Oracle® Transaction Controls Governor
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Oracle Transaction Controls Governor User Guide

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Introduction

Oracle Transaction Controls Governor (TCG) enables users to define "models," each of which specifies circumstances under which individual transactions pose unacceptable risk to a company. It can apply models to transactions completed in Oracle E-Business Suite, and may be configured to work with other business-management applications as well.

TCG runs in a Governance, Risk and Compliance Controls (GRCC) platform. So does a second application, Application Access Controls Governor (AACG). The GRCC platform offers administrative and other functionality shared by AACG and TCG. Administrative features include tools to connect GRCC to Oracle and other business-management-application datasources (instances), and to refresh "snapshots" of data gathered from those applications; to create GRCC users and user roles; and to set GRCC parameters, connect with your email server (for the purpose of sending notifications to GRCC users), and integrate GRCC with other applications. Moreover, the GRCC platform can display information in any of eleven languages.

These shared administrative and language capabilities are documented in detail in a distinct *Governance, Risk and Compliance Controls User Guide* (and features specific to AACG are documented in a distinct *Application Access Controls Governor User Guide*). This *Transaction Controls Governor User Guide* focuses on the creation of TCG models, and the review of the risky transactions they identify.

Models

A model consists of one or more elements — "filter," "function," or "pattern" — each of which is a type of formula that specifies the risk posed by a transaction (or specifies an aspect of the risk, if a model contains more than one element). Each of these elements specifies a "business object" and an "attribute" of that object, which supply transaction data. Each object or attribute represents a component of what the user of a business-management application would see in his user interface:

- A business object corresponds to one or more database tables, but is given a business-language name that evokes the UI screen those tables support.

- An attribute corresponds to a database column in a business object's tables, but is given a business-language name that evokes the UI field that column supports.

There are two model types:

- A "Defined" model contains filters or functions. These formula types enable the user creating the model to define circumstances under which transactions are considered to pose a risk. A model can incorporate any number of filters or functions (and so any number of business objects and attributes from which they are derived).

  For example, a model may include two filters, both based on a Payables Standard Invoice business object. One filter would select transactions for which an Invoice Cancelled Date attribute is not blank. From the transactions captured by the first filter, the second would select those for which an Amount Paid attribute is not equal to zero. The model would therefore identify invoices on which payments had been made even though the invoices had been cancelled.

- A "Pattern" model contains a pattern — an Oracle-supplied statistical function uncovers outliers to a baseline value, as a way of discovering unknown risk. A model can include only one pattern (although that pattern can be combined with any number of filters or functions).

When evaluated, a model returns records of transactions that exceed the defined risk. TCG retains these records only until the model is run again, when it replaces the earlier results with a new set. The results of each model run may, however, be exported to a spreadsheet and saved there. Models may be created not only by users who intend to investigate suspect transactions, but also by users, such as auditors, who want to assess the risk inherent in a system at a given moment.

Starting Transaction Controls Governor

To start Transaction Controls Governor:

1. Open a web browser.

2. In the Address field, type the URL for your instance of Governance, Risk and Compliance Controls, and press the Enter key.

3. A Login dialog box appears. Type your user name and password in the appropriate fields. Optionally, select a language in which to work in the Language Preference list box, and click on the Login button.

   You can leave the Language Preference field blank. If so, GRCC selects (in order of preference) the language specified in your user profile, the language of your web browser, or US English.
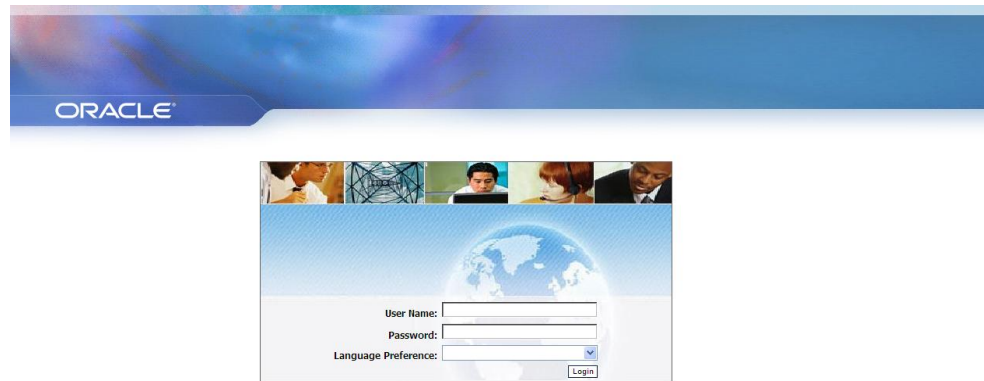
Using the Navigation Panel

The left column of the GRCC GUI is a Navigation panel. To its right, a larger frame initially displays a Home page, but then presents items you select in the Navigation panel. The illustration below shows the page in which users manage TCG models.

Of the top-level nodes in the Navigation panel, Transaction Governor presents links to features that are the focus of this *User Guide*. (See the *Application Access Controls Governor User Guide* for information on features available from the Access Governor and Report Center nodes, or the *Governance, Risk and Compliance Controls User Guide* for information on features available from the other nodes.)

The Transaction Governor node offers links to pages in which users can create models, or can manage the models they have already created. In each case, TCG displays only models created or imported by the user who is currently logged on. From either the creation or management page, the user can view results — either see records of risky transactions generated by the most recent run of each model, or generate a new set of results.

When you select a high-level link, it opens a list of subordinate links. Some of these display a box containing a symbol that toggles between a plus sign and a minus sign. These entries provide a path to lower-level entries, but do not themselves open pages in which you can work. Click on a plus sign to reveal lower-level entries; click on a minus sign to hide the lower-level entries from view. When you reach an entry with no plus or minus sign, click on the entry to open pages in the frame to the right.

To expand the Navigation panel, position the mouse cursor over its right border, hold down the left mouse button, and drag the border to the right. Having done so, you can drag the border to the left, causing the panel to contract up to its original size. To close the Navigation panel entirely (and so expand the frame in which you will be working), click on the button with the << symbol, located at the top right of the Navigation panel. The button then changes to display a >> symbol; click on it to reopen the Navigation panel.

Creating Views

In lists — such as the list of models you've created in the Manage Models page — you can limit the display of entries to those that satisfy filtering criteria, and you can sort the entries. You can also remove columns from display, or restore them; rearrange the order in which columns appear; and resize them. You can then save your selections as a "view," and then either select your view for display or cause it to be displayed by default.

Filtering Data

To filter the values displayed in a list:

1. In any combination of columns, enter (or select) values appropriate to the columns in the text boxes that appear directly above the column headings.

2. Click on the View button in the tool bar above the list. The list then contains only entries that match the values you've entered.

The percent sign (%) serves as a wild-card character. If it is placed after a string of text or numbers, the view returns all values that begin with the string. If it is placed before a string, the view returns all values that end with the string. If it is placed both before and after a string, the view returns all values in which the string appears at any position. If you omit the wild-card character, the view returns only a value that matches the string exactly.

Sorting Data

To set a sort order for items in a list, click in the heading for one of its columns. Entries in that column are then arranged in alphanumeric order (and entries in other columns are, of course, rearranged so that rows remain intact). Click in the column heading a second time to arrange entries in reverse alphanumeric order.

Removing and Restoring Columns

To remove columns from display, or to restore them:

1. Right click in the header row of the list from which you wish to remove columns, or to which you wish to restore them.

2. In some cases, a menu appears. If so, position the mouse cursor over its Columns option, and a list of available columns appears. In other cases, the parent menu does not appear, and the list of available columns opens directly.

3. To remove a column from view, click on its check box so that its check mark disappears. To restore a column to view, click on its check box so that its check mark reappears.

4. Left click anywhere outside of the menu and list of columns to close them.

Rearranging Columns

To rearrange the order in which columns appear:

1. Position the mouse cursor over a column you want to move, and hold down the left mouse button.

2. A "shadow" instance of the column heading appears. Continue to hold down the left mouse button, and drag that instance to the right or left.

3. Blue arrows appear — one above and one below the header row — to show where the column will be inserted. When they appear at the position you want, release the left mouse button.

Resizing Columns

To alter the width of columns in lists:

1. In the row that displays column titles, position the mouse cursor over the faint bar that separates one column from another.

2. The cursor changes to look like a pair of parallel vertical lines, each with an arrow extending horizontally from it. When that happens, hold down the left mouse button and drag the column border to the left or right.

Saving or Deleting a View

In the Manage Model page, you can save the views you create:

1. Define the view: In the My Models pane of the Manage Models page, set filtering criteria and sort order for data entries, and select, arrange, and resize columns as you wish.

2. Click on the Manage Saved Views button. A Manage Saved Views dialog opens.
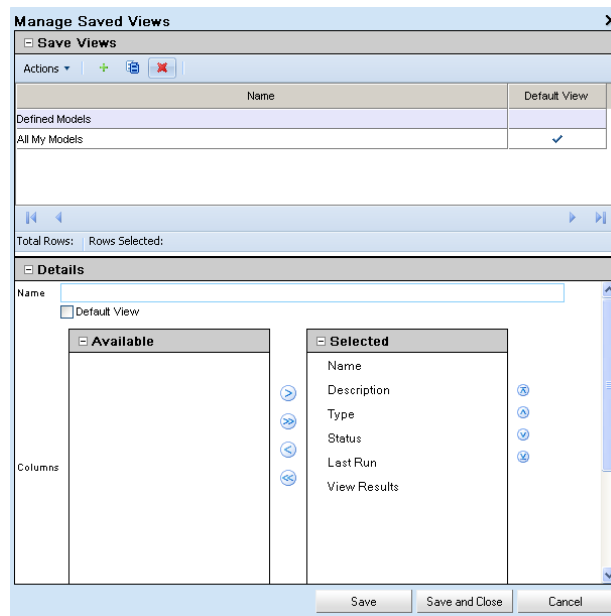
The upper pane — "Save Views" — lists views that have already been configured. The lower pane — "Details" — shows some of the selections you've already made for your view. For example, if you've excluded columns from the My Models pane, those columns appear in the Available box; those you have not excluded appear in the Selected box.

3. In the Details area, type a name for the view in the Name field.

4. If you want this view to appear each time you open the page in which you are working, select the Default View check box. There can be only one default view, so when you select this check box for a view, it overrides any prior selections involving other views.

5. Click on the Save button (or Save and Close button) to save the view. When you do, a row for the view appears in the Save Views list. In that list, the Default View column contains one check mark in the row for the one view selected as default; all other cells in the column are blank.

To delete a view, click on its row in the Save Views list, and then click on Actions > Delete, or on the red × button. The view disappears from the list. You can copy a view: select its row, and then click on Actions > Duplicate, or on the Duplicate button (which looks like one page overlapping another).

In the Create Model and Edit Model pages, you can use view functionality to filter the contents of a Library pane (from which you select business objects for use in models, or select models or templates to be used as a "starting point" for the creation of other models). However, the views you create there are temporary; they cannot be saved.

Displaying a View

To cause the My Models pane to display entries selected by a saved view:

1. Click on the downward-pointing triangle at the right of the View button.

2. A list of saved views appears. Click on the one you want to use.

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Managing Models

The Manage Model page provides information about Transaction Controls Governor models created or imported by the user who is currently logged on — you. To open the page, select Transaction Governor > Model Workbench > Manage Model in the Navigation panel.

Although the Manage Model page does not provide immediate access to models created by other users, you can share models — you can export your models so that other users can import them, or you can import models exported by others.

A "My Models" pane displays a list of existing models, together with summary information about them — for each model, its name and description, type and status, and the date when it was last evaluated. All these pieces of information are supplied by TCG, from information recorded when a model is created, edited, or run; you cannot update them directly.

The model type is either Defined or Pattern. A Defined model contains filters or functions, which enable the user to define the circumstances under which transactions are considered to pose a risk. A Pattern model incorporates a pattern — an object provided by Oracle and based on statistical functions that identify baselines and anomalies to those baselines. (A Pattern model may make use of filters or functions as well, but a Defined model may not contain a pattern.)

Model status indicates whether the model has been evaluated and has produced results — records of transactions captured by its filters. Values include Not Started, Started, Completed, and Canceled. In addition, an Error status links to the GRCC Jobs page, which can provide information about processing errors.

Synchronizing Data

Models evaluate transactions completed in business-management applications (datasources). For models to recognize changes made in their datasources, you must synchronize data — run a process that captures changes made since the last time a model was evaluated.

Each data synchronization job updates data used by all models created by all users.

To synchronize data:

1. Select (click on) the row for any model displayed in the My Models pane. (This is true even though synchronization is not model-specific.)

2. Select Actions > Synchronize.

3. A dialog box displays the status of the run — "Successful" if the process ran with no errors. To close the window, click on its OK button.

Viewing or Exporting Results

From the Manage Model page, you can either evaluate a model or view results from its most recent run. TCG displays these results in a pop-up window.

- For a defined model, the window displays a grid that devotes a row to each risky transaction. Each row includes values selected when the model was created or edited. The results grid contains an ID column that contains an identifying number assigned by TCG to each record (row).

- For a pattern model, the window displays a graph. The image represents a base-line identified by the pattern, and outliers to it. If multiple attributes are used by the pattern analysis, the results page generates multiple results tabs. Each opens an individual graph, with data related to the attribute on which the graph is based.
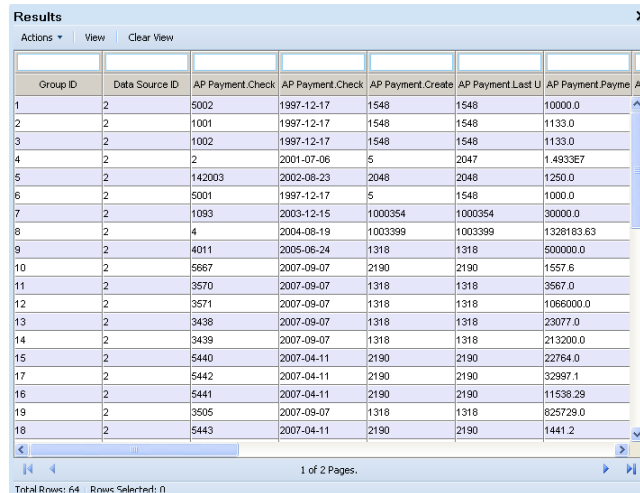
  If you hold the mouse cursor over a data point in the graph, the values that define that point are displayed. If you click on a data point, a grid appears below the graph, displaying a row for each outlier data point. Columns in the grid once again provide values selected when the model was created or edited

To open the results window, do either of the following:

- The My Models pane of the Manage Model page includes a column labeled "View Results." In it, the entry for each model either contains a prompt (which also reads "View Results") or is blank. If a prompt appears, double-click on it to open the window, which then displays results for the most recent model run. If a model's View Results cell is blank, the model has not been evaluated and there are no results to be displayed.

- In the My Models pane, click on the model whose results you want to view. Then, in the menu bar, select Actions > View Results. If the model has been evaluated previously, a dialog box prompts you to decide whether to overwrite existing results. Select Yes to generate and display a new set of model results; select No to display the existing results. If the model has not been evaluated previously, TCG runs it without further prompting, and displays the results.

The following is a sample Results window for a defined model:

You can export model results of a defined model to an Excel spreadsheet. To do so:

1. In the Results window, click on Actions > Export to Excel.

2. A pop-up window offers you options to open or save the export file. Typically, click on its Save button and, in a Save As dialog, use standard Windows techniques to navigate to a folder in which you want to save the file.

Creating, Editing, Duplicating, or Deleting Models

To create a model, click on Actions > Create New. Alternatively, click on the Create Model link in the GRCC Navigation panel. Either action opens a Create Model page, and detailed instructions on creating models are available in Chapter 3.

To edit a model, click in the My Models pane on the row for the model you want to edit. Then click on Actions > Edit. This opens an Edit Model page — it's identical to the Create Model page, except that it's populated by values for the model you want to edit. Detailed instructions on editing models are available Chapter 3.

Rather than create a model from scratch, you can copy an existing model, then modify the copy. To do so, select (click on) the model you want to copy. Then select Actions > Duplicate. A new row appears in the My Models pane; it's identical to the listing for the copied model except that the model name ends in a number in parentheses. (The value of the number depends on how often you copy the original.) Once the copy exists, you can select Actions > Edit to modify the model as you please.

To delete a model, click in the My Models pane on the row for the model you want to delete. Then click on Actions > Delete, and respond to a pop-up message that asks you to confirm the deletion.

Exporting Models or Templates

You can export models from a source instance to a file, either as models or as templates. A template is a broadly defined model that can serve as the basis for models you create. (Templates may also be provided, in import files, by Oracle.)

1. In the My Models pane, select models to export. To select one, click on it. To select a continuous set, click on the first, hold down the Shift key, and click on the last. To select a discontinuous set, hold the Ctrl key as you click on models.

2. Click on Actions > Export to export models as models. Click on Actions > Export as Template to export models as templates.

3. An Export Statistics pop-up window appears. Click on its Download button.

4. A pop-up window offers you options to open or save the export file. Typically, click on its Save button and, in a Save As dialog, use standard Windows techniques to navigate to a folder in which you want to save the file. The file is saved in .xml format; depending on your choice in step 2, its name begins with the word *Models* or *Templates*, followed by a number.

Importing Models or Templates

You can import models or templates from a source file to a destination instance. If you import models, they are available only to you. If you import templates, they are available to all users.

1. Click on Actions > Import to import models, or on Actions > Import as Template to import templates.

2. An Import File pop-up window opens. Click on its Browse button.

3. A Choose File dialog opens. In it, use standard Windows techniques to navigate to, and select, the file you want to import. If you chose the Import option in step 1, select an .xml file whose name begins with the word *Models*. If you chose the Import as Template option in step 1, select an .xml file whose name begins with the word *Templates*. The path and name of the file then populate the field next to the Browse button in the Import File window.

4. Click on the OK button in the Import File window.

5. A Select Items to Import window lists the models or templates contained in the import file. Select those you wish to import: To select one item, click on it. To select a continuous set, click on the first item, hold down the Shift key, and click on the last. To select a discontinuous set, hold down the Ctrl key as you click on items.

6. If you are importing models, click on the Next button. An Import Datasource Mapping window opens, displaying one row for each datasource specified in the models you've chosen to import. For each, in a Mapped Datasources list box, select a corresponding datasource in the environment into which you are importing the models. (The list box displays datasources configured in the GRCC Data Administration page.)

   If you are importing templates, the Next button does not appear and this step does not apply.

7. Click on the Import button. A pop-up message reports the number of models or templates imported and the status of the import operation. Click on its × button to close it.

8. Confirm the import: If you have imported models, they should be listed both in the My Models pane of the Manage Models page, and under the Models tab in the Library on the Create Models page. If you have imported templates, they should be listed under the Templates tab in the Library on the Create Models page.

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Creating and Editing Models

A Transaction Controls Governor model defines conditions under which transactions in a business-management application might involve error or fraud, or otherwise entail risk. When evaluated, the model returns records of transactions that violate those conditions.

A model is created, and may also be evaluated, in a Create Model page. To open it, select Transaction Governor > Model Workbench > Create Model in the Navigation panel. Or, in the Manage Model page, select Actions > Create New.

Once created, a model may be edited in an Edit Model page. It's identical to the Create Model page (and is used in the same way), except that it's populated with values configured for a model selected for editing. You would open the Edit Model page from the Manage Model page (see Chapter 2) — in the My Models pane, click on the model you want to edit, then select Actions > Edit.

To create a model:

- Name and describe it.

- Select business objects and datasources, which supply the transaction data the model will evaluate.

- Create one or more elements — filters, functions, or a pattern — that define what makes transactions risky.

- Select attributes for which the model, when it is evaluated, will return values for each risky transaction it finds.

- Save the model, and run it.

Naming the Model

Near the top right of the Create Model page, locate the Name field. Click in it, and type a name for your model. Then click in the Description field immediately below the Name field, and enter a brief explanation of the purpose for the model.

Alongside the Name field, a Datasource field displays the datasources (instances of business-management applications) that are subject to the model you create. Initially, the field displays a default datasource (which is specified in the Data Administration page). You can add datasources to the model, or delete datasources (including the default datasource), but you do so elsewhere (see "Selecting Datasources" on page 3-4). TCG updates the Datasource field, and you cannot do so directly.

Selecting Business Objects

A standard "business object" corresponds to one or more database tables (existing in one or more datasources) that hold information pertinent to transactions; the object is given a business-language name that evokes the UI screen its tables support. TCG is shipped with a selection of business objects; more may be developed over time, and can be uploaded via a Business Objects Administration page (available from the Administration node in the Navigation panel).

In addition, you can import any set of data as a "custom object" and use it as if it were a business object.

Adding Objects to Models

To add a standard business object or custom object to a model:

1. In a grid at the left of the Create Model page, select (click on) the Business Objects tab, and then on an object in the grid. (Although it's unlabeled, this grid is known as "the Library.")

More business objects may exist than can be displayed at once, so the Library is divided into pages. Click on the icon that looks like a right-pointing triangle to move forward one page, or the right-pointing triangle with a vertical bar to move to the last page. Click on the left-pointing triangle to move back one page, or the left-pointing triangle with a vertical bar to move to the first page.

2. Do either of the following:

- In the Library, click on the Add to Model button. The selected business object appears in the pane labeled "Model Objects."

- Use your mouse to drag the business object to the area labeled "Add Object Here" in the Model Objects pane.

Adding Custom Objects to the Library

Before you can use a custom object, you must import it. For this purpose, you can import only xml files, which must observe the following formatting conventions:

- The first row of the file must be column headers. Each header name serves as an attribute of the object. Each header entry must comprise a name and, in parentheses, a data type — for example NAME(String), IDNUMBER(Integer), or DATE(Date).

- The second row and beyond are considered its values.

- The file should contain only one sheet and cannot support multiple sheets.

- Before the xml file is uploaded, the following format-related conversions must be made in the datasource xls file:

  – Computed values should be converted to absolute values.

  – Any "total" amount rows not directly tied to specific data attributes should be removed.

  – Numeric formatting, such as $ signs, is not supported. The format should be changed to Number format.

  – Negative amounts should be formatted to use a negative sign, –, not open and close parentheses.

  – Date format is *mm/dd/yyyy*.

  – Excel 2003 and later are supported. (You can take an xls file as the datasource, properly format it to support upload to TCG, and perform a Save As operation to convert it to an xml file.)

If you choose to replace an existing custom object, the new file must use the exact format of the original. Columns (attributes) can neither be added nor deleted. Only additional rows of values can be added. Moreover, only the user who added the custom object has access to it.

To upload a custom object:

1. Click on the Custom Objects button in the Library. An Import File dialog opens.

2. Create a name for the object in the Name field. This is the object name the Library will display.

3. Click the Browse button. A Choose File dialog opens. In it, use standard Windows techniques to navigate to, and select, the file you want to import. The path and name of the file then populate the field next to the Browse button in the Import File window.

4. With the file selected, click on the OK button. The custom object is now available for use as if it were a standard business object.

Manipulating Objects in the Model Objects Pane

Within the Model Objects pane, each object appears as a window that lists the attributes belonging to the object. In this window, you can view, but not actually select, the attributes. You can, however, do the following:

- Remove a business object from the model: click on its × button.

- Move a business object to the left or right of other objects: Click on the downward-pointing, green triangle. Two options appear; click on either Move Left or Move Right.

- Create custom attributes:

  1. Click on the green + icon. A dialog box opens, labeled with the name of the business object.

  2. In an Attribute Name field, create a name for the new attribute.

  3. In a Base Attribute field, select one of the existing attributes.

  4. In a Modifier field, select a mathematical operator: + (addition), – (subtraction), * (multiplication), or / (division).

  5. In a Value field, enter a value that the Modifier will apply to the Base Attribute.

  6. Click on the OK button.

  Subsequently, you can use the custom attribute in filters. Custom attributes appear at the top of the list of attributes displayed by the business object, and each has an edit icon (which looks like a pencil). You can click on a custom attribute to open another dialog box in which you may either edit or delete the custom attribute.

Selecting Datasources

One datasource (instance of a business-management application) is designated as default in the Data Administration page. Each business object you add to a model is associated with that datasource — as the model is run, a filter, function, or pattern citing that object evaluates data from the default source. However, you can change, or add to, the default datasource selection:

1. When you add at least one business object to the Model Objects pane, a Manage Datasource button becomes active there. Click on it. A Manage Datasource window opens, displaying one row for each business object selected for the model.
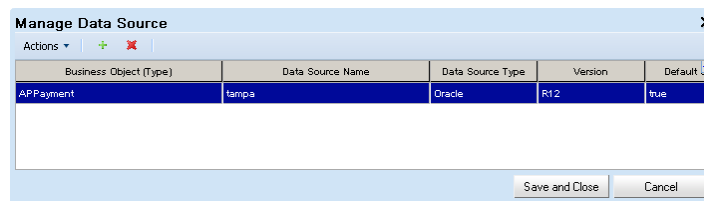
2. To add to the default datasource selection, create a new row: click on Actions > Create New, or on the green + sign. (You can have multiple rows for each business object.) To change an object's default selection, work in its existing row.

3. If you're adding a datasource, click in the Business Object field of a new row and select the Business Object for which you want to add a source. If you're modifying a default datasource, locate the row in which the Business Object field displays the name of the object whose source you want to change.

4. Click in the Datasource Name field, which lists datasources configured in the Data Administration page. Click on the datasource you want to associate with the business object. Other fields are populated automatically.

5. Click on the Save and Close button. If you've added datasources, their names appear in the Datasource field (alongside the Name field near the top right of the Create Model page.)

You can also delete datasources assigned to the model. To do so, open the Manage Datasources window and select (click on) the row for the datasource you want to delete. Click on Actions > Delete or on the red × icon, and then on the Save and Close button.

Creating Filters, Functions, and Patterns

Once business objects and datasources are selected, create one or more logical formulas that specify what makes a transaction risky (or, if a model contains more than one formula, specify aspects of the risk). There are three types:

- A filter, in its basic form, comprises an attribute, a condition, and (usually) a third term. The attribute corresponds to a database column that belongs to a business object selected for the filter; it's given a business-language name that evokes the UI field that the column supports. The condition is a mathematical or other operator. The terms combine to define risk — for example, purchase order amount (attribute) is greater than (condition) a threshold amount (third term).

  A filter may also arrange records of transactions into groups, based on commonality in the values of an attribute. It may, for example, find invoices with similar vendor names, to identify duplicate invoices in which the vendor's name is rendered slightly differently.

- A function, like a filter, creates a formula consisting of an attribute, condition, and (usually) third term. However, it also incorporates a function that operates on the attribute term, for example taking the average of values in the column. It also uses the grouping capability to establish sets of records on which the function operates. For example, a function might group records by supplier so that it can calculate an average purchase-order amount for each supplier.

- A Pattern filter employs a "pattern" — a statistical function, provided by Oracle, that identifies baselines and outliers to those baselines.

As you create model elements (filters, functions, or pattern), each appears as a dialog box in a Model Logic pane. To define the element, make selections in the fields displayed by its dialog box. As you add elements, you position each vertically or horizontally with respect to others; a vertical pairing depicts an AND relationship, and a horizontal pairing depicts an OR relationship. As you position elements, they are connected by arrows suggesting the order in which they will be processed.

To add the first element to a model, click on a button (or a corresponding option in the Actions menu) that selects the type you want — New Filter, New Function, or New Pattern.
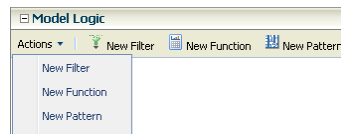
To add subsequent elements, click again on any of those buttons (or menu options). As you do, keep these concepts in mind:

- No matter whether you add a filter, function, or pattern, it appears by default immediately beneath the lowest object in your model hierarchy. If, for example, a model contains four vertical levels and you click on the New Filter button, a filter appears at the fifth vertical level.

- Once two or more elements exist in your model, you can select them: hold down the Ctrl key and click in the title bars of the elements you want to select. When you select an element, its entire dialog box turns blue. (Ordinarily, the perimeter is blue but the interior is white.) You can select one or multiple elements, but in the latter case, those you select must be adjacent to one another.

- Having selected elements, you can add a new element specifically in relation to those you've selected. If, for example, your model includes two filters in an AND relationship (stacked vertically), you select the higher one, and you click on the New Filter button, the new filter appears immediately beneath that higher one; the filter that had been second in the model hierarchy moves to the third level.

- You can drag and drop existing elements to new positions within the model.

  – To create an OR (horizontal) relationship, click on one element and drag it to the left edge of another.

  – To create or rearrange an AND (vertical) relationship, click on one element and drag it to the upper edge of another, to place it above. Or drag it to the lower edge of another, to place it below.

  – Alternatively, to move an element into an AND relationship with other elements, click on it and drag it to an arrowhead at any point in the model hierarchy.

Using these techniques, create structures as complex as you like. For example, an OR statement may contain any number of elements.

Or, an element may have an AND or OR relationship with blocks of other elements. For example, suppose filters One, Two, and Three are in an AND relationship — stacked vertically. You could drag Two to the left of Three, creating a horizontal pairing between them; One would remain centered above them. At this point, the model would return results if One returned results and then either of Two or Three returned results.
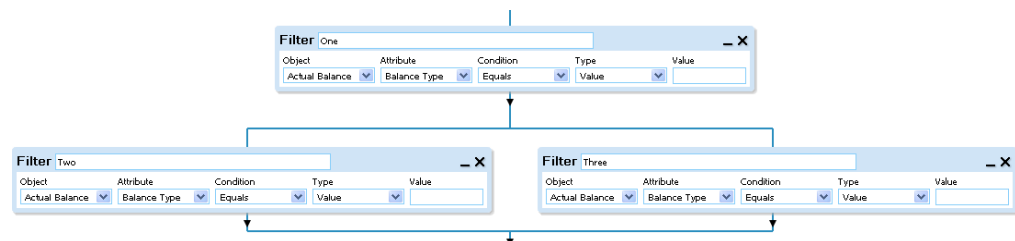
You could then drag One on top of Two, thus creating an AND relationship (vertical pairing) between the two of them, with Three in an OR (horizontal) relationship to both. At this point the model would return results either if One and Two returned results, or if Three returned results on its own.
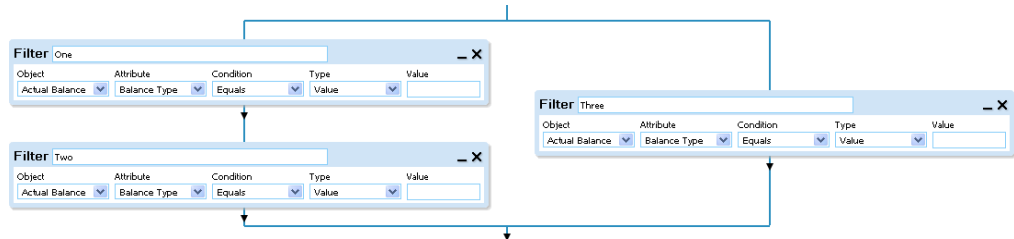
- You can incorporate elements into groups: select those you want to include and click on the Group Filters button (or on Actions > Group Filters). Once you have placed elements in a group, you cannot remove them.

- A model can contain only one pattern, so you can select the New Pattern button (or menu option) only once.

You may want to enlarge the Model Logic pane; objects that fill it can occupy considerable space. Click on its Expand button (which becomes active when you select a business object). This compresses other panes and enlarges the Model Logic pane to fill the space the others had occupied. The Expand button is then relabeled to read "Collapse" — click on it to compress the Model Logic pane and reopen the others. Or, reopen the other panes individually by clicking on their + or >> toggle switches.

Creating a Filter

To create a filter:

1. Click on the New Filter button, or on Actions > New Filter. A dialog box appears in the Model Logic pane.

2. In the header area of the dialog box, enter a name for the filter in the field next to the label *Filter*.

3. An Object field lists all of the business objects you've added to the model in the Model Objects pane. Select (click on) the one from which you want to select an attribute for use in this filter.

4. An Attribute field presents a list of attributes belonging to the object you selected in step 3. Select (click on) the one you want to use in this filter.

5. A Condition field presents a list of operators that may be applied to the attribute you selected, usually to force a comparison between each attribute value and a third (yet-to-be specified) term in the filter. Select one. Conditions include the following, although you will see only those appropriate for the attribute you've selected.

    - Mathematical operators: The filter returns results if the value of the attribute equals, does not equal, is less than, is less than or equal to, is greater than, or is greater than or equal to a specified value.

- Between: The filter returns results if the value of the attribute falls between two other specified values.

- Contains and Does not contain: The filter returns results if the value of the attribute is a text string that includes, or excludes, a specified text string.

- Is blank and Is not blank: The filter returns records for which the attribute column either contains no value, or contains any value.

- Is not related to: The filter returns records of items that should, but do not, have links to other items. For example, invoices should have references (links) to purchase orders, and a filter using this condition would return records of those that don't.

- Similar and Similar to: The filter collects records into groups when one or two specified attributes have values that are similar to one another. Similarity is measured in percentage; for example, two text strings would be considered 50 percent similar if half the characters in each were duplicate. The Similar condition checks for similarity in the values of the attribute you selected in step 4. The Similar to condition checks for similarity in that attribute and a second one; each of their values are compared not only with themselves, but also with the values of the other.

  The Similar and Similar to conditions activate a Matches Only check box. When it is selected (the default), each condition creates groups of records for which attribute values meet the specified similarity, but are nevertheless distinct from one another. When the Matches Only check box is cleared, each condition creates the same groups, but also creates groups of records with attribute values that are not distinct from one another or that are not similar (for example, groups for records with exactly matching attribute values, or one-member groups for records with attribute values that have no similar values).

6. Define the third term of the filter, the format of which varies according to the condition you selected.

   - If you selected any of the mathematical operators, select either "Value" or "Object" in the Type field. If you select "Value," a single Value field appears. In it, enter a value to be compared with attribute values. If you select "Object," new Object and Attribute fields appear. In them, select a business object and an attribute within it, whose values are compared with those of the attribute in the first term of this filter.

   - If you selected the Between condition, a Type field reads "Value," and two Value fields appear. In them, enter two values that set the range between which attribute values must fall for the filter to return results.

   - If you selected the Contains or Does not contain condition, a Type field reads "Value," and one Value field appears. In it, enter a text string that may appear at any position within a larger text string. For example, "customer_name Contains smi" would return records of customers named Smith, Smithers, Nesmith, Jasmine, and Ossmi.

   - If you selected the Is blank or Is not blank condition, there is no third term (because the first two terms are sufficient to define the filter).

- If you selected Is not related to, new Object and Attribute fields appear. Select an attribute (and its object) to which the filter's initial attribute should be related. For example, if the initial attribute is Invoice ID, this attribute might be Purchase Order ID, to return records of invoices without linked purchase orders.

- If you selected Similar, the filter will check for similarity in the values of the attribute you've already selected in step 4. If you selected Similar to, a pair of fields appear; in it, select an attribute (and its object) whose values will also be checked for similarity. In a Percent Similar field, enter a number from 1 to 100 that defines the precision with which attribute values must match. Select or clear the Matches Only check box to cause the filter to form groups only of records with attribute values that meet the specified similarity, or groups that exclude no records.

Creating a Function

A function applies a mathematical calculation to groups of attribute values, then determines whether each calculated value poses a risk. For example, it may calculate the average beginning balance credit for bank accounts, and then find average credit values that are less than a threshold amount. To do so, it must establish groups of records to which it applies the mathematical calculation. In the example, it must group records by bank account, so that it can take the take the average beginning balance credit for each account.

The function can perform this grouping on its own, in which case groups contain records for which the values of an attribute exactly match. In the example, it might group records by Bank Account ID. Or, the function can be used in conjunction with a filter that uses the Similar or Similar to condition to create groups of records. In the example, the filter might create sets of records for which an Account Name attribute contains values that are 95 percent similar.

If you intend to use such a filter to group records, create it first. Then create the function, placing it in an AND relationship with (below) the filter.

To create a function:

1. Click on the New Function button, or on Actions > New Function. A dialog box appears in the Model Logic pane.

2. In the header area of the dialog box, enter a name for the function in the field next to the label *Function*.

3. In a line labeled *Filter*, Use Object and Attribute fields to gather records into groups:

- If the function is to perform the grouping on its own, select a business object in the Object field and one of its attributes in the Attribute field. The function will then create groups of records in which values for that attribute

exactly match. (In the example above, the business object would be Bank Account and the attribute would be Bank Account ID.)

- If you have created a filter to perform the grouping, make a selection only in the Object field (the Attribute field is disabled). The appropriate selection is the value *Similar:* followed by the name of the business object specified in a Similar filter, or the two business objects specified in a Similar to filter. (In the example above, the filter would use the Account Name attribute of the Bank Account object, so the appropriate selection would be Similar: BankAccount.)

4. In a line labeled *When*, use a Function field to select the mathematical calculation that is to be performed on grouped attribute values. These functions include the following:

- Average: Calculates the average of the attribute values.

- Count: Determines how many attribute values exist.

- Sum: Adds the attribute values together.

5. Next to the Function field, use Object and Attribute fields to select the attribute (and the object to which it belongs) upon which the function will perform calculations. (The Attribute field displays only attributes appropriate for the function you selected in step 4.) In the example, this would be the Beginning Balance Credit attribute of the Bank Account object.

6. In the remaining fields of the When line, complete the logical formula that defines what makes a transaction risky. (It might be, for example, that average Beginning Balance Credit is less than a threshold amount.) To do so, specify a condition and (if needed) a third term, as described in steps 5 and 6 of "Creating a Filter," beginning on page 3-7.

Creating a Pattern

You can add one pattern to a given model (and the addition of that pattern classifies the model as the Pattern type, regardless of what other filters or functions it contains). There are initially two pattern types (although Oracle continues to develop patterns and make them available independently of GRCC releases). Each pattern calculates a baseline value and identifies transactions that vary excessively from the baseline; each takes parameters, which enable you to define the variance that is considered excessive.

- Benford: Monitors variations from lists of numbers from many sources of data, where the leading digit is distributed in a specific, nonuniform way. Its parameters include the percentage above and below the baseline at which outliers are specified.

- Mean: Calculates a mean for a set of attribute values, and identifies individual values that are too far above or below the mean. Parameters include the amounts above and below the mean at which outliers are identified.

To create a pattern filter:

1. In the Model Logic pane, click on Actions > New Pattern, or on the New Pattern button. A dialog box appears, as shown at the top of the next page.

Note, however, that you must first have selected at least one business object for the model with at least one attribute that provides data upon which patterns can operate (in the case of Benford and Mean patterns, numeric values). Otherwise, an error message informs you that no patterns are associated with the selected business objects.

2. In the header area of the dialog box, enter a name for the pattern in the field next to the label *Pattern*.

3. In the Pattern list box, select the pattern you want to use. (If you have not selected a business object appropriate for your patterns, however, this list box is empty.)

4. Click on the green + icon; a row appears beneath the Object and Attribute headings. In the Object field of this row, select a business object; in the Attribute field, select an attribute belonging to the object. These fields display only objects and attributes upon which your patterns can operate. You may create additional rows to select additional attributes for the pattern to evaluate. You may also select a row and click on the red × icon to delete the row.

5. Under the headings Parameter, Value, and Unit, one row appears for each parameter appropriate for the pattern you've selected. For each parameter row, enter a value in the Value field and select a unit of measurement to apply to that value — for example, 20 percent.

Defining Model Results

Once the model is developed, select attributes for which the model, when it is run, will return values for each risky transaction it finds.

Be careful to choose attributes that reflect the level of detail you want to see in your results. A model might identify many records that exceed the risk it specifies, but if you define results so broadly that there would be no way to distinguish these records, the results window will present only one record and eliminate the apparent duplicates. Suppose, for example, a model searches for purchase-order amounts above a threshold value, and you choose both supplier and purchase-order amount as your results attributes. For each supplier in violation of the model, you may see multiple records — one for every PO amount above the threshold value. If, however, you choose only supplier as a results attribute, you would see only one record for each supplier in violation of the model.

To define results:

1. Scroll down to the Result Display pane in the Create Model page. (Or, collapse other panes by clicking on their ± toggle icons.)

2. An Available box lists business objects included in the model. For each, click on the ± toggle to reveal a list of the attributes that belong to the business object.

3. Select an attribute for which you want to see results (click on it), then click on the > button. The attribute moves to a Selected box. Repeat this process for all other attributes for which you want to see results. Alternatively, click on the >> button to move all attributes to the Selected box.

   If you reconsider your choices, select attributes individually in the Selected box and click on the < button to return them to the Available box. Or, click on the << button to return all attributes to the Available box.

4. Select the Include for Data Analytics check box if you want to make model results available to Governance, Risk and Compliance Intelligence (GRCI), another Oracle product. If not, clear the check box.

   The data provided to GRCI includes model name, model description, datasource name and description, last model run, model run by, and the first fifteen columns (attributes) of data selected as model results. If you select this option, therefore, ensure that the data you want to provide to GRCI is included in the first fifteen attributes you select as model results.

   For this option to be used, a "data analytics" schema must exist, and values for it must be entered on the Analytics Integration tab of the GRCC Application Configuration page. (See the *Governance, Risk and Compliance Controls User Guide*.)

Saving the Model and Viewing or Exporting Results

To save the model, click on the Save button or the Save and Close button. Both buttons are located near the upper right corner of the Create Model (or Edit Model) page. The Save option saves the model, but leaves its values on display for potential further editing, or for the generation of results. The Save and Close option saves the model but empties the Create Model page so that it is ready for the creation of a new model. Alternatively, you can click the Cancel button and respond to a confirmation prompt to restore the blank Create Model page without saving the model.

When the model has been saved, you can view results. If you intend to view model results from the Create Model (or Edit Model) page, you should have selected the Save (rather than Save and Close) option. (If you've closed the model, you can view its results from the Manage Model page; see page 2-2.)

- If you've created a Defined model, a Results pop-up window displays a grid with a row for each transaction the model identifies as risky. Columns in the grid provide values for the results attributes you've selected. The results grid contains an ID column which contains an identifying number assigned by TCG to each record (row).

- If you've created a pattern model, results are displayed graphically. The image represents a baseline identified by the pattern, and outliers to it. If multiple attri-

butes are used by the pattern analysis, the results page generates multiple results tabs. Each opens an individual graph, with data related to the attribute on which the graph is based.

If you hold the mouse cursor over a data point in the graph, a box displays the values that define that point. If you click on a data point, a grid appears below the graph, displaying a row for each outlier data point. Columns in the grid once again provide values for the results attributes you've selected.

To open the Results window, click on either of two View Results buttons, located in the title bars of the Model Logic and Result Display panes.

- If the model has not been evaluated previously, a dialog box prompts you to choose between Run and Run in Background options. If you select run, the Create Model (or Edit Model) page remains open, and displays run status at the foot of the page. If you select Run in Background, the model runs, but you return to the Manage Model page, where you may work with another model or navigate to another GRCC page and work there. (A Cancel option also exists; it stops the run and keeps you at the Create or Edit Model page.)

- If the model has been evaluated previously, a dialog box prompts you to decide whether to overwrite existing results. Select No to display the existing results. Select Yes to generate and display a new set of results. In this case, the dialog box prompting you to run the model directly or in the background appears; make a selection there. When you generate a new run, the earlier set of results is lost.

You can export results of a defined model to an Excel spreadsheet. To do so:

1. In the results window, click on Actions > Export to Excel.

2. A pop-up window offers you options to open or save the export file. Typically, click on its Save button and, in a Save As dialog, use standard Windows techniques to navigate to a folder in which you want to save the file.

Using a Model or Template to Create a New Model

Rather than create a model from scratch, you may use an existing model or a template as a starting point, editing it to create a new model. (A template is a "starter" model created by Oracle and uploaded to TCG through the import feature of the Manage Model page. Although a model is available only to the user who has created or imported it, a template is available to all TCG users.)

1. In the Library pane at the left of the Create Model (or Edit Model) page, click on the Models tab or the Templates tab, depending on the type of object you want to use in creating a new model.

2. The Library displays instances of the object you've selected. (As you create or import models, they populate a grid available in the Models tab. The Templates grid is populated when you import templates.) Click on the model or template you want to use.

3. Click on the Open button. The model or template values populate the Name, Model Objects, Model Logic, and Result Display panes. Using procedures described above, rename the model, and then edit, add to, or delete from the source model or template values. Save the new model.