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Interaction Process Automation Designer

Printed Help

Abstract

This document contains the application help for Interaction Process Automation Designer.

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Working with Processes

Before you create a process in IPA Designer, you should have a process map and requirements documentation formulated by subject matter experts from both the business and IT areas. This is something you do completely outside of IPA Designer:

- Create an "as is" process map of the manual process you want to automate.
- Identify potential problem points (bottlenecks, hand-offs, information "black holes," redundancies, etc.) that could halt or slow a process. Then build in redundant paths through those points.
- Create a "to be" process map of the automated version of the process.

Process automation is a business topic with many practical resources available for reference and consultation. Process design is both a collaborative and exploratory endeavor. Large deployments and cross-functional applications can benefit from broad input and participation during the research, discovery, and design phases. IPA eases the implementation of conceptual process models with a full suite of tools and a leading integrated communications platform.

Related topics:

[Naming Rules](#)

[Security Specifications](#)

[High-level Steps for Creating and Publishing Processes](#)

[Creating a Process](#)

[Overview of Dynamic Details](#)

[Adding Dynamic Details to a Process](#)

[Deleting a Process](#)

[Removing a Process from Your Workspace](#)

[Adding a Previously-Created Process to Your Workspace](#)

[Checking In a Process](#)

[Checking Out a Process](#)

[Testing a Process](#)

[Publishing a Process](#)

[Importing a Process](#)

[Exporting a Process](#)

Naming Rules

When you create processes, variables, and other process elements, you should follow IPA Designer's naming rules. If you use names that violate the rules, your processes might not work correctly.

The name of a process or process element should:

- Consist only of letters, digits (0 to 9), and underscores (_).
- Begin with an uppercase letter.
- Use "camel case" or underscores for names that contain multiple words. For example, if a variable contains a person's first name, you might call it *FirstName* or *First_Name*.

Examples of legal names are:

FirstName

First_Name

FIRST_NAME

NAME

CustomerIntakeForm

Run_Credit_Check

Examples of illegal names are:

987Run_credit_check

_FirstName

Last.Name

Note: The above rules work for *all* identifiers in IPA Designer. However, spaces are allowed in the names of processes, states, tasks, work items, and pages. They are not allowed in variable names.

Security Specifications

When you add a variable to a process, task, or state, the **Add Variable** dialog box includes a drop-down list that lets you select a security specification. The security specification controls which users can see the variable and its value. For example, you might not want everyone to see a variable that holds credit card numbers. You can give the variable a security specification that allows only authorized people to see it.

You do not create security specifications in IPA Designer. Your system administrator should create them in Interaction Administrator's Interaction Process Automation | Security Specifications container. The specific names of security specifications can be anything that your system administrator chooses. For more information, see the "Security Specifications" help topic in Interaction Administrator.

If you do not assign a security specification to a process element, then it is *public*: all users will be able to see it in forms and in the Interaction Process Automation Monitor.

WARNING: If you use a variable in an e-mail message (such as by using the [Send E-Mail](#) action), IPA does not apply the variable's security specification to the message content, *including* to the variable. Any recipient of the message will be able to view the variable's value, whether or not that recipient has the appropriate security permissions.


High-level Steps for Creating and Publishing Processes

To create and publish a process in IPA Designer:

- [Create and name the process.](#)
- [Create process variables to hold process data.](#)
- [Create work items \(forms\) to collect values for the variables.](#)
- [Create tasks to use the work items.](#)
- [Create states to group the tasks.](#)
- [Test the process.](#)
- [Publish the process.](#)

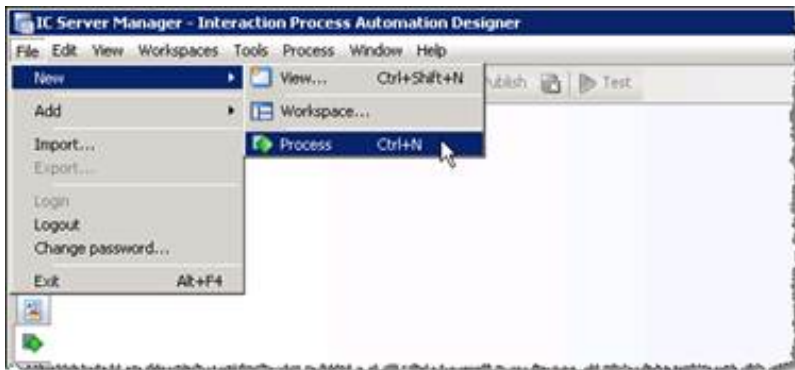
Creating a Process

To create a process in IPA Designer:

1. In the IC Server Manager, click the IPA Designer  tab.

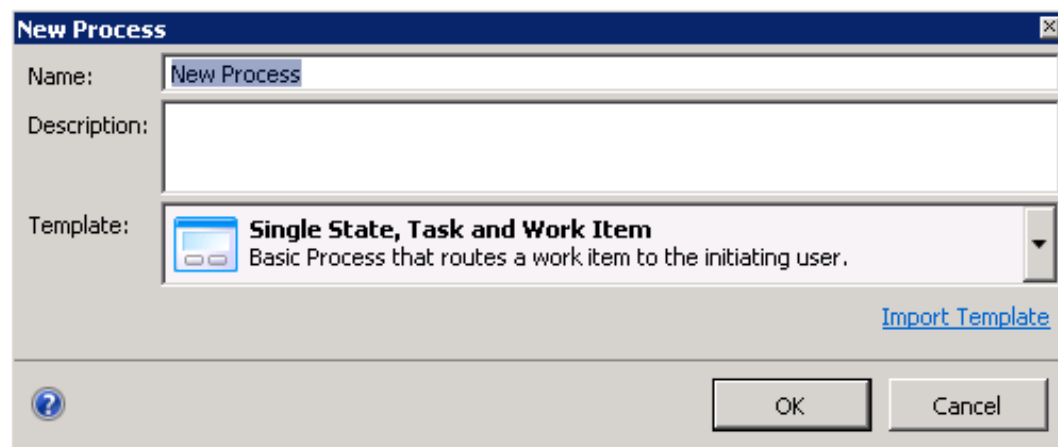
Note: If the IPA Designer tab is not visible, you might not have an IPA Designer license assigned to your user account. Contact your system administrator.

2. Open the **File** menu, point to New, and click **Process** (see figure).



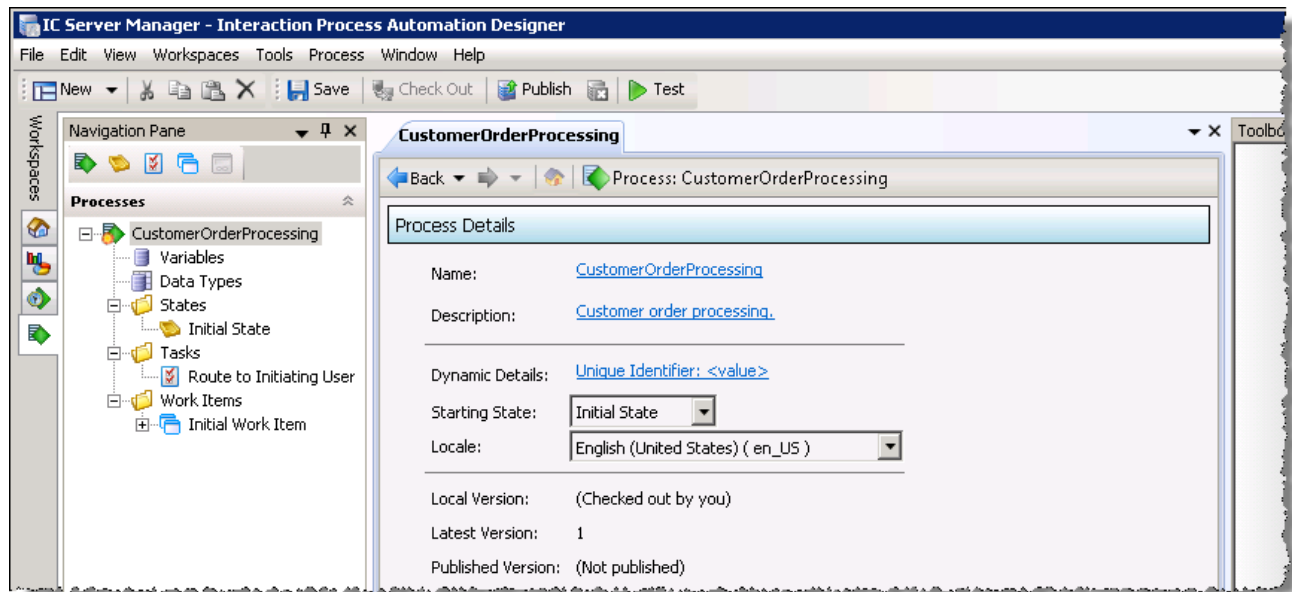
Note: If you have not previously created any processes, you might need to create a view in the IPA Designer workspace before creating your first process.

IPA Designer displays the **New Process** dialog box (see figure).



3. In the Name text box, type the name of the process.
4. In the Description text box, type a brief description of the process. The CIC Client displays this description to anyone who uses or views the process.
5. In the Template list, either accept the default, use a blank template, or click **Import Template** to browse for a template.
6. Click **OK**.

IPA Designer adds your new process to the Processes list. In the workspace, it displays the Process Details view, which has separate sections showing process details and process states (see figure). Note that IPA Designer automatically creates a Unique Identifier variable to use in the Dynamic Details field. The Variables page lists this variable.



Note: IPA Designer will not publish a process containing errors, such as when a data item is missing or incomplete. After you correct the error, you can publish the process. If you hover your mouse pointer over the exclamation-mark icon, IPA Designer displays a popup tip box with a brief explanation of the error.

Later, when you have created [process variables](#), you must return to the Process Details view to add [dynamic details](#). Dynamic details are one variable or (more typically) an ordered group of variables that uniquely identify a running process in Interaction Process Automation Monitor or completed instance of the process in reports. In creating dynamic details, choose variables with the most immediate, relevant, identifiable, and actionable information. That makes management and reporting activities much easier.

Related topics are:

[High Level Steps for Creating and Publishing Processes](#)

[Working with Variables](#)

[Working with Work Items](#)

[Working with Tasks](#)

[Working with States](#)

[Working with Calculations](#)

Opening a Process

To open a process for editing, either:

- Right-click the process in the process list, then click **Open** in the shortcut menu.
- Double-click the process in the process list.

Note that opening a process is different from checking out a process. Before you can edit a process, you must check it out. Opening the process simply displays it in your workspace. If the process is checked out, you can then edit it.

If an existing process does not appear in the process list:

1. Open the **File** menu, point to **Add**, and click **Existing Process**.

IPA Designer displays a dialog with a list of existing processes. You can access processes for which you have the appropriate permissions.

2. Select the desired process and click **Add**.

See also:

[Checking Out a Process](#)

Overview of Dynamic Details

Dynamic details uniquely identify each process instance or work item so that it can be saved, searched for, located in the CIC Client, and retrieved. Dynamic details are typically a group of variables associated with a process. You can use any variable types except for Date, Date Time, and Time.

Dynamic details serve as a high-level description of each process or work item. The dynamic details for a process or work item should include variables that distinguish it from others of the same type. At a glance, process users should be able to identify a process instance by looking at its dynamic details. Dynamic details become read-only, retaining their variables' last-saved values after a process instance completes.

IPA uses a work item's dynamic details to create the value that the CIC Client displays in the Description column of My Work Items.

Note: From the CIC Client's process search screen, a user can search for any variable used in dynamic details.

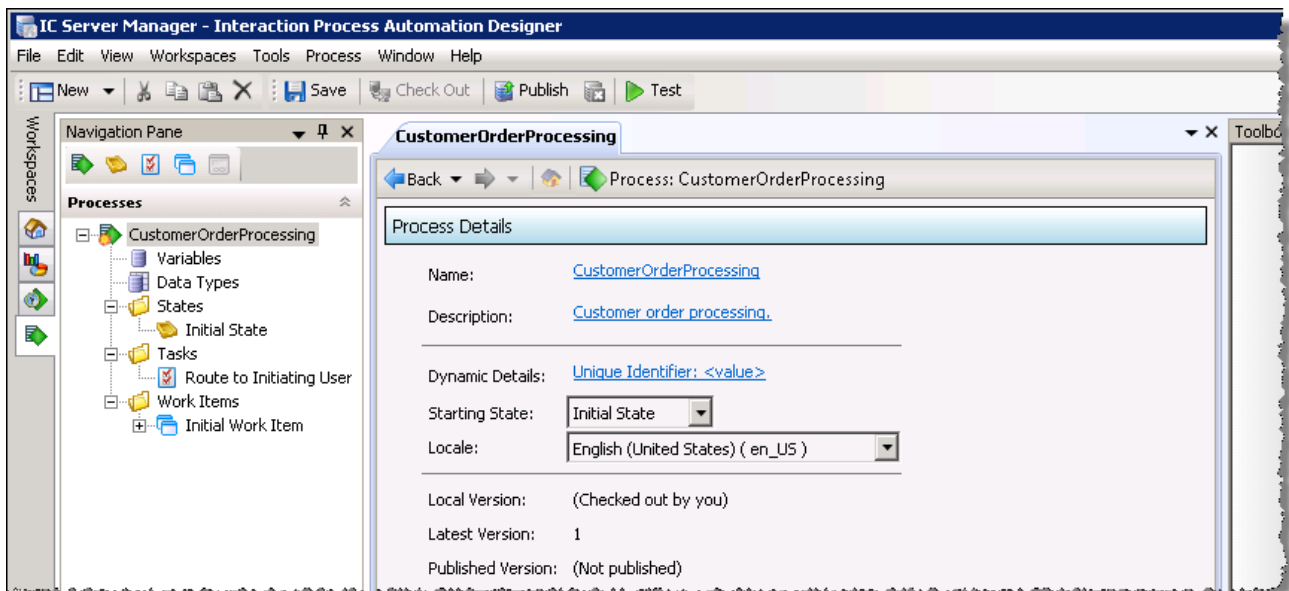
Adding Dynamic Details to a Process

Dynamic details uniquely identify each process so that it can be saved, located, and retrieved. A dynamic detail is typically a variable such as Customer ID that would be associated with a particular process.

To add dynamic details to a process:

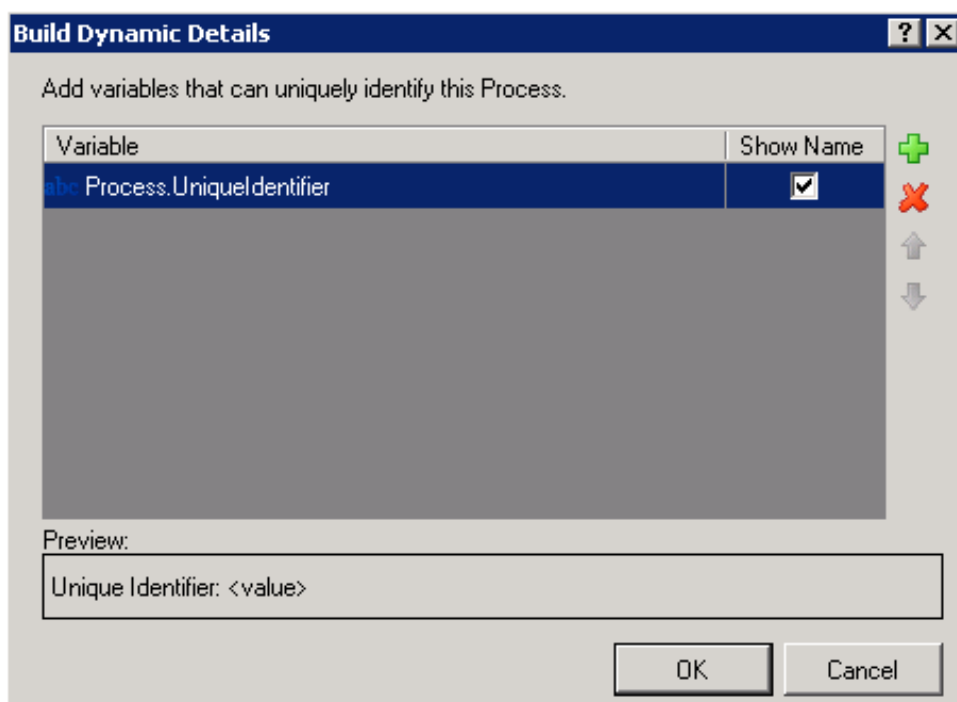
1. Verify that you previously created one or more process variables to use as dynamic details identifiers for the process.
2. In the processes list, double-click the desired process.

IPA Designer displays the Process Details view (see figure).



3. Click the link text next to **Dynamic Details**.

IPA Designer displays the **Build Dynamic Details dialog box** (see figure). Note that when you create a process, IPA Designer automatically creates a *Unique Identifier* variable to use for dynamic details. You can add other variables to dynamic details, providing more identifying information.



4. Click **Add** (+).

IPA Designer displays the **Select Variable** dialog box. The dialog box lists variables that can be used as dynamic details identifiers.

5. Select a variable to add to dynamic details:
 - a. Either click the name of a variable to use as a dynamic details identifier for the process, or click **Insert** to create a new variable "on the fly."
 - b. Click **OK** to close the dialog box.
6. To add more variables, repeat steps 4 and 5 as needed.
7. If needed, use the up and down arrow buttons to adjust the order of the variables. If needed, use the delete (X) button to remove

variables from the list.

The order of the variables in the list controls the order in which the CIC Client displays them in the process's dynamic details string of text. The topmost variable(s) should be most specific and identifiable at a glance.

8. Click **OK** to close the **Build Dynamic Details** dialog box.

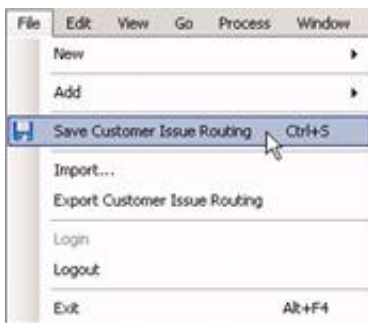
IPA Designer assigns the variable as the dynamic details identifier for the process.

Saving a Process

When you save a process, IPA Designer saves any changes you have made in the process, locally to your computer, but does not make a separate versioned copy of the process on the CIC server. This differs from checking in a process, which does save a separate version of the process on the CIC server.

To save a process, *either*:

- On the **File** menu, click **Save** <process name>.



or

- Click the **Save**  button on the IPA Designer toolbar.

Tip: When you only want to save changes to a process for your exclusive and subsequent editing on your computer, save the process instead of checking it in. That saves the current version of the process with your changes.

Each time you check in a process, IPA Designer keeps a separate system-wide version of the process for that check-in. Check in the process only when you want to share your current version of the process design with other people for their further development, review, or publishing.

Related topics:

[Checking In a Process](#)

[Exporting a Process](#)

Deleting a Process

Appropriate user rights are required to publish, deactivate, or delete a process. If IPA Designer shows an error message when you try to do those tasks, contact your system administrator to obtain the required user rights.

To delete a process:

- In the Processes list, right-click the process, then click **Delete** in the shortcut menu.

If you simply want to remove the process from your IPA workspace without deleting it, see [Removing a process from your workspace](#). Removing a process simply gets it out of your way. You can restore it later.

There is seldom any need to delete a process, because you can easily remove it from your visible workspace. However, you can delete any process, even one that is currently running. Any currently-running instances of the process will continue until they terminate normally.

Note: If you delete a process in IPA Designer, then Run Process actions in other processes might still show it as available until after you close IPA Designer and re-start it. Even if a Run Process action lists a deleted process, it is no longer available. If a process is currently running, you cannot delete it.

Removing a Process from Your Workspace

When you remove a process from your workspace, you simply remove it from the displayed processes in your process list. You can add the process back later.

To remove a process from your workspace:

- In the Processes list, right-click the process, then click **Remove From Workspace** in the shortcut menu.

Note: If you have modified the process since the last time you checked it in, IPA Designer will ask if you want to check in the modified process before you remove it. If you do not check in the process before removing it, you will lose any changes you made since the last check-in.

See also: [Adding a Previously-Created Process to Your Workspace](#).

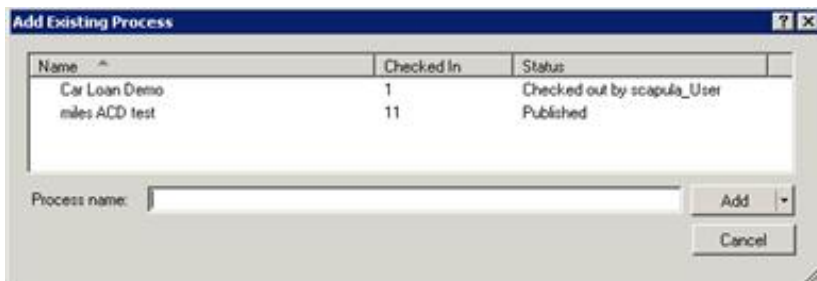
Adding a Previously-Created Process to Your Workspace

You can add any process to your workspace as long as the process has been checked in or published. This feature lets you work with processes created by others in your organization, purchased, or imported. Your administrator uses Interaction Administrator to set your permissions to access and add processes.

To add a previously-removed process back to your workspace:

1. Open the **File** menu, point to **Add**, and then click **Existing Process**.

IPA Designer displays the **Add Existing Process** dialog box (see figure).



2. In the process list, click the name of the desired process.

Tip: You can also click the down arrow on the Add button to select previous versions of processes.

3. Click **Add**.

See also:

[Saving a Process](#)

[Revert to a Previous Version of a Process](#)

Get Latest Version of a Process

The Get Latest Version option on the **Process** menu lets you retrieve the latest checked-in version of a process.

To get the latest version of a process:

- On the **Process** menu, click **Get Latest Version**.

IPA Designer loads the latest checked in version of the process.

Revert to a Previous Version of a Process

The Revert option on the **Process** menu discards any changes from your current editing session and loads the most recently checked-in version of the process.

To revert a process:

- On the **Process** menu, click **Revert**.

IPA Designer discards any changes from your current editing session and loads the most recently checked in version of the process.

See also:

[Adding a Previously-Created Process to Your Workspace](#)

Checking In a Process

Checking in a process lets several people collaborate on the process design. It stores the process in IPA Designer's version control repository but does not remove it from your IPA workspace. While a process is checked in, a version is saved that can be viewed but not edited until it is checked out. It is available for you or other users to check out and edit. To edit a process that has been checked in, see [Checking out a process](#).

Checking in a process is different from saving a process, which IPA Designer does automatically. You only need to check in a process if you want other people to be able to view or work from your current version of its design.

To check in a process:

- Open the **Process** menu and click **Check In**.

Notice that the process is still listed in IPA's process list. On the IPA toolbar, **Check Out** is now active. You can view the process but cannot change it unless you first check it out.

IPA Designer automatically checks in a process on publication.

Tip: When you only want to save changes to a process for subsequent editing on your computer, [save the process](#) instead of checking it in. That saves the current version of the process with your changes.

Each time you check in a process, IPA Designer keeps a separate version of the process for that check-in. Check in the process only when you want to share the current version of the process design with other people.

Related topic:

[Saving a Process](#)

Checking Out a Process

Checking out a previously [checked-in](#) or published process allows you to edit the process. If your CIC administrator assigned the necessary rights, you can check out processes that you or another user created or edited.

To check out a process:

1. In the IPA process list, click the name of the desired process.
2. On the **Process** menu, click **Check Out**. Alternatively, you can click **Check Out** on the toolbar.

The process is now open for editing. Notice that on the toolbar, **Check Out** is now unavailable and **Check In** is now becomes available on the **Process** menu.

Testing a Process


When you have finished designing a process, you should test it before publishing it. This helps you identify any problems that might arise for process users. Unexpected errors can cause delays or wasted effort within your organization. Always plan for, test, and handle potentially harmful scenarios in the process design phase before they occur in production.

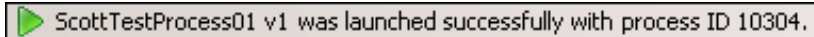
Thorough testing involves exercising all paths of the process design under varying conditions, decisions, routing patterns, user inputs, and possible variable values. The logic guiding calculations, decisions, loops should be solid and robust, with defined and adequate procedures to identify, address and eliminate any errors that may arise during the execution of a process.

Remember that users may provide input data that is unanticipated, inaccurate, or unusual. Review IPA and IPA Designer features and best practices to address such situations. Comprehensive testing is also important to verify data security, authorization activities, and procedural compliance.

IPA provides the necessary capabilities and features to protect the integrity of your data and to expedite your processes from start to finish. Frequent, incremental, and varied testing will enhance your process and ensure valuable operational activities

To test a process:

1. In the Processes list, click the process to test.
2. In the IPA Designer toolbar, click **Test** .
3. If the process launches successfully, IPA Designer displays a success message in its status bar at the bottom of the window (see figure).



4. Follow the steps of the process and note any errors.
5. If the process contained errors, IPA Designer displays an error message (see figure).



6. Correct any errors you identified.
7. Re-test the process until it runs without errors.

Note: Testing a process routes all work items to the user logged into IPA. While testing, be sure to run the CIC Client with the same user account.

Testing Processes with the IPA Web Client

The IPA Web Client only allows a user to pick up work items from *published* processes. Clicking the Test button always sends unpublished processes to the regular CIC Client. To test a process in the IPA Web Client, you must publish the process.

Searching Within a Process

You can search within a process for:

- Places where a variable is used
- Places where a text string occurs

To search for places where a variable is used, see the help topic [Seeing Where a Variable is Used](#).

To search for a text string:

1. Click the **Search** tab to display the search tab.
2. Click **Options** to display search options (figure, 1).



3. In the Search text box (figure, 3), type the text for which to search.
4. If desired, select **Starts with** and/or **Match case** to narrow the search (figure, 2).
5. Click the magnifying glass icon (figure, 3).

IPA Designer displays the results from your search (figure, 4).

Publishing a Process

Publishing a process makes it available for authorized users to launch on demand and active use in production.

Appropriate user rights are required to publish, deactivate, or delete a process. If IPA Designer shows an error message when you try to do those tasks, contact your system administrator to obtain the required user rights.

To publish a process:

1. In the process list, click the name of the desired process.
2. On the **Process** menu, click **Publish**. Alternatively, you can click **Publish** on the toolbar.

The process is now available for deployment. Authorized users can now launch the process. When you publish a process, IPA Designer automatically checks it in.

Note: Interaction Administrator lists the process in its IPA container as soon as you create it. The CIC Client does not display unpublished processes. An administrator can set permissions to view processes in the Users container. The permissions control which user(s) can see the process.

Tip: If a work item page has a password box bound to a variable, and another control on the same page is bound to the same variable, then IPA Designer will not publish the process. For more information, see [Telling Data-Bound Controls Where to Send or Get Their Data](#) and [Password Box](#).

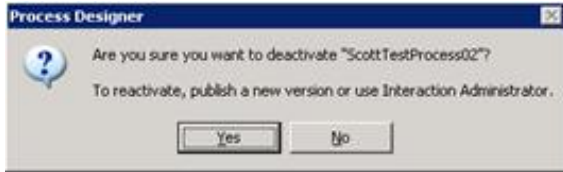
Deactivating a Process

Deactivating a process makes it unavailable for launch but does not delete it. In effect, it "un-publishes" the process.

Appropriate user rights are required to publish, deactivate, or delete a process. If IPA Designer shows an error message when you try to do those tasks, contact your system administrator to obtain the required user rights.

To deactivate a process:

1. In the IPA process list, click the name of the desired process.
2. On the **Process** menu, click **Deactivate**.
3. IPA Designer asks you to confirm the deactivation (see figure).



4. Click **Yes**.

IPA Designer deactivates the process. The process can no longer be launched unless you re-publish it or another authorized user publishes it.

Cloning a Process

Cloning a process makes an exact copy of the cloned process and adds it to IPA Designer's process list.

The clone has the same name as the original process, but the new name ends with "- Clone". After cloning a process, you can then rename and modify the new (clone) process as needed.

To clone a process:

1. In the IPA Designer process list, right-click the process to clone.
2. In the shortcut menu, click **Clone**.

IPA Designer clones the process and adds the clone to the process list.

Renaming a Process

To rename a process, either:

- Right-click the process name in the process list, click **Rename**, type the new process name, and press **Enter**.
- Click the process name in the process list, press **F2**, type the new process name, and press **Enter**.

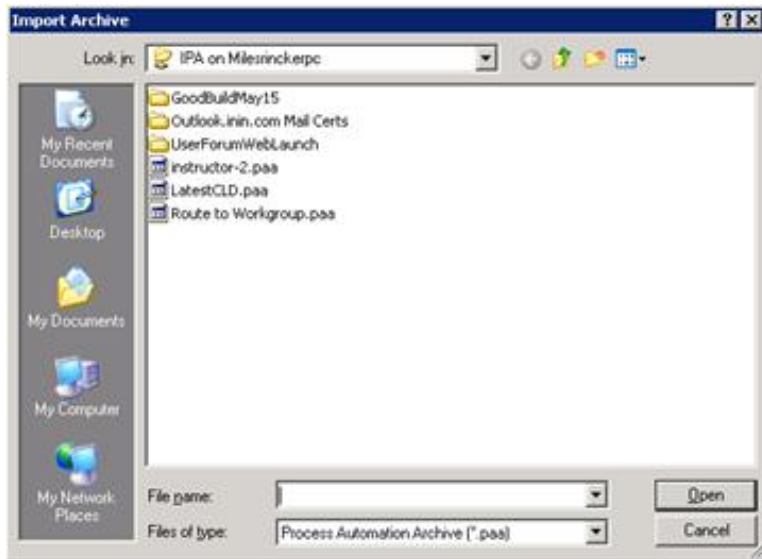
Importing a Process

You can import a process that IPA Designer previously [exported](#). The exported process is stored as a file with the .PAA extension.

To import a process:

1. Open the **File** menu and click **Import**.

IPA Designer displays the **Import Archive** dialog box (see figure).



If needed, browse to the folder where the exported process resides.

2. Click the name of the process to import, then click **Open**.

IPA Designer imports the process and displays it in the Processes list. You can now work with the process.

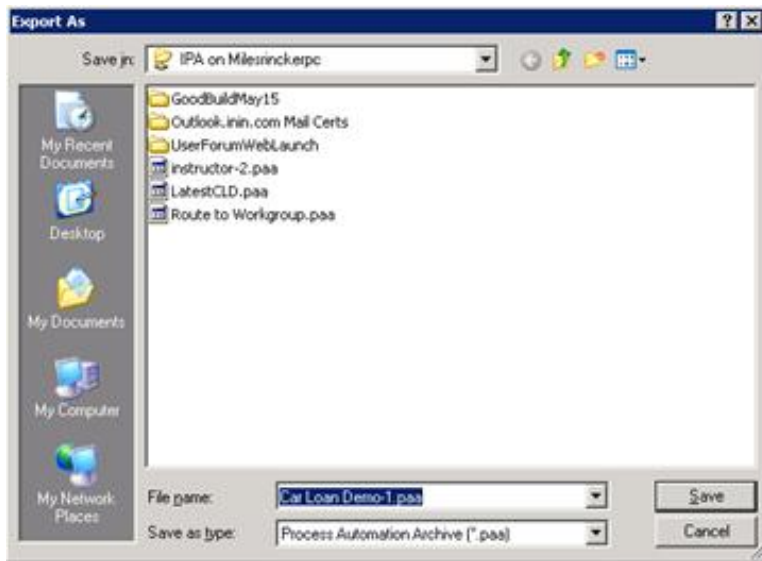
Exporting a Process

You can export a process for off-site backup, to transfer the process to a different server, or for version control (though [checking in a process](#) is a better method of version control).

To export a process:

1. Select the process in the Processes list.
2. Open the **File** menu and click **Export [Name]**, where "[Name]" is the name of the process.

IPA Designer displays the **Export As** dialog box (see figure).



3. Browse to the folder where you want to save the exported process, then click **Save**.

IPA Designer saves the exported process as a .PAA file in the folder.

Adding a Local Variable

This section gives the general procedure for adding a local variable that is only available inside a task, state, work item, or work item page. For information about how to add specific types of variables, see the section for the [desired variable \(data\) type](#).

To add a local variable:


1. In the Processes list, double-click the task, state, or work item inside which you want to create a local variable.

IPA Designer displays the task, state, or work item workspace and the toolbox. At the bottom of the toolbox are two tabs: Toolbox and Variables (see figure).



2. Click the **Variables** tab.

IPA Designer displays the local variables list for the task or state.

3. At the top of the variables list, click **Plus** .


IPA Designer displays a list of variable types.


4. Click the desired variable type.

IPA Designer displays an **Add Variable** dialog box for that data type.

5. In the **Name** box, type the name of the variable. Follow the IPA Designer [naming rules](#).
6. If you want to create the variable as a collection (see the topic on [Collections of Variables](#)), select the check box labeled **Contains a collection of variables**.
7. In the **Security** list, click the desired [security specification](#).
8. In the **Accessibility** list, choose the [accessibility setting](#).
9. Add data constraints as desired. These vary depending on the data type.

For more information about data constraints, see the [data constraints help topic](#).

10. If you want to set an initial value for the variable, type it into the **Initial value** text box. To set initial values for members of a collection, click the “Edit Collection” icon  on the right side of the initial value (“0 items”) box.

Initial values can be *literal* (explicitly entered or selected) values or *not set*. For each value, the icon on the right with the drop-down menu  toggles between *literal* (specified values) and *not set*.

11. Click Add.







IPA Designer adds your new variable to the local variables list.

Note: You can also create variables inside a loop action. However, those variables are local to the task in which the loop occurs. As a result, they are available anywhere inside that task. Add a note for demo.

See also: [Editing a Variable](#).

Process Icons

IPA Designer uses several icons to identify objects in the processes list. The icons are as follows.

Icon	Meaning
	Folder containing process objects of the type indicated by the text to the right of the icon (e.g., States).
	Process
	State
	Task
	Variables
	Work Item

Working with Templates

IPA supports the use of templates to simplify the creation of processes that have similar characteristics. Third-party developers can export processes as templates and make them available through the Interaction Marketplace. Templates may require licenses.

Related topics are:

- [Exporting a Process as a Template](#)
- [Importing a Template to Create a Process](#)

Exporting a Process as a Template

You can export a process as a template in order to simplify the creation of future processes that are based on the template.

Note: If you want to use a template on many servers within your own company, do not export the process as a template. Instead, [clone](#) the template.

If you are a third-party developer planning on creating templates for the Marketplace, you can optionally include a license key in your template. This will ensure that only people who have legally obtained the license key will be able to import the template. To obtain a license key to include in your template, contact the [Marketplace Team](#).

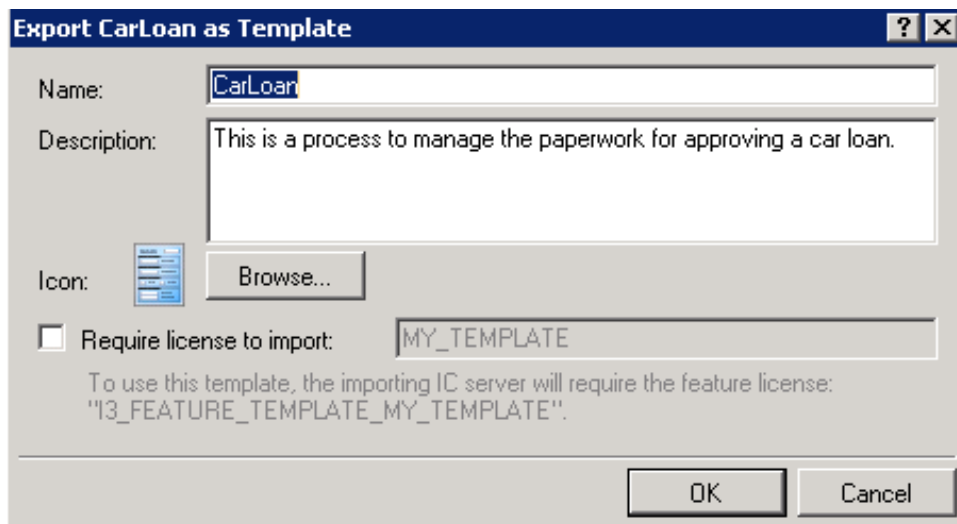
Note: The license key applies only to the ability to import the template to create and edit processes based on it. The license is not a license to run those processes.

If you want to require a license key, you must first update the CIC Server with that license key. License strings all have the same root name: I3_FEATURE_TEMPLATE_XXXXX

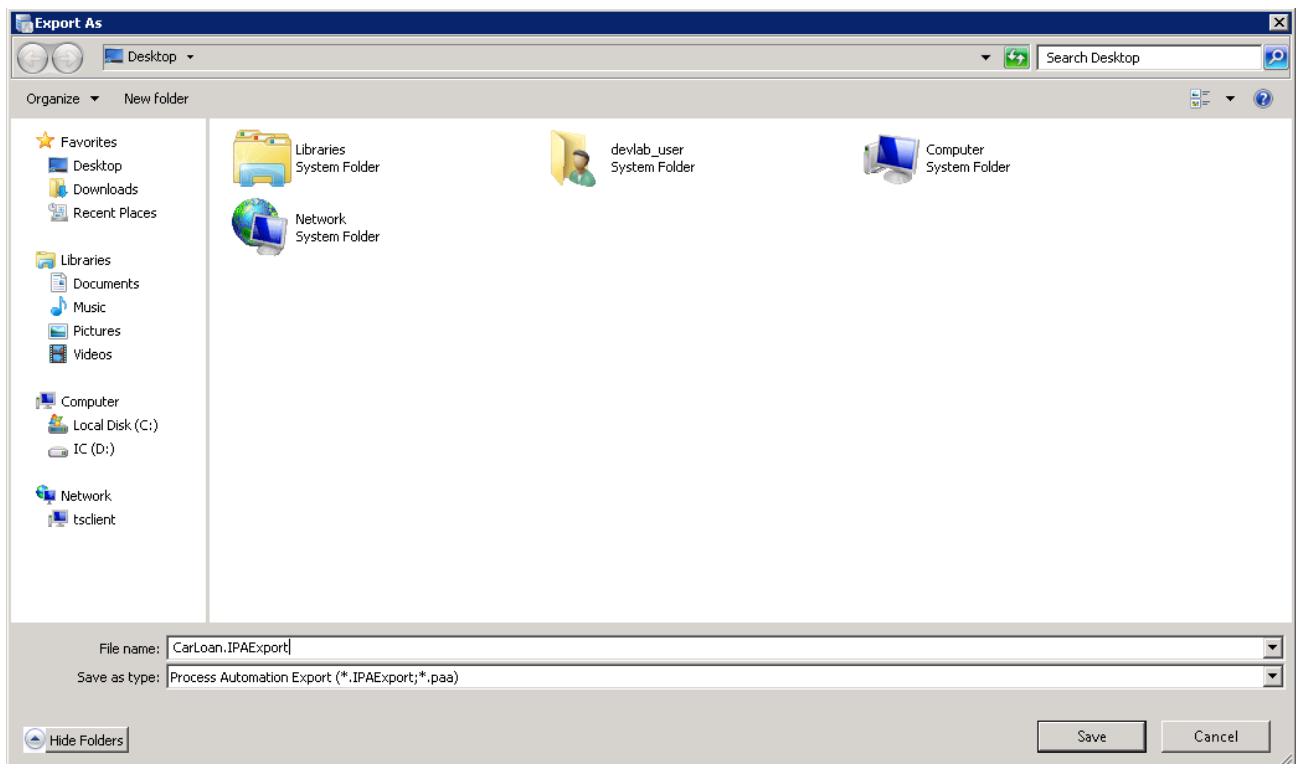
To export a process as a template:

1. Select the process to export in the Processes list.
2. Open the **File** menu and click **Export [Name]**, where "[Name]" is the name of the process.

IPA Designer displays the **Export As** dialog box (see figure).



3. In the **Name** field, specify a logical name that you will recognize later. You may want to use a different name than the name of the original process.
4. In the **Description** field, type a helpful description.
5. Click the **Browse** button to select an image file for the template. Supported types are .bmp, .ico, .jpg, .png, and .gif.
6. Do you want to require a license in order for the template to be imported?
 - If yes, then you must first update the CIC Server with a new license key. Then select the **Require license to import** check box and specify the license key here.
 - If no, then skip to the next step.
7. Click **OK**.



8. Specify a file name.


Note: The file extension is .IPATemplate.

9. Click **Save**.

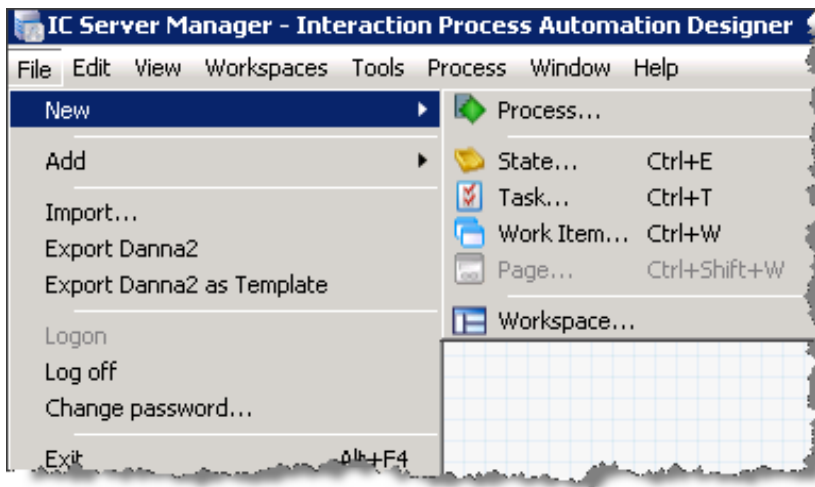
Importing a Template to Create a Process

You can import a template to create a new process from it. If the template requires a license key, then your server license file must be regenerated before you can use the template. Contact your authorized reseller for assistance. You will then be able to import the template as many times as necessary.

To import a template to create a process:

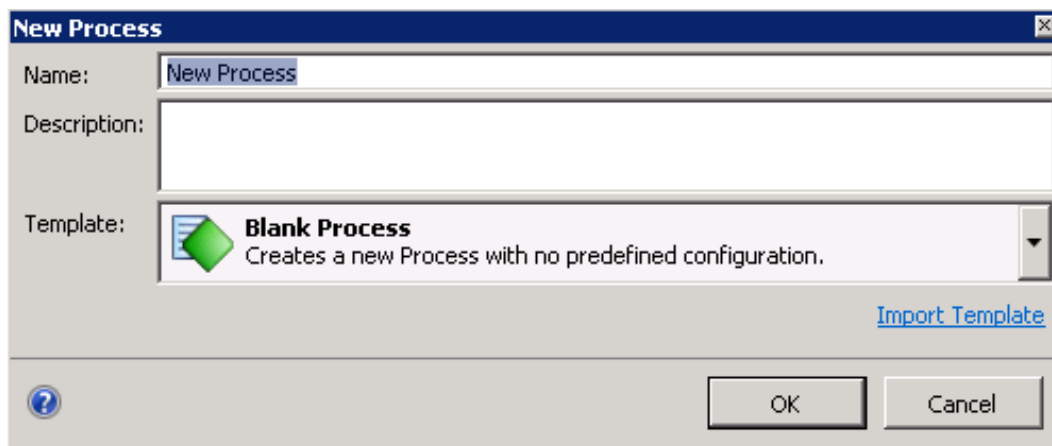
1. In the IC Server Manager, click the IPA Designer  tab.

Open the **File** menu, point to **New**, and click **Process** (see figure).



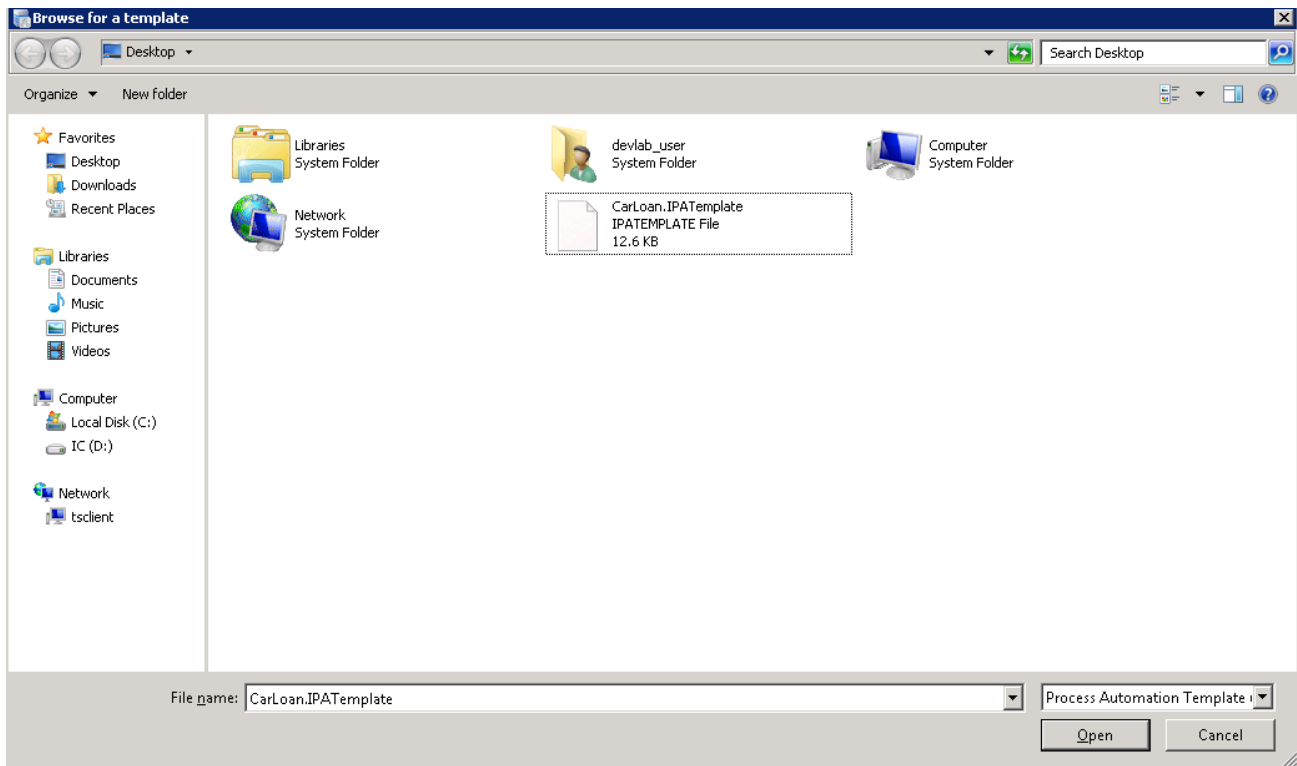
Note: If you have not previously created any processes, you might need to create a view in the IPA Designer workspace before creating your first process.

2. IPA Designer displays the **New Process** dialog box (see figure).



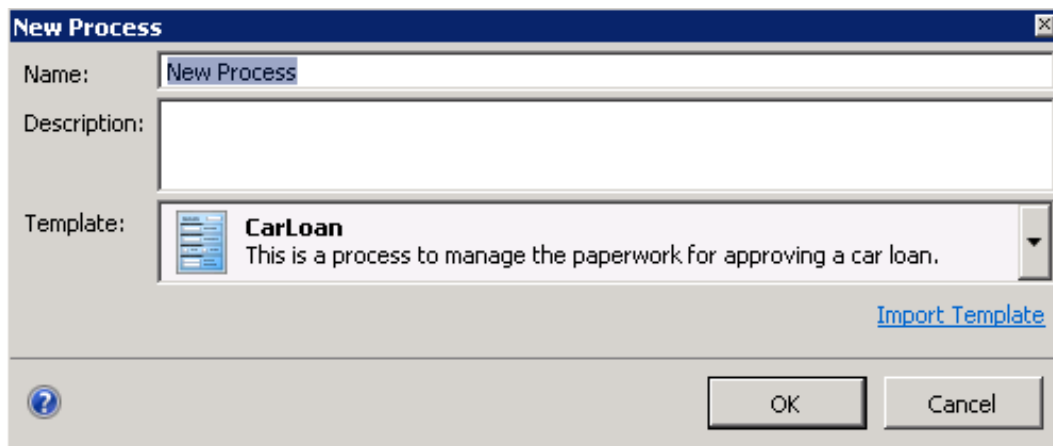
3. In the **Name** text box, type the name of the new process that you are creating.
4. In the **Description** text box, type a brief description of the process. The CIC Client displays this description to anyone who uses or views the process.
5. Click **Import Template**.

The Browse for a template dialog box appears (see figure).



6. Select the template that you want to import and then click **Open**.

The **New Process** dialog box appears. The **Template** field displays the icon, name, and description for the template that you selected.



7. Click **OK**.
8. IPA Designer adds your new process to the Processes list. In the workspace, it displays the Process Details view (see figure).

Loan Process 2

Back Forward Process: Loan Process 2

Process Details

Name: [Loan Process 2](#)

Description:

Dynamic Details: [Initiating User: <value>](#)

Starting State: Initial State

Locale: English (United States) (en_US)

Local Version: (Checked out by you)

Latest Version: 1

Published Version: (Not published)

9. You can now work with your process in the same way in which you work with all other processes.

Note: You cannot copy any elements of a licensed process to an unlicensed process. If the source process and the destination process have the same license requirement, and if you have satisfied that requirement, then you can copy and paste between them.

Related topics are:

- [High Level Steps for Creating and Publishing Processes](#)
- [Working with Variables](#)
- [Working with Work Items](#)
- [Working with Tasks](#)
- [Working with States](#)
- [Working with Calculations](#)

Working with Sharepoint Sites

Working with Variables

IPA Designer supports two kinds of variables: *process variables* and *local variables*. These two kinds of variables differ only in their [scope](#).

A *process variable* holds values that you can use anywhere in your process. For example, if your process involves sending e-mail notifications, it might have one "Mailbox" variable to hold each e-mail address. The auto-generated "Process" prefix helps identify and categorize process-level variables for calculations and updates. IPA also stores process variables in its database after a process completes. A *local variable* holds values used only within a specific process task or state. Note, however, that an input and output mechanism for local variables can facilitate passing values to like variable types among states and processes. (See [Variable Accessibility](#).) The auto-generated "Local." Prefix helps to identify those task- and state-level variables for calculations and updates.

To work with the variables for a process, double-click the **Variables** container in the Processes list. IPA Designer displays the Variables workspace and the Variables Toolbox.

Related topics:

[Variable Scope](#)

[Adding a Process Variable](#)

[Adding a Local Variable](#)

[Variable Accessibility](#)

[Pattern Matching with String Variables](#)

[Variable \(Data\) Types – Overview](#)

[Collections of Variables](#)

[Creating Variables for Work Items](#)

Variable Scope

You can use process variables anywhere in your process. However, you can also create [local variables](#) inside tasks, states, and work items. If you create a local variable, it is available only in the task, state, or work item where you created it. Like variable types in tasks, states, and work items can, however, use an input and output mechanism to pass values among those entities. (See [Variable Accessibility](#).)

Process-level (global) variables are appropriate for values that must be shared by multiple different tasks, states, work items, and so forth. Variables whose values affect or reflect common or basic functionality of a process may be good candidates to keep together as a set of process variables.

Local variables are appropriate especially when a process has multiple tasks, states, or work items that:

- Use similar values in similar ways, and
- Use those variables in an isolated context, and do not share those values with other parts of the process.
- Have direct and specific input/output parameters.

For example, your process might have several tasks, each of which gets a credit score from a different credit bureau. Each task could have a local variable to hold the raw credit score received from the credit bureau and might then do calculations with the score. By using local variables, each task could have its own variable named *CreditScore* that was only available inside the task. As a result, the meaning of the variable would be clear to anyone who looks at it, but the process wouldn't be confused by multiple variables having the same name. States and tasks may use process- and local-scoped variables, either exclusively or inclusively, as needed and appropriate to their intended function.

Note: When you use process variables in a work item, IPA makes copies of the variable values to use while the work item is running. If the work item updates the values, then IPA does not copy the updated values back to the process variables until the work item ends.

Related topic:

[Variable Accessibility](#)

Adding a Process Variable

This section gives the general procedure for adding a process variable of any type.

For information about how to add specific types of variables, see the section for the [desired variable \(data\) type](#).

Reminder: You must check out a process before editing it. That applies to adding process variables.

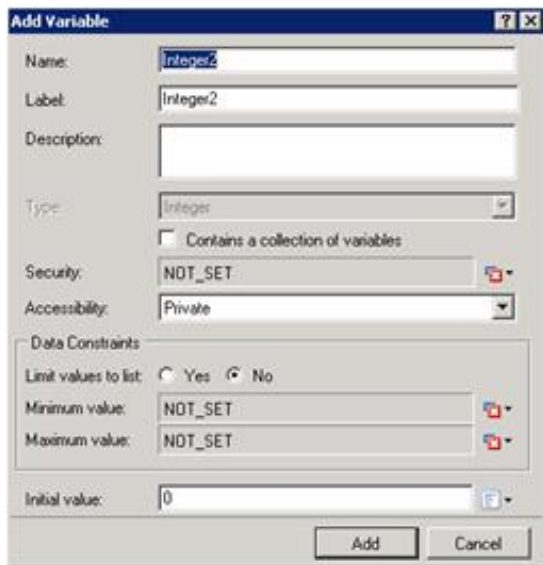
To add a variable:

1. In the Processes list, double-click the **Variables** container in your process.

IPA Designer displays the Variables workspace.

2. Right-click a blank area of the Variables workspace, point to **Add**, and click the desired variable type in the shortcut menu.

IPA Designer displays the **Add Variable** dialog box (see figure). The dialog box has slightly different features depending on the data type of the variable you are creating.




3. In the Name text box, type the name of the variable. Follow the IPA Designer [naming rules](#).
4. If you want to create the variable as a collection (see the topic on [Collections of Variables](#)), select the check box labeled **Contains a collection of variables**.
5. In the **Security** list, click the desired [security specification](#). If you do not select a security specification, then the variable defaults to *public*. All users will have access to the variable in forms and in the Interaction Process Automation Monitor.

Note: The administrator creates security specifications in Interaction Administrator. See [Security Specifications](#). Also, to support PCI (Payment Card Industry) compliance, IPA logging of process variables is optional. By default, IPA does not log values in processes created with IC 4.0 Service Update 4 or later, though the administrator can turn on logging. For processes created in IC 4.0 Service Update 3 and earlier, IPA logs values to maintain consistency with its previous behavior. The administrator can turn off logging.

6. In the **Accessibility** list, choose the [accessibility setting](#).
7. Add data constraints as desired. These vary depending on the data type.

For more information about data constraints, see the [data constraints help topic](#).

8. If you want to set an initial value for the variable, type it into the **Initial value** text box. To set initial values for members of a collection, click the “Edit Collection” icon  on the right side of the initial value (“0 items”) box.

Initial values can be *literal* (explicitly entered or selected) values or *not set*. For each value, the icon on the right with the drop-down menu toggles between *literal* (specified values) and *not set*.

9. Click **Add**.

IPA Designer adds your new variable to the variable list in the Variables workspace.

See also: [Editing a Variable](#).

Adding a Local Variable

This section gives the general procedure for adding a local variable that is only available inside a task, state, work item, or work item page. For information about how to add specific types of variables, see the section for the [desired variable \(data\) type](#).

To add a local variable:

1. In the Processes list, double-click the task, state, or work item inside which you want to create a local variable.

IPA Designer displays the task, state, or work item workspace and the toolbox. At the bottom of the toolbox are two tabs: Toolbox and Variables (see figure).



2. Click the **Variables** tab.

IPA Designer displays the local variables list for the task or state.

3. At the top of the variables list, click **Plus** .


IPA Designer displays a list of variable types.


4. Click the desired variable type.

IPA Designer displays an **Add Variable** dialog box for that data type.

5. In the **Name** box, type the name of the variable. Follow the IPA Designer [naming rules](#).
6. If you want to create the variable as a collection (see the topic on [Collections of Variables](#)), select the check box labeled **Contains a collection of variables**.
7. In the **Security** list, click the desired [security specification](#).
8. In the **Accessibility** list, choose the [accessibility setting](#).
9. Add data constraints as desired. These vary depending on the data type.

For more information about data constraints, see the [data constraints help topic](#).

10. If you want to set an initial value for the variable, type it into the **Initial value** text box. To set initial values for members of a collection, click the “Edit Collection” icon  on the right side of the initial value (“0 items”) box.

Initial values can be *literal* (explicitly entered or selected) values or *not set*. For each value, the icon on the right with the drop-down menu  toggles between *literal* (specified values) and *not set*.

11. Click Add.

IPA Designer adds your new variable to the local variables list.

Note: You can also create variables inside a loop action. However, those variables are local to the task in which the loop occurs. As a result, they are available anywhere inside that task. Add a note for demo.

See also: [Editing a Variable](#).

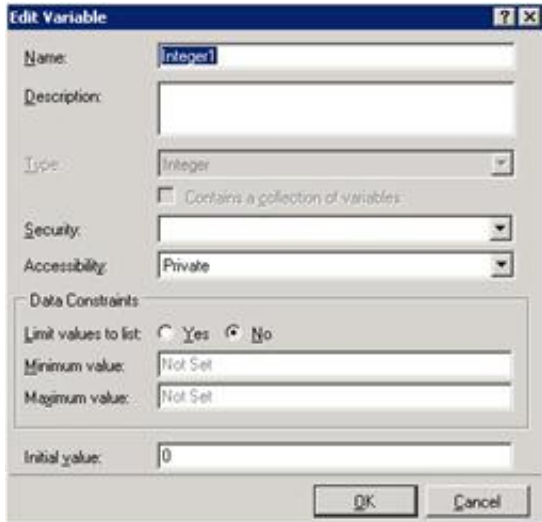
Editing a Variable

You edit a variable in the same way whether it is a process variable or a local variable.

To edit a variable:

1. In the **Variables** list, double-click the variable to edit.

IPA Designer displays the **Edit Variable** dialog box (see figure). The dialog box has slightly different features depending on the data type of the variable you are editing.



2. Change the desired properties by changing the values in the dialog box controls.

Except for the check box labeled **Contains a collection of variables**, which is grayed, the controls are the same and work the same as in the **Add Variable** dialog box.

3. When you are finished editing the variable, click **OK**.

IPA Designer saves the changes you made in the variable definition.

Deleting a Variable

You delete a variable in the same way whether it is a process variable or a local variable.

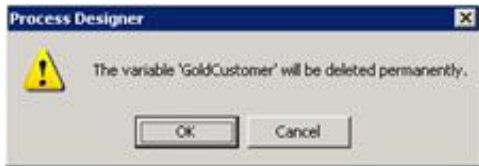
To delete a variable:

1. In the Variables list, right-click the variable to delete.

Locate the variable in the same list you used to add it as a [process variable](#) or as a [local variable](#).

2. In the shortcut menu, click Delete.

IPA Designer prompts you to confirm the deletion (see figure).



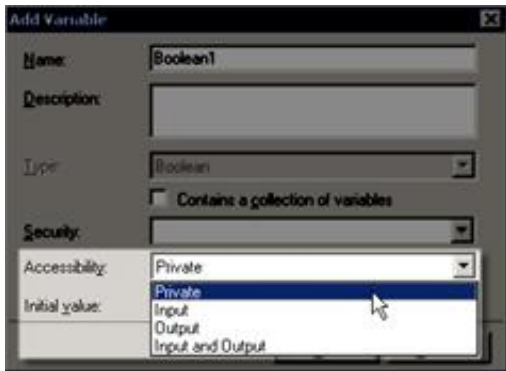
3. Click OK.

IPA Designer deletes the variable.

Note: If you delete a variable from a work item and then add a variable with the same name but a different variable type, it will cause an error in your process.

Variable Accessibility

When you add a variable, you can set its *accessibility* to control how your process uses it (see figure).



By expanding the **Accessibility** list box, you can choose one of these accessibility settings:

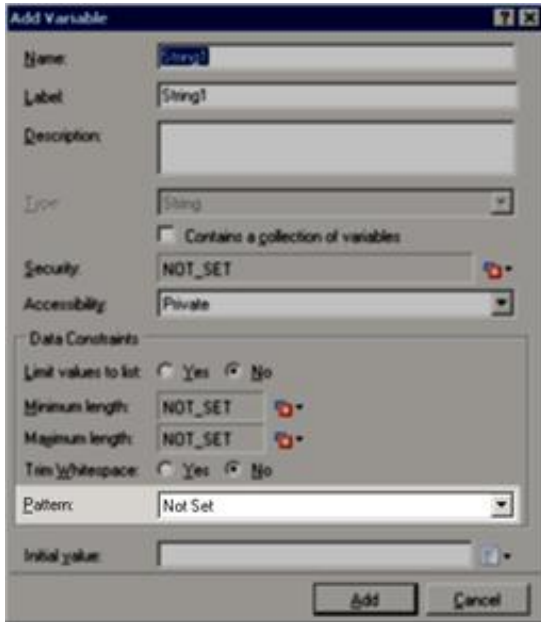
- **Private:** The process cannot use the variable to pass values to processes, tasks, states, or work items, nor can it use the variable to get values from processes, tasks, states, or work items.
- **Input:** The process can use the variable to pass values to processes, tasks, states, or work items.
- **Output:** The process can use the variable to pass values to processes, tasks, or work items. States do not use output variables.
- **Input and Output:** The process can use the variable either to pass values to processes, tasks, or states, or to get values from processes and tasks.

Process variables marked as inputs and outputs can be passed in by the Run Process action. The Run Task (available in tasks and states) and Change State (available in states) toolbox actions will update to reflect the change in variable accessibility for corresponding input and output of values.

If you do not choose an accessibility setting, the variable's accessibility will be set to *Private*.

Pattern Matching with String Variables

Variables of the String data type support *pattern matching*, which prevents data entry errors by refusing to accept typed entries unless they conform to a certain pre-selected pattern. You can either select a standard pattern or create your own customized pattern. To select or create a pattern, use the Pattern list box in the **Add Variable** dialog box (see figure).



Standard patterns are:

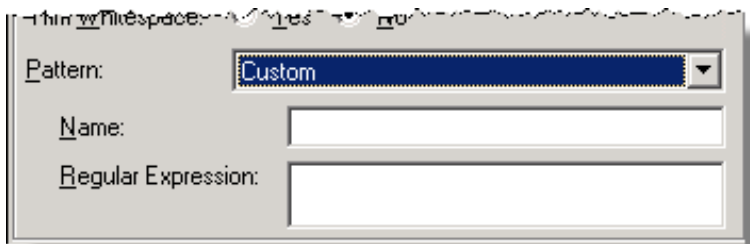
- **Not Set:** No pattern.
- **Custom:** Lets you create a pattern by using the same regular expression syntax as in Perl. Regular expressions are outside the scope of this help topic. However, both the web and printed books offer abundant tutorial and reference information about [regular expressions](#). Regular expressions in IPA Designer follow Perl syntax.
- **Alphabetic (lower case):** This only accepts lower case letters. No spaces, digits, or punctuation are allowed.
- **Alphabetic (Mixed Case):** This accepts upper case or lower case letters. No spaces, digits, or punctuation are allowed.
- **Alphabetic (UPPER CASE):** This only accepts upper case letters. No spaces, digits, or punctuation are allowed.
- **Alphanumeric:** This accepts any letters or digits. No spaces or punctuation are allowed.

To add a standard pattern to the definition of a string variable:

1. In the desired workspace, add the variable to display the **Add Variable** dialog box.
2. As needed, add the other information in the dialog box.
3. In the Pattern list, click the desired pattern.
4. Click the **Add** button to create the string variable.

To add a custom pattern to a string variable:

1. In the desired workspace, add the variable to display the **Add Variable** dialog box.
2. As needed, add the other information in the dialog box.
3. In the Pattern list, click **Custom**.
4. The dialog displays two new fields under the Pattern list box (see figure).



5. In the **Name** text box, type a name for the custom pattern.

This makes the same pattern available later.

6. In the **Regular Expression** text box, type the regular expression for the pattern.

Regular expressions are beyond the scope of this help system. However, you can find tutorial and reference information about regular expressions on the web at sites such as <http://www.regular-expressions.info>. (Genesys does not endorse or recommend any such external site: this help system provides a URL only to help you get started.) Regular expressions in IPA Designer follow Perl syntax.

7. Click the **Add** button to create the string variable.

Understanding Data Constraints

Data constraints limit the values of variables in ways that you specify. Typical examples of data constraints are:

- Limiting a variable's possible values to items on a list that you define.
- Limiting an integer variable to a range of values, such as 1 to 10.
- Limiting a date variable to a range of dates, such as August 5, 2011 to September 30, 2011.
- Limiting the length of a string variable to a specified number of characters, such as 25.

Even if there are additional data constraints, the value of any variable can be NOT SET. However, you can use the required field option to force a variable's value to be set.

The constraints you can add and the procedures for adding them depend on the data type of the variable involved. For more information about adding data constraints to a variable of a particular data type, see the help topic about that data type. Links to the help topics are [here](#).

Variable (Data) Types - Overview

Each variable has a data type that defines what kind of information it can hold. For example, an integer variable can only hold whole numbers (integers), a boolean variable can only hold the values *True* and *False*, and a mailbox variable can only hold e-mail addresses. If you try to put a data of one type into a variable of a different type, IPA will flag it as an error.

IPA Designer lets you create variables with these native data types:

- [Boolean](#)
- [Currency](#)
- [Date](#)
- [Date Time](#)
- [Decimal](#)
- [Duration](#)
- [Integer](#)
- [Mailbox](#)
- [Skill](#)
- [String](#)
- [Time](#)
- [URI](#)
- [User](#)
- [Workgroup](#)

Boolean

A boolean can have only one of two values: true (yes) or false (no). For example, the expression "Date equal to 07/17/12" has a value of yes (true) if the current variable's value is July 17, 2012; otherwise, it has a value of no (false). Use boolean values (or expressions that return boolean values) with **If-Then-Else** actions to tell IPA how to make decisions based on two clear alternatives.

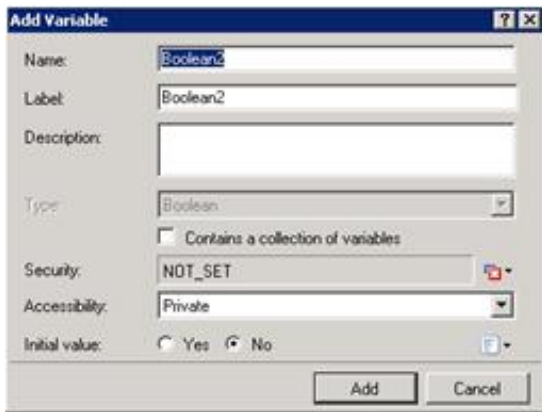
To add a boolean variable:

1. In the Processes list, double-click the **Variables** container in your process.


IPA Designer displays the Variables workspace in the center pane.


2. Right-click a blank area of the Variables workspace, point to **Add**, and click **Boolean** in the shortcut menu.

IPA Designer displays the **Add Variable** dialog box (see figure).



3. Enter a name, label, and description:
 - a. In the **Name** text box, type the name of the variable. The variable name must begin with a letter.
 - b. In the **Label** text box, type the label to identify the variable on work item pages.
 - c. In the **Description** text box, type a brief description of the variable.
4. If you want to create the variable as a collection (see the section on [Collections of Variables](#)), select the check box labeled **Contains a collection of variables**.
5. Select the variable's security and accessibility settings:
 - a. In the **Security** list box, either accept the default value of Full Access or expand the list box to select from a list of [security specifications](#) previously created in Interaction Administrator.
 - b. In the **Accessibility** list, either accept the default [accessibility](#) value of Private or expand the list box to select from the list of accessibility settings.
6. (Optional) If you want to set an initial value for the variable:
 - a. Click the **Yes** (true) or **No** (false) radio button.

If the variable is a collection, click the **Collection** icon  and add items, then go to Step 7 of this procedure.

- b. Click the down arrow  button at the right end of the **Initial value** row.
- c. In the drop-down list, click **Literal** or **Not Set**.

Not Set gives the variable a value of NULL (neither true nor false).

- d. For the **Initial value** text box, select the radio button for Yes (true) or No (false). Those are the only two possible values for a boolean variable.

Note: If you do not set an initial value for a boolean, IPA gives it a default value of *false*.

7. Click **Add**.

IPA Designer adds your new variable to the variable list in the Variables workspace.

Properties of Boolean Variables

Property	Description
Name	The name by which you refer to the variable in your process. The name must begin with a letter or underscore (_). It can contain digits (0 to 9), but cannot contain any other characters, including spaces or punctuation. Best practice: If the name consists of multiple words, begin the first word with an upper-case letter and begin other words with uppercase letters.
Label	The label that identifies the variable on work item pages.
Description	A brief description of the variable and its purpose, sufficient to explain the variable to someone who knows nothing about why it was created.
Collection	Indicates whether or not the variable is a collection of values.
Security	A list of users or workgroups allowed to see the value of the variable. In Interaction Administrator, create security specification groups to include users and workgroups that can see particular data items. In IPA Designer, each variable's Security Specification property has a list box with in which the designer can choose from the Interaction Administrator groups available for that variable. For more information, see the IPA Technical Reference.
Accessibility	How the process can use the variable. For more information, see Variable Accessibility .
Initial Value	The initial value of the variable. For a boolean variable, the default value is no (<i>false</i>). If you set it to yes (<i>true</i>), then IPA will treat the variable as true unless an update variables action or user explicitly sets it to a false value. A boolean variable can also have the value NOT_SET.

Currency

A currency value is used to represent monetary values. It has two properties:

The **Amount** property is a [decimal value](#).

The **Code** property is a string that holds either a 3-character ISO 4217 code or the value NOT_SET.

Adding or Subtracting Currency Values in Expressions

When you add or subtract currency values, the currency codes of the currency values should be the same. For example, the following expression is valid at runtime:

`MakeCurrency(5.00, "USD") + MakeCurrency(10.00, "USD")`

This expression evaluates to a currency value with an amount of 15.00 and a code of "USD" (United States Dollars).

The following expression causes an error at runtime because the currency codes are not the same (Euros and Dollars):

`MakeCurrency(5.00, "EUR") + MakeCurrency(10.00, "USD")`

The following expression is valid:

`MakeCurrency(5.00, NOT_SET) - MakeCurrency(10.00, NOT_SET)`

This expression evaluates to a currency value whose amount is -5.00 with a NOT_SET currency code.

Multiplying or Dividing Currency Values in Expressions

When performing multiplication or division, the left-hand side should be a currency value and the right-hand side should be an integer or decimal. For example:

`MakeCurrency(5.00, "EUR") * 10.0`

This expression results in a currency value of 50.00 whose code is "EUR" (50.00 Euros). If you do decide to put a currency value on both sides of a multiplication or division operation, the result is going to be a decimal, not a currency value. For example:

`MakeCurrency(5.00, "EUR") * MakeCurrency(10.00, "USD")`

This expression returns a decimal value of 50.00. Technically, multiplying a currency value by another currency value is not supported. However, the parser adds implicit casts and recognizes that it can convert both currency values to decimals. It then multiplies the decimal values. The above expression, when parsed, actually looks like this at runtime:

`ToDecimal(MakeCurrency(5.00, "EUR")) * ToDecimal(MakeCurrency(10.00, "USD"))`

Tip: When you write an expression in the Custom Calculation Builder dialog box, click on the CPU with the play button to see what the runtime expression will look like.

Obtaining the Symbol for a Currency

There is no "Symbol" property for a currency. However, you can use an expression to return the correct currency symbol:

```
GetCurrencySymbol(MakeCurrency(5.0,"USD"))
```

This expression returns \$.

Adding a Currency Variable

To add a currency variable:

1. In the Processes list, double-click the Variables container in your process. IPA Designer displays the Variables workspace in the center pane.
2. For a state or task, right-click in the blank area of the Variables tab, point to Add, and then click Currency. IPA Designer displays the Add Variable dialog box (see figure).

3. Enter a name, label, and description:
 - a. In the Name text box, type the name of the variable. The variable name must begin with a letter.
 - b. In the Label text box, type the label to identify the variable on work item pages.
 - c. In the Description text box, type a brief description of the variable.
4. If you want to create the variable as a collection (see the section on [Collections of Variables](#)), select the check box labeled Contains a collection of variables.
5. Select the variable's security, accessibility, and database reporting settings:
 - a. In the Security list box, expand the list box to select from a list of [security specifications](#) previously created in Interaction Administrator. (If no security specifications are defined, only NOT SET and Literal are available.)
 - b. In the Accessibility list, either accept the default [accessibility](#) value of Private or expand the list box to select from the list of accessibility settings.
 - c. To include the variable's value in the reporting database, select the "Include the final value ..." check box.
6. (Optional) To limit the variable's possible values to a specific list:
 - a. Select the check box labeled Limit values to list. IPA Designer displays an Available Values text box (see figure).

Property	Description
Name	The name by which you refer to the variable in your process. The name must begin with a letter or underscore (_). It can contain digits (0 to 9), but cannot contain any other characters, including spaces or punctuation. Best practice: If the name consists of multiple words, begin the first word with an upper-case letter and begin other words with uppercase letters.
Label	The label that identifies the variable on work item pages.
Description	A brief description of the variable and its purpose, sufficient to explain the variable to someone who knows nothing about why it was created.
Collection	Indicates whether or not the variable is a collection of values.
Security	A list of users or workgroups allowed to see the value of the variable. In Interaction Administrator, create security specification groups to include users and workgroups that can see particular data items. In IPA Designer, each variable's Security Specification property has a list box with in which the designer can choose from the Interaction Administrator groups available for that variable. For more information, see the IPA Technical Reference.
Accessibility	How the process can use the variable. For more information, see Variable Accessibility .
Include final value in reporting database	Indicates whether or not to include the currency value in the process reporting database.
Limit values to list	Indicates whether or not the user can only enter values on a specific list or within a specific range.
Minimum Value	The smallest decimal value to which the variable can be set. Optional.
Maximum Value	The largest decimal value to which the variable can be set. Optional.
Display Decimal Places	The number (1 to 28) of digits displayed to the right of the decimal point. Default value is 2. This property is specific to amount values. It behaves similarly to Decimal data types when bound to text boxes or grids on work item pages.
Initial Value	The value and currency of the variable when the process starts. The default amount is 0.00. The default currency code is the ISO 4217 code for the locale where the Designer is running.

Date

A date is a string in the format prescribed by the XML standard for date data, similar to ISO 8601.

Note: Every date, time, and date-time value has an associated time zone. Unless otherwise specified, this is the time zone of the PC running IPA Designer or, on a work item, of the user's computer. For more information, see [Configuring Time Zone Settings](#).

IPA Designer supports dates from January 1, 1800 to December 31, 2200, inclusive. Using dates or date-times outside of that range might cause your process to work incorrectly.

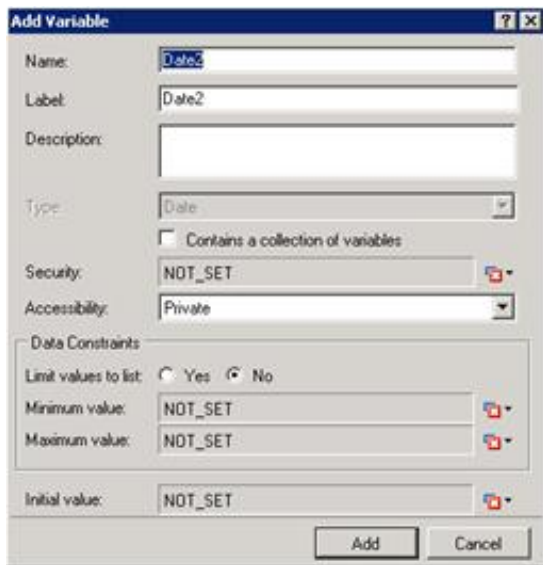
To add a date variable:

1. In the Processes list, double-click the **Variables** container in your process.

IPA Designer displays the Variables workspace in the center pane.

2. Right-click a blank area of the Variables workspace, point to **Add**, and click **Date** in the shortcut menu.

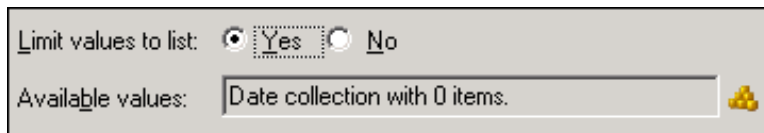
IPA Designer displays the **Add Variable** dialog box (see figure).




The 'Add Variable' dialog box contains the following fields and controls:

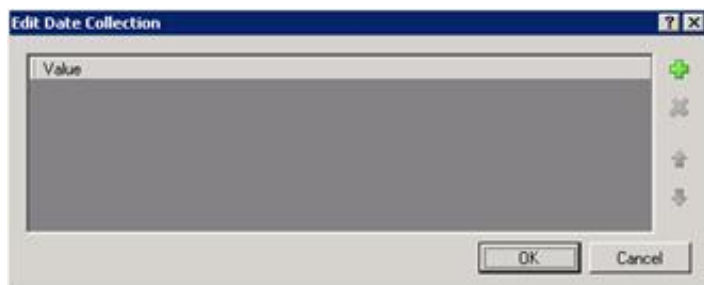
- Name:** Text box with 'Date2' entered.
- Label:** Text box with 'Date2' entered.
- Description:** Empty text box.
- Type:** Dropdown menu set to 'Date'.
- Contains a collection of variables:** Unchecked checkbox.
- Security:** Text box with 'NOT_SET' and a selection icon.
- Accessibility:** Text box with 'Private' and a selection icon.
- Data Constraints:**
 - Limit values to list:** Radio buttons for 'Yes' and 'No', with 'No' selected.
 - Minimum value:** Text box with 'NOT_SET' and a selection icon.
 - Maximum value:** Text box with 'NOT_SET' and a selection icon.
 - Initial value:** Text box with 'NOT_SET' and a selection icon.
- Buttons:** 'Add' and 'Cancel' at the bottom right.

3. Enter a name, label, and description:
 - a. In the **Name** text box, type the name of the variable. The variable name must begin with a letter.
 - b. In the **Label** text box, type the label to identify the variable on work item pages.
 - c. In the **Description** text box, type a brief description of the variable.
4. If you want to create the variable as a collection (see the section on [Collections of Variables](#)), select the check box labeled **Contains a collection of variables**.
5. Select the variable's security and accessibility settings:
 - a. In the **Security** list box, expand the list box to select from a list of [security specifications](#) previously created in Interaction Administrator.
 - b. In the **Accessibility** list, either accept the default [accessibility](#) value of Private or expand the list box to select from the list of accessibility settings.
6. (Optional) To limit the variable's possible values to a specific list of dates:
 - a. Click the **Yes** radio button after the label **Limit values to list**. IPA Designer displays an Available Values text box (see figure).




This dialog box shows the 'Limit values to list' section with the 'Yes' radio button selected. Below it, the 'Available values' text box displays 'Date collection with 0 items.' and a 'Collection' icon (a small yellow cube).


- b. Click the **Collection**  icon at the right end of the text box. IPA Designer displays the **Edit Date Collection** dialog box (see figure).





The 'Edit Date Collection' dialog box features a large list area labeled 'Value' at the top. On the right side of the list area, there are four icons: a green plus sign, a red X, a yellow cube, and a blue minus sign. At the bottom right, there are 'OK' and 'Cancel' buttons.

- c. Click **Plus**  to add a date to the collection, then select the date from the drop-down calendar.
 - d. Repeat (c) to add more dates as needed.
 - e. Click **OK** to return to the **Add Variable** dialog box.

Note: If you limit the variable's values to a list, you cannot set minimum or maximum values for the variable. In addition, you must set an initial value that appears in the list. When you select the Yes radio button for limiting the values to a list, IPA Designer automatically changes the Initial Value text box to a drop-down list and fills in the suggested initial value.

7. (Optional) To set a minimum or maximum value, click the down arrow  button at the right end of the Minimum value or Maximum value row, click **Literal**, then select a date from the drop-down calendar.
8. (Optional) If you want to set an initial value for the variable:

Note: If you previously (in Step 6) limited the variable's value to a list, then the Initial Value box is already a drop-down list. Select a value from the list, then skip directly to Step 9.

- a. Click the down arrow  button at the right end of the **Initial value** row. If the variable is a collection, click the **Collection** icon  and add items, then go to Step 9 of this procedure.
 - b. In the drop-down list, click **Literal**.
 - c. In the drop-down calendar, select a date.
9. Click Add.

IPA Designer adds your new variable to the variable list in the Variables workspace.

Properties of Date Variables

Property	Description
Name	The name by which you refer to the variable in your process. The name must begin with a letter or underscore (_). It can contain digits (0 to 9), but cannot contain any other characters, including spaces or punctuation. Best practice: If the name consists of multiple words, begin the first word with an upper-case letter and begin other words with uppercase letters.
Label	The label that identifies the variable on work item pages.
Description	A brief description of the variable and its purpose, sufficient to explain the variable to someone who knows nothing about why it was created.
Collection	Indicates whether or not the variable is a collection of values.
Security	A list of users or workgroups allowed to see the value of the variable. In Interaction Administrator, create security specification groups to include users and workgroups that can see particular data items. In IPA Designer, each variable's Security Specification property has a list box with in which the designer can choose from the Interaction Administrator groups available for that variable. For more information, see the IPA Technical Reference.
Accessibility	How the process can use the variable. For more information, see Variable Accessibility .
Limit values to list	Indicates whether or not the user can only enter values on a specific list or within a specific range.
Minimum Value	The earliest date to which the variable can be set. Optional.
Maximum Value	The latest date to which the variable can be set. Optional.
Initial Value	The value of the variable when the process starts. By default, this value is NOT_SET.

Date Time

A date-time is a string in the format prescribed by the XML standard for date data, similar to ISO 8601.

Note: Every date, time, and date-time value has an associated time zone. Unless otherwise specified, this is the time zone of the PC running IPA Designer or, on a work item, of the user's computer. For more information, see [Configuring Time Zone Settings](#).

IPA Designer supports dates from January 1, 1800 to December 31, 2200, inclusive. Using dates or date-times outside of that range might cause your process to work incorrectly.

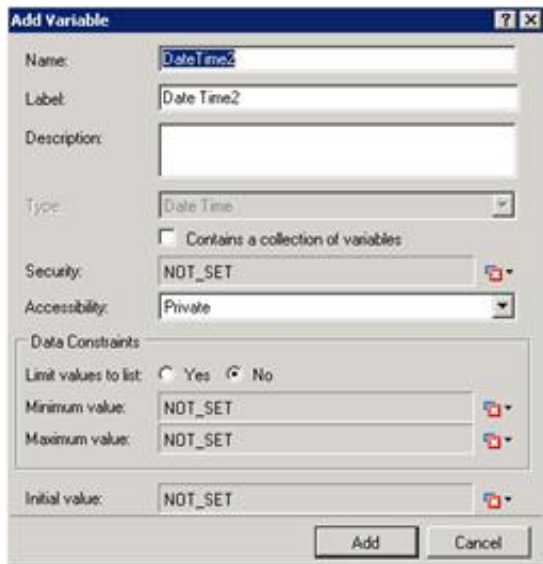
To add a date-time variable:

1. In the Processes list, double-click the **Variables** container in your process.

IPA Designer displays the Variables workspace in the center pane.


2. Right-click a blank area of the Variables workspace, point to **Add**, and click **DateTime** in the shortcut menu.

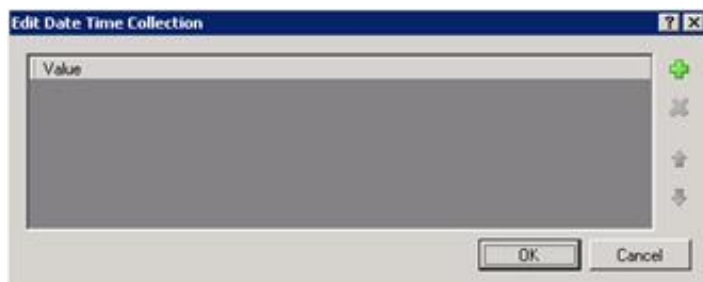
IPA Designer displays the **Add Variable** dialog box (see figure).


The 'Add Variable' dialog box is shown with the following fields: 'Name' (DateTime2), 'Label' (Date Time2), 'Description' (empty), 'Type' (Date Time), 'Contains a collection of variables' (unchecked), 'Security' (NOT_SET), 'Accessibility' (Private), 'Data Constraints' section with 'Limit values to list' (No), 'Minimum value' (NOT_SET), 'Maximum value' (NOT_SET), and 'Initial value' (NOT_SET). 'Add' and 'Cancel' buttons are at the bottom.

3. Enter a name, label, and description:
 - a. In the **Name** text box, type the name of the variable. The variable name must begin with a letter.
 - b. In the **Label** text box, type the label to identify the variable on work item pages.
 - c. In the **Description** text box, type a brief description of the variable.
4. If you want to create the variable as a collection (see the section on [Collections of Variables](#)), select the check box labeled **Contains a collection of variables**.
5. Select the variable's security and accessibility settings:
 - a. In the **Security** list box, expand the list box to select from a list of [security specifications](#) previously created in Interaction Administrator.
 - b. In the **Accessibility** list, either accept the default [accessibility](#) value of Private or expand the list box to select from the list of accessibility settings.
6. (Optional) To limit the variable's possible values to a specific list of dates:
 - a. Click the **Yes** radio button after the label **Limit values to list**. IPA Designer displays an Available Values text box (see figure).


This section shows the 'Limit values to list' area with the 'Yes' radio button selected. Below it, the 'Available values' text box displays 'Date Time collection with 0 items.' and a small yellow cube icon.

- b. Click the **Collection**  icon at the right end of the text box. IPA Designer displays the **Edit Date Collection** dialog box (see figure).



The 'Edit Date Time Collection' dialog box features a large 'Value' text area, a vertical toolbar on the right with icons for adding, deleting, and sorting, and 'OK' and 'Cancel' buttons at the bottom.

- c. Click **Plus**  to add a date-time to the collection, then select the date-time from the drop-down calendar. After you select a date-time, you can change the default time of 11:00am by clicking the time in the text box and typing the desired time.
- d. Repeat (c) to add more as needed.
- e. Click **OK** to return to the **Add Variable** dialog box.

Note: If you limit the variable's values to a list, you cannot set minimum or maximum values for the variable. In addition, you must set an initial value that appears in the list. When you select the Yes radio button for limiting the values to a list, IPA Designer automatically changes the Initial Value text box to a drop-down list and fills in the suggested initial value.

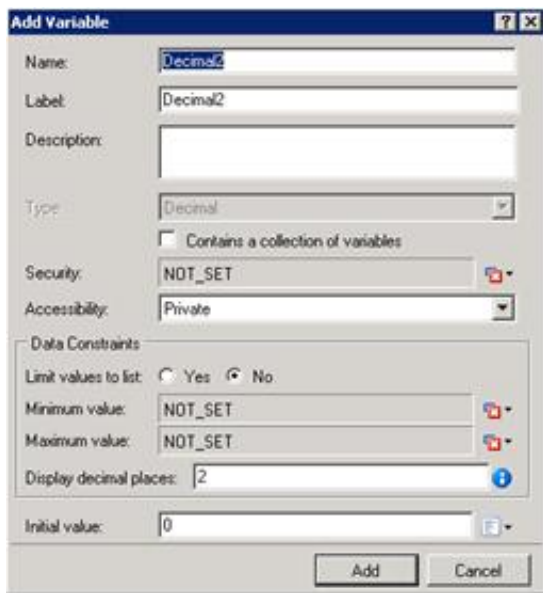
7. (Optional) To set a minimum or maximum value, click the down arrow  button at the right end of the Minimum value or Maximum value row, click **Literal**, then select a date-time from the drop-down calendar. You can then change the default time by clicking the time in the text box and typing the desired time.
8. (Optional) If you want to set an initial value for the variable:

Note: If you previously (in Step 6) limited the variable's value to a list, then the Initial Value box is already a drop-down list. Select a value from the list, then skip directly to Step 9.

- a. Click the down arrow  button at the right end of the **Initial value** row. If the variable is a collection, click the **Collection** icon  and add items, then go to Step 9 of this procedure.
 - b. In the drop-down list, click **Literal**.
 - c. In the drop-down calendar, select a date-time. You can then change the default time by clicking the time in the text box and typing the desired time.
9. Click **Add**.

IPA Designer adds your new variable to the variable list in the Variables workspace.

Properties of Date Time Variables

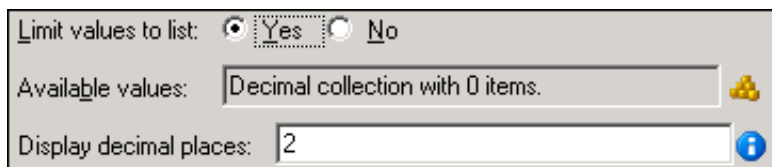


The 'Add Variable' dialog box contains the following fields and options:

- Name:** Text box containing 'Decimal2'.
- Label:** Text box containing 'Decimal2'.
- Description:** Empty text box.
- Type:** Dropdown menu set to 'Decimal'.
- Contains a collection of variables:** Unchecked checkbox.
- Security:** Dropdown menu set to 'NOT_SET'.
- Accessibility:** Dropdown menu set to 'Private'.
- Data Constraints:**
 - Limit values to list:** Radio buttons for 'Yes' and 'No', with 'No' selected.
 - Minimum value:** Text box containing 'NOT_SET'.
 - Maximum value:** Text box containing 'NOT_SET'.
 - Display decimal places:** Text box containing '2'.
 - Initial value:** Text box containing '0'.


Buttons at the bottom: 'Add' and 'Cancel'.

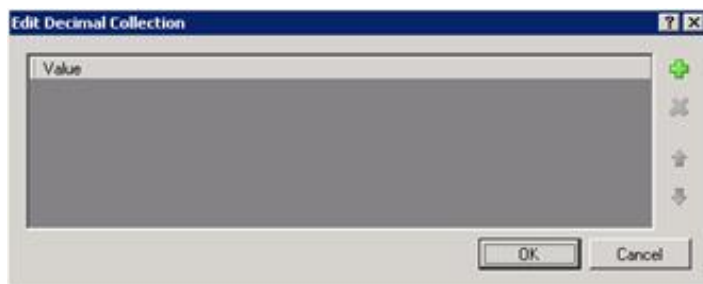
3. Enter a name, label, and description:
 - a. In the **Name** text box, type the name of the variable. The variable name must begin with a letter.
 - b. In the **Label** text box, type the label to identify the variable on work item pages.
 - c. In the **Description** text box, type a brief description of the variable.
4. If you want to create the variable as a collection (see the section on [Collections of Variables](#)), select the check box labeled **Contains a collection of variables**.
5. Select the variable's security and accessibility settings:
 - a. In the **Security** list box, expand the list box to select from a list of [security specifications](#) previously created in Interaction Administrator.
 - b. In the **Accessibility** list, either accept the default [accessibility](#) value of Private or expand the list box to select from the list of accessibility settings.
6. (Optional) To limit the variable's possible values to a specific list:
 - a. Select the check box labeled **Limit values to list**. IPA Designer displays an Available Values text box (see figure).



The 'Limit values to list' dialog box contains the following fields and options:


- Limit values to list:** Radio buttons for 'Yes' and 'No', with 'Yes' selected.
- Available values:** Text box containing 'Decimal collection with 0 items.' with a yellow collection icon on the right.
- Display decimal places:** Text box containing '2' with an information icon on the right.

- b. Click the **Collection**  icon at the right end of the text box. IPA Designer displays the **Edit Decimal Collection** dialog box (see figure).





The 'Edit Decimal Collection' dialog box contains the following elements:

- Value:** A large list box for entering decimal values.
- Buttons:** 'OK' and 'Cancel' at the bottom right.
- Icons:** A green plus icon for adding a row, and minus, up, and down arrows for managing the list.

- c. Click **Plus**  to add a row to the list. Double-click the row, type a decimal value to add, then press **Enter**.
 - d. Repeat (c) to add more decimal values as needed.
 - e. (Optional) Type the desired number of decimal places in the **Display decimal places** text box.
 - f. Click **OK** to return to the **Add Variable** dialog box.

Note: If you limit the variable's values to a list, you cannot set minimum or maximum values for the variable. In addition, you must set an initial value that appears in the list.

- (Optional) To set a minimum or maximum value click the down arrow  button at the right of the Minimum or Maximum value row, then enter the desired value in the text box.
- (Optional) To change the default display and precision of two decimal places, enter the desired integer value in the **Display decimal places** text box.
- (Optional) If you want to set an initial value for the variable, type the value in the Initial Value box.

If the variable is a collection, click the **Collection** icon  and add items, then go to Step 10 of this procedure.

- Click **Add**.

IPA Designer adds your new variable to the variable list in the Variables workspace.

Properties of Decimal Variables

Property	Description
Name	The name by which you refer to the variable in your process. The name must begin with a letter or underscore (_). It can contain digits (0 to 9), but cannot contain any other characters, including spaces or punctuation. Best practice: If the name consists of multiple words, begin the first word with an upper-case letter and begin other words with uppercase letters.
Label	The label that identifies the variable on work item pages.
Description	A brief description of the variable and its purpose, sufficient to explain the variable to someone who knows nothing about why it was created.
Collection	Indicates whether or not the variable is a collection of values.
Security	A list of users or workgroups allowed to see the value of the variable. In Interaction Administrator, create security specification groups to include users and workgroups that can see particular data items. In IPA Designer, each variable's Security Specification property has a list box with in which the designer can choose from the Interaction Administrator groups available for that variable. For more information, see the IPA Technical Reference.
Accessibility	How the process can use the variable. For more information, see Variable Accessibility .
Limit values to list	Indicates whether or not the user can only enter values on a specific list or within a specific range.
Minimum Value	The smallest decimal value to which the variable can be set. Optional.
Maximum Value	The largest decimal value to which the variable can be set. Optional.
Display Decimal Places	The number of digits displayed to the right of the decimal point. This property is specific to amount values. It behaves similarly to Currency data types when bound to text boxes or grids on work item pages.
Initial Value	The value of the variable when the process starts. By default, this value is 0.00.

Duration

A duration is a representation of time expressed as a string in a *subset* of the format prescribed by the XML date data standard. Durations have a composite value of days, hours, minutes, and seconds. The length of the duration is the sum total of days, hours, minutes, and seconds values.

You can use a duration value to determine how long a "portion" of a process should [wait](#) before proceeding.

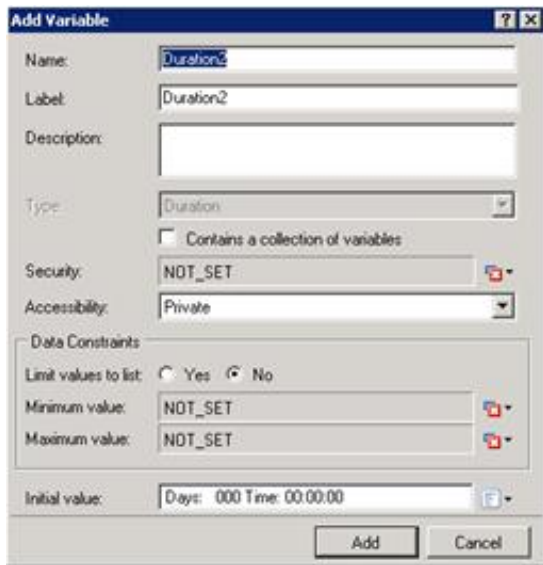
To add a duration variable:

- In the Processes list, double-click the **Variables** container in your process.

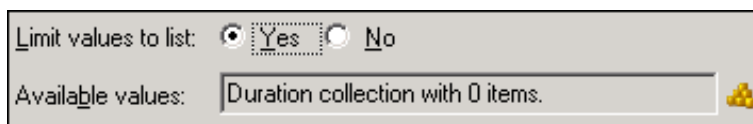
IPA Designer displays the Variables workspace in the center pane.


2. Right-click a blank area of the Variables workspace, point to **Add**, and click **Duration** in the shortcut menu.

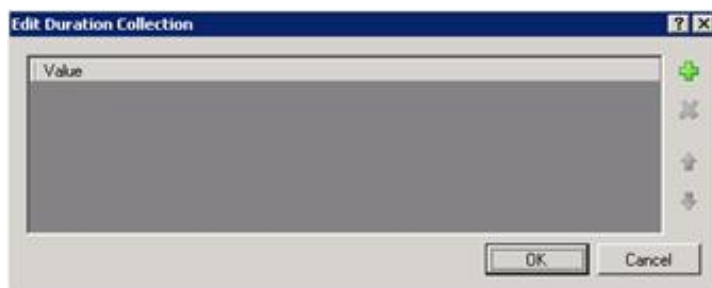
IPA Designer displays the **Add Variable** dialog box (see figure).


The 'Add Variable' dialog box is shown with the following fields: 'Name' (Duration2), 'Label' (Duration2), 'Description' (empty), 'Type' (Duration), 'Contains a collection of variables' (unchecked), 'Security' (NOT_SET), 'Accessibility' (Private), 'Data Constraints' (Limit values to list: No, Minimum value: NOT_SET, Maximum value: NOT_SET), and 'Initial value' (Days: 000 Time: 00:00:00). There are 'Add' and 'Cancel' buttons at the bottom.

3. Enter a name, label, and description:
 - a. In the **Name** text box, type the name of the variable. The variable name must begin with a letter.
 - b. In the **Label** text box, type the label to identify the variable on work item pages.
 - c. In the **Description** text box, type a brief description of the variable.
4. If you want to create the variable as a collection (see the section on [Collections of Variables](#)), select the check box labeled **Contains a collection of variables**.
5. Select the variable's security and accessibility settings:
 - a. In the **Security** list box, expand the list box to select from a list of [security specifications](#) previously created in Interaction Administrator.
 - b. In the **Accessibility** list, either accept the default [accessibility](#) value of Private or expand the list box to select from the list of accessibility settings.
6. (Optional) To limit the variable's possible values to a specific list:
 - a. Click the **Yes** radio button after the label **Limit values to list**. IPA Designer displays an Available Values text box (see figure).

This section shows the 'Limit values to list' area with the 'Yes' radio button selected. Below it is a text box labeled 'Available values:' containing the text 'Duration collection with 0 items.' and a small yellow cube icon.

- b. Click the **Collection**  icon at the right end of the text box. IPA Designer displays the **Edit Duration Collection** dialog box (see figure).


The 'Edit Duration Collection' dialog box features a large list area with a single row labeled 'Value'. To the right of the list are four icons: a green plus sign, a green minus sign, a green star, and a green trash can. At the bottom are 'OK' and 'Cancel' buttons.

- c. Click **Plus**  to add a row to the list. Double-click the row to edit it. In the appropriate places, type the number of days, hours, minutes, and seconds in the duration. Then press **Enter**.
 - d. Repeat (c) to add more duration values as needed.


- e. Click **OK** to return to the **Add Variable** dialog box.

Note: If you limit the variable's values to a list, you cannot set minimum or maximum values for the variable. In addition, you must set an initial value that appears in the list.

7. (Optional) To set a minimum or maximum value:

- Click the down arrow  button at the right end of the Minimum value or Maximum value row and click **Literal**.
- Type the duration's days, hours, minutes, and seconds in the text box.
- Press **Enter**.

8. (Optional) If you want to set an initial value for the variable:

- Click the down arrow  button at the right end of the **Initial value** row.

If the variable is a collection, click the **Collection** icon  and add items, then go to Step 9 of this procedure.

- In the drop-down list, click **Literal**.
- In the text box, type the duration's days, hours, minutes, and seconds.
- Press **Enter**.

9. Click **Add**.

IPA Designer adds your new variable to the variable list in the Variables workspace.

Properties of Duration Variables

Property	Description
Name	The name by which you refer to the variable in your process. The name must begin with a letter or underscore (_). It can contain digits (0 to 9), but cannot contain any other characters, including spaces or punctuation. Best practice: If the name consists of multiple words, begin the first word with an upper-case letter and begin other words with uppercase letters.
Label	The label that identifies the variable on work item pages.
Description	A brief description of the variable and its purpose, sufficient to explain the variable to someone who knows nothing about why it was created.
Collection	Indicates whether or not the variable is a collection of values.
Security	A list of users or workgroups allowed to see the value of the variable. In Interaction Administrator, create security specification groups to include users and workgroups that can see particular data items. In IPA Designer, each variable's Security Specification property has a list box with in which the designer can choose from the Interaction Administrator groups available for that variable. For more information, see the IPA Technical Reference.
Accessibility	How the process can use the variable. For more information, see Variable Accessibility .
Limit values to list	Indicates whether or not the user can only enter values on a specific list or within a specific range.
Minimum Value	The shortest period of time to which the variable can be set. Optional.
Maximum Value	The longest period of time to which the variable can be set. Optional.
Initial Value	The value of the variable when the process starts. Unless the variable has a larger minimum value, the initial value is zero days, zero hours, zero minutes, and zero seconds. You can change this value. IPA treats the variable as having its initial value unless a process or user explicitly changes it.

Integer

An integer is a whole number such as 987 or 5. Use integer values to represent complete objects and processes that cannot be subdivided, such as the number of calls waiting or the number of agents on duty. An integer is an eight-byte value, which means that

it can hold positive or negative numbers of practically any size. The range of the Integer data type is -2^{63} to $+2^{63} - 1$.

Warning: If you try to enter a decimal number instead of a whole number, IPA Designer will not stop you. However, it will "truncate" the decimal digits and change what you entered into a whole number: for example, 1.3 or 1.7 would be truncated into simply 1. If you need to enter a decimal number, be sure to use a Decimal-type variable.

Prior to IC 4.0 Service Update 1, dividing two integers gave an integer result, such as $2/5 = 0$. Service Update 1 changes that behavior to give a decimal result when the calculation requires it, such as $2/5 = 0.4$.

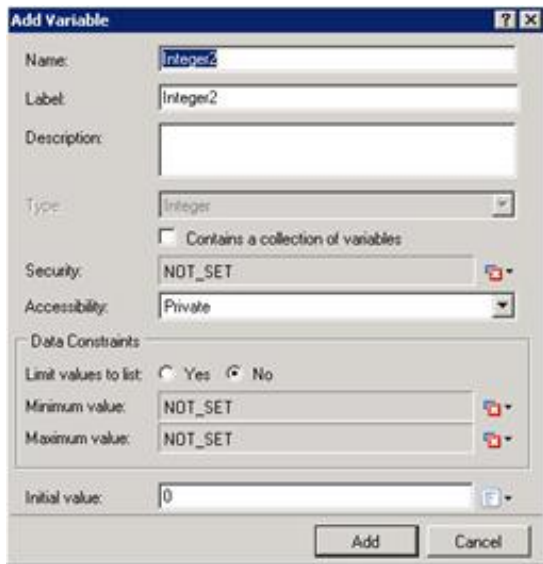
To add an integer variable:

1. In the Processes list, double-click the **Variables** container in your process.

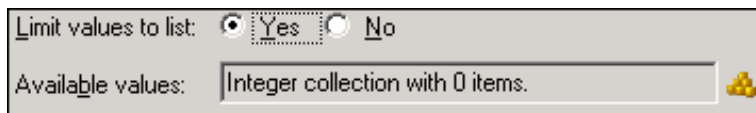
IPA Designer displays the Variables workspace in the center pane.

2. Right-click a blank area of the Variables workspace, point to **Add**, and click **Integer** in the shortcut menu.

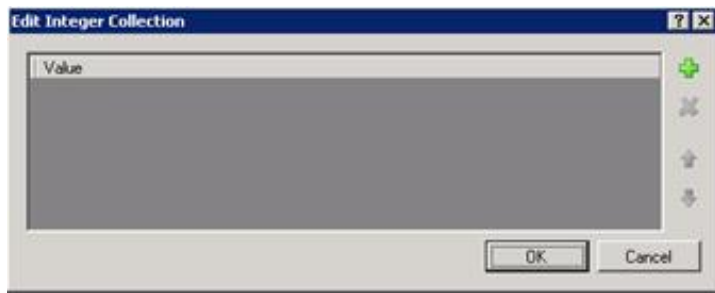
IPA Designer displays the **Add Variable** dialog box (see figure).


The 'Add Variable' dialog box is shown with the following fields: 'Name' (Integer2), 'Label' (Integer2), 'Description' (empty), 'Type' (Integer), 'Contains a collection of variables' (unchecked), 'Security' (NOT_SET), 'Accessibility' (Private), 'Data Constraints' (Limit values to list: No, Minimum value: NOT_SET, Maximum value: NOT_SET), and 'Initial value' (0). There are 'Add' and 'Cancel' buttons at the bottom.

3. Enter a name, label, and description:
 - a. In the **Name** text box, type the name of the variable. The variable name must begin with a letter.
 - b. In the **Label** text box, type the label to identify the variable on work item pages.
 - c. In the **Description** text box, type a brief description of the variable.
4. If you want to create the variable as a collection (see the section on [Collections of Variables](#)), select the check box labeled **Contains a collection of variables**.
5. Select the variable's security and accessibility settings:
 - a. In the **Security** list box, expand the list box to select from a list of [security specifications](#) previously created in Interaction Administrator.
 2. In the **Accessibility** list, either accept the default [accessibility](#) value of Private or expand the list box to select from the list of accessibility settings.
6. (Optional) To limit the variable's possible values to a specific list:
 - a. Click the **Yes** radio button after the label **Limit values to list**. IPA Designer displays an Available Values text box (see figure).

This section shows the 'Limit values to list' area with the 'Yes' radio button selected. Below it is a text box labeled 'Available values:' containing the text 'Integer collection with 0 items.' and a small yellow cube icon.


- b. Click the **Collection**  icon at the right end of the text box. IPA Designer displays the **Edit Integer Collection** dialog box (see figure).



- c. Click **Plus**  to add a row to the list. Double-click the row, type an integer value to add, then press **Enter**.
- d. Repeat (c) to add more integer values as needed.
- e. Click **OK** to return to the **Add Variable** dialog box.

Note: If you limit the variable's values to a list, you cannot set minimum or maximum values for the variable. In addition, you must set an initial value that appears in the list.


7. (Optional) To set a minimum or maximum value, type the desired value(s) into the **Minimum value** or **Maximum value** text boxes.
8. (Optional) If you want to set an initial value for the variable, type the desired value into the **Initial value** text box.

If the variable is a collection, click the **Collection** icon  and add items, then go to Step 9 of this procedure.

To set the initial value to *Not Set*, simply delete the contents of the text box and leave it empty.

9. Click **Add**.

IPA Designer adds your new variable to the variable list in the Variables workspace.

Note: In the unlikely event that you try to enter a value exceeding the range of the Integer data type, IPA Designer will immediately display an error icon  and require you to enter an acceptable value.

Properties of Integer Variables

Property	Description
Name	The name by which you refer to the variable in your process. The name must begin with a letter or underscore (_). It can contain digits (0 to 9), but cannot contain any other characters, including spaces or punctuation. Best practice: If the name consists of multiple words, begin the first word with an upper-case letter and begin other words with uppercase letters.
Label	The label that identifies the variable on work item pages.
Description	A brief description of the variable and its purpose, sufficient to explain the variable to someone who knows nothing about why it was created.
Collection	Indicates whether or not the variable is a collection of values.
Security	A list of users or workgroups allowed to see the value of the variable. In Interaction Administrator, create security specification groups to include users and workgroups that can see particular data items. In IPA Designer, each variable's Security Specification property has a list box with in which the designer can choose from the Interaction Administrator groups available for that variable. For more information, see the IPA Technical Reference.
Accessibility	How the process can use the variable. For more information, see Variable Accessibility .
Limit values to list	Indicates whether or not the user can only enter values on a specific list or within a specific range.
Minimum Value	The smallest integer value to which the variable can be set. Optional.
Maximum Value	The largest integer value to which the variable can be set. Optional.
Initial Value	The value of the variable when the process starts. For an Integer variable, the initial value 0. You can change this value. IPA treats the variable as having its initial value unless a process or user explicitly changes it.

Mailbox

A mailbox represents an e-mail address to which IPA will send a notification or work item. This is a text string that must include exactly one "at" character (@) and one period. It must be at least three characters. IPA Designer does not verify that the e-mail addresses exist, only that the format is correct.

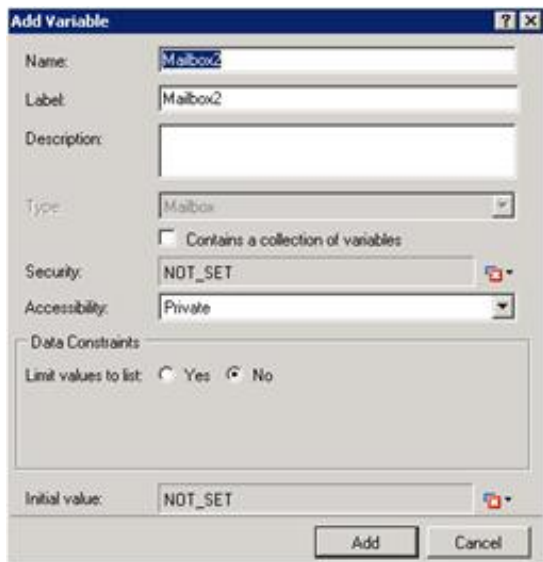
To add a mailbox variable:

1. In the Processes list, double-click the **Variables** container in your process.

IPA Designer displays the Variables workspace in the center pane.

2. Right-click a blank area of the Variables workspace, point to **Add**, and click **Integer** in the shortcut menu.

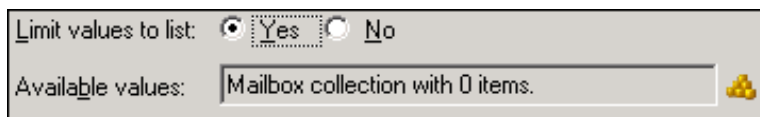
IPA Designer displays the **Add Variable** dialog box (see figure).




The 'Add Variable' dialog box contains the following fields and controls:

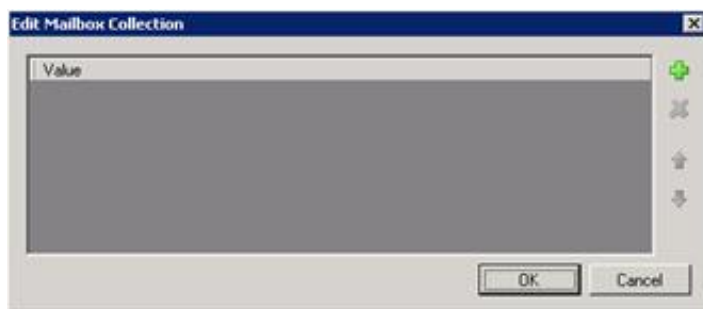
- Name:** Text box containing 'Mailbox2'.
- Label:** Text box containing 'Mailbox2'.
- Description:** Empty text box.
- Type:** Dropdown menu set to 'Mailbox'.
- Contains a collection of variables:** Unchecked checkbox.
- Security:** Text box containing 'NOT_SET' with a selection icon.
- Accessibility:** Dropdown menu set to 'Private'.
- Data Constraints:**
 - Limit values to list:** Radio buttons for 'Yes' and 'No', with 'No' selected.
- Initial value:** Text box containing 'NOT_SET' with a selection icon.
- Buttons:** 'Add' and 'Cancel' at the bottom right.

3. Enter a name, label, and description:
 - a. In the **Name** text box, type the name of the variable. The variable name must begin with a letter.
 - b. In the **Label** text box, type the label to identify the variable on work item pages.
 - c. In the **Description** text box, type a brief description of the variable.
4. If you want to create the variable as a collection (see the section on [Collections of Variables](#)), select the check box labeled **Contains a collection of variables**.
5. Select the variable's security and accessibility settings:
 - a. In the **Security** list box, expand the list box to select from a list of [security specifications](#) previously created in Interaction Administrator.
 - b. In the **Accessibility** list, either accept the default [accessibility](#) value of Private or expand the list box to select from the list of accessibility settings.
6. (Optional) To limit the variable's possible values to a specific list:
 - a. Click the **Yes** radio button after the label **Limit values to list**. IPA Designer displays an Available Values text box (see figure).




The 'Limit values to list' section shows the 'Yes' radio button selected. Below it, the 'Available values' text box contains 'Mailbox collection with 0 items.' and a 'Collection' icon (a small yellow cube).

- b. Click the **Collection**  icon at the right end of the text box. IPA Designer displays the **Edit Mailbox Collection** dialog box (see figure).




The 'Edit Mailbox Collection' dialog box features a large list area with a single header row labeled 'Value'. To the right of the list are three icons: a green plus sign (Add), a grey X (Remove), and a downward arrow (Sort). At the bottom are 'OK' and 'Cancel' buttons.

- c. Click **Plus**  to add a row to the list. Double-click the row, type an integer value to add, then press **Enter**.
 - d. Repeat (c) to add more integer values as needed.

Note: If you limit the values to a list, you must set an initial value that appears in the list.

- e. Click **OK** to return to the **Add Variable** dialog box.

7. (Optional) If you want to set an initial value for the variable, type the desired value into the **Initial value** text box.

If the variable is a collection, click the **Collection** icon  and add items, then go to Step 8 of this procedure.

8. Click **Add**.

IPA Designer adds your new variable to the variable list in the Variables workspace.

Properties of Mailbox Variables

Property	Description
Name	The name by which you refer to the variable in your process. The name must begin with a letter or underscore (_). It can contain digits (0 to 9), but cannot contain any other characters, including spaces or punctuation. Best practice: If the name consists of multiple words, begin the first word with an upper-case letter and begin other words with uppercase letters.
Label	The label that identifies the variable on work item pages.
Description	A brief description of the variable and its purpose, sufficient to explain the variable to someone who knows nothing about why it was created.
Collection	Indicates whether or not the variable is a collection of values.
Security	A list of users or workgroups allowed to see the value of the variable. In Interaction Administrator, create security specification groups to include users and workgroups that can see particular data items. In IPA Designer, each variable's Security Specification property has a list box with in which the designer can choose from the Interaction Administrator groups available for that variable. For more information, see the IPA Technical Reference.
Accessibility	How the process can use the variable. For more information, see Variable Accessibility .
Limit values to list	Indicates whether or not the user can only enter values on a specific list or within a specific range.
Available Values	A collection of e-mail addresses that can be used as the variable's value.
Initial Value	The value of the variable when the process starts. By default, this value is NOT_SET.

Skill

A skill variable represents a Customer Interaction Center skill (such as a language or certification) possessed by one or more members of an ACD workgroup. In IPA, a skill requirement routes a work item to an eligible recipient. Skills are established and configured in Interaction Administrator.

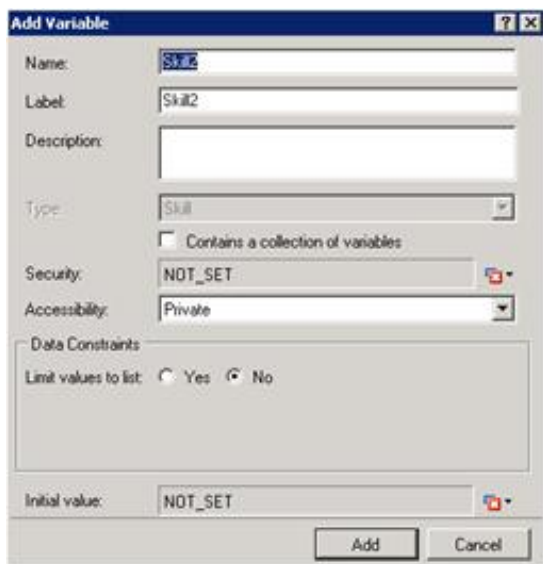
To add a skill variable:

1. In the Processes list, double-click the **Variables** container in your process.

IPA Designer displays the Variables workspace in the center pane.

2. Right-click a blank area of the Variables workspace, point to **Add**, and click **Skill** in the shortcut menu.

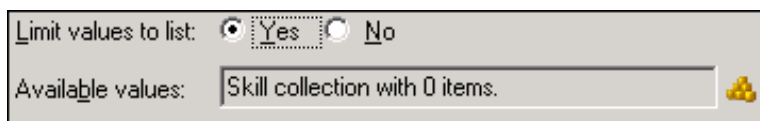
IPA Designer displays the **Add Variable** dialog box (see figure).




The 'Add Variable' dialog box contains the following fields and controls:

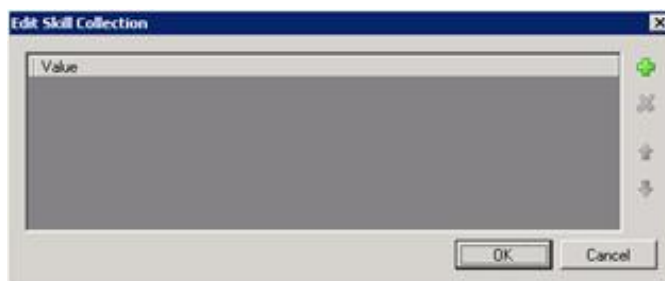
- Name:** Text box with 'Skill' entered.
- Label:** Text box with 'Skill2' entered.
- Description:** Empty text box.
- Type:** Dropdown menu with 'Skill' selected.
- Contains a collection of variables:** Unchecked checkbox.
- Security:** Text box with 'NOT_SET' and a selection icon.
- Accessibility:** Text box with 'Private' and a dropdown arrow.
- Data Constraints:** Section with 'Limit values to list:' and two radio buttons: 'Yes' (selected) and 'No'.
- Initial value:** Text box with 'NOT_SET' and a selection icon.
- Buttons:** 'Add' and 'Cancel' at the bottom right.

3. Enter a name, label, and description:
 - a. In the **Name** text box, type the name of the variable. The variable name must begin with a letter.
 - b. In the **Label** text box, type the label to identify the variable on work item pages.
 - c. In the **Description** text box, type a brief description of the variable.
4. If you want to create the variable as a collection (see the section on [Collections of Variables](#)), select the check box labeled **Contains a collection of variables**.
5. Select the variable's security and accessibility settings:
 - a. In the **Security** list box, expand the list box to select from a list of [security specifications](#) previously created in Interaction Administrator.
 - b. In the **Accessibility** list, either accept the default [accessibility](#) value of Private or expand the list box to select from the list of accessibility settings.
6. (Optional) To limit the variable's possible values to a specific list:
 - a. Click the **Yes** radio button after the label **Limit values to list**. IPA Designer displays an Available Values text box (see figure).




This dialog box shows the 'Limit values to list' section with the 'Yes' radio button selected. Below it is a text box labeled 'Available values:' containing the text 'Skill collection with 0 items.' and a 'Collection' icon (a small yellow cube) on the right.

- b. Click the **Collection**  icon at the right end of the text box. IPA Designer displays the **Edit Skill Collection** dialog box (see figure).



The 'Edit Skill Collection' dialog box features a large list area with a single row labeled 'Value'. To the right of the list are four icons: a green plus sign (Add), a red X (Remove), a double arrow (Move Up), and a single arrow (Move Down). At the bottom are 'OK' and 'Cancel' buttons.



- c. Click **Plus**  to add a row to the list. Double-click the row, type a skill value to add, then press **Enter**. You can only add skills an administrator previously defined in Interaction Administrator.
 - d. Repeat (c) to add more skill values as needed.

Note: If you limit the values to a list, you must set an initial value that appears in the list.

- e. Click **OK** to return to the **Add Variable** dialog box.

7. (Optional) If you want to set an initial value for the variable:

Note: You need appropriate access rights to use this feature. Contact your administrator for more information.

- For a single variable (not a collection), click the down arrow  button at the right end of the Initial Value box, click **Literal**, and select a skill from the drop-down list.
- For a collection, click the **Collection**  icon at the right end of Initial Value box and use the Edit Skill Collection dialog box to add initial skill values to the collection.

8. Click **Add**.

IPA Designer adds your new variable to the variable list in the Variables workspace.

Properties of Skill Variables

Property	Description
Name	The name by which you refer to the variable in your process. The name must begin with a letter or underscore (_). It can contain digits (0 to 9), but cannot contain any other characters, including spaces or punctuation. Best practice: If the name consists of multiple words, begin the first word with an upper-case letter and begin other words with uppercase letters.
Label	The label that identifies the variable on work item pages.
Description	A brief description of the variable and its purpose, sufficient to explain the variable to someone who knows nothing about why it was created.
Collection	Indicates whether or not the variable is a collection of values.
Security	A list of users or workgroups allowed to see the value of the variable. In Interaction Administrator, create security specification groups to include users and workgroups that can see particular data items. In IPA Designer, each variable's Security Specification property has a list box with in which the designer can choose from the Interaction Administrator groups available for that variable. For more information, see the IPA Technical Reference.
Accessibility	How the process can use the variable. For more information, see Variable Accessibility .
Limit values to list	Indicates whether or not the user can only enter values on a specific list or within a specific range.
Available Values	A collection of skills that can be used as the variable's value.
Initial Value	The value of the variable when the process starts. By default, this value is NOT_SET.

String

This is a standard text string or a custom series of alphabetical, numerical, and symbolic characters. Its size is limited only by available system resources.

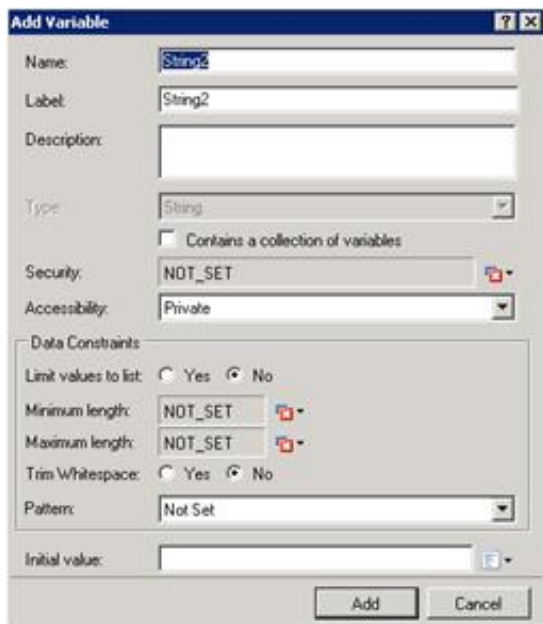
To add a string variable:

1. In the Processes list, double-click the **Variables** container in your process.

IPA Designer displays the Variables workspace in the center pane.

2. Right-click a blank area of the Variables workspace, point to **Add**, and click **String** in the shortcut menu.

IPA Designer displays the **Add Variable** dialog box (see figure).

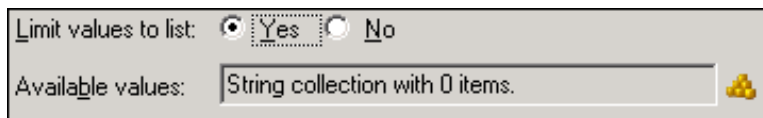


The 'Add Variable' dialog box is shown. It has fields for Name (String2), Label (String2), and Description. The Type is set to String. There is a checkbox for 'Contains a collection of variables'. The Security is set to NOT_SET and Accessibility is set to Private. Under Data Constraints, there are radio buttons for 'Limit values to list' (Yes/No), fields for Minimum and Maximum length (both NOT_SET), radio buttons for 'Trim Whitespace' (Yes/No), and a Pattern field (Not Set). An Initial value field is at the bottom. Add and Cancel buttons are at the bottom right.

3. Enter basic information about the variable:
 - a. In the **Name** text box, type the name of the variable. The variable name must begin with a letter.
 - b. In the **Label** text box, type the label to identify the variable on work item pages.
 - c. In the **Description** text box, type a brief description of the variable.
 - d. If you want to create the variable as a collection (see the section on [Collections of Variables](#)), select the check box labeled **Contains a collection of variables**. Note that if you select this check box, the Initial Value box at the bottom of the dialog adds a Collection icon.
4. Select the variable's security and accessibility settings:
 - a. In the **Security** list box, expand the list box to select from a list of [security specifications](#) previously created in Interaction Administrator.
 - b. In the **Accessibility** list, either accept the default [accessibility](#) value of Private or expand the list box to select from the list of accessibility settings.
5. (Optional) To limit the variable's possible values to a specific list:

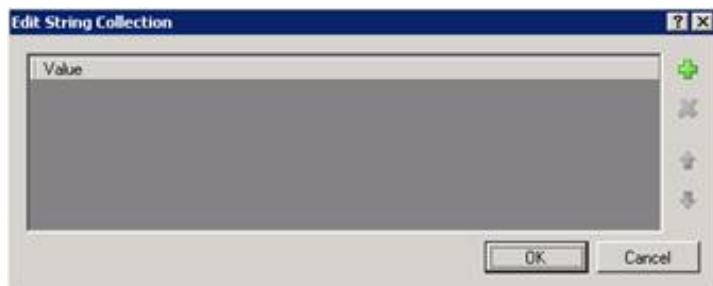
Note: String values in the list are case-sensitive. Therefore, JOE and Joe are different values.

- a. Click the **Yes** radio button after the label **Limit values to list**. IPA Designer displays an Available Values text box (see figure).




The 'Limit values to list' section shows the 'Yes' radio button selected. Below it, the 'Available values' text box contains 'String collection with 0 items.' and a Collection icon (three yellow cubes).

- b. Click the **Collection**  icon at the right end of the text box. IPA Designer displays the **Edit String Collection** dialog box (see figure).




The 'Edit String Collection' dialog box is shown. It has a list box with one row labeled 'Value'. To the right of the list box are four icons: a green plus sign (Add), a green minus sign (Remove), a green double arrow (Move Up), and a green single arrow (Move Down). At the bottom are OK and Cancel buttons.

- c. Click **Plus**  to add a row to the list. Double-click the row, type a text string to add, then press **Enter**.
- d. Repeat (c) to add more text strings as needed.

e. Click **OK** to return to the **Add Variable** dialog box.

Note: If you limit the text string's values to a list, you cannot set minimum or maximum lengths for the text string. In addition, you must set an initial value that appears in the list.

6. (Optional) To set a minimum or maximum length, type the desired length(s) into the **Minimum length** or **Maximum length** text boxes.
7. (Optional) To delete spaces at the right end of the string, select the **Trim Whitespace** check box.
8. (Optional) To add a pattern for basic error checking, follow the steps in [Pattern Matching with String Variables](#).
9. (Optional) If you want to set an initial value for the text string, type it in the **Initial value** text box. If you made the variable a collection, click the **Collection**  icon and add items to the collection.
10. Click **Add**.

IPA Designer adds your new variable to the variable list in the Variables workspace.

Properties of String Variables

Property	Description
Name	The name by which you refer to the variable in your process. The name must begin with a letter or underscore (_). It can contain digits (0 to 9), but cannot contain any other characters, including spaces or punctuation. Best practice: If the name consists of multiple words, begin the first word with an upper-case letter and begin other words with uppercase letters.
Label	The label that identifies the variable on work item pages.
Description	A brief description of the variable and its purpose, sufficient to explain the variable to someone who knows nothing about why it was created.
Collection	Indicates whether or not the variable is a collection of values.
Security	A list of users or workgroups allowed to see the value of the variable. In Interaction Administrator, create security specification groups to include users and workgroups that can see particular data items. In IPA Designer, each variable's Security Specification property has a list box with in which the designer can choose from the Interaction Administrator groups available for that variable. For more information, see the IPA Technical Reference.
Accessibility	How the process can use the variable. For more information, see Variable Accessibility .
Limit values to list	Indicates whether or not the user can only enter strings on a specific list.
Minimum Length	The minimum number of characters that the variable can hold.
Maximum Length	The maximum number of characters that the variable can hold.
Trim Whitespace	A yes/no value that shows whether or not IPA should trim off any spaces at the right end of the text string.
Initial Value	The value of the variable when the process starts. By default, this value is "" (an empty string). Note that an empty string is different from a string with a value of NOT SET.

Time

A time is a string expressed in the format prescribed by the XML time data standard. Time variable values do not contain a date designation; they could apply to any arbitrary date. To specify both a date and time, use the Date Time variable instead.

Note: Every date, time, and date-time value has an associated time zone. Unless otherwise specified, this is the time zone of the PC running IPA Designer or, on a work item, of the user's computer. For more information, see [Configuring Time Zone Settings](#).

The IPA Web Client displays times using the UTC time zone (Greenwich mean time), while the standard client and Process Monitor display times with the process automation server's local time zone.

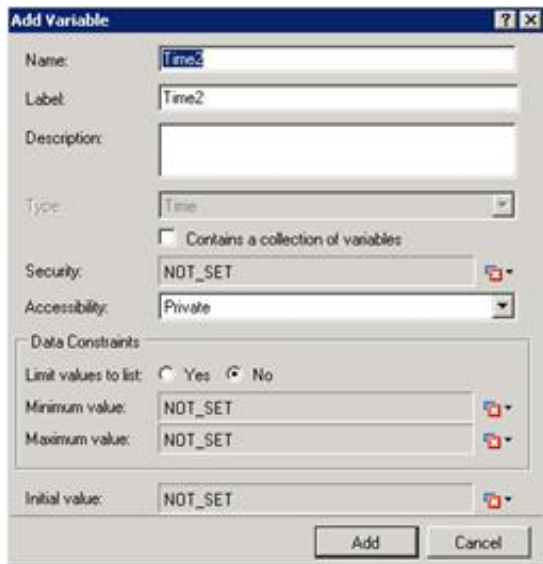
To add a time variable:

1. In the Processes list, double-click the **Variables** container in your process.

IPA Designer displays the Variables workspace in the center pane.

2. Right-click a blank area of the Variables workspace, point to **Add**, and click **Time** in the shortcut menu.

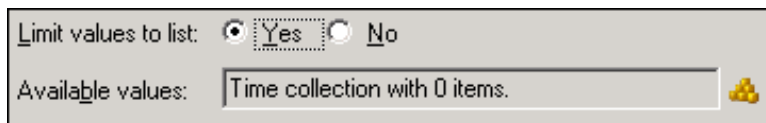
IPA Designer displays the **Add Variable** dialog box (see figure).


The 'Add Variable' dialog box is shown with the following fields: 'Name' (Time2), 'Label' (Time2), 'Description' (empty), 'Type' (Time), 'Contains a collection of variables' (unchecked), 'Security' (NOT_SET), 'Accessibility' (Private), 'Data Constraints' section with 'Limit values to list' (No), 'Minimum value' (NOT_SET), 'Maximum value' (NOT_SET), and 'Initial value' (NOT_SET). 'Add' and 'Cancel' buttons are at the bottom.

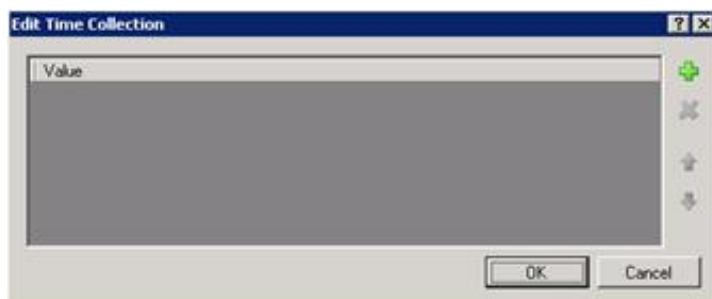
3. Enter a name, label, and description:
 - a. In the **Name** text box, type the name of the variable. The variable name must begin with a letter.
 - b. In the **Label** text box, type the label to identify the variable on work item pages.
 - c. In the **Description** text box, type a brief description of the variable.


If you want to create the variable as a collection (see the section on [Collections of Variables](#)), select the check box labeled **Contains a collection of variables**.

4. Select the variable's security and accessibility settings:
 - a. In the **Security** list box, expand the list box to select from a list of [security specifications](#) previously created in Interaction Administrator.
 - b. In the **Accessibility** list, either accept the default [accessibility](#) value of Private or expand the list box to select from the list of accessibility settings.
5. (Optional) To limit the variable's possible values to a specific list:
 - a. Click the **Yes** radio button after the label **Limit values to list**. IPA Designer displays an Available Values text box (see figure).

This section shows the 'Limit values to list' area with the 'Yes' radio button selected. Below it is an 'Available values' text box containing 'Time collection with 0 items.' and a 'Collection' icon (three yellow cubes).


- b. Click the **Collection**  icon at the right end of the text box. IPA Designer displays the **Edit Time Collection** dialog box (see figure).

The 'Edit Time Collection' dialog box features a large 'Value' text area, a vertical toolbar on the right with icons for adding, deleting, and other operations, and 'OK' and 'Cancel' buttons at the bottom.


- c. Click **Plus**  to add a row to the list. Double-click the row to edit it. In the appropriate places, type the hour, minute, and AM or PM. Then press **Enter**.
- d. Repeat (c) to add more time values as needed.
- e. Click **OK** to return to the **Add Variable** dialog box.

Note: If you limit the variable's values to a list, you cannot set minimum or maximum values for the variable. In addition, you must set an initial value that appears in the list.

6. (Optional) To set a minimum or maximum value:

- a. Click the down arrow  button at the right end of the Minimum value or Maximum value row and click **Literal**.
- b. Type the minimum (earliest) or maximum (latest) hour, minute, and AM or PM value in the text box.
- c. Press **Enter**.

7. (Optional) If you want to set an initial value for the variable:

- a. Click the down arrow  button at the right end of the **Initial value** row. If the variable is a collection, click the **Collection** icon and add items, then go to Step 9 of this procedure.
- b. In the drop-down list, click **Literal**.
- c. In the text box, type the time's hour, minute, and AM or PM value.
- d. Press **Enter**.

8. Click **Add**.

IPA Designer adds your new variable to the variable list in the Variables workspace.

Properties of Time Variables

Property	Description
Name	The name by which you refer to the variable in your process. The name must begin with a letter or underscore (_). It can contain digits (0 to 9), but cannot contain any other characters, including spaces or punctuation. Best practice: If the name consists of multiple words, begin the first word with an upper-case letter and begin other words with uppercase letters.
Label	The label that identifies the variable on work item pages.
Description	A brief description of the variable and its purpose, sufficient to explain the variable to someone who knows nothing about why it was created.
Collection	Indicates whether or not the variable is a collection of values.
Security	A list of users or workgroups allowed to see the value of the variable. In Interaction Administrator, create security specification groups to include users and workgroups that can see particular data items. In IPA Designer, each variable's Security Specification property has a list box with in which the designer can choose from the Interaction Administrator groups available for that variable. For more information, see the IPA Technical Reference.
Accessibility	How the process can use the variable. For more information, see Variable Accessibility .
Limit values to list	Indicates whether or not the user can only enter time values on a specific list.
Minimum Value	The earliest time value that the variable can hold.
Maximum Value	The latest time value that the variable can hold.
Initial Value	The value of the variable when the process starts. By default, this value is NOT_SET.

URI

This is a text string that contains a Web or network address. You can bind URI variables to these controls on work item pages:

- Drop List

- Edit Box
- Image
- Internet Explorer
- Link
- Text

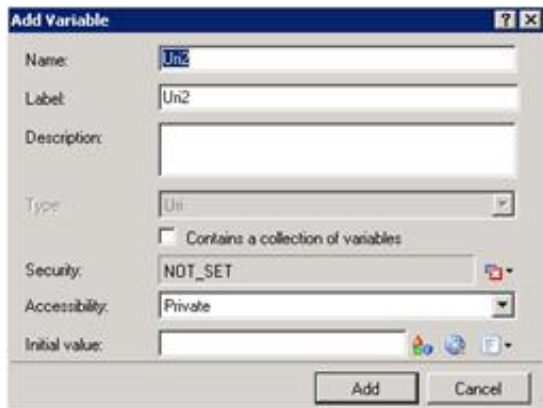
To add a URI variable:

1. In the Processes list, double-click the **Variables** container in your process.

Process Designer displays the Variables workspace in the center pane.

2. Right-click a blank area of the Variables workspace, point to **Add**, and click **URI** in the shortcut menu.

Process Designer displays the **Add Variable** dialog box (see figure).



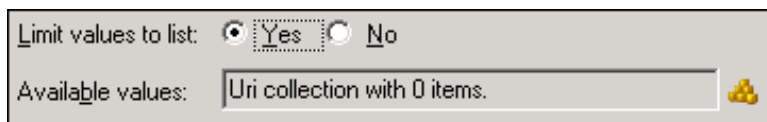
The 'Add Variable' dialog box is shown with the following fields and options:

- Name:** Un2
- Label:** Un2
- Description:** (empty text box)
- Type:** Uri (dropdown menu)
- ☐ Contains a collection of variables
- Security:** NOT_SET (dropdown menu)
- Accessibility:** Private (dropdown menu)
- Initial value:** (empty text box)
- Buttons:** Add, Cancel

3. Enter a name, label, and description:
 - a. In the **Name** text box, type the name of the variable. The variable name must begin with a letter.
 - b. In the **Label** text box, type the label to identify the variable on work item pages.
 - c. In the **Description** text box, type a brief description of the variable.
4. If you want to create the variable as a collection (see the section on [Collections of Variables](#)), select the check box labeled **Contains a collection of variables**.
5. Select the variable's security and accessibility settings:
 - a. In the **Security** text box, either accept the default value of NOT_SET or click the [Value list box](#) and click **Literal** to select from a list of [security specifications](#) from Interaction Administrator.
 - b. In the **Accessibility** list, click the desired [accessibility](#) value.
6. (Optional) To limit the variable's possible values to a specific list:


Note: String values in the list are case-sensitive. Therefore, JOE and Joe are different values.

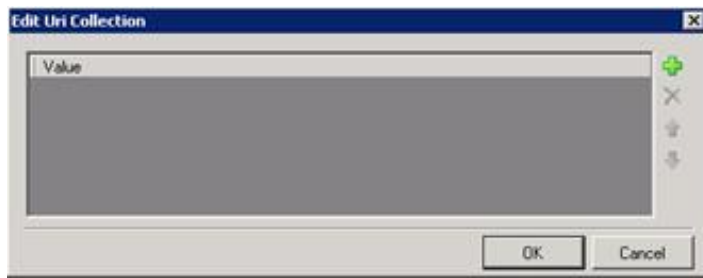
- a. Click the **Yes** radio button after the label **Limit values to list**. Process Designer displays an Available Values text box (see figure).







The 'Limit values to list' dialog box is shown with the following fields and options:

- Limit values to list:** Yes (selected radio button), No
- Available values:** Uri collection with 0 items. (text box with a yellow cube icon)

- b. Click the **Collection**  icon at the right end of the text box. Process Designer displays the **Edit URI Collection** dialog box (see figure).



- c. Click **Plus**  to add a row to the list. Double-click the row, type a URI value to add, then press **Enter**.
 - d. Repeat (c) to add more URI values as needed.
 - e. Click **OK** to return to the **Add Variable** dialog box.
7. (Optional) If you want to set an initial value for the URI string, either:

	Enter a text string to encode as a URI.
	Browse to a Sharepoint site so IPA Designer can get its URL. You must have credentials to connect to the site. For more information, see Working with Sharepoint Sites.
	Display the Value List Box to enter a literal or NOT_SET value.

8. Click **Add**.

Process Designer adds your new variable to the variable list in the Variables workspace.

Property	Description
Name	The name by which you refer to the variable in your process. The name must begin with a letter or underscore (_). It can contain digits (0 to 9), but cannot contain any other characters, including spaces or punctuation. Best practice: If the name consists of multiple words, begin the first word with an upper-case letter and begin other words with uppercase letters.
Label	The label that identifies the variable on work item pages.
Description	A brief description of the variable and its purpose, sufficient to explain the variable to someone who knows nothing about why it was created.
Collection	Indicates whether or not the variable is a collection of values.
Security	A list of users or workgroups allowed to see the value of the variable. In Interaction Administrator, create "views" to list users and workgroups that can see particular data items. In Process Designer, each variable's Security Specification property has a list box with in which the designer can choose from the IA views available for that variable. For more information, see the IPA Technical Reference.
Accessibility	How the process can use the variable. For more information, see Variable Accessibility .
Limit values to list	Indicates whether or not the user can only enter URI values on a specific list.
Initial Value	The value of the variable when the process starts. By default, this value is "" (an empty string). Note that an empty URI string is different from a value of NOT SET.

User

This is a text string (user name) that IPA Designer associates with configured Customer Interaction Center users. In IPA Designer, you choose this string from a list box.

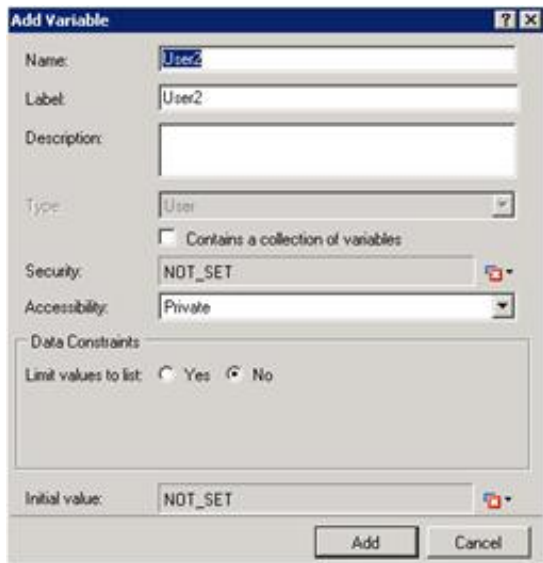
To add a user variable:

1. In the Processes list, double-click the **Variables** container in your process.

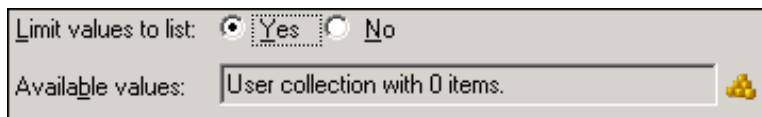
IPA Designer displays the Variables workspace in the center pane.


2. Right-click a blank area of the Variables workspace, point to **Add**, and click **User** in the shortcut menu.

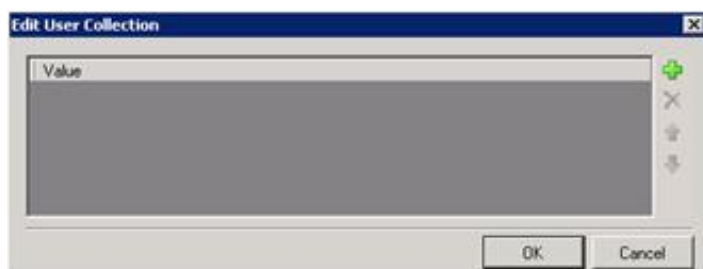
IPA Designer displays the **Add Variable** dialog box (see figure).


The 'Add Variable' dialog box is shown. It has fields for Name (User2), Label (User2), and Description. The Type is set to User. There is a checkbox for 'Contains a collection of variables' which is unchecked. Security is set to NOT_SET and Accessibility is set to Private. Under Data Constraints, 'Limit values to list' has radio buttons for Yes and No, with No selected. The Initial value is set to NOT_SET. There are Add and Cancel buttons at the bottom.

3. Enter a name, label, and description:
 - a. In the **Name** text box, type the name of the variable. The variable name must begin with a letter.
 - b. In the **Label** text box, type the label to identify the variable on work item pages.
 - c. In the **Description** text box, type a brief description of the variable.
4. Select the variable's security and accessibility settings:
 - a. In the **Security** list box, expand the list box to select from a list of [security specifications](#) from Interaction Administrator.
 - b. In the **Accessibility** list, either accept the default [accessibility](#) value of Private or expand the list box to select from the list of accessibility settings.
5. If you want to create the variable as a collection (see the section on [Collections of Variables](#)), select the check box labeled **Contains a collection of variables**.
6. (Optional) To limit the variable's possible values to a specific list:
 - a. Click the **Yes** radio button after the label **Limit values to list**. IPA Designer displays an Available Values text box (see figure).

This section shows the 'Limit values to list' area. The 'Yes' radio button is selected. Below it, the 'Available values' text box contains the text 'User collection with 0 items.' and a yellow collection icon (three stacked cubes).

- b. Click the **Collection**  icon at the right end of the text box. IPA Designer displays the **Edit User Collection** dialog box (see figure).

The 'Edit User Collection' dialog box is shown. It has a large text area labeled 'Value' at the top. Below it is a list box. On the right side of the list box, there are icons for adding (+), removing (-), and refreshing (circular arrow). At the bottom are OK and Cancel buttons.

- c. Click **Plus**  to add a row to the list. Click the row, then click the link [Click here to assign a user](#).

- d. In the **Lookup** dialog box, type the first letters of the desired user's name, then click **Search**.



Whether you should type the user's first or last name depends on how your directory is set up.

- e. In the Search Results list, click the desired user, then click **Assign**.
- f. Repeat steps (c)-(e) to add more users as needed.

Note: If you limit the values to a list, you must set an initial value that appears in the list.

- g. Click **OK** to return to the **Add Variable** dialog box.

7. (Optional) If you want to set an initial value for the variable:

- a. Click the down arrow  button at the right end of the **Initial value** row. If the variable is a collection, click the **Collection**  icon and add items, then go to Step 8 of this procedure.

- b. In the drop-down list, click **Literal**.

- c. In the text box, type the user name. You can also search for a user name.

- d. Press **Enter**.

8. Click **Add**.

IPA Designer adds your new variable to the variable list in the Variables workspace.

Properties of User Variables

Property	Description
Name	The name by which you refer to the variable in your process. The name must begin with a letter or underscore (_). It can contain digits (0 to 9), but cannot contain any other characters, including spaces or punctuation. Best practice: If the name consists of multiple words, begin the first word with an upper-case letter and begin other words with uppercase letters.
Label	The label that identifies the variable on work item pages.
Description	A brief description of the variable and its purpose, sufficient to explain the variable to someone who knows nothing about why it was created.
Collection	Indicates whether or not the variable is a collection of values.
Security	A list of users or workgroups allowed to see the value of the variable. In Interaction Administrator, create security specification groups to include users and workgroups that can see particular data items. In IPA Designer, each variable's Security Specification property has a list box with in which the designer can choose from the Interaction Administrator groups available for that variable. For more information, see the IPA Technical Reference.
Accessibility	How the process can use the variable. For more information, see Variable Accessibility .
Limit values to list	Indicates whether or not the user can only enter values on a specific list or within a specific range.
Available Values	A collection of user values that can be used as the variable's value.
Initial Value	The value of the variable when the process starts. By default, this value is NOT_SET.
Mailbox	(In IC 4.0 Service Update 1 and higher versions) This property allows Update Variables and other actions to retrieve the e-mail addresses of specific workgroup members. It is available only from actions that support it and is not on the Add Variable dialog. Member numbering starts with 0, not with 1. To get a member's e-mail address, enter an expression such as Process.Workgroup1.Members[0].Mailbox. See also: Members property of the Workgroup data type.

Workgroup

This is a text string that IPA Designer retrieves from Customer Interaction Center. In IPA Designer, you choose this string from a list box.

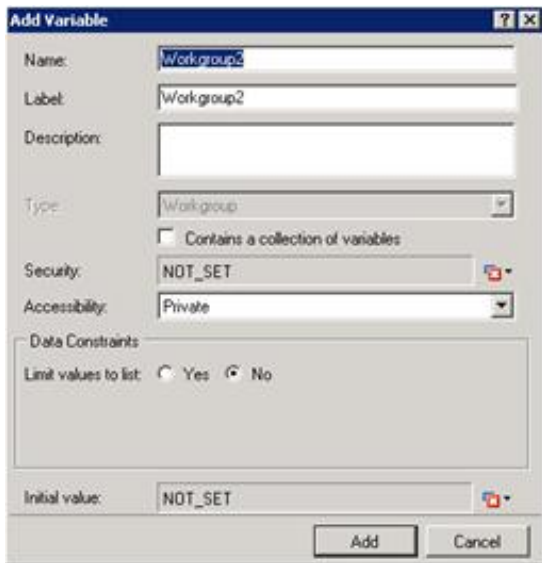
To add a workgroup queue variable:

1. In the Processes list, double-click the **Variables** container in your process.

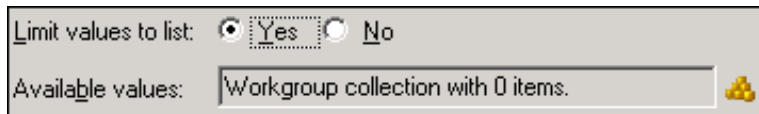
IPA Designer displays the Variables workspace in the center pane.


2. Right-click a blank area of the Variables workspace, point to **Add**, and click **Workgroup Queue** in the shortcut menu.

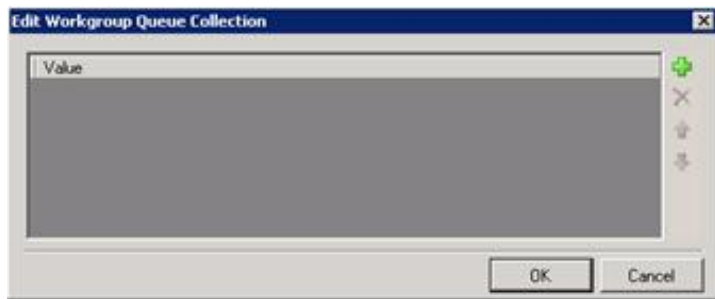
IPA Designer displays the **Add Variable** dialog box (see figure).


The 'Add Variable' dialog box is shown with the following fields: 'Name' (Workgroup3), 'Label' (Workgroup2), 'Description' (empty), 'Type' (Workgroup), 'Contains a collection of variables' (unchecked), 'Security' (NOT_SET), 'Accessibility' (Private), 'Data Constraints' (Limit values to list: No), and 'Initial value' (NOT_SET). There are 'Add' and 'Cancel' buttons at the bottom right.

3. Enter a name, label, and description:
 - a. In the **Name** text box, type the name of the variable. The variable name must begin with a letter.
 - b. In the **Label** text box, type the label to identify the variable on work item pages.
 - c. In the **Description** text box, type a brief description of the variable.
4. If you want to create the variable as a collection (see the section on [Collections of Variables](#)), select the check box labeled **Contains a collection of variables**.
5. Select the variable's security and accessibility settings:
 - a. In the **Security** list box, expand the list box to select from a list of [security specifications](#) from Interaction Administrator.
 - b. In the **Accessibility** list, either accept the default [accessibility](#) value of Private or expand the list box to select from the list of accessibility settings.
6. (Optional) To limit the variable's possible values to a specific list:
 - a. Click the **Yes** radio button after the label **Limit values to list**. IPA Designer displays an Available Values text box (see figure).


This section shows the 'Limit values to list' area with the 'Yes' radio button selected. Below it, the 'Available values' text box contains the text 'Workgroup collection with 0 items.' and a small yellow cube icon.

- b. Click the **Collection**  icon at the right end of the text box. IPA Designer displays the **Edit Workgroup Queue Collection** dialog box (see figure).



- c. Click **Plus**  to add a row to the list. Click the row, then click the link [Click here to assign a workgroup queue.](#)
- d. In the **Lookup** dialog box, type the first letters of the desired user's last name, then click **Search**.
- e. In the Search Results list, click the desired user, then click **Assign**.
- f. Repeat steps (c)-(e) to add more workgroup queues as needed.

Note: If you limit the values to a list, you must set an initial value that appears in the list.

- g. Click **OK** to return to the **Add Variable** dialog box.
1. (Optional) If you want to set an initial value for the variable:
 - a. Click the down arrow  button at the right end of the **Initial value** row. If the variable is a collection, click the **Collection** icon and add items, then go to Step 8 of this procedure.
 - b. In the drop-down list, click **Literal**.
 - c. In the text box, type the workgroup queue name. You can also search for a user name.
 - d. Press **Enter**.
2. Click **Add**.

IPA Designer adds your new variable to the variable list in the Variables workspace.

Properties of Workgroup Queue Variables

Property	Description
Name	The name by which you refer to the variable in your process. The name must begin with a letter or underscore (_). It can contain digits (0 to 9), but cannot contain any other characters, including spaces or punctuation. Best practice: If the name consists of multiple words, begin the first word with an upper-case letter and begin other words with uppercase letters.
Label	The label that identifies the variable on work item pages.
Description	A brief description of the variable and its purpose, sufficient to explain the variable to someone who knows nothing about why it was created.
Collection	Indicates whether or not the variable is a collection of values.
Security	A list of users or workgroups allowed to see the value of the variable. In Interaction Administrator, create security specification groups to include users and workgroups that can see particular data items. In IPA Designer, each variable's Security Specification property has a list box with in which the designer can choose from the Interaction Administrator groups available for that variable. For more information, see the IPA Technical Reference.
Accessibility	How the process can use the variable. For more information, see Variable Accessibility .
Limit values to list	Indicates whether or not the user can only enter values on a specific list or within a specific range.
Available Values	A collection of workgroup queue values that can be used as the variable's value.
Initial Value	The value of the variable when the process starts. By default, this value is NOT_SET.
Members	<p>(In IC 4.0 Service Update 1 and higher versions)</p> <p>This property allows Update Variables and other actions to retrieve specific workgroup members. It is available only from actions that support it and is not on the Add Variable dialog.</p> <p>The numbering starts with 0, not with 1. To get a workgroup member, enter an expression such as <code>Process.Workgroup1.Members[0]</code> to retrieve the first member or <code>Process.Workgroup1.Members[4]</code> to retrieve the fifth member.</p> <p>The User data type has a Mailbox property that lets you retrieve that user's e-mail address. To retrieve an e-mail address, enter an expression such as <code>Process.Workgroup1.Members[0].Mailbox</code>.</p> <p>See also: Mailbox property of the User data type.</p>

Custom Data Types

Note: This section applies only to IC 4.0 SU1 (Service Update 1) and later versions.

In addition to its native data types, IPA Designer lets you create custom data types to fit your specific needs.

Creating variables with custom data types has an extra step that you don't need with native data types. When you create a variable with a native data type, you just drag the data type from the toolbox into the Variables workspace. When you create a variable with a custom data type, you must define the type first. Only then can you create variables based on the custom type.

After you create a custom data type, IPA Designer lists that type in the Variables Toolbox. You add custom-type variables in the same way as you add variables of native types.

There are two categories of custom data type:

- **Simple:** This extends one of IPA Designer's native data types. For example, a `PhoneNumber` custom type might extend the `String` type by allowing only digits.
- **Complex:** This data type is a container. It holds pieces of information called properties. Each property is a basic, simple, or complex type. Properties are similar to variables in that they have names, labels, and descriptions, but they do not have accessibility settings or security settings.

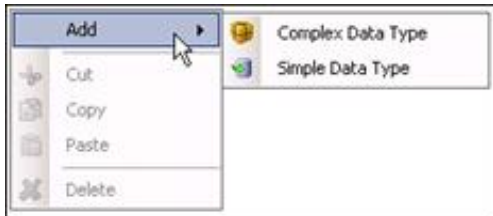
For example, a `Customer` complex data type might include several string properties (`Firstname`, `Lastname`, `Street`, `City`, `State`, `Zip`), a decimal property (`account balance`), a date property (`FirstPurchaseDate`), and a boolean property (`IsGoldCustomer`).

Certain actions such as Call Web Service automatically create complex data types that represent the inputs and outputs of their operations. Database actions also create complex data types. Data types created by process authors are editable. Complex data types created by actions cannot be edited by process authors, but process authors can edit their labels.

When you create a custom or complex data type, you can optionally create a compound identifier from the properties defined for the type. The compound identifier is used to identify a particular item of that same type or to identify items in a collection of that type.

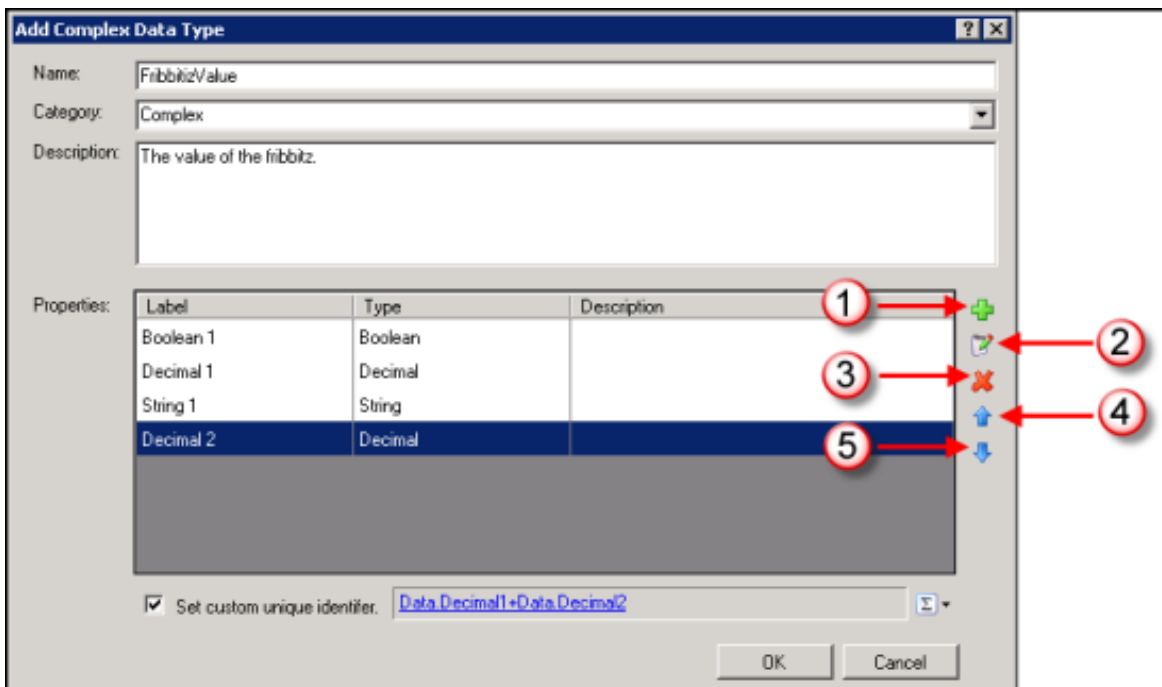
To create a custom complex data type:

1. In IPA Designer, right-click a blank area in the Data Types workspace, then click **Add** in the shortcut menu (see figure).



2. Click Complex Data Type.

IPA Designer displays the Add Complex Data Type dialog box (see figure).



(1) Add property row; (2) Edit selected property row; (3) Delete selected property row; (4) Move row up; (5) Move row down.

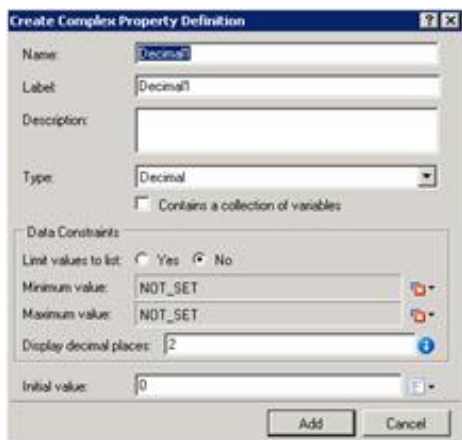
If a property is a collection, the Type column includes the word "Collection" in that property's row.

3. Enter a name and description for the type. If needed, select an existing category or enter a new category in the Category list box.

Names for complex data types need to be unique within a process. Category is a grouping mechanism that makes it easier to organize types.

4. Click the **Plus** icon to add a property.

IPA Designer displays the Create Complex Property Definition dialog (see figure). The dialog will vary depending on the data type you choose for the property. It might not exactly match the figure.



5. Define the property as you would normally define a variable of that data type, then click **Add**.

Note: If you give a property a label different from its name, then IPA Designer's literal editor refers to the property by its label instead of by its name. For example, suppose you create a variable using a custom data type that has a property called FName with the label "First Name". If you assign a value to the labeled property, the editor displays "First Name" instead of FName.

6. If you want to create a compound identifier from the existing properties for the type, select the **Set custom unique identifier**

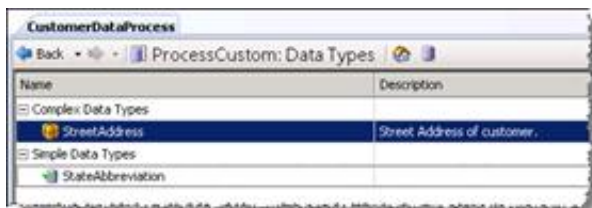


check box. On the right side of the box, click the button and then click **Calculation**. Next, click the hyperlink in the box to open the Custom Calculation Builder dialog box and [create the custom calculation](#).

Note: If the user selects the check boxes in the complex data type definition, IPA uses the ToString() function instead of ToDisplay() when generating the expression for the type definition. IPA uses this expression to generate the \$ID value on a complex data type. The core parser still uses ToDisplay() for implicit string conversions.

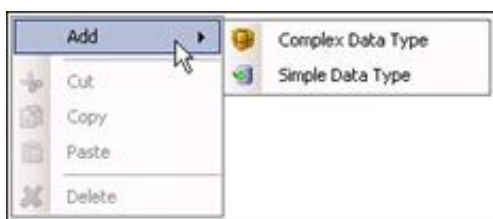
7. Repeat steps 4 and 5 to add more properties as needed. Then click **OK**.

IPA Designer adds your custom data type to the data types list (see figure).



To create a custom simple data type:

1. In IPA Designer, right-click a blank area in the Data Types workspace, then click **Add** in the shortcut menu (see figure).



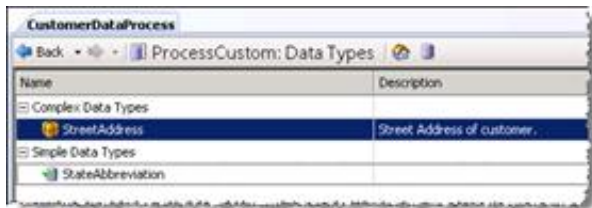
2. Click Simple Data Type.

IPA Designer displays the Add Simple Data Type dialog (see figure). The dialog will vary depending on the data type you choose for the property. It might not exactly match the figure.



3. Define the variable as you would normally define a variable of that data type, then click **Add**.

IPA Designer adds your custom data type to the data types list (see figure).



4. Repeat steps 1-3 to add more simple data types as needed.

Creating Validation Lists with Custom Types

Note: This section applies only to IC 4.0 SU1 (Service Update 1) and later versions.

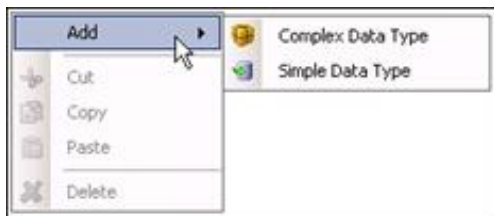
There are two ways to restrict a variable's value to a specific list:

- Enter the list when you create the variable.
- Create a simple data type that allows only the values on the list. If you create a variable of that data type, then IPA restricts the variable's value to the values allowed by the simple type.

If you use a list of allowable values only once, the first method is simpler. However, if you use the list repeatedly in your process, such as for state postal abbreviations, the second method saves time. When you create the list using a custom simple type, you enter the list items only once instead of re-entering them each time you create a variable that uses them.

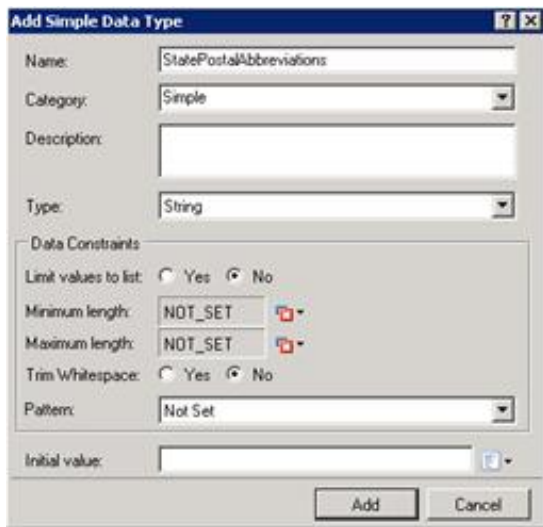
To create a validation list using a custom simple data type:

1. In IPA Designer, right-click a blank area in the Data Types workspace, then click **Add** in the shortcut menu (see figure).



2. Click Simple Data Type.

IPA Designer displays the Add Simple Data Type dialog (see figure). The dialog will vary depending on the data type you choose for the property. It might not exactly match the figure.



Add Simple Data Type

Name: StatePostalAbbreviations

Category: Simple

Description:

Type: String

Data Constraints

Limit values to list: ☐ Yes ☒ No

Minimum length: NOT_SET

Maximum length: NOT_SET

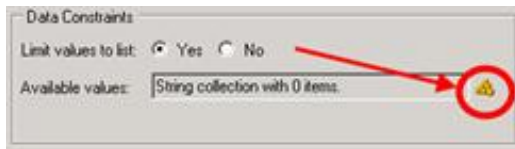
Trim Whitespace: ☐ Yes ☒ No

Pattern: Not Set

Initial value:

Add Cancel

3. Select **Yes** for Limit values to list, then click the **Collection** icon (see figure).



Data Constraints

Limit values to list: ☒ Yes ☐ No

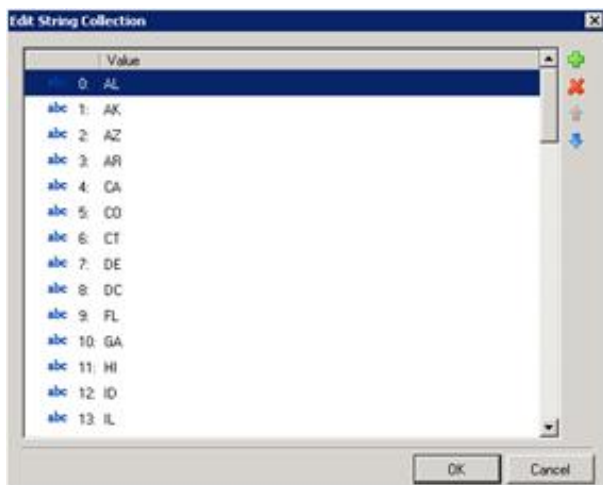
Available values: String collection with 0 items

Collection icon (plus sign in a circle)

4. Click the **Plus** icon to add a row for a value, then enter the value in the row.

Tip: If you are creating a validation list with a known number of values, first create all the rows for the acceptable values *and then* enter the values. That reduces data entry time because you make about half as many hand movements on your keyboard.

5. Add more rows and values as needed (see figure).



Edit String Collection

	Value
0:	AL
abc 1:	AK
abc 2:	AZ
abc 3:	AR
abc 4:	CA
abc 5:	CO
abc 6:	CT
abc 7:	DE
abc 8:	DC
abc 9:	FL
abc 10:	GA
abc 11:	HI
abc 12:	ID
abc 13:	IL

OK Cancel

6. Click **OK**.

IPA Designer adds the data type to your data types list. You can now use the data type to limit variables to values on the list.

Collections of Variables

A collection is special kind of variable that holds multiple values in a serial, indexed order of the same data type. When you create a variable of any type, you can make it a collection of values of that type. You can also create collections of [custom data type](#) variables.

You will most often use collections:

- At process design time, to create lists of values for display in combo box controls on process forms.
- At process run time, to store ordered sets of values from web services.

Note: To create a predefined list of values that a process design might use in several places, use a custom simple data type to [create a validation list](#). Then you can create variables of that type whose values will be restricted to the values in the validation list.

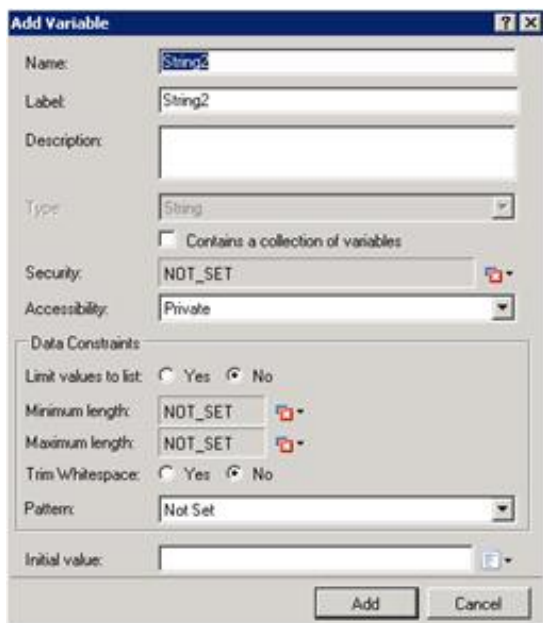
To add a variable as a collection:

1. In the Processes list, double-click the **Variables** container in your process.

IPA Designer displays the Variables workspace in the center pane.

2. Right-click a blank area in the Variables workspace, point to **Add**, and click the desired variable type in the shortcut menu.

IPA Designer displays the **Create a New Variable** dialog box (see figure).



3. Name the variable and add data constraints as you normally would.

For more information about data constraints, see the [data constraints help topic](#).

4. Make the variable a collection:
 - a. Select the check box labeled **Contains a collection of variables**.
 - b. Add collection items as you normally would.

The specific steps might differ depending on the data type. See the corresponding topic for that type if you need more information.

5. Click **Add**.

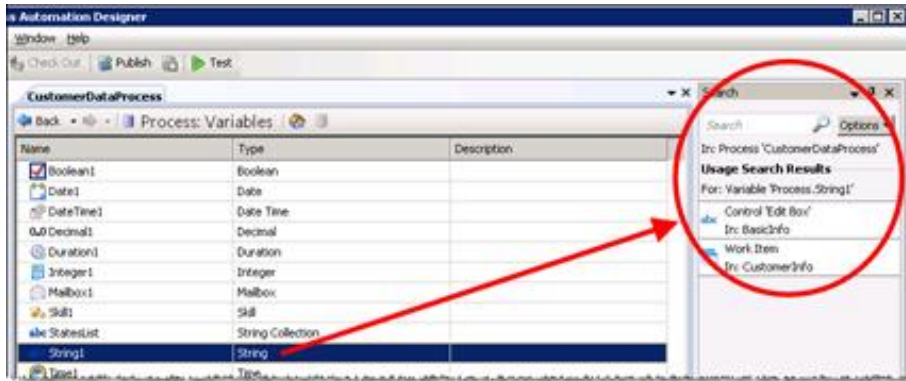
Seeing Where a Variable is Used

Note: This section applies only to IC 4.0 SU1 (Service Update 1) and later versions.

When you test or debug a process, it can help to see all the places where a variable is used.

To see a list of all the places where a variable is used:

1. Display the Variables list.
2. Right-click the desired variable and click **Show Usage**.
3. IPA Designer lists all the places where your process uses the variable (see figure).



Working with Work Items

A work item is an on-screen data entry form where users view and enter information or start actions needed by the process. A work item can have [multiple pages](#) and you can [control the user's navigation](#) between pages. Each work item has these required properties:

- **Name:** This is the name by which you refer to the work item in other parts of IPA Designer.
- **Category:** This is a name to organize and group similar work items. Multiple work items can belong to the same category.
- **Height:** This is the on-screen height of the work item in pixels.
- **Width:** This is the on-screen width of the work item in pixels.

When a process sends a work item to a user, the user's CIC Client lists it on the *My Work Items* tab.

Related topics:

[Creating a Work Item](#)

[Creating Variables for Work Items](#)

[Adding Pages to a Work Item](#)

[Defining a New Work Item Page](#)

[Controlling the Order of Work Item Pages](#)

[Adding Dynamic Details to a Work Item](#)

[Adding Controls to a Work Item](#)

[Controls on Work Items](#)

[Work Item Control Types](#)

Creating a Work Item

Before you begin to design a work item in IPA Designer, identify all the information that the work item needs to obtain.

For example, if a work item collects information for a credit application and your process will use a web service obtain the applicant's credit score, consult the web service to find out what information it requires. If you design a work item with a single text box for applicant name but you later discover that the web service needs separate first, middle, and last names, you'll need to go back and redesign your work item. Planning ahead will prevent wasted time.

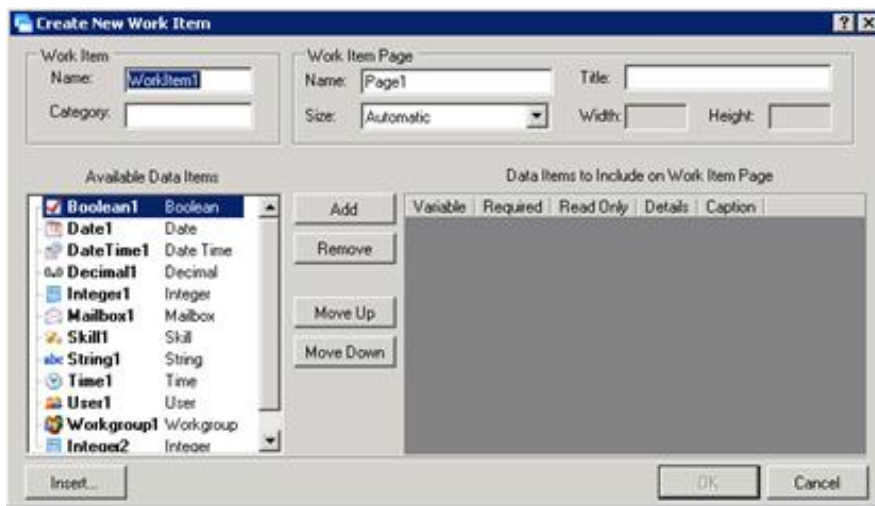
You can design a work item with one page or with [multiple pages](#). Multiple pages enable you to group information and controls to effect conditional logic or "branching" so that a user sees information on one page based on prior page inputs. You can also [control the order](#) in which the work item displays the pages and trigger actions between pages.

A work item can have as many pages as you want. However, if a work item has more than seven pages, consider dividing the information between multiple work items to make things simpler.

To create a work item:

1. Right-click the Work Items container and click **New Work Item** in the shortcut menu. You can also press **Ctrl+W** to create a new work item.

IPA Designer displays the **Create a New Work Item** dialog box (see figure).



2. In the Work Item section:

- In the **Name** text box, type a [name](#) for the work item.
- In the **Category** text box, type the [name](#) of the category for this work item. The category is displayed in the CIC Client and is used to organize a user's work.

Note: Categories and dynamic details apply to the entire work item, not to individual pages.

3. In the Work Item Page section:

- In the **Name** text box, type the name by which the process will refer to the page. The default value is the word *Page* followed by the page number.
- In the **Title** text box, type the title that should appear at the top of the page.
- If desired, expand the **Size** drop-down list and select a predefined size or use the **Width** and **Height** text boxes to define a custom size.

4. Add data items (variables) to link with controls on the page:

- In the Available Data Items list, click the desired data item, then click **Add**. You can also create a new data item "on the fly" by clicking the **Insert** button.

IPA Designer moves the data item into the included data items list. For more information, see [Creating Variables for Work Items](#). The Available Data Items list does not include collections. If a user selects a non-collection variable that has a list of acceptable values, then IPA displays it as a drop-down list when added to the work item.

- As desired, select the check boxes to make the data item **Required** or **Read Only**.
- To include the data item in the work item's dynamic details, select the **Details** check box.
- If desired, edit the data item's caption by double-clicking the default text in the **Caption** column, editing the text, and pressing the **Enter** key.
- If desired, use the **Move Up** and **Move Down** buttons to change the order in which the page displays controls for the data items.

5. Click **OK**.

In your workspace, IPA Designer displays the Work Item Overview view.

Tip: To redisplay the Work Item Overview view, double-click the work item in the navigation pane. You can display a work item page by double-clicking its title bar in the overview diagram.

6. Set work item options (see figure):



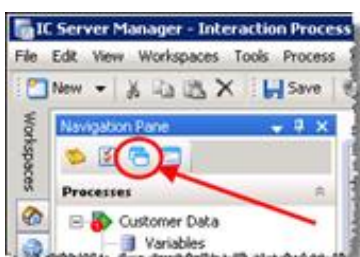
Tip: The green plus (+) icon indicates that the user can add an item of the appropriate kind, such as a work item page or a destination.

- Click the **Dynamic Details** link (see figure, a) to [set dynamic details for the work item](#). Dynamic details are required for each work item in your process. The CIC Client displays work item details in its Description column. You can use process variables or work item local variables in dynamic details, but you cannot use variables that are local to states or tasks, or variables that are present only in other work items.
 - In the **Client Category** text box (see figure, b), type the category for the work item. The user can use the category to filter work items on the My Work Items tab of the CIC Client.
 - Click the link(s) under **Start of Work Item** (see figure, c) to add actions that the work item should do when it loads or to change/add the first page the work item displays. For more information about controlling the order of work item pages, see [Controlling the Order of Work Item Pages](#). For more information about starting work items, see [Start of Work Item](#).
 - Click the link under **End of Work Item** (see figure, d) to add actions that the work item should do when it exits for any reason. In tasks, the Send Work Item to User action shows possible exit actions as plus (+) icons. The Exit: OK and Exit: Cancel actions execute *after* any actions you added to the end of the work item. For more information about ending work items, see [End of Work Item](#).
 - Double-click the page title bar (see figure, e) to make changes in the work item page.
 - Click **Add page initialize actions** (see figure, f) to add actions that the page should do when it loads, before the page is displayed.
 - Click **Add actions for this button** (see figure, g) to add actions that the work item should do when a user clicks the button, before navigation or exit. For information about changing the destination after a button is clicked, see [Controlling the Order of Work Item Pages](#).
7. In the processes list, double-click the work item page.

IPA Designer displays the work item page in the workspace. You can then add controls, edit controls, move things around, and make any other graphical changes you want.

8. To add more pages to the work item, follow the steps in [Adding Pages to a Work Item](#).

Another way to create a work item is to right-click the process name in the process list, point to **Add** on the shortcut menu, then click **New Work Item**. You can also press **Ctrl+W** to create a new work item. A third way is to click the **New Work Item** icon at the top of the Navigation Pane (see figure).



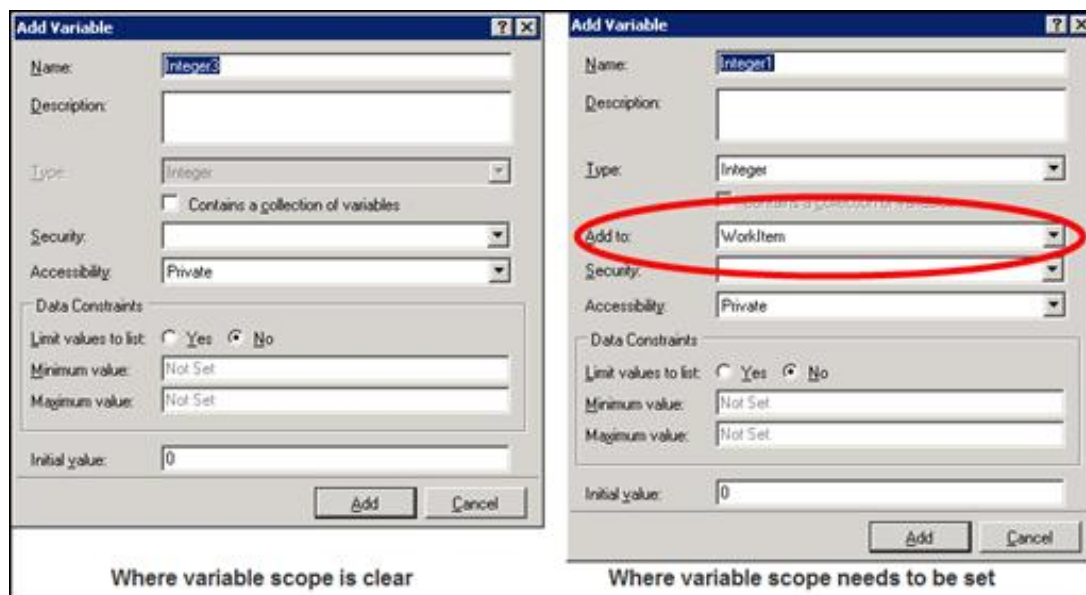
Creating Variables for Work Items

IPA Designer lets you create variables at two levels:

- **Process level:** These variables are available anywhere in the process. You can use these in work items and elsewhere. Another term for this kind of variable is *global variable*.
- **Work item level:** These variables are *only* available inside the work item where you create them: they are *local variables*. You can use them in the work item dynamic details, but not in the process dynamic details. For example, a process might have several work items that require similar information. Local variables let you re-use the same names for the same information inside different work items. Because each local variable is available only inside the work item where you created it, there is no chance that the process will get confused about which variable to use.

Note: When you use process variables in a work item, IPA makes copies of the variable values to use while the work item is running. If the work item updates the values, then IPA does not copy the updated values back to the process variables until the work item ends.

There are two slightly different dialog boxes for adding process and work item variables (see figure).




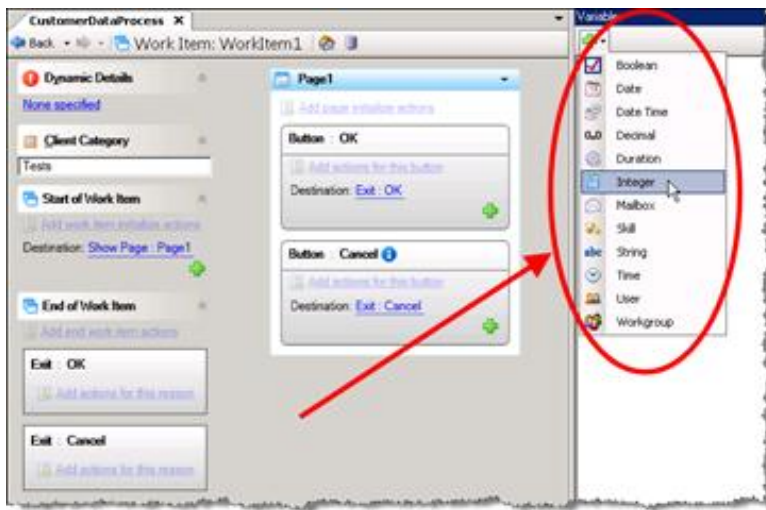
IPA Designer displays one or the other version of the dialog depending on the situation. If the scope of the new variable is clear, then it displays the dialog on the left side of the figure. If the scope is not clear, then IPA Designer displays the dialog on the right side, with an extra list box to choose the scope. In particular:

- If you add a variable while displaying the list of process variables, IPA Designer infers that the new variable is a process level (global) variable. It displays the dialog on the left side of the figure.
- If you add a variable while displaying the Work Item Overview view, IPA Designer infers that the new variable will be local to the work item. It displays the dialog on the left side of the figure.
- If you insert a variable while choosing dynamic details for a work item, the new variable could be *either* a process level variable or a work item level variable. IPA Designer displays the dialog on the right side of the figure so that you can select the scope.
- Work item variables persist across all pages of the work item in which they are defined.
- If a work item changes the value of a process variable, the change in the process variable's value is not available outside the work item until the work item ends.
- If a user picks up a work item, puts it on hold, and then cancels it, any variable values changed in that work item revert back to the values they had before the user picked up the work item.

Process dynamic details can include only process level variables. [Work item level dynamic details](#) may include process level variables, work item level variables, or both.

To create a variable for a work item:

1. Display the Work Item Overview view for the desired work item.
2. In the Variables pane, click the Add  button to display the list of variable types (see figure).



3. In the **Variable Types** list, click the desired variable [type](#).

IPA Designer displays the Add Variable dialog box.

4. In the **Name** text box, type the name of the variable. Follow the IPA Designer [naming rules](#). In the **Description** text box, type a brief description of the variable and its purpose.
5. If you want to create the variable as a collection (see the topic on [Collections of Variables](#)), select the check box labeled **Contains a collection of variables**.
6. In the **Security** list, click the desired [security specification](#).
7. In the **Accessibility** list, choose the [accessibility setting](#).
8. Add data constraints as desired. These vary depending on the data type.

For more information about data constraints, see the [data constraints help topic](#).

9. If you want to set an initial value for the variable, type it into the **Initial value** text box.
10. Click **Add**.

IPA Designer adds your new variable to the local variables list.

Adding Actions to a Work Item

Click the appropriate links to add actions to a work item (1) or a work item page (2) in the Work Item Overview view (see figure).



IPA Designer includes a built-in variable called *WorkItem.CurrentUser*. It lets you do actions (routing, etc.) on work items and pages based on the current user of the work item. For example, you might reassign the work item to a different user based on the current user's skills or availability.

Both work items and work item pages can have local variables. Using these variables, you have individual control over work items and pages. The Work Item Overview view and the Page Design view both display a Variables tab. The tab shows currently-defined local variables. To create a local variable for the work item or the page, click the plus sign icon at the top of the Variables tab.

Adding Dynamic Details to a Work Item

Dynamic details uniquely identify each work item. A dynamic detail is typically an ordered group of variables that would be associated with a particular work item.

IPA Designer requires you to add dynamic details to each work item in your process. If any work items do not have dynamic details assigned, IPA Designer will flag them as containing errors and not allow you to publish your process design until you correct the errors.

Although a work item can have multiple pages, dynamic details apply to the entire work item and not to individual pages.

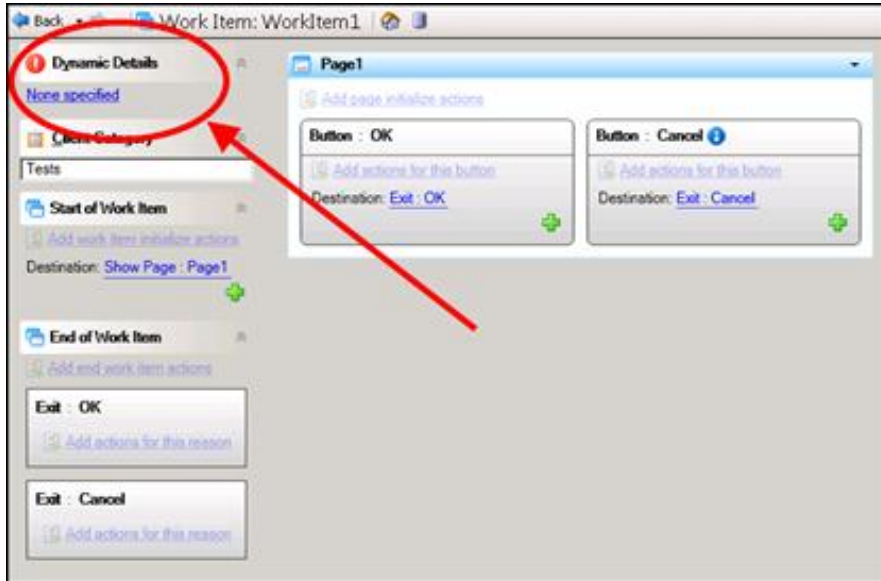
Tip: If you collect first name and last name in a work item, you should use those two variables in the work item's dynamic details. The reason is that if you put the work item on hold, the only way you can distinguish it from other work items is by its

dynamic details. If the dynamic details include first and last names, then on hold you will see the values you entered in the CIC Client.

To add dynamic details to a work item:

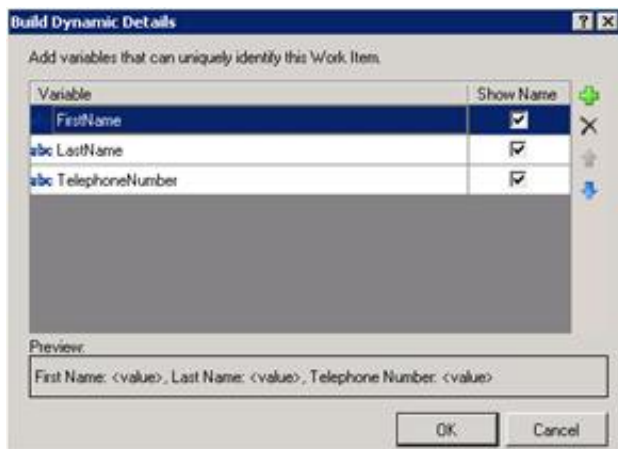
1. Verify that you previously created a variable to use as a dynamic details identifier for the work item.
2. In the work items list under the desired process, double-click the work item.

IPA Designer displays the Work item Overview view (see figure).



3. Click the link text next to **Dynamic Details**.

IPA Designer displays the [Build Dynamic Details dialog box](#) (see figure). IPA Designer automatically adds the variables you chose when you initially created the work item.



4. To add more variables to dynamic details, click the **Add (+)** icon.

IPA Designer displays the **Select Variable** dialog box. The dialog box lists variables that can be used as dynamic details identifiers.

5. Select a variable to add to dynamic details:
 - a. Either click the name of a variable to use as a dynamic details identifier for the work item, or click **Insert** to create a new variable "on the fly."
 - b. Click **OK** to close the dialog box.

Leaving the Show Name check box enabled displays the variable name in addition to the variable value in the dynamic details. For example: FirstName: <John>, LastName: <Smith>.

6. To add more variables, repeat steps 4 and 5 as needed.

7. If needed, use the up and down arrow buttons to adjust the order of the variables. If needed, use the delete (X) button to remove variables from the list.

The order of the variables in the list controls the order in which the CIC Client displays them in the work item's dynamic details.

8. Click **OK** to close the **Build Dynamic Details** dialog box.

IPA Designer assigns the variable as the dynamic details identifier for the work item.

Copying and Pasting a Work Item

You can copy a work item to the Windows Clipboard and paste it into the same process or into a different process. When you paste the work item, IPA Designer adds its name to the Work Items container of the process list.

If you post a copied work item into the same process, IPA Designer adds a number (starting with "1") at the end of the work item name to indicate that it is a copy of the original work item of the same name.

To copy and paste a work item:

1. In the process list, right-click the work item to copy, then click **Copy**.

IPA Designer copies the work item to the Windows Clipboard.

2. Right-click the process into which you want to paste the work item, then click **Paste**.

IPA Designer pastes the work item into the process and adds its name to the Work Items container of the process list.

Note: In IC 4.0 Service Update 1 (SU1) and later versions, IPA Designer automatically includes any referenced items (such as variables) when you copy and paste. It also updates the references to the pasted location.

Adding Pages to a Work Item

Add a page to a work item in one of three ways:

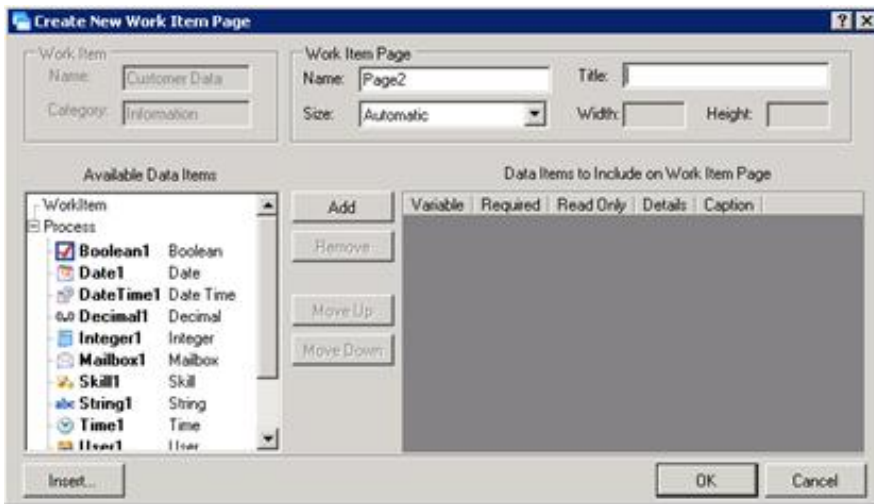
- With the work item highlighted in the Navigation pane, open the **File** menu, point to **Add**, and click **Page**.
- In the Navigation pane, right-click the work item, point to **Add**, and click **New Page**.
- In the Navigation pane, right-click **Pages** under the desired work item, then click **New Page**.

Tip: You can also press **Ctrl+Shift+W** to display the Create New Work Item Page dialog.

In the Create a New Work Item Page dialog, define the new page by filling in the fields and clicking **OK**. For specific steps in defining a new work item page, see [Defining a New Work Item Page](#).

Defining a New Work Item Page

When you first create a work item, it has only one page. You can [add more pages](#) as needed. When you add a page, IPA Designer displays the Create a New Work Item Page dialog (see figure). You define the new page by filling in the fields on the dialog.



To define a new work item page:

1. Add a new work item page, using one of the methods in [Adding Pages to a Work Item](#).

IPA Designer displays the **Create a New Work Item Page** dialog box. Because you have already defined the work item to which you are adding this page, the Work Item section is grayed out.

Note: Categories and dynamic details apply to the entire work item, not to individual pages.

2. In the Work Item Page section:
 - In the **Name** text box, type the name by which the process will refer to the page.
 - In the **Title** text box, type the title that should appear at the top of the page.
 - If desired, expand the **Size** list box and select a predefined size or use the **Width** and **Height** text boxes to define a custom size.
3. Add data items to link with controls on the page:
 - In the Available Data Items list, click the desired data item, then click **Add**. You can also create a new data item "on the fly" by clicking the **Insert** button.
4. IPA Designer moves the data item into the included data items list. For more information, see [Creating Variables for Work Items](#).
 - As desired, select the check boxes to make the data item **Required** or **Read Only**.
 - Ignore the **Details** column. The column is unavailable because dynamic details apply only to the work item itself, not to individual pages.
 - If desired, edit the data item's caption by double-clicking the default text in the **Caption** column, editing the text, and pressing the **Enter** key.
 - If desired, use the **Move Up** and **Move Down** buttons to change the order in which the page displays controls for the data items.
4. Click **OK**.

In navigation tree, IPA Designer displays the new page in the Pages branch of the work item.

Another way to define a new work item page is to right-click the work item name in the Navigation pane, point to **Add** on the shortcut menu, then click **New Page**. You can also press **Ctrl+Shift+W** to create a new page. A third way is to click the **New Page** icon at the top of the Navigation Pane (see figure).

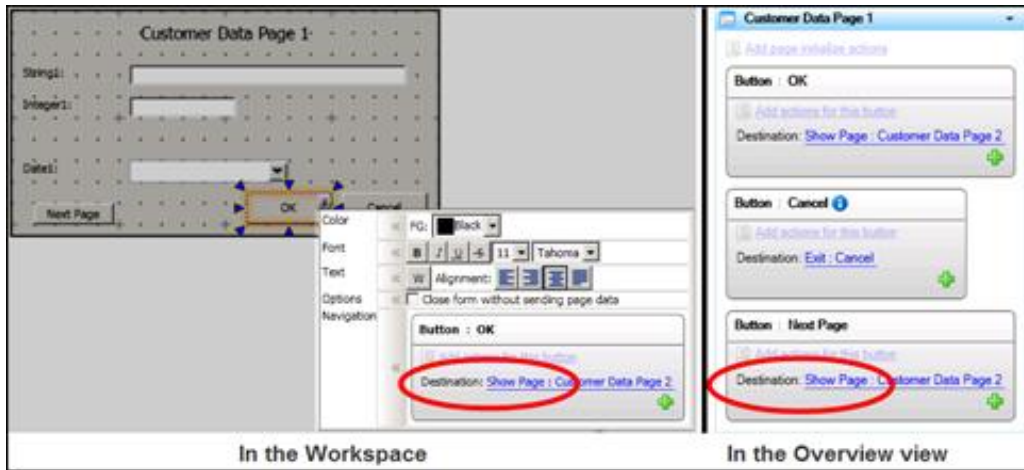


Controlling the Order of Work Item Pages

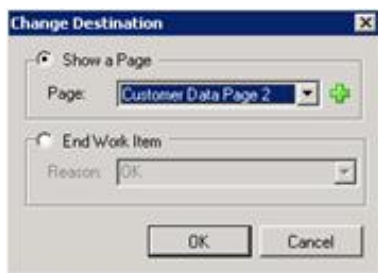
You must set the order in which a work item displays its pages to the user.

To set the page order:

1. In the Graphical Page Designer or the Overview view, click the **Destination** link (see figure).



IPA Designer displays the Change Destination dialog box (see figure). Note that each destination link also has a green plus sign icon to add destinations. A page can only go to one destination. If a matching condition shows which destination is correct, the page goes to that destination. Otherwise, it goes to the last destination in the list.



2. In the Change Destination dialog box, either:

- Expand the **Page** list box and select a different page of the work item to display.
- Click the **Add Page** (+) green plus sign icon to create a new page to display.
- Select the **End Work Item** radio button, expand the **Reason** list box, and select the reason for ending the work item.

Note: You can also type a new reason directly into the Reason box. However, you will need to add new logic for the new exit path.

3. Click **OK**.

IPA Designer changes the destination of your work item page, thereby changing the order in which the work item displays the pages when routed to a user or workgroup.

Tip: You can add Next and Previous buttons and link them to pages so users can navigate forward and backward.

Adding Controls to a Work Item Page

This section gives the general procedure for adding a control to a work item page. For information about specific types of controls and their properties, see the section for the desired control type.

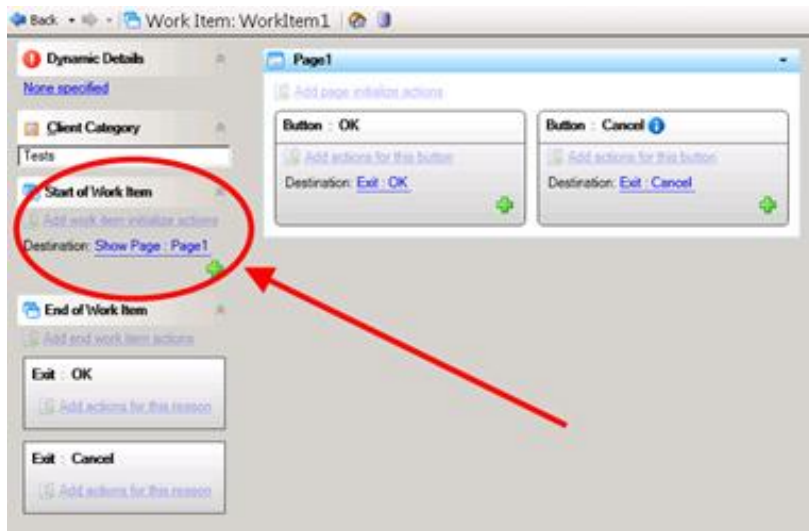
To add a control to a work item page:

1. If needed, double-click the desired work item page in the Processes list.

IPA Designer displays the work item page in the Graphical Page Designer.

2. In the Toolbox, click the desired control and drag it onto the page.
3. If needed, drag the control to position it on the page. You can also resize the control by dragging its border.

Start of Work Item



In the Work Item Overview view, use the Start of Work Item area (see figure) to:

- Specify actions that run at the start of the work item before any pages are displayed.
- Provide logic that determines which page displays first.
- Unlike work item pages, which have similar ways of editing the actions and navigation conditions (also shown in the figure), the Start of Work Item section must navigate to a page. It cannot navigate to an exit reason.

End of Work Item



In the Work Item Overview view, use the End of Work Item area (see figure) to:

- Specify actions that always run at the end of the work item regardless of the exit reason.
- Specify different actions to run in response to specific exit reasons.

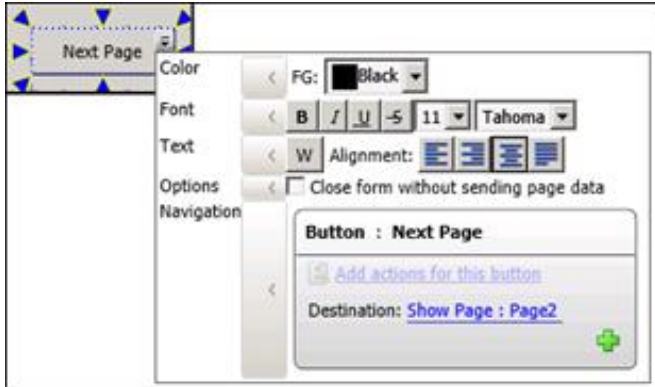
IPA always executes any reason-independent actions before it executes any actions associated with the specific exit reason.

Controls on Work Item Pages

Work item controls are visual objects that either (1) display data to the user, (2) get data from the user, or (3) perform some action such as saving the data a user entered in the form. Examples of controls are labels, text boxes, radio buttons, drop-down lists, and command buttons such as **OK**. Controls have *properties* that you can use to adjust how a control looks and what action it performs.

Shortcut Menu to Edit Control Properties

When you place a control on a work item, you can view or change its properties on the properties palette (see figure). A properties palette displays different options depending on the type of the control.

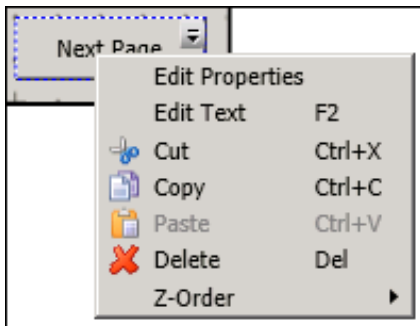


To open this properties palette, either:

- Click the control on your work item, then click the down arrow button at the right end of the control.
- Right-click the control and click **Edit Properties** in the shortcut menu.

Shortcut Menu for Controls

When you right-click a control, IPADesigner displays the control's shortcut menu (see figure).



- **Edit Properties:** This displays the same properties palette that you could get by clicking the down arrow button at the right end of the control. See also: [Shortcut Menu to Edit Control Properties](#).
- **Edit Text:** For controls (such as buttons) that display text to the user, this lets you edit the text.
- **Cut:** This copies the control to the Windows Clipboard and deletes it from its current location.
- **Copy:** This copies the control to the Windows Clipboard without deleting it from its current location.
- **Paste:** This pastes IPADesigner contents of the Windows Clipboard onto the current location.
- **Delete:** This deletes the control.
- **Z-Order:** If you have multiple controls selected, this lets you change their front-to-back order, such as changing which control appears to be "on top" of the others.

Selecting One or More Controls

When a work item page is visible in the Graphical Page Designer, you can select controls on the page to move, resize, or edit them.

To select a control on a page, click it with the mouse.

To select multiple controls on a page:

1. Click the first control you want to select.
2. Hold down the Ctrl key.
3. Click the other controls you want to select.
4. Release the Ctrl key.

Or

- Drag the mouse to select the desired controls.

If you have selected multiple controls, you can simultaneously drag or resize all the selected controls.

However, if you right-click a group of selected controls, most of the choices on the right-click popup menu apply *only* to the "active control" whose border has the resize arrows and shortcut menu.





Tip: To drag a control straight up or down, or straight to left or right, press and hold the Alt key while dragging.

Data-Bound Controls and Data Binding vs. Static Controls

Controls that get data from or show data to the user are called *data-bound controls* because they are bound to specific process or work item variables. When a user enters a value into a data-bound control, such as an edit box bound to a string variable, the control passes the value into the control's bound variable. Similarly, if a data-bound control's variable has a value, the control displays that value.

Controls that are not data-bound are *static controls*. Static controls, such as labels without an optional data binding, present information to the user but do not pass any information to process or work item variables.

The control's context menu displays two icons to specify whether a data-bound control sends data to a variable or receives data from a variable (see table).

Icon	Meaning
	When modifying design of the work item, changes apply to all selected controls.
	When modifying the design of the work item, changes apply only to the active control if more than one control is selected.
	When the work item runs, the control sends changes to the data source.
	When the work item runs, the data source sends changes to the control.

If you bind multiple controls to the same variable:

- A change in the variable's value changes the value of all controls that get data from it.
- A change in the value of a control that sends data to the variable changes the value of the variable. The variable will have the value of the last control that updated it.

Note (background information): When a process user picks up a work item page, the IPA server sends that page to the client, along with a snapshot of all bound variables and their values. When the client displays the page, the page controls display their corresponding variable values. Those values come from the snapshot. When the user enters data on the work item page to controls that are bound to data, IPA updates the values in the local snapshot but does not change the values of the original work item variables. When a process user submits the work item page, IPA sends the values from the snapshot to the server and updates the work item variables. If the process user cancels without submitting, IPA does not update the work item variables. If the process user holds the page, the IPA server holds any updated values that the user enters but does not update the work item variables unless the user later submits the page.

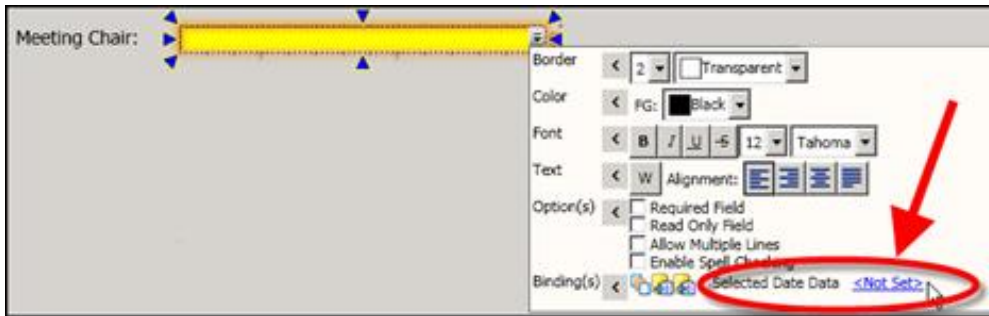
Telling Data-Bound Controls Where to Send or Get Their Data

A data-bound control either sends data to a variable or gets data from a variable. When you add a data-bound control to a work item, you must tell IPA Designer which variable to use with the control. You can use process level variables or work item level variables, though you would obviously use process level variables if the values need to be shared with other parts of the process, outside of the work item.

Note that some controls are not data-bound, so this information does not apply to all controls.

To link a data-bound control to its corresponding variable:

1. At the right end of the control, click its down arrow button to display the properties palette.
2. At the bottom right of the control's properties palette (see figure), click the link **<Not Set>**.



IPA Designer displays a small dialog box containing only a list. The list contains the names of all the variables whose data types are compatible with the control.

3. In the list dialog, select the variable that should get data from the control.
4. Click **OK**.

Work Item Control Types

IPA Designer provides these controls for use on work items:

- [Button](#)
- [Check box](#)
- [Data grid](#)
- [Date picker](#)
- [Drop list](#)
- [Edit box](#)
- [Group box](#)
- [Image](#)
- [Internet Explorer](#)
- [Link](#)
- [Month calendar](#)
- [Password box](#)
- [Radio button](#)
- [Text](#)
- [Time editor](#)

Button



A button carries out an action, such as saving the data a user has entered on a form. The most commonly used buttons are OK and Cancel. In dialogs that have multiple pages, you can add navigation buttons such as **Next** and **Previous** to move from page to page.

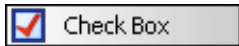
Buttons can have multiple exit reasons, with a different exit path and destination for each reason. To add an exit path and associated destination, display the [shortcut menu](#) and click the plus (+) sign icon.

To set properties (except for text), display the control's [shortcut menu](#) and click **Edit Properties**.

Button Control Properties

Property	Description
Text	The text that the control should display. Double-click the button, type the desired text, and press Enter . The shortcut key is F2 . Not accessible from the properties palette.
Color	FG: Foreground color. In the list, select a color.
Font	The properties palette has standard buttons to set text style (such as bold), size, and font. Note: Type size is measured in points. One inch is 72 points, so 12-point type is one-sixth of an inch high, 18-point type is one-fourth of an inch high, and so on.
Text (format)	The shortcut menu has standard buttons to set text format. The W button sets word wrap on or off. Other buttons align the text left, right, center, or justified.
Options	<i>Close form without sending page data</i> check box: If selected, makes the button discard any data the user just entered on the work item. If not selected, then when the user clicks the button, the work item submits its data to the next step of your process.
Navigation	<ul style="list-style-type: none">• Add actions for this button: Displays an empty workspace where you can add actions that the process should do after the button is clicked.• Destination: Lets you specify where the process should go after the button is clicked: either to exit the work item or to go to a different page of the work item if there are multiple pages. By default, OK buttons save the work item data and exit; Cancel buttons discard the data and exit. You can change exit path. A button can also have multiple destinations. You can add a destination by clicking the plus (+) icon under the button's current destination link.




Check Box



Check boxes allow the user to select one or more items from a group of check boxes. Use check boxes to let the user select *one or multiple* items from the group. For example, an employee might be a member of the management group as well as a member of the I.T. Department and the long-range planning committee. Check boxes are the opposite of [radio buttons](#), which allow the user to select only one item from a group of radio buttons.

To set properties, display the control's shortcut menu and click **Edit Properties**.

Check Box Control Properties

Property	Description
Color	FG: Foreground color. In the list, select a text color.
Font	The shortcut menu has standard buttons to set text style (such as bold), size, and font. Note: Type size is measured in points. One inch has 72 points, so 12-point type is one-sixth of an inch high, 18-point type is one-fourth of an inch high, and so on.
Text (format)	The shortcut menu has standard buttons to set text format. The W button sets word wrap on or off. Other buttons align the text left, right, center, or justified.
Options	Allows you to make the check box read-only.
Binding(s)	 Control Only: The control only displays its state. It does not send its data anywhere else or get data from anywhere else. The user can change the state of the control, but the change doesn't cause anything else to happen.  Data to Control: The control gets its value from the data item with which it is bound by the <i>Checked State Data</i> property. It displays that data.  Control to Data: The control takes whatever value the user gives it and copies that value into the data item with which it is bound by the <i>Checked State Data</i> property.
Checked State Data	The variable with which the process links the control. Click the hyperlink to select or change the variable.

Data Grid



Data grid controls allow you to display items as a collection. Most commonly the collection will hold complex data types. For example, you could create a custom data type called **customer** that contains these properties for a customer: Age, First Name, Last Name. You could then create a variable that is a collection of customers, bind it to the data grid, and the data grid will show the properties of customer as columns. Each row of the table shows one member of the collection. Each column of the table shows a property of the complex data type.

You can also bind the data grid to a simple or basic variable type, like a string collection. In this case, you will see a list with a single column.

Data grids are read-only; you can use them to display data, which users cannot modify directly in the table. However, users can select data in the data grid and you can use their selection in further processing.

Example of a Data Grid in a Form

Current Users

Customer Data Page 1

Account Balance: \$ 0.00

Account Number: 0

Customer Name:

Customer Email:

Is Gold Customer: ☐

OK Cancel

ID	Account Number	Start Date	First Name	Last Name	Account Balance
1		12/4/2012 12:00:00 AM	John	Jones	\$187.95
2		12/4/2012 12:00:00 AM	Sally	Smith	\$455.00
3		12/11/2012 12:00:00 AM	Fred	Frederick	\$25.00
4		12/11/2012 12:00:00 AM	Nora	Charles	\$975.75
5		12/11/2012 12:00:00 AM	Nick	Charles	\$155.00
6		12/11/2012 12:00:00 AM	Judson	Hammond	\$75.00

Setting the Properties for a Data Grid

After you [add the data grid to a work item page](#), you must set the properties of the data grid. To set properties, display the control's shortcut menu and click **Edit Properties**.

Personal Data

Select your name: First Name Last Name Age C

Options

- ☐ Required Field
- ☐ Allow Multiselect

Bindings

- * Source for Items in Datagrid [Process.CustomerCollection1](#)
- Selection None

Layout

- Columns [5 columns selected.](#)

OK Cancel

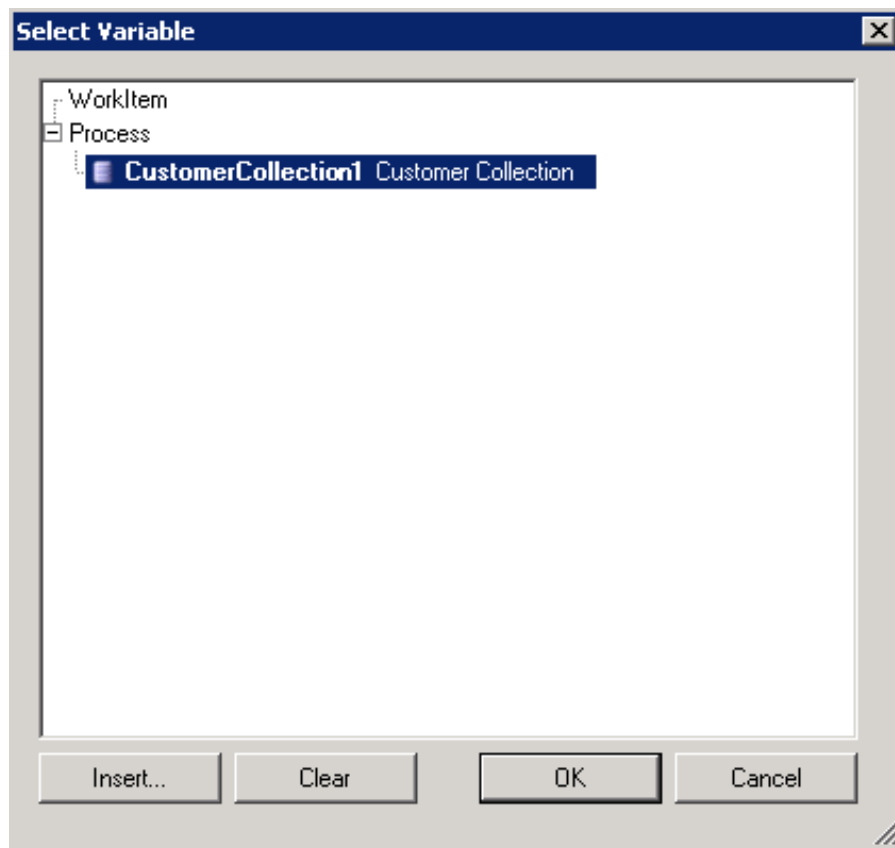
Data Grid Control Properties

Property	Description
Required Field	If selected, this option requires that the user select one or more rows in the data grid. For example, you could use a data grid to show a list of values on a form. You could make the data grid required, meaning that the user would have to select a value shown in the grid. Then you could add an Edit button to the form to access a different form where the user could provide additional information about the selected value.
Allow multi-select	Indicate whether the user can select multiple items in the control.
Bindings (Source for Values)	You can bind the control to a process-level variable or to a local variable that has been defined for a work item. Alternatively, you can insert a new variable. For more information, see the links below.
Selection Type	Select by data type or by unique identifier. <ul style="list-style-type: none"> By Data Type returns a copy of the object selected and puts it in the bound variable. For example, if you pick a customer object, the whole object will be returned. By Unique Identifier is valid only for collections of complex data types. It will return whatever is configured as a string for the unique identifier of the complex data type.
Layout	Indicate the number of columns in the control.

Defining the Bindings for the Data Grid

1. In the Properties pop-up, next to **Bindings *Source for Items in Datagrid**, click the hyperlink. If no variables have been selected, the hyperlink says [<Not Set>](#). If a variable has been selected, then the name of the variable appears in the hyperlink.

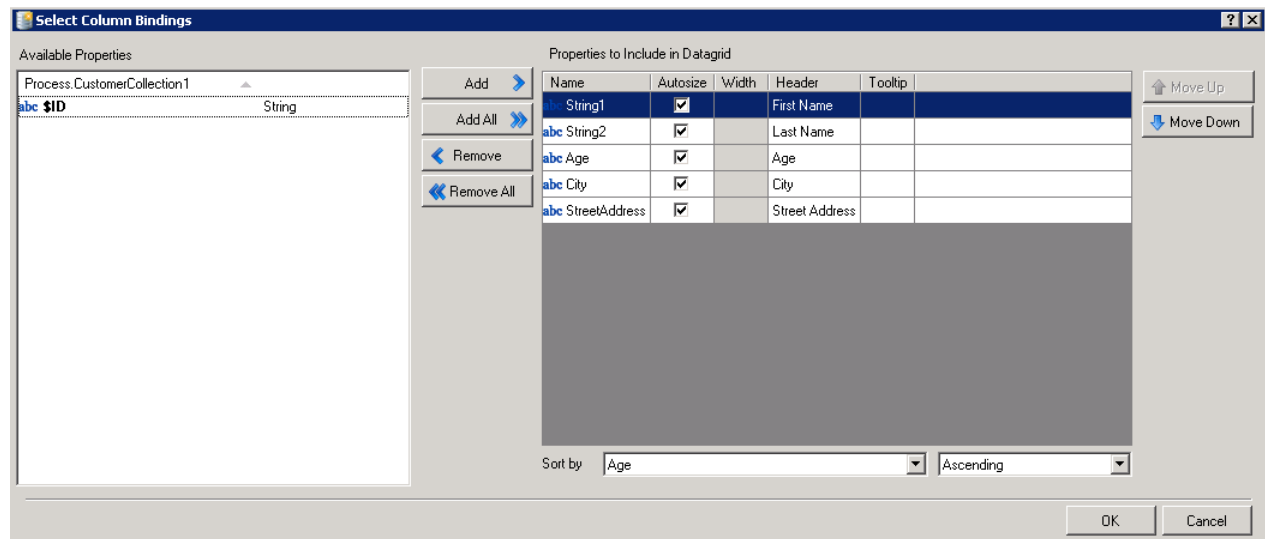
The Select Variable dialog box appears.



2. Do one of the following:
 - To select a variable that has been already defined for another work item or for the process, **select it in the hierarchy tree** and then click **OK**.
 - To insert a variable specifically for this data grid, click **Insert**. Then specify the [properties for the variable](#). For all variables, you must complete the **Add To** field to indicate whether you are adding the variable to a process or to a work item. When you click **OK**, you are automatically returned to the **Select Variable** dialog box. Select the new variable in the hierarchy tree

and then click **OK**.

The **Select Column Bindings dialog box** appears. The number of columns that appear depends on whether you selected a variable with simple or complex data type. For a simple data type, a single column appears. For a complex data type, multiple columns appear.



3. The **Available Properties box** shows the properties for the variable. Each property that you select will appear as a column in the data grid control. For each property that you want to select, click the **Add** button. To select all of the properties, click **Add All**.

To designate the width of each column, do one of the following:

- To have the IPA Designer automatically adjust the width of the data grid based on the actual data that appears, select the **Autosize** check box. In this case, the longest data element returned will determine the width of the column.
- To specify a fixed width in pixels, use the arrows under the **Width** column heading.

The header text appears at the top of the column that is specific to this variable in the data grid. By default, the header is pulled from the variable definition. To change the header, click in the field under the **Header** column and type a new header.

You can include a tool tip, which is a short explanation of the field. To do this, click in the field under **Tool tip** and type the text you want to display.

You can specify a property by which to sort the data in the data grid. To do this, in the **Sort list** select the property to sort by. Then in the list to the right, select **Ascending** or **Descending**.

1.

8. The property at the top of the **Properties to Include...** box will appear in the left-most column in the data grid. To change the position of the properties in the data grid, select one or more rows and then use the **Move Up button** and the **Move Down button**.

9. Click **OK**.

Defining How Selected Data will be Stored

1. Will the user select one or more items from the data grid?

- If no, (if you are just using the grid to display data), then in the Properties pop-up, from the **Selection list**, select **None**.
- If yes, then continue with the next step.

2. Do one of the following:

- Select **By Data Type** to return a copy of the object that the user selected and put it in the bound variable. For example, suppose the data grid is bound to a collection of customers and you have enabled multi-select. If you select **By Data Type**, then the items the user selects will be stored in a new customer collection variable.
- Select **By Unique Identifier** only if the collection is of complex data types. In this case, whatever the user selects will be configured as a string for the unique identifier of the collection.

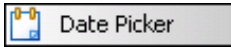
3. If you selected either **By Data Type** or **By Unique Identifier**, then the hyperlinked words, **<Not Set>**, appear next to the list. Click this hyperlink to specify the unique identifier—a [variable and its properties](#). Database actions that create complex data types automatically set a unique identifier. However, if you manually create a custom data type or select a data type from a web service call, the unique identifier is not automatically set and you need to configure it.

Viewing the Columns in a Data Grid

After you have selected the columns (properties) for a data grid, you can view them in order to edit their sort order, position, headings, and so on.

1. In the Properties pop-up, next to Columns, the hyperlink indicates the number of columns that you have selected to include in the data grid. If there are multiple columns, click the link to view the [Define the Bindings](#) in the **Select Column Bindings** dialog box.

Date Picker



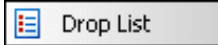
Date pickers allow the user to select a date from a list of dates. The process then passes the date to a bound work item or process variable.

To set properties, display the control's shortcut menu and click **Edit Properties**.

Date Picker Control Properties

Property	Description
Color	FG: Foreground color. In the list, select a color.
Font	The shortcut menu has standard buttons to set text style (such as bold), size, and font. Note: Type size is measured in points. One inch has 72 points, so 12-point type is one-sixth of an inch high, 18-point type is one-fourth of an inch high, and so on.
Options	Required Field: If selected, this check box requires the user to enter or select a value before proceeding. Read Only Field: If selected, this check box makes the control display a value that the user cannot change.
Binding(s)	Control Only: The control only displays its state. It does not send its data anywhere else or get data from anywhere else. The user can change the state of the control, but the change doesn't cause anything else to happen. Data to Control: The control gets its value from the data item with which it is bound by the <i>Selected Date Data</i> property. It displays that data. Control to Data: The control takes whatever value the user gives it and copies that value into the data item with which it is bound by the <i>Selected Date Data</i> property.
Selected Date Data	The variable with which the process links the control. Click the hyperlink to select or change the variable.

Drop List



Drop lists allow the user to select a value from pre-determined list.

To set properties, display the control's shortcut menu and click **Edit Properties**.

Drop List Control Properties

Property	Description
Color	FG: Foreground color. In the list, select a color.
Font	The shortcut menu has standard buttons to set text style (such as bold), size, and font. Note: Type size is measured in points. One inch has 72 points, so 12-point type is one-sixth of an inch high, 18-point type is one-fourth of an inch high, and so on.
Options	Required Field: If selected, this check box requires the user to enter or select a value before proceeding. Read Only Field: If selected, this check box makes the control display a value that the user cannot change. Sort and Remove Duplicates: If selected, this check box removes duplicate entries from the list and lists the items in order.
Binding(s)	Control Only: The control only displays its state. It does not send its data anywhere else or get data from anywhere else. The user can change the state of the control, but the change doesn't cause anything else to happen. Data to Control: The control gets its value from the data item with which it is bound by the <i>Selected Value Data</i> property. It displays that data. Control to Data: The control takes whatever value the user gives it and copies that value into the data item with which it is bound by the <i>Selected Value Data</i> property.
Selected Value Data	The variable with which the process links the control. Click the hyperlink to select or change the variable. The variable can be a single value or a collection. See the discussion of data sources in this help topic for more information.
Source for Items in Drop-Down	A collection variable from which the drop-down list gets its available values. Can be used by itself or together with the <i>Selected Value Data</i> field. See the discussion of data sources in this help topic for more information.

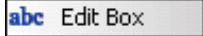
Data Sources for Drop List Controls

There are two ways to use the *Selected Value Data* and *Source for items in Drop-Down* fields.

Method #1: Set *Selected Value Data* to use values from a collection variable. The values in the collection will be the available values in the drop-down list. Do not set the *Source for items in Drop-Down* at all. Just leave it alone.

Method #2: Set *Selected Value Data* to get its value from variable with a single value (not a collection). Set *Source for items in Drop-Down* to use values from a collection variable. If the value of the variable in the *Selected Value Data* field matches one of the values in the collection used by *Set Source for items in Drop-Down*, then that matching value will be the default value in the drop-down list. If the value in *Selected Value Data* does not match any of the values in the collection, or if the value in *Selected Value Data* is not set, then the drop-down list will not have a pre-selected default value.




Edit Box



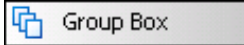
An edit box allows the user to type a value into the box. The process then passes the value to a work item or process variable.

To set properties, display the control's shortcut menu and click **Edit Properties**.

Edit Box Control Properties

Property	Description
Border	Use the first list box to select the thickness in pixels of the border line around the control. Use the second list box to select the color of the border line.
Color	FG: Foreground color. In the list, select a color.
Font	The shortcut menu has standard buttons to set text style (such as bold), size, and font. Note: Type size is measured in points. One inch has 72 points, so 12-point type is one-sixth of an inch high, 18-point type is one-fourth of an inch high, and so on.
Text (format)	The shortcut menu has standard buttons to set text format. The W button sets word wrap on or off. Other buttons align the text left, right, center, or justified.
Options	<p>Required Field: If selected, this check box requires the user to enter or select a value before proceeding.</p> <p>Read Only Field: If selected, this check box makes the control display a value that the user cannot change.</p> <p>Allow Multiple Lines: If selected, this check box lets the edit box expand to display multiple lines of text. Best used with word wrap turned on (see the <i>Text (format)</i> row, above). If selected, it also makes the Tab key insert tabs instead of moving the focus to the next field. To make the Tab key move the focus, the user should turn off Insert mode.</p> <p>Enable Spell Checking: If selected, this check box makes IPA flag potentially misspelled words the user enters in the edit box.</p>
Binding(s)	<p> Control Only: The control only displays its state. It does not send its data anywhere else or get data from anywhere else. The user can change the state of the control, but the change doesn't cause anything else to happen.</p> <p> Data to Control: The control gets its value from the data item with which it is bound by the <i>Selected Data</i> property. It displays that data.</p> <p> Control to Data: The control takes whatever value the user gives it and copies that value into the data item with which it is bound by the <i>Entered Value Data</i> property.</p>
Entered Value Data	The variable with which the process links the control. Click the hyperlink to select or change the variable.

Group Box



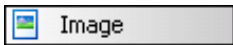
A group box is a visual element that does not get data from the user. Its function is to group controls visually on a work item so that the user can see which controls go together. It has no effect on how the process works.

To set properties, display the control's shortcut menu and click **Edit Properties**.

Group Box Control Properties

Property Description	
Color	FG: Foreground color. BG: Background color. In the lists, select the desired colors.
Font	The shortcut menu has standard buttons to set text style (such as bold), size, and font. Note: Type size is measured in points. One inch has 72 points, so 12-point type is one-sixth of an inch high, 18-point type is one-fourth of an inch high, and so on.



Image



An image control is a visual element that does not get data from the user. It displays an image file.

To set properties, display the control's shortcut menu and click **Edit Properties**.

Image Control Properties

Property	Description
Color	BG: Background color. In the list, select a color.
Values	Fixed URI: A variable that contains the location of the image file to display.
Options	Scale down to fit, if necessary: If selected, shrinks the original image to fit within the control. Scale up to fit, if necessary: If selected, expands the original image to fill up the control. Stretch to fill, if necessary: If selected, stretches the original image vertically or horizontally to fill the control. For example, in a control whose width exceeded its height, an image might be stretched horizontally to touch the sides of the control. In a tall, thin control, an image might be stretched vertically.
Binding(s)	 Control Only: The control only displays its state. It does not send its data anywhere else or get data from anywhere else. The user can change the state of the control, but the change doesn't cause anything else to happen.  Data to Control: The control gets its value from the data item with which it is bound by the <i>URI Data</i> property. It displays that data. URI Data: Click the link to bind a URI address value to the control. Best practice is to select a URI-type value, but you can also select a string-type value.

You can use the image control with the following file types:

- BMP
- GIF
- ICO
- JPG
- PNG
- TIF
- WDP




Internet Explorer



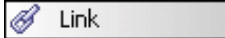
The Internet Explorer control contains and displays a web browser window on a work item page. To move or resize the web browser window, move or resize the Internet Explorer control.

To set properties, display the control's shortcut menu and click **Edit Properties**.

Internet Explorer Control Properties

Property	Description
Border	Use the first list box to select the thickness in pixels of the border line around the control. Use the second list box to select the color of the border line.
Color	The shortcut menu displays nothing in this area.
Values	Fixed URI: Location of the image file to display.
Binding(s)	 Control Only: The control only displays its state. It does not send its data anywhere else or get data from anywhere else. The user can change the state of the control, but the change doesn't cause anything else to happen.  Data to Control: The control gets its value from the data item with which it is bound by the <i>URI Data</i> property. It displays that data.  Control to Data: The control takes whatever value the user gives it and copies that value into the data item with which it is bound. It can apply to the <i>Plain Text</i> or <i>URI Data</i> property.
Update URI when user navigates	Updates the URI Data property when a process user navigates within the Internet Explorer control to a different URI.
URI Data	A variable that contains the address for the Internet Explorer control. The value should be fully qualified, such as: <ul style="list-style-type: none">• <code>http://www.inin.com.</code> Relative URI values do not work because the web browser is not on the same system as the web server. Use only fully-qualified URI values, such as <code>http://www.FakeAddress.com/Features.html</code> . The process design should be robust enough to accommodate all viewers.
Plain Text Data	A plain-text string variable that contains the contents of the page that the browser control displays. Click the hyperlink to select or change the variable.



Link



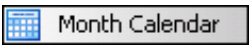
A link control displays a clickable link to a web URL or a shared file location.

To set properties, display the control's shortcut menu and click **Edit Properties**.

Link Control Properties

Property	Description
Color	BG: Background color. In the list, select a color.
Font	The shortcut menu has standard buttons to set text style (such as bold), size, and font. Note: Type size is measured in points. One inch has 72 points, so 12-point type is one-sixth of an inch high, 18-point type is one-fourth of an inch high, and so on.
Binding(s)	 Control Only: The control only displays its state. It does not send its data anywhere else or get data from anywhere else. The user can change the state of the control, but the change doesn't cause anything else to happen.  Data to Control: The control gets its value from the data item with which it is bound by the <i>Text Data</i> and <i>Link Data</i> properties. It displays that data.
Text Data	A variable that contains text to display with the link.
Link Data	<p>A variable that contains the address for the link. The value can be a URI, UNC, or command line statement with parameters. Examples are:</p> <ul style="list-style-type: none">• URI: http://www.inin.com.• UNC: \\Design Documents\Functional Specification.doc• Command line with parameters: Notepad ReadMe.txt <p>UNC and command line values do not work in the IPA Web Client because the user's web browser is not on the same system where the files (for a UNC) or programs (for a command line) reside.</p> <p>For the same reason, <i>relative</i> URI values do not work. Use only <i>fully-qualified</i> URI values, such as http://www.FakeAddress.com/Features.html. The process design should be robust enough to accommodate all viewers.</p>

Month Calendar



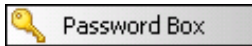
A Month Calendar control lets the user select a date from a month calendar. The process then passes the date to a process variable.

To set properties, display the control's shortcut menu and click **Edit Properties**.

Month Calendar Control Properties

Property	Description
Color	FG: Foreground color. In the list, select a color.
Font	The shortcut menu has standard buttons to set text style (such as bold), size, and font. Note: Type size is measured in points. One inch has 72 points, so 12-point type is one-sixth of an inch high, 18-point type is one-fourth of an inch high, and so on.
Options	Required Field: If selected, this check box requires the user to enter or select a value before proceeding.
Binding(s)	<div> Control Only: The control only displays its state. It does not send its data anywhere else or get data from anywhere else. The user can change the state of the control, but the change doesn't cause anything else to happen.</div> <div> Data to Control: The control gets its value from the data item with which it is bound by the <i>Date Data</i> property. It displays that data.</div> <div> Control to Data: The control takes whatever value the user gives it and copies that value into the data item with which it is bound by the <i>Date Data</i> property.</div>
Date Data	The variable with which the process links the control. Click the hyperlink to select or change the variable.



Password Box



A Password Box control lets the user type a password or other short series of private data, and it masks what the user types. The process then passes the value to a process variable.

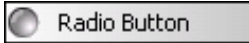
To set properties, display the control's shortcut menu and click **Edit Properties**.

Password Box Control Properties

Property	Description
Color	The shortcut menu displays nothing in this area.
Options	Required Field: If selected, this check box requires the user to enter or select a value before proceeding. With a Password Box control, you should always select this option.
Binding(s)	 Control Only: The control only displays its state. It does not send its data anywhere else or get data from anywhere else. The user can change the state of the control, but the change doesn't cause anything else to happen.  Data to Control: The control gets its value from the data item with which it is bound by the <i>Password Data</i> property. It displays that data.
Password Data	The variable to contain the password entered by the user.

Tip: If a work item page has a password box bound to a variable, and another control on the same page is bound to the *same* variable, then IPA Designer will not publish the process. For more information, see [Telling Data-Bound Controls Where to Send or Get Their Data](#) and [Publishing a Process](#).

Radio Button



Radio buttons allow the user to select one item from a group of related radio buttons. Use radio buttons to let the user select *only one* item from the group. For example, an employee can work part-time or full-time, but not both. Radio buttons are the opposite of [check boxes](#), which let the user select one or multiple items from a group of related check boxes. When a user selects a radio button, the process then passes the value to a process or work item variable.

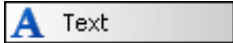
To set properties, display the control's shortcut menu and click **Edit Properties**.

Note: Unlike most controls, radio buttons are normally used not alone but in *groups*. For example, suppose that a process must categorize a loan as *Consumer*, *Automobile*, or *Home*. You might create a variable called *loanType* to hold that information. On a form, you would add one radio button for each different type of loan. If the process user clicks the radio button for *Consumer Loan*, it selects that radio button. If the user then clicks the radio button for *Automobile Loan*, it de-selects the radio button for *Consumer Loan* at the same time as it selects the button for *Automobile Loan*. To do this, IPA Designer must know that the radio buttons go together. Therefore, when you bind a group of radio buttons to the same variable (such as *loanType*), IPA Designer automatically groups them together.

Radio Button Control Properties

Property	Description
Color	The shortcut menu displays nothing in this area.
Font	The shortcut menu has standard buttons to set text style (such as bold), size, and font. Note: Type size is measured in points. One inch has 72 points, so 12-point type is one-sixth of an inch high, 18-point type is one-fourth of an inch high, and so on.
Text (format)	The shortcut menu has standard buttons to set text format. The W button sets word wrap on or off. Other buttons align the text left, right, center, or justified.
Values	Value When Selected: A variable that sets the initial value to display when selected.
Options	Required Field: If selected, this check box requires the user to enter or select a value before proceeding.
Binding(s)	Control Only: The control only displays its state. It does not send its data anywhere else or get data from anywhere else. The user can change the state of the control, but the change doesn't cause anything else to happen. Data to Control: The control gets its value from the data item with which it is bound by the <i>Selected Value Data</i> property. It displays that data. Control to Data: The control takes whatever value the user gives it and copies that value into the data item with which it is bound by the <i>Selected Value Data</i> property.
Selected Value Data	The variable with which the process links the control. Click the hyperlink to select or change the variable.



Text



A Text control lets the designer place a text string on a work item. It does not collect data from the user or pass any data to the process.

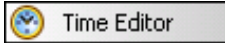
To set properties including the text string to display, display the control's shortcut menu and click **Edit Properties**.

Text Control Properties

Property	Description
Color	The shortcut menu displays nothing in this area.
Font	The shortcut menu has standard buttons to set text style (such as bold), size, and font. Type size is measured in points. One inch has 72 points, so 12-point type is one-sixth of an inch high, 18-point type is one-fourth of an inch high, and so on. Important: When work item pages will display in browsers, it's best to use browser-safe fonts when designing the page in IPA Designer. Non-browser-safe fonts sometimes display incorrectly. Also, because of the variety of browsers and operating systems, it is best practice to test even "safe" fonts to verify that they display correctly when viewed in an IPA-supported browser. Safe non-serif fonts are Arial, Tahoma, and Verdana. Safe serif fonts are Georgia and Times New Roman. The W3 Consortium maintains a list of safe fonts on its web site and offers safe font guidance here .
Text (format)	The shortcut menu has standard buttons to set text format. The W button sets word wrap on or off. Other buttons align the text left, right, center, or justified.
Binding(s)	 Control Only: The control only displays its state. It does not send its data anywhere else or get data from anywhere else. The user can change the state of the control, but the change doesn't cause anything else to happen.  Data to Control: The control gets its value from the data item with which it is bound by the <i>Text Data</i> property. It displays that data.
Text Data	The variable with which the process links the control. Click the hyperlink to select or change the variable.

Note: If you bind a Date, Time, or Date Time variable to a Text control, the control will display the date, time, or date and time, depending on the variable type.

Time Editor



The Time Editor control lets the user enter or select a time of day value. The control can link either to a Time variable or to a DateTime variable. The time always displays for the user's local time zone.

To set properties, display the control's shortcut menu and click **Edit Properties**.

Time Editor Control Properties

Property	Description
Border	Thickness: Width of the field border in pixels. Color: Color of the field border. Transparent color makes the border invisible.
Color	FG: Foreground color of the text in the field. In the list, select a color.
Font	Standard buttons to set text style (such as bold), size, and font. Note: Type size is measured in points. One inch has 72 points, so 12-point type is one-sixth of an inch high, 18-point type is one-fourth of an inch high, and so on.
Text	Standard buttons to set text format. The W button sets word wrap on or off. Other buttons align the text left, right, center, or justified.
Options	Required Field: If selected, this check box requires the user to enter or select a value before proceeding. Read Only Field: If selected, this check box makes the control display a value that the user cannot change.
Binding(s)	Control Only: The control only displays its state. It does not send its data anywhere else or get data from anywhere else. The user can change the state of the control, but the change doesn't cause anything else to happen. Data to Control: The control gets its value from the data item with which it is bound by the <i>Time Value</i> property. It displays that data. Control to Data: The control takes whatever value the user gives it and copies that value into the data item with which it is bound by the <i>Time Value</i> property.
Time Value	The Time or DateTime variable with which the control is linked. The Select Variable dialog box also has an Insert button that lets you create a new Time or DateTime variable "on the fly" to link with the field.

Working with Tasks and Actions

Tasks combine work items with actions to move a process forward. For example, a hospital might need to process a patient's admission information. Work items might be a diagnosis form and an insurance form. The task would combine those work items with actions:

- IF condition = "life-threatening emergency" THEN status = ("Admit" AND PostponeForms) ELSE
- Send Work Item (insurance form) to User (admitting desk)
- Send Work Item (insurance form) to Workgroup (billing department)
- Send Work Item (diagnosis form) to User (attending physician)
- Send Work Item (diagnosis form) to Workgroup (medical records department)

Other tasks might prepare a patient for surgery, discharge a patient, or arrange for follow-up home visits by a nurse. Each task would group related actions into one package.

Related topics:

[Creating a Task](#)

[Adding Actions to a Task](#)

[Actions You Can Add to Tasks](#)

Creating a Task

You can create a task from anywhere in IPA Designer. When you create the task, IPA Designer automatically displays a task workspace where you can add content to the task.

To create a task:

1. Open the **File** menu, point to **Add**, and click **New Task**.

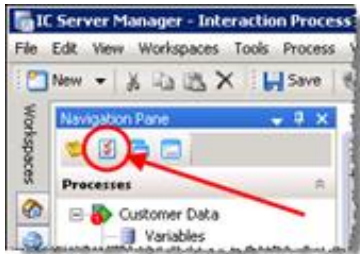
IPA Designer displays the **New Task** dialog box (see figure).



2. In the **Name** text box, type a **name** for the task.
3. In the **Description** text box, type a brief description of the task and its use.
4. Click **OK**.

IPA Designer creates a blank task diagram and displays it in your workspace. You can now [add actions](#) to the task. You can use the [Run Task in a state](#) action to add the task to a state or [Run Task in a task](#) action to add the task to another task.

Another way to create a task is to right-click the process name in the process list, point to **Add** on the shortcut menu, then click **New Task**. You can also press **Ctrl+T** to create a new task. A third way to create a task is to click the New Task icon at the top of the Navigation Pane (see figure).



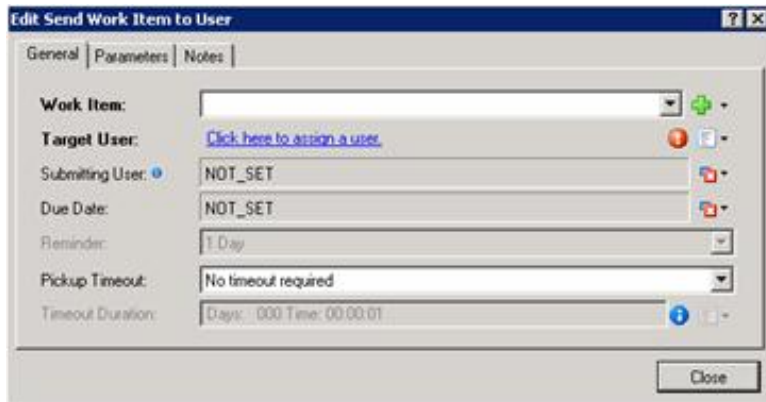
Adding Actions to a Task

This section gives the general procedure for adding an action to a task. For information about how to add specific types of tasks, see the section for the desired task type.

To add an action to a task:

1. Display the task in the IPA Designer workspace.
2. In the Toolbox, click the desired action and drag it to the desired point in the task.

IPA Designer adds the action to the workspace and displays the **Edit Action** dialog box (see figure). The dialog box has a different title and shows different options depending on the action you selected.



3. In the dialog box, add or select the desired values.
4. Click **Close**.

For more information about adding specific tasks, see [Actions You Can Add to Tasks](#) and look at the section about the type of action you want.

Copying and Pasting a Task

You can copy a task to the Windows Clipboard and paste it into the same process or into a different process. When you paste the process, IPA Designer adds its name to the Tasks container of the process list.

If you post a copied task into the same process, IPA Designer adds a number (starting with "1") at the end of the task name to indicate that it is a copy of the original task of the same name.

To copy and paste a task:

1. In the process list, right-click the task to copy, then click **Copy**.

IPA Designer copies the task to the Windows Clipboard.

2. Right-click the process into which you want to paste the task, then click **Paste**.

IPA Designer pastes the task into the process and adds its name to the Tasks container of the process list.

Note: In IC 4.0 Service Update 1 (SU1) and later versions, IPA Designer automatically includes any referenced items (such as variables) when you copy and paste. It also updates the references to the pasted location.

Copying and Pasting an Action from a Task to a State

You can copy and paste an action from a task to a state. Tasks support some action types that states do not support, so you can only paste these action types:

- Decision
- Loop
- Run Task
- Select

To copy and paste an action from a task to a state:

1. In the task, right-click the desired action, then click **Copy** in the shortcut menu.

IPA Designer copies the action to the Windows Clipboard.

2. Navigate to the state in which you want to paste the action.
3. In the state, right-click the desired location for the action, then click **Paste** in the shortcut menu.

Actions You Can Add to Tasks

IPA Designer lets you add these actions to tasks (listed here in the order that IPA Designer lists them):

- [Call Web Service Operation](#)
- [Decision](#)
- Database Actions
- [End Task](#)
- [Loop](#)
- [Run Handler](#)
- [Run Process](#)
- [Run Task](#)
- [Select](#)
- [Send E-Mail](#)
- [Send Work Item To User](#)
- [Send Work Item To Workgroup](#)
- [Update Variables](#)
- [Wait](#)

Call Web Service Operation

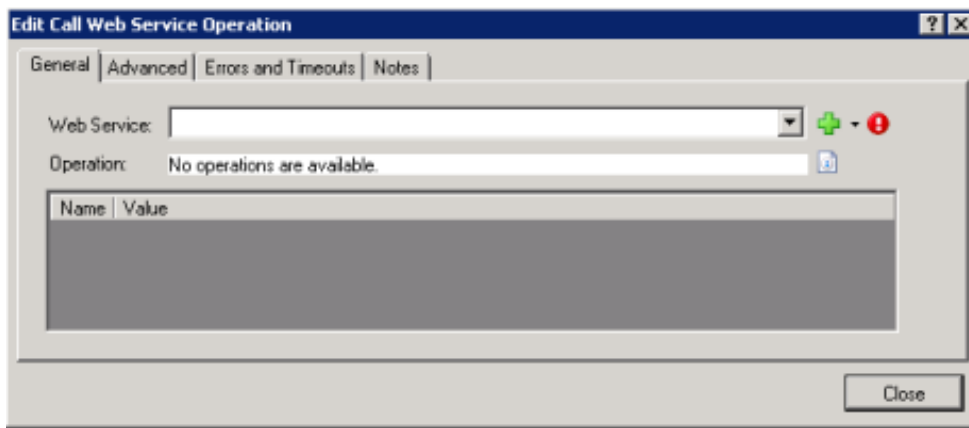
A web service is "a software system designed to support interoperable machine-to-machine interaction over a network" (W3C definition). It is similar in function to Microsoft's proprietary Distributed Component Object Model (DCOM).

Note: Each web service requires different information items, often in different forms. Before you add an action to call a web service operation, make sure that you know what information it will require and what information it returns to your process. You also need the URL (web address) of the web service.

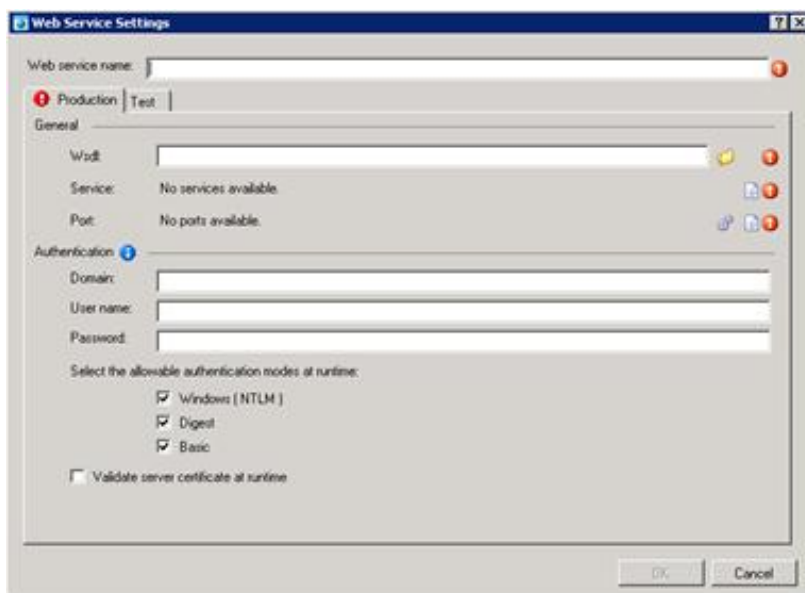
To add a web service call to your process design:

1. Drag the action **Call Web Service Operation** from the toolbox to the desired point in your task design.

IPA Designer displays the **Edit Call Web Service Operation** dialog box (see figure). If you have previously defined one or more web services, the dialog box will differ from the figure and you should skip directly to **Step 7** of this procedure.



2. Click the Plus sign (+) icon to display the Web Service Settings dialog box (see figure). This is where you define the web services that your process uses.



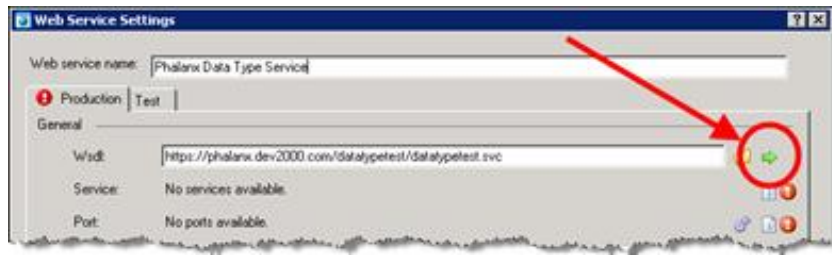
3. Enter basic information about the web service:
 - a. In the web **service name** text box, type the name of the web service.
 - b. In the **WSDL** text box, type web service URL, such as <http://myservice.com/myservice.svc> or <https://myservice.com/myservice.svc> (for a secure web service).

IPA Designer will fill in the Service and Port blanks automatically after it completes a test connection to the URL and retrieves that information from the web service.

Note: The Advanced tab in the Edit Call Web Service dialog can dynamically specify a different URL.

4. Enter authentication information about the web service:
 - a. In the **Domain** text box, type the domain to use for the web service.
 - b. In the **User name** and **Password** text boxes, type the user ID and password for login.
 - c. Under **Select the allowable authentication modes at runtime**, select one or more check boxes for the authentication mode(s) to use with the web service.
 - d. For secure web services (those whose URLs begin with https://), select the **Validate server certificate at runtime** check box.

As soon as you finish entering information, the dialog box displays a green arrow icon (see figure) to run a test connection to the web service.



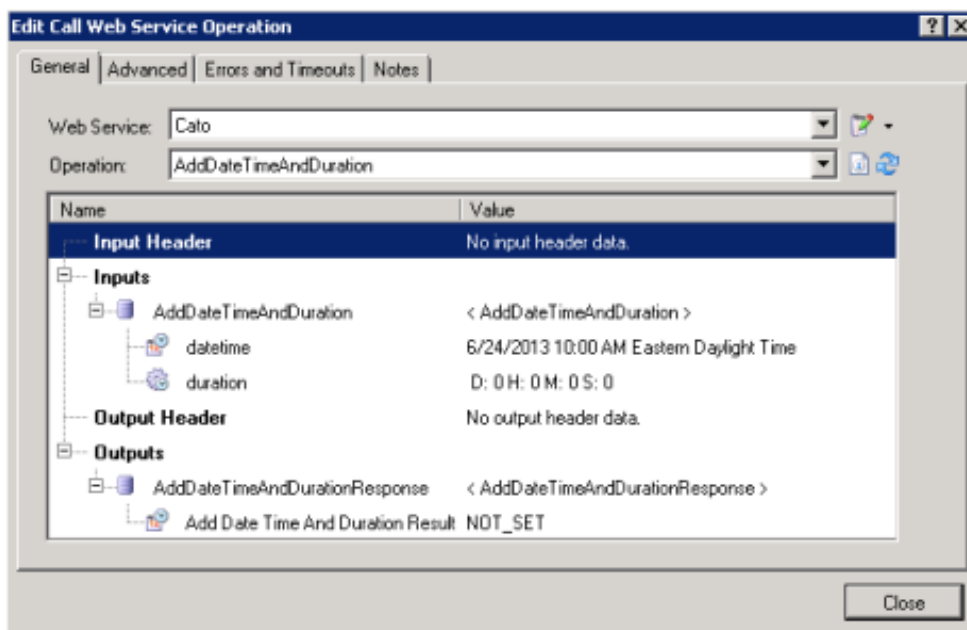
5. To connect to the web service and retrieve information about it, click the green arrow icon.

IPA Designer connects to the web service. It fills in the Service, displays a drop-down list of available ports, and changes the green arrow icon to a refresh icon.

6. Click **OK** to return to the Call Web Service dialog box.

IPA Designer re-displays the Call Web Service dialog box. This time, the dialog includes information about the web service.

7. In the Edit Call Web Service dialog box (see figure):

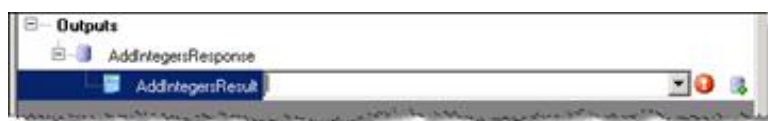


- a. If needed, expand the Web Service drop-down list and select the web service to use.
- b. Expand the **Operation** drop-down list and select the desired web service operation.
- c. In the Inputs row(s), click the default values to replace them with the values to send to the web service.


Depending on the web service and input type, you can enter literal values, variables, and [calculations](#).

- d. In each Output row, click **No Reference Set**.

IPA Designer displays a drop-down list box with available variables of the appropriate type to hold value(s) returned by the web service (see figure).



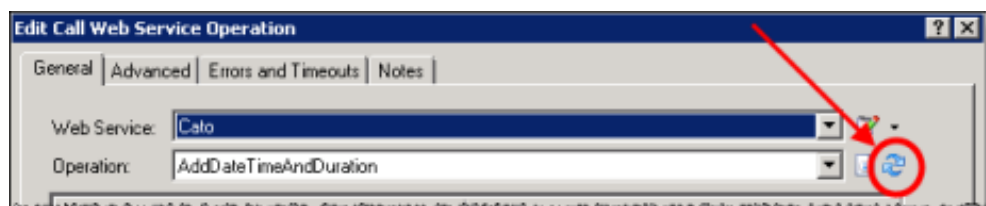
- e. Expand the list box and select the variable to hold the value returned by the web service.

You can also create a new variable "on the fly" by clicking the **Add Variable** () icon.

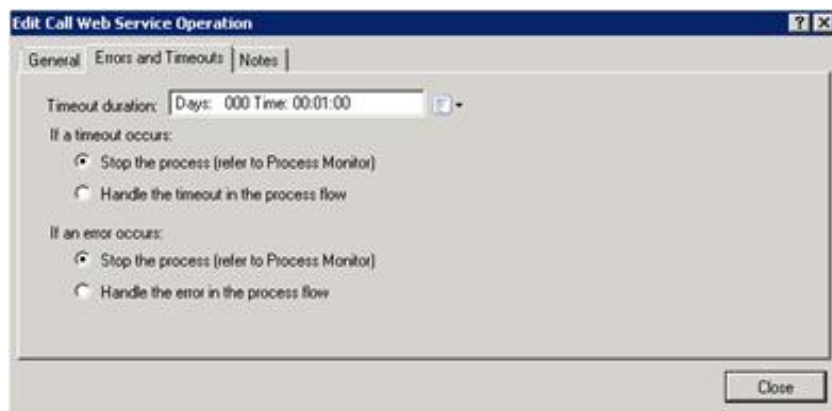
Note: Inputs and outputs to a Call Web Service action are wrapped in a complex data type. If you have a variable of that type, you can reference the variable to access the inputs or outputs.

- 1.
- f. At the right end of the Operation box, click the **Refresh** icon (see figure).

This retrieves updated qualified / unqualified meta data that the Call Web Service action needs.



8. Configure Errors and Timeouts (see figure):

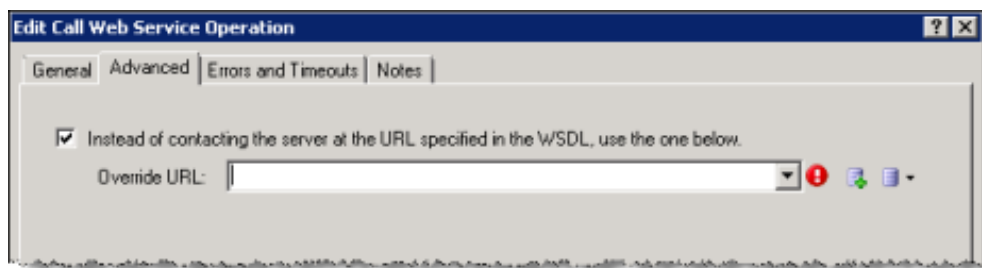


Note: The Errors and Timeouts tab is only available in IC 4.0 Service Update 1 and later versions. The Advanced tab is only available in IC 4.0 Service Update 4 and later versions.

- a. Click the Errors and Timeouts tab.
- b. In the **Timeout Duration** text box, enter the amount of time that the process should wait for the web service to respond.
- c. Select the radio buttons for the desired timeout and error handling methods.

Currently, IPA returns no error information about why the action failed.

9. If desired, configure a dynamic URL or add notes:



- (optional) On the Advanced tab, select the **Instead of contacting the server ...** check box. Then enter the desired URL in the **Override URL** box.
- (optional) On the Notes tab, add any notes about the web service.

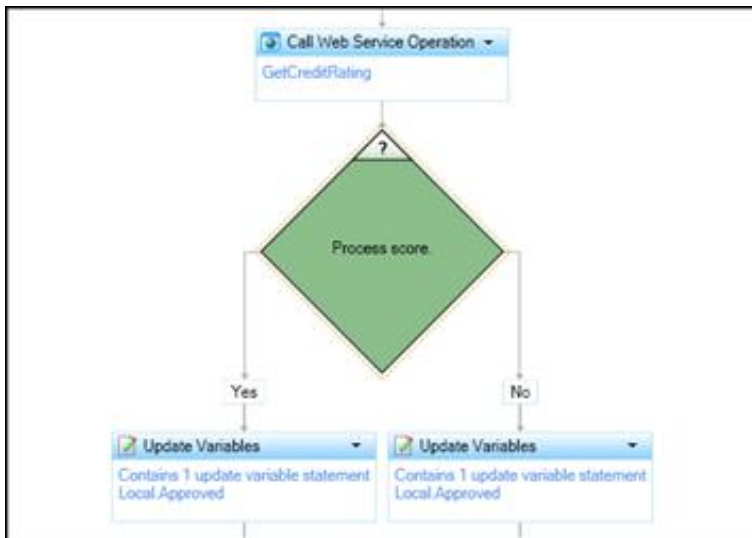
10. Click **Close**.

IPA Designer adds the Call Web Service action to your process.

Note: If you delete a Call Web Service action that created a complex data type definition, then IPA Designer deletes the data type definition unless it is used elsewhere in the process.

Decision

Use **Decision** to make the process branch depending on whether or not a condition is true. If the condition is true, then the process goes in the **Yes** direction; if the condition is false, then the process goes in the **No** direction (see figure for an example).



Typical examples of conditions are:

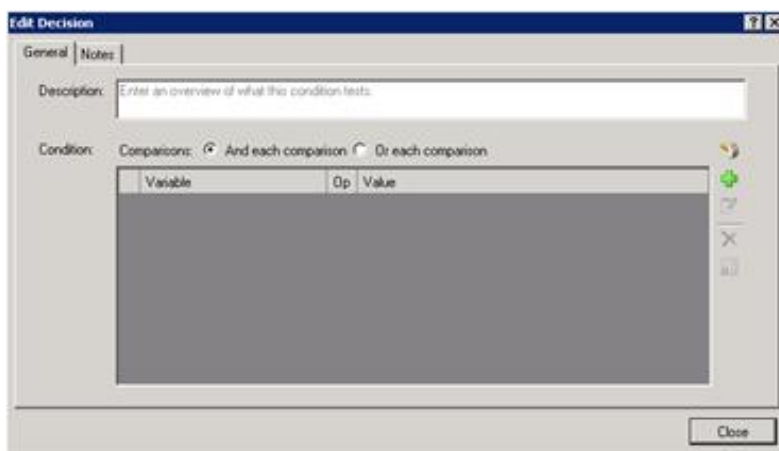
- A boolean variable has a true value.
- An integer variable is equal to 10.
- The current date is after a deadline date.

Note: You can add Decision actions both to tasks and to states. They work the same in either, though you will obviously use them in slightly different ways.

To add a Decision action to a task:


1. Drag the Decision action from the toolbox to the desired location in your task, then click the link **Click here to add a calculation**.

IPA Designer displays the **Edit Decision** dialog box (see figure).



2. In the **Description** text box, type a brief explanation of the decision that the action makes.
3. If the decision will use multiple comparisons, select the radio button to use AND or OR.

If the action only makes one comparison, then this radio button doesn't matter. For more information, see the help topics [Understanding Boolean Expressions](#), [The AND Operator](#), and [The OR Operator](#).

4. Click **Plus**  to add a comparison to the list.

IPA Designer displays the [Comparison Item dialog box](#).

5. Add one or more comparisons:

- a. In the **Value** list, select a variable to compare. You can also use a function on the variable's value before using it in the comparison. See the help topic [Understanding Functions](#) for more information.

You can also create a new variable for the comparison by clicking the  New Variable icon.

- b. In the **Operator** list, select the operator to use (equal, greater than, etc.).
- c. Using the **Value** control(s), enter the value with which to compare the variable.

IPA Designer displays different controls to enter the value depending on the data type of the variable you selected in Step 5(a).

- d. Click **Finished** to add the comparison.

6. To add more comparisons, click **Plus**  in the **Comparison Item** dialog box.

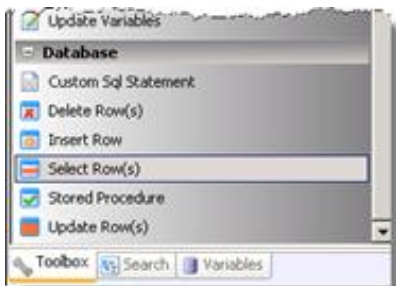
7. When you are finished adding comparisons, click **Close** to close the **Edit Decision** dialog box.

Database Actions

Note: This section applies only to IC 4.0 SU1 (Service Update 1) and later versions.

To access CIC Data Sources in your process designs, you must have the user rights to access them. If you get an error message when you try to access a data source from a process design, contact your system administrator to obtain the required user rights. Users of the process must also have rights to access the data sources.

IPA Designer now supports six database actions:



- **Select Row(s):** This selects table rows based on criteria you specify.
- **Insert Row:** This inserts a row into a table.
- **Delete Row(s):** This deletes selected rows from a table.
- **Update Row(s):** This changes data in selected rows.
- **Stored Procedure:** This runs a predefined routine with the database.
- **Custom SQL Statement:** This lets you write your own SQL statement.

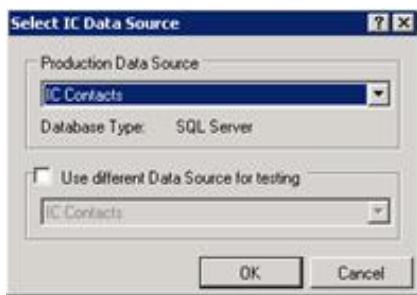
When you pass values to these standard database actions, do not use the ToSql() function to convert the values. IPA Designer does any required conversion automatically. If you use ToSql() with standard database actions, it causes an error.

The database action dialog boxes have different features that depend on the actions they define. For information about creating a specific database action, see the help topic for that dialog box.

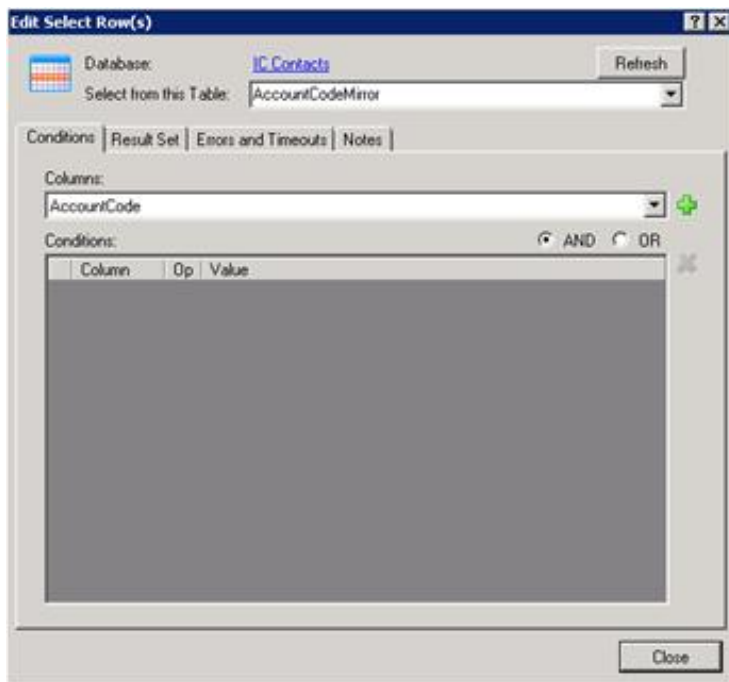
Warning: Database actions are a technical feature of IPA Designer. They are best used by programmers, database administrators, or other technical staff. If you are unfamiliar with database concepts, techniques, and SQL, use database actions very carefully. Remember that even if a database action runs without crashing, it might produce incorrect results if designed incorrectly.

To add a database action:

1. Display the Task workspace. Drag the desired database action from the toolbox to the workspace.
2. In the Select IC Data Source dialog, select the desired database from the **Production Data Source** list box (see figure). Then click **OK**.



3. In the database action dialog (see figure for an example):



- In the **Select from this Table** list box, select the table to use.
- Use the tabs to define the action (these will be different for each action type).
- Click **Close**.

End Task

Use **End Task** to end a task in a process. When you design a task in IPA Designer, you must add at least one End Task action at the end of the task. In some situations, you might have more than one End Task action in a task. For example, if your task includes a Decision action:

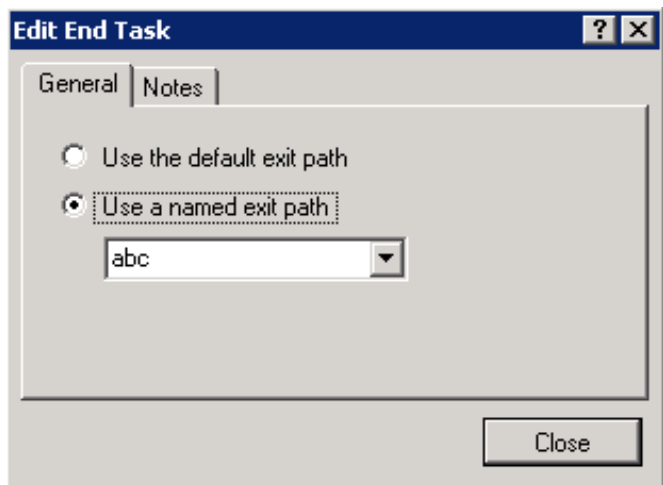
- Your task might terminate if the *If* condition is true. In that case, you put an End Task action directly after the True part of the Decision action (see the section [Decision](#) for a diagram).
- Your task might continue for several more steps if the *Else* condition true. In that case, you put an End Task action at the end of the additional steps.

You might also insert multiple End Task actions if your task uses a [Select](#) statement to branch or uses a [Loop](#) statement to loop. The rule is: *Every separate sequence of actions within a task must terminate in an End Task action.*

To add an End Task action to your process design:

1. Drag the action **End Task** from the toolbox to the desired point in your task design.

IPA Designer displays the **Edit End Task** dialog box (see figure).



2. Choose the exit path (what the task does as it ends):
 - To use the default exit path, select the radio button labeled **Use the default exit path**.
 - If you want the End Task action to return a value to your process, such as *Success* or *Error 5332*, select the radio button labeled **Use a named exit path**, then type or select the desired path. The result value is the same as the path name.
3. The path name (result value) can be anything you want. You use the value in the Run Task action, which can make your process do different things depending on the path chosen.

If needed, click the **Notes** tab and add explanatory notes in the text box.

4. Click **Close**.

IPA Designer adds the End Task action to your task design at the point you indicated.

Loop

Use the Loop action in a task or state to make your process repeat a series of actions before it goes on to the next action in your design. You can create three kinds of loop actions:

- **Loop through items a collection:** This applies the actions inside the loop to each item of a collection of variables. For example, the actions inside the loop might add 2 and then multiply by 3. If you looped through a collection of five integers, then the loop would add 2 to the first integer, multiply the sum by 3, and put the product back into the first integer's slot in the collection. The loop would do the same actions on the second integer, then the third, fourth, and fifth. When it finished with the last item in the collection, the loop would "exit" and your process would move forward to the next action in your process design.
- **Loop until a fixed count is reached:** This applies the actions inside the loop for a number of times that you specify. For example, if you specify 10, then the loop will run 10 times before moving forward to the next action in your process design.
- **Loop while a condition is true:** This applies the actions inside the loop as long as a certain condition is true, such as an integer value being greater than zero. You use the [Calculation Editor dialog box](#) to construct the condition.

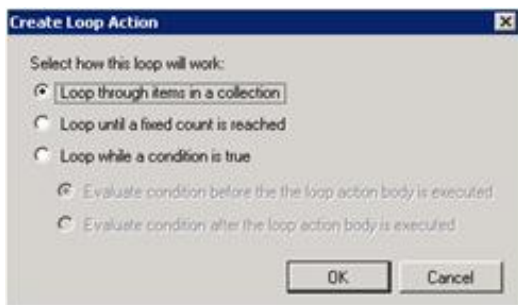
Note: There are two ways to loop while a condition is true. First, you can check the condition *before* going through the loop. If you check before going through the loop, then if the condition is false, the process will not go through the loop. Second, you can check the condition *after* going through the loop. In this case, the process will still go through the loop even if the condition is already false. The "extreme case" occurs when the condition is never true. If the process checks the condition before running the loop, then the loop will never execute. If the process checks the condition after running the loop, then even if the condition is always false, the loop will always execute at least once. By default, the process checks the condition *before* executing the loop.

Warning: Do not insert or remove items from a collection while inside a loop traversing the collection. Doing so can corrupt your data or cause the process to crash.

To add a loop action to a task or state:

1. Drag the Loop action from the toolbox to the desired location in your task.

IPA Designer displays the **Create Loop Action** dialog box (see figure).



2. Select the radio button for the type of loop you want.
3. If needed, select the collection to use or add a calculation.
4. Click **OK**.

Parallel Split

Normally, process tasks run one after another, in the order you specify when you design the process. The process finishes task A before it starts task B, finishes task B before it starts task C, and so forth.

Use the Parallel Split action when a process needs to perform multiple actions in parallel. For example, suppose that a loan application requires approval by two separate departments, and that the approvals don't have to occur in any particular sequence. It would waste time to have your process send the application to one department, then wait on its approval before sending the application to the second department. If your process sent the application to both departments at the same time, you could handle the application more quickly for your customer. That's what you can make a process do by using a Parallel Split action.


When you add a parallel split, you first create enough *paths* for all the tasks you want to run in parallel. Then, you go into each path and tell it which task it should run.

To add a Parallel Split action:

1. From the Toolbox, drag the Parallel Split action to the appropriate place in the current task or state.

IPA Designer displays the **Edit Parallel Split** dialog box (see figure).

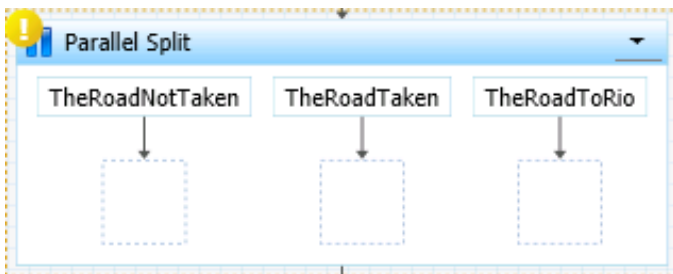


2. In the **Path** text box, type a path name, then click .
3. Repeat Step (2) to create as many paths as you need for the tasks you want to run in parallel.

The Paths box lists all the paths you have created. The names of the paths must be unique.

4. Click **Close**.

The workspace now shows the Parallel Split action (see figure). The exclamation mark icon at the top left shows that one or more of the paths do not have actions.



5. Into the box under each path, drag a Run Task action and set it up to run the desired task.

At runtime, before execution continues to the next action after the parallel split, each path must complete execution. After all paths defined in the Parallel Split complete execution, they join back together and execution proceeds to the next action after the Parallel Split.

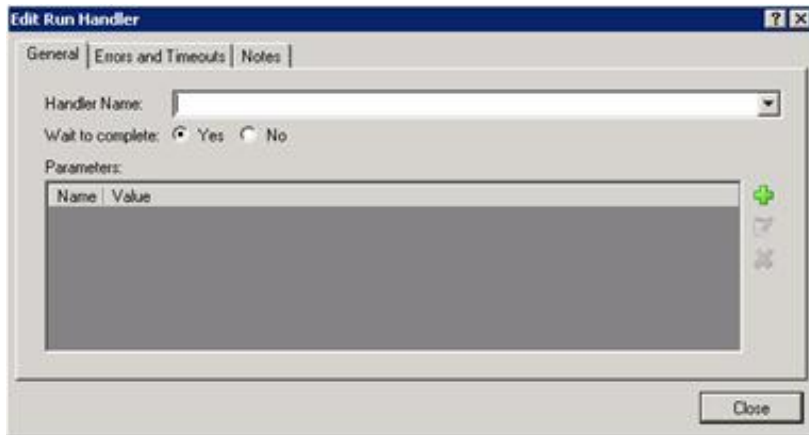
Run Handler

Use the Run Handler action to call a CIC handler from a process.

To add this action to a task:

1. Drag the action from the Toolbox to the desired location in the workspace.

IPA Designer displays the **Edit Run Handler** dialog box (see figure).



2. In the **Handler Name** list, select the handler to run.

The handler must be currently available in your CIC installation.

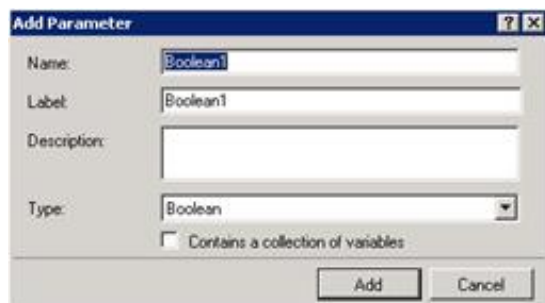
Note: The Run Handler action will only run handlers that begin with the Process Automation Initiator. No other handlers are available here.

3. If you want the process to wait until the handler finishes before the process continues with the next action, select the **Yes** radio button labeled Wait to Complete.

The Yes radio button is selected by default. If you do not want your process to continue while the handler runs, select the **No** radio button.

4. To add a parameter to pass to the handler:
 - a. Click **Plus** to the right of the parameter list.

IPA Designer displays the **Add Parameter** dialog box (see figure).



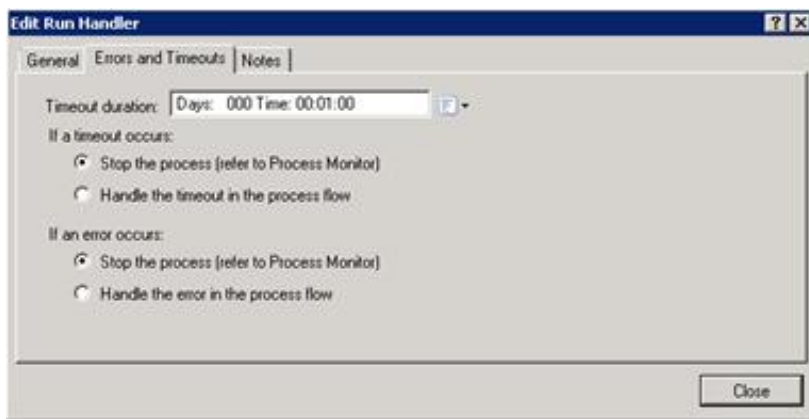
- b. In the **Name** text box, type the name of the parameter. In the **Label** text box, type the variable label for the handler parameter. In the **Description** text box, type a brief description of the parameter.
- c. In the **Type** list, click the data type of the parameter. You can use any available data type, including [custom types](#) that you have defined.
- d. If you want the parameter to be a collection of values, select the **Contains a collection of variables** check box.
- e. Click **Add**.

IPA Designer redisplay the **Edit Run Handler** dialog box.

Note: IPA now supports a predefined integer parameter named *PAS_HandlerResponseTimeout*. This contains the number of seconds that the Run Handler action waits before the process errors out. If the value is not set, then the default wait time is 30 seconds. If the value is 0, then the wait time is unlimited. To use the parameter, simply add it to the parameter list and assign the desired value.

5. To remove a parameter from the parameter list:

- a. Click the parameter name in the parameter list.
 - b. Click the **X** button to the right of the parameter list.
6. Configure Errors and Timeouts (see figure):



Note: The Errors and Timeouts tab is only available in IC 4.0 Service Update 1 and later versions.

- a. Click the Errors and Timeouts tab.
 - b. In the **Timeout Duration** text box, if Wait to complete is set to Yes then IPA waits that amount of time to receive a response from the handler. If no response is received, it follows the Timeout exit path.
 - c. Select the radio buttons for the desired timeout and error handling methods.
7. If desired, click the **Notes** tab and add notes about the handler. Then click **Close**.

IPA Designer adds the Run Handler action to your process.

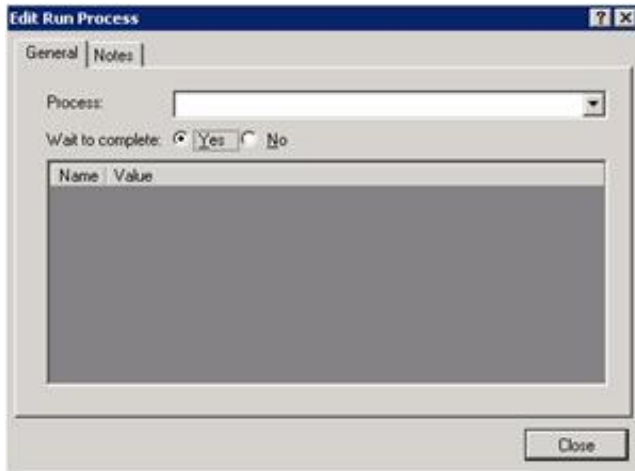
Run Process

Use the Run Process action to call another IPA process.

To add this action to a task:

1. Drag the action from the Toolbox to the desired location in the workspace.

IPA Designer displays the **Send Work Item to User** dialog box (see figure).



2. In the **Process** list, select a process to run.

IPA displays a list of published processes. You can run another instance of the current process, but use caution if you do so.

3. If you want your current process to wait until the other process finishes before continuing with the next action, make sure that the **Wait to complete** radio button is selected.

The *Wait to complete* radio button is selected by default. If you want your process to continue while the other process runs, deselect the *Wait to complete* radio button.

Note: If *Wait to Complete* is set to Yes, the Run Process action has two exit paths: Completed and Canceled. You can assign a different action to each path. If *Wait to Complete* is set to No, the Run Process action has only one exit path and IPA deletes the [outputs from the process being launched](#).

4. Click the **Notes** tab and add any explanatory notes in the text box.
5. Click **Close**.

Note: Because *Wait to Complete* is set to Yes by default, the Run Process action has two exit paths by default. If you set *Wait to Complete* to No, one of the exit paths disappears. If the deleted exit path has actions in it, then the Run Process action goes into error until you delete those "orphaned" actions.

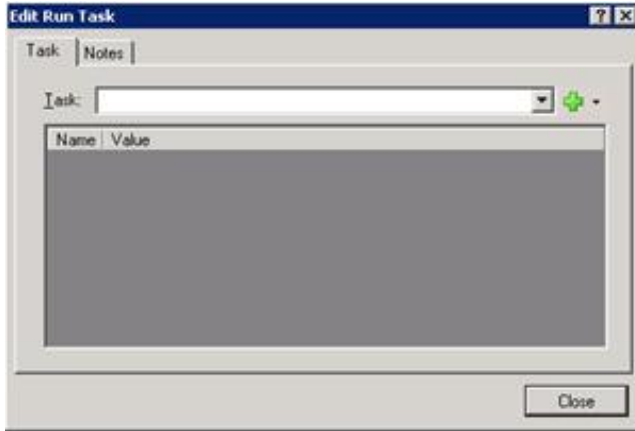
Run Task in a Task

Use the Run Task action to call another task.



To add this action to a task:

1. Drag the action from the Toolbox to the desired location in the workspace.

IPA Designer displays the **Edit Run Task** dialog box (see figure).



2. In the **Task** list, select a task to run.

IPA Designer selects the task and changes the Add  button to an Edit  button. This button opens a menu in which you can add more tasks to the Run Task action or edit a selected task.

3. If needed, edit the task you added or add more tasks to the action.
4. Click **Close**.

Select

Use **Select** to make the process branch depending on which of several possible values a variable has. For example, suppose that customer accounts are categorized as class 1, 2, or 3 depending on their business value to your organization. You might want a process to handle class 1 customers differently from those in class 2, and handle class 2 customers differently from those in class 3. IPA Designer could use the Select action to make the process branch depending on the value of the *AccountClass* variable:

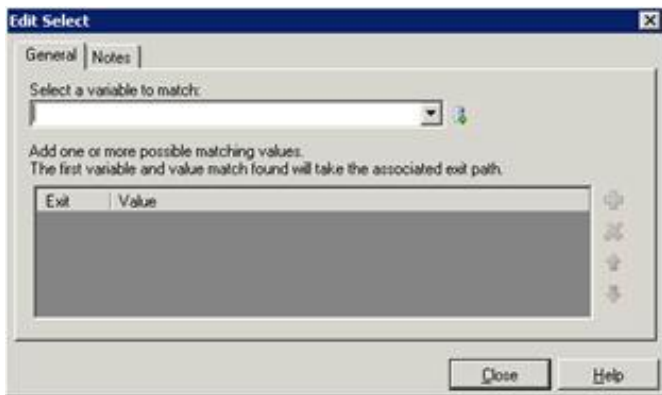
- If AccountClass = 1, then do this.
- If AccountClass = 2, then do that.
- If AccountClass = 3, then do something else.
- If AccountClass equals *none* of the values you listed, then do another thing.

Note: One important difference between the Decision and Select actions is that a Decision action can make your process branch if a value is in a given *range*. On the other hand, the Select action requires *specific values* and cannot work with ranges of values. For example, you could tell a Decision action to do something if a person's credit score was above 700. With a Select action, however, you would need to give the action specific values for each case: do one thing if a person's credit score is 701, another if a person's credit score is 557, and so forth. Therefore, if you need to make a task branch based on ranges of values, you are better off using a Decision action.

To add this action to a task:

1. Drag the action from the Toolbox to the desired location in the workspace.

IPA Designer displays the **Edit Select** dialog box (see figure).



2. In the **Select a variable to match** list, select the variable that the Select action should use.

Tip: To create a new variable on the fly, click the  icon at the right end of the list box.

3. To add a value for one of the cases, click Plus  to the right of the Exit | Value row.

IPA Designer adds a row for the value (see figure).

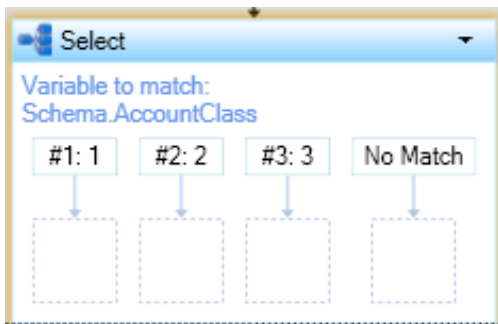


4. Double-click the new row in the **Value** column, type the value for the first case, and press **Enter**.

IPA Designer adds the value for the first case of the Select action.

5. Repeat steps 3-4 to add more values as needed.
6. If you need to delete a value, click its row and then click the Delete icon.
7. If you need to edit a value, double-click the **Value** column of the desired row, make any desired changes, and then press **Enter**.
8. Click **Close**.

IPA Designer will display a diagram showing a separate action path under each of the values you added to the list (see figure). The process will follow the action path under the value that the Select statement found in the variable.



9. For each value, drag the desired action to the box under it.

The process will do this action if and only if the variable matches the value above the action.

10. Under the "No Match" path, drag an action that the process should execute if the variable doesn't match any of the values in the Select action.

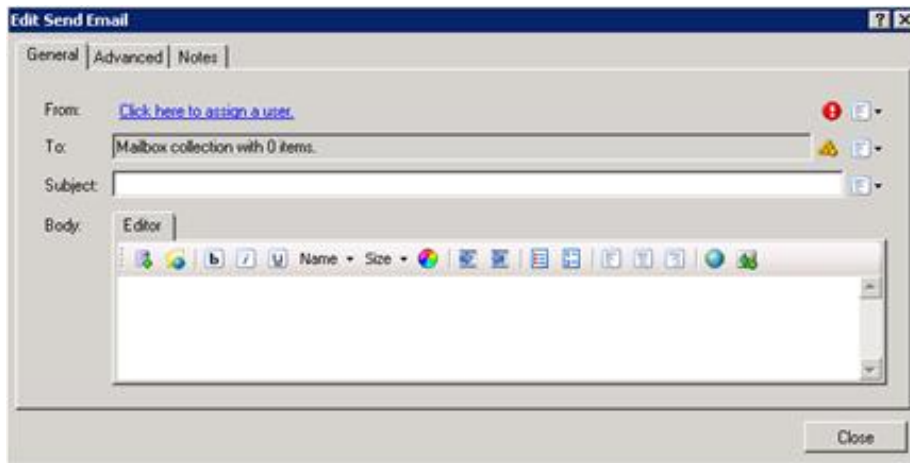
Send E-Mail

Use Send E-Mail to send an e-mail message to the e-mail address(es) specified by either the process designer or the person doing a task.

To add this action to a task:


1. Drag the action from the Toolbox to the desired location in the workspace.

IPA Designer displays the **Edit Send E-mail** dialog box (see figure).



2. Designate the sender of the message:

- To assign a user from the CIC user directory, click **Literal**, click the link [Click here to assign a user](#), use the **Lookup** dialog to find the user, and click **Assign**.
- To assign a user based on the value of a variable, click **Variable**, then click the variable name in the From list box.
- To assign a user based on a calculation, click **Calculation**, click the link [Click here to add a calculation](#), use the [Custom Calculation Builder](#) dialog to create the calculation, and click **OK**.

3. In the **To** text box, click the [Collections](#)  icon at the right end of the text box to create a collection of e-mail addresses to which the process will send the message.
4. In the **Subject** text box, type the subject of the message.

As always, you can type the subject (as a "literal"). You can also click the down arrow button at the right end of the text box to select a variable that contains the subject text or create a [calculation](#) that sets the subject text.

5. In the **Body** text box, type the body text of the e-mail message.

The text box toolbar has standard buttons for text formatting. For more information about using the **Send E-mail** dialog box, see [The Send E-mail Dialog Box](#).

6. Click Close.

WARNING: If you insert a variable reference in the body of the message (see [The Send E-Mail Toolbar](#)), the Process Automation Server does not apply the variable's security specification to the message content. Any recipient of the message will be able to view the variable's value, whether or not that recipient has the appropriate security permissions.

Send Work Item To User

Sends a work item (form) to a specific user for completion.

To add this action to a task:

1. Drag the action from the Toolbox to the desired location in the workspace.

IPA Designer displays the **Edit Send Work Item to User** dialog box.

Edit Send Work Item to User

General | Timeout | Parameters | Notes

Work Item: Add Customer Data

Target User: Process.InitiatingUser

Submitting User: NOT_SET

User Transferable: ☒ Yes ☐ No


Due Date: NOT_SET

Reminder: 1 Day

Auto Transfer Mode: Do not transfer on due date

Auto Transfer Target: NOT_SET

Close

2. Add basic information to the General tab:
 - a. Expand the Work Item list box and click the name of the work item to send. To create a new work item "on the fly," open the drop-down at the right and click the Add  choice.
 - b. Expand the **Target User** list box and select the target user.
 - c. To set the Submitting User, click the drop-down at the right to display the [Value list box](#), then click **Variable**. The Submitting User row changes to a list box. Expand the list box and select a variable to contain the submitting user.
 - d. To prevent the target user from transferring the work item, select the **No** radio button for **User Transferable**. The Yes button is selected by default.
 - e. To set the Due Date, expand the menu at the right end of the Due Date line to display the [Value list box](#). Select a variable or enter a [calculation](#) for the date.

Note: If you specify a due date earlier than the current system date, then the work item's reminder message will immediately appear in the user's CIC Client.

- f. To set a reminder, expand the **Reminder** list box and select the amount of time prior to the due date that the process should remind the user.
 - g. To transfer the work item automatically if not picked up by the due date, expand the **Auto Transfer Mode** list box and select user or workgroup. Then in the **Auto Transfer Target** list box, select the user or workgroup.
3. To specify a time limit for the user to pick up the work item:
 - a. On the Timeout tab, select the **Use Pickup Timeout** check box and select **Requires Timeout**.
 - b. In the **Timeout Duration** text box, enter the number of days and hours that the user has to pick up the work item. Alternatively, you can open the Value list box to use a variable or calculation.
4. To view parameters or add notes:
 - a. Display the **Parameters** tab.
 - b. Display the **Notes** tab and click inside the text box to type notes.
5. Click **Close**.

Note: If you schedule a reminder for a date after Daylight Saving Time causes your time to shift, the reminder might appear one hour early or one hour late. This problem is common to most programs that display reminders, including Microsoft Outlook, and occurs *only* when Daylight Saving Time causes the time to change. You should be alert for this issue.

Send Work Item To Workgroup

Sends a work item (form) to a workgroup for completion by a member of that workgroup.

To add this action to a task:

1. Drag the action from the Toolbox to the desired location in the workspace.


IPA Designer displays the **Send Work Item to Workgroup** dialog box (see figure).

The screenshot shows the 'Edit Send Work Item to Workgroup' dialog box with the 'General' tab selected. The dialog has a title bar with a question mark and a close button. Below the title bar are tabs for 'General', 'Timeout', 'Parameters', 'ACD', and 'Notes'. The 'General' tab contains the following fields and controls:


- Work Item:** A list box with a green plus icon to its right.
- Target Workgroup:** A text field containing the link 'Click here to assign a workgroup.' with a red exclamation mark icon to its right.
- Submitting User:** A text field containing 'NOT_SET' with a dropdown arrow icon to its right.
- User Transferable:** Radio buttons for 'Yes' (selected) and 'No'.
- Due Date:** A text field containing 'NOT_SET' with a dropdown arrow icon to its right.
- Reminder:** A text field containing '1 Day' with a dropdown arrow icon to its right.
- Auto Transfer Mode:** A text field containing 'Do not transfer on due date' with a dropdown arrow icon to its right.
- Auto Transfer Target:** A text field containing 'NOT_SET'.
- Report Group:** A text field containing 'NOT_SET' with a dropdown arrow icon to its right.

A 'Close' button is located at the bottom right of the dialog.

2. Add information to the General tab:

- a. Expand the Work Item list box and click the name of the work item to send. You can also click the Add  button to create a new work item "on the fly."
 - b. Click the link **Click here to assign a workgroup**. In the **Lookup** dialog, locate and select the desired user, then click **Assign**. Alternatively, you can use the Value list box to enter a variable or calculation.
 - c. To select a variable to contain the Submitting User, click the arrow at the right end of the row to display the [Value list box](#). Select a variable for the submitting user.
 - d. To specify if the work item is transferable, select the wanted radio button. If appropriate, add a literal, variable, or calculation to set the value of Is_Transferable.
 - e. To set the Due Date, expand the menu at the right end of the Due Date line to display the [Value list box](#). Select a variable or enter a [calculation](#) for the date.
 - f. To set a reminder, expand the **Reminder** list box and select the amount of time prior to the due date that the process should remind the user.
 - g. If appropriate, expand the **Auto Transfer Mode** list box and select a value, then select the **Auto Transfer Target**.
 - h. To set the Report Group, expand the menu at the right end of the Report Group line to display the [Value list box](#). Enter a literal value, select a variable, or enter a [calculation](#) for the group.
3. To view parameters or add notes:
 - a. Display the **Parameters** tab.
 - b. Display the **Notes** tab and click inside the text box to type notes.
 4. To set skill requirements:
 - a. Display the **Skills** tab (see figure).

The screenshot shows the 'Edit Send Work Item to Workgroup' dialog box with the 'Skills' tab selected. The dialog has a title bar with a question mark and a close button. Below the title bar are tabs for 'General', 'Parameters', 'Skills', and 'Notes'. The 'Skills' tab contains a table with two columns: 'Name' and 'Value'. The table is currently empty. A green plus icon is located to the right of the table. A 'Close' button is located at the bottom right of the dialog.

- b. Click the green plus () icon to add skills and minimum proficiency levels for selecting members of the workgroup to handle the work item.
5. Click **Close**.

Note: In order to view or work with skills, you need the appropriate access privileges. Contact your administrator for more information.

Update Variables

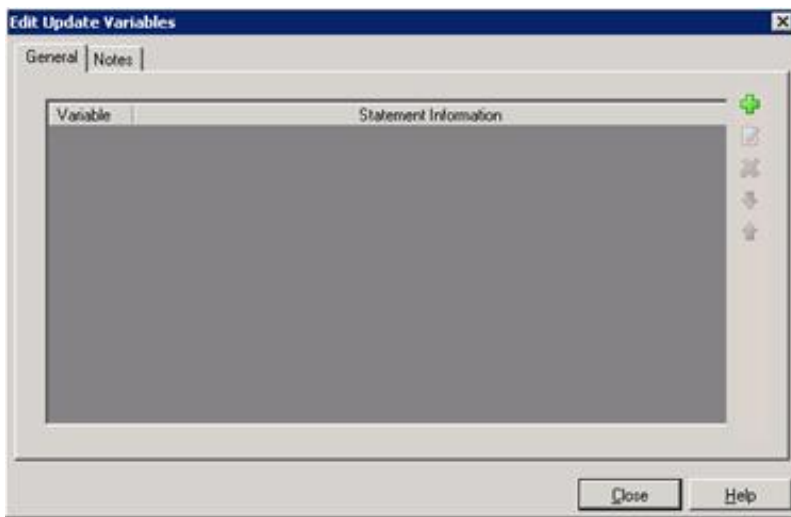
Assigns values to process variables and/or other variables specified by the process designer.


Note: If a work item collects data using data-bound controls such as edit boxes or radio buttons, the process will automatically copy the data from those controls into their corresponding variables when the user clicks OK. You only need to use an Update Variables action if you need to set values at other times.

To add this action to a task:

1. Drag the action from the Toolbox to the desired location in the workspace.

IPA Designer displays the **Edit Update Variables** dialog box (see figure).



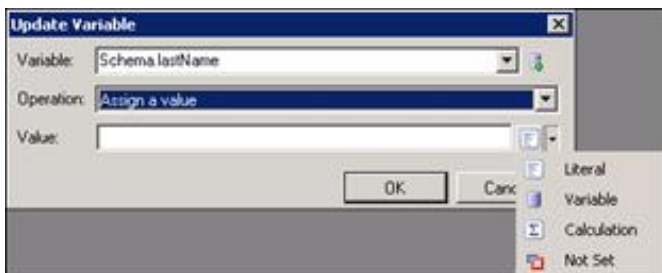
2. To add a variable to update, click the green plus  icon at the top right of the variables list.

IPA Designer displays the **Update Variable** dialog box.

3. In the **Variable** list, click the variable to update.

IPA Designer selects the variable. The Operation list box shows *Assign Value*.

4. Click the down arrow button at the right end of the **Value** box (see figure) and select how to get the value to assign:



- To type a value into the Value text box, click **Literal**.
 - To get the value from another variable, click **Variable**.
 - To calculate the value, click **Calculation**.
5. Click **OK**.

IPA Designer adds the variable to the list. The Statement Information column shows the value that the Update Variables action will assign to the variable.

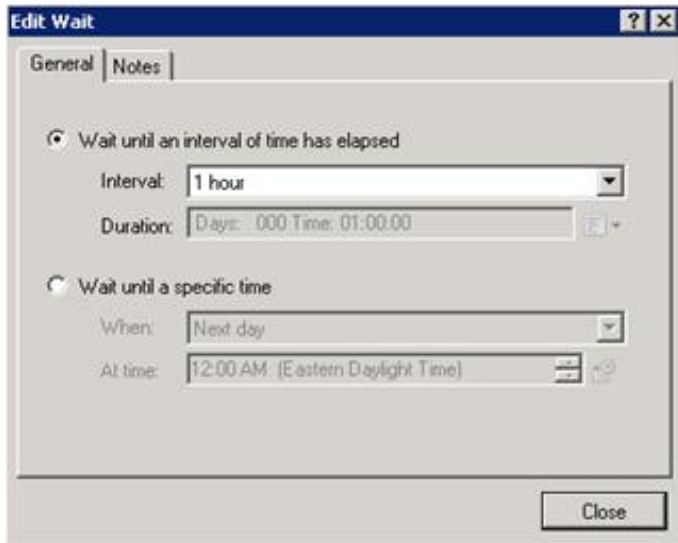
Wait

Pauses a process for a duration or until a time that you specify.

To add this action to a task:

1. Drag the action from the Toolbox to the desired location in the workspace.

IPA Designer displays the **Edit Wait** dialog box (see figure).



2. To pause the process for a specific amount of time:
 - a. Select the radio button **Wait until an interval of time has elapsed**.
 - b. In the **Interval** list, click the desired duration.
3. To pause the process until a specific date and time:
 - a. Select the radio button **Wait until a specific time**.
 - b. In the **When** list, click the desired day or click **Custom** to add a [calculation](#).
 - c. At the right end of the **At Time** box, use the scroll buttons to select the desired time.

Warning: If you select a time earlier than the current system time, no wait will occur because the wait action's ending time has already passed.

4. Click **Close**.

Modifying an Action

To modify an action:

1. In the workspace, right-click the action, then click **Edit** in the shortcut menu.

IPA Designer displays the appropriate **Edit** dialog box for the action.

2. In the dialog box, make any desired changes.
3. Click **Close**.

IPA Designer saves your changes.

Deleting an Action

To delete an action:

- In the workspace, right-click the action, then click **Delete** in the shortcut menu; or
- Click to select the item and press **Delete** on the keyboard. Then click **OK**.

Working with States and Actions

In the same way that tasks group actions together into logical units, states group tasks together into logical units.

Every process starts with an [initial state](#). If your process is very simple, you can leave it at that. For more complex processes, you should create states to group tasks that occur together, usually at the same stage of your process.

The best way to understand states is to think of them as being like stations along an automobile assembly line. At one station, mechanics install the axles, wheels, and steering components onto the chassis. At the next station, workers install the engine and all of its related parts. At the next station, the shell of the car body is welded onto the chassis and the doors are installed. At each station, workers do a group of related tasks and then send the car down the line to the next station for another group of tasks to be done. At the end of the line, the result is a finished automobile.

Similarly, a process is like an assembly line. At each stage of the process, people must do various related tasks before the process can continue: getting intake data, checking a credit score, routing a form to the relevant manager for approval, and so forth. At each point, a state groups the tasks so that the process is easy to understand and carry out. At the end of the process, you get the result.

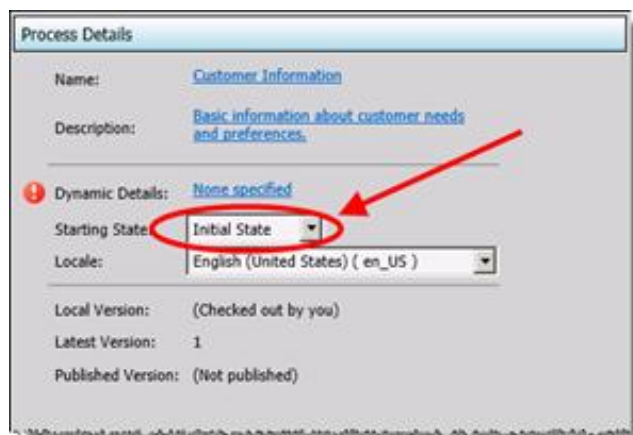
Related topics are:

- [Initial State](#)
- [Adding a State](#)
- [Adding Actions to a State](#)
- [Adding Tasks to a State](#)

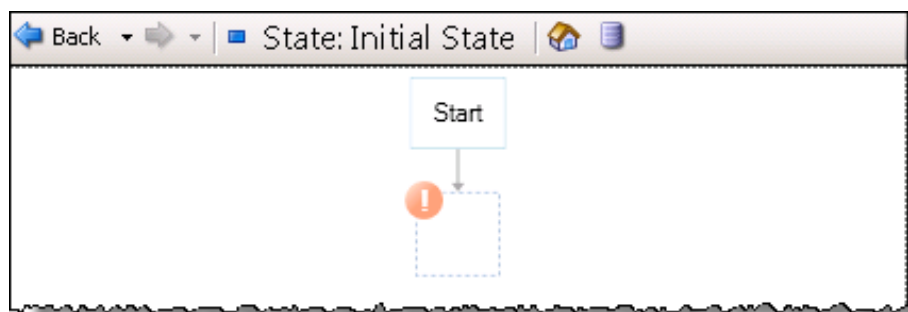
Initial State

When you create a process, IPA Designer automatically gives it an *initial state*. When users run the process, the process begins in this state.

The name "initial state" is optional. You can also add other states. In the Process Details view (see figure), you can select the starting state for your process.



You can add actions to the initial state, just as you can add actions to any other state. When IPA Designer first creates it, however, the initial state has only its default Start action (see figure).

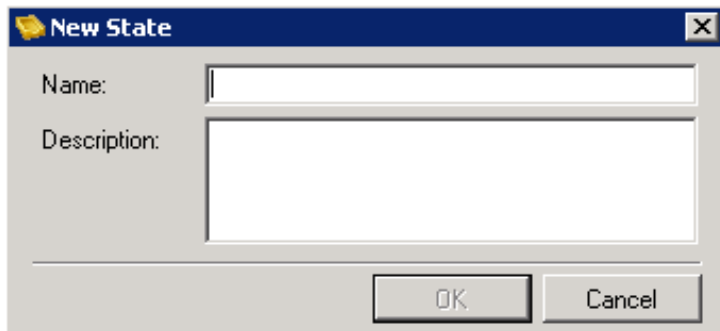


Adding a State

To add a state:

1. On the **File** menu, point to **Add**, then click **New State**.

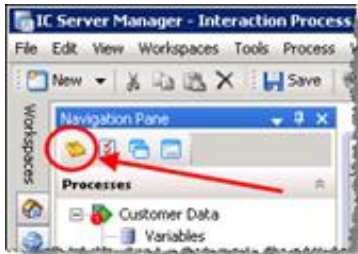
IPA Designer displays the **New State** dialog box (see figure).



2. In the **Name** text box, type the name of the new state.
3. In the **Description** text box, type a brief description of the new state.
4. Click **OK**.

IPA Designer creates the new state and adds it to your workspace.

Another way to add a state is to right-click the process name in the process list, point to **Add** on the shortcut menu, then click **New State**. You can also press **Ctrl+E** to add a new state. A third way is to click the **New State** icon at the top of the Navigation Pane (see figure).



Copying and Pasting a State

You can copy a state to the Windows Clipboard and paste it into the same process or into a different process. When you paste the process, IPA Designer adds its name to the States container of the process list.

If you post a copied state into the same process, IPA Designer adds a number (starting with "1") at the end of the state name to indicate that it is a copy of the original state of the same name.

To copy and paste a state:

1. In the process list, right-click the state to copy, then click **Copy**.

IPA Designer copies the state to the Windows Clipboard.

2. Right-click the process into which you want to paste the state, then click **Paste**.

IPA Designer pastes the state into the process and adds its name to the States container of the process list. If you paste the state into the same process as the original, IPA Designer adds a number at the end of the name to distinguish it from the original state.

Note: In IC 4.0 Service Update 1 (SU1) and later versions, IPA Designer automatically includes any referenced items (such as variables) when you copy and paste. It also updates the references to the pasted location.

Copying and Pasting an Action from a State to a Task

You can copy and paste an action from a state to a task. States support some action types that tasks do not support, so you can only paste these action types:

- Decision
- Loop
- Run Task
- Select

To copy and paste an action from a state to a task:

1. In the state, right-click the desired action, then click **Copy** in the shortcut menu.

IPA Designer copies the action to the Windows Clipboard.

2. Navigate to the task in which you want to paste the action.
3. In the task, right-click the desired location for the action, then click **Paste** in the shortcut menu.

Adding Actions to States

IPA Designer lets you add these actions to states (listed here in the order that IPA Designer lists them):

- [Change State](#)
- [Decision](#)
- [End Process](#)
- [Goto](#)
- [Label](#)
- [Loop](#)
- [Parallel Split](#)
- [Run Task](#)
- [Select](#)

Change State

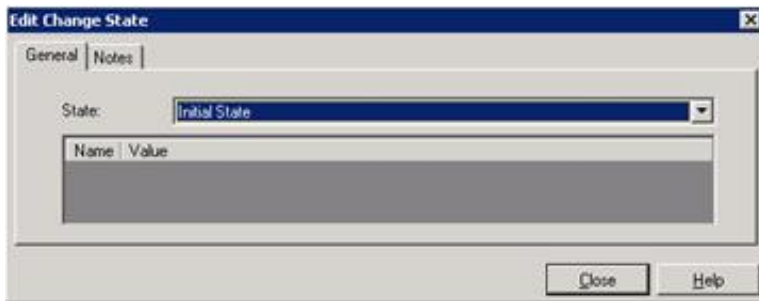
The Change State action jumps the process directly to the beginning of a different state without any intervening steps.

For example, if the value of a variable showed that no more work was needed in the current state, you could embed the Change State action inside an If-Then / Else action to skip over remaining steps in the current state and go directly to the next (or any other) state.

Note: Before you add a Change State action, you must first create the state to which the action should lead.

To add the Change State action to a state:

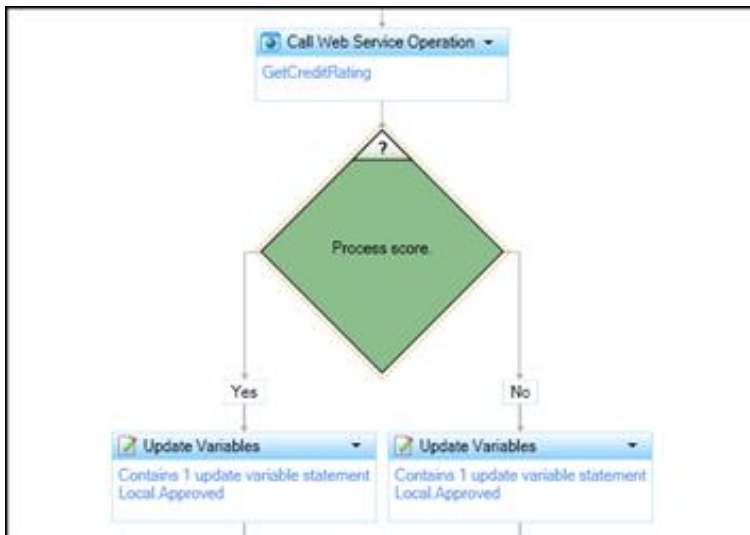
1. From the Toolbox, drag the Change State action to the appropriate place in the current state.
2. IPA Designer displays the **Edit Change State** dialog box (see figure).



3. In the **State** list, click the state to which the process should jump.
4. Click the **Notes** tab and enter a brief explanation of the purpose of the Change State action.
5. Click **Close**.

Decision

Use **Decision** to make the process branch depending on whether or not a condition is true. If the condition is true, then the process goes in the **Yes** direction; if the condition is false, then the process goes in the **No** direction (see figure for an example).



Typical examples of conditions are:

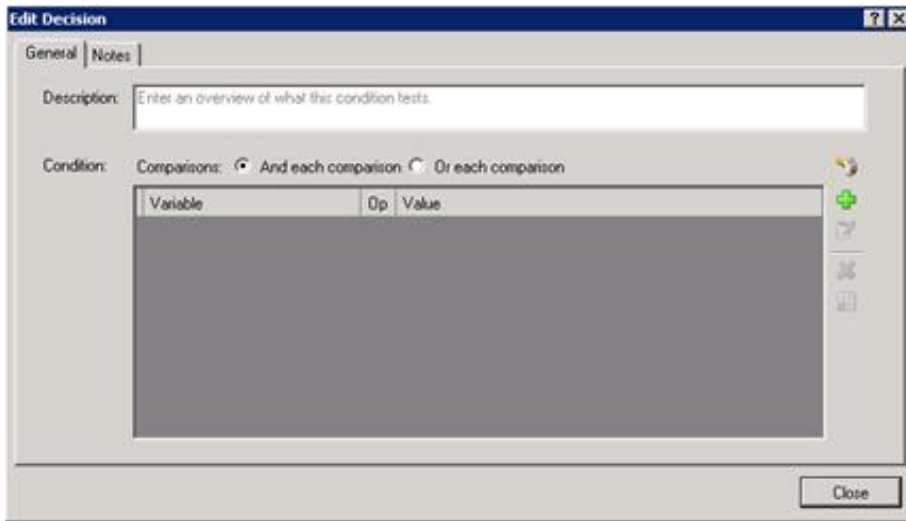
- A boolean variable has a true value.
- An integer variable is equal to 10.
- The current date is after a deadline date.

Note: You can add Decision actions both to tasks and to states. They work the same in either, though you will obviously use them in slightly different ways.

To add a Decision action to a state:


1. Drag the Decision action from the toolbox to the desired location in your state.

IPA Designer displays the **Edit Decision** dialog box (see figure).




2. In the **Description** text box, type a brief explanation of the decision that the action makes.
3. If the decision will use multiple comparisons, select the radio button to use AND or OR.

If the action only makes one comparison, then this radio button doesn't matter. For more information, see the help topics [Understanding Boolean Expressions](#), [The AND Operator](#), and [The OR Operator](#).

4. Click **Plus**  to add a comparison to the list.

IPA Designer displays the [Comparison Item dialog box](#).

5. Add one or more comparisons:
 - a. In the **Value** list, select a variable to compare. You can also use a function on the variable's value before using it in the comparison. See the help topic [Understanding Functions](#) for more information.
 - b. In the **Operator** list, select the operator to use (equal, greater than, etc.).
 - c. In the **Value** text box, enter the value with which to compare the variable. You can type the value directly or use the [Value list box](#) to use a variable or calculation.
 - d. To add more comparisons, click **Plus**  in the **Comparison Item** dialog box.
 - e. When finished adding comparisons, click **Finished**.
6. Click the **Close** button to close the **Edit Decision** dialog box.

End Process

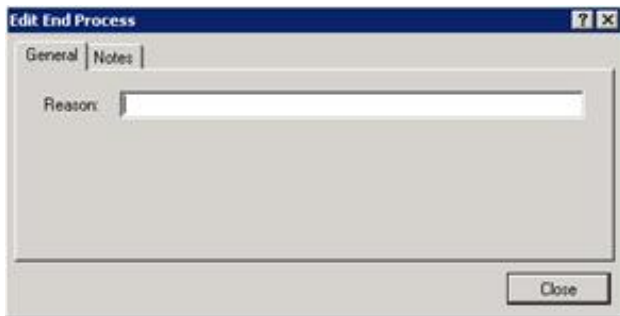
The End Process action ends the current process immediately. You can use the End Process action to end a process when:

- The process has information (that is, variables have certain values) showing that further steps in the process are not needed and you can go straight to the end.
- The process has information (that is, variables have certain values) showing that further steps in the process are not possible (fatal error) and that the current process should be discarded.

To add the End Process action to a state:

1. From the Toolbox, drag the End Process action to the appropriate place in the current state.

IPA Designer displays the **Edit End Process** dialog box (see figure).



2. In the **Reason** text box, type a very short reason for ending the process, such as *Success*.

The user's CIC Client will display the reason when the process ends.

3. Click **Close**.

Goto

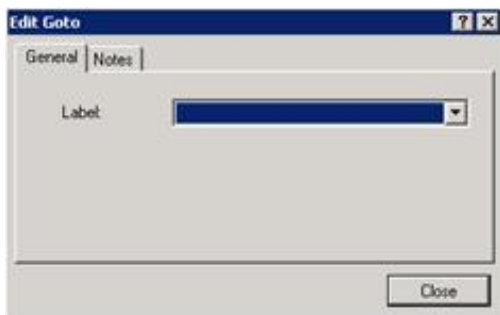
The Goto action lets you make the process jump to any other point in your process design. Before you can add a Goto action, however, you must first add a **Label** action to mark the point where the process should jump. Goto and Label actions work together: a *goto* won't work without a *label*, and a *label* doesn't make any sense without a *goto*.

Warning: Using Goto actions can make your process design confusing, error-prone, and difficult to debug. Use Goto actions very carefully, and only when they are clearly necessary.

To add a Goto action to your process:

1. From the Toolbox, drag the Goto action to the appropriate place in the current state.

IPA Designer displays the **Edit Goto** dialog box (see figure).



2. In the **Label** list, click the name of the label to which the process should jump.
3. Click the **Notes** tab and briefly explain the purpose and result of this Goto action.
4. Click **Close**.

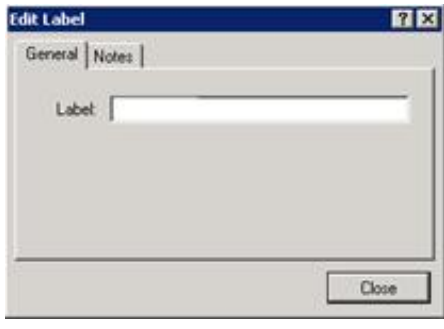
Label

You only need to add a Label action to a state if you are going to use a [Goto](#) action. A label marks the location in your process to which a Goto action should jump.

To add a Label action to a state:

1. From the Toolbox, drag the Label action to the appropriate place in the current state.

IPA Designer displays the **Edit Label** dialog box (see figure).



2. In the **Label** text box, type the name of the label.
3. Click the **Notes** tab and briefly explain the purpose of this label.
4. Click **Close**.

Loop

Use the Loop action in a task or state to make your process repeat a series of actions before it goes on to the next action in your design. The loop can execute any action available in states: note that the available state actions list differs slightly from the list of actions available in tasks.

You can create three kinds of loop actions:

- **Loop through items a collection:** This applies the actions inside the loop to each item of a collection of variables, then exits the loop.
- **Loop until a fixed count is reached:** This applies the actions inside the loop for a number of times that you specify. For example, if you specify 10, then the loop will run 10 times before moving forward to the next action in your process design.
- **Loop while a condition is true:** This applies the actions inside the loop as long as a certain condition is true, such as an integer value being greater than zero. You use the [Calculation Editor dialog box](#) to construct the condition.

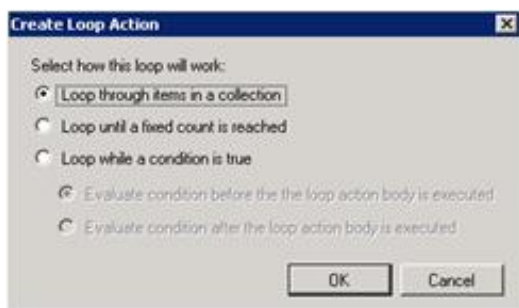
Warning: Do not insert or remove items from a collection while inside a loop traversing the collection. Doing so can corrupt your data or cause the process to crash.

Note: There are two ways to loop while a condition is true. First, you can check the condition *before* going through the loop. If you check before going through the loop, then if the condition is false, the process will not go through the loop. Second, you can check the condition *after* going through the loop. In this case, the process will still go through the loop even if the condition is already false. The "extreme case" occurs when the condition is never true. If the process checks the condition before running the loop, then the loop will never execute. If the process checks the condition after running the loop, then even if the condition is always false, the loop will always execute at least once. By default, the process checks the condition *before* executing the loop.

To add a loop action to a task or state:

1. Drag the Loop action from the toolbox to the desired location in your state.

IPA Designer displays the **Create Loop Action** dialog box (see figure).



2. Select the radio button for the type of loop you want.
3. If needed, select the collection to use or add a calculation.
4. Click **OK**.

Parallel Split

Normally, process tasks run one after another, in the order you specify when you design the process. The process finishes task A before it starts task B, finishes task B before it starts task C, and so forth.

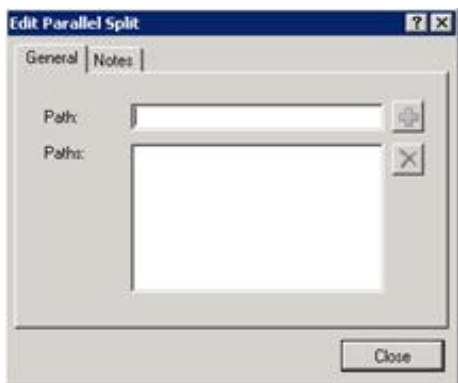
The Parallel Split action lets you design your process to run two or more tasks at the same time. For example, suppose that a loan application requires approval by two separate departments, and that the approvals don't have to occur in any particular sequence. It would waste time to have your process send the application to one department, then wait on its approval before sending the application to the second department. If your process sent the application to both departments at the same time, you could handle the application more quickly for your customer. That's what you can make a process do by using a Parallel Split action.


When you add a parallel split, you first create enough *paths* for all the tasks you want to run in parallel. Then, you go into each path and tell it which task it should run.

To add a Parallel Split action:

1. From the Toolbox, drag the Parallel Split action to the appropriate place in the current task or state.

IPA Designer displays the **Edit Parallel Split** dialog box (see figure).

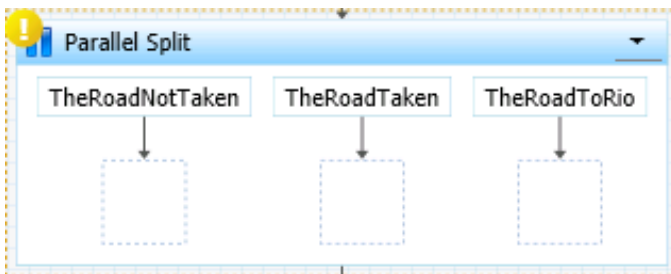


2. In the **Path** text box, type a path name, then click .
3. Repeat Step (2) to create as many paths as you need for the tasks you want to run in parallel.

The Paths box lists all the paths you have created. Path names must be unique.

4. Click **Close**.

The workspace now shows the Parallel Split action (see figure). The exclamation mark icon at the top left shows that one or more of the paths do not have actions.



5. Into the box under each path, drag a **Run Task** action and set it up to run the desired task.

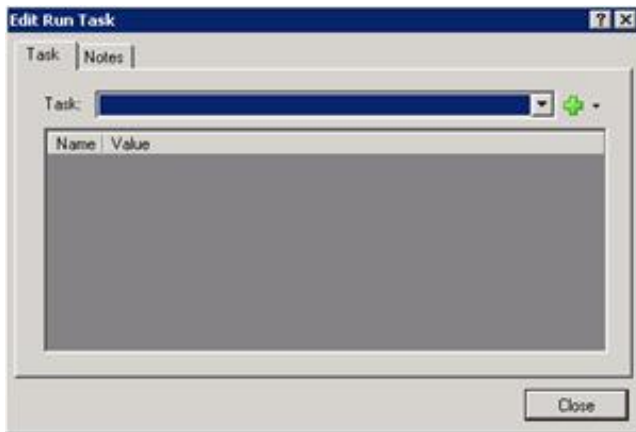
At runtime, before execution continues to the next action after the parallel split, each path must complete execution. After all paths defined in the Parallel Split complete execution, they join back together and execution proceeds to the next action after the Parallel Split.

Run Task in a State

To add a Run Task action to a state:

1. Drag the action from the Toolbox to the desired location in the workspace.

IPA Designer displays the **Edit Run Task** dialog box (see figure).



2. In the **Task** list, select a task to run.

IPA displays a list of available tasks in your process design.

3. Click **Close**.

Select

Use **Select** to make the process branch depending on which of several possible values a variable has. For example, suppose that customer accounts are categorized as class 1, 2, or 3 depending on their business value to your organization. You might want a process to handle class 1 customers differently from those in class 2, and handle class 2 customers differently from those in class 3. IPA Designer could use the Select action to make the process branch depending on the value of the *AccountClass* variable:

- If AccountClass = 1, then do this.
- If AccountClass = 2, then do that.
- If AccountClass = 3, then do something else.
- If AccountClass equals *none* of the values you listed, then do another thing.

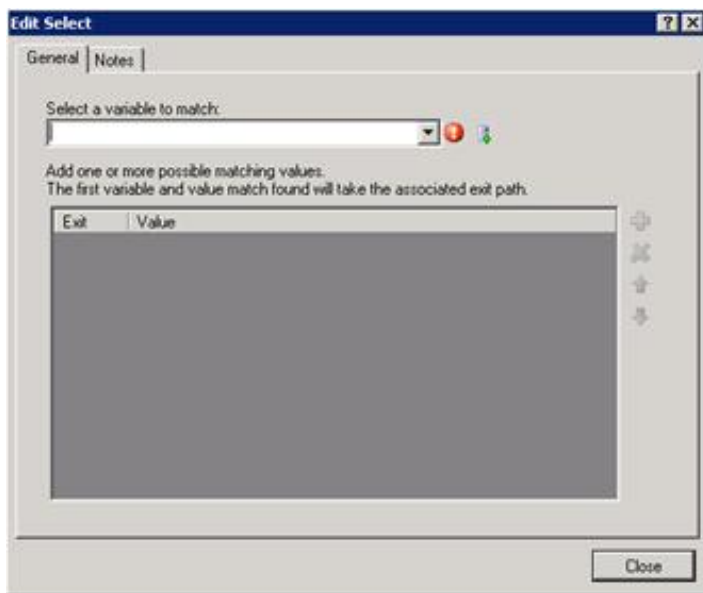
Note: One important difference between the Decision and Select actions is that a Decision action can make your process branch if a value is in a given *range*. On the other hand, the Select action requires *specific values* and cannot work with ranges of values. For example, you could tell a Decision action to do something if a person's credit score was above 700. With a Select action, however, you would need to give the action specific values for each case: do one thing if a person's credit score is 701, another if a person's credit score is 557, and so forth. Therefore, if you need to make a state branch based on ranges of values, you are better off using a Decision action.

One "trick" to get around this limitation is to embed Decisions inside Selects, so the Decision sets a variable to a certain value if, for example, a credit score is above 700. The Select statement can then use the value of that variable to choose a branch based on the >700 value. **Warning:** It is in the nature of tricks to be tricky. If you use them, carefully verify both the logic and the implementation.

To add a Select action to a state:

1. Drag the action from the Toolbox to the desired location in the workspace.

IPA Designer displays the **Edit Select** dialog box (see figure). The exclamation mark icon indicates that no variable is selected yet.



2. In the **Select a variable to match** list, select the variable that the Select action should use.

Tip: To create a new variable on the fly, click the  icon at the right end of the list box.

3. To add a value for one of the cases, click Plus  to the right of the Exit | Value row.

IPA Designer adds a row for the value (see figure).

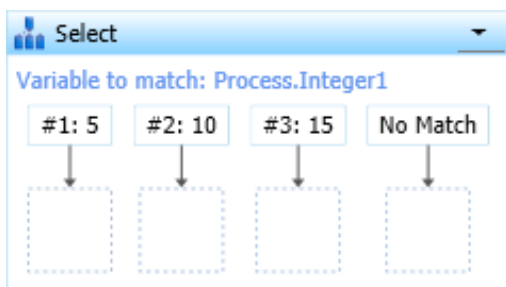


4. Click the new row in the **Value** column, type the value for the first case, and press **Enter**.

IPA Designer adds the value for the first case of the Select action.

5. Repeat steps 3-4 to add more values as needed.
6. If you need to delete a value, click its row and then click the Delete icon.
7. If you need to edit a value, double-click the **Value** column of the desired row, make any desired changes, and then press **Enter**.
8. Click **Close**.

IPA Designer will display a diagram showing a separate action path under each of the values you added to the list (see figure). The process will follow the action path under the value that the Select statement found in the variable.



9. For each value, drag the desired action to the box under it.

The process will do this action if and only if the variable matches the value above the action.

10. Under the "No Match" path, drag an action that the process should execute if the variable doesn't match any of the values in the Select action.

Adding Tasks to a State

To add tasks to a state, you use the [Run Task](#) action. When you add the Run Task action to a state, it prompts you to choose the task that you want to run. You can also drag an existing task from the process's *Task* container in the process tree onto the desired location.

Working with Web Services

In practical terms, a web service is an Internet- or Intranet-accessible service that can do calculations, query databases, and perform other operations for computers that send appropriately-coded requests to the service's address.

IPA Designer enables you to use web services in your processes. You can use both secure (encrypted) and non-secure web services. IPA Designer also includes features that make it easier for you to set up web service calls in your processes.

In a process, each web service definition has the data to fetch the service's WSDL at design time and to call it at run time. That's an unwieldy amount of information to put into each Call Web Service action, so IPA Designer encapsulates it into the web service definition.

The World Wide Web Consortium defines web service technically as "a software system designed to support interoperable machine-to-machine interaction over a network. It has an interface described in a machine-processable format (specifically Web Services Description Language WSDL). Other systems interact with the web service in a manner prescribed by its description using SOAP messages, typically conveyed using HTTP with an XML serialization in conjunction with other Web-related standards."

Related topics:

[Call Web Service Operation](#)

[Defining a Web Service](#)

[Editing a Web Service](#)

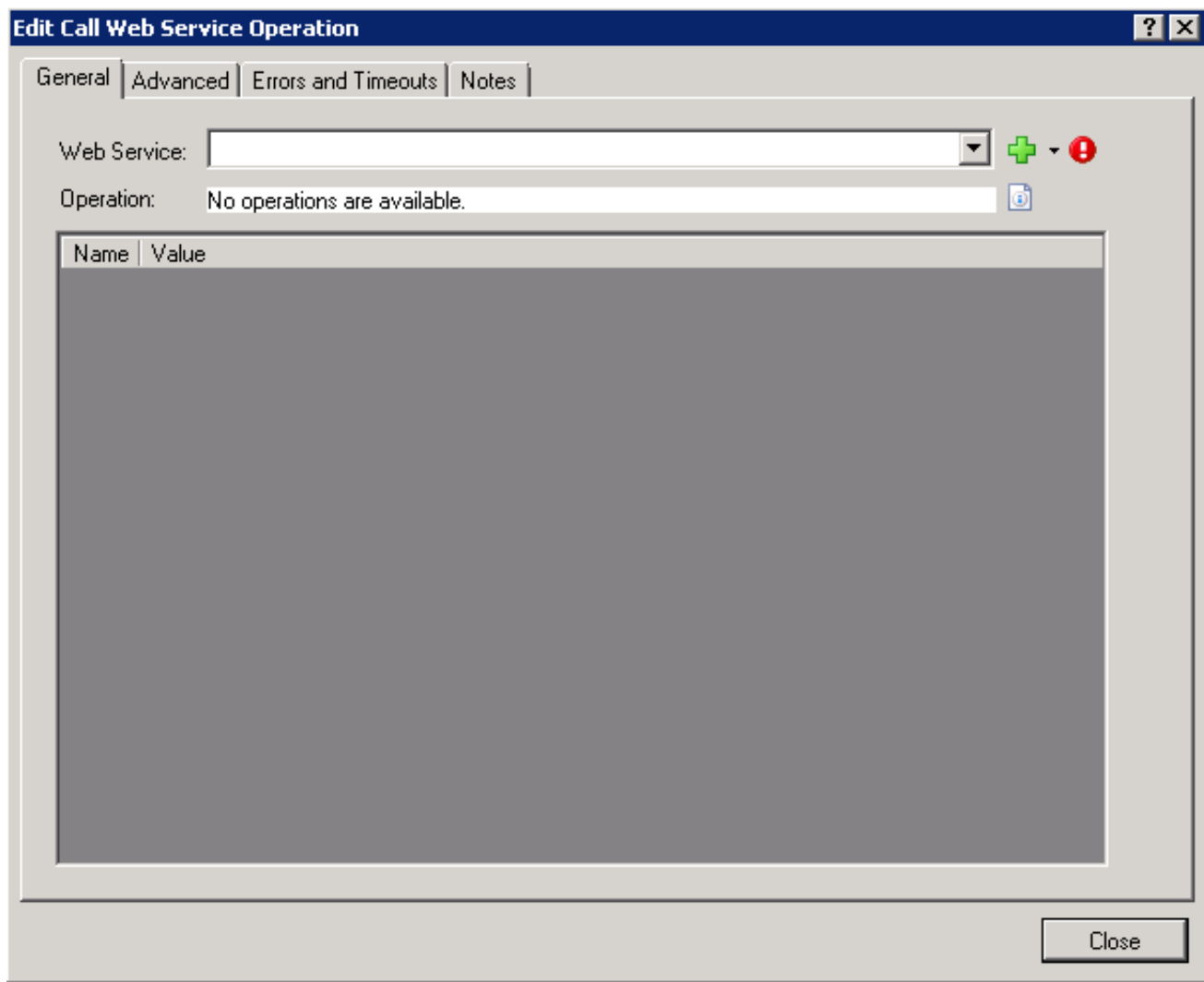
[Deleting a Web Service](#)

[Copying and Pasting Call Web Service Actions](#)

[Migrating Call Web Service Actions from Previous Versions](#)

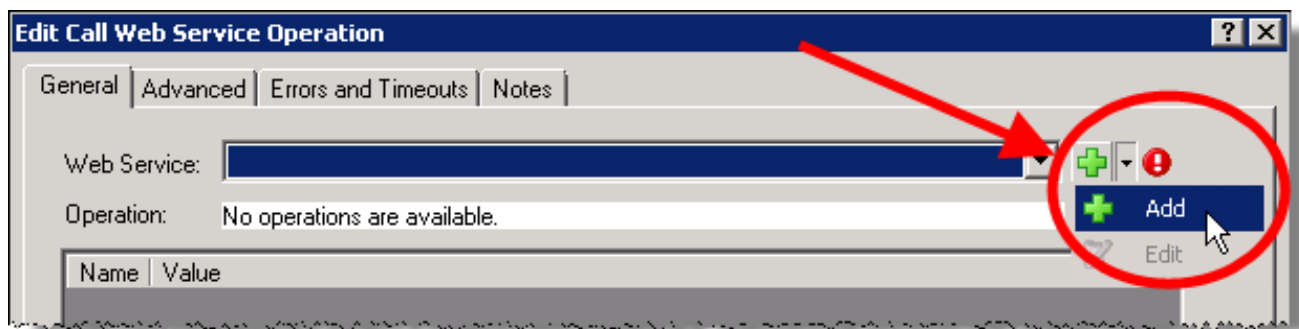
Defining a Web Service

Use the Web Service Settings dialog box (see figure) to define web services for your process.



To define a web service:

1. Add or edit a [Call Web Service](#) action to display its dialog box:
 - To the right of the Web Service drop-down, expand the list box and click **Add** (see figure).



IPA Designer displays the Web Service Settings dialog box. In this dialog you enter information about the web service.

2. Enter basic information about the web service:
 - a. In the web **service name** text box, type the name of the web service.

Note that each web service in a process must have a unique name. A process cannot use multiple web service definitions that have the same name value.

- b. In the **WSDL** text box, type the address for the web service's Web Service Definition Language (WSDL).

If authentication is needed to obtain the WSDL, IPA Designer uses credentials from the Authentication section, such as <http://myservice.com/myservice.svc> or <https://myservice.com/myservice.svc> (for a secure web service).

IPA Designer will fill in the Service and Port blanks automatically after it completes a test connection to the URL and retrieves that information from the web service.

Note: The Advanced tab in the Edit Call Web Service dialog can dynamically specify a different URL.

3. Enter the domain, user ID, and password for connecting to the web service:
 - a. In the **Domain** text box, type the domain to use for the web service.
 - b. In the **User name** and **Password** text boxes, type the user ID and password for login.

IPA Designer uses the domain, user name, and password at design time when fetching a web service's WSDL. PAS also uses them at runtime to call the web service.

4. Under **Select the allowable authentication modes at runtime**, select one or more check boxes for the authentication modes (NTLM, Digest, or Basic) to use with the web service.

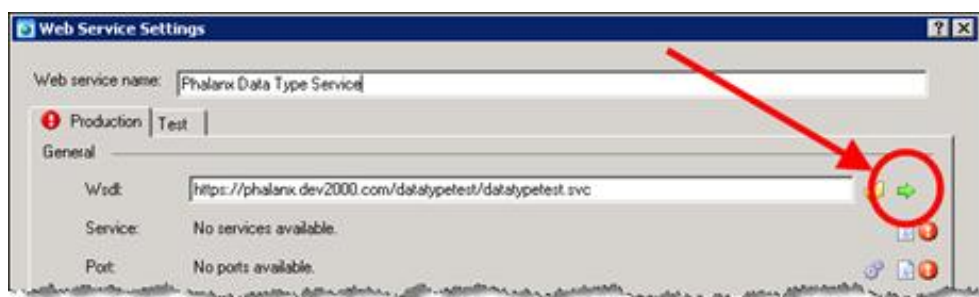
These specify which types of authentication PAS can use at runtime when executing a Call Web Service action that uses this web service.

5. For secure web services (those whose URLs begin with https://), select the **Validate server certificate at runtime** check box.

Note that if the web server's certificate is expired or is not signed by a certificate authority that PAS allows, then the process goes into error and stops at that point.

Note: If PAS does not allow a web server's certificate authority, contact your CIC administrator and/or refer to the Interaction Process Automation Technical Reference's section on "Adding a Certification Authority to Process Automation Server."

As soon as you finish entering information, the dialog box displays a green arrow icon (see figure) to run a test connection to the web service.



6. To connect to the web service and fetch its WSDL, click the green arrow icon.

IPA Designer connects to the web service. It displays available services and ports, and changes the green arrow icon to a refresh icon. The gear (⚙️) icon next to each port displays the available web services for that port.

Note: If the web service contains ports that use unsupported bindings, IPA Designer will display a message box listing the unsupported ports and bindings.

7. (Optional) To specify a web service that IPA Designer calls when running the process in Test mode:



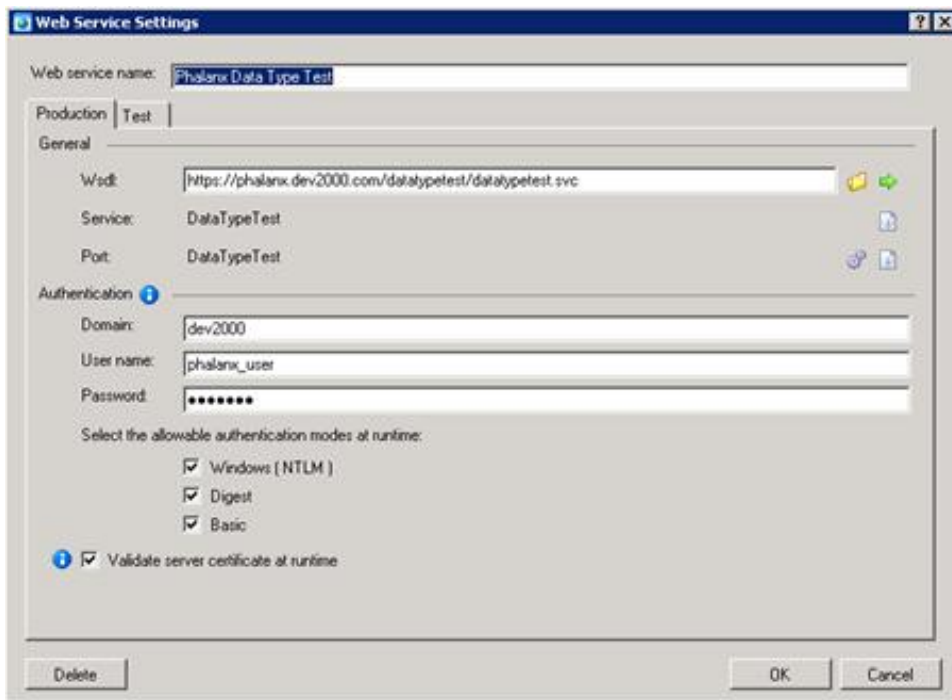
- a. Click the **Test** tab to display it (see figure).
- b. Select the **Use Test settings when running in Test mode** check box.
- c. Fill in the web service information in the same way as on the Production tab.

Note: If you fill in the Test tab, IPA Designer assumes that the test web service has the same services, ports and operations as the one on the Production tab. This is important because if the web service on the Test tab is different, the process might fail at run time because testing only checked the Test web service, not the one that the process will actually call in production.

8. Click **OK**.

IPA Designer re-displays the Call Web Service dialog box. This time, the dialog includes information about the web service.

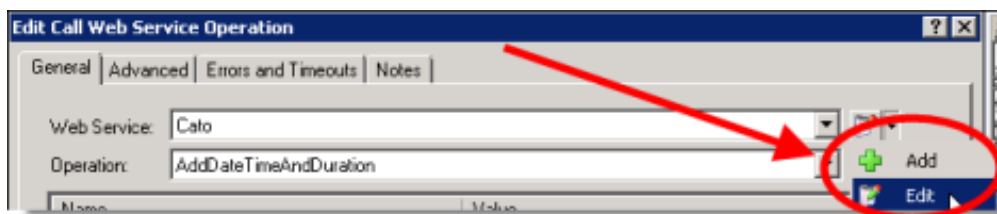
Editing a Web Service




Use the Web Service Settings dialog box (see figure) to edit a web service definition that you previously created for your process.

To edit a web service:

1. Add or edit a [Call Web Service](#) action to display its dialog box:
 - a. Expand the Web Service drop-down list and select the desired web service.
 - b. At the right end of the list box, expand the value list box and click **Edit** (see figure).



2. IPA Designer displays the Web Service Settings dialog box.

Tip: You can also click the Edit () icon to display the Web Service Settings dialog box.

3. Make any desired changes on the Production or Test tab.
4. Verify the changes by clicking the green arrow icon (see figure).



IPA Designer fetches the WSDL for the web service. If the same service and ports are available, IPA Designer automatically selects them from the refreshed WSDL.

5. Click **OK**.

IPA Designer re-displays the Call Web Service dialog box.

Deleting a Web Service

To delete a web service definition from a process:

1. In the dialog box for the Call Web Service action:
 - a. Expand the Web Service drop-down list and select the desired web service.
 - b. At the right end of the list box, expand the value list box and click **Edit** (see figure).

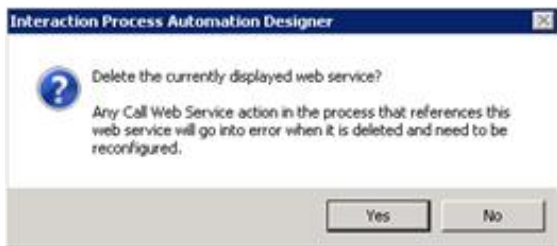


IPA Designer displays the Web Service Settings dialog box.

2. In the lower right corner of the dialog box, click **Delete** (see figure).



3. IPA Designer asks you to confirm the deletion (see figure):



4. Click **Yes**.

IPA Designer deletes the web service definition.

Any Call web service actions that used this web service will go in to error because they no longer have a valid web service selected.

Tip: An easy way to delete a web service without changing the web service used by an action is to add a new Call Web Service action to a task; edit the action; select the web service to delete; click Edit; delete the web service; close the Call Web Service action editor; and then delete the action.

Copying and Pasting Call Web Service Actions

You can copy a Call Web Service action to the Windows Clipboard and then paste it into another process.

When you copy a Call Web Service action to the Clipboard, it includes information about the web service that the action calls. When you paste the action into another process, the pasted code checks to see if the web service is defined in the process where it's being pasted. If not, the web service definition is pasted into the process.

To copy and paste a Call Web Service action:

1. In the workspace, right-click the desired Call Web Service action and click **Copy** in the shortcut menu.
2. In the Navigation pane, double-click the task in the other process that will get the pasted action.

The second process displays the task in its workspace.

3. Right-click the task at the point where you want to insert the pasted process.
4. In the shortcut menu, click **Paste**.

IPA Designer inserts the pasted process at that point in the task.

5. Review the pasted Call Web Service action and the web service definition to verify that they are correct.

Note: If you copy a Call Web Service action to another process, then change the web service definition in the destination process, IPA Designer treats the pasted web service as a different web service from the original.

Note: In IC 4.0 Service Update 1 (SU1) and later versions, IPA Designer automatically includes any referenced items (such as variables) when you copy and paste. It also updates the references to the pasted location.

Migrating Call Web Service Actions from Previous Versions

If you load a process that you created with a previous version of IPA Designer, then IPA Designer automatically updates the old process and any Call Web Service actions it contains.

It takes the old Call Web Service action and creates a web service whose production Wsdl is set to the old action's Wsdl. The name of the web service is the same as the Wsdl unless the Wsdl exceeds 49 characters, in which case IPA Designer truncates the name to that length (the Wsdl is unchanged).

IPA Designer updates the Call Web Service action to use the new web service.

Working with Calculations

You can use a calculation in most places where you could also use a literal value or a variable. In those places, your process looks at a value and decides what to do based on the value. A process doesn't care *how* the value gets there: all that matters is *what* the value is. The value can be:

- A literal value that the user types into a text box, such as "Smith" or "123".
- The value of a variable, such as *ApplicantNumber*.
- The result of a calculation, such as *CreditScore + YearsOnJob* or the truth value of *CreditScore > 700*.

To create calculations, you use the [Calculation Editor](#) dialog box. The dialog box varies depending on the variable (data) type you are using in the calculation. However, the dialog box has similar features and works the same regardless of data type.

Related links:

[Configuring Time Zone Settings](#)

[Understanding Boolean Expressions](#)

[Boolean Operators](#)

[The AND Operator](#)

[The OR Operator](#)

[Combining AND with OR](#)


[Comparison Operators in Calculations](#)

[Understanding Functions](#)

[Creating a Calculation](#)

[Creating Custom Calculations](#)

Configuring Time Zone Settings

If you use a Date or DateTime value in a calculation, your process uses the CIC server's local date and time unless you specify otherwise. You can configure how your process uses time zones by clicking the Time Zones  button in the **Comparison Item** dialog box.

Note: Due to the variation in daylight savings time (DST) practices around the world, IPA server processing might not always recognize a time change, whether forward or backward in time. As a result, some process-specific, time-related actions might occur earlier or later than expected, depending on the direction of the time shift. In practice, those time-dependent actions will remain synchronized with the previous time, before the change, as if the time change never happened. In circumstances where DST observance must be exact, contact support to accommodate your specific needs.

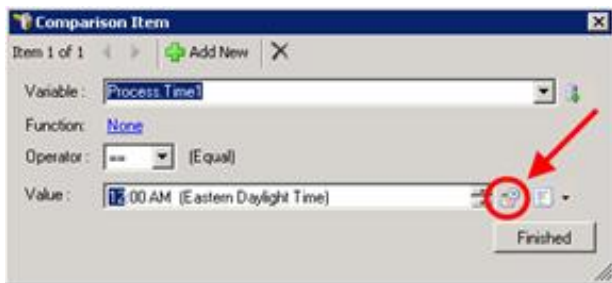
In addition, the IPA Web Client displays times using the UTC time zone (Greenwich mean time), while the standard client and Process Monitor display times with the user's local time zone.

To configure time zones:

1. In the dialog box to add or edit an action, add a Time or Date Time value.

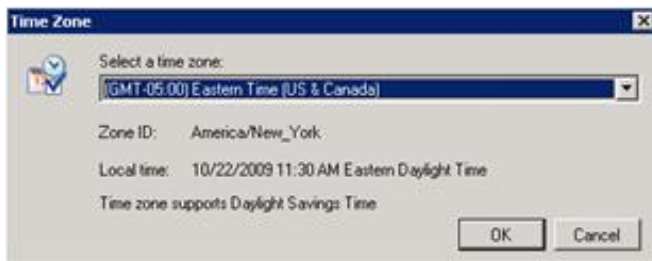
IPA Designer displays the **Comparison Item** dialog box.

2. In the Comparison Item dialog box, click the Time Zones button (see figure).



IPA Designer displays the **Time Zone** dialog box.

3. In the **Time Zone** dialog box (see figure), expand the **Select a time zone** list, click the desired time zone.



Notice that the dialog box now shows the date, time, and the selected time zone.

4. Click **OK**.

Note: If a Date, Time, or DateTime value is changed by a work item, the new value displays in the time zone where the Client using the work item was configured.

Understanding Boolean Expressions

A boolean calculation evaluates a boolean expression, which has a true or false value. Examples of boolean expressions are:

- **CreditScore > 700**: True if the value of *CreditScore* exceeds 700; otherwise false.
- **CreditScore > 700 AND NetYearlyIncome > 30000**: True if both expressions are true; otherwise false.
- **CreditScore > 700 OR NetYearlyIncome > 30000**: True if either expression is true; false only if both expressions are false.
- **CreditScore > 700 AND NetYearlyIncome > 30000 AND CurrentCustomer = true**: True if all three expressions are true; otherwise false.
- **CreditScore > 700 OR NetYearlyIncome > 30000 OR CurrentCustomer = true**: True if any or all of the expressions are true; false only if all of the expressions are false.
- **(CreditScore > 700 AND NetYearlyIncome > 30000) OR CurrentCustomer = true**: True if both the first two expressions are true or if the third expression is true; otherwise false.

You can use the **Calculation Editor** dialog box to create all of the bulleted expressions except for the last expression, which includes both AND and OR. To create complex boolean expressions like that one, you use the [Custom Calculation Editor](#), which you can access by clicking the [Enter a custom calculation](#) link at the bottom left corner of the **Calculation Editor** dialog box.

You can test for only one condition with one variable, or you can test for multiple conditions with multiple variables. Each time you click **Plus**, IPA Designer adds a variable row to the conditions table in the dialog box. If the table has more than one row, then:

- The process evaluates the conditions in top-to-bottom order as they appear in the table.
- The process uses "short-circuit evaluation." When an expression combines multiple conditions by using OR, then the whole expression is true if any of the conditions are true. Therefore, if the first condition is true, the process knows that the whole expression is true and doesn't need to evaluate any of the other conditions. As soon as the process hits a condition that is true, it stops evaluating an OR expression. On the other hand, if an expression combines multiple conditions by using AND, then the whole expression is false if even *one* of its conditions is false. Therefore, as soon as the process hits a condition that is false, it stops evaluating an AND expression because it knows that the whole expression is false. In either case, the process moves on to the next step.

Boolean Operators

The best way to understand boolean expressions and operators is through *truth tables*. Boolean expressions have one or more constituent expressions. Each constituent expression is true or false. Different combinations of true and false values for the constituent expressions make the larger boolean expressions true or false.

The AND Operator

The logical operator AND has the following truth table, where A and B are constituent expressions of the larger boolean expression **A AND B**:

A	B	A AND B
True	True	True
True	False	False
False	True	False
False	False	False

From the truth table, you can see that an expression using AND is true if and only if all of its constituent expressions are true. Here is another truth table:

A	B	C	A AND B AND C
True	True	True	True
True	True	False	False
True	False	True	False
False	True	True	False
True	False	False	False
False	False	True	False
False	True	False	False
False	False	False	False

No matter how many constituents a boolean expression with AND has, the expression is true if and only if *all* of its constituents are true. If one or more constituents are false, then the whole expression is false.

The OR Operator

The logical operator OR has the following truth table, where A and B are constituent expressions of the larger boolean expression **A OR B**:

A	B	A OR B
True	True	True
True	False	True
False	True	True
False	False	False

From the truth table, you can see that an expression using OR is true if *any* of its constituent expressions is true, if several of them are true, or if all of them are true. Here is another truth table:

A	B	C	A OR B OR C
True	True	True	True
True	True	False	True
True	False	True	True
False	True	True	True
True	False	False	True
False	False	True	True
False	True	False	True
False	False	False	False

No matter how many constituents a boolean expression with OR has, the expression is true if *any* of its constituents is true. It's only false if *all* of its constituents are false.

Combining AND with OR

Best Practice: Use parentheses to group parts of any boolean expression that has multiple operators. Parentheses eliminate any doubt about the order in which the process evaluates parts of the expression. The evaluation order is inside-out. The process first evaluates anything within the innermost parentheses, then within the next parentheses out, working its way outward.

Combining AND with OR is a little more complicated, but not too much.

The **Calculation Editor** dialog box does not let you combine AND with OR: instead, you need to use the [Custom Calculation Editor](#), which you access by clicking *Enter a custom calculation* at the bottom left corner of the **Calculation Editor** dialog box. Here is an example of combining AND with OR:

A	B	C	(A AND B) OR C
True	True	True	True
True	True	False	True
True	False	True	True
False	True	True	True
True	False	False	False
False	False	True	True
False	True	False	False
False	False	False	False

If you let D represent the expression (A AND B), you can see that this is basically just a more complicated version of the truth table for OR:

D	C	D OR C
True	True	True
True	False	True
False	True	True
False	False	False

Because an expression using OR is true if *any* of its constituent expressions is true, then the complex expression is true if and only if *either* (A AND B) or C is true; otherwise, it is false.

Warning: AND has precedence over OR. If an expression contains both ANDs and ORs, your process will evaluate the AND parts first, and then evaluate the OR parts. As a result, a process would evaluate *X OR Y AND Z* as *X OR (Y AND Z)* rather than *(X OR Y) and Z*.

Note that if you follow best practice and use parentheses to group parts of complex expressions, the precedence of AND over OR will never cause any problem or confusion.

Comparison Operators in Calculations

When you create a calculation in the [Calculation Editor dialog box](#), you compare the value of a variable or expression with another value. IPA Designer provides several operators that you can use:

==	Equal to
>	Greater than
>=	Greater than or equal to
<	Less than
<=	Less than or equal to
!=	Not equal to

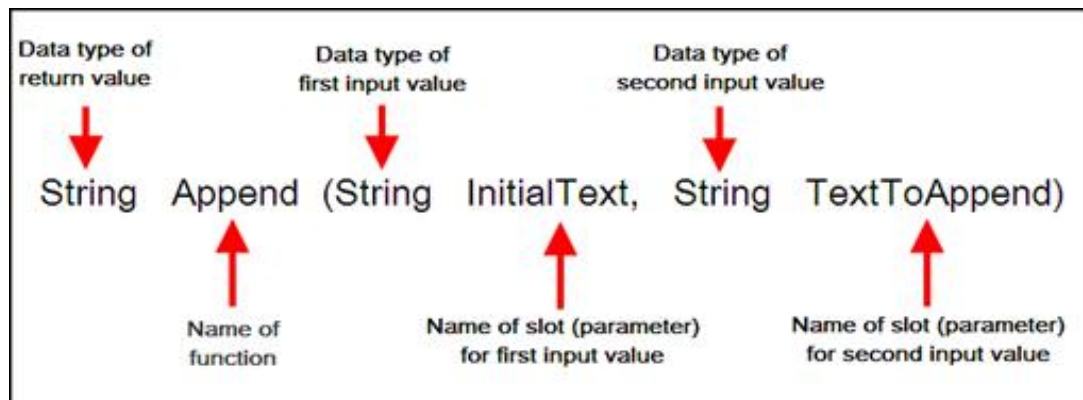
Note: When you apply comparison operators to numbers, they work just as you would expect. When you apply them to dates, date A is greater than date B if it's later than B; the other operators work similarly. For other data types such as text strings and boolean values, use only the operators *Equal to* and *Not equal to*. The other operators will technically work with the other data types, but applying them is complicated and it's safer to avoid doing so.

Understanding Functions

Some of the **Calculation Editor** dialog boxes, such as the [Calculation Editor – String dialog box](#), require you to have a general understanding of functions and how they work. This help topic gives a very general overview.

A function takes one or more input values and does things with them. It then hands back another value that is called its *return value*. A function can get input values directly, from variables, or even from other functions.

For example, suppose that you had a text string containing the name "Joe" and you wanted to add Joe's last name. You could use the Append function to do it (see figure).



You could use "Joe" as input value #1 and "Smith" as input value #2:

```
Append("Joe","Smith")
```

The return value of the function is "Joe Smith." You could then use the function expression wherever you wanted to insert the full name.

Obviously, it's not very powerful if you use specific text strings as input values. You can also use variables and other functions as input values. If you had one variable *FirstName* to hold customers' first names and another variable *LastName* to hold their last names, you could pass the variables to the Append function and it would use whatever values were in those variables at the moment. It would return customers' full names as its return values.

Creating a Calculation

You can use the **Calculation Editor** dialog box to create most calculations. For unusual or very complex calculations, use the [Custom Calculation Builder](#) dialog box. The dialog box has different controls based on the variable (data) type you are using in the

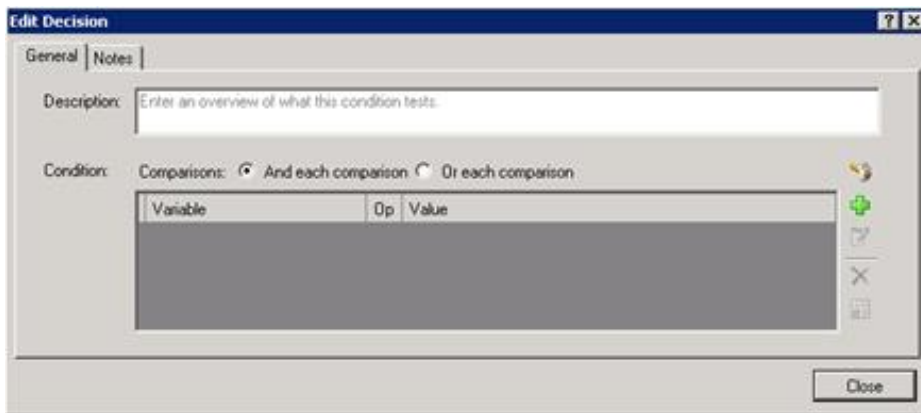
calculation.

For more information about creating calculations with a specific data type, see the help topic on the **Calculation Editor** dialog box for that data type.

To create a calculation (general steps):

1. In IPA Designer, drag an action into the workspace (such as Decision) that makes a decision based on one or more values.

IPA Designer displays an edit dialog box for that action (see figure). The figure shows a Decision action, but the dialogs for other decision-making actions are similar.

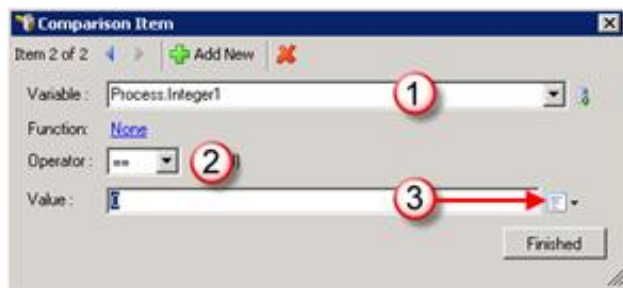


2. Add basic information about the action:
 - a. In the **Description** text box, type a brief description of the comparison in which you will use the calculation.
 - b. For Condition, select either the **And each comparison** or the **Or each comparison** radio button. For more information, see the topic [Understanding Boolean Expressions](#).


3. Add a comparison:

- a. Click **Add Comparison** .

IPA Designer displays the **Comparison Item** dialog box (see figure).



- b. In the **Variable** list box (see figure, 1) and select the variable to use for the comparison.

The dialog box displays controls you can use to set up the comparison.
- c. In the **Operator** list box (see figure, 2) and select the operator to use, such as *equal* or *not equal*.
- d. Next to the Value text box, expand the [Value list box](#) (see figure, 3) and select **Calculation** .
- e. In the Value text box, click the link that says **Click here to add a calculation**.

IPA Designer displays the **Calculation Editor** dialog box (see figure) for the data type of the variable you selected.



Reminder: IPA Designer displays different calculation editor dialog boxes for different data types, so the one you see might not match the figure shown above. For more information, see the help topic for the specific calculation editor dialog that matches the variable's data type.

4. Use the dialog box controls to construct your calculation.
5. Click **OK**.

IPA Designer redisplay the **Comparison Item** dialog box.

6. Click **Finished**.

IPA Designer redisplay the edit action dialog box. You can now add other conditions to the action.

Note: If a calculation includes a Date or DateTime value, your process uses your server's local time and date unless you specify otherwise. For more information, see [Configuring Time Zone Settings](#).

Creating Custom Calculations

IPA Designer provides a robust set of tools that help you "build" calculations quickly and easily. However, if you want to create very sophisticated calculations that combine multiple logical operators, use built-in functions, or if you simply prefer to enter calculations manually, use the Custom Calculation Builder.

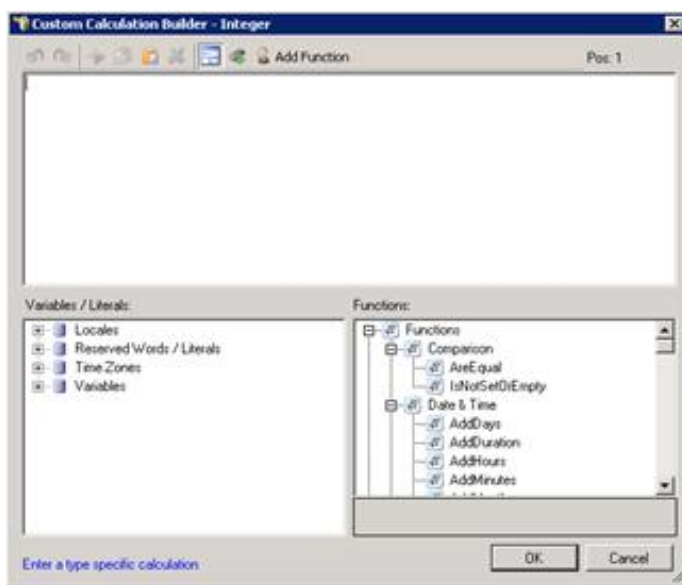
Note: Be careful to use the correct units when you create a calculation. If you create a calculation that uses or accepts inconsistent units, then your process might give incorrect results. For example, if your calculation used currency units and divided 10 dollars by 2 Euros, it might give an answer of 5 dollars.

More generally, you should always check the units in your calculations. Incorrect units in your answer usually indicate that you made an error in your calculation.

To use the Custom Calculation Builder:

1. Display the **Calculation Editor** dialog, then click the link [Enter a custom calculation](#) at the bottom right corner of the dialog box.

IPA Designer displays the **Custom Calculation Builder** dialog box (see figure). The dialog box differs slightly based on the data type of the variable you're using in the calculation, so it might not exactly match the figure you see here.



2. In the Calculation text box at the top, enter your calculation by any or all of these methods:
 - Type it directly into the box.
 - In the Variables / Literals tree, double-click the item(s) to insert into your calculation at the current cursor position. You can also drag it from the tree and drop it into your calculation.
 - In the Functions tree, double-click the functions or operators to insert into your calculation at the current cursor position.
 - Click the **Add Function** button on the dialog box toolbar to use the Function Assistant wizard.
3. When you have finished entering the calculation:
 - Correct any errors that IPA Designer detected.
 - IPA Designer indicates where an error occurred by displaying the error's position in the calculation text. For example, if the expression begins with a five-letter variable name and then has an incorrect operator, IPA Designer says that the error is at position 6 in the calculation expression.
 - Carefully examine the calculation text to verify that the calculation does *what you want it to do*.
4. Click **OK**.

IPA Designer adds the calculation at the desired location in your workspace.

Tip: Function names always end with opening and closing parentheses, even if they don't take any parameters. For example, **WriteLine("IPA Designer")** and **WriteLine()** are both correct, but **WriteLine** without any parentheses is incorrect.

Tips for Custom Calculations

Creating custom calculations is very tricky unless you are a programmer or mathematician. Because you are entering calculations directly, you risk creating calculations with three different kinds of errors:

- First, your calculation might have a *syntax error*. This is annoying, but it's the least serious kind of error because IPA Designer will detect it and refuse to accept the calculation until you correct the error.
- Second, your calculation might have a *run-time error*. IPA Designer often cannot detect this kind of error because it does not show up until you actually run the process on your CIC server. Your expression might refer to a file that is missing, for example. This is more serious because it interrupts your process when employees are trying to use it.
- Third, your calculation might have a *logical error*. This is the most serious kind of error because it means that your process appears to work correctly, but does something other than what you want it to do and it gives incorrect results. IPA Designer cannot detect this kind of error because it only knows what you *tell* the process to do, not what you *want* it to do.

One of the most important things you can do is to use parentheses to group the parts of your calculation. For example:

if (CurrentBalance > 1000 AND PaymentsUpToDate) OR GoldCustomer

is different from

if CurrentBalance > 1000 AND (PaymentsUpToDate OR GoldCustomer)

When your calculation has nested parentheses, IPA calculates the result by starting on the *inside* and working its way to the *outside*. Consider this simplified example:

((3 + (5-7)) * 100)

IPA would calculate the result by:

- Subtracting 7 from 5 to get negative 2. Notice that it starts inside the innermost parentheses.
- Adding negative 2 to 3 to get 1. It has now worked outward one level.
- Multiplying 1 by 100. It finally does the calculation in the outermost parentheses.

Best practice: If you need custom calculations, have a programmer, software engineer, or mathematician create them to minimize the risk of errors.

Dialog Box Help

This section provides information about specific dialog boxes in the IPA Designer user interface. It covers:

- [The Build Dynamic Details Dialog Box](#)
- [The Toolbox](#)
- [The Add Variable Dialog Box](#)
- [The Create a New Work Item Dialog Box](#)
- [The Calculation Editor Dialog Box – Overview](#)
- [Calculation Editor – Boolean](#)
- [Calculation Editor - Currency](#)
- [Calculation Editor – Date](#)
- [Calculation Editor – DateTime](#)
- [Calculation Editor – Decimal](#)
- [Calculation Editor – Duration](#)
- [Calculation Editor – Integer](#)
- [Calculation Editor – Mailbox](#)
- [Calculation Editor – Skill](#)
- [Calculation Editor – String](#)
- [Calculation Editor – Time](#)
- [Calculation Editor - URI](#)
- [Calculation Editor – User](#)
- [Calculation Editor – Workgroup Queue](#)
- [The Custom Calculation Builder Dialog Box](#)
- [The Send E-mail Dialog box](#)
- [The Value List Box](#)

The Build Dynamic Details Dialog Box

To build [dynamic details](#) for a process or a work item, use the **Build Dynamic Details** dialog box (see figure).



The **Build Dynamic Details** dialog box has these main features (see figure):

- **Variable list (1):** This lists the variables that are used as dynamic details identifiers. Your process evaluates the variables in the same order as they appear in the list. If the Show Name check box is selected, the variable name will be included when the process displays dynamic details.
- **Add button (2):** This lets you select a variable to use as a dynamic details identifier and add it to the Variable list.
- **Delete button (3):** This button deletes the variable currently selected in the variable list.
- **Move Up button (4):** This lets you move a variable up one row in the list of variables.
- **Move Down button (5):** This lets you move a variable down one row in the list of variables.
- **Preview (6):** This lists the variable(s) selected as dynamic details identifiers as a comma-delimited string. The variables' left-to-right order in the string is the order in which the process evaluates them.

Related topics:

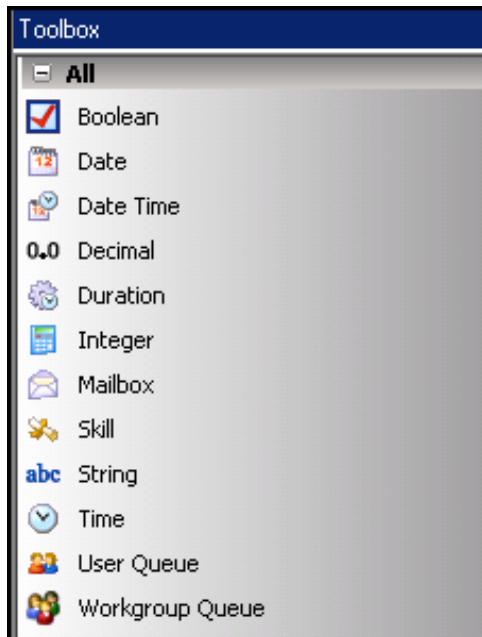
[Overview of Dynamic Details](#)

[Adding Dynamic Details to a Process](#)

[Adding Dynamic Details to a Work Item](#)

The Toolbox

When you display a particular workspace, IPA Designer displays a toolbox (see figure) with tools for that container. For example, if you display the Variables workspace, the toolbox lists the different [types of variables](#) you can add to the process. If you display the Tasks workspace, the toolbox lists actions you can add to tasks.



Tip: A quick way to add a toolbox item to a workspace is to drag the desired tool from the toolbox onto the desired location within the workspace.

Related topics:

[Variable \(Data\) Types – Overview](#)

[Work Item Control Types](#)

[Actions You Can Add to Tasks](#)

[Adding Actions to States](#)

The Add Variable Dialog Box

To add a variable of any type, you use the **Add Variable** dialog box (see figure).

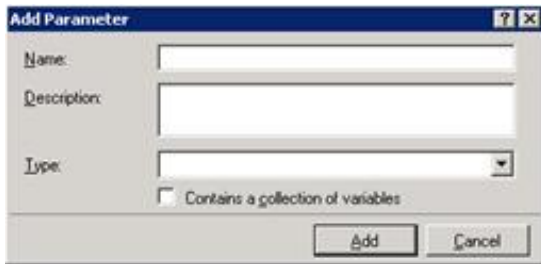
The image shows a screenshot of the 'Add Variable' dialog box. It has a title bar with a close button. The dialog contains several fields: 'Name' with the text 'Integer1', 'Description' (empty), 'Type' with a dropdown menu showing 'Integer', a checkbox for 'Contains a collection of variables' which is unchecked, 'Security' (empty), 'Accessibility' with a dropdown menu showing 'Private', a 'Data Constraints' section with a checkbox for 'Limit values to list' which is unchecked, and two fields for 'Minimum value' and 'Maximum value' both showing 'Not Set'. At the bottom, there is an 'Initial value' field showing '0' and two buttons labeled 'Add' and 'Cancel'.

The dialog box has different features depending on the data type of the variable you are creating. However, most **Add Variable** dialog boxes have at least these features:

- **Name:** The name of the variable. Follows the standard [naming conventions](#) for IPA.
- **Description:** A brief explanation of the variable and its purpose. Should give enough information for someone who knows nothing about the variable.
- **Type:** The variable's data type. Normally, this control is already filled in because you previously chose the data type for the variable.
- **Contains a collection of variables:** Indicates whether or not the variable is a [collection](#).
- **Security:** Lets you select who can view or modify the variable and its value. Security specifications are created in Interaction Administrator by your system administrator.
- **Accessibility:** Indicates how the variable is used (private, input, output, or input and output). Process variables marked as inputs or outputs can be passed to processes by the Run Process action.
- **Limit values to list:** Lets you specify a list of acceptable values for the variable and prevent assignment of other values to the variable.
- **Data Constraints:** Let you limit the values of a variable in different ways depending on the data type of the variable. For example, you could require string values to be in UPPER CASE or require integer values to be between 1 and 100.
- **Minimum/Maximum value:** Lets you specify minimum and maximum values for the variable.
- **Initial value:** Lets you specify a default value for the variable. The default value must match the restrictions you placed on the variable. For example, if you set a minimum or maximum value, then the initial value must be within the range you set. You can also set the initial value to NOT SET, which means that the variable has no value until set by an action or on a work item. A variable whose value is NOT SET will not appear in dynamic details until the process or a user sets its value.

The Add Parameter Dialog Box

To add a parameter, you use the **Add Parameter** dialog box (see figure). To edit a parameter, you use the **Edit Parameter** dialog box, which is identical to the Add Parameter dialog box.

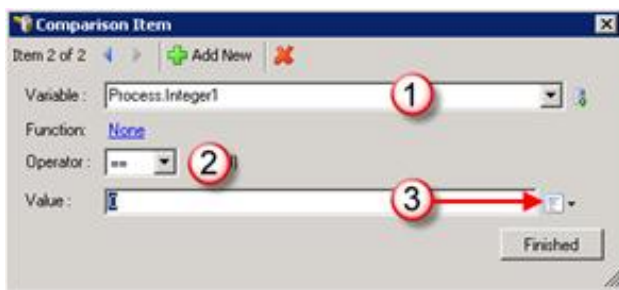


The features of this dialog box are:


- **Name:** The name of the parameter. Follows the standard [naming conventions](#) for IPA.
- **Description:** A brief explanation of the parameter and its purpose. Should give enough information for someone who knows nothing about the parameter.
- **Type:** The parameter's data type. If you are editing a parameter that you previously added, this list box is unavailable because the parameter type is already set.
- **Contains a collection of variables:** Indicates whether or not the parameter takes a [collection](#) of values or variables.

The Comparison Item Dialog Box

Use the **Comparison Item** dialog box (see figure) to add comparisons to actions (such as Decision) that branch in multiple directions based on a value.

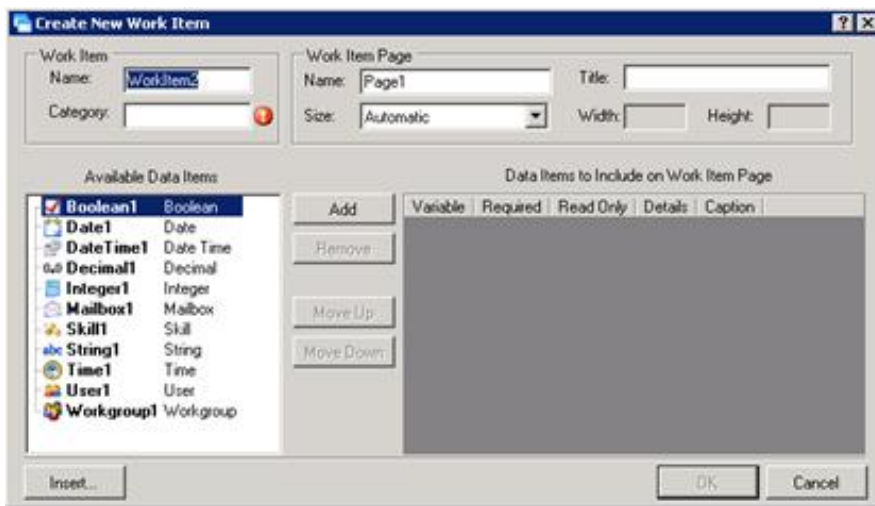


Some of the features in the dialog box will be unavailable until you select a variable for comparison. The main features of the **Comparison Item** dialog box are:

- **Add New button:** This lets you add new comparison rows to the action dialog box without closing the Comparison Item dialog box.
- **Delete (X) button:** This lets you delete comparison rows from the action dialog box without closing the **Comparison Item** dialog box.
- **Variable list box (1):** Use this to select a variable for the comparison. You can also click the **Add Variable**  button to create a new variable "on the fly."
- **Operator list box (2):** Use this to select an operator (such as equal, greater than, etc.) for the comparison.
- **Value text box (3):** Use this to enter a value with which the action compares the variable. You can type the value directly into the box or use the [Value list box](#) to enter a variable or calculation.
- **Finished button:** Click this to close the dialog box.

The Create a New Work Item Dialog Box

To add work items to your process, use the **Create a New Work Item** dialog box (see figure).



The features of the **Create a New Work Item** dialog box are:

Name: This is the name that the process and CIC will use for the work item.

- **Category:** This is the category that CIC Client will display for the work item. You can create any category that makes sense for this work item. The CIC Client uses categories to organize work items.
- **Name:** This is the name of the initial page of the work item. IPA Designer displays this name in the Navigation Pane as a page under the work item.
- **Title:** This is the title that appears at the top of the page.
- **Size:** This is a drop-down list that lets you select predefined sizes for the page. If you select a Custom size, you must then specify the **Width** and **Height** of the page.
- **Available Data Items:** Variables that you can add to this work item.
- **Data Items to Include on Work Item Page:** Variables you have already added to this page. The page will show the variable labels and fields in the same order as they appear in the list.
 - ✓ *Required column:* If you select the check box in this column, the process requires the user to enter the variable's value on the form. Otherwise, the user can (but does not need to) leave the field blank.
 - ✓ *Read Only:* If you select the check box in this column, the field displays a value (for example, from a variable) but the user cannot change it.
 - ✓ *Details:* If you select the check box in this column, it adds the variable to the dynamic details of the work item. The CIC Client will display the variable as part of the item description.
 - ✓ *Caption:* This column displays the text string that the work item will use for the variable.
- **Add button:** If a variable is selected in the list on the left, clicking this button adds the variable to the list of work item variables on the right. The work item form will have fields and labels for these variables.
- **Remove button:** If a variable is selected in the list on the right, clicking this button removes the variable from the work item.
- **Move Up button:** This moves a variable up one row in the work item variables list on the right.
- **Move Down button:** This moves a variable down one row in the work item variables list on the right.
- **Insert button:** This displays the **Add Variable** dialog box. It lets you [add a new variable](#) "on the fly" as you create a work item. Checking *Details* puts the variable into the work item's dynamic details.

Note: The **Create New Work Item** dialog box creates a simply arranged work item page with labels and fields for the variables you selected, displaying them in the order you selected. When you display the page in your IPA Designer workspace, you can add more variables to the page, drag variable labels and fields to different locations, and edit the controls on the page. The **Create a New Work Item** dialog box simply gives you a "first draft" form that you can modify as needed.

The Calculation Editor Dialog Box - Overview

The **Calculation Editor** dialog box lets you build calculations by selecting variables and operators. The features of the **Calculation Editor** dialog box depend on the data type of the variable in a calculation. For example, you use the **Boolean Calculation Editor** dialog to enter a calculation that returns a True or False value.

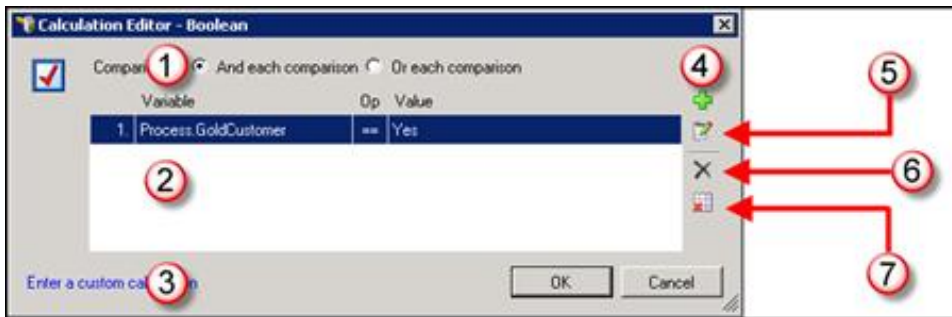
To create more complex calculations (or if you simply prefer to enter calculations by typing them), use the [Custom Calculation Editor](#) by clicking the *Enter a custom calculation* link at the bottom left corner of the **Calculation Editor** dialog box.

Help about specific calculation editor dialog boxes is available here:

- [Boolean](#)
- [Currency](#)
- [Date](#)
- [DateTime](#)
- [Decimal](#)
- [Duration](#)
- [Integer](#)
- [Mailbox](#)
- [Skill](#)
- [String](#)
- [Time](#)
- [URI](#)
- [User](#)
- [Workgroup Dialog Box](#)

Calculation Editor - Boolean

Use the **Calculation Editor – Boolean** dialog box to create calculations that result in a true or false value. IPA Designer displays the dialog box when you edit an action that uses boolean values, such as an If-Then / Else action. The dialog box shows different options depending on the data type of the variable you use in the calculation.



The major parts of the dialog box are (see figure):

- **Comparisons radio buttons (1):** Use these radio buttons to use the AND or the OR logical operator in your calculation. If your calculation requires a combination of AND with OR, then use the [Custom Calculation Builder](#) dialog box by clicking the link at (3).
- **Condition list (2):** This lists the conditions used in your calculation. The Variable column shows the variable, the Op column shows which comparison the process uses (equal to, greater than, etc.), and the Value column shows the value with which the process compares the variable's value.
- **Enter a custom calculation link (3):** This link opens the [Custom Calculation Builder](#) dialog box.
- **The Add Condition button (4):** This button adds a row to the condition list.
- **The Edit Condition button (5):** This button lets you edit the currently-selected comparison.
- **The Remove Condition button (6):** This button removes the selected row from the condition list.
- **The Remove All Conditions button (7):** This button removes all rows from the condition list.

Calculation Editor - Currency

Use the **Calculation Editor – Currency** dialog box to create calculations that include a currency value. IPA Designer displays the dialog box when you edit an action that uses currency values. The dialog box shows different options depending on the data type of the variable you use in the calculation.

The screenshot shows the 'Comparison Item' dialog box. It features a title bar with a close button. Below the title bar, there is a status bar showing 'Item 1 of 1' and navigation arrows. To the right of the status bar are two buttons: a green '+ Add New' button and a red 'X' button. The main area of the dialog box contains four labeled fields: 'Variable:' with a dropdown menu showing 'State.Currency1.Code' and a green '+' button; 'Function:' with a blue link 'None'; 'Operator:' with a dropdown menu showing '==' and the text '(Equal)'; and 'Value:' with an empty text box and a small icon button. A 'Finished' button is located at the bottom right of the dialog box.

The major parts of the dialog box are (see figure):

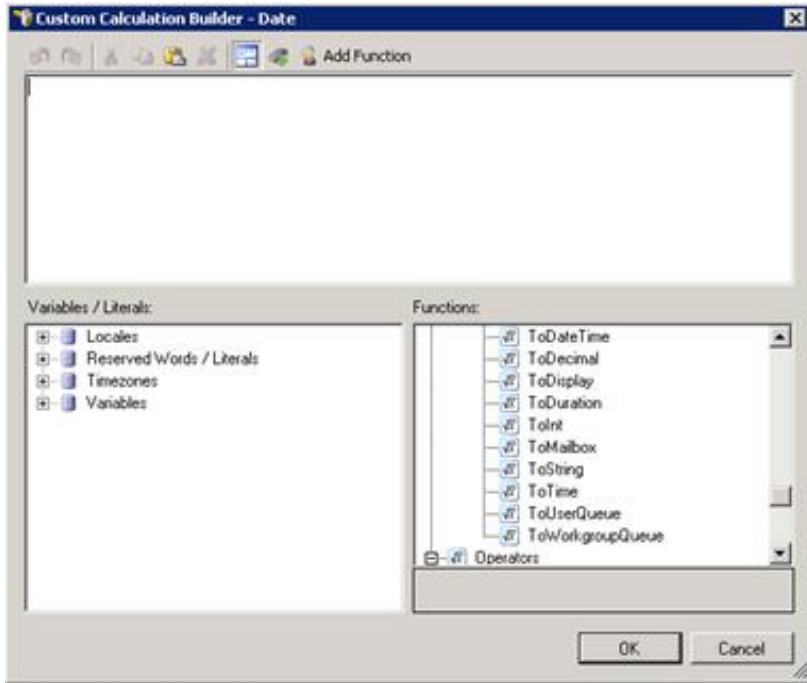
- **Add New button:** This button adds a row to the condition list.
- **Variable list:** This lists the variables that you can select for your calculation.
- **Function link:** This link opens the [Set Variable Function Calculation](#) dialog box.
- **Operator list:** Use this list to select the operator for your calculation.
- **Value:** Specify the value to complete the calculation.

Calculation Editor – Date

Use the **Custom Calculation Builder – Date** dialog box (see figure) to create calculations that use a date value.

Note: Every date, time, and date-time value has an associated time zone. Unless otherwise specified, this is the time zone of the PC running IPA Designer or, on a work item, of the user's computer. For more information, see [Configuring Time Zone Settings](#).

IPA Designer supports dates from January 1, 1800 to December 31, 2200, inclusive. Using dates or date-times outside of that range might cause your process to work incorrectly.



This dialog box is described in [The Custom Calculation Builder Dialog Box](#).

Calculation Editor – DateTime

Use the **Calculation Editor – DateTime** dialog box to create calculations that use a date-time value.

Note: Every date, time, and date-time value has an associated time zone. Unless otherwise specified, this is the time zone of the PC running IPA Designer or, on a work item, of the user's computer. For more information, see [Configuring Time Zone Settings](#).

IPA Designer supports dates from January 1, 1800 to December 31, 2200, inclusive. Using dates or date-times outside of that range might cause your process to work incorrectly.



The major parts of the dialog box are (see figure):

- **When list box (1):** Lets you select the day to use, such as *Next day*, *In 2 days*, *In 1 week*, and so forth.
- **At time list box (2):** Lets you enter the time to use:

To type the time directly, click the hour, minute, or AM/PM in the box and type the desired value.

To use the mouse, click the hour, minute, or AM/PM and then click the up/down buttons at the right end of the box.

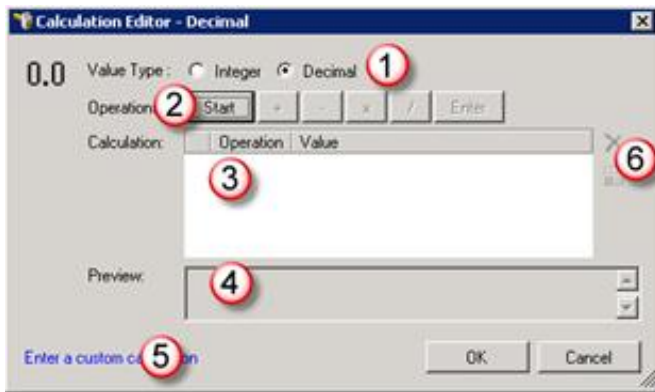
- **Relative to (3):** This lets you select the date and time relative to which the date-time is calculated.

For example, *In 2 days* doesn't mean anything unless you know "in two days *after what?*" This box lets you select the current date, the date the process started, the date a meeting was held, and so forth.

- **Enter a custom calculation (4):** Opens the [Custom Calculation Builder](#) dialog box.
- **Configure or View Time Zone button (5):** Lets you select the time zone to use. See the section [Configuring Time Zone Settings](#) for more information.
- **Insert Variable button (6):** Lets you create a new variable "on the fly."

Calculation Editor – Decimal

Use the **Calculation Editor – Decimal** dialog box to create calculations that use a decimal value.



The major parts of this dialog box are (see figure):

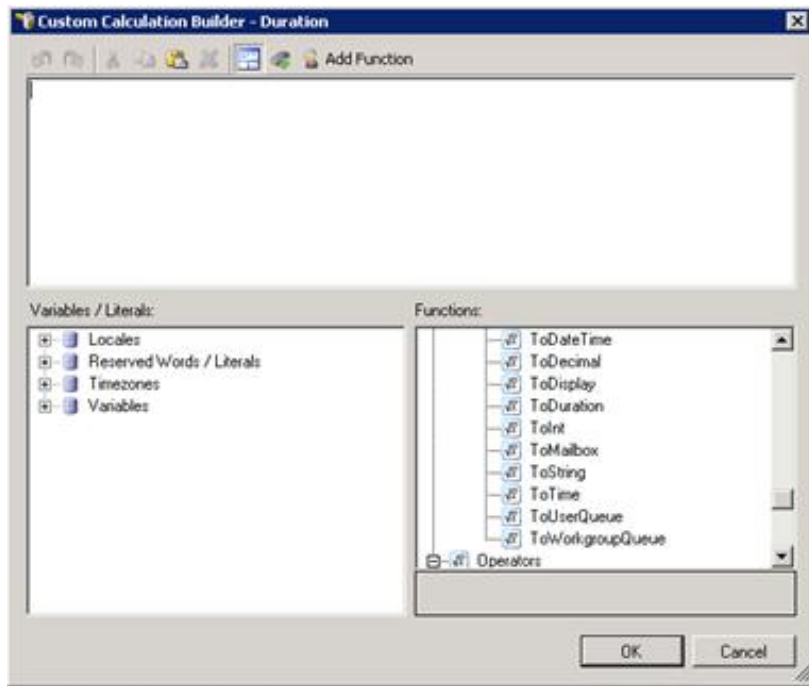
- **Integer/Decimal radio buttons (1):** Let you switch between entering integer (whole number) or decimal values.
- **Operations buttons (2):** Let you select the arithmetic operations to use in your calculation. The Enter button inserts a carriage-return character on the current row of the Calculation table, thereby executing all the rows above it in the table. You can use the Enter button to do intermediate calculations, such as a subtotal that you use later in the same calculation.
- **Calculation table (3):** Displays the arguments (values or variables) and operators of the calculation in table format. The order of the rows is the order in which IPA will execute parts of the calculation.
- **Preview area (4):** Displays the currently-entered calculation in standard arithmetical form.
- **Enter a custom calculation link (5):** Displays the [Custom Calculation Builder](#).
- **Remove/Remove All buttons (6):** Remove either the currently-selected row in the Calculation table, or all of the rows in the table.

Note: Be careful to use the correct units when you create a calculation. If you create a calculation that uses or accepts inconsistent units, then your process might give incorrect results. For example, if your calculation used currency units and divided 10 dollars by 2 Euros, it might give an answer of 5 dollars.

More generally, you should always check the units in your calculations. Incorrect units in your answer usually indicate that you made an error in your calculation.

Calculation Editor – Duration

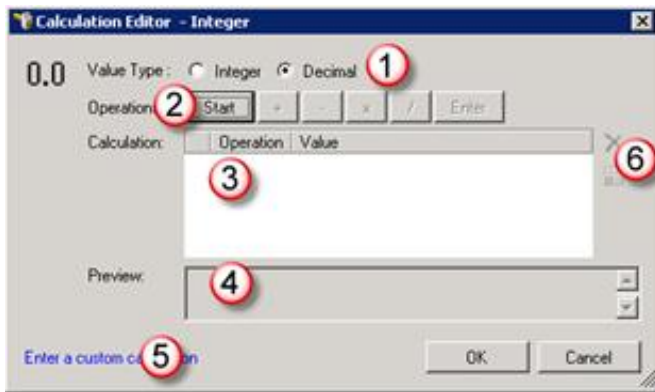
Use the **Calculation Editor – Duration** dialog box to create calculations that use a duration value.



This dialog box is described in [The Custom Calculation Builder Dialog Box](#).

Calculation Editor – Integer

Use the **Calculation Editor – Integer** dialog box to create calculations that use an integer value.



The major parts of this dialog box are (see figure):

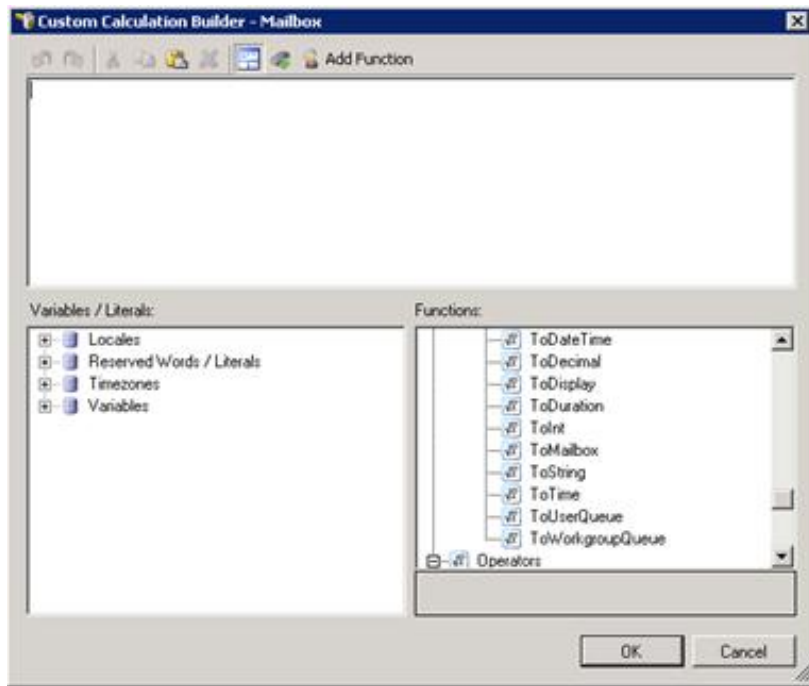
- **Integer/Decimal radio buttons (1):** Let you switch between entering integer (whole number) or decimal values.
- **Operations buttons (2):** Let you select the arithmetic operations to use in your calculation. The Enter button inserts a carriage-return character on the current row of the Calculation table, thereby executing all the rows above it in the table. You can use the Enter button to do intermediate calculations, such as a subtotal that you use later in the same calculation.
- **Calculation table (3):** Displays the arguments (values or variables) and operators of the calculation in table format. The order of the rows is the order in which IPA will execute parts of the calculation.
- **Preview area (4):** Displays the currently-entered calculation in standard arithmetical form.
- **Enter a custom calculation link (5):** Displays the [Custom Calculation Builder](#).
- **Remove/Remove All buttons (6):** Remove either the currently-selected row in the Calculation table, or all of the rows in the table.

Note: Be careful to use the correct units when you create a calculation. If you create a calculation that uses or accepts inconsistent units, then your process might give incorrect results. For example, if your calculation used currency units and divided 10 dollars by 2 Euros, it might give an answer of 5 dollars.

More generally, you should always check the units in your calculations. Incorrect units in your answer usually indicate that you made an error in your calculation.

Calculation Editor – Mailbox

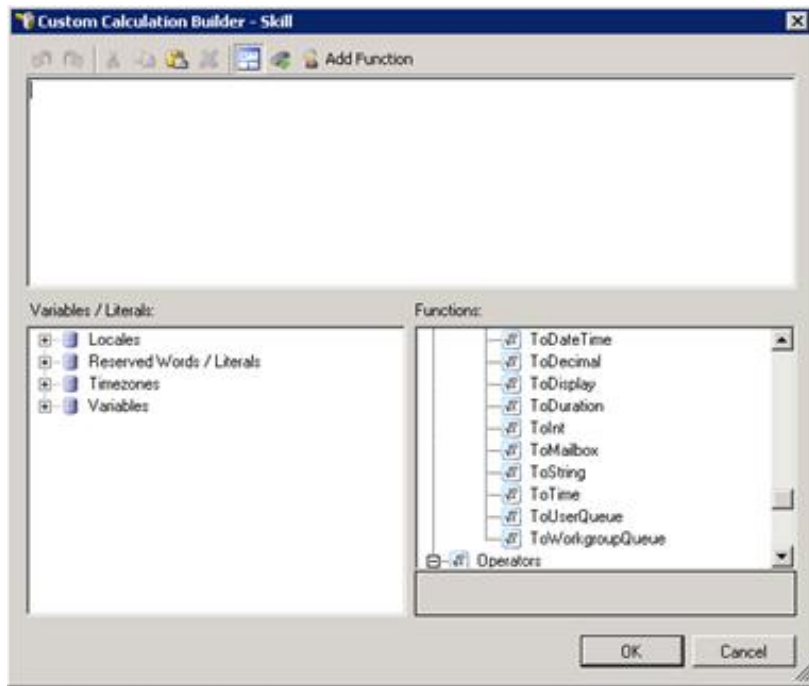
Use the **Calculation Editor – Mailbox** dialog box to create calculations that use mailbox values.



This dialog box is described in [The Custom Calculation Builder Dialog Box](#).

Calculation Editor – Skill

Use the **Calculation Editor – Skill** dialog box to create calculations that use skill values.

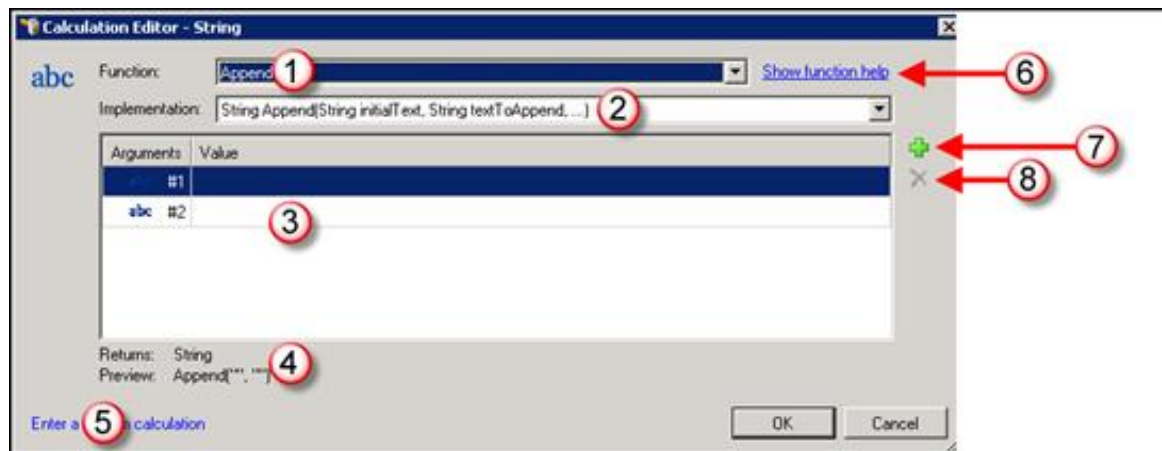


This dialog box is described in [The Custom Calculation Builder Dialog Box](#).

Note: You need appropriate access rights to use this feature. Contact your administrator for more information.

Calculation Editor – String

Use the **Calculation Editor – String** dialog box to create calculations that use string values. After you have selected a string variable for an action, you display the **Calculation Editor – String** dialog box by clicking **Calculation** in the [Value List box](#) and then clicking the [Click here to add a calculation](#) link. This dialog box allows you to create an expression that the process compares to the value of the variable you selected in the action's **Edit** dialog box.

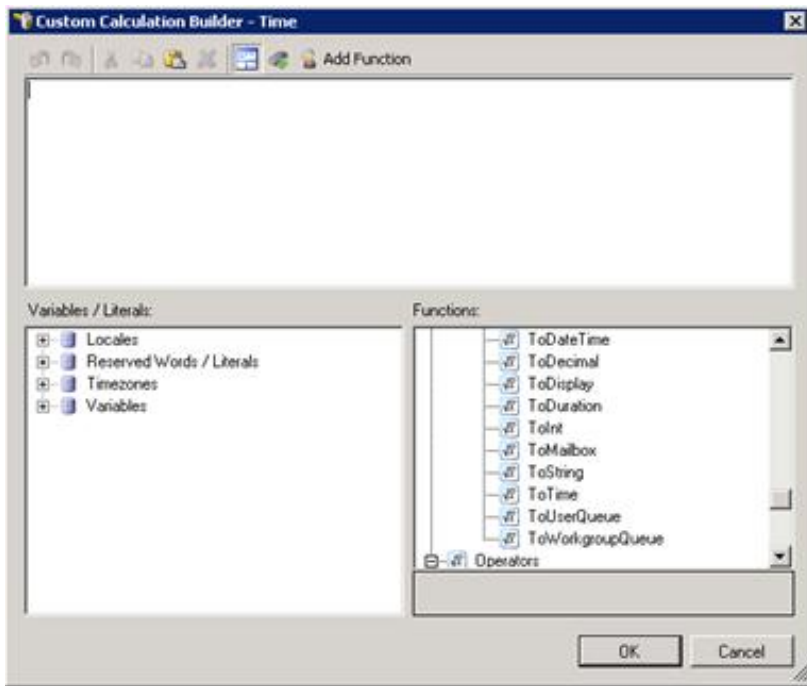


The major parts of this dialog box are (see figure):

- **Function list box (1):** Use this list box to select the function to use in the calculation. For an overview of how functions work, see the help topic [Understanding Functions](#).
- **Implementation list box (2):** This box displays the function header, including the data type of the value that the function returns, the name of the function, and a list of the function's arguments. The control is a list box because a function can use different lists of arguments. For more information, see the help topic [Understanding Functions](#).
- **Argument list (3):** Shows the values that will be passed to the function's arguments. The value in the first row is passed to the first argument in the function's argument list, the second value to the second argument, and so forth.
- **Return type and preview (4):** Shows the data type of the value that the function returns to the process. Also shows a preview of how the function header looks with the currently-selected values in the argument list.
- **Enter a custom calculation link (5):** Click this link to enter a [custom calculation](#).
- **Show function help link (6):** Opens a window with help information about the function selected in the Function list box.
- **Add Argument button (7):** Adds an argument row to the argument list.
- **Delete Argument button (8):** Deletes the selected row in the argument list.

Calculation Editor – Time

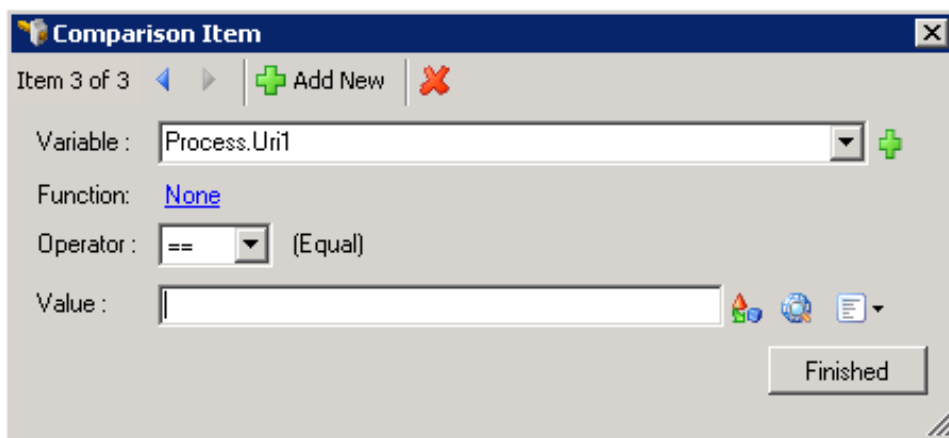
Use the **Calculation Editor – Time** dialog box to create calculations that use time values.



This dialog box is described in [The Custom Calculation Builder Dialog Box](#).

Calculation Editor - URI

Use the **Calculation Editor – URI** dialog box to create calculations that include a URI data type. IPA Designer displays the dialog box when you edit an action that uses URI values. The dialog box shows different options depending on the data type of the variable you use in the calculation.

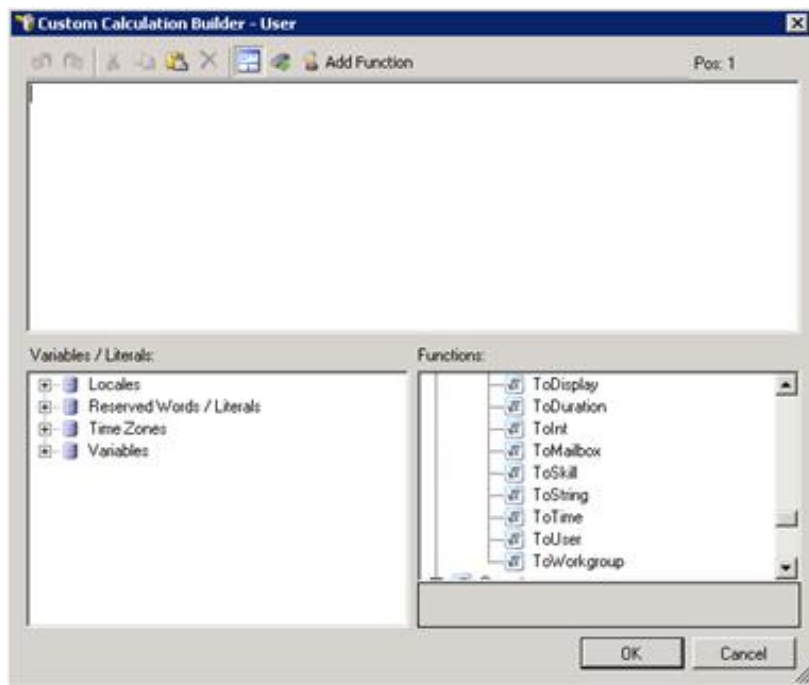


The major parts of the dialog box are (see figure):

- **Add New button:** This button adds a row to the condition list.
- **Variable list:** This lists the variables that you can select for your calculation.
- **Function link:** This link opens the [Set Variable Function Calculation](#) dialog box.
- **Operator list:** Use this list to select the operator for your calculation.
- **Value:** Specify the value to complete the calculation.

Calculation Editor – User

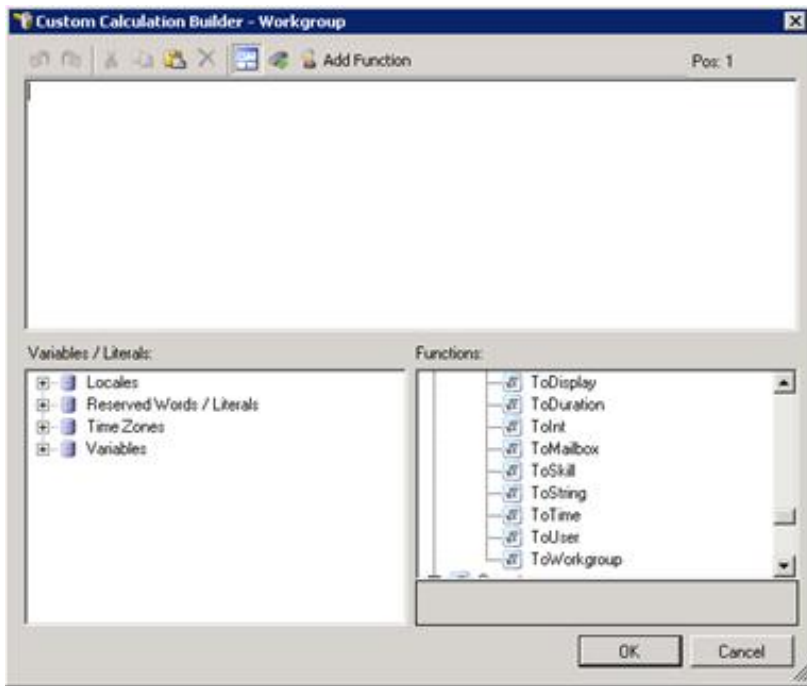
Use the **Calculation Editor – User** dialog box to create calculations that use user values.



This dialog box is described in [The Custom Calculation Builder Dialog Box](#).

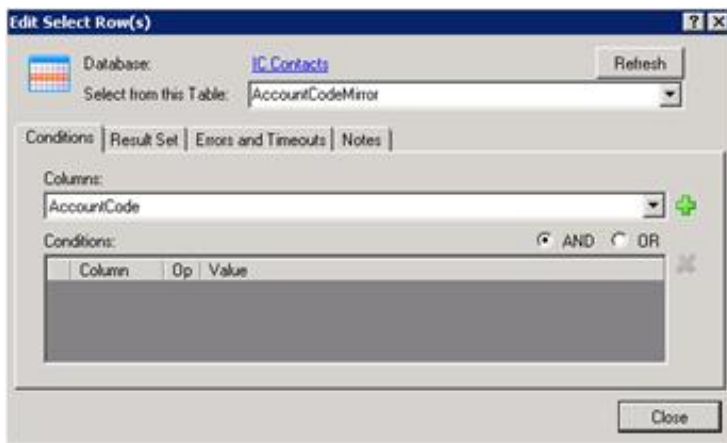
Calculation Editor – Workgroup

Use the **Calculation Editor – Workgroup** dialog box to create calculations that use workgroup queue values.



This dialog box is described in [The Custom Calculation Builder Dialog Box](#).

Database Action – Select Row(s)



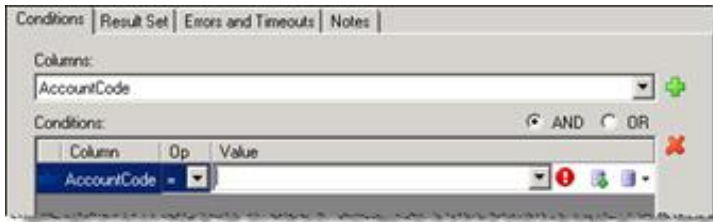
Use the **Edit Select Rows** dialog to create or edit an SQL SELECT statement.

When you pass values to a standard database action such as this one, do not use the `ToSql()` function to convert the values. IPA Designer does any required conversion automatically. If you use `ToSql()` with standard database actions, it causes an error.

Note: To access CIC Data Sources in your process designs, you must have the user rights to access them. If you get an error message when you try to access a data source from a process design, contact your system administrator to obtain the required user rights. Users of the process must also have rights to access the data sources.

To create an SQL SELECT statement:

1. In the **Select from this Table** list box, select the desired database table.
2. On the **Conditions** tab, select a column in the **Columns** list box (see figure):
3. Click the **Plus** icon to add a condition (see figure).



	New Variable: Lets you create a new variable to use for the criterion value.
	Value List Box: Displays the Value list box, in which you can choose to use a literal value, a variable, or a calculation.

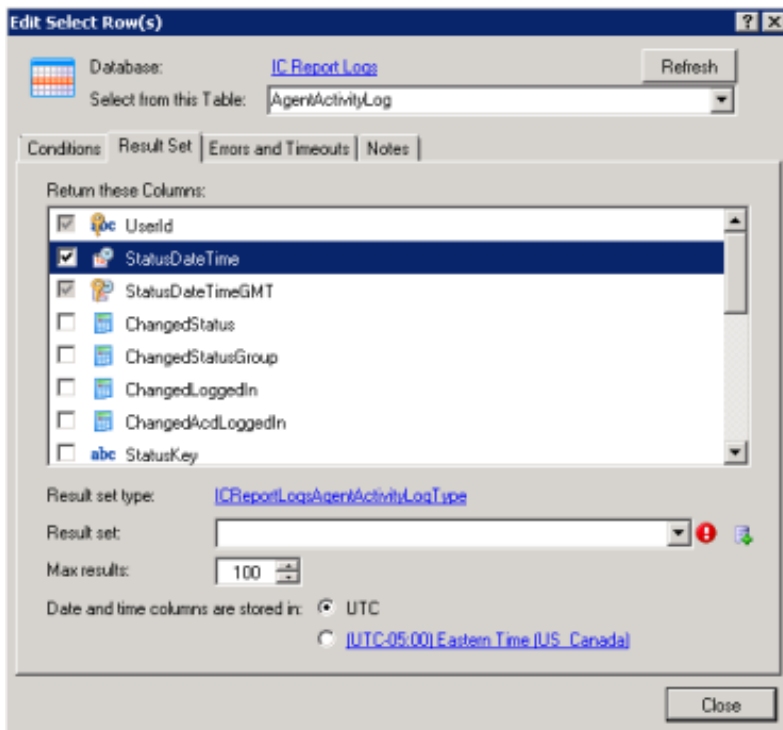
4. In the **Op** list box, select a **Boolean operator** to use.
5. In the **Value** column, enter a value to use as a selection criterion. Either:
 - Click the Value List Box icon to enter a literal text value, a variable, or a calculation.
 - Click the New Variable icon to create a new variable for the value.

Tip: When the New Variable icon is available, you can also type in the box to find a variable or use the drop-down list to browse for a variable.

6. Repeat steps 3-5 to add more selection criteria if needed.
7. If you have multiple criteria, select the **AND** or **OR** radio button.

If you select **AND**, the SELECT statement will search for table rows that match *all* of your criteria. If you select **OR**, the SELECT statement will search for table rows that match *any* of your criteria. For more information, see [Understanding Boolean Expressions](#).

8. On the **Result Set** tab (see figure):

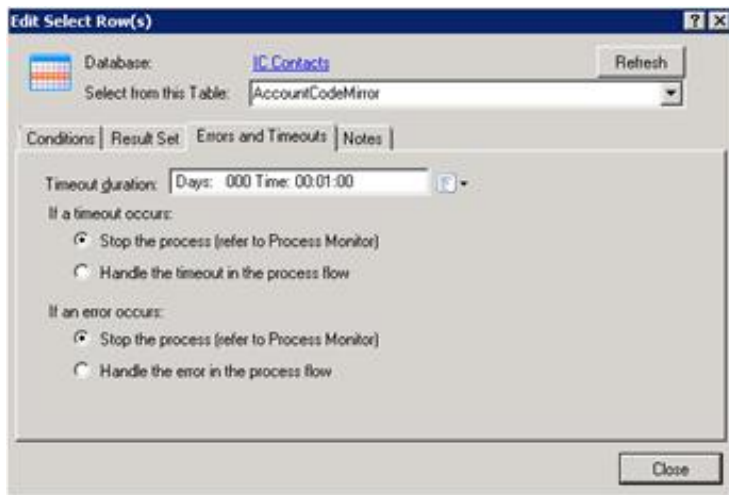


- a. In the **Return these Columns** list, select the table columns to include in the result set.
- b. In the **Result set** text box, enter or create a variable to hold the results of the SELECT query.

- c. If needed, set the **Max results** box to the desired value.
- d. If needed, set the time zone using the **Date and time columns are stored in** radio buttons.

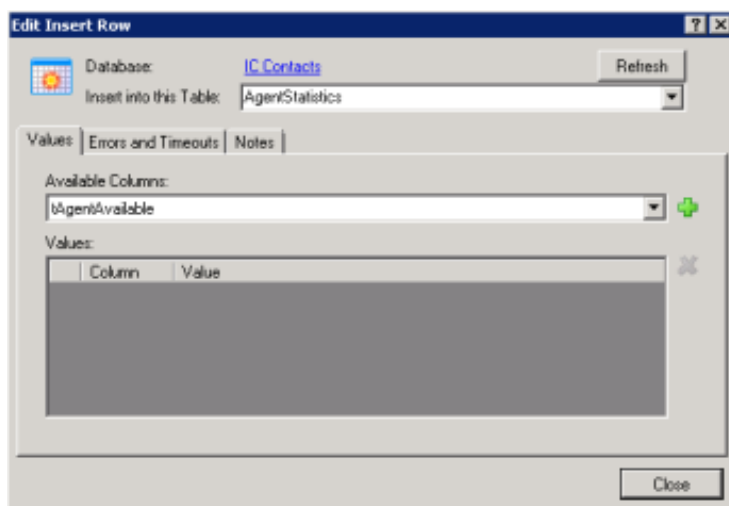
Note: When you add a database action that has a result set from a specific database/table pair, IPA Designer automatically creates a custom type to hold the results from your database action. That's the type shown as *Result set type* on the Result Set tab. Multiple actions against the same database/table pair will use the same type.

9. Configure Errors and Timeouts (see figure):



- a. Click the **Errors and Timeouts** tab.
 - b. In the **Timeout Duration** text box, enter the amount of time that the process should try to do the database action before giving up.
 - c. Select the radio buttons for the desired timeout and error handling methods.
10. If desired, click the **Notes** tab and add notes about the database action. Then click **Close**.

Database Action – Insert Row(s)



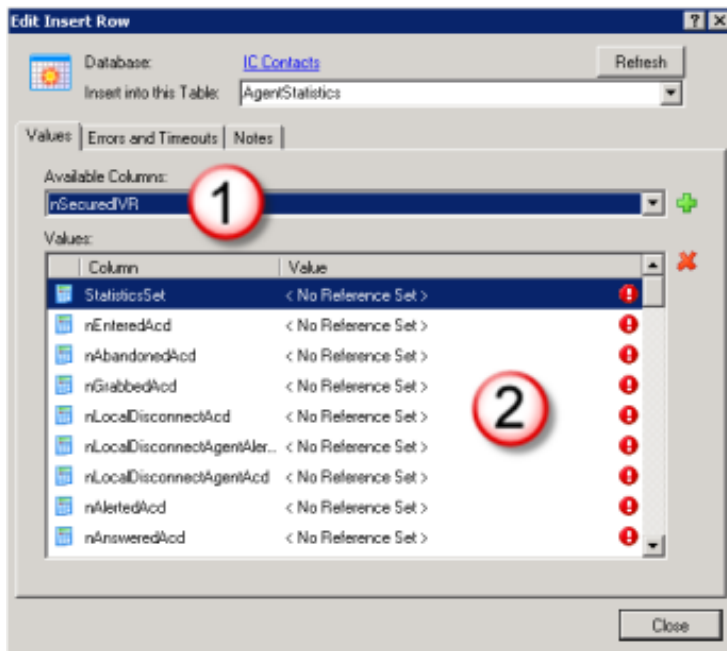
Use the **Insert Rows** dialog to insert rows into an SQL table.

When you pass values to a standard database action such as this one, do not use the ToSql() function to convert the values. IPA Designer does any required conversion automatically. If you use ToSql() with standard database actions, it causes an error.

Note: To access CIC Data Sources in your process designs, you must have the user rights to access them. If you get an error message when you try to access a data source from a process design, contact your system administrator to obtain the required user rights. Users of the process must also have rights to access the data sources.

To create an INSERT statement:

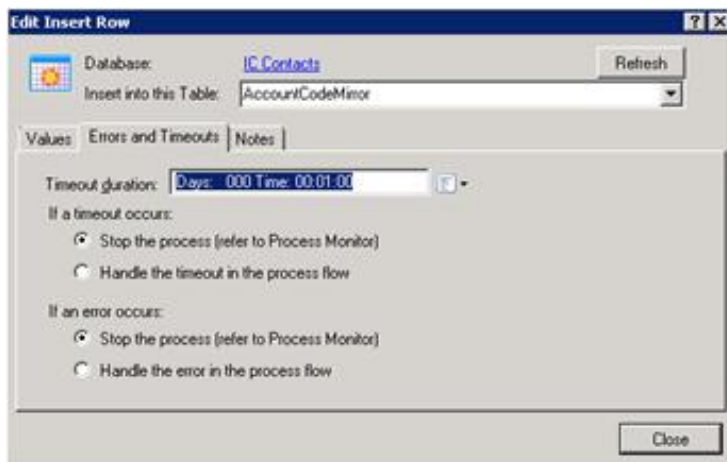
1. In the **Select from this Table** list box, select the desired database table.
2. On the **Values** tab, choose the columns to include in the Insert operation (see figure).



- To add a column to the Insert operation, open the **Available Columns** list (1) and select the column. The list displays only columns that are not already in the selected columns list (2).
- To remove a column from the Insert operation, highlight its row in the selected columns list (2) and click the red X icon.

Note: Some tables have columns whose values automatically increment, so you should not include those columns in your Insert operation.

3. Configure Errors and Timeouts (see figure):



- a. Click the **Errors and Timeouts** tab.
- b. In the **Timeout Duration** text box, enter the amount of time that the process should try to do the database action before giving up.
- c. Select the radio buttons for the desired timeout and error handling methods.

4. If desired, click the **Notes** tab and add notes about the database action.
5. Click **Close**.

Database Action – Delete Row(s)



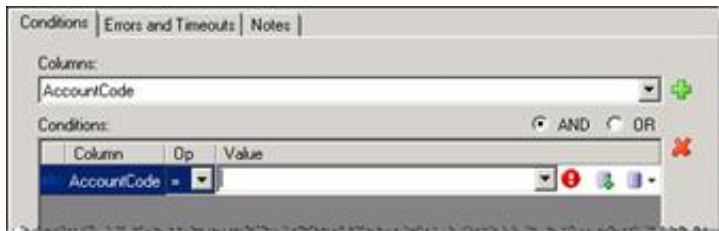
Use the **Edit Delete Rows** dialog to delete selected rows in a database table.

When you pass values to a standard database action such as this one, do not use the ToSql() function to convert the values. IPA Designer does any required conversion automatically. If you use ToSql() with standard database actions, it causes an error.

Note: To access CIC Data Sources in your process designs, you must have the user rights to access them. If you get an error message when you try to access a data source from a process design, contact your system administrator to obtain the required user rights. Users of the process must also have rights to access the data sources.

To create an SQL DELETE statement:

1. In the **Select from this Table** list box, select the desired database table.
2. On the **Conditions** tab, select a column in the **Columns** list box (see figure):
3. Click the **Plus** icon to add a condition (see figure).



	New Variable: Lets you create a new variable to use for the criterion value.
	Value List Box: Displays the Value list box, in which you can choose to use a literal value, a variable, or a calculation.

4. In the **Op** list box, select a **Boolean operator** to use.
5. In the **Value** column, enter a value to use as a selection criterion. Either:
 - Click the Value List Box icon to enter a literal text value, a variable, or a calculation.
 - Click the New Variable icon to create a new variable for the value.

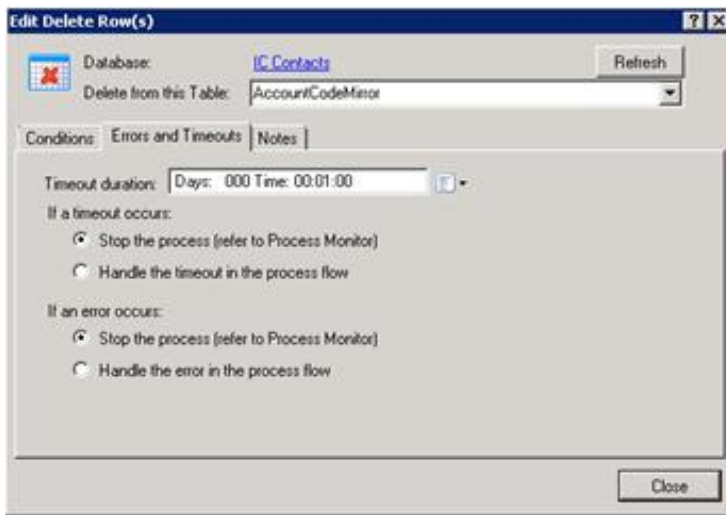
Tip: When the New Variable icon is available, you can also type in the box to find a variable or use the drop-down list to browse for a variable.

6. Repeat steps 3-5 to add more selection criteria if needed.

7. If you have multiple criteria, select the **AND** or **OR** radio button.

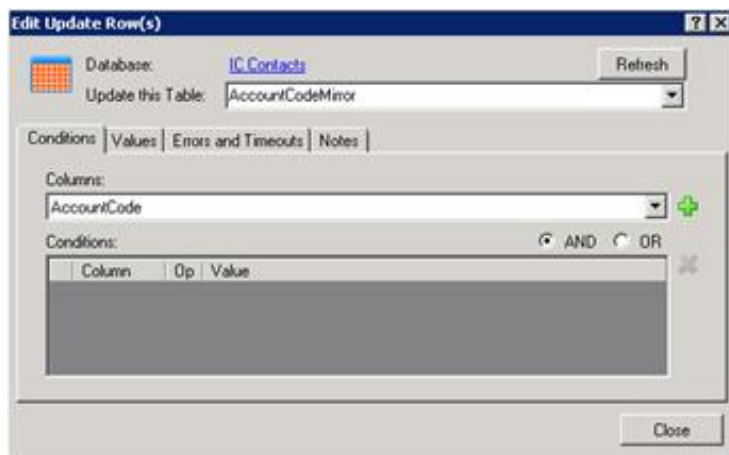
If you select **AND**, the SELECT statement will search for table rows that match *all* of your criteria. If you select **OR**, the SELECT statement will search for table rows that match *any* of your criteria. For more information, see [Understanding Boolean Expressions](#).

8. Configure Errors and Timeouts (see figure):



- a. Click the **Errors and Timeouts** tab.
 - b. In the **Timeout Duration** text box, enter the amount of time that the process should try to do the database action before giving up.
 - c. Select the radio buttons for the desired timeout and error handling methods.
9. If desired, click the **Notes** tab and add notes about the database action.
 10. Click **Close**.

Database Action – Update Row(s)



Use the **Edit Update Rows** dialog to change values in selected rows of a database table.

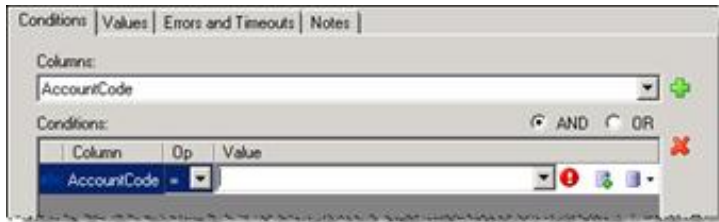
When you pass values to a standard database action such as this one, do not use the `ToSql()` function to convert the values. IPA Designer does any required conversion automatically. If you use `ToSql()` with standard database actions, it causes an error.

Note: To access CIC Data Sources in your process designs, you must have the user rights to access them. If you get an error message when you try to access a data source from a process design, contact your system administrator to obtain the required user rights. Users of the process must also have rights to access the data sources.

To create an SQL UPDATE statement:

1. In the **Update this Table** list box, select the desired database table.

2. On the **Conditions** tab, select a column in the **Columns** list box.
3. Click the **Plus** icon to add a condition (see figure).

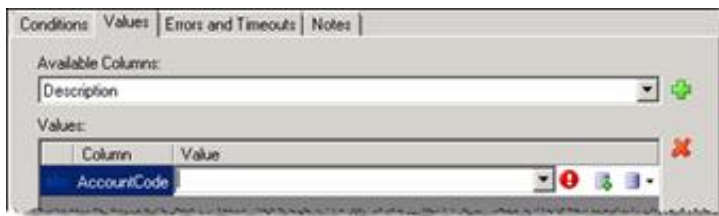


	New Variable: Lets you create a new variable to use for the criterion value.
	Value List Box: Displays the Value list box, in which you can choose to use a literal value, a variable, or a calculation.

4. In the **Op** list box, select a **Boolean operator** to use.
5. In the **Value** column, enter a value to use as a selection criterion. Either:
 - Click the Value List Box icon to enter a literal text value, a variable, or a calculation.
 - Click the New Variable icon to create a new variable for the value.

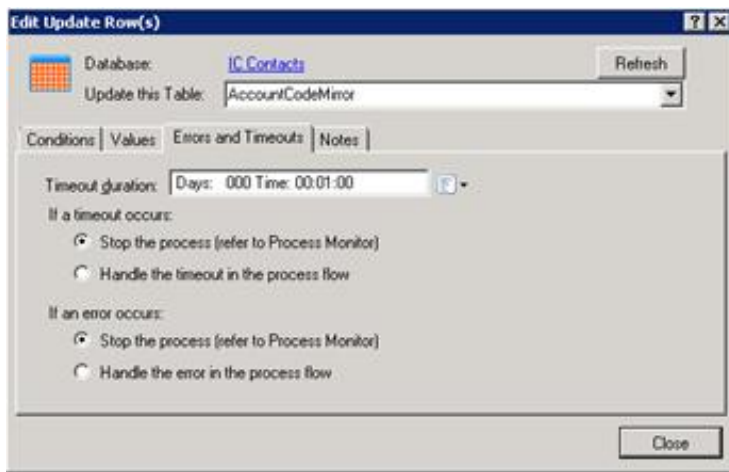
Tip: When the New Variable icon is available, you can also type in the box to find a variable or use the drop-down list to browse for a variable.

6. Repeat steps 3-5 to add more selection criteria if needed. If you have multiple criteria, select the **AND** or **OR** radio button.
7. On the Values tab (see figure):



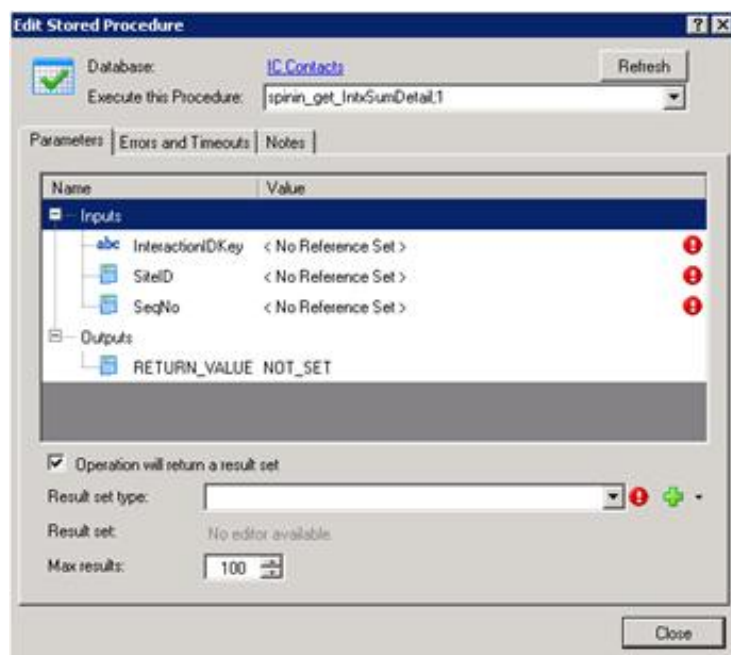
	New Variable: Lets you create a new variable to use for the criterion value.
	Value List Box: Displays the Value list box, in which you can choose to use a literal value, a variable, or a calculation.

- In the **Available Columns** list box, select the column to update.
 - In the **Value** text box, enter a value (or NOT_SET) to insert into the column.
8. Repeat step 7 to update additional columns as desired.
 9. Configure Errors and Timeouts (see figure):



- a. Click the **Errors and Timeouts** tab.
 - b. In the **Timeout Duration** text box, enter the amount of time that the process should try to do the database action before giving up.
 - c. Select the radio buttons for the desired timeout and error handling methods.
10. If desired, click the **Notes** tab and add notes about the database action. Then click **Close**.

Database Action – Stored Procedure



Use the **Edit Stored Procedure** dialog to run one or more SQL statements that were previously created and stored as a procedure.

When you pass values to a standard database action such as this one, do not use the ToSql() function to convert the values. IPA Designer does any required conversion automatically. If you use ToSql() with standard database actions, it causes an error.

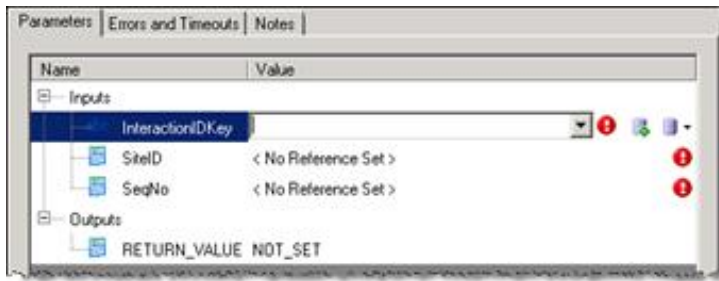
Note: If your stored procedure returns a result set, you must define a custom type to hold the result set *before* you configure the Stored Procedure database action. **Column names and types in the database must match the names and types of the custom type members. If they do not match, the action will fail.**



To access CIC Data Sources in your process designs, you must have the user rights to access them. If you get an error message when you try to access a data source from a process design, contact your system administrator to obtain the required user rights. Users of the process must also have rights to access the data sources.

To configure a call to a stored procedure:

1. In the **Execute this Procedure** list box, select the procedure to call.

2. The Parameters tab will display parameters for the procedure you select.
3. On the **Parameters** tab, enter input values and a return value (see figure).

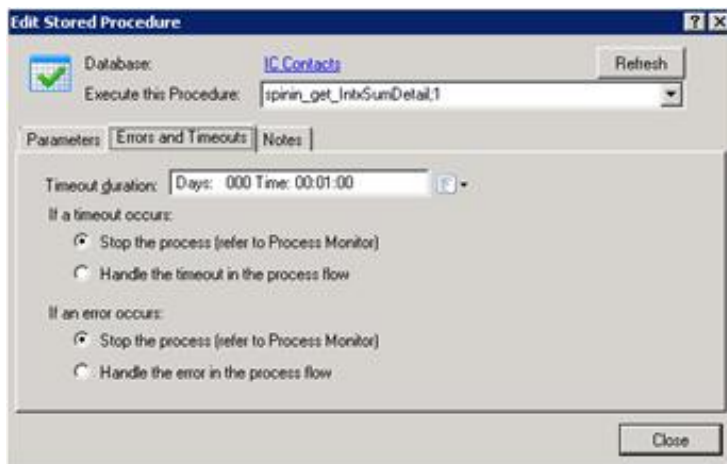


	New Variable: Lets you create a new variable to use for the criterion value.
	Value List Box: Displays the Value list box, in which you can choose to use a literal value, a variable, or a calculation.

4. If the procedure should return a result set, then at the bottom of the Parameters tab (see figure):

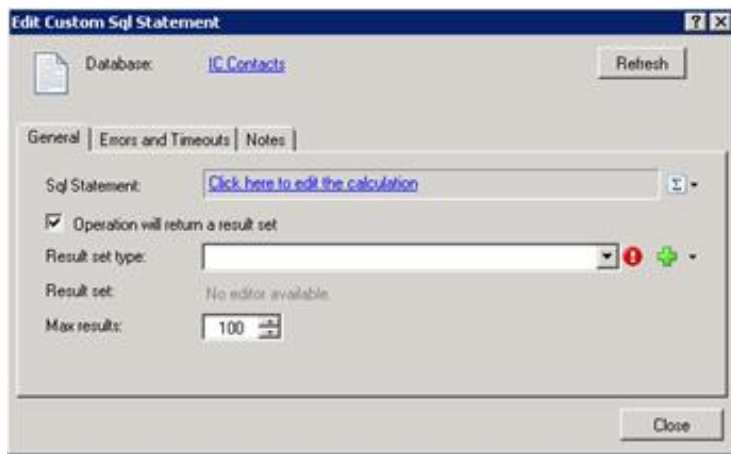


- a. Select the **Operation will return a result set** check box.
 - b. In the **Result set type** list box, select the result set type. This is the custom type that you previously configured (see the note at the beginning of this section).
 - c. In the **Result set** box, select or enter the variable to hold the result set.
 - d. In the **Max results** box, specify how many results the procedure should return.
5. Configure Errors and Timeouts (see figure):



- a. Click the **Errors and Timeouts** tab.
 - b. In the **Timeout Duration** text box, enter the amount of time that the process should try to do the database action before giving up.
 - c. Select the radio buttons for the desired timeout and error handling methods.
6. If desired, click the **Notes** tab and add notes about the database action.
 7. Click **Close**.

Database Action – Custom SQL Statement



Use the **Edit Custom SQL Statement** to write or edit a custom SQL statement.

Note: If your custom SQL statement returns a result set, you must define a custom type to hold the result set *before* you configure the Custom SQL Statement action. Column names and types in the database must match the names and types of the custom type members. If they do not match, the action will fail.

Note: To access CIC Data Sources in your process designs, you must have the user rights to access them. If you get an error message when you try to access a data source from a process design, contact your system administrator to obtain the required user rights. Users of the process must also have rights to access the data sources.

To create a custom SQL statement:

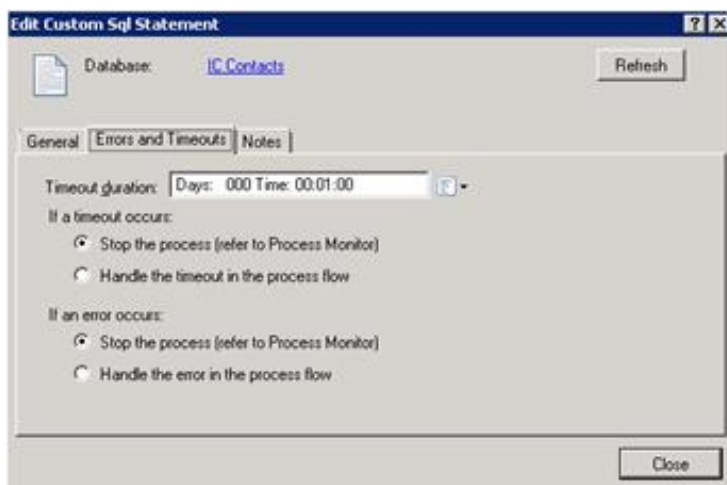
1. On the General tab, click the link **Click here to edit the calculation.**

IPA Designer displays the **Calculation Editor – String** dialog box.

2. Enter the SQL statement in the String calculation editor, then click **OK**.
3. If the SQL statement should return a result set:



- a. Select the Operation will return a result set check box.
 - b. In the **Result set type** list box, select the result set type.
 - c. In the **Result set** box, select or enter the variable to hold the result set.
 - d. In the **Max results** box, specify how many results the procedure should return.
4. Configure Errors and Timeouts (see figure):



- a. Click the **Errors and Timeouts** tab.
- b. In the **Timeout Duration** text box, enter the amount of time that the process should try to do the database action before giving up.
- c. Select the radio buttons for the desired timeout and error handling methods.
5. If desired, click the **Notes** tab and add notes about the database action.
6. Click **Close**.

The Set Variable Function Calculation Dialog Box

Use the **Set Variable Function Calculation** dialog box to set up a function that returns a value to use in a **Calculation Editor** comparison. To display this dialog, click the Function link in the [Comparison Item dialog box](#).

Set Variable Function Calculation


Variable: Process.Uri1

Use this variable in the following function calculation:

Function Name: IsSet [Help on this Function](#)

Implementation: Boolean IsSet(Any Data Type item)

Arguments

[item](#) Process.Uri1  Uri

Function Description: Determines whether or not the supplied value is NOT_SET.

Return Type: Boolean

Return Description: Returns a Boolean true if the value passed in is NOT_SET.

Preview: IsSet(Process.Uri1)

Use Function Clear Cancel

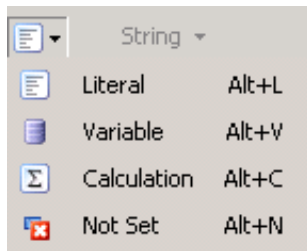
The major parts of the dialog box are (see figure):

- **Function Name list box:** This lets you select the function to use. Available functions depend on the data type of the variable(s) you use in the comparison.
- **Argument list:** The top row contains the first argument in your function.

The controls in the Arguments group change, based on your selection in the Function Name list.



The  button allows you to add a variable.

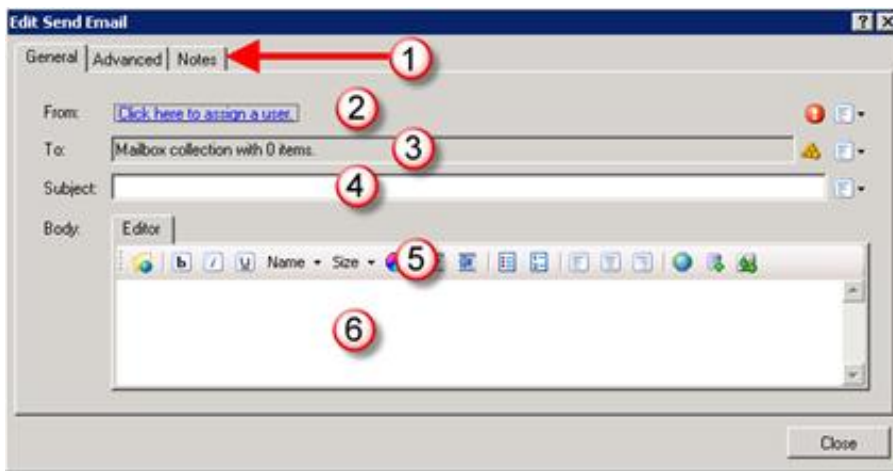


The list allows you to select any of the following items:

- To specify a value, click **Literal**.
- To get the value from another variable, click **Variable**.
- To calculate the value, click **Calculation**.
- To set no value, click **Not Set**.
- Additional argument lines may appear to allow you to complete the definition of your function.
- **Return Type**: The data type of the value returned by the function.
- **Return Description**: An explanation of what is returned by the function.
- **Preview**: What the function expression looks like with the currently-selected function and the arguments in the argument list.
- **Use Function button**: Closes the **Set Variable Function Calculation** dialog box and adds the function expression to the Calculation Editor.
- **Clear button**: Clears all the current selections in the dialog box.

The Send E-mail Dialog Box

The **Send E-mail** dialog box (see figure) enables you to address, write, and format e-mail messages that processes send to users and workgroups.

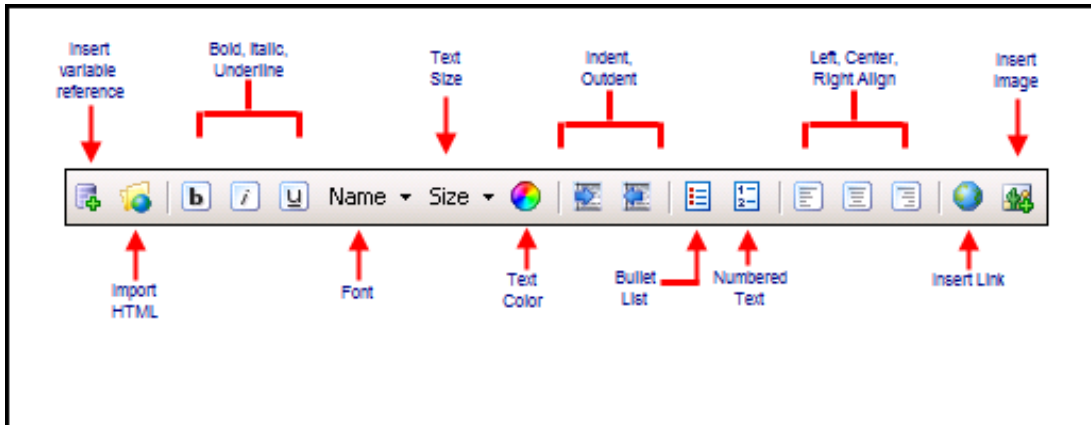


The major parts of the dialog box are (see figure):

- **Tabs (1)**: Each tab lets you perform different tasks. The General tab lets you address, write, and format your e-mail message. The Advanced tab lets you set the priority of the message and choose its format (such as HTML). The Notes tab lets you add information about the e-mail message itself.
- **From (2)**: This lets you assign the sender of the e-mail message. See [Send E-Mail](#) for more information.
- **To (3)**: This lets you choose the recipient(s) of the e-mail message. See [Send E-Mail](#) for more information.
- **Subject (4)**: This text box is where you type the subject of the e-mail message.
- **Toolbar (5)**: This has buttons that let you format the e-mail message. See [The Send E-Mail Toolbar](#) for more information.
- **Editor (6)**: This text box is where you type and format the body of the e-mail message.

The Send E-Mail Toolbar

The Send E-mail toolbar (see figure) enables you to format and perform other tasks in the body of your e-mail message.



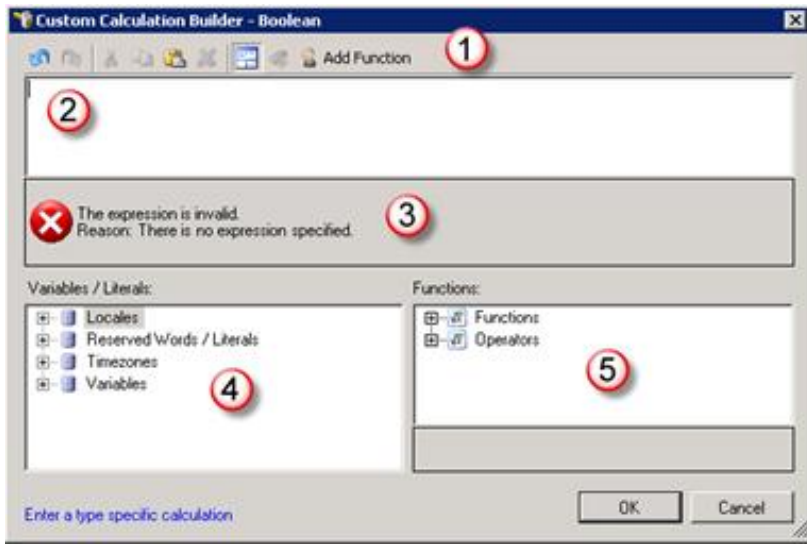
The toolbar buttons are:

- **Insert variable reference:** Lets you insert a variable reference at the current cursor position. For example, if you had a variable *FirstName* that held the first names of call center agents, you could insert that variable into an e-mail message to call center agents to address each one individually.
- **Import HTML:** Lets you browse to an HTML file and insert it as the body of the e-mail message. Warning: The HTML content will *replace* any text that is already in the editor.
- **Bold, italic, underlined:** Let you format selected text as bold, italic, or underlined.
- **Name:** Lets you select the font to use (Arial, etc.). Note: Fonts are limited to those available on all PCs. As a result, less-common fonts are not in the list.
- **Size:** Lets you select the size of selected text. Note: One point (pt) is 1/72 of an inch. Therefore, 12pt text is one-sixth of an inch high, 18pt text is one-fourth inch, 36pt text is one-half inch, and so on.
- **Text color:** Lets you select the color of the selected text.
- **Indent, outdent:** Lets you indent or outdent the selected text.
- **Bullet list:** Formats the selected text as a bullet list.
- **Numbered list:** Formats the selected text as a numbered list.
- **Left align, center, right align:** Aligns the text horizontally.
- **Insert link:** Lets you add a hyperlink to the selected text.
- **Insert image:** Lets you browse to and insert an image file at the current cursor position.

WARNING: If you insert a variable reference, the Process Automation Server does not apply the variable's security specification to the message content. Any recipient of the message will be able to view the variable's value, whether or not that recipient has the appropriate security permissions.

The Custom Calculation Builder Dialog Box

The **Custom Calculation Builder** dialog box (see figure) lets you create more sophisticated calculations than you can create in the [Calculation Editor](#) dialog box. However, because you are essentially typing in calculations directly, you need more technical knowledge than you need to use the **Calculation Editor**.



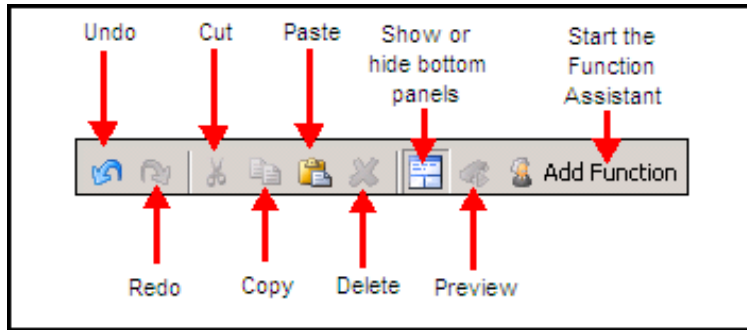
The major parts of the dialog box are (see figure):

- **Toolbar (1):** Buttons that let you do common tasks.
- **Calculation text box (2):** Where you enter the text of your custom calculation.
- **Message area (3):** Displays error messages about the current calculation text.
- **Variables / Literals area (4):** Tree diagrams that let you select available process elements for your expression by double-clicking them in lists.
- **Functions / Operators area (5):** Tree diagrams that let you select available process functions and operators for your expression by double-clicking them in lists.

Tip: You can use your mouse to drag items from the Variables / Literals and Functions / Operators areas into the Calculation text box.

The Custom Calculation Builder Toolbar

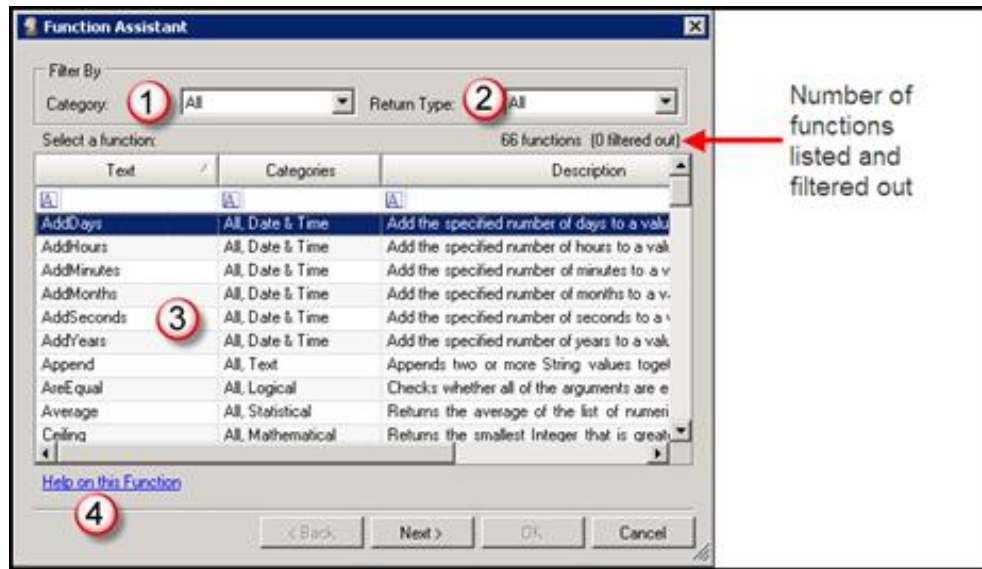
The Custom Calculation Builder toolbar (see figure) lets you do commonly-needed tasks.



- **Undo:** Reverses the last change you made.
- **Redo:** Cancels the last undo operation you did.
- **Cut:** Deletes selected text and copies it to the Clipboard.
- **Copy:** Copies selected text to the Clipboard.
- **Paste:** Copies the Clipboard contents to the current cursor location.
- **Show or hide bottom panes:** If the Variables / Literals and Functions panes are visible, this button hides them and expands the Calculation text box so that you have more space to enter your calculation. If the panes are hidden, this button displays them.
- **Preview:** Shows the calculation as it will be interpreted by IPA Designer and sent to the CIC server. This can be important, especially in calculations that combine different data types.
- **Add Function:** This starts the [Function Assistant](#) wizard.

The Function Assistant Wizard

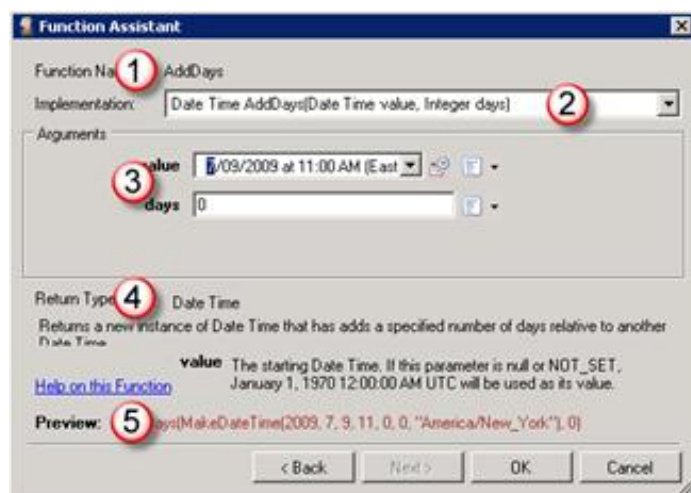
IPA Designer displays the Function Assistant wizard (see figure) when you click the **Add Function** button in the toolbar of the [Custom Calculation Builder](#) dialog box.



The Function Assistant wizard is a rich and flexible tool that walks you through the process of adding a function to your custom calculation. When you select a function in the list (3) and click the **Next** button, the wizard displays a dialog box that lets you enter values and parameters for the specific function you selected. Notable features of the initial dialog box (see figure, above) are:

- **Category list box (1):** Lets you select the category of function you want to see in the list (3).
- **Return type list box (2):** Lets you select the return type of functions that you want to see in the list (3), such as Integer or String.
- **Function list (3):** Displays either all available functions or a subset of those functions based on your selections in the Category and Return Type lists.
- **Help on this function (4):** Displays reference information about the function currently selected in the list.

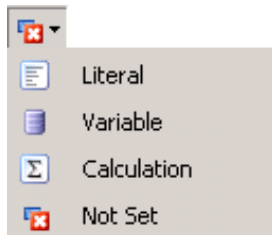
The second dialog of the Function Assistant wizard (see figure) is different for every function. However, it does have some features that are displayed for all functions:



- **Function Name (1):** The name of the function.
- **Implementation (2):** The function header, including return type, name, and parameter list.
- **Arguments (3):** Values that you want to pass to the function. Note that each parameter in the parameter list has a matching field in this section.
- **Return Type (4):** The data type of the value returned by the function. This section also gives a brief explanation of the function's return value and has a link to function help.
- **Preview (5):** Shows the function as it will appear in your process with the values you added.

The Value List Box

The Value list box (see figure) is a small feature, but it appears so many places in IPA Designer that it merits its own explanation.



The Value list box lets you enter a value in three different ways. You can also choose not to set the value:

- **Literal:** This displays a text box in which you can type the value.
- **Variable:** This lets you select a process variable from which to get the value. When the process runs, it will use the current value of the variable you select.
- **Calculation:** This lets you [create a calculation](#) whose result will be used as the value. To create the calculation, you will use the [Calculation Editor](#) dialog box.
- **Not Set:** This leaves the variable with a null (not set) value.

Tip: When the Value list box is open, you can quickly select one of its list choices by pressing **L** (Literal), **V** (Variable), or **C** (Calculation).

Glossary for IPA

Action

IPA's smallest unit of work. A process consists of structured groups of actions. All process objects, tasks, and forms are composed of actions.

Active

One of the two possible process states (active and inactive). A process becomes active when it is published. An administrator can deactivate the process to stop people from using it. To reactivate a process, the administrator republishes it.

Check In

Makes a process available for others to modify. Until it is once again checked out, the process is viewable but cannot be edited.

Check Out

Retrieves the checked-in version of a process from the server and locks the copy on the server so that no one else can work with it. The checkout is associated with the person's user name.

CIC Client

In this document, "CIC Client" refers to Interaction Desktop. That is the client version supported for use with Interaction Process Automation.

Dynamic details

Unique identifiers for each process or work item so that it can be saved, located in the client, and retrieved. A dynamic detail is typically a variable or concatenation of variables that would be associated with a particular process.

Error, logical

In a custom calculation, an error that makes the calculation return an incorrect result even though it works correctly from a technical standpoint.

Error, run-time

In a custom calculation, an error that makes a process malfunction because it requires some condition that is not true when the process runs, such as the presence of a file in a particular place.

Error, syntax

In a custom calculation, an error that prevents the calculation from working at all.

Function

A pre-defined component that takes one or more values as input, does operations with them, and then hands back a new value as its output. The input values of a function are called its *arguments* or its *parameters*. The output value of a function is called its *return value*.

Initial State

The state in which a process starts. Each process *can* have multiple states, but *must* have at least the initial state. IPA Designer creates an initial state by default when you create a process.

Initiator

The type of event that can launch a particular process. For example, a process might be Client initiated or Handler/Icelib initiated.

Menu, context

The menu that appears when you click the down arrow button at the right end of a control on a work item. The shortcut menu lets you set values of the control's properties.

Menu, shortcut

The standard Windows right-click menu that appears when you right-click a control or other program item.

NOT SET

A "null" value for a variable whose value has not yet been set by the process or by user action.

Process

A pre-defined, ordered series of actions taken by CIC and its users to achieve a specific end result.

Publish

To make a process active on the CIC server and available to its designated users.

State

A group of one or more tasks that go together in one stage of a process. A state is like a station on an automobile assembly line where specific tasks are done (such as adding doors) before the car moves down the line to the next station.

Task

A sequence of actions by the CIC server and its users to achieve a specified result.

Variable, local

A variable that is available only within a specific task, state, or work item.

Variable, process

A variable that is available anywhere within a process.

Variables

Named holders of values in the process, such as **BuildingName** or **MeetingDate**.

Work Item

An area on the screen where the user enters data for the process. Work items, also known as *forms*, use controls to collect data from the users and pass data to variables.

Change Log

Date	Changes
04-November-2014	2015 R1 Updated documentation to reflect changes required in the transition from version 4.0 SU# to CIC 2015 R1, such as updates to product version numbers, system requirements, installation procedures, references to Interactive Intelligence Product Information site URLs, and copyright and trademark information.
05-May-2015	2015 R3 Updated documentation with information about IPA Web Client, removed references to Sharepoint integration (which is no longer available), and made other minor tweaks or updates. Also updated to the latest copyright information.
03-November-2015	2016 R1 Updated documentation to reflect the addition of two CIC client applications, Interaction Desktop and Interaction Connect and the removal of Interaction Client .NET edition.
08-August-2017	2017 R4 Updated documentation to remove reference to Interaction Client Web edition.
20-February-2018	2018 R2 Rebranded terminology. Updated copyright page.
28-February-2019	2019 R2 Updated Naming Rules topic to include examples of all uppercase names. Created this change log.