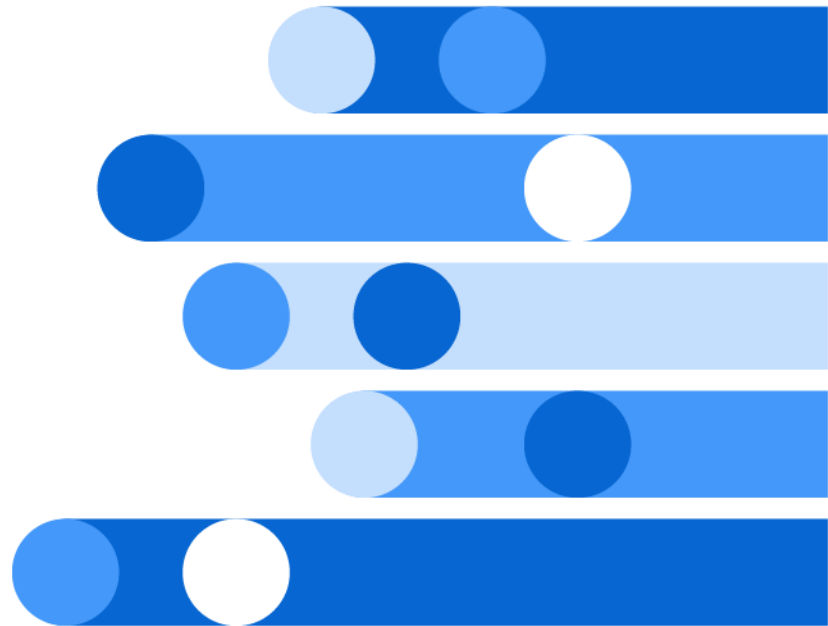




SAS[®] Intelligent Decisioning: Tutorials

2026.06*



* This document might apply to additional versions of the software. Open this document in [SAS Help Center](#) and click on the version in the banner to see all available versions.



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SAS® Intelligent Decisioning: Tutorials

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Getting Started

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Introduction

The SAS Intelligent Decisioning tutorials are an introduction to some of the primary features of SAS Intelligent Decisioning.

[Defining Rule Sets and Decisions](#)

walks you through the process of creating rule sets and decisions, creating custom variables, importing variables from data tables, defining business rules, combining rules sets and conditional logic into a decision, and testing rule sets and decisions.

[Using Treatments and Scoring Data Grids](#)

walks you through the process of defining treatments, combining treatments into a treatment group, adding that group to a decision, and scoring the data grid that is produced by the treatment group.

Before You Begin

Note: In order to complete the tasks in this tutorial, your user ID must have the appropriate permissions. See [SAS Intelligent Decisioning: Administrator's Guide](#) for more information.

Before you work through these tutorials, you must sign in to SAS Intelligent Decisioning and import the data used in the tutorials. Complete the following steps:

- 1 [Download the tutorial files.](#)
- 2 [Sign in](#) to SAS Intelligent Decisioning at your site.
- 3 [Import the HMEQ data sets.](#)
- 4 (Optional) [Import the Calc_Credit_Limit model on page 4.](#) This step is required only if you are working with the [Chapter 3, "Using Treatments and Scoring Data Grids," on page 29](#) tutorial.

Download the Tutorial Files

The ZIP file QuickStartTutorial.zip contains the tutorial data sets that are used by both tutorials and the model that is used by the tutorial in [Chapter 3, "Using Treatments and Scoring Data Grids," on page 29](#). This ZIP file is available at <https://support.sas.com/en/software/intelligent-decisioning-support.html#documentation>.

Before you begin the tutorials, complete these steps:

- 1 Create a folder on a machine that is accessible to SAS Intelligent Decisioning users.
- 2 Save the QuickStartTutorial.zip file into the folder that you created.
- 3 Extract the contents of the QuickStartTutorial.zip file. In Windows Explorer, right-click **QuickStartTutorial.zip**, and select **WinZip** ⇒ **Extract to here**. Windows creates a folder called QuickStartTutorial that contains the tutorial data sets, the model file, and additional sample data sets and models.

In [Step 3](#) of "[Before You Begin](#)", you use SAS Data Hub to import the data sets.

In [Step 4](#), you use SAS Model Manager to import the model that is used in the treatments tutorial.

Sign in to SAS Intelligent Decisioning

Note: If you are already signed in to SAS Viya, you can access SAS Intelligent Decisioning by clicking  and selecting **Build Decisions**.

To sign in to SAS Intelligent Decisioning at your site:

- 1 In the address bar of your web browser, enter the URL for SAS Intelligent Decisioning at your site and press **Enter**. The Sign In page appears.

Note: Contact your system administrator if you need the URL for SAS Intelligent Decisioning at your site. The default URL is `https://host_name/SASDecisionManager`.

- 2 Enter your user ID and password.
- 3 Click **Sign In**.

Import the Data Tables

- 1 Click  and select **Access and Manage Data** to switch to SAS Data Hub.
- 2 Click  to open the Data Explorer page.
- 3 Click the **Import** tab.
- 4 Click **Local files**.
- 5 In the **Open** window, navigate to the location where you saved the contents of the QuickStartTutorial.zip file in ["Download the Tutorial Files"](#).
- 6 Select the data sets **hmeq_test.sas7bdat** and **hmeq_accounts.sas7bdat** files, and click **Open**.
- 7 Click **Import all**. By default, the tables are added to the `cas-shared-default/public` library, loaded into memory, and added to the list of available tables on the **Sources** tab.

Note: Data can be unloaded from memory if the user session that loaded the data ends, if a server is restarted, or if system memory runs low. Tables that are loaded into memory are identified by the  icon. Tables that not loaded into

memory are identified by the  icon. To load a table into memory, right-click the table name in the `cas-shared-default/Public` library, and select **Load into memory**.

- 8 Click  and select **Build Decisions** to return to SAS Intelligent Decisioning.

Import the Calc_Credit_Limit Model

The Calc_Credit_Limit model is used in the tutorial described in [Chapter 3, “Using Treatments and Scoring Data Grids,”](#) on page 29.

- 1 Click  to open the side menu, and select **Manage Models**.
- 2 Click  to navigate to the Models category view.
- 3 Click **Add models** and select **Import**, or click **Import Models** if the Models category view is empty. The Import Models window appears.
- 4 Select the target location where you want to import the model.
- 5 Select the **calc_credit_limit.zip** file that you downloaded in [“Download the Tutorial Files”](#) on page 2. Do not change the default model name in the **Import as** field.
- 6 Click **Import** to import the model. If the request is successful, SAS Model Manager displays the message `The models were imported.`
- 7 Click  and select **Build Decisions** to return to SAS Intelligent Decisioning.

Defining Rule Sets and Decisions

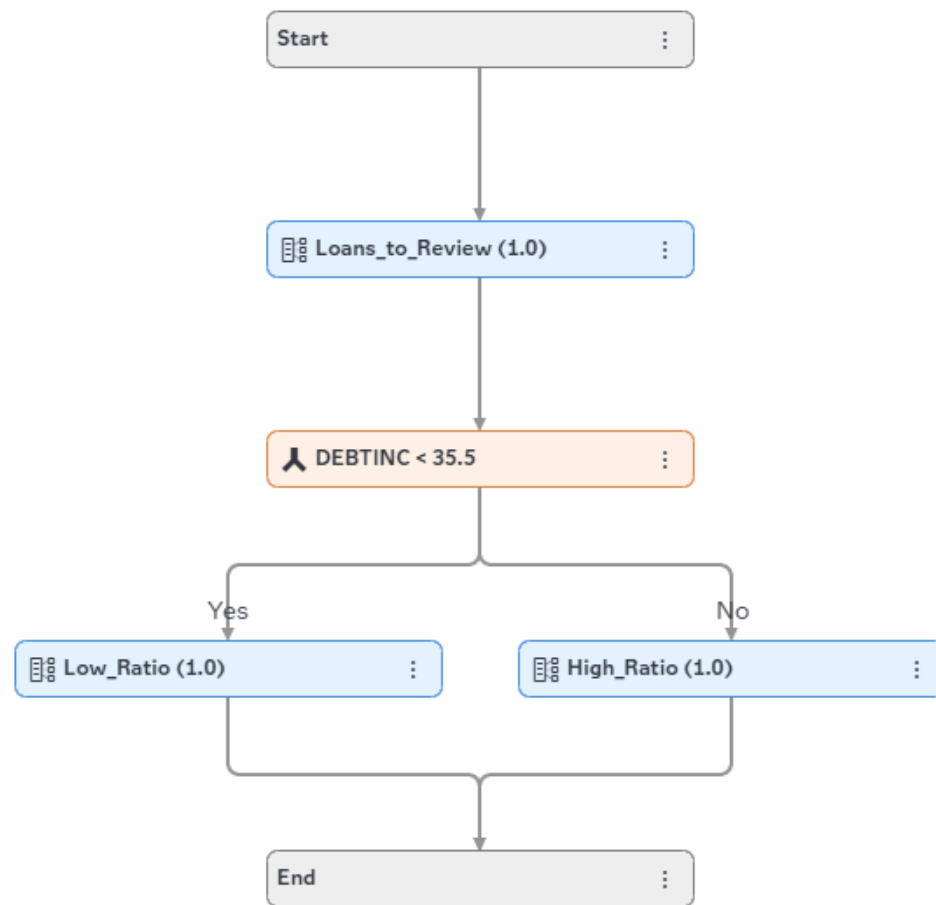
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Overview

A rule set is a group of business rules. Business rules specify conditions to be evaluated and actions to be taken if those conditions are satisfied. For example, if the applicant for a residential loan has a high debt-to-income ratio and little equity in their property, their loan application might be denied or flagged for additional review.

A decision can combine rule sets, analytical models, treatment groups, custom code files, subdecisions, and conditional branches. Decisions enable you to automate the decision-making process and provide a streamlined mechanism for controlling and monitoring the rules and processes used by your organization.

In this tutorial, you create three rule sets and combine these rule sets together with conditional logic into a decision. This decision evaluates residential loan applications. It identifies loan applications that need to be reviewed manually, and it approves or rejects other loan applications based on certain criteria. The final decision diagram is shown in [Figure 2.1 on page 6](#).

Figure 2.1 Decision Flow Diagram for the Evaluate_Loans Decision

Note: In order to complete the tasks in this tutorial, your user ID must have the appropriate permissions. See *SAS Intelligent Decisioning: Administrator's Guide* for more information.

The steps in this tutorial are typical steps that you would complete to add content to your decision database. In this tutorial, you complete the following steps:

- 1 Complete the steps listed in “Before You Begin” on page 2.
- 2 [Create the Loans_To_Review rule set](#). This rule set identifies loan applications that must be reviewed manually.
- 3 [Create the Low_Ratio rule set](#). This rule set evaluates applications for which the applicant has a low debt-to-income ratio.
- 4 [Create the High_Ratio rule set](#). This rule set evaluates loans for which the applicant has a high debt-to-income ratio.
- 5 [Create the Evaluate_Loans decision](#). The decision incorporates the three rule sets and uses a condition to control which rule sets are run.
- 6 (Optional) [Test the Evaluate_Loans decision](#).
- 7 [Publish the decision](#).

8 (Optional) Validate the decision in the publishing destination.

For additional information about defining rule sets and decisions, see [SAS Intelligent Decisioning: User's Guide](#).

Create the Loans_to_Review Rule Set

The Loans_to_Review rule set identifies loans for which key information is missing, but the available data suggests that the application should be approved. These loans need to be reviewed by an underwriter. This rule set flags a loan application for review if all of the following conditions are true:

- The value of the applicant's property is greater than or equal to \$120,000 (VALUE >= 120000).
- The total amount of debt that the applicant has is less than 35.5% of their total income (DEBTINC < 35.5).
- The data for the applicant's total amount of debt is not missing (DEBTINC ^= .).
- The data for either the number of delinquent credit lines or the number of major derogatory reports is missing (DEROG=. OR DELINQ=.).

To create the Loans_to_Review rule set, you complete the following steps:

- 1 Create a new rule set.
- 2 Add variables to the rule set.
- 3 Define the business rule. This rule set contains only one rule.
- 4 Test the rule set.

Create a New Rule Set

- 1 Click  to navigate to the Rule sets category view.
- 2 Click **New rule set**. The New Rule Set window appears.
- 3 Enter **Loans_to_Review** for the rule set name.
- 4 Select **Assignment** for the rule type.
- 5 Click  and select the folder where you want to save the rule set.

IMPORTANT The instructions in this tutorial assume that the folder in which you save your work has not been configured as a folder whose objects must be checked out. It is recommended that you either create a folder for your tutorial files in the **Public** folder or save your work in **My Folder**. Do not save your work in **Decision Repository** or any other folder that has been enabled for the checkout and commit feature. For more information, see ["Check Out and Commit a REST API Definition Version"](#) in *SAS Intelligent Decisioning: User's Guide*.

- 6 Click **Save**. The application opens the new rule set and displays the **Rule Set Variables** subtab of the **Variables** tab.

TIP You can expand the workspace area by clicking << to collapse the navigation bar.

Add Variables to the Rule Set

You can import existing variables from data tables or from other rule sets and decisions, or you can create custom variables. In this tutorial, you create a custom variable that does not exist in the table, and then import the variables that are in the table HMEQ.TEST.

- 7 On the **Rule Set Variables** subtab, click **Add variable** and select **Custom variable**. The Add Variables window appears.
- 8 Enter **REVIEW** as the variable name, select **Boolean** as the data type, and click **Add**.

- 9 Clear the check box in the **Input** column.

When the **Input** check box is selected for a variable, the application attempts to map the variable to a column in the input table. The variable REVIEW does not appear in the HMEQ.TEST input table, so this variable is only an output variable.

In this tutorial, REVIEW is an output-only variable. In other cases, you might need a temporary variable that exists only while the rule set is running. To create temporary variables, you clear both the **Input** and **Output** check boxes.

- 10 Click **OK** to add the output variable REVIEW to the rule set.
- 11 Click **Add variable** and select **Data table**. The Add Variables window appears.

- 12 Click  to open the Choose Data window.

The list of data tables shown in this window depends on the list that you select in the **Show** field. The list of SAS Cloud Analytic Services (CAS) tables that are loaded into memory is displayed on the **Available** tab. If the HMEQ_TEST table does not appear in any of the tabs in this window, import the data tables as described in [“Import the Data Tables” on page 3](#).

- 13 In the Choose Data window, select the HMEQ_TEST table, and click **OK** to return to the Add Variables window.
- 14 In the Add Variables window, click  to select all of the variables in the table, and then click **Add** to add the variables to the rule set. All of the variables in the HMEQ_TEST table are added to the rule set as both input and output variables. Input variables are variables that appear in the input data. Output variables are variables that appear in the output of the rule set.
- 15 Click  to save the rule set.

SAS® Intelligent Decisioning - Build Decisions

Loans_to_Review (1.0)

Rule set Properties Variables Scoring Versions History

Rule Set Variables Global Variables

Filter Import Export Add variable

☐	Name	Data Type	☒ Input	☒ Output	Initial Value
☐	BAD	⊕ Decimal	☒	☒	
☐	CLAGE	⊕ Decimal	☒	☒	
☐	CLNO	⊕ Decimal	☒	☒	
☐	DEBTINC	⊕ Decimal	☒	☒	
☐	DELINQ	⊕ Decimal	☒	☒	
☐	DEROG	⊕ Decimal	☒	☒	
☐	JOB	⊕ Character	☒	☒	

Define the Business Rule

- 16 On the **Rule Set** tab, click **Add rule**. The application adds a new rule that contains an IF-THEN statement.
- 17 In the field next to the IF rule operator, select the variable **VALUE**.
- 18 Select **>=** as the expression operator.
- 19 Enter the number 120000 in the expression field.

Default_rule_1 ☒ Record rule fired data

IF VALUE >= 120000

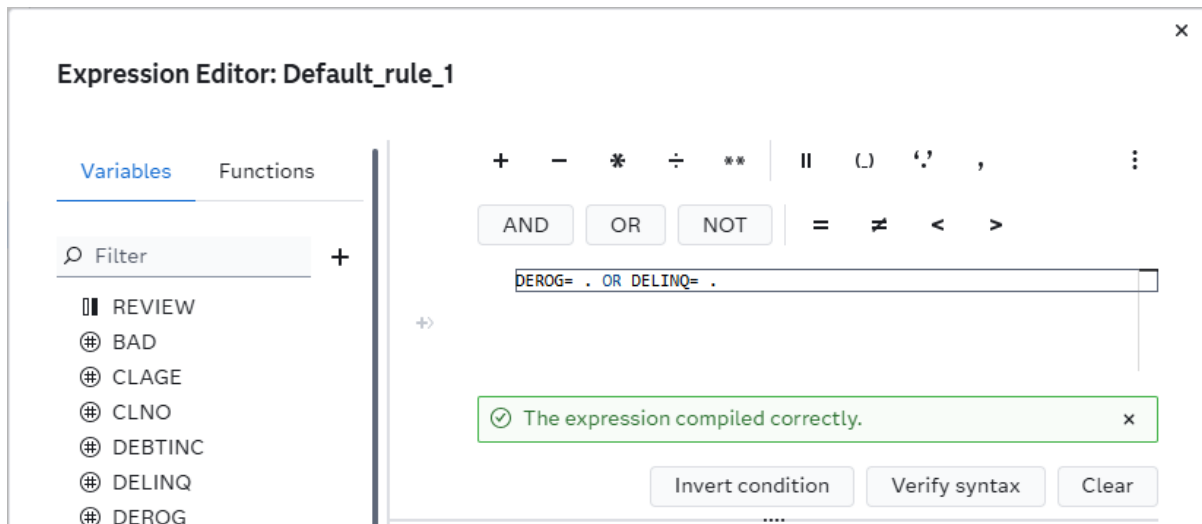
THEN ASSIGN REVIEW

TIP By default, the **Record rule-fired data** check box is selected on all new rules. If a rule's conditions evaluate to True, SAS Intelligent Decisioning executes the rule's actions, and the rule is said to have *fired*. If the **Record rule-fired data** check box is selected for that rule, then a rule-fired record is generated. When you test a rule set, you can analyze the rule-fired data by running a rule-fired analysis.

For this tutorial, the **Record rule-fired data** check boxes remain selected. When you test the final decision, you will run a rule-fired analysis test.

- 20 Click **Add** and select **Condition**.

- 21 For the second condition, select **DEBTINC** as the variable, select **<** as the expression operator, and enter **35.5** in the expression field.
- 22 Click **Add** and select **Condition**.
- 23 Select **DEBTINC** as the variable, select **^=** (not equal to) as the expression operator, and enter **.** (a period) in the expression field. The period denotes a missing numeric value.
- 24 Click **Add** and select **Condition**.
To enter this condition expression, you must use the expression editor.
- 25 Click  for the new condition to open the expression editor.
- 26 Enter **DEROG= . OR DELINQ= .** in the expression field, and click **Verify syntax**.
Alternatively, you can construct the expression by selecting variable names on the **Variables** tab and selecting operators in the rows above the expression field.



Expression Editor: Default_rule_1

Variables Functions

Filter +

- REVIEW
- BAD
- CLAGE
- CLNO
- DEBTINC
- DELINQ
- DEROG

+, -, *, ÷, **, ||, (.), ' ', , :

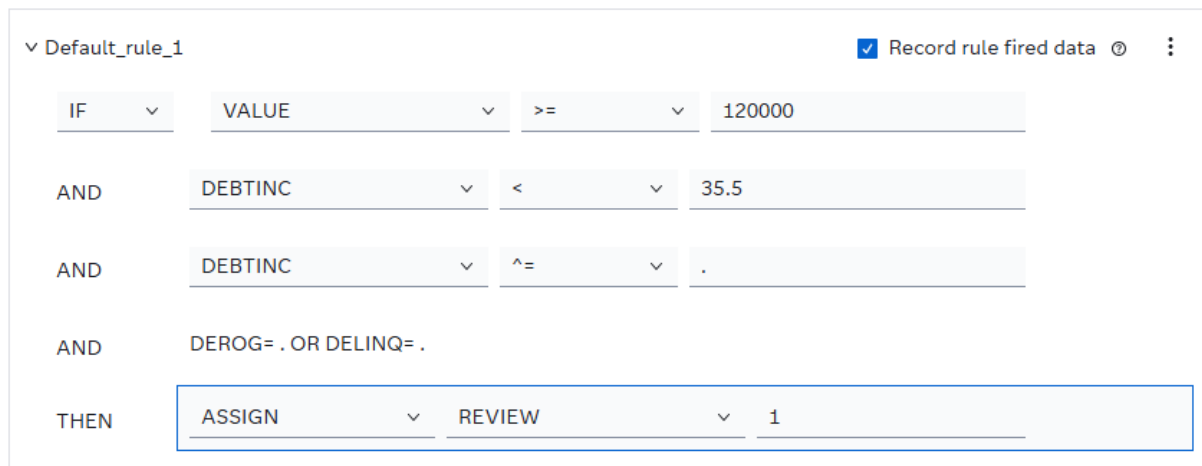
AND OR NOT = ≠ < >

DEROG= . OR DELINQ= .

✓ The expression compiled correctly.

Invert condition Verify syntax Clear

- 27 Click **Save** to close the expression editor and return to the rule set editor.
- 28 To construct the THEN clause, select **ASSIGN** as the action, select **REVIEW** as the variable, and enter **1** (to indicate True) in the expression field.



▼ Default_rule_1 ☒ Record rule fired data

IF	VALUE	>=	120000
AND	DEBTINC	<	35.5
AND	DEBTINC	^=	.
AND	DEROG= . OR DELINQ= .		
THEN	ASSIGN	REVIEW	1

29 Click  to save the rule set.

Test the Rule Set

Testing a rule set is optional, but it enables you to discover any problems with a rule set before you incorporate it into a decision.

30 On the **Scoring** tab, click the **Tests** tab.

31 Click **New test**. The New Test window appears.

32 (Optional) Enter a name for the test if you do not want to use the default name.

33 (Optional) Enter a description for the test.

34 Click  for the **Location** field, and select the location where you want to save the test. The test definition and the test results are saved to the same location.

35 Click  for the **Input table** field, select the **HMEQ_TEST** table, and click **OK**.

SAS Intelligent Decisioning automatically maps input variables in the rule set to columns in the input table when the names and data types of the variables match those of the table columns. If any input variables cannot be mapped automatically, an error message is displayed, and you can map the variables manually. You can map variables and view variable mappings by clicking **Variables** in the New Test window.

36 Click **Run** to save and run the test. If the test runs successfully, SAS Intelligent Decisioning displays a green check mark  in the **Status** column.

37 (Optional) Click  in the Results column to view the results of the test.

You can click **Test Results** to display information about the test, including the URIs for the test definition and test results. It also includes URIs to the SAS code that was run by SAS Intelligent Decisioning, the output data set, and the SAS log that was generated when the code was run.

38 Click **x** to close the test results, and click **x** again to close the rule set.

Create the Low_Ratio Rule Set

As shown in [Figure 2.1 on page 6](#), the Low_Ratio rule set evaluates loans for which the applicant's debt-to-income ratio is less than 35.5% of their total income. This rule set defines two rules.

The first rule approves a loan application if all of the following conditions are true:

- The current value of the applicant's property is greater than or equal to \$120,000 (`VALUE >= 120000`).
- The reason for the loan is either debt consolidation or home improvement (`REASON IN ('DebtCon', 'HomeImp')`).

- The applicant's current number of credit lines is less than 15 (CLNO < 15).

The second rule rejects a loan application if all of the following conditions are true:

- The current value of the applicant's property is less than \$120,000 (VALUE < 120000).
- The number of derogatory reports for the applicant is greater than 2 (DEROG > 2).
- The number of delinquent credit lines for the applicant is greater than or equal to 2 (DELINQ >= 2).

To create the Low_Ratio rule set, you complete the following steps:

- 1 Create a new rule set.
- 2 Add variables to the rule set.
- 3 Define the Approve rule.
- 4 Define the Reject rule.

Create a New Rule Set

- 1 Click  to navigate to the Rule sets category view.
- 2 Click **New rule set**. The New Rule Set window appears.
- 3 Enter **Low_Ratio** for the rule set name.
- 4 Select **Assignment** for the rule type.
- 5 Click , and select the same folder where you saved the Loans_to_Review rule set.
- 6 Click **Save**. The application opens the new rule set and displays the **Rule Set Variables** subtab of the **Variables** tab.

Add Variables to the Rule Set

For this rule set, you define a custom variable named REJECT, and import the variables from the Loans_to_Review rule set.

- 7 On the **Rule Set Variables** subtab, click **Add variable** and select **Custom variable**. The Add Variables window appears.
- 8 Enter **REJECT** as the name, select **Boolean** as the data type, and click **Add**.
- 9 Clear the check box in the **Input** column, and click **OK**. The REJECT variable does not exist in the input data source. It is an output-only variable.
- 10 Click **Add variable** and select **Rule set**. The Add Variables window appears.
- 11 Click  to open the Choose an Item window, select the **Loans_to_Review** rule set, and click **OK** to return to the Add Variables window.
- 12 Click  to select all of the variables in the Loans_to_Review rule set, and then click **Add** to add the variables to the Low_Ratio rule set.
- 13 Click  to save the rule set.

Define the Approve Rule

- 14 On the **Rule set** tab, click **Add rule**. The application adds a new rule that contains an IF-THEN statement.
- 15 To construct the IF condition, select **VALUE** as the variable, select **>=** as the operator, and enter 120000 in the expression field.
- 16 Click **Add** and select **Condition**.
- 17 To construct the second condition, select **REASON** as the variable, select **IN** as the operator, and enter 'HomeImp', 'DebtCon' in the expression field.

Note: The values in the IN clause are case sensitive and must be entered as shown.

TIP When you use the IN operator, SAS Intelligent Decisioning automatically adds parentheses around the set of values that you enter when it generates code.

- 18 Click **Add** and select **Condition**.
- 19 Select **CLNO** as the variable, select **<** as the operator, and enter 15 in the expression field.
- 20 To construct the THEN clause, select **ASSIGN** as the action, select **REJECT** as the variable, and enter 0 (to indicate False) in the expression field.
- 21 Click **:** for this rule, and select **Edit rule information**.

TIP Assigning logical names to the rules makes it easier to determine which rules fired when you review rule-fired data.

- 22 In the Edit Rule window, enter **Approve** as the rule name, and click **Save**.

The screenshot shows the 'Edit Rule' window for a rule named 'Approve'. The window has a title bar with a dropdown arrow, the rule name 'Approve', and a checkbox labeled 'Record rule fired data' which is checked. Below the title bar, there is a logical expression builder with four rows:

IF	VALUE	>=	120000
AND	REASON	IN	'HomeImp','DebtCon'
AND	CLNO	<	15
THEN	ASSIGN	REJECT	0

- 23 Click  to save the rule set.

Define the Reject Rule

- 24 Click **+Add rule**. The application adds a new rule that contains an IF-THEN statement.
- 25 To construct the IF condition, select the variable **VALUE**, select **<** as the operator, and enter 120000 in the expression field.
- 26 Click **Add** and select **Condition**.
- 27 Select **DEROG** as the variable in the new condition, select **>** as the operator, and enter 2 in the expression field.
- 28 Click **Add** and select **Condition**.
- 29 Select **DELINQ** as the variable, select **>=** as the operator, and enter 2 in the expression field.
- 30 To construct the THEN clause, select **ASSIGN** as the action, select **REJECT** as the variable, and enter 1 (to indicate True) in the expression field.
- 31 Click **:** for this rule and select **Edit rule information**.
- 32 In the Edit Rule window, enter **Reject** as the rule name, and click **Save**.

▼ Reject ☒ Record rule fired data ⓘ ⋮

IF	VALUE	<	120000
AND	DEROG	>	2
AND	DELINQ	>=	2
THEN	ASSIGN	REJECT	1

- 33 Click to save the rule set.
- 34 (Optional) Test the rule set. Follow the instructions for testing a rule set in [“Create the Loans_to_Review Rule Set” on page 7](#).
- 35 Click **x** to close the rule set.

Create the High_Ratio Rule Set

As shown in [Figure 2.1 on page 6](#), the High_Ratio rule set evaluates loans for which the applicant's debt-to-income ratio is greater than 35.5% of their total income. This rule set defines one rule with both IF and ELSE conditions. This rule approves a loan application if all of the following conditions are true:

- The applicant has no more than one delinquent credit line (`DELINQ <= 1`).
- The data for the number of delinquent credit lines is not missing from the application (`DELINQ ^= .`).
- The applicant's oldest credit line is at least 290 months old (`CLAGE >= 290`).

It rejects a loan application if both of the following conditions are true:

- The applicant has more than one delinquent line of credit (`DELINQ > 1`).
- The applicant's oldest credit line is less than 178 months old (`CLAGE < 178`).

To create the High_Ratio rule set, you complete the following steps:

- 1 Create a new rule set.
- 2 Add variables to the rule set.
- 3 Define the Approve rule.
- 4 Define the Reject rule. This rule is implemented as an ELSE clause.

Create a New Rule Set

- 1 Click  to navigate to the Rule sets category view.
- 2 Click **New rule set**. The New Rule Set window appears.
- 3 Enter **High_Ratio** for the rule set name.
- 4 Select **Assignment** for the rule type.
- 5 Click , and select the same folder where you saved the Loans_to_Review rule set.
- 6 Click **Save**. The application opens the new rule set and displays the **Rule Set Variables** subtab of the **Variables** tab.

Add Variables to the Rule Set

For this rule set, you import the variables from the Low_Ratio rule set.

- 7 Click **Add variable** and select **Rule set**. The Add Variables window appears.
- 8 Click  to open the Choose an Item window, select the **Low_Ratio** rule set, and click **OK** to return to the Add Variables window.
- 9 Click  to select all of the variables in the Low_Ratio rule set, and then click **Add** to add the variables to the High_Ratio rule set.
- 10 Click  to save the rule set.

Define the Approve Rule

- 11 On the **Rule set** tab, click **Add rule**. The application adds a new rule that contains an IF-THEN statement.
- 12 To construct the IF condition, select the variable **DELINQ**, select the **<=** operator, and enter 1 in the expression field.
- 13 Click **Add** and select **Condition**.

- 14 For the second condition, select the variable **DELINQ**, select the ^= (not equal to) operator, and enter . (a period) in the expression field. The period denotes a missing numeric value.
- 15 Click **Add** and select **Condition**.
- 16 Select **CLAGE** as the variable, select >= as the operator, and enter 290 in the expression field.
- 17 To construct the THEN clause, select **ASSIGN** as the action, select **REJECT** as the variable, and enter 0 (to indicate False) in the expression field.
- 18 Click ⋮ for this rule, and select **Edit rule information**.
- 19 In the Edit Rule window, enter **Approve** as the rule name, and click **Save**.

Define the Reject Rule

- 20 Click **Add** and select **ELSE rule**.
- 21 Click to the right of the ELSE operator field to select the ELSE rule, click **Add**, and select **Condition**.
- 22 In the condition, select the variable **DELINQ**, select > as the operator, and enter 1 in the expression field.
- 23 Click **Add** and select **Condition**.
- 24 Select **CLAGE** as the variable, select < as the operator, and enter 178 in the expression field.
- 25 To construct the THEN clause, select **ASSIGN** as the action, select **REJECT** as the variable, and enter 1 (to indicate True) in the expression field.
- 26 Right-click on the **ELSE** rule operator and select **Edit rule information**.
- 27 In the Edit Rule window, enter **Reject** as the rule name, and click **Save**.

TIP Rule names for ELSE clauses do not appear in the rule set editor.

v Approve

☒ Record rule fired data ⓘ

IF	DELINQ	<=	1
AND	DELINQ	^=	.
AND	CLAGE	>=	290
THEN	ASSIGN	REJECT	0
ELSE	DELINQ	>	1
AND	CLAGE	<	178
THEN	ASSIGN	REJECT	1

28 Click  to save the rule set.

29 (Optional) Test the rule set. Follow the instructions for testing a rule set in [“Create the Loans_to_Review Rule Set” on page 7](#).

30 Click **x** to close the rule set.

Create the Evaluate_Loans Decision

The Evaluate_Loans decision combines the Loans_to_Review, Low_Ratio, and High_Ratio rule sets with conditional logic to evaluate loan applications. The conditional logic determines which rule set is run based on the value of the DEBTINC variable.

To create the Evaluate_Loans decision, you complete the following steps:

- 1 Create a new decision.
- 2 Add the Loans_to_Review rule set.
- 3 Add a condition.
- 4 Add the Low_Ratio and High_Ratio rule sets.

Create a New Decision

- 1 Click  to navigate to the Decisions category view.
- 2 Click **New decision**. The New Decision window appears.
- 3 Enter **Evaluate_Loans** as the decision name.

Note: A **Type** field appears in the New Decision window if custom decision types have been defined at your site. Do not select a **Type**. Leave this field blank.

This tutorial assumes that you are not editing the decision in a workflow. Do not select a workflow.

- 4 Click  and select the same folder where you saved the Low_Ratio rule set.
- 5 Click **Save**. The new decision SAS Intelligent Decisioning opens the decision and displays the **Decision Flow** tab. A Start node and an End node are automatically added to decision.

TIP The icons such as  and  at the left and right of the **Decision Flow** tab are toggles. Click an icon to open or close the corresponding pane.

TIP There are two views that you can use to edit decisions. On the **Decision Flow** tab, you can edit a decision by using a graphical editor. On the **Decision** tab, you can edit the decision by using a tabular view similar to the rule set editor. For more information, see [“The Decision Flow Tab versus the Decision Tab” in SAS Intelligent Decisioning: User's Guide](#).

This tutorial uses the graphical view on the **Decision Flow** tab.

Add the Loans_to_Review Rule Set

- 6 On the **Decision Flow** tab, click , and navigate to the location where you saved the Loans_to_Review, Low_Ratio, and High_Ratio rule sets.
- 7 Drag the **Loans_to_Review** rule set from the **Content Selector Objects** list onto the Start node in the diagram.

IMPORTANT This tutorial assumes that you are using the default value for the **Create variables automatically in decisions** setting. By default, this setting is turned off, which means that you see a red X  on the rule set node when you add the rule set to the decision.

If an object defines an input or output variable, you must define a decision variable of the same type to which you can map the object's variables. If a decision does not already have a variable of the same name and data type as an object's variable, then SAS Intelligent Decisioning displays the red X. In these cases, you can use the **Add missing variables** option to add the missing decision variables. This tutorial includes steps for using this option. If you turn on the **Create variables automatically in decisions** setting, you do not see the red X, and you can skip these steps. For more information, see [“About Decision Variables and Mapping” in SAS Intelligent Decisioning: User's Guide](#).

TIP As an alternative to dragging objects from the list, you can right-click on an object in the diagram and use the pop-up menu to add objects to the decision flow.

- 8 Click  in the toolbar, and select **Add missing variables**.
- 9 In the Add Missing Variables window, select the **Select all** check box at the top of the check box column, and click **Add**. SAS Intelligent Decisioning creates decision variables that have the same name and data type as the variables in the Loans_to_Review rule set and maps the decision's variables to the rule set's variables.
- 10 Click  to save the decision.

Add a Yes/No Branch

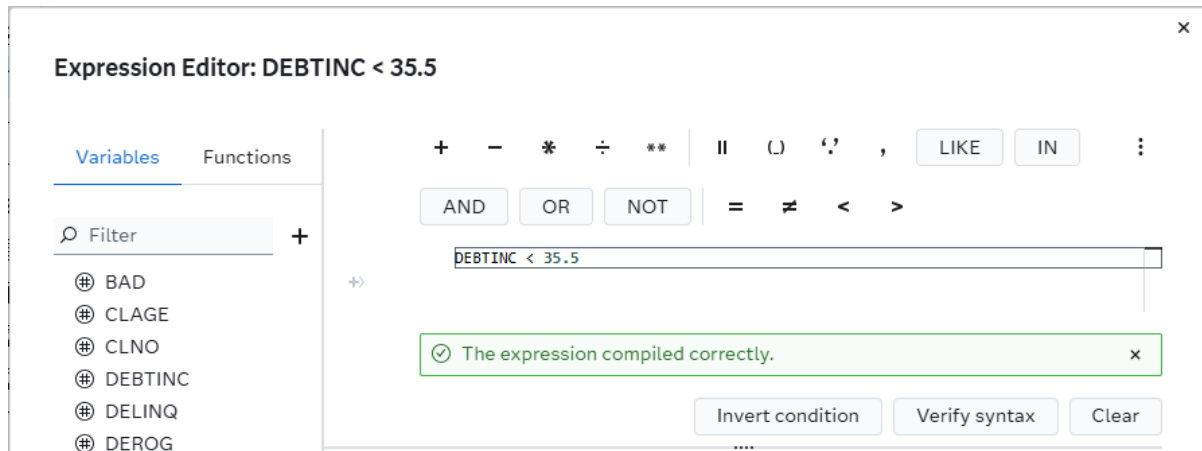
A Yes/No branch expression is evaluated as a Boolean expression. In **Yes/No (expression)** branches, you can use the expression editor to enter an expression that uses multiple variables or complicated expressions. In this tutorial, the branch expression determines whether the value of the DEBTINC variable is less than the literal value 35.5.

- 11 Click , and drag the **Branch** object onto the **Loans_to_Review** rule set. The New Branch window appears.

TIP To choose objects that have already been defined by navigating to their location, click . To add objects by selecting the object type, click .

- 12 Enter **DEBTINC < 35.5** for the branch name, select **Yes/No (expression)** for the branch type, and click **OK**.
- 13 If the **Properties** pane for the condition is not open, click .
- 14 In the **Properties** pane, click  in the **Branch expression** field to open the expression editor.
- 15 Enter **DEBTINC < 35.5** in the expression field, and click **Verify syntax** to validate the expression syntax.

Alternatively, you can construct the expression by selecting and adding variable names from the **Variables** tab and selecting operators in the rows above the expression field.



16 Click **Save** to return to the **Properties** pane.

17 Click  to close the **Properties** pane.

Add the Low_Ratio and High_Ratio Rule Sets

18 Right-click on the branch node, and select **Add to Yes path** ⇒ **Rule set**.

19 In the Choose an Item window, navigate to the location where you saved the rule sets, select the **Low_Ratio** rule set, and click **OK**. If you are using the default settings, SAS Intelligent Decisioning displays the same red X as when you added the Loans_to_Review rule set. You will fix this error in [Step 22](#) and [Step 23](#).

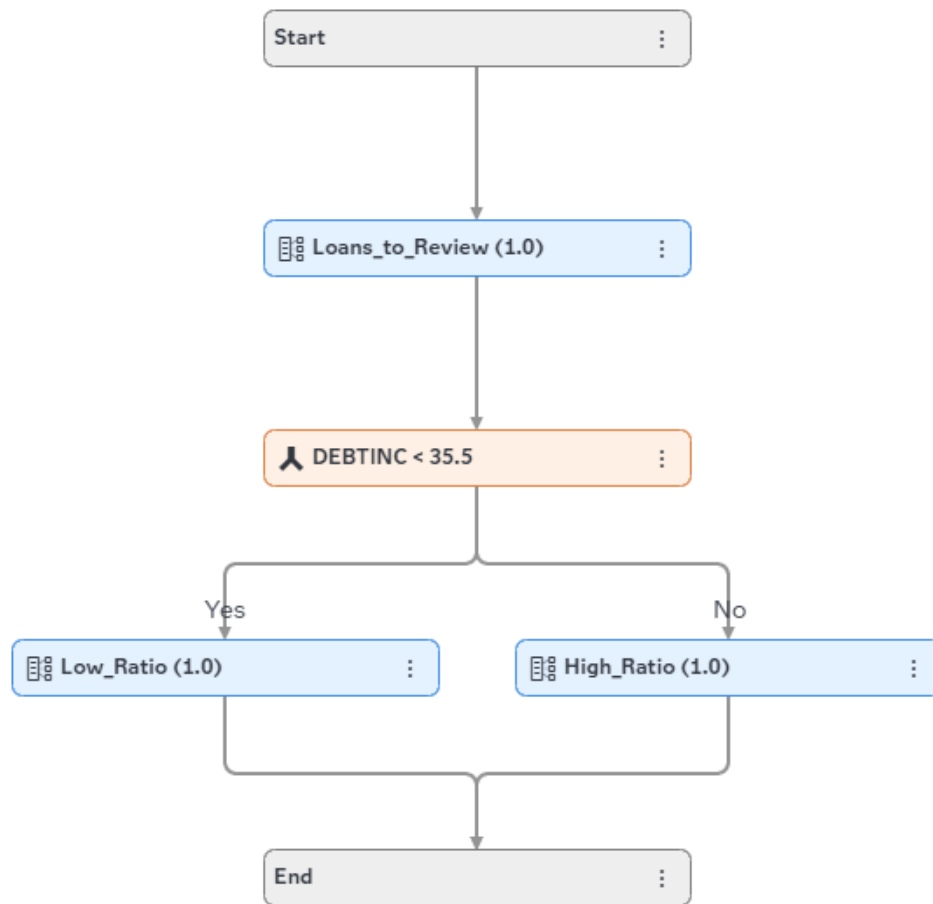
20 Right-click on the branch node, and select **Add to No path** ⇒ **Rule set**. The Choose a Rule Set window appears.

21 Navigate to the location where you saved the rule sets, select the **High_Ratio** rule set, and click **OK**.

22 Click  in the toolbar, and select **Add missing variables**. The Add Missing Variables window displays only one variable, REJECT. This variable is used in both the Low_Ratio and High_Ratio rule sets.

23 Select the REJECT variable, and click **Add**. SAS Intelligent Decisioning defines a decision variable named REJECT and automatically maps it to the rule set's variable.

24 Click  to save the decision.



Test the Decision

To test the decision, you complete the following steps:

- 1 Create and run a new test.
- 2 Run a rule-fired analysis.
- 3 Run a decision path tracking analysis.

Create and Run a New Test

Testing a decision is optional, but it enables you to discover any problems with a decision before it is published and incorporated into a production system.

- 1 On the **Scoring** tab of the decision, click the **Tests** tab.
- 2 Click **New test**. The New Test window appears.
- 3 (Optional) Enter a name for the test if you do not want to use the default name.

- 4 If you do not want to use the location that is automatically selected, click  for the **Location** field, and select the location where you want to save the test. The test definition and the test results are saved to the same location.
- 5 Click  for the **Input table** field, select the **HMEQ_TEST** table, and click **OK**. SAS Intelligent Decisioning automatically maps input variables in the decision to columns in the input table when the names and data types of the variables match those of the table columns. If any input variables cannot be mapped automatically, an error message is displayed, and you can map the variables manually. You can map variables and view variable mappings by clicking **Variables** in the New Test window.

IMPORTANT When the decision is published and run in a production environment, the decision expects the input data to contain variables that have the same name and data type as the decision's input variables. You cannot map variables to input data in a published decision.

- 6 Click **Run** to save and run the test. If the test runs successfully, SAS Intelligent Decisioning displays a green check mark  in the **Status** column.

Note: This test runs in a SAS Cloud Analytic Services (CAS) session. Later in this tutorial, you will test the decision in the publishing destination after it has been published by running a publishing validation test.

- 7 Click  in the **Results** column to view the results of the test. SAS Intelligent Decisioning opens the test results and displays the **Output** page.

Click **Test Results** to display information about the test, including the URIs for the test definition, the test results, the output data set, the SAS code that was generated and run by SAS Intelligent Decisioning, and the SAS log that was generated when the code was run.

Run a Rule-Fired Analysis

If a rule's condition expression evaluates to True, then the rule is said to have *fired*. Rule-fired data includes summary information about how many times each rule fired and detailed information for each time that a rule evaluates to True. See [“How Rules Are Evaluated and When Rule-Fired Records Are Generated” in SAS Intelligent Decisioning: User's Guide](#) for more information.

- 8 Click **Rule-Fired Analysis** in the navigation pane.
- 9 Click **Run Rule-Fired Analysis**. SAS Intelligent Decisioning analyzes the test results to determine which rules fired for each row in the HMEQ.TEST table.
- 10 Click **Analysis** in the navigation pane. The analysis page displays the number of rules that fired for each output record that was generated by the decision.

The numbers in the **Rules Fired Count** column are links to more information. You can click on these links to display the rules that fired for that output row. For example, in this tutorial, there is one output record for which two rules fired.

TIP You can click a column heading sort the table entries according to the values in the column. You can toggle between ascending order and descending order.

- 11 Click the column heading **Rules Fired Count** twice in order to sort the table in descending order according to the values in that column.

Evaluate_Loans_Test

Analysis
Output Records

Rules Fired Count ↓	REJECT	REVIEW	BAD	CLAGE	CLNO
2	0	1	1		
1	0		0	90.992533467	13
1	0		0	101.54029753	13
1	0		1	298.13156403	7
1	1		1	61.64250608	14
1	0		1	100.3	14
1	0		1		
1	0		1	121.9	14

- 12 Click the number **2** in the **Rules Fired Count** column. The Rule Fired Count window displays the two rules that fired for the output row that you selected. These rules are the only rule in the Loans_to_Review rule set and the Approve rule in the Low_Ratio rule set.

Rule Fired Count

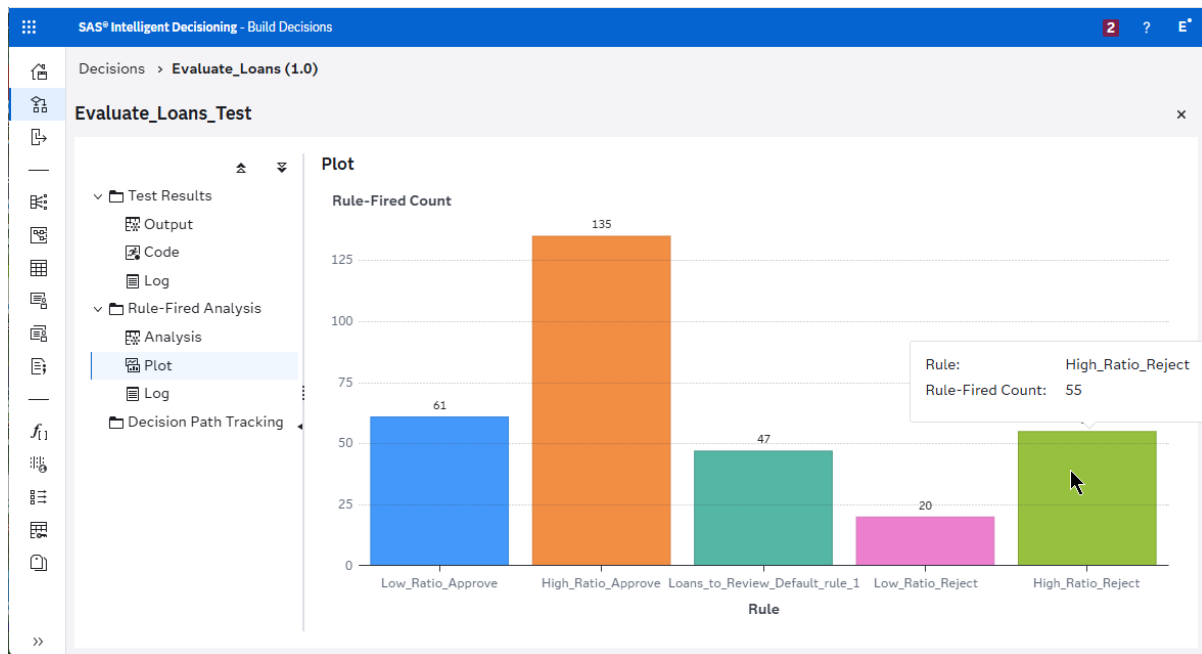
Details Analysis Output Columns

Rule Set Name	Rule Name	Order in Diagram	Rule Logic
Loans_to_Review	Default_rule_1	1	IF (VALUE >= 120000) AND (DEBTINC < 35.5) AND (DEBTINC ^= .) AND (DEROG= . OR DELINQ= .) THEN REVIEW = 1
Low_Ratio	Approve	2	IF (VALUE >= 120000) AND (REASON in ('HomeImp', 'DebtCon')) AND (CLNO < 15) THEN REJECT = 0

Close

- 13 Click **Close** to close the Rule Fired Count window.
- 14 Click **Plot** in the navigation pane. SAS Intelligent Decisioning displays a bar chart that shows how many times each rule in the decision fired. Position your cursor over a bar to display the name of the rule and the number of times that the rule fired.

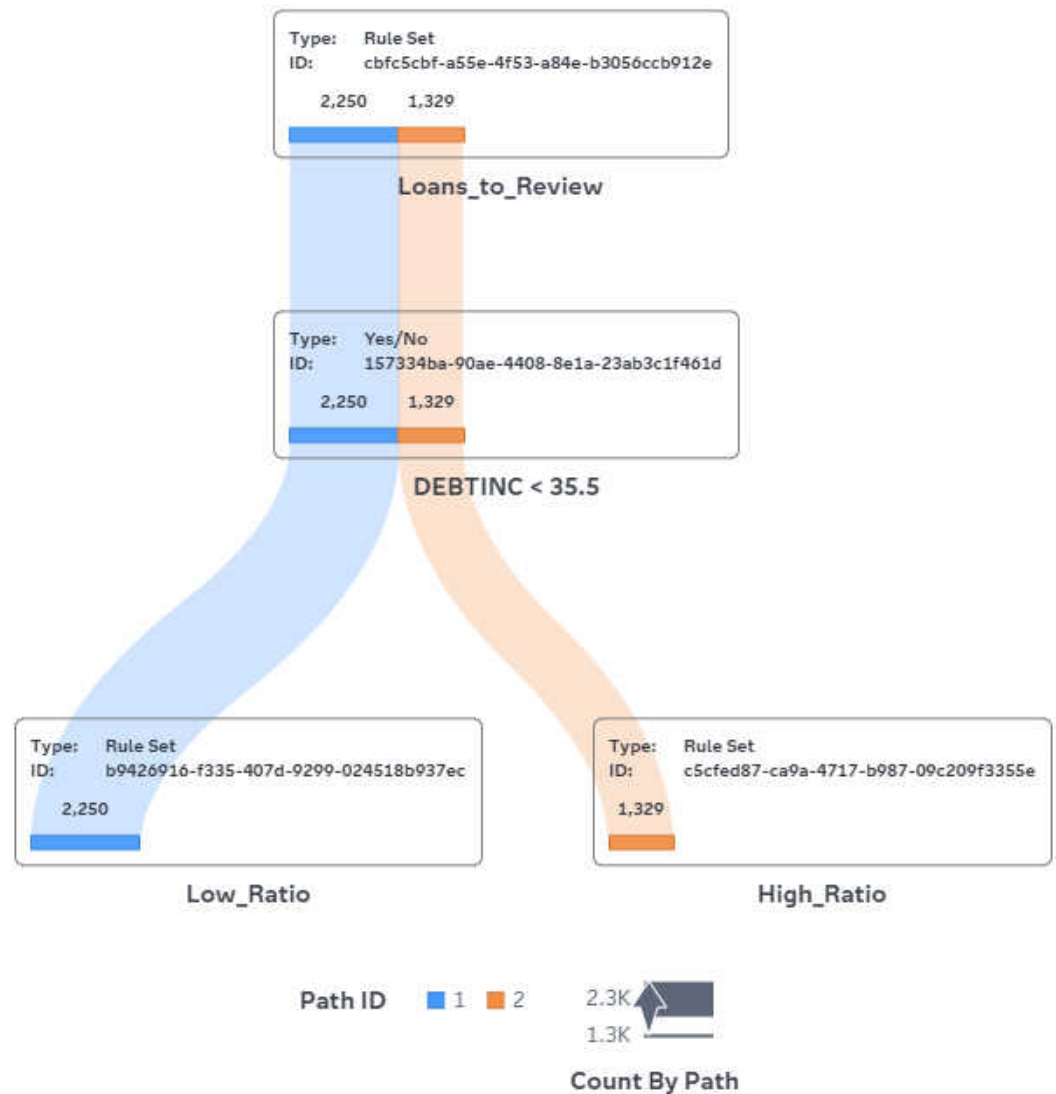
Note: The bars in the graph might appear in a different order than the order shown in the figure below.



Run a Decision Path Tracking Analysis

Decision path tracking shows you the route that input records take through the rule sets and conditions in your decision.

- 15 Click **Decision Path Tracking** in the navigation pane.
- 16 Click **Run Path Tracking** to run a decision path analysis.
- 17 Click **Analysis and Plot** to display a Sankey diagram that shows the flow of the input records through the rule sets and conditions in the decision. The numbers in the diagram are the number of rows in the input table that followed each path.



- 18 Click **Node Count** in the navigation pane to display a table showing the number of input records evaluated at each node in the decision.
- 19 Click **x** to close the Test Results window.

Validate and Publish the Decision

Validating decisions ensures that there are no errors in rule sets, that treatment groups and lookup tables are activated, and more. For more information, see [“Validate a Decision in the Decision Editor” in SAS Intelligent Decisioning: User’s Guide](#).

Publishing content makes it available to other applications. Publishing a decision or a rule set creates an entity that can be managed and run in another environment. For example, if you publish content to the SAS Micro Analytic Service destination,

SAS Intelligent Decisioning creates a DS2 package that can be managed and run by using the SAS Micro Analytic Service interface.

The maslocal publishing destination is automatically configured for you. In order to publish content to a destination other than maslocal, your administrator must configure the additional publishing destination. For more information, see [“Configuring Publishing Destinations” in SAS Intelligent Decisioning: Administrator’s Guide](#).

In this tutorial, you publish the entire decision, but you could also publish each of the rule sets separately.

To validate and publish the Evaluate_Loans decision:

- 1 On the **Decision Flow** tab for the decision, click **Validate**. SAS Intelligent Decisioning displays the message `Start to validate decision` and checks the completeness of all related objects. When completed, the message `Finish validating decision` is displayed at the bottom of the decision flow.
- 2 Click **Publish**. The Publish Decisions window appears.
- 3 In the Publish Decisions window, select the destination where you want to publish the decision.
- 4 (Optional) Add a tag to the published decision. Tags are character strings that enable you to better organize and group your content. The use of tags is controlled by configuration options and permission settings, so you might not be able to specify a tag, or you might be restricted to selecting a predefined tag. For more information, see [“Managing and Using Tags” in SAS Intelligent Decisioning: User’s Guide](#).
- 5 (Optional) Enter a **Published name** if you do not want to use the default published name.
- 6 (Optional) Click the **Replace item with the same name** toggle if you have published the decision previously, and you want to replace the previously published decision with the current name.
- 7 (Optional) Select the **Path tracking** check box if you want to publish the path tracking results for the decision.

Note: You cannot select **Path tracking** when you publish content to a SAS Micro Analytic Service destination, a Git destination, or a container destination.

- 8 (Optional) Select the **Rule-fired tracking** check box if you want to publish the rule-fired tracking results for the decision.

Note: You cannot select the Rule-Fired Tracking option when you publish content to a SAS Micro Analytic Service destination, a Git destination, or a container destination.

- 9 Click **Publish**.

Note: When you publish content to a SAS Cloud Analytic Services (CAS) destination, the destination table must be reloaded in order to make the newly published item available to other applications. SAS Intelligent Decisioning automatically reloads the CAS destination table. If another user is executing the code for an item that was previously published to CAS while the table is being reloaded, reloading the table causes temporary problems with accessing the table content. After the table is reloaded, all authorized users can access all items in the table.

The destination tables for other destination types do not need to be reloaded.

The Publishing Results window appears. It displays the name of the published decision, its status, and information about any issues that were encountered while publishing the decision.

- 10 Click **Close** to close the Publishing Results window.

Run a Publishing Validation Test

You can test the published decision in the publishing destination. When you publish the decision, a publishing validation test is automatically defined for that decision in that destination.

To run a publishing validation test:

- 1 On the **Scoring** tab, click the **Publishing Validation** subtab. The  icon in the **Status** column indicates that the test is not ready to run. The  icon indicates that the test is ready to run.
- 2 Click on the test name to open it. The Edit Publishing Validation Test window appears.
- 3 Click  for the **Location** field to open the **Choose a Location** window, select the location where you want to save the test, and click **OK**. If you do not select a location, the test is not saved in a folder. The test definition and the test results are saved to the same location.
- 4 Click  for the **Input table** field to open the **Choose Data** window, select the **HMEQ_TEST** table, and click **OK**.
- 5 Click **Run** to save and run the test. If the test runs successfully, SAS Intelligent Decisioning displays a green check mark  in the **Status** column.
- 6 Click  in the **Results** column to view the SAS code that was run by SAS Intelligent Decisioning, the output data set, and the SAS log that was generated when the code was run.
- 7 Click **x** to close the decision.

Using Treatments and Scoring Data Grids

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Overview

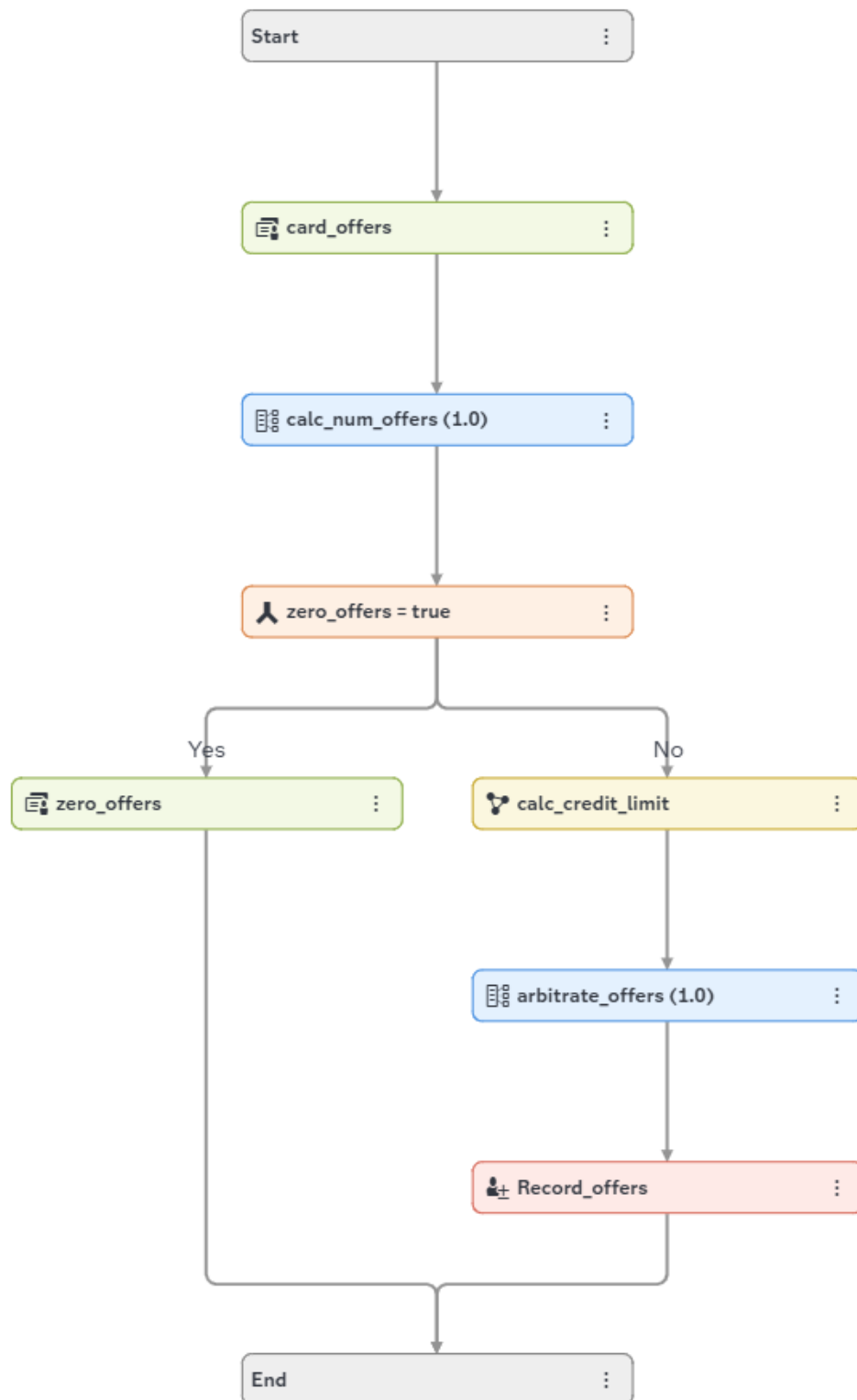
Treatments define offers that you might want to present to subjects that contact your company as a result of an inbound marketing campaign. You can combine treatments into a treatment group, and add the treatment group to a decision that determines the treatments for which the subject qualifies. You can use rule sets,

models, custom code files, and subdecisions to determine eligibility, score the treatments, and arbitrate the treatments.

A treatment is a set of attributes, eligibility rules, and effective dates. Attributes are name-value pairs that define the specific details of the offer that you present to a subject. For example, for a treatment that gives subjects a 20% discount, you could define an attribute named DISCOUNT that has the value 20.

Eligibility rules define who is eligible to receive the offer defined by the treatment. For example, your campaign might target people who have low debt and clean credit records. You define eligibility rules in an eligibility rule set. An eligibility rule set is a filtering rule set.

In this tutorial, you create three treatments, including their eligibility rule sets. Each treatment defines the offer for a different credit card with different rates and benefits. You combine these treatments into a treatment group, and add the group to a new decision. SAS Intelligent Decisioning creates an output data grid that contains one row for each treatment for which the associated subject qualifies. You use a model to score the data grid and a rule set to arbitrate the results. Finally, you add a record contacts node that records the best offer for each subject in the subject contacts database. The final decision diagram is shown in [Figure 3.1 on page 31](#).

Figure 3.1 Decision Flow Diagram for the Credit_Card_Offers Decision

Note: In order to complete the tasks in this tutorial, your user ID must have the appropriate permissions. See [“Managing Permissions” in SAS Intelligent Decisioning: Administrator’s Guide](#) for more information.

To complete the tutorial, follow these steps:

- 1 Complete the steps listed in [“Before You Begin” on page 2](#).
- 2 [Create a filtering rule set for each treatment](#). These rule sets define who is eligible for each credit card offer.
- 3 [Create a treatment for each credit card offer](#). You define three treatments, one for each credit card offer.
- 4 [Combine the treatments into the Card_Offers treatment group](#).
- 5 [Create the Credit_Card_Offers decision, and add the treatment group](#). When you add a treatment group to a decision, SAS Intelligent Decisioning creates an output data grid variable that contains a column for each of the attributes in the treatment group.
- 6 [Create the Calc_Num_Offers rule set](#). This rule set uses the DATAGRID_COUNT function to calculate the number of offers in the output data grid variable created in [Step 5 on page 32](#).
- 7 [Create the Arbitrate_Offers rule set](#). This rule set uses the DATAGRID_TOPN function to return the treatment with the highest score.
- 8 [Complete the Credit_Card_Offers decision](#). In this step, you add the remaining objects, including the Calc_Credit_Limit model, to the decision. The model scores each row in the output data grid variable that was created in [Step 5 on page 32](#).
- 9 [Test the decision](#), and view the results.

Create Eligibility Rule Sets for Each Treatment

About the Treatments and Eligibility Rule Sets

When you create a treatment, you can specify a set of eligibility rules that determines who is eligible to receive the treatment. To specify eligibility rules for a treatment, create a filtering rule set and specify the rule set on the **Eligibility Rule Set** tab of the treatment. Eligibility rules are optional for a treatment, but in this tutorial, you create an eligibility rule set for each treatment that you create in [“Create Treatments for Each Card” on page 37](#). The treatments are named Card_PREFERRED, Card_Silver, and Card_Gold. The corresponding eligibility rule sets are named Eligibility_PREFERRED, Eligibility_Silver, and Eligibility_Gold.

For more information about filtering rule sets, see [“About Rules and Rule Set Types”](#) in *SAS Intelligent Decisioning: User’s Guide* and [“Add a New Rule in a Filtering Rule Set”](#) in *SAS Intelligent Decisioning: User’s Guide*.

Create the Eligibility_PREFERRED Rule Set

The Eligibility_PREFERRED rule set determines whether an applicant is eligible for the Preferred credit card. An applicant is eligible for the Preferred card if their account score is greater than or equal to .67 (`ACCTSCORE >= .67`) or if the applicant does not yet have an account score.

To create the Eligibility_PREFERRED rule set, complete the following steps:

- 1 Create a new filtering rule set.
- 2 Add variables to the rule set.
- 3 Define the filtering rule. This rule set contains only one rule with multiple conditions.

Create a New Filtering Rule Set

- 1 Click  to navigate to the Rule sets category view.
- 2 Click **New rule set**. The New Rule Set window appears.
- 3 Enter **Eligibility_PREFERRED** for the rule set name.
- 4 Select **Filtering** for the rule set type.
- 5 Click  and select the folder where you want to save the rule set.

IMPORTANT The instructions in this tutorial assume that the folder in which you save your work has not been configured as a folder whose objects must be checked out. It is recommended that you either create a folder for your tutorial files in the **Public** folder or save your work in **My Folder**. Do not save your work in **Decision Repository** or any other folder that has been enabled for the checkout and commit feature. For more information, see [“Check Out and Commit a REST API Definition Version”](#) in *SAS Intelligent Decisioning: User’s Guide*.

- 6 Click **Save**. The application opens the new rule set and displays the **Rule Set Variables** subtab of the **Variables** tab.

TIP You can expand the workspace area by clicking << to collapse the navigation bar.

Add Variables to the Rule Set

You can import existing variables from data tables or from other rule sets and decisions, or you can create custom variables. In this tutorial, import the variables that are in the table HMEQ.ACCOUNTS.

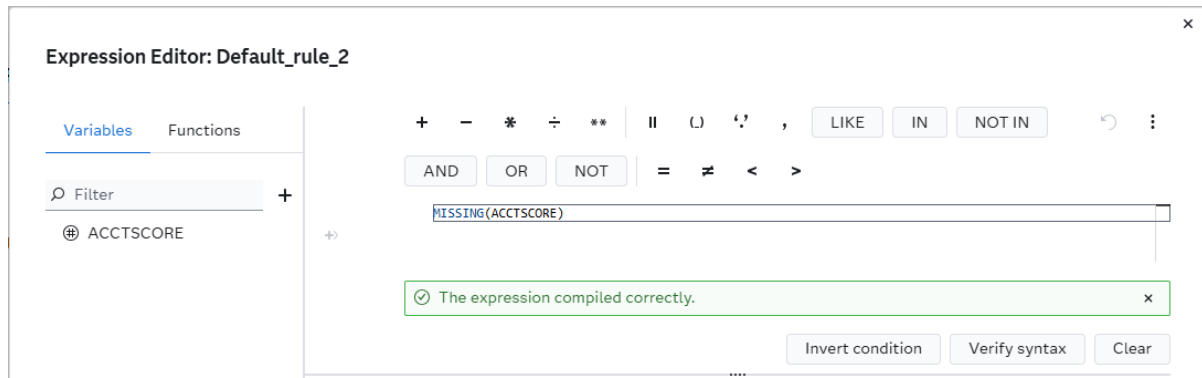
- 7 Click **Add variable** and select **Data table**. The Add Variables window appears.
- 8 Click  to open the Choose Data window
 The list of data tables shown in this window depends on the list that you select in the **Show** field. The list of SAS Cloud Analytic Services (CAS) tables that are loaded into memory is displayed on the **Available** tab. If the HMEQ_ACCOUNTS table does not appear in any of the tabs in this window, import the data tables as described in [“Import the Data Tables” on page 3](#).
- 9 In the Choose Data window, select the HMEQ_ACCOUNTS table, and click **OK** to return to the Add Variables window.
- 10 In the Add Variables window, select the **ACCTSCORE** variable, click **➔**, and click **Add**. The variable is added to the rule set as both an input and output variable. Input variables are variables that appear in the input data. Output variables are variables that appear in the output of the rule set.
- 11 Click  to save the rule set.

Define the Filtering Rules

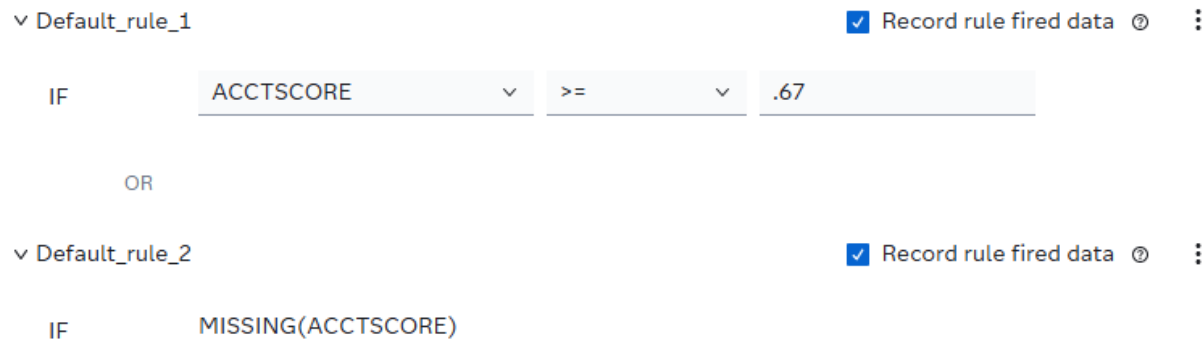
- 12 On the **Rule Set** tab, click **Add rule**. The application adds an IF statement to the rule set.
- 13 In the field next to the IF rule operator, select the variable **ACCTSCORE**.
- 14 Select **>=** as the expression operator.
- 15 Enter the number **.67** in the expression field.

TIP The **Record rule-fired data** check box is selected by default. However, rule-fired data is never recorded for filtering rule sets that are used as eligibility rule sets in treatments. For this tutorial, you can ignore this check box. For more information, see [“About Rules and Rule Set Types” in SAS Intelligent Decisioning: User’s Guide](#).

- 16 Click **+Add rule** to add a second rule.
- 17 For the second rule, click  to open the expression editor.
- 18 Enter **MISSING (ACCTSCORE)** for the rule expression, and click **Verify syntax** to verify the expression syntax. You can enter this expression directly into the expression editor, or you can use the lists of operators, function names, and variable names as described in [“Using the Expression Editor” in SAS Intelligent Decisioning: User’s Guide](#).



19 Click **Save** to add the expression to the rule.



20 Click  and **x** to save and close the rule set.

Create the Eligibility_Silver Rule Set

The Eligibility_Silver rule set determines whether an applicant is eligible for the Silver credit card. An applicant is eligible for the Silver card if their account score is greater than or equal to .74 ($ACCTSCORE \geq .74$).

To create the Eligibility_Silver rule set, duplicate the Eligibility_Preferred rule set, and modify the rule to specify the conditions for the Silver credit card.

Duplicate the Eligibility_Preferred Rule Set

- 1 In the Rule Sets category view, select the check box for the **Eligibility_Preferred** rule set, click , and select **Duplicate**. The Duplicate Rule Set window appears.
- 2 Enter **Eligibility_Silver** for the rule set name.
- 3 Click  and select the folder where you want to save the rule set.
- 4 Click **Duplicate**.

Modify the Rule Criteria

- 5 Open the **Eligibility_Silver** rule set.
- 6 For the first rule, change the value of the ACCTSCORE variable from .67 to .74.

- 7 Delete the second rule. Click  for the second rule, and select **Delete**.

v Default_rule_1

☒ Record rule fired data ⓘ

IF

ACCTSCORE

▼

>=

▼

.74

- 8 Click  and **x** to save and close the rule set.

Create the Eligibility_Gold Rule Set

The Eligibility_Gold rule set determines whether an applicant is eligible for the Gold credit card. An applicant is eligible for the Gold card if their account score is greater than or equal to .8 (ACCTSCORE >= .8).

To create the Eligibility_Gold rule set, duplicate the Eligibility_Silver rule set, and modify the rule to specify the conditions for the Gold card.

Duplicate the Eligibility_Silver Rule Set

- 1 In the Rule Sets category view, select the check box for the **Eligibility_Silver** rule set, click , and select **Duplicate**. The Duplicate Rule Set window appears.
- 2 Enter **Eligibility_Gold** for the rule set name.
- 3 Click  and select the folder where you want to save the rule set.
- 4 Click **Duplicate**.

Modify the Rule Criteria

- 5 Open the **Eligibility_Gold** rule set.
- 6 Change the value of the ACCTSCORE variable from .74 to .8.

v Default_rule_1

☒ Record rule fired data ⓘ

IF

ACCTSCORE

▼

>=

▼

.8

- 7 Click  and **x** to save and close the rule set.

Create Treatments for Each Card

About Treatment Attributes

There are three credit card treatments: Card_PREFERRED, Card_Silver, and Card_Gold. Each card has different benefit levels. You define attributes that specify the benefits that come with each card. Attributes are name-value pairs that define the specific details of the offer that you present to a subject. For example, the Card_PREFERRED treatment comes with an introductory bonus of 200 dollars. You will define an attribute named INTRO_BONUS and assign it a value of 200. In this tutorial, all three treatments define the same attributes, but the attributes have different values for each card.

An attribute's value can be fixed or dynamic.

Fixed

You specify the value or set of values for fixed attributes when you define the attribute. The values cannot be customized in treatment groups or set by the decision at run time.

Dynamic

The value of a dynamic attribute can be set when you add a treatment group to a decision or by the decision at run-time. When you define a dynamic attribute, you can specify a default value for the attribute. Within each treatment group in which the attribute appears, you can set a static value that is used only within that specific treatment group, or you can specify that the attribute's value is set by the decision at run time.

All of the treatment attributes defined in this tutorial are fixed.

For more information, see [“Attributes and Attribute Aliases” in SAS Intelligent Decisioning: User's Guide](#) and [“Managing Attributes and Aliases” in SAS Intelligent Decisioning: User's Guide](#).

Create the Card_PREFERRED Treatment

The Card_PREFERRED treatment is the treatment with the highest interest rate. To create the Card_PREFERRED treatment, complete the following steps:

- 1 Create a new treatment.
- 2 Define the treatment attributes.
- 3 Add the eligibility rule set that you created in [“Create the Eligibility_PREFERRED Rule Set” on page 33](#).

Create a New Treatment

- 1 Click  to switch to the Treatments category view.
- 2 Click **New treatment**. The New Treatment window appears.
- 3 Enter **card_preferred** for the treatment name.
- 4 Click , and select the location where you want to save the treatment.
- 5 Click **Save**. SAS Intelligent Decisioning opens the new treatment and displays the **Attributes** tab.

Add Treatment Attributes

- 6 On the **Attributes** tab, click **Add attribute**, and select **Custom attribute**. The Add Attribute window appears.
- 7 For each attribute listed in the following table, enter the name, select the data type, select the value type, enter the default value, and click **Add**.

Table 3.1 *Attributes to Define for the Preferred Treatment*

Name	Data Type	Value Type	Value
annual_fee	Decimal	Fixed	0
APR	Decimal	Fixed	18.7
card_type	Character	Fixed	preferred
cashback_gas	Decimal	Fixed	3
cashback_stream	Decimal	Fixed	3
intro_bonus	Decimal	Fixed	200

- 8 Click **OK** to add the attributes to the treatment.

The screenshot shows the SAS Intelligent Decisioning - Build Decisions interface. The left sidebar contains various icons for navigation. The main panel is titled "< Treatments" and shows the treatment "*card_preferred (1.0)". The "Attributes" tab is selected, displaying a table of attributes.

	Name	Value	Data Type	Value Type	Description
☐	annual_fee	0	⊕ Decimal	Fixed	
☐	APR	18.7	⊕ Decimal	Fixed	
☐	card_type	preferred	⚠ Character	Fixed	
☐	cashback_gas	3	⊕ Decimal	Fixed	
☐	cashback_stream	3	⊕ Decimal	Fixed	
☐	intro_bonus	200	⊕ Decimal	Fixed	

Add the Eligibility Rule Set

- 9 On the **Eligibility Rule Set** tab, click **Add rule set**. The Choose an Item window appears.
- 10 Navigate to the folder that contains the **Eligibility_Preferred** rule set, select the rule set, and click **OK**.

The screenshot shows the SAS Intelligent Decisioning - Build Decisions interface. The left sidebar contains various icons for navigation. The main panel is titled "< Treatments" and shows the treatment "*card_preferred (1.0)". The "Eligibility Rule Set" tab is selected, displaying the rule set configuration.

Eligibility_Preferred Version 1.0

Open Replace Remove

✓ Record rule fired data

Default_rule_1

IF ACCTSCORE >= .67

OR

Default_rule_2

IF MISSING(ACCTSCORE)

✓ Record rule fired data

- 11 Click and to save and close the treatment.

Create the Card_Silver Treatment

The Silver credit card is a mid-level product. Its interest rate is slightly lower than Preferred card, but it offers lower benefit levels. To create the Card_Silver treatment, duplicate the Card_PREFERRED Treatment, modify the attributes, and replace the eligibility rule set.

Duplicate the Card_PREFERRED Treatment

- 1 In the Treatments category view, select the check box for the **card_preferred** treatment, click **:**, and select **Duplicate**. The Duplicate Treatment window appears.
- 2 Enter **card_silver** for the treatment name.
- 3 Select the location where you want to save the treatment, and click **Duplicate**.

Modify the Treatment Attribute Values and Eligibility Rule Set

- 4 Open the **card_silver** treatment.
- 5 On the **Attributes** tab, modify the attributes to match the values shown in [Table 3.2](#). Click on an attribute name to edit the attribute's properties.

Table 3.2 Attributes to Define for the Silver Treatment

Name	Data Type	Value Type	Value
annual_fee	Decimal	Fixed	0
APR	Decimal	Fixed	16.5
card_type	Character	Fixed	silver
cashback_gas	Decimal	Fixed	2
cashback_stream	Decimal	Fixed	2
intro_bonus	Decimal	Fixed	0

SAS® Intelligent Decisioning - Build Decisions

< Treatments

* card_silver (1.0)

Attributes | Eligibility Rule Set | Properties | Versions

Add attribute ▾

☐	▼	Name	↑	Value	Data Type	Value Type	Description
☐		annual_fee		0	⊕ Decimal	Fixed	
☐		APR		16.5	⊕ Decimal	Fixed	
☐		card_type		silver	⚡ Character	Fixed	
☐		cashback_gas		2	⊕ Decimal	Fixed	
☐		cashback_stream		2	⊕ Decimal	Fixed	
☐		intro_bonus		0	⊕ Decimal	Fixed	
☐							
☐							

- 6 On the **Eligibility Rule Set** tab, click **Replace**.
- 7 In the Choose an Item window, select the **Eligibility_Silver** rule set, and click **OK**.
- 8 Click and **x** to save and close the treatment.

Create the Card_Gold Treatment

The Gold credit card is the premium product. Its interest rate is the lowest of the three cards, and it offers good benefits, but it comes with an annual fee. To create the Card_Gold treatment, duplicate the Card_Preferred Treatment, modify the attributes, and replace the eligibility rule set.

Duplicate the Card_Preferred Treatment

- 1 In the Treatments category view, select the check box for the **card_preferred** treatment, click , and select **Duplicate**. The Duplicate Treatment window appears.
- 2 Enter **card_gold** for the treatment name.
- 3 Select the location where you want to save the treatment, and click **Duplicate**.

Modify the Treatment Attribute Values and Eligibility Rule Set

- 4 Open the **card_gold** treatment.
- 5 On the **Attributes** tab, modify the attribute values to match the values shown in [Table 3.3 on page 42](#).

Table 3.3 Attributes to Define for the Gold Treatment

Name	Data Type	Value Type	Value
annual_fee	Decimal	Fixed	95
APR	Decimal	Fixed	14.5
card_type	Character	Fixed	gold
cashback_gas	Decimal	Fixed	3
cashback_stream	Decimal	Fixed	6
intro_bonus	Decimal	Fixed	250

SAS® Intelligent Decisioning - Build Decisions

< Treatments

Opened items (1)

* card_gold (1.0)

Attributes Eligibility Rule Set Properties Versions

Add attribute ▾

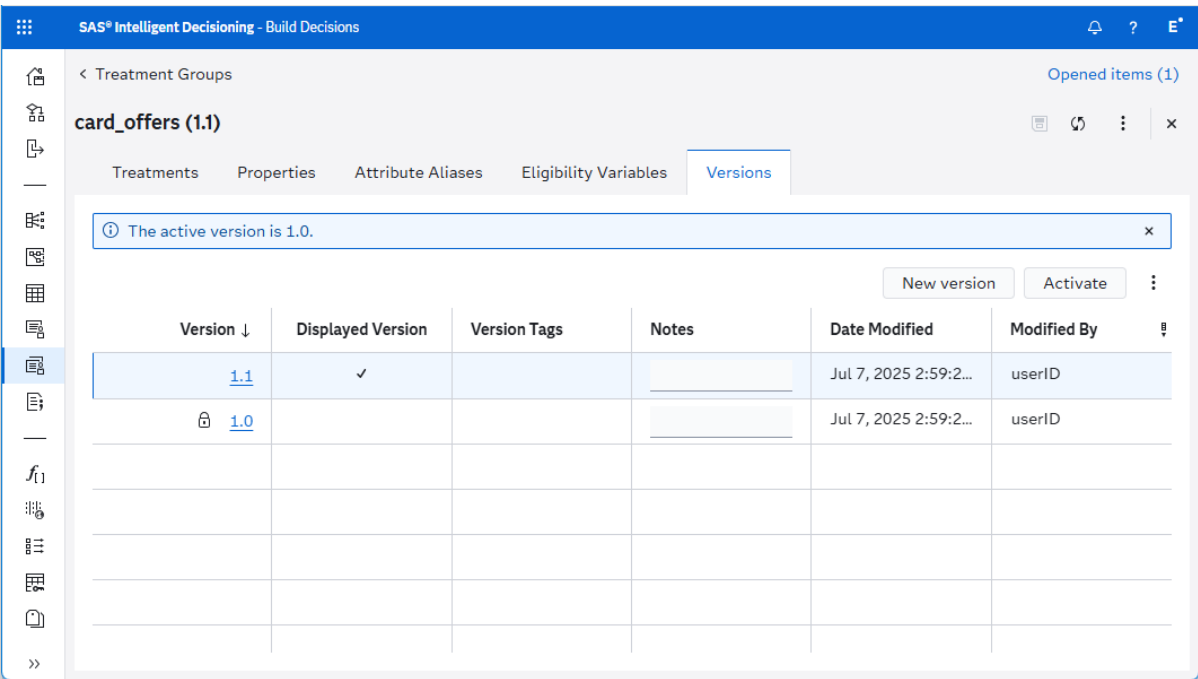
☐	▽	Name	↑	Value	Data Type	Value Type	Description
☐		annual_fee		95	⊕ Decimal	Fixed	
☐		APR		14.5	⊕ Decimal	Fixed	
☐		card_type		gold	⊕ Character	Fixed	
☐		cashback_gas		3	⊕ Decimal	Fixed	
☐		cashback_stream		6	⊕ Decimal	Fixed	
☐		intro_bonus		250	⊕ Decimal	Fixed	
☐							
☐							

- 6 On the **Eligibility Rule Set** tab, click **Replace**.
- 7 In the Choose an Item window, select the **Eligibility_Gold** rule set, and click **OK**.
- 8 Click  and **x** to save and close the treatment.

- 6 Click  to save the treatment group.

TIP It is a best practice to always click **Set attributes** and verify the settings of the dynamic attributes in a treatment group. For dynamic attributes within a treatment group, you can specify that a dynamic attribute's value is set by the decision at run time, or you can set a static value that is used only within that specific treatment group. In this tutorial, all of the attributes are fixed.

- 7 On the **Versions** tab, click **Activate** to activate version 1.0 of the treatment group. When you activate a treatment group, a public module is created for each treatment in the group and the treatment group is made available to be referenced by decisions. The application locks the treatment group before you activate it. SAS Intelligent Decisioning displays the message The active version is version 1.0. after the version has been activated.



SAS® Intelligent Decisioning - Build Decisions

< Treatment Groups

card_offers (1.1)

Opened items (1)

Treatments Properties Attribute Aliases Eligibility Variables Versions

① The active version is 1.0.

New version Activate

Version ↓	Displayed Version	Version Tags	Notes	Date Modified	Modified By
1.1	✓			Jul 7, 2025 2:59:2...	userID
 1.0				Jul 7, 2025 2:59:2...	userID

- 8 Click **x** to close the treatment group.

Create the Credit_Card_Offers Decision

At this point in the tutorial, you need to create the Credit_Card_Offers decision and add the Card_Offers treatment group to the decision. When you add the treatment group to the decision, SAS Intelligent Decisioning creates the output data grid variable that serves as an input variable for the Calc_Num_Offers rule set, the Calc_Credit_Limit model, and the Arbitrate_Offers rule set.

Create a New Decision

- 1 Click  to navigate to the Decisions category view.
- 2 Click **New decision**. The New Decision window appears.
- 3 Enter `credit_card_offers` as the decision name.

Note: A **Type** field appears in the New Decision window if custom types have been defined at your site. Do not select a **Type**. Leave this field blank.

This tutorial assumes that you are not editing the decision in a workflow. Do not select a workflow.

- 4 Click , and select the folder where you want to save the decision.
- 5 Click **Save**. SAS Intelligent Decisioning opens the decision and displays the **Decision Flow** tab. A Start node and an End node are automatically added to decision.

TIP The icons such as  and  at the left and right of the **Decision Flow** tab are toggles. Click an icon to open or close the corresponding pane.

TIP There are two views that you can use to edit decisions. On the **Decision Flow** tab, you can edit a decision by using a graphical editor. On the **Decision** tab, you can edit the decision by using a tabular view similar to the rule set editor. For more information, see [“The Decision Flow Tab versus the Decision Tab” in SAS Intelligent Decisioning: User's Guide](#).

This tutorial uses the graphical view on the **Decision Flow** tab.

Add Variables to the Decision

- 6 On the **Variables** tab, click the **Decision Variables** subtab.
- 7 Click **Add variable**, and select **Data table**. The Add Variables window appears.
- 8 Click  to open the Choose Data window

The list of data tables shown in this window depends on the list that you select in the **Show** field. The list of SAS Cloud Analytic Services (CAS) tables that are loaded into memory is displayed on the **Available** tab. If the HMEQ_ACCOUNTS table does not appear in any of the tabs in this window, import the data tables as described in [“Import the Data Tables” on page 3](#).

- 9 In the Choose Data window, select the HMEQ_ACCOUNTS table, and click **OK** to return to the Add Variables window.
- 10 Select the following variables in the **Available items** list:
 - ACCOUNT
 - ACCTSCORE

- BAD
- CLAGE
- DEBTINC
- DEROG

- 11 Click ➔ to move the selected variables to the **Selected items** list, and then click **Add**. SAS Intelligent Decisioning adds the variables to the decision as input-output variables.

Add the Card_Offers Treatment Group

- 12 On the **Decision Flow** tab, right-click on the Start node, and select **Add below** ➔ **Treatment group**. The Choose a Treatment Group window appears.
- 13 Select the **card_offers** treatment group, and click **OK**.

If you are using the default settings, and you have not already defined decision variables with the same name and data type as the object's input and output variables, SAS Intelligent Decisioning displays a red X ❌ on the object to indicate that decision variables need to be created.

IMPORTANT This tutorial assumes that you are using the default value for the **Create variables automatically in decisions** setting. By default, this setting is turned off, which means that you see a red X ❌ on the treatment group node when you add the treatment group to the decision.

The attributes in the treatment group are the treatment group's output variables. If an object defines an input or output variable, you must define a decision variable of the same type to which you can map the object's variables. If a decision does not already have a variable of the same name and data type as an object's variable, then SAS Intelligent Decisioning displays the red X. In these cases, you can use the **Add missing variables** option to add the missing decision variables. This tutorial includes steps for using this option. If you turn on the **Create variables automatically in decisions** setting, you do not see the red X, and you can skip these steps. For more information, see [“About Decision Variables and Mapping” in SAS Intelligent Decisioning: User's Guide](#).

When you add a treatment group to a decision, SAS Intelligent Decisioning defines an output variable of type data grid that contains a column for each attribute in the treatment group. The name of the data grid variable is *treatment-group-name_out*. In this case, the name is *card_offers_out*, and this variable provides input data for the rule sets and model that follow the treatment group in the decision.

For more information, see [“About Decision Variables and Mapping” in SAS Intelligent Decisioning: User's Guide](#).

- 14 Click ⋮ in the toolbar, and select **Add missing variables**.
- 15 In the Add Missing Variables window, select **card_offers_out**, and click **Add**. SAS Intelligent Decisioning adds the data grid output variable to the decision,

and maps the treatment group's output variables to the columns in the decision's data grid variable.

TIP When you run the decision, the data grid in the output table contains a row for each treatment for which the subject qualifies.

If a treatment group includes dynamic attributes, SAS Intelligent Decisioning defines an input decision variable for each dynamic attribute whose value is set by the decision. You can use the **Add missing variables** option to add these variables to the decision and map the treatment group's attributes to the decision variables.

For more information, see [“About Decision Variables and Mapping” in SAS Intelligent Decisioning: User's Guide](#).

- 16 Click  to save the decision.

Set the Subject ID and Subject Level

The subject ID and level are recorded in the subject contact record that is written to the subject contact database by the record contacts node that you add to the decision in [“Add a Record Contacts Node” on page 59](#). In this case, the ACCOUNT variable identifies the subject.

- 17 On the **Properties** tab for the decision, select **ACCOUNT** for subject ID, and select **Account** for the subject level.

TIP The selections that are available in the **Subject level** menu are specified in the Subject Level lookup table. [“Predefined Lookup Tables” in SAS Intelligent Decisioning: User's Guide](#)

- 18 Click  and  to save and close the decision.

Create the Calc_Num_Offers Rule Set

The Calc_Num_Offers rule set determines whether a subject qualified for any of the credit card offers. The card_offers_out data grid variable contains a row for each treatment for which the subject qualified. This rule set uses the DATAGRID_COUNT function to determine the number of rows in the card_offers_out data grid. If the data grid is empty, the subject did not qualify for any offers.

Create a New Rule Set

- 1 In the Rule Sets category view, click **New rule set**. The New Rule Set window appears.

- 2 Enter **calc_num_offers** for the rule set name, select **Assignment** for the rule set type.
- 3 Click  in the **Location** field, select the location where you want to save the rule set, and click **Save**. SAS Intelligent Decisioning opens the new rule set and displays the **Rule Set Variables** subtab of the **Variables** tab.

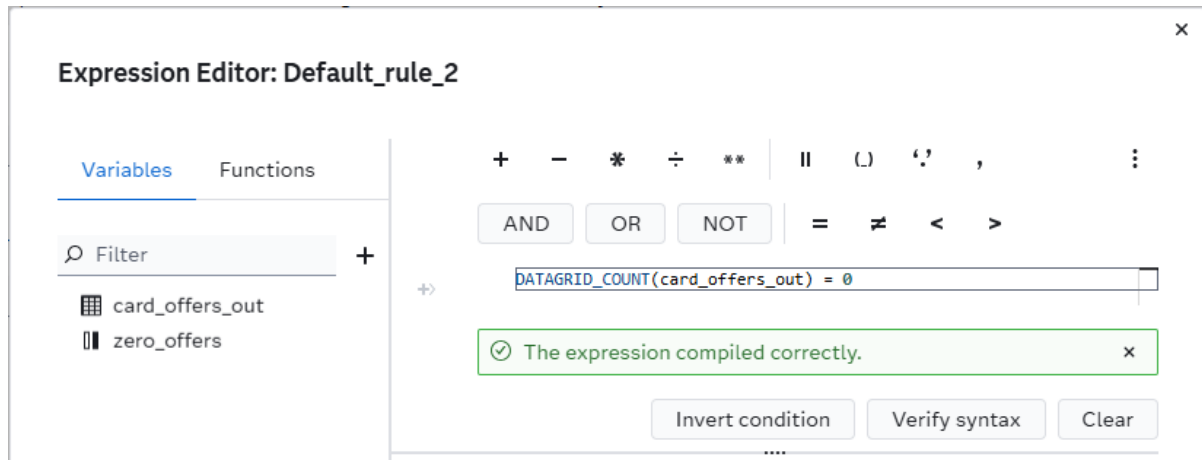
Add Variables to the Rule Set

- 4 On the **Rule Set Variables** subtab, click **Add variable**, and select **Decision**. The Add Variables window appears.
- 5 Click  to open the Choose an Item window.
- 6 In the Choose an Item window, select the **credit_card_offers** decision, and click **OK** to return to the Add Variables window.
- 7 In the **Available items** list, select the **card_offers_out** variable, click **➔**, and click **Add** to add the variable to the rule set.
- 8 On the **Variables** tab, select the **Input** check box, and clear the **Output** check box for the variable. The variable is an input-only variable for Calc_Num_Offers rule set.
- 9 Click **Add variable**, and select **Custom variable**. The Add Variables window appears.
- 10 Enter **zero_offers** for the variable name, select **Boolean** as the data type, and click **Add** to add the variable to the table of variables.
- 11 Clear the check box beside the **Input** table column. The **zero_offers** is an output-only variable.
- 12 Click **OK** to add the variable to the rule set and close the Add Variables window.
- 13 Click  to save the rule set.

Define the Business Rules

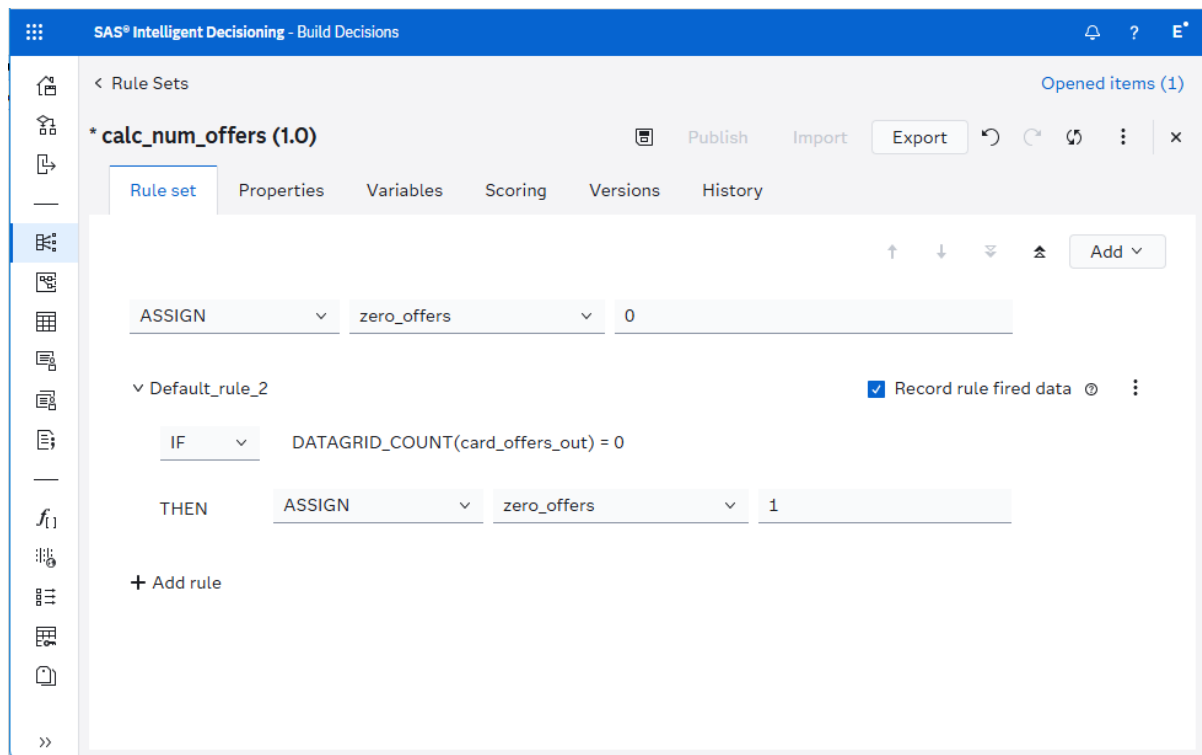
- 14 On the **Rule set** tab, click **Add other**, select **Assignment** for the rule type, and click **OK**.
- 15 In the variable field, select the **zero_offers** variable.
- 16 Enter 0 (to indicate False) in the assignment statement value field.
- 17 Click **Add** and select **Add rule**. SAS Intelligent Decisioning adds a new rule to the rule set.
- 18 In the IF condition for the new rule, click  to open the expression editor, and enter the following statement:

`DATAGRID_COUNT(card_offers_out)=0`
- 19 Click **Verify syntax** to validate the expression syntax.



20 Click **Save** to add it to the rule set.

21 In the THEN clause for the rule, select **ASSIGN** as the action, select **zero_offers** for the variable, and enter 1 (to indicate True) in the value field.



22 Click  and  to save and close the rule set.

Create the Arbitrate_Offers Rule Set

If a subject qualifies for more than one offer, you can use rule sets, models, and other methods to arbitrate the treatments. You might want to present all of the

treatments, in a specific order, or you might want to present only a subset of the treatments. In this tutorial, you use arbitration to select the treatment with the highest interest rate. For more information about arbitrating treatments, see [“Arbitrating Treatments” in SAS Intelligent Decisioning: User’s Guide](#).

Create a New Rule Set

- 1 In the Rule Sets category view, click **New rule set**. The New Rule Set window appears.
- 2 Enter **arbitrate_offers** for the rule set name, select **Assignment** for the rule set type.
- 3 Click  in the **Location** field, select the location where you want to save the rule set, and click **Save**. SAS Intelligent Decisioning opens the new rule set and displays the **Rule Set Variables** subtab of the **Variables** tab.

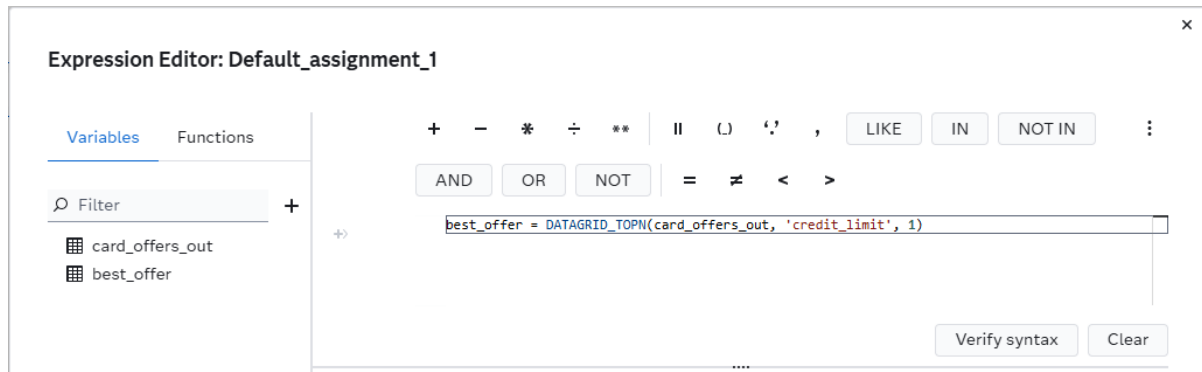
Add Variables to the Rule Set

- 4 On the **Rule Set Variables** subtab, click **Add variable**, and select **Decision**. The Add Variables window appears.
- 5 Click  to open the Choose an Item window.
- 6 In the Choose an Item window, select the **credit_card_offers** decision, and click **OK** to return to the Add Variables window.
- 7 In the **Available items** list, select the **card_offers_out** variable, click **➔**, and click **Add** to add the variable to the rule set.
- 8 On the **Variables** tab, select the **Input** check box, and clear the **Output** check box for the variable. The variable is an input variable for Arbitrate_Offers rule set.
- 9 Click **Add variable**, and select **Custom variable**. The Add Variables window appears.
- 10 Enter **best_offer** for the variable name, select **Data grid** as the data type, and click **Add** to add the variable to the table of variables.
- 11 Clear the check box beside the **Input** table column. The **best_offer** is an output-only variable.
- 12 Click **OK** to add the variable to the rule set and close the Add Variables window.
- 13 Click  to save the rule set.

Define the Arbitration Rule

- 14 On the **Rule set** tab, click **Add other**, select **Assignment** for the rule type, and click **OK**.
- 15 Click  to open the expression editor for the assignment statement, and enter the following statement:

```
best_offer = DATAGRID_TOPN(card_offers_out, 'credit_limit', 1)
```



- 16 Click **Verify syntax** to validate the expression, and click **Save** to add it to the rule set.
- 17 Click  and **x** to save and close the rule set.

Create and Activate the Zero_Offers Treatment Group

The Zero_Offers treatment group contains only one treatment, Zero_Offers_Msg. This treatment returns a message to the subject when the subject does not qualify for any of the credit card offers.

Create the Zero_Offers_Msg Treatment

- 1 Click  to navigate to the Treatments category view.
- 2 Click **New treatment**.
- 3 Enter **zero_offers_msg** for the treatment name, select the location where you want to save the treatment, and click **Save**. SAS Intelligent Decisioning opens the new treatment and displays the **Attributes** tab.
- 4 Click **Add attribute**, and select **Custom attribute**. The Add Attribute window appears.
- 5 Enter **message** for the attribute name, select **Character** for the data type, and select **Fixed** for the value type.
- 6 Enter the following message for the attribute value: **Thank you for your interest. An agent will contact you shortly.**
- 7 Click **Add** to add the attribute to the table, and click **OK** to add the attribute to the treatment.
- 8 Click  and **x** to save and close the treatment.

Create the Zero_Offers Treatment Group

- 9 Click  to navigate to the Treatment Groups category view.
- 10 Click **New treatment group**.
- 11 Enter **zero_offers** for the name, select the location where you want to save the treatment group, and click **Save**. SAS Intelligent Decisioning opens the new treatment group and displays the **Treatments** tab.

Add the Treatment to the Group and Activate the Group

- 12 Click **Add treatments**.
- 13 In the Add Treatments window, select the **zero_offers_msg** treatment, and click **OK**.
- 14 Click  to save the treatment group.
- 15 On the **Versions** tab, click **Activate** to activate version 1.0 of the treatment group. SAS Intelligent Decisioning displays the message `The active version is version 1.0.` after the version has been activated.
- 16 Click **x** to close the treatment group.

Complete the Credit_Card_Offers Decision

The Credit_Card_Offers decision combines the treatment groups, rule sets, and model that you have created in previous steps into a single decision. The decision determines the credit card offers for which a customer is eligible and records subject contact history information.

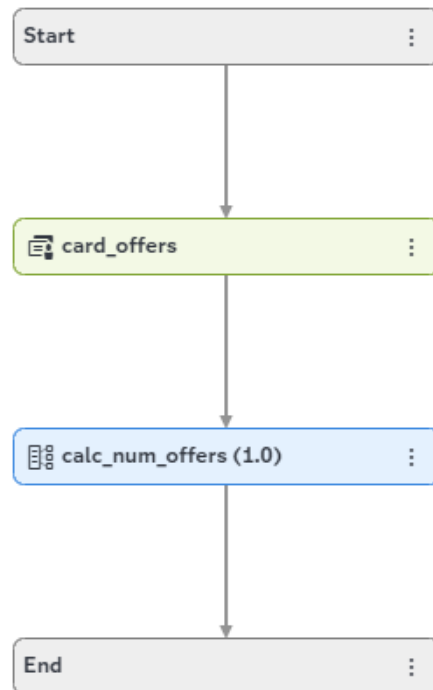
To complete the Credit_Card_Offers decision, you complete the following steps:

- 1 [Add the Calc_Num_Offers rule set.](#)
- 2 [Add a Yes/No branch.](#)
- 3 [Add the Zero_Offers treatment group to the Yes branch path.](#)
- 4 [Add a credit_limit column to the card_offers_out data grid.](#)
- 5 [Add the Calc_Credit_Limit model to the No path, and specify that this model scores the rows in the card_offers_out data grid.](#)
- 6 [Add the Arbitrate_Offers rule set to the No path.](#)
- 7 [Add a record contacts node to the No path.](#)

Add the Calc_Num_Offers Rule Set

- 1 Click  to navigate to the Decisions category view, and open the **credit_card_offers** decision.

- 2 Right click on the **card_offers** node, and select **Add** ⇒ **Rule set**. The Choose an Item window appears.
- 3 Select the **calc_num_offers** rule set, and click **OK**. If you are using the default settings, SAS Intelligent Decisioning displays the same red X ❌ on the rule set node as it did when [you added the card_offers treatment group](#).
- 4 Click  in the toolbar, and select **Add missing variables**. The Add Missing Variables window displays only one variable, zero_offers.
- 5 Select the **zero_offers** variable, and click **Add**. SAS Intelligent Decisioning defines a decision variable named zero_offers and automatically maps it to the rule set's variable.



Add a Yes/No Branch

A Yes/No branch expression is evaluated as a Boolean expression. In **Yes/No (variable)** branches, you can compare the value of a variable either to a literal value or to the value of another variable. The **Comparison mode** specifies which method to use. In this tutorial, we compare the value of the zero_offers variable to the literal value **true**.

- 6 Right click the Calc_Num_Offers rule set, and select **Add** ⇒ **Branch**. The New Branch window appears.
- 7 Enter `zero_offers = true` for the branch name, select **Yes/No (variable)** for the branch type, and click **OK**. The branch is added to the decision flow below the Calc_Num_Offers rule set.
- 8 If the **Properties** pane for the condition is not open, click .
- 9 In the **Properties** pane, select **zero_offers** for the variable, and enter **true** in the **Variable or value** field. Do not change the default operator (**=**) or comparison mode (**Value**).

Properties

Name:

zero_offers = true

Branch type:

Yes/No

Branch expression

Variable:

zero_offers

Operator:

=

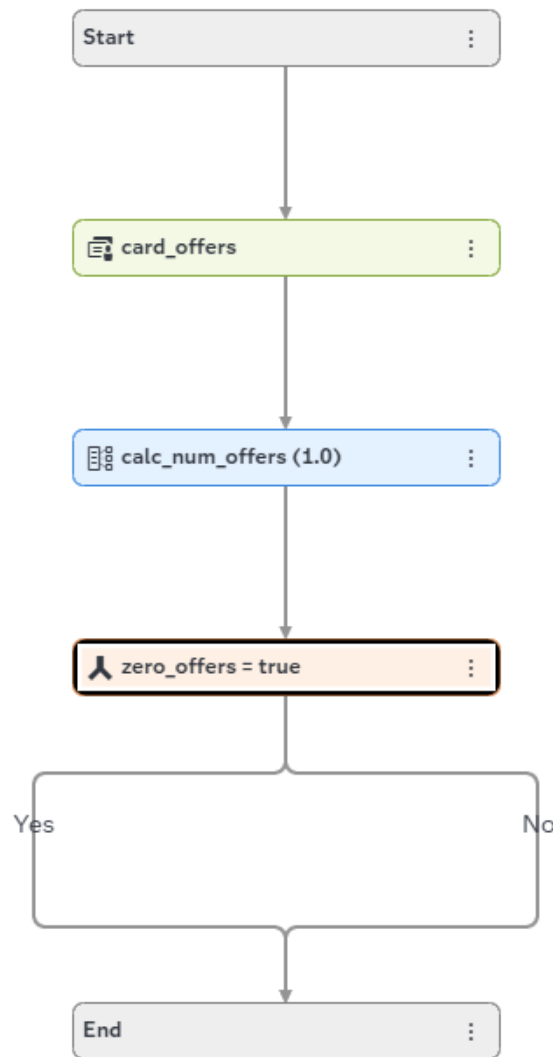
Comparison mode:

Value

Variable or value:

true

The decision diagram now appears as shown in the following figure.



Add the Zero_Offers Treatment Group

- 10 Right click the branch node, and select **Add to Yes path** ⇒ **Treatment group**.
- 11 In the Choose an Item window, navigate to the location where you saved the treatment groups, select the **zero_offers** treatment group, and click **OK**.
- 12 Click **:** in the toolbar, and select **Add missing variables**. The Add Missing Variables window displays the variable zero_offers_out. This variable is the output data grid variable for the zero_offers treatment group.
- 13 Select the **zero_offers_out** variable, and click **Add**. SAS Intelligent Decisioning defines a decision variable named zero_offers and automatically maps it to the rule set's variable.
- 14 Click **Save** to save the decision.

Add a Credit_Limit Column to the card_offers_out Data Grid

SAS Intelligent Decisioning created the card_offers_out data grid variable when you added the Card_Offers treatment group to the decision in [“Create the Credit_Card_Offers Decision” on page 44](#). This data grid contains a column for each attribute in the treatment group, including APR, annual_fee, card_type, and so on.

The Calc_Credit_Limit model that you add to the decision in “Add the Model and Score the Data Grid” on page 57 calculates a credit limit for the current subject. It assigns this value to a data grid column named `credit_limit`. Because the treatment group does not have an attribute named `credit_limit`, the output data grid does not contain a column by that name. You must edit the data grid variable and add an output column named `credit_limit`.

- 15 On the **Variables** tab, click the **card_offers_out** variable to edit it.
- 16 In the Edit Variable window, click  to open the Edit Columns window.
- 17 In the Edit Columns window, select **Add a new column**, enter `credit_limit` in the text box, select **Decimal** as the data type, and click **Add** to add the new variable to the table of columns.
- 18 Select the **Create Column** check box for the `credit_limit` column.

TIP When you add a new column in the Edit Columns window, the application defines the metadata for the column. If you are defining a new data grid variable or if the new column is not in your input data, select **Create Column**. If you select this check box, the code that is generated by the application calls the appropriate data grid function at run time to create the new column that you added to the metadata.

-

Add the Model and Score the Data Grid

“Add a Credit_Limit Column to the card_offers_out Data Grid” on page 55.

input variables. In this tutorial, you select the **Score rows in this data grid** option.

Decisioning: Using Data Grids and “Scoring Rows in a Data Grid” in *SAS Intelligent Decisioning: Using Data Grids*.

- 22 On the **Decision Flow** tab, right click the branch node, and select **Add to No path** ⇒ **Model**.
- 23 In the Choose an Item window, navigate to the repository where you saved the **calc_credit_limit** model, select the model, and click **OK**. The model defines two variables for which no decision variables have been defined: **card_type** and **credit_limit**.
- 24 Click  in the toolbar, and select **Add missing variables**.
- 25 Select the **Select all** check box at the top of the check box column, and click **Add**. SAS Intelligent Decisioning creates two new decision variables for the new model variables, and maps the model variables to the decision variables.
- 26 In the **Properties** pane for the model, select  to display the input variable mappings for the model.

Input Variables

☐ Score rows in this data grid ⓘ

Select a data grid variable ▼

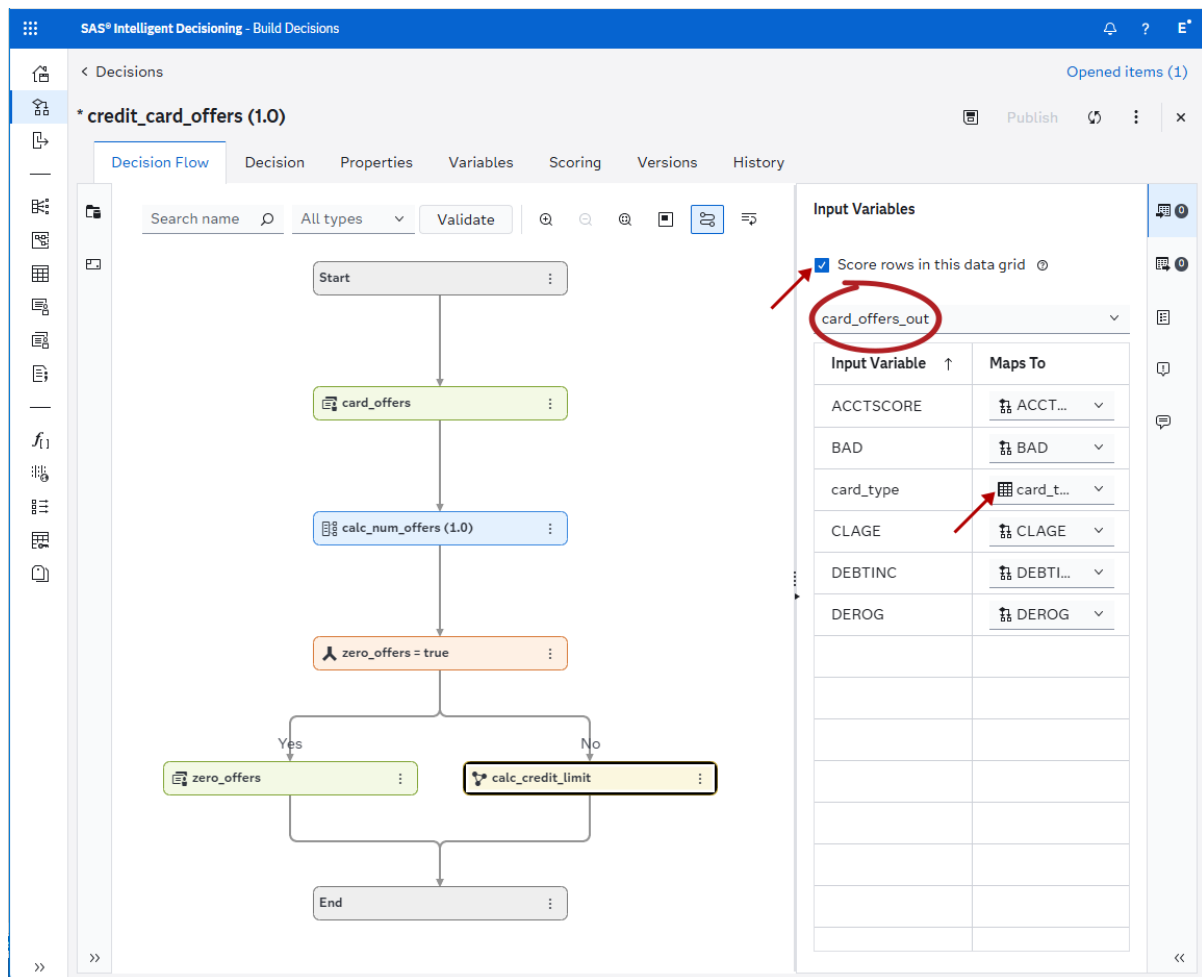
Input Variable ↑	Maps To
ACCTSCORE	 ACCTSCORE ▼
BAD	 BAD ▼
card_type	 card_type ▼
CLAGE	 CLAGE ▼
DEBTINC	 DEBTINC ▼
DEROG	 DEROG ▼

 0
 0




- 27 Check the **Score rows in this data grid** check box, and select the **card_offers_out** data grid. When you select this option, SAS Intelligent Decisioning maps the **card_type** input variable to the **card_type** column in the **card_offers_out** data grid. It also maps the **credit_limit** output variable to the **credit_limit** column in the **card_offers_out** data grid.

TIP In the variable mapping property panes, decision variables are identified with the icon , and data grid columns are identified with the icon .



Add the Arbitrate_Offers Rule Set

- 28 Right click the **calc_credit_limit** model, and select **Add ⇒ Rule set**.
- 29 In the Choose an Item window, navigate to the location where you saved the **arbitrate_offers** rule set, select the rule set, and click **OK**.
- 30 Click **⋮** in the toolbar, and select **Add missing variables**.
- 31 Select the **best_offer** variable, and click **Add**.

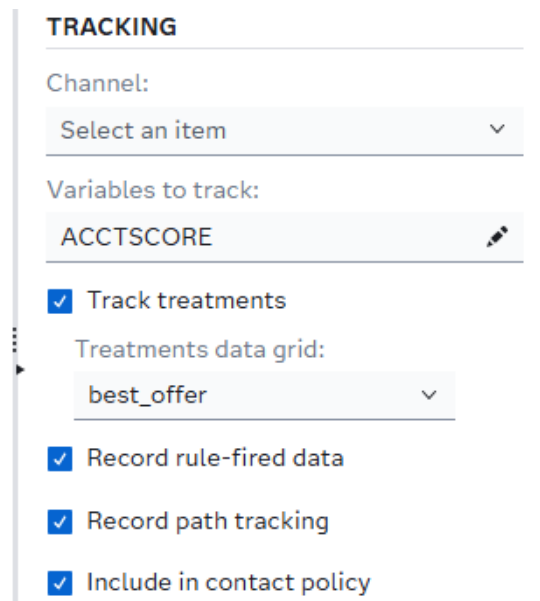
Add a Record Contacts Node

Record contacts nodes record information about a specific contact with a specific subject. This information includes the variables and treatment data grid that you specify in the record contacts node. In this example, the subject contact record contains the customer's account number and the data grid for the one treatment selected by the Arbitrate_Offers rule set.

When a decision is run in a real-time destination (SAS Micro Analytic Service destination), this node writes a record to the subject contact history. In all other destinations, this node creates an output variable that contains the information.

- 32 Right click the **arbitrate_offers** rule set, and select **Add ⇒ Record contacts**. SAS Intelligent Decisioning adds the node to the decision and opens the **Properties** pane. The node is named **Record_Contacts1**.

- 33 In the **Properties** pane, click  in the **Name** field.
- 34 In the Rename window, enter **Record_offers** for the node name, and click **Rename**.
- 35 Click  in the **Variables to track** field. The Select Variables to Track window appears.
- 36 Select the **ACCTSCORE** variable, click **➔**, and click **OK**.
- 37 Check the **Track treatments** check box.
- 38 In the **Treatment data grid** field, select the **best_offer** data grid to include this data grid in the subject contact record.



TRACKING

Channel:
Select an item

Variables to track:
ACCTSCORE

☒ Track treatments

Treatments data grid:
best_offer

☒ Record rule-fired data

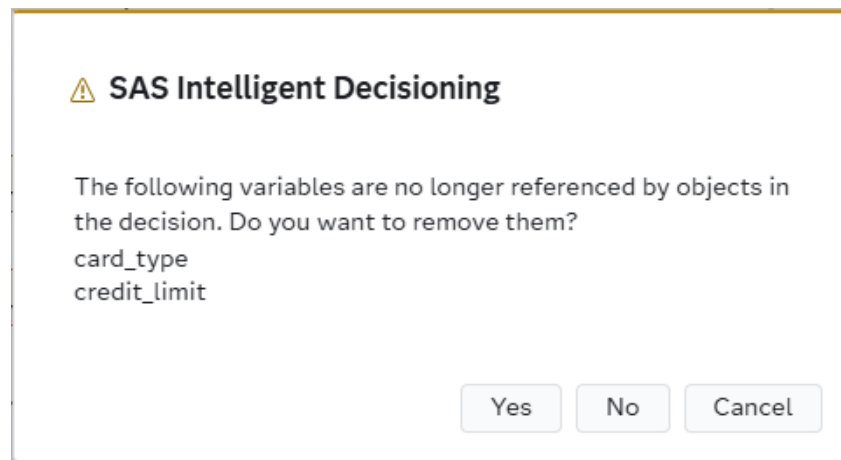
☒ Record path tracking

☒ Include in contact policy

- 39 Click  to save the decision. SAS Intelligent Decisioning asks you if you want to remove the card_type and credit_limit variables from the decision.

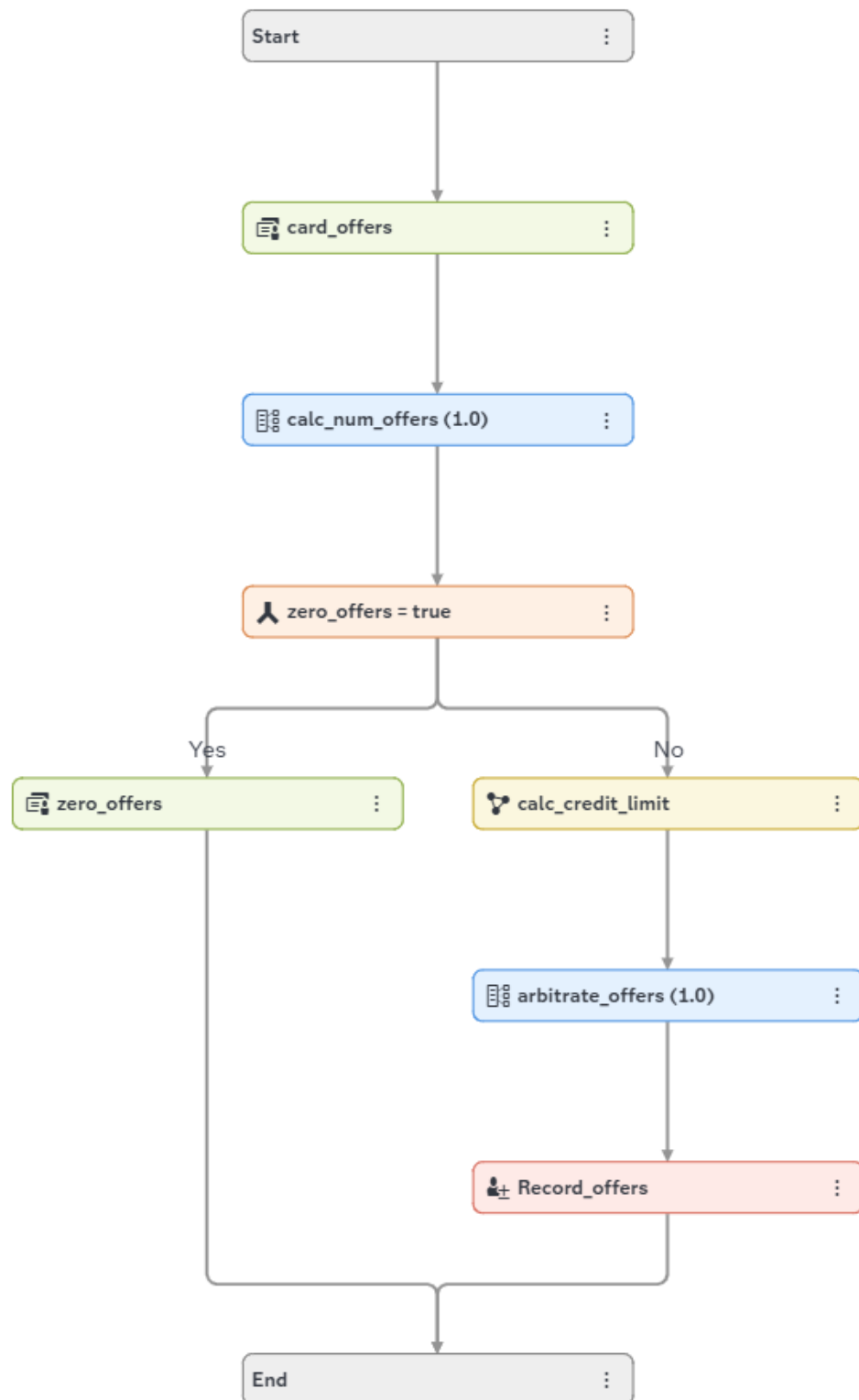
Note: If you have already deleted these variables, you will not see this message.

When you selected the **Score rows in this data grid** option in [Step 27 on page 58](#), SAS Intelligent Decisioning mapped the card_type and credit_limit model variables to columns in the card_offers_out data grid. As a result, the card_type and credit_limit decision variables that were created when you added the model to the decision are no longer needed.



40 Click **Yes** to remove the card_type and credit_limit decision variables.

The final decision diagram is shown in [Figure 3.2 on page 62](#)

Figure 3.2 Final Credit_Card_Offers Decision Diagram

Test the Credit_Card_Offers Decision

Testing a decision is optional, but it enables you to discover any problems with a decision before it is published and incorporated into a production system.

- 1 On the **Scoring** tab of the decision, click the **Tests** tab.
- 2 Click **New test**. The New Test window appears.
- 3 (Optional) Enter a name for the test if you do not want to use the default name.
- 4 If you do not want to use the location that is automatically selected, click  for the **Location** field, and select the location where you want to save the test. The test definition and the test results are saved to the same location.
- 5 Click  on the **Input table** field, select the **HMEQ_ACCOUNTS** table, and click **OK**. SAS Intelligent Decisioning automatically maps input variables in the decision to columns in the input table when the names and data types of the variables match those of the table columns. If any input variables cannot be mapped automatically, an error message is displayed, and you can map the variables manually. You can map variables and view variable mappings by clicking **Variables** in the New Test window.

IMPORTANT When the decision is published and run in a production environment, the decision expects the input data to contain variables that have the same name and data type as the decision's input variables. You cannot map variables to input data in a published decision.

- 6 Click **Run** to save and run the test. If the test runs successfully, SAS Intelligent Decisioning displays a green check mark  in the **Status** column.

Note: This test runs in a SAS Cloud Analytic Services (CAS) session. Later in this tutorial, you will test the decision in the publishing destination after it has been published by running a publishing validation test.

- 7 Click  in the **Results** column to view the results of the test. SAS Intelligent Decisioning opens the test results and displays the **Output** page.

The screenshot shows the SAS Intelligent Decisioning - Build Decisions interface. The main window displays the 'credit_card_offers_Test' results. On the left, a sidebar shows a tree view with 'Test Results' expanded, containing 'Output', 'Code', 'Log', 'Rule-Fired Analysis', and 'Decision Path Tracking'. The 'Output' tab is selected, showing an 'Output Table' with the following columns: 'Rules Fired Count', 'best_offer', 'card_offers_out', 'credit_limit', and 'rt_Record_offers'. The table contains several rows of data, with the first row showing a 'Rules Fired Count' of 0, an empty 'best_offer' column, a 'card_offers_out' data grid, a 'credit_limit' of 40000, and 'rt_Record_offers' information. Subsequent rows show 'Rules Fired Count' of 1, a populated 'best_offer' column, and empty 'card_offers_out' and 'rt_Record_offers' columns.

Rules Fired Count	best_offer	card_offers_out	credit_limit	rt_Record_offers
0			40000	
1				
0			15000	
0			15000	
1				
1				
1				
1				

View the Decision Test Results

The **Output** page displays the output table that was generated by the decision test. The output table includes a column for each of the following data grids:

best_offer

contains a record for the one treatment that was selected for the subject by the Arbitrate_Offers rule set. If a subject did not qualify for any credit card offers, the best_offer column is empty.

card_offers_out

contains a record for each treatment for which the subject qualifies. If the subject did not qualify for any offers, this column still contains a card_offers_out data grid, but this data grid is empty.

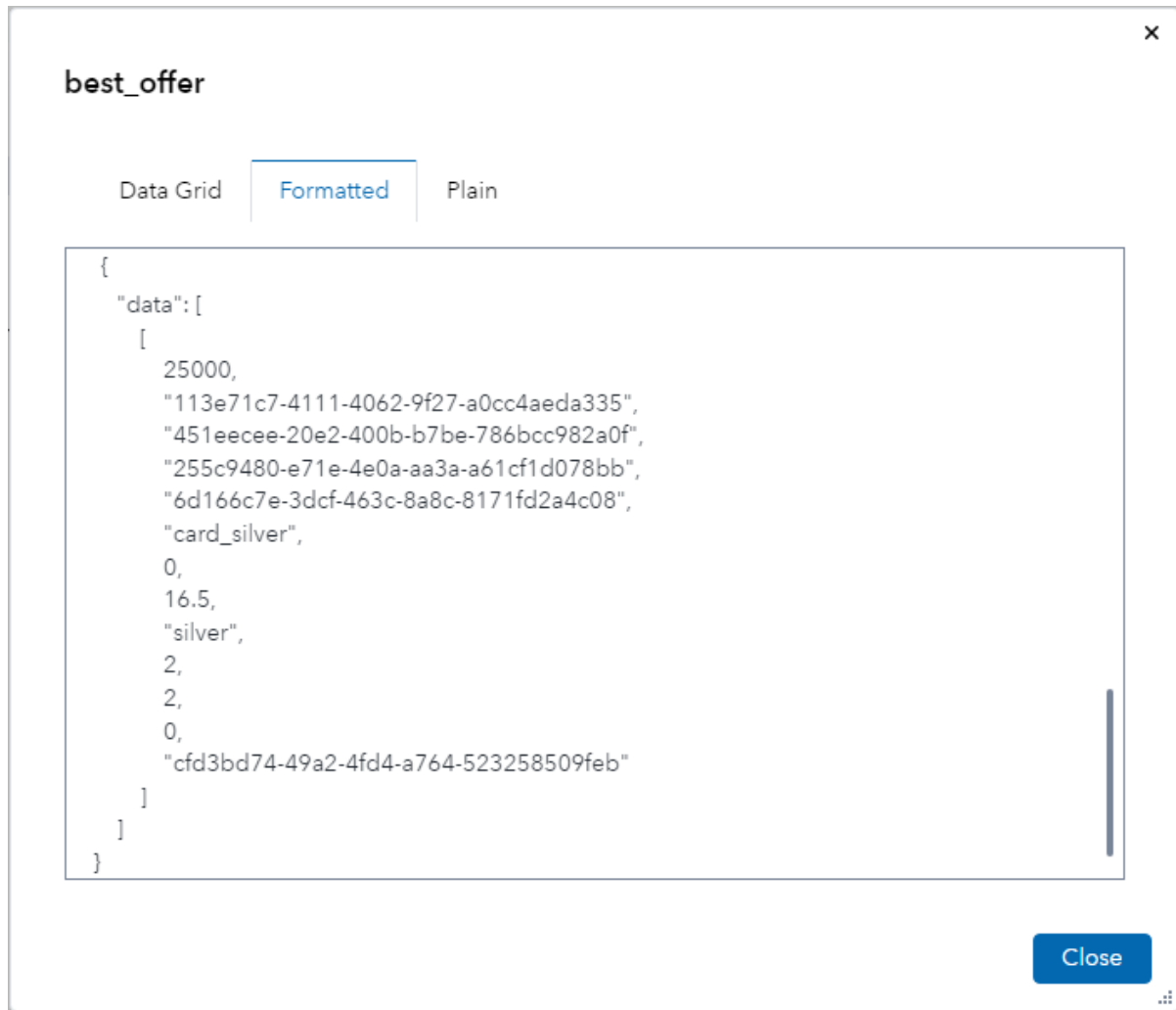
rt_Record_offers

contains the subject contact information that is generated by the record contacts node.

You can click on any value in these columns to view the results of the decision. For example:

- 1 Click on a data grid in the best_offer column.
- 2 In the best_offer window, click the **Formatted** tab, and scroll to the bottom of the window.

In the example shown in [Figure 3.3](#), the treatment that was returned by the decision as the best offer is the card_silver treatment, and the credit limit for the offer is 25000.

Figure 3.3 *Best_Offer Data Grid*

- 3 Click **Close** to close the best_offer window and return to the **Output** page.
- 4 Click on the card_offers_out data grid in the same row of the output table to display the list of all treatments for which the subject qualified. In this example, the subject qualified for both the Preferred and the Silver credit cards.

Figure 3.4 Card_Offers_Out Data Grid

card_offers_out

Data Grid Formatted Plain

TREATMENT_D...	TREATMENT_D...	TREATMENT_D...	TREATMENT_D...	TREATMENT_D. ¶
1c66e248-85ac...	c0cfc90d-fb0b-...	311f2727-b1ab...	d4eb0a9c-a4ce...	card_silver
1c66e248-85ac...	c0cfc90d-fb0b-...	f25ba6d4-b72b...	9ac40795-6e17...	card_preferred

Close

- 5 Click **Close** to close the card_offers_out window and return to the **Output** page.
- 6 Scroll to the right, and click on the data grid in the rt_Record_offers column to view the subject contact information. The subject contact information includes the subject ID, information about the ACCTSCORE variable, the treatment ID of the treatment specified in the best_offer data grid, and a response tracking code that you can use to update the subject contact information.

Figure 3.5 Subject Contact Information

rt_Record_offers

Formatted

Plain

```
[
  {
    "objectId": "f009517a-e6a4-4139-8db1-511712d4f6f9",
    "objectRevisionId": "2a013b0d-d3b2-4722-9dc8-18b664959038",
    "objectType": "decision",
    "objectUri": "/decisions/flows/f009517a-e6a4-4139-8db1-511712d4f6f9",
    "subjectId": "32056305-kwdo",
    "channel": "NONE",
    "excludeFromContactRule": false,
    "subjectLevel": "Account",
    "responseTrackingCode": "ee180f87-4b07-ff4b-bf09-6bff729e4cc9",
    "objectVariables": [
      {
        "name": "ACCTSCORE",
        "dataType": "decimal",
        "value": "0.796"
      }
    ]
  },
  {
    "pathTraversed": "/bdbd03fe-995b-4600-888b-39a934b56da5/bee6ce87-3e49-424c-9ed4-79c223a27b06/874023b5-7403-4770-a325-63b4e22ec36c/2da7832a-09c7-4b8a-bd75-8d0f0c25c0cb/906528ab-1f39-4397-b608-32da20665580/5791963d-9724-4114-a076-312c94e5789a",
    "ruleFired": "",
    "treatmentsForConsideration": [
      {
        "treatmentId": "d50cc4fd-cfb0-473a-b248-72f888af9ab0",
        "treatmentRevisionId": "42b28efc-a0c1-4f90-a35d-0be0b72235ae",
        "treatmentGroupId": "591024a8-0cfb-4f64-bdc3-a62e0497c41b",
        "treatmentGroupRevisionId": "893537b4-6a35-4c8d-9439-86c2f051e055",
        "objectNodeId": "bdbd03fe-995b-4600-888b-39a934b56da5"
      }
    ]
  }
]
```

Close

TIP In SAS Cloud Analytic Services (CAS), Teradata, and Apache Hadoop destinations, the record contacts node creates an output data grid variable that contains the subject contact information. Because decision tests run in the CAS destination, the subject contact information is written to a data grid variable in the output data set as shown in [Figure 3.5](#).

In real-time destinations (SAS Micro Analytic Service destinations), the record contacts node writes the subject contact information to the subject contact history database and returns the response tracking code to the calling application. You can use the response tracking code to retrieve or update the information in the subject contact history. For more information, see [“Update Subject Contact History” in SAS Intelligent Decisioning: Decision Management REST API Examples](#).