create New

Scenario Category: Structuring and Obfuscation

Status: Inactive

Frequency: Daily

Suppression (Calendar Days): 0

Replication (Business Days): 1

TF Bayes Weight (0 To 10): 5.00000

ML Bayes Weight (0 To 10): 5.00000

Execution Probability (0.0 To 0.9999999): 0.0050000

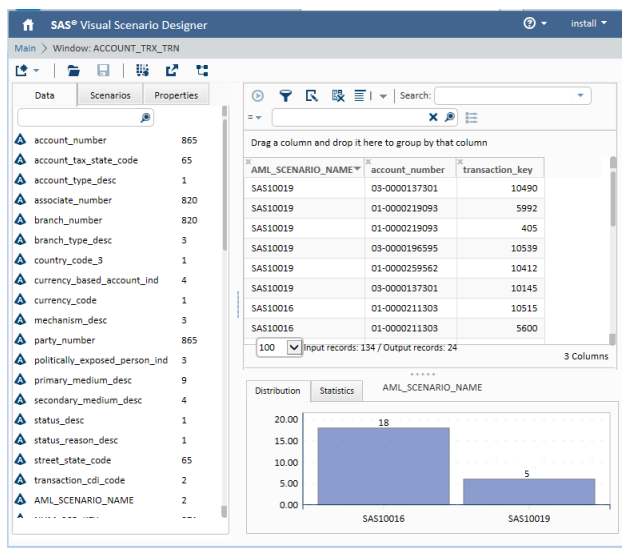
Display 42. SAS Anti-Money Laundering Scenario Screen

A complete list of these optional rules are as follows:

- **REPLICATION_DAYS:**
 - Usage: Number of days to replicate corresponding transactions
 - Default value: 1
 - Usage: Number of days to suppress alerts for this scenario
 - Default: 0
- **MONEY_LAUUNDERING_BAYES_WEIGHT_NUMBERS**
 - This value is used during alert generation process
 - Default: 5
 - Range: 0-10
- **TERROR_FINANCING_BAYES_WEIGH**
 - This value is used during alert generation process
 - Default: 5
 - Range: 0-10
- **EXECUTING_PROBABILITY_RATE**
 - Default: 0.005
 - Range: 0-0.9999999

Triggering Transactions Window

The investigator may want to view the transactions that triggered the alert, as well as including them as part of a case. The third window contains the triggering transactions for the alert. This window is created by joining the first two windows together by the *NUM_SRC_KEY* column.



Display 53. Triggering Transaction Window

Once the windows and the scenarios are created, you are required to create a deployment package for each entity type. In this example, we need to create only one deployment. The deployment contains the windows and scenarios that you created in the previous paragraphs. You can enable and disable the windows and scenarios within the deployment.

The deployment also provides a simulation window. Simulations provides the capacity to execute your scenarios on the fly over data contained in the window to tune your parameter thresholds. Your customer base may be comprised of different tiers, such as personal accounts versus commercial accounts; or small business, medium sized, and large accounts. You can use the simulation tool to fine tune the scenario thresholds for each of the different account tiers.

Once you are satisfied that the SAS Visual Scenario Designer scenarios are properly tested and tuned, the latest version of your SAS Visual Scenario Designer deployment can be seamlessly incorporated into the SAS Anti-Money Laundering alert generation process. The alert generation process executes the windows and scenarios that have been enabled within the deployment on the high performance in-memory LASR server. The results are ported into the necessary format and appended into the SAS Anti-Money Laundering alert list. The *SAS Anti-Money Laundering 6.3: Installation, Configuration and Administration Guide, Section Edition* provides detailed information about this process.

The SAS Anti-Money Laundering web-based user interface supports the management, investigation, and reporting needs of anti-money laundering analysts and investigators. The solution includes a banking specific data model; provides suspicious activity monitoring and reporting; investigation and alert management; customer due diligence including KYC risk scoring and classification; watch-list matching; and an integrated case management. The new Entity Triage window facilitates triaging at the Customer level and provides all the data necessary to triage a decision about a customer through this interface, rather than having to delve into multiple screens.

CONCLUSION

SAS Visual Scenario Designer can now be integrated with the SAS Anti-Money Laundering solution. As a result, scenarios can be created, tested, tuned, and simulated using a point and click interface. An audit trail is logged and available for auditors. Once deployed, the SAS Visual Scenario Designer scenarios execute on a high speed in-memory LASR server in conjunction with the traditional anti-money laundering scenarios. The alerts generated can be viewed and investigated through the SAS Anti-Money Laundering GUI. The automated business process workflow ensures that the correct progression of tasks is adhered to while providing a detailed audit trail of activities. Cases can be created and managed through the Case Management tool. Using the SAS Visual Scenario Designer in tandem with the SAS Anti-Money Laundering solution offers an effective mechanism to detection anomalous and nefarious behavior; meeting compliance requirements; and safeguarding your institution's reputation while lowering development and maintenance costs.

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- The SAS Visual Scenario Designer – Fraud and Financial Crimes R&D Team

RECOMMENDED READING

- SAS Visual Scenario Designer 6.3: User's Guide, Second Edition
- SAS Visual Scenario Designer 6.3: Administrator's Guide, Second Edition

- SAS Anti-Money Laundering 6.3: Installation, Configuration and Administration Guide, Second Edition
- SAS Anti-Money Laundering 6.3: Scenario Administration User's Guide, Second Edition
- SAS Anti-Money Laundering 6.3: User's Guide, Second Edition

CONTACT INFORMATION

Your comments and questions are valued and encouraged. Contact the author at:

Renee Elizabeth Palmer
Principal Solutions Architect
Security Intelligence Practice
SAS Institute Inc.
SAS World Headquarters
919-531-1929
Renee.Palmer@sas.com

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