stonebranch

Universal Controller 6.5.x

Workflows

Creating and Maintaining Workflows

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Overview

A Workflow is a task comprised of one or more tasks of one or more task types, including other Workflows.

To create a Workflow, you enter task Details just as you would for any task, and then design the Workflow on the Workflow Editor, where you add, connect, and organize the tasks that will comprise the Workflow.

During and after a Workflow run, you can view detailed results of the run in the Workflow Task Instance Details, and monitor the status of the Workflow on the Workflow Monitor.

Although a typical Workflow is a single group of tasks, a Workflow can contain multiple groups of tasks and/or individual tasks. Each task in a group of tasks is connected to one or more other tasks in that group. Each connection is made from one task (the predecessor) to another task (the successor). There is no limit to the number of connections that can be made to or from a task.

The following sample Workflow contains a single group of tasks.
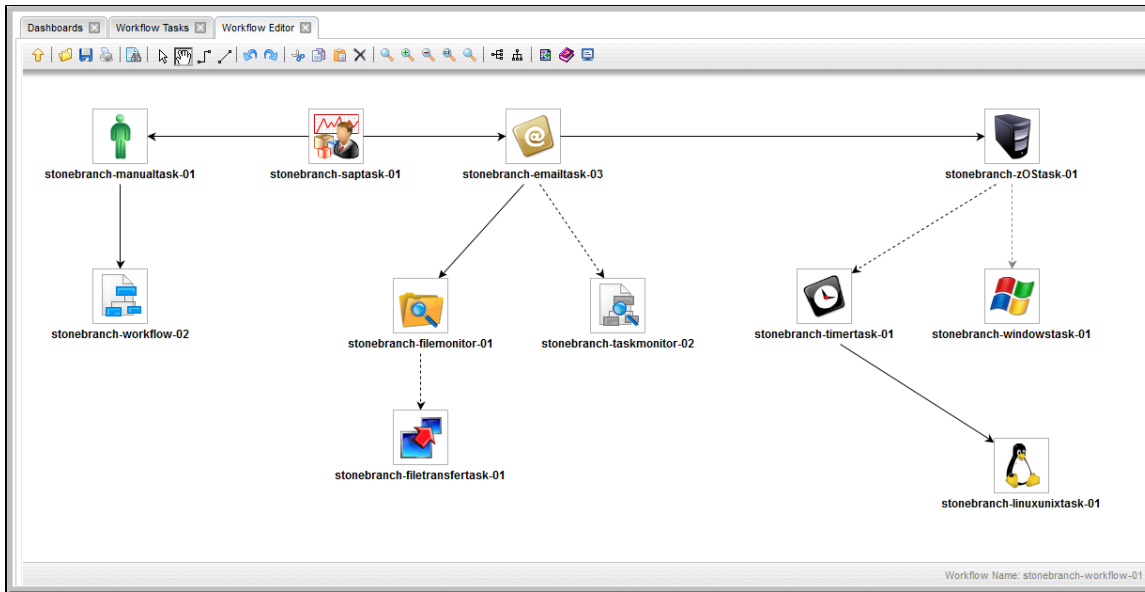
When you launch a Workflow, the first predecessor task in all task groups, and all individual tasks, begin to run. In this example, task **stonebranch-saptask-01** would begin to run.
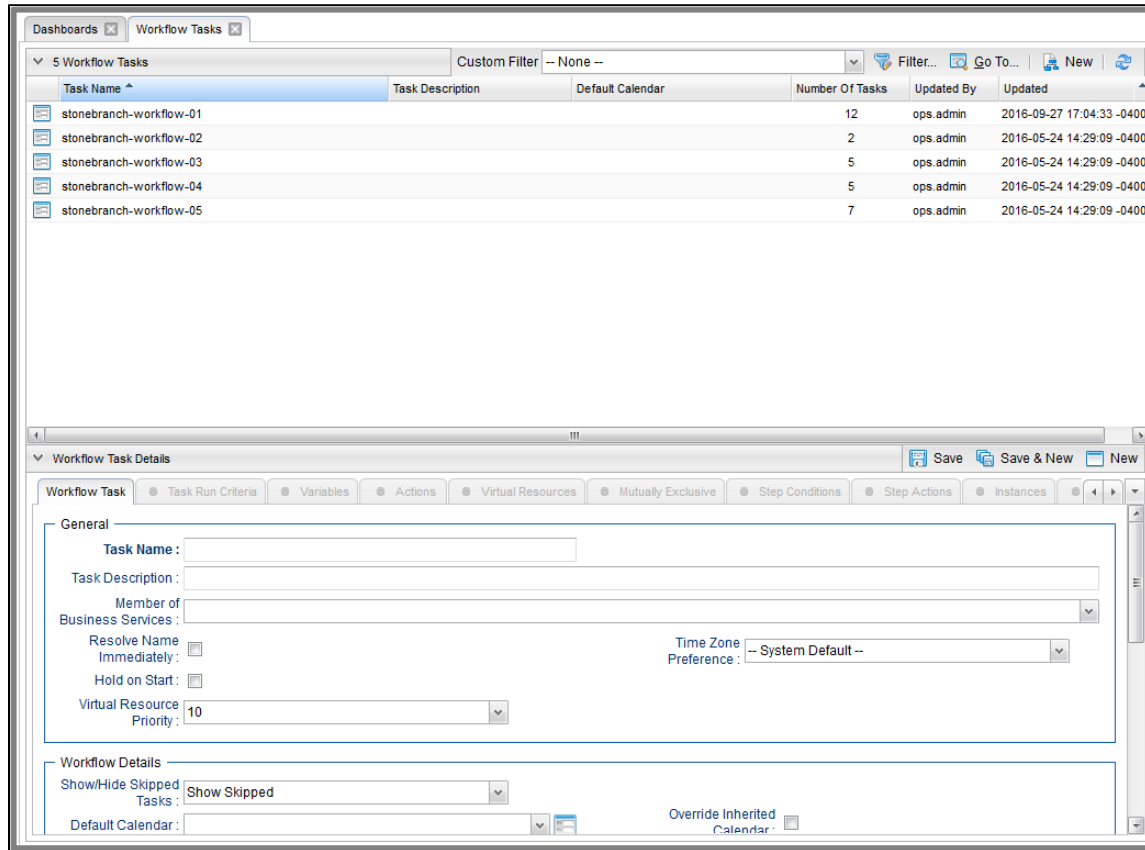
Built-In Variables

The following built-in variables can be used in a Workflow task to pass data where appropriate:

- Task Instance variables

Creating a Workflow Task

Step 1	From the Automation Center navigation pane, select **Tasks > Workflow Tasks**. The Workflow Tasks list displays a list of all currently defined Workflow tasks. Below the list, Workflow Task Details for a new Workflow task displays.
Step 2	Enter/select Details for a new Workflow task, using the field descriptions below as a guide. • Required fields display in **boldface**. • Default values for fields, if available, display automatically. To display more of the Details fields on the screen, you can either: • Use the scroll bar. • Temporarily hide the list above the Details. • Click the **New** button above the list to display a pop-up version of the Details.
Step 3	Click a **Save** button. The Workflow task is added to the database, and all buttons and tabs in Workflow Task Details are enabled.
Step 4	Click the **Edit Workflow** button to display a blank Workflow Editor canvas.

Step 5	Follow the instructions provided below for designing the Workflow in the Workflow Editor.

> ⚠ **Note**
> To open an existing record on the list, either:
>
> - Click a record in the list to display its record Details below the list. (To clear record Details below the list, click the **New** button that displays above and below the Details.)
> - Clicking the Details icon next to a record name in the list, or right-click a record in the list and then click **Open** in the Action menu that displays, to display a pop-up version of the record Details.
> - Right-click a record in the a list, or open a record and right-click in the record Details, and then click **Open In Tab** in the Action menu that displays, to display the record Details under a new tab on the record list page (see Record Details as Tabs).

Workflow Task Details

The following Workflow Task Details is for an existing Workflow task.

Depending on the values that you enter / select for these fields, and whether or not the Workflow task has ever been launched, more (or less) fields may display. See the field descriptions, below, for a description of all fields that may display in the Workflow Task Details.

For information on how to access additional details - such as Metadata and complete database Details - for Workflows (or any type of record), see Records.

Workflow Task Details Field Descriptions

The following table describes the fields, buttons, and tabs that display in Workflow Task Details.

Field Name	Description
General	This section contains general information about the Workflow task.
Task Name	User-defined name of this task (Maximum = 255 alphanumeric characters); variables supported. It is the responsibility of the user to develop a workable naming scheme for tasks.
Version	System-supplied; version number of the current record, which is incremented by the Controller every time a user updates a record. Click the Versions tab to view previous versions. For details, see Record Versioning.
Task Description	Description of this record. (Maximum = 200 characters.)
Member of Business Services	User-defined; allows you to select one or more Business Services that this record belongs to.
Resolve Name Immediately	If enabled, the Instance Name of the task instance will be resolved immediately at trigger/launch time.

Time Zone Preference	User-defined; allows you to specify the time zone that will be applied to the task.
	
	Options:
	
	• – System Default –
	  Time zone is based on the value of the Task Timezone Preference Universal Controller system property: Server or Inherited.
	• Server (xxx)
	  Where (xxx) is the time zone ID of the server; time zone is evaluated in the time zone of the server.
	• Inherited
	  Time zone is evaluated in the time zone of the Trigger or Launch specification.

Hold on Start	If enabled, when the task is launched it appears in the Activity Monitor with a status of **Held**. The task runs when the user releases it.
Hold Reason	Information about why the task will be put on hold when it starts.
Virtual Resource Priority	Priority for acquiring a resource when two or more tasks are waiting for the resource. This priority applies to all resources required by the task. Options: 1 (high) - 20 (low). Default is 10.

Workflow Details	This section contains assorted detailed information about the Workflow task.
Show/Hide Skipped Tasks	Specification to either show or hide tasks that have been skipped in a Workflow (see Skipping a Task). Options: • **Show Skipped** • **Hide Skipped**
Auto Layout	If Show/Hide Skipped Tasks = **Hide Skipped**; specification for the layout of the Workflow Monitor. Options: • **- - None - -** • **Horizontal Layout** • **Vertical Layout**
Default Calendar	Default calendar used by the Workflow. If the Workflow is launched by a trigger, the trigger calendar overrides this default calendar.
Override Inherited Calendar	If enabled, uses the selected Default Calendar for this Workflow instead of the calendar used in the trigger or parent Workflow.
Wait / Delay Options	This section contains specifications for waiting to start and/or delaying on start the task.
Wait To Start	Amount of time to wait before starting a task from the time that it was launched. Options are: • – None – • Time • Relative Time • Duration • Seconds
Wait Time	If Wait To Start = Time; Number of hours and minutes to wait before starting the task.
Wait Duration	If Wait To Start = Duration; Number of days, hours, minutes, and seconds to wait before starting the task.
Wait Duration In Seconds	If Wait To Start = Seconds; Number of seconds to wait before starting the task.

Delay On Start	Amount of time to delay the start of a task, after it has been launched, from the time that it is eligible to start; that is, all dependencies have been met. For example: it is not being held, it is not waiting on any predecessors, or there is no wait time specified. Options are: • – None – • Duration • Seconds
Delay Duration	If Delay On Start = Duration; Number of days, hours, minutes, and seconds to delay after starting the task.
Delay Duration In Seconds	If Delay On Start = Seconds; Number of seconds to delay after starting the task.
Workflow Only	Specification for whether or not to apply the Wait To Start and Delay On Start specifications only if the task is in a Workflow. Options are: • - - System Default - - Apply the Wait To Start and Delay On Start specifications as defined by the System Default Wait/Delay Workflow Only system property. (Default is **yes**.) • Yes Apply the Wait To Start and Delay On Start specifications only if the task is in a Workflow. • No Apply the Wait To Start and Delay On Start specifications whether or not the task is in a Workflow.
Time Options	This section contains time-related specifications for the task.
Late Start	If enabled, and if the task instance starts after the time or period specified, the task instance is flagged as late. You can specify a time or duration to determine a late start (see Late Start Type). To determine whether a task instance started late, open the task instance and locate the Started Late field; the field is checked if the instance started after the specified time. The Started Late field displays in the task instance Details only if the user specified a Late Start in the task Details.
Late Start Type	Required if Late Start is enabled. Options: • Time - Flag the task if it starts after the specified time. • Duration - Flag the task if it starts a certain amount of time after the programmed start time. The task must have a specific start time.
Late Start Time	If Late Start Type = Time; Time after which the task start time is considered late. Use HH:MM, 24-hour time.

Late Start Day Constraint	If Late Start Type = Time; Specification for whether or not to advance the late start time to another day.
	
	Valid values:
	
	• -- None --
	   Advance to the next day if the specified late start time is before the Created time of the task instance.
	• Same Day
	   Do not advance day.
	• Next Day
	   Advance to the next day.
	• Next Business Day
	   Advance to the next business day.
	• Sunday
	   If today is not Sunday, advance to next Sunday.
	• Monday
	   If today is not Monday, advance to next Monday.
	• Tuesday
	   If today is not Tuesday, advance to next Tuesday.
	• Wednesday
	   If today is not Wednesday, advance to next Wednesday.
	• Thursday
	   If today is not Thursday, advance to next Thursday.
	• Friday
	   If today is not Friday, advance to next Friday.
	• Saturday
	   If today is not Saturday, advance to next Saturday.
	• Nth Day
	   Advance to a specific number of days in the future.
	
	Default is – None --.

Late Start Nth Amount	If Late Start Day Constraint = Nth Day; Number of days to advance.
Late Start Duration	If Late Start Type = Duration; Duration (amount of relative time) after which the task is considered to have started late. For a task within a workflow, the duration is the period between the time the workflow starts and the time the task itself starts. For example, a task might have a Late Start Duration of 60 minutes. If the workflow starts at 9:00 a.m. but the task itself does not start until 10:30, the task has started late. For a task that is not within a workflow, Late Start Duration has meaning only if the task has been held upon starting. For example, if a task has a Late Start Duration of 60 minutes and the Hold on Start field is enabled, if the task is not released from hold within the amount of time specified in the Late Start Duration field, the task has started late.
Late Finish	If enabled, and if the task instance finishes after the time or period specified, the task instance is flagged as late. You can specify a time or duration to determine a late finish (see Late Finish Type). To determine whether a task instance finished late, open the task instance and locate the Finished Late field; the field is checked if the instance finished after the specified time or lasted longer than expected. This field only appears on the task instance if the user specified a Late Finish in the task definition.

Late Finish Type	Required if Late Finish is enabled. Options: • Time - Flag the task if it finishes after the specified time (see Late Finish Time). • Duration - Flag the task if it finishes a certain amount of time after the programmed finish time (see Late Finish Duration). The task must have a specific finish time.
Late Finish Time	If Late Finish Type = Time; Time after which the task finish time is considered late. Use HH:MM, 24-hour time.

Late Finish Day Constraint	If Late Finish Type = Time; Specification for whether or not to advance the late finish time to another day.
	
	Valid values:
	
	• -- None --
	  Advance to the next day if the specified late finish time is before the Created time of the task instance.
	• Same Day
	  Do not advance day.
	• Next Day
	  Advance to the next day.
	• Next Business Day
	  Advance to the next business day.
	• Sunday
	  If today is not Sunday, advance to next Sunday.
	• Monday
	  If today is not Monday, advance to next Monday.
	• Tuesday
	  If today is not Tuesday, advance to next Tuesday.
	• Wednesday
	  If today is not Wednesday, advance to next Wednesday.
	• Thursday
	  If today is not Thursday, advance to next Thursday.
	• Friday
	  If today is not Friday, advance to next Friday.
	• Saturday
	  If today is not Saturday, advance to next Saturday.
	• Nth Day
	  Advance to a specific number of days in the future.
	
	Default is – None --.

Late Finish Nth Amount	If Late Finish Day Constraint = Nth Day; Number of days to advance.
Late Finish Duration	If Late Finish Type = Duration; Longest amount of time this task instance should take to run.

Early Finish	If enabled, and if the task instance finishes before the time or period specified, the task instance is flagged as early. You can specify a time or duration to determine an early finish (see Early Finish Type). To determine whether a task instance finished early, open the task instance and locate the Finished Early field; the field is checked if the instance finished before the specified time or did not last as long as expected. This field only appears on the task instance if the user added Early Finish specifications to the task definition.
Early Finish Type	Required if Early Finish is enabled. Options: • Time - Flag the task if it finishes before the specified time (see Early Finish Time). • Duration - Flag the task if it finishes a certain amount of time before the programmed finish time (see Early Finish Duration). The task must have a specific finish time.
Early Finish Time	If Early Finish Type = Time; Time before which the task finish time is considered early. That is, enter a time at which the task should still be running. Use HH:MM, 24-hour time.
Early Finish Day Constraint	If Early Finish Type = Time; Specification for whether or not to advance the early finish time to another day. Valid values: • -- None -- Advance to the next day if the specified early finish time is before the Created time of the task instance. • Same Day Do not advance day. • Next Day Advance to the next day. • Next Business Day Advance to the next business day. • Sunday If today is not Sunday, advance to next Sunday. • Monday If today is not Monday, advance to next Monday. • Tuesday If today is not Tuesday, advance to next Tuesday. • Wednesday If today is not Wednesday, advance to next Wednesday. • Thursday If today is not Thursday, advance to next Thursday. • Friday If today is not Friday, advance to next Friday. • Saturday If today is not Saturday, advance to next Saturday. • Nth Day Advance to a specific number of days in the future. Default is – None --.
Early Finish Nth Amount	If Early Finish Day Constraint = Nth Day; Number of days to advance.

Early Finish Duration	If Early Finish Type = Duration; Shortest amount of time this task instance should take to run.
User Estimated Duration	Estimated amount of time it should normally take to run this task. The Controller uses this information to calculate the User Estimated End Time on a task instance record.
Critical Path Options	This section contains Critical Path-related specifications for the task.
Calculate Critical Path	If enabled (checked), the Controller calculates the Critical Path of this Workflow and, by default, displays it in the Workflow Monitor. You can toggle between the normal view and the Critical Path view by using the Toggle Critical Path View icon on the Workflow Monitor toolbar.
	If disabled (unchecked), the Controller does not calculate the Critical Path of this Workflow and display it in the Workflow Monitor, and the Toggle Critical Path View icon on the Workflow Monitor toolbar is disabled.
	⚠️ **Note** This field displays only if the Critical Path Calculations Permitted Universal Controller system property is set to **true**.
	⛔ **Important** • When restoring a Workflow Details Version, the Calculate Critical Path setting (enabled or disabled) will be preserved. • When promoting a Workflow record or importing (list or bulk) Workflow Details: • Critical Path Calculations Permitted setting will not change. • **Calculate Critical Path**, if enabled, will be disabled. • If the database is "dropped" for any reason: • Critical Path Calculations Permitted will be set to **false**. • **Calculate Critical Path**, if enabled, will be disabled.
CP Duration	Optional; Allows you to override the estimated Critical Path Duration of the task when running in a Workflow; used in conjunction with the CP Duration Unit field. In most cases, this field should be left blank, which implies that the Controller will estimate the Critical Path Duration based on historical executions. Valid values are any integer equal to or greater than 0. Variables and Functions are supported.
CP Duration (Resolved)	Displays the current resolved value of the CP Duration field, which may contain variables or functions that will be displayed as unresolved until the task instance starts. The CP Duration (Resolved) field can continue to change value until the task instance starts, at which time CP Duration will display as resolved and CP Duration (Resolved) will no longer be visible unless there was an issue resolving the variables and/or functions contained within CP Duration. If the Controller is unable to resolve CP Duration or it resolves to an invalid value, CP Duration will be ignored and the Controller will estimate the Critical Path Duration based on historical executions.

CP Duration Unit	Type of CP Duration; used in conjunction with the CP Duration field. For example, for a CP Duration of two minutes, specify 2 in the CP Duration field and select **Minutes** in this field. Options: • Seconds • Minutes • Hours Default is Minutes.
Workflow Execution Options	This section contains Execution Restriction specifications for the task if it is within a Workflow.
Execution Restriction	Specification for whether or not there is a restriction for this task to be run, skipped, or held. Options are: • -- None -- No restriction for this task. • Run Restriction for when this task will be run. • Skip Restriction for when this task will be skipped. • Hold Restriction for when this task will be held. If Execution Restriction on a task is Run or Skip, then when it is part of a Workflow that is being launched, the Restriction Period is evaluated. The task instance will be skipped if Execution Restriction is Skip and the date is within the Restriction Period or Execution Restriction is Run and the date is not within the Restriction Period. Execution Restriction can be set to Skip with a Restriction Period of - None -, meaning the restriction is always active and the task will be skipped when it is part of a Workflow.
Restriction Period	If Execution Restriction = Run, Skip, or Hold; Period of time when the task is restricted. Options are: • – None – No period of restriction for this task. • Before Restriction is valid if the date is before the Before Date value. • After Restriction is valid if the date is after the After Date value. • Span Restriction is valid if the date is before the Before Date value and after After Date value. • On Restriction is valid if the date is one of the Date List values.
Before Date	If Restriction Period = Before or Span; Date before which the restriction is valid.

Before Time	If Restriction Period = Before or Span; Time on the selected date before which the restriction is valid.
After Date	If Restriction Period = After or Span; Date after which the restriction is valid.
After Time	If Restriction Period = After or Span; Time on the selected date after which the restriction is valid.
Date List	If Restriction Period = On; Date(s) on which the restriction is valid.
Statistics	This section contains time-related statistics for task instances of the task.
First Time Ran	System-supplied; date and time this task first ran.
Last Time Ran	System-supplied; date and time the task last ran.
Last Instance Duration	System-supplied; amount of time the task took to run the last time it ran.
Lowest Instance Time	System-supplied; shortest amount of time this task has taken to run.
Average Instance Time	System-supplied; average amount of time this task takes to run.
Highest Instance Time	System-supplied; longest amount of time this task has taken to run.
Number of Instances	System-supplied; number of instances in the database for this task.
Buttons	This section identifies the buttons displayed above and below the Workflow Task Details that let you perform various actions.
Save	Saves a new record in the Controller database.
Save & New	Saves a new record in the Controller database and redisplays empty Details so that you can create another new record.
Save & View	Saves a new record in the Controller database and continues to display that record.

New	Displays empty (except for default values) Details for creating a new record.
Update	Saves updates to the record.
View Parents	Displays a list of any parent Workflow tasks for this task.
Launch	Manually launches this task.
Edit Workflow	Displays the Workflow Editor for this task.
Copy	Creates a copy of this Workflow task, which you are prompted to rename.
Delete	Deletes the current record.
Refresh	Refreshes any dynamic data displayed in the Details.
Close	In pop-up view only; closes the pop-up view of this task.
Tabs	This section identifies the tabs across the top of the Workflow Task Details that provide access to additional information about the task.
Workflow Task	Displays details about this Workflow task.
Task Run Criteria	Workflows only. Allows you to specify skip and run criteria for specific tasks in the workflow.
Variables	Lists all user-defined variables associated with this record; that is, variables that have been defined for this specific record.

| **Actions** | Allows you to specify actions that the Controller will take automatically based on events that occur during the execution of this task. |

Events are:

- Task instance status
- Exit codes
- Late start
- Late finish
- Early finish

Actions are:

Abort Action	Abort the task if certain events occur. For details, see Abort Actions.
Email Notification	Send an email if certain events occur. For details, see Email Notification Actions.
Set Variable	Used in tasks and workflows to set a variable based on the occurrence of certain events. For details, see Creating a Set Variable Action within a Task or Workflow.
SNMP Notification	Send an email if certain events occur. For details, see SNMP Notification Actions.
System Operation	Run an Universal Controller system operation based on specified conditions. For details, see System Operation Actions.

Virtual Resources	Lists all Virtual Resources to which this task is assigned.
Mutually Exclusive	Lists all tasks that have been set to be mutually exclusive of this task.
Step Conditions	Lists all step conditions defined for this task.
Step Actions	Lists all step actions created for this task.
Instances	Lists all instances of this Workflow.
Triggers	List of all triggers that reference this task in the Task(s) field of the trigger Details; that is, a list of all triggers that have been defined to launch this task. Also allows you to add new triggers. If you add a new trigger from this location, the Controller automatically constructs a default trigger name as follows: <current task name>#TRIGGER#. You can change the default name if desired. For instructions on creating triggers, see Triggers.
Notes	Lists all notes associated with this record.

Versions	Stores copies of all previous versions of the current record. See Record Versioning.

Viewing a Workflow Task Instance

When a Workflow task is launched, the Controller creates a task instance record of that Workflow (and task instance records of all tasks in that Workflow).

A task instance contains detailed information about a single execution of that task.

You can access a Workflow task instance from:

- **Instances tab** on the Workflow Task Details for that task
- Activity Monitor
- Task Instances list

Workflow Task Instance Details

The following Workflow Task Instance Details contains information on the execution of the Workflow shown in the Workflow Task Details.

Workflow Task Instance Details Field Descriptions

The following table describes the fields, buttons, and tabs that display in Workflow Task Instance Details.

Field Name	Description
General	This section contains general information about the task instance.
Instance Name	Name of this task instance.
Reference Id	System-supplied; the Controller increments this number each time the task is run.
Task	Name of the task that was run to create this task instance. Click the icon to display Task Details for the task.
Invoked by	System-supplied; how the task instance was launched. Options: • Trigger: (Trigger Name) Instance was launched by the named trigger. • Workflow: (Workflow Name) Instance was launched by the named workflow. • Manually Launched Instance was launched by a user. To identify the user, check the Execution User column for that task instance on the Task Instances screen or, on most task instance screens, the Execution User field.
Task Description	Description of this record. (Maximum = 200 characters.)
Member of Business Services	User-defined; allows you to select one or more Business Services that this record belongs to.
Execution User	System-supplied; If the task was launched manually; ID of the user who launched it.
Calendar	Calendar associated with the task instance.

Time Zone Preference	User-defined; allows you to specify the time zone that will be applied to the task. Options: • – System Default – Time zone is based on the value of the Task Timezone Preference Universal Controller system property: Server or Inherited. • Server (xxx) Where (xxx) is the time zone ID of the server; time zone is evaluated in the time zone of the server. • Inherited Time zone is evaluated in the time zone of the Trigger or Launch specification.
Virtual Resource Priority	Priority for acquiring a resource when two or more tasks are waiting for the resource. This priority applies to all resources required by the task. Options: 1 (high) - 20 (low). Default is 10.
Progress	Number of tasks in the Workflow that are in Success, Skipped, or Finished status / Total number of tasks in the Workflow.
Status	This section contains information about the current status of the task instance.
Status	System-supplied; see Task Instance Statuses.
Status Description	System-supplied; additional information, if any, about the status of the task instance.
Operational Memo	User-defined operational memo.
Evaluation Time	If time zone of user is different than time zone of task instance; Time at which Execution Restrictions and Run Criteria were evaluated based upon the requested time zone. (Time zone of task instance displays in parentheses.)
Critical	Indicates that this task is in the Critical Path of a workflow.
Wait Until Time	Amount of time calculated to wait before the task was started, based on Wait To Start and Delay On Start times.
Queued Time	System-supplied; Date and time the task was queued for processing.

Trigger Time	System-supplied; Date and time the task instance was triggered.
Launch Time	System-supplied; Date and time the task instance was launched.
Start Time	System-supplied; Date and time the task instance started.
End Time	System-supplied; Date and time the task instance completed.
Duration	System-supplied; amount of time the task instance took to run.
Workflow Details	This section contains assorted detailed information about the task instance.
Show/Hide Skipped Tasks	Specification to either show or hide tasks that have been skipped in a Workflow (see Skipping a Task). Options: • **Show Skipped** • **Hide Skipped**
Wait / Delay Options	This section contains specifications for waiting to start and/or delaying on start the task.
Wait To Start	Amount of time to wait before starting a task from the time that it was launched. Options are: • – None – • Time • Relative Time • Duration • Seconds
Wait Time	If Wait To Start = Time; Number of hours and minutes to wait before starting the task.
Wait Duration	If Wait To Start = Duration; Number of days, hours, minutes, and seconds to wait before starting the task.

Wait Duration In Seconds	If Wait To Start = Seconds; Number of seconds to wait before starting the task.

Delay On Start	Amount of time to delay the start of a task, after it has been launched, from the time that it is eligible to start; that is, all dependencies have been met. For example: it is not being held, it is not waiting on any predecessors, or there is no wait time specified.
	
	Options are:
	
	   • – None –
	   • Duration
	   • Seconds

Delay Duration	If Delay On Start = Duration; Number of days, hours, minutes, and seconds to delay after starting the task.
Delay Duration In Seconds	If Delay On Start = Seconds; Number of seconds to delay after starting the task.
Time Options	This section contains information on time-related specifications for the task instance.
Late Start	If enabled, and if the task instance starts after the time or period specified, the task instance is flagged as late. You can specify a time or duration to determine a late start (see Late Start Type). To determine whether a task instance started late, open the task instance and locate the Started Late field; the field is checked if the instance started after the specified time. The Started Late field displays in the task instance Details only if the user specified a Late Start in the task Details.
Started Late	System-supplied; this field is flagged if the task started later than the time specified in the Late Start fields.

Late Start Type	Required if Late Start is enabled.
	
	Options:
	
	   • Time - Flag the task if it starts after the specified time.
	   • Duration - Flag the task if it starts a certain amount of time after the programmed start time. The task must have a specific start time.

Late Start Time	If Late Start Type = Time; Time after which the task start time is considered late. Use HH:MM, 24-hour time.

Late Start Day Constraint	If Late Start Type = Time; Specification for whether or not to advance the late start time to another day.
	
	Valid values:
	
	• -- None --
	  Advance to the next day if the specified late start time is before the Created time of the task instance.
	• Same Day
	  Do not advance day.
	• Next Day
	  Advance to the next day.
	• Next Business Day
	  Advance to the next business day.
	• Sunday
	  If today is not Sunday, advance to next Sunday.
	• Monday
	  If today is not Monday, advance to next Monday.
	• Tuesday
	  If today is not Tuesday, advance to next Tuesday.
	• Wednesday
	  If today is not Wednesday, advance to next Wednesday.
	• Thursday
	  If today is not Thursday, advance to next Thursday.
	• Friday
	  If today is not Friday, advance to next Friday.
	• Saturday
	  If today is not Saturday, advance to next Saturday.
	• Nth Day
	  Advance to a specific number of days in the future.
	
	Default is – None --.

Late Start Nth Amount	If Late Start Day Constraint = Nth Day; Number of days to advance.
Late Start Duration	If Late Start Type = Duration; Duration (amount of relative time) after which the task is considered to have started late. For a task within a workflow, the duration is the period between the time the workflow starts and the time the task itself starts. For example, a task might have a Late Start Duration of 60 minutes. If the workflow starts at 9:00 a.m. but the task itself does not start until 10:30, the task has started late. For a task that is not within a workflow, Late Start Duration has meaning only if the task has been held upon starting. For example, if a task has a Late Start Duration of 60 minutes and the Hold on Start field is enabled, if the task is not released from hold within the amount of time specified in the Late Start Duration field, the task has started late.
Late Finish	If enabled, and if the task instance finishes after the time or period specified, the task instance is flagged as late. You can specify a time or duration to determine a late finish (see Late Finish Type). To determine whether a task instance finished late, open the task instance and locate the Finished Late field; the field is checked if the instance finished after the specified time or lasted longer than expected. This field only appears on the task instance if the user specified a Late Finish in the task definition.

Finished Late	System-supplied; this field is flagged if the task finished later than the time or duration specified in the Late Finish fields.
Late Finish Type	Required if Late Finish is enabled. Options: • Time - Flag the task if it finishes after the specified time (see Late Finish Time). • Duration - Flag the task if it finishes a certain amount of time after the programmed finish time (see Late Finish Duration). The task must have a specific finish time.
Late Finish Time	If Late Finish Type = Time; Time after which the task finish time is considered late. Use HH:MM, 24-hour time.

Late Finish Day Constraint	If Late Finish Type = Time; Specification for whether or not to advance the late finish time to another day.
	
	Valid values:
	
	• -- None --
	  Advance to the next day if the specified late finish time is before the Created time of the task instance.
	• Same Day
	  Do not advance day.
	• Next Day
	  Advance to the next day.
	• Next Business Day
	  Advance to the next business day.
	• Sunday
	  If today is not Sunday, advance to next Sunday.
	• Monday
	  If today is not Monday, advance to next Monday.
	• Tuesday
	  If today is not Tuesday, advance to next Tuesday.
	• Wednesday
	  If today is not Wednesday, advance to next Wednesday.
	• Thursday
	  If today is not Thursday, advance to next Thursday.
	• Friday
	  If today is not Friday, advance to next Friday.
	• Saturday
	  If today is not Saturday, advance to next Saturday.
	• Nth Day
	  Advance to a specific number of days in the future.
	
	Default is – None --.

Late Finish Nth Amount	If Late Finish Day Constraint = Nth Day; Number of days to advance.

Late Finish Duration	If Late Finish Type = Duration; Longest amount of time this task instance should take to run.
Early Finish	If enabled, and if the task instance finishes before the time or period specified, the task instance is flagged as early. You can specify a time or duration to determine an early finish (see Early Finish Type). To determine whether a task instance finished early, open the task instance and locate the Finished Early field; the field is checked if the instance finished before the specified time or did not last as long as expected. This field only appears on the task instance if the user added Early Finish specifications to the task definition.
Finished Early	System-supplied; this field is flagged if the task finished earlier than the time specified in the Early Finish fields.
Early Finish Type	Required if Early Finish is enabled. Options: • Time - Flag the task if it finishes before the specified time (see Early Finish Time). • Duration - Flag the task if it finishes a certain amount of time before the programmed finish time (see Early Finish Duration). The task must have a specific finish time.
Early Finish Time	If Early Finish Type = Time; Time before which the task finish time is considered early. That is, enter a time at which the task should still be running. Use HH:MM, 24-hour time.

Early Finish Day Constraint	If Early Finish Type = Time; Specification for whether or not to advance the early finish time to another day.
	Valid values:
	• -- None -- Advance to the next day if the specified early finish time is before the Created time of the task instance.
	• Same Day Do not advance day.
	• Next Day Advance to the next day.
	• Next Business Day Advance to the next business day.
	• Sunday If today is not Sunday, advance to next Sunday.
	• Monday If today is not Monday, advance to next Monday.
	• Tuesday If today is not Tuesday, advance to next Tuesday.
	• Wednesday If today is not Wednesday, advance to next Wednesday.
	• Thursday If today is not Thursday, advance to next Thursday.
	• Friday If today is not Friday, advance to next Friday.
	• Saturday If today is not Saturday, advance to next Saturday.
	• Nth Day Advance to a specific number of days in the future.
	Default is – None --.
Early Finish Nth Amount	If Early Finish Day Constraint = Nth Day; Number of days to advance.
Early Finish Duration	If Early Finish Type = Duration; Shortest amount of time this task instance should take to run.
Critical Path Options	This section contains Critical Path-related specifications for the task.

Calculate Critical Path	If enabled (checked), the Controller calculates the Critical Path of this Workflow and, by default, displays it in the Workflow Monitor. You can toggle between the normal view and the Critical Path view by using the Toggle Critical Path View icon on the Workflow Monitor toolbar.
	If disabled (unchecked), the Controller does not calculate the Critical Path of this Workflow and display it in the Workflow Monitor, and the Toggle Critical Path View icon on the Workflow Monitor toolbar is disabled.
	⚠ **Note** This field displays only if the Critical Path Calculations Permitted Universal Controller system property is set to **true**.

	⛔ **Important**
	
	• When restoring a Workflow Details Version, the Calculate Critical Path setting (enabled or disabled) will be preserved.
	• When promoting a Workflow record or importing (list or bulk) Workflow Details:
	  • Critical Path Calculations Permitted setting will not change.
	  • **Calculate Critical Path**, if enabled, will be disabled.
	• If the database is "dropped" for any reason:
	  • Critical Path Calculations Permitted will be set to **false**.
	  • **Calculate Critical Path**, if enabled, will be disabled.

CP Duration	Optional; Allows you to override the estimated Critical Path Duration of the task when running in a Workflow; used in conjunction with the CP Duration Unit field. In most cases, this field should be left blank, which implies that the Controller will estimate the Critical Path Duration based on historical executions. Valid values are any integer equal to or greater than 0. Variables and Functions are supported.
CP Duration (Resolved)	Displays the current resolved value of the CP Duration field, which may contain variables or functions that will be displayed as unresolved until the task instance starts. The CP Duration (Resolved) field can continue to change value until the task instance starts, at which time CP Duration will display as resolved and CP Duration (Resolved) will no longer be visible unless there was an issue resolving the variables and/or functions contained within CP Duration. If the Controller is unable to resolve CP Duration or it resolves to an invalid value, CP Duration will be ignored and the Controller will estimate the Critical Path Duration based on historical executions.
CP Duration Unit	Type of CP Duration; used in conjunction with the CP Duration field. For example, for a CP Duration of two minutes, specify 2 in the CP Duration field and select **Minutes** in this field. Options: • Seconds • Minutes • Hours Default is Minutes.

Workflow Execution Options	This section contains Execution Restriction specifications for the task if it is within a Workflow.
Execution Restriction	Specification for whether or not there is a restriction for this task to be run, skipped, or held.
	Options are:
	-- None -- No restriction for this task. - Run Restriction for when this task will be run. - Skip Restriction for when this task will be skipped. - Hold Restriction for when this task will be held.
	If Execution Restriction on a task is Run or Skip, then when it is part of a Workflow that is being launched, the Restriction Period is evaluated. The task instance will be skipped if Execution Restriction is Skip and the date is within the Restriction Period or Execution Restriction is Run and the date is not within the Restriction Period. Execution Restriction can be set to Skip with a Restriction Period of - None -, meaning the restriction is always active and the task will be skipped when it is part of a Workflow.
Restriction Period	If Execution Restriction = Run, Skip, or Hold; Period of time when the task is restricted.
	Options are:
	– None – No period of restriction for this task. - Before Restriction is valid if the date is before the Before Date value. - After Restriction is valid if the date is after the After Date value. - Span Restriction is valid if the date is before the Before Date value and after After Date value. - On Restriction is valid if the date is one of the Date List values.
Before Date	If Restriction Period = Before or Span; Date before which the restriction is valid.
Before Time	If Restriction Period = Before or Span; Time on the selected date before which the restriction is valid.
After Date	If Restriction Period = After or Span; Date after which the restriction is valid.
After Time	If Restriction Period = After or Span; Time on the selected date after which the restriction is valid.
Date List	If Restriction Period = On; Date(s) on which the restriction is valid.

Statistics	This section contains time-related statistics for the task instance.
User Estimated End Time	System-supplied; if the user entered information into the User Estimated Duration field in the task Details, the Controller uses this information to calculate an end time for the task instance, based on the date/time the task instance started.
Average Estimated End Time	System-supplied; average estimated end time of the task instance, calculated by the Controller based on the date/time the task instance started.
Shortest Estimated End Time	System-supplied; shortest estimated end time of the task instance, calculated by the Controller based on the date/time the task instance started.
Longest Estimated End Time	System-supplied; longest estimated end time of the task instance, calculated by the Controller based on the date/time the task instance started.
Projected End Time	System-supplied; projected end time of the task instance, calculated by the Controller based on the projected end time of its predecessor (or the maximum projected end time of all its predecessors, if more than one path exists to that task instance) plus its estimated critical path duration.
Buttons	This section identifies the buttons displayed above and below the Workflow Task Instance Details that let you perform various actions.
Update	Saves updates to the record.
Force Finish	See Force Finishing a Task.
Hold	Places the task instance on Hold (see Putting a Task on Hold).
Skip	For tasks loaded into the schedule that have not yet run; allows you to tell the Controller to skip this task. See Skipping a Task.
Release Recursive	Releases the entire held workflow and its tasks (see Releasing a Task From Hold).
View Parent	Displays the task instance Details for the parent Workflow of this task instance.
View Workflow	Displays the graphical workflow.
Delete	Deletes the current record.
Refresh	Refreshes any dynamic data displayed in the Details.

Close	For pop-up view only; closes the pop-up view of this task instance.
Tabs	This section identifies the tabs across the top of the Workflow Task Instance Details that provide access to additional information about the task instance.
Workflow Task Instance	Displays details about this Workflow task instance.
Virtual Resources	Lists all Virtual Resources to which this task is assigned.
Exclusive Requests	Lists all records in the Exclusive Requests table (`ops_exclusive_order`) for this task instance.
Step Conditions	Lists all step conditions defined for this task.
Notes	Lists all notes associated with this record.

Designing a Workflow

The Workflow Editor lets you select tasks for a Workflow, position them within the Workflow, and specify dependency relationships between the tasks.

Workflows can be as simple or elaborate as necessary. Zooming and scrolling features are provided that allow you to work on small areas of a very large Workflow, or to create simple ad hoc Workflows.

The following is a sample Workflow Editor for a Workflow consisting of a variety of task types. There are no restrictions on the types of tasks that can be included as part of a single Workflow; you can also put other Workflows into a Workflow.
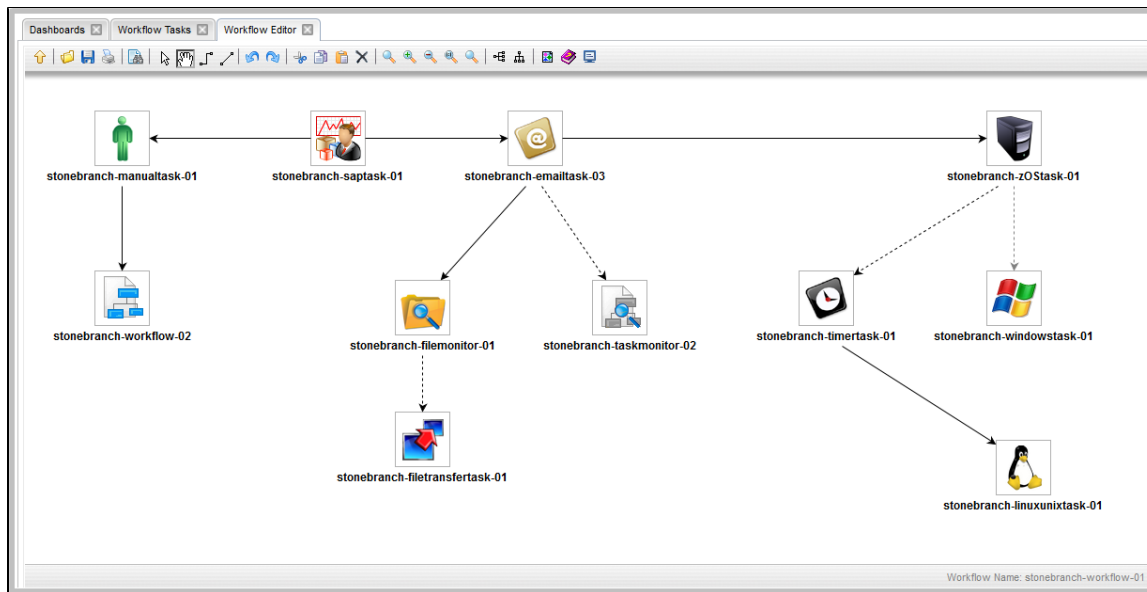
> ⚠️ **Note**
> The name of the workflow that you are editing is shown:
>
> 1. At the bottom right corner of the Workflow Editor.
> 2. By hovering over the Workflow Editor tab at the top of the Workflow Editor.

See Workflow Editor Icons for a guide to the editing tools available for designing Workflows; for more detailed instructions, see the individual topics in this section, below.

Designing, Modifying, or Viewing Multiple Workflows

You can design, modify, or simply view multiple Workflows in the Workflow Editor at the same time.

Step 1	From the Workflow Tasks list, open the Workflow task for which you want to design, modify, or view the Workflow.
Step 2	Click the **Edit Workflow** button to display the Workflow Editor for the Workflow.
Step 3	Click the **Workflow Tasks** tab at the top of the Workflow Editor (next to the **Workflow Editor** tab) to redisplay the Workflow Tasks list.
Step 4	Open another Workflow task for which you want to design, modify, or view the Workflow.
Step 5	Click the **Edit Workflow** button to display the Workflow Editor for this second Workflow under a second tab.
Step 6	Open and display as many Workflows as desired, clicking the appropriate tab to create, modify, and view each one.

Workflow Editor Modes

The actions you can perform within the Workflow Editor depend on the Workflow Editor mode.

The Workflow Editor has three modes. Each mode, which you select by clicking the appropriate icon in the Workflow Editor toolbar, allows you to use one or more specific Workflow Editor tools.

Icon	Mode	Description
↕	**Select**	Clicking the Select icon on the Workflow Editor toolbar places the Workflow Editor in **Select** mode, which allows you to use all Workflow Editor tools except Connect and Pan. The **Select** mode is the default mode for the Workflow Editor.
⌐	**Connect**	Clicking a Connect icon on the Workflow Editor toolbar places the Workflow Editor in **Connect** mode, which allows you to create connections between tasks. In **Connect** mode, you also can use all other Workflow Editor tools except Connect.
✋	**Pan**	Clicking the Pan icon on the Workflow Editor toolbar places the Workflow Editor in **Pan** mode, which allows you to scroll around in the Workflow. (You also can use the Outline tool in any mode) to scroll around in the Workflow. In **Pan** mode, you also can use all other Workflow Editor tools except Connect. ⚠ **Note** **Pan** mode does not allow you to use the drag and drop method for moving, deleting, and copying groups of Workflow elements.

Workflow Editor Toolbar

The Workflow Editor toolbar, which displays above the Workflow Editor, contains icons for every tool that you need to design a Workflow.

A shadowed outline around the icon in the toolbar indicates the currently selected Workflow Editor mode.

The following example shows that the Workflow Editor is in **Select** mode.

You also can perform all task actions and connector actions in any mode.

Workflow Editor Tools

The following table describes the tools used to define Workflows, including the tools associated with the three Workflow Editor modes. The tools are listed by icon, as they appear - left to right - in the Workflow Editor toolbar.

Icon	Tool	Description
⬆	Go to Parent	If this Workflow is embedded in another Workflow, navigates to the parent. If this Workflow has more than one parent, clicking this icon displays a list of all parent Workflows; in this case, to navigate to a parent Workflow, double-click the Workflow's icon. To return to your original Workflow, click its name. (The current Workflow name displays in the lower right corner of the editor.) ⚠ **Note** To open an embedded Workflow (sub-Workflow) from its Parent Workflow, double-click the embedded Workflow.

	Open Workflow	Displays an Open Workflow pop-up dialog from which you can select a Workflow to replace the Workflow currently displayed in the Workflow Editor. (Make sure to save the current Workflow before replacing it.)
		  The Workflow Search Result Limit Universal Controller system property defines how many Workflows display on the list. To replace the current Workflow, either double-click a Workflow name or you click and drag a Workflow icon into the Workflow Editor canvas. ⚠ **Note** If you want to open another Workflow without replacing the current Workflow, see Designing, Modifying, or Viewing Multiple Workflows.
	Save	Saves the current Workflow.
	Print	Prints the current Workflow.
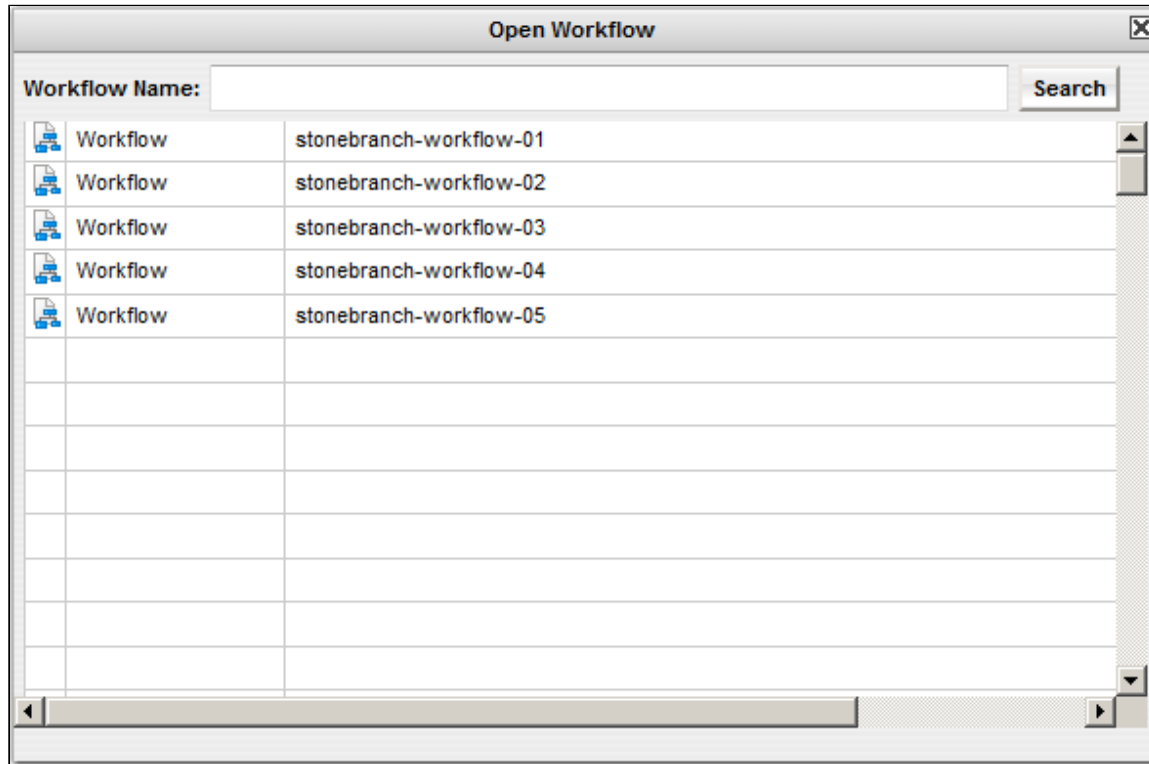
	Add Task	Displays the Task Find dialog, which allows you to search for and select tasks for the Workflow from a searchable list of defined tasks. (The Workflow Search Result Limit Universal Controller system property defines how many tasks display on the list.) To search for and select tasks: 1. Click the Add Task icon. 2. Optionally, enter a task name, a partial string, optionally using * or ? as wildcards, or select the type of task you are searching for. 3. Click **Search**. Universal Controller displays the tasks that meet your selection criteria. 4. To bring a task onto the Workflow Editor canvas, click and drag the task's icon out of the window and onto the canvas. 5. To close the Task Find window, click the **X** in the upper right corner.
	Select	Places the Workflow Editor in Select mode.
	Pan	Places the Workflow Editor in Pan mode. To pan around the Workflow, click any white space in the Workflow Editor canvas and drag your cursor to display any section of the Workflow. To return to your original location, click the Actual Size icon.
	Connect (bent) Connect (straight)	Places the Workflow Editor in Connect mode. To create a connection: 1. Click either icon. 2. Click a predecessor task. If you are using Firefox, click the center of the task icon. If you are using Internet Explorer, click the task name. 3. Drag the cursor to the successor task. You will see a colored line as you drag. 4. When you reach the successor task, release the cursor. The connector appears as a straight or bent line, depending on which icon you selected.
	Undo	Click to undo the most recent change.
	Redo	Click to redo the most recent change that you undid by clicking Undo.
	Cut	Deletes the selected element(s): tasks, connectors, or both. Use Ctrl+Click to select and cut multiple elements. You can paste cut tasks into the same Workflow Editor or into the Workflow Editor of any other Workflow. If you cut a connector, and include its source and target tasks in the cut, you can paste the cut connector (and the tasks) into the same Workflow Editor or into the Workflow Editor of any other Workflow. ⚠ **Note** Do not use cut and paste to move Workflow elements; use select and drag.
	Copy	Copies the selected element(s): tasks, connectors, or both. Use Ctrl+Click to select and copy multiple elements. You can paste copied tasks into the same Workflow Editor or into the Workflow Editor of any other Workflow. If you copy a connector, and include its source and target tasks in the copy, you can paste the copied connector (and the tasks) into the same Workflow Editor or into the Workflow Editor of any other Workflow.
	Paste	Pastes the copied or cut element(s) into the currently open Workflow Editor or into the Workflow Editor of any other Workflow. If you want to paste a cut or copied connector, you must include the source and target tasks of the connector in the cut or copy.
	Delete	Permanently deletes the selected elements. Delete does not keep a copy of the deleted elements in memory.

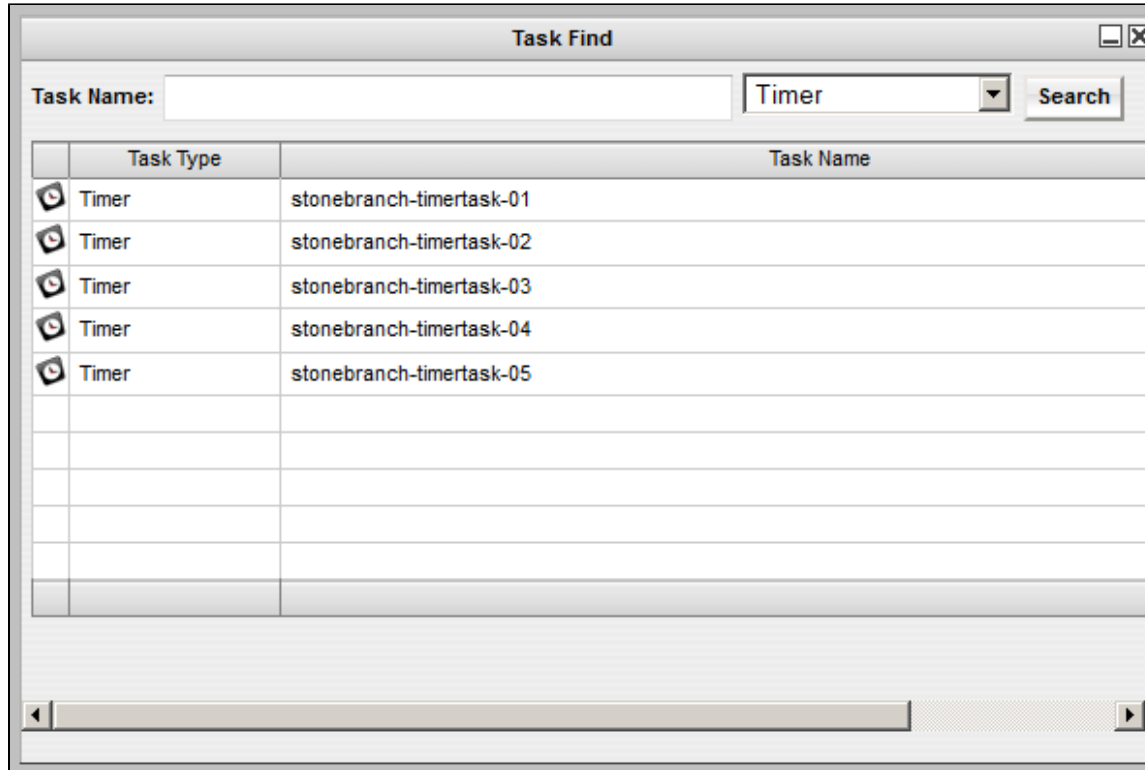|	Fit	Fits the Workflow into the display. If necessary, this shrinks the icons and size of the Workflow in order to make it fit. You can undo a Fit by clicking the Actual Size icon.
	Zoom In	Zooms in (enlarges) the Workflow. To return the Workflow to its default size, click the Actual Size icon.
	Zoom Out	Zooms out (diminishes) the Workflow. To return the Workflow to its default size, click the Actual Size icon.
	Actual Size	Returns the Workflow to its default size after a Fit or Zoom.
	Zoom	Opens a window that allows you to specify a zoom ratio. For example, to double the size of the Workflow, enter 200 and click **OK**. To return the Workflow to its default size, click the Actual Size icon.
	Horizontal Layout	Reformats the Workflow into a horizontal layout.
	Vertical Layout	Reformats the Workflow into a vertical layout.
	Toggle Vertex Style	For running Workflows, switches the icon display between status-related icons and task-related icons (see Monitoring Workflows). This icon only appears on the icon bar when you are monitoring a running Workflow.
	Outline	For large Workflows, the outline provides a way of positioning a specific area of the Workflow in the display, without using the Pan mode. 1. Click the **Outline** icon. The **Outline** window opens. 2. In the **Outline** window, move and/or resize the blue box to identify the area of the Workflow you want to work on. The display repositions to show only the area within the blue box.
	Help	Displays help documentation for Workflows.
	Console	While a Workflow is running, you can click the Console icon to display processing messages.

Searching For and Adding Tasks

Step 1	Click the Add Task icon. The **Task Find** dialog displays.

Step 2	Several methods are available for finding tasks:
	- To find a specific task, type the name into the Task name field and click **Search**. - To display a list of tasks whose names match a string, type the string into the Task name field and use one or more wildcards. Wildcard(s) can appear anywhere in the string. For example, to find tasks whose name begins with "Fee", type **Fee** in the Task name field and click **Search**. - To display a list of tasks of a specific type, such as Windows, select the task type from the drop-down menu and click **Search**. - To display a list of all tasks, select All Task Types (the default selection) from the drop-down menu and click **Search**. The Task Find dialog lists the task(s) that match your search criteria.
Step 3	To add a task to the Workflow Editor canvas, click the icon to the left of the task and drag it onto the canvas. You can add any task to a Workflow multiple times. To differentiate between multiple additions of the same task in a Workflow, you can assign each of them a unique name used only within the Workflow; the name of the task in the Task Details will not change. To change the name of a task within a Workflow, display the Task Properties menu and select a new name in the **name** field.
Step 4	Repeat these steps until you have added all the tasks you need.

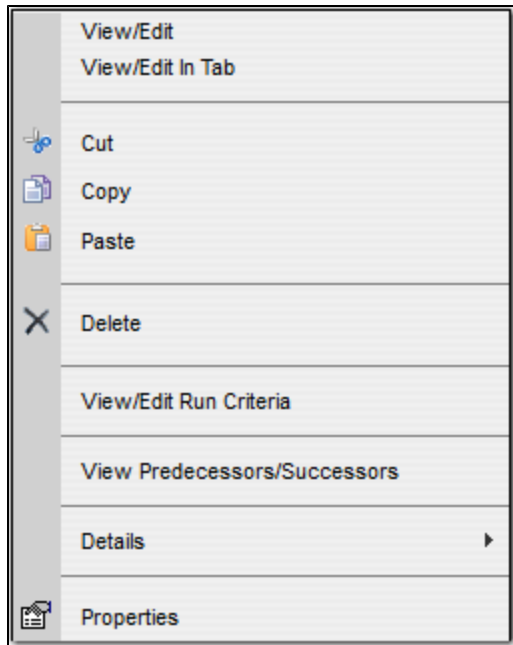| Step 5	Position the tasks on the canvas as desired. The connections that you will make between the tasks determine the order in which the tasks run, so position the tasks accordingly. For example:
Step 6	To close the **Task Find** window, click the **X** in the upper right corner. Or, to keep the window open but minimized, click the minimize icon.
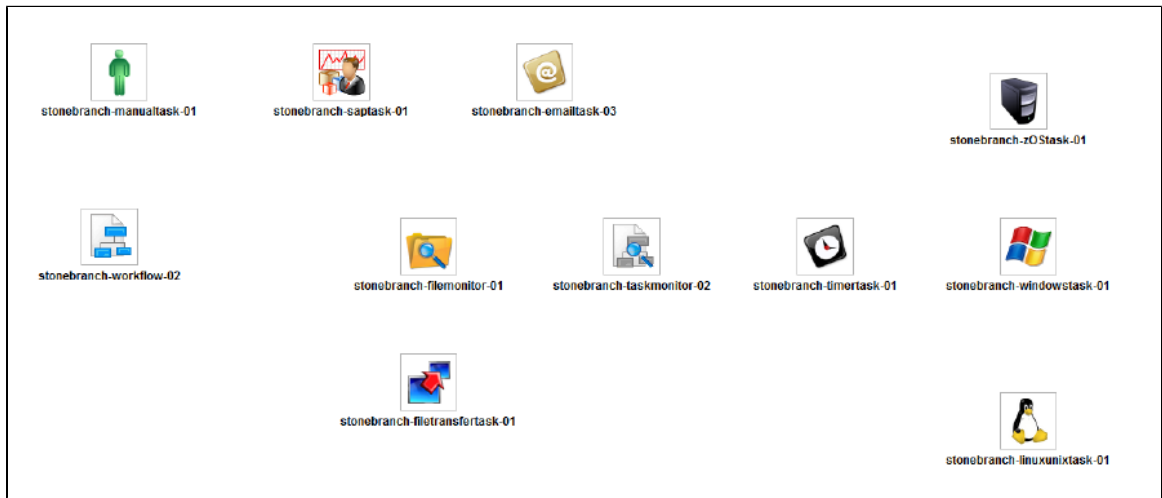
Task Details

You can display the following detailed information for any task by hovering your mouse over the task.

Task Actions

For each task in a Workflow, the Controller provides a menu of actions that you can take on that task. You can perform task actions in any Workflow Editor mode.

To display the menu of task actions, right-click a task.
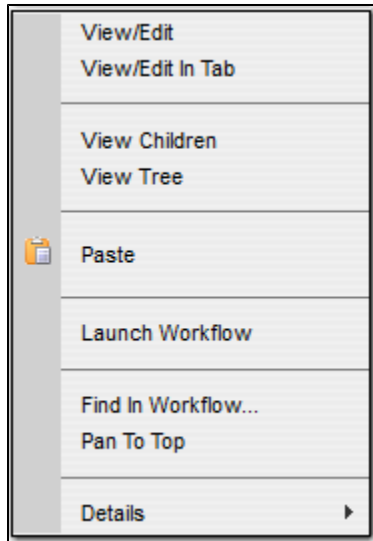
The following table describes each action in the menu:

Action	Description
View/Edit	Allows you to view and edit the Task Details for this task.
View/Edit In Tab	Allows you to view and edit the Task Details for this task in a new tab.
Cut	Cuts the task from its location in the Workflow. You can paste a cut task back into the same Workflow Editor or into the Workflow Editor of any other Workflow.
Copy	Creates a copy of the task for inclusion in the same Workflow Editor or for inclusion in the Workflow Editor of any other Workflow.
Paste	Pastes a copy of the task into the Workflow or into the Workflow Editor of any other Workflow.
Delete	Deletes the task from the Workflow. You cannot paste a deleted task back into the Workflow.
View/Edit Run Criteria	Allows you to view and edit any run criteria that has been created for this task. (This action is disabled for tasks that have been added to a Workflow but not saved.)
View/Edit z/OS Step Actions	z/OS Tasks only; Allows you to view and edit any z/OS step actions that have been created for this task. (This action is disabled for tasks that have been added to a Workflow but not saved.)
View Predecessors/Successors	Allows you to view all predecessors and successors of this task in the Workflow.
Details > Show Details	Allows you to display complete database details for this task.

Properties	Displays a menu of properties for the task.

Task Actions for Workflow

For the workflow displayed in the Workflow Editor, the Controller provides a menu of actions that you can take on that workflow. You can perform task actions in any Workflow Editor mode.

To display the menu of workflow task actions, right-click any white space in the Workflow Editor canvas.

The following table describes each action in the menu:

Action	Description
View/Edit	Allows you to view and edit the Task Details for this workflow task.
View/Edit In Tab	Allows you to view and edit the Task Details for this workflow task in a new tab.
View Children	Allows you to view a list of child tasks of this workflow task.
Paste	Allows you to paste cut or copied elements from this workflow or any other workflow into the Workflow Editor.
Launch Workflow	Allows you to launch this workflow task
Find In Workflow...	Allows you to find a task in this workflow task.
Pan To Top	Allows you to restore the displayed Workflow Editor for this workflow task to its default, top-left position.
Details > Show Details	Allows you to display complete database details for this workflow task.

Task Properties

One of the task actions available for any task in a Workflow is to display a list of properties for that task.
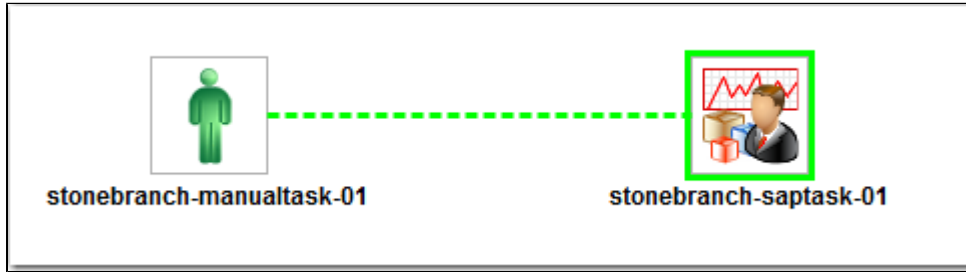

You can change the name of a task within a Workflow by entering a new name in the **name** field. By Default, the **name** of a task is its name in the Task Details. Changing the **name** of a task within a Workflow does not change its name in the Task Details.
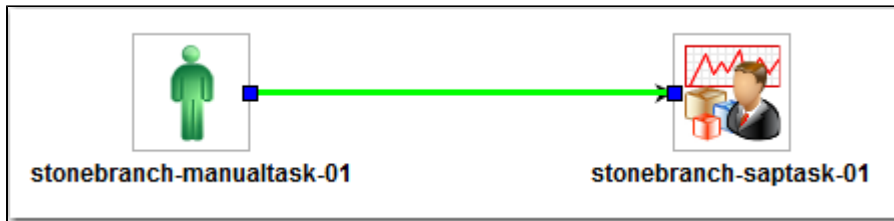
Specifying Connections

After you have added tasks and positioned them on the Workflow Editor canvas, you must connect the tasks.

Step 1	Click one of the Connect icons to place the Workflow Editor in Connect mode.
Step 2	Click the predecessor task; that is, the task whose status will trigger the next task. • For Firefox, make sure you click the center of the task icon. • For Internet Explorer, click the task name, **hold down the cursor**, and drag your mouse.

Step 3	Drag your mouse to the successor task; that is, the task that will be triggered. As you drag your mouse, a red line display. Drag your mouse all the way to the center of the successor task; the red line becomes a dotted, green line - the connector between the tasks - and the successor task is highlighted.
Step 4	Release the mouse button. The connector becomes a highlighted, solid green line (identifying it as a default Success condition).. Optionally, you can reposition the connection by dragging it to a new location. Arrows on the connectors indicate the direction of the Workflow.
Step 5	Repeat this process for other connectors to be added.

Connector Details

You can display detailed information for any connector by hovering your mouse over it.

For example:

Connector Actions

For each connector in a Workflow, the Controller provides a menu of actions that you can take on that connector. You can perform connector actions in any Workflow Editor mode.

To display the menu of connector actions, right-click a connection.

The following table describes each action in the menu:

Action	Description
Conditions	Allows you to select a dependency condition for the connection.
Go To Source	Highlights the predecessor task for the connector and moves it to the center of the Workflow Editor display.
Go To Target	Highlights the successor task for the connector and moves it to the center of the Workflow Editor display.
Cut	Cuts the connector from its location in the Workflow. If you include the source and target tasks of a connector in the cut, you can paste the cut connector (and the tasks) into the same Workflow Editor or into the Workflow Editor of any other Workflow.
Copy	Creates a copy of the connector for inclusion in the Workflow if you include the source and target tasks of the connector in the copy. You can paste the copied connector (and the tasks) into the same Workflow Editor or into the Workflow Editor of any other Workflow.
Paste	Pastes a copy of the connector (if you also copied the source and target tasks of the connector) into the Workflow.
Delete	Deletes the connector from the Workflow. You cannot paste a deleted connector back into the Workflow.
Properties	Displays a menu of properties for the connector.

Connector Properties

One of the connector actions available for any connector in a Workflow is to display a list of properties for that connector.

The information in the connector properties is view-only.

Specifying Conditions on Connections

When you create a connection between the tasks in a Workflow, you can specify a dependency condition between the predecessor and successor task. The successor task will run if the condition that you specify matches the condition of the predecessor task.

By default, a Success condition is specified automatically for a connection when you create it; if the predecessor task runs to Success, the successor task will run.

The dependency condition that you select for a connection, as allowed for the task type of the predecessor task (see Conditions per Task Type, below), determines the format of the connector in the Workflow Editor.

Condition	Connector Format	Description
Success	Solid black line	Run the successor task if the predecessor task goes to Success.
Failure	Dotted black line	Run the successor task if the predecessor task goes to Failure.
Success/Failure	Dotted black line	Run the successor task if the predecessor task goes to Success or Failure.
Exit Code(s)	Dotted black line	Run the successor task if the predecessor task returns one of the specified exit code(s). Format: Numeric. Use commas to list a series of exit codes; use hyphens to specify a range. Example: 1,5, 22-30.

Step Conditions	Dotted gray line	For predecessor z/OS tasks only: Run the successor task if the running predecessor z/OS task has a step end matching the specified Step Condition(s).

Connector Graphics for All Condition Types, below, illustrates a Workflow containing connectors for all condition types.

Conditions per Task Type

The following table identifies the dependency conditions that are supported for each type of task:

Task Type	Success	Failure	Success/Failure	Step Condition(s)	Exit Code(s)
Workflow	✓				✓
Linux/Unix	✓	✓	✓		✓
Windows	✓	✓	✓		✓
z/OS	✓	✓	✓	✓	✓
Universal Command	✓	✓	✓		✓
SAP	✓	✓	✓		✓
File Transfer	✓	✓	✓		✓
Manual	✓				✓
Timer	✓				✓
SQL	✓	✓	✓		✓
Stored Procedure	✓	✓	✓		✓
Email	✓	✓	✓		✓
Web Service	✓	✓	✓		✓
Task Monitor	✓	✓	✓		✓
File Monitor	✓	✓	✓		✓
FTP File Monitor	✓	✓	✓		✓
System Monitor	✓	✓	✓		✓
Variable Monitor	✓	✓	✓		✓

Application Control	✅	✅	✅		✅
Email Monitor	✅	✅	✅		✅
Universal	✅	✅	✅		✅

Specifying a Condition

To specify a dependency condition for a connection between a predecessor and successor task:

Step 1	Hover your mouse over the connection to view the currently selected condition. If you want to change the condition, right-click the connection to display a Connector Actions menu.
Step 2	Select **Conditions**. The Conditions dialog displays.
Step 3	Specify a condition (as supported for each task type).
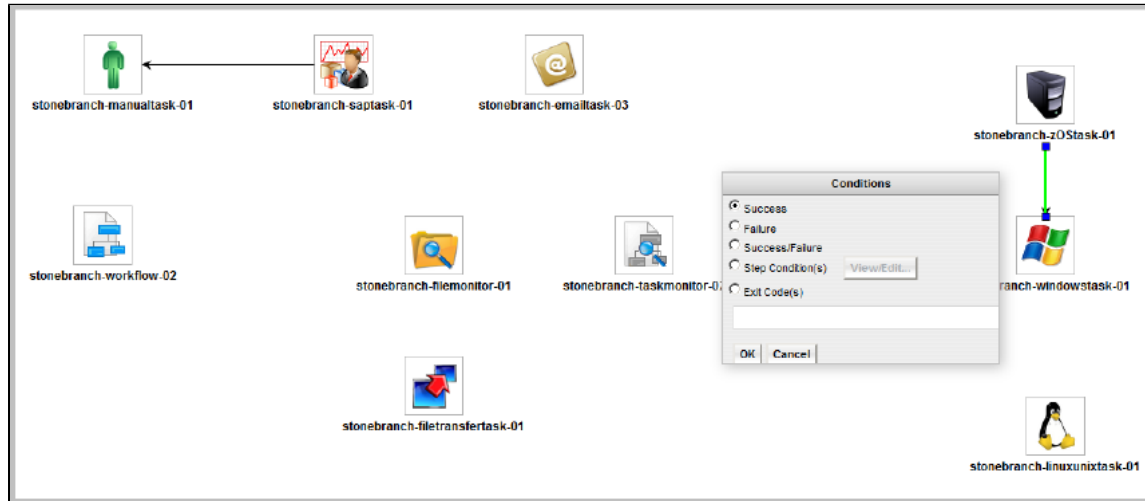
Step 4	If you selected **Step Condition(s)** for a connection to a predecessor z/OS task, click the **View/Edit...** button to display a Step Conditions dialog that lets you define the step conditions.
	Using the field descriptions below as a guide, complete the fields and click **OK**.
Step 5	Click **OK** on the Conditions dialog.
Step 6	To see the condition that is specified for a connection, hover your cursor over the connector (see Connector Graphics for All Condition Types, below).
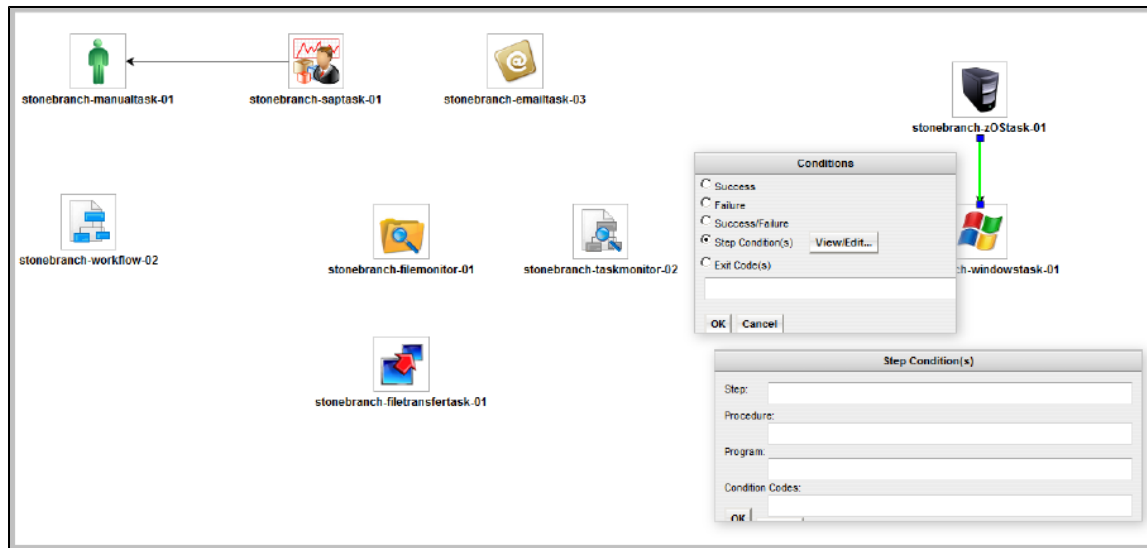
Step Conditions

A Step Condition - for a z/OS task only - is an intermediate condition that is evaluated immediately after each z/OS step end. In other words, it does not specify a condition to be met when the z/OS task completes.

In this way, Step Conditions allow a successor task to run before its predecessor task has completed. The successor task may require only that a step in the z/OS task completes, not the entire task.

Step Condition connectors display in gray to distinguish the difference between intermediate Step Conditions and task completion Conditions.

On z/OS task instance completion - specifically, Failed, Success or Finished - Step Conditions are not relevant and are not evaluated. If one or more non-Step Condition dependencies were satisfied, all remaining unsatisfied dependencies, including Step Condition dependencies, become unreachable and their associated paths are skipped.

Step Condition(s) Field Descriptions

The following table describes the fields on the Step Condition(s) dialog.

Field Name	Description

Step	Job step name to match. A blank value or an asterisk (*) will match any job step name. Generic matching characters asterisk (*) and question mark (?) match zero or more characters and one character, respectively.
Procedure	Procedure step name to match. A blank value or an asterisk (*) will match any procedure step name. Generic matching characters asterisk (*) and question mark (?) match zero or more characters and one character, respectively.
Program	Program name to match. A blank value or an asterisk (*) will match any program name. Generic matching characters asterisk (*) and question mark (?) match zero or more characters and one character, respectively.
Condition Codes	Conditions codes are integer return codes from the program or ABEND codes. Integer return codes are specified as a comma-separated list of integer values or ranges. Ranges are specified with a dash (–) separating the lower and upper bounds of the range. The z/OS job step return code range is 0-4095. ABEND codes are specified directly as either a user ABEND or a system ABEND. The ABEND code must be specified verbatim including leading zeroes. For example: 1,6-4095,Sxxx,Unnnn,JCLERR

Connector Graphics for All Condition Types

The following illustration shows the connector formats for all condition types and the details that displays for each condition type (in this case, Success/Failure) when you hover your cursor over the connector.
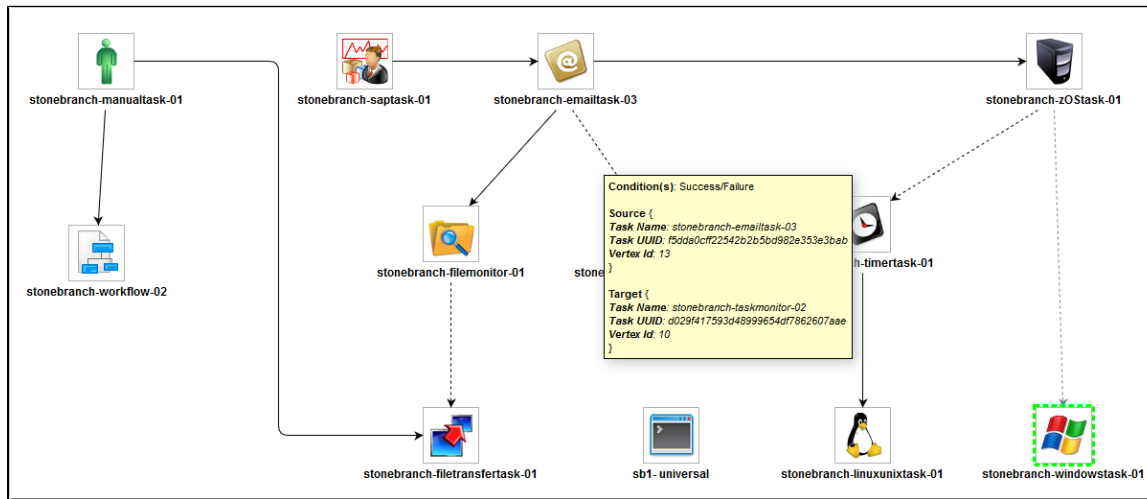
Creating Conditional Paths

The Controller allows you to specify a separate processing path for each possible condition between a predecessor task and a successor task. The Controller selects the appropriate conditional path when the predecessor task goes to a finished status (Success or Failure). As a result, at least one successor dependency is satisfied and at least one successor dependency is not satisfied.

For example, you could specify a conditional path containing a group of tasks that will run if the predecessor task goes to Success, and a second conditional path containing a group of tasks that will run if the predecessor task goes to Failure. When the predecessor task has run to completion, the tasks in the path whose condition meets the condition of the predecessor task will run, and the tasks in the path whose condition does not meet the condition of the predecessor task will go to a Skipped status.

Further examples:

Example 1
Task A is at the top of the Workflow. Three conditional paths have been specified for Task A: one for Failure and two for Success. Task A executes and goes to Success status. The Controller places all of the tasks in the Failure conditional path into Skipped status and the tasks in the two Success conditional paths begin running.

Example 2
Task A is at the top of the Workflow. Two conditional paths have been specified: one for exit codes 1 through 10, the second for exit codes 11 through 20.

- If Task A completes with exit code 5, the tasks in the first path run and the second path is skipped.
- If Task A completes with exit code 15, the first path is skipped and the tasks in the second path run.
- If Task A completes with exit code 25, neither condition is satisfied and both paths remain in Waiting status.

Conditions for Multiple Connections

If a task is connected to multiple predecessor tasks, that successor task remains in Waiting status until the condition of each of its immediate predecessor tasks is evaluated. If all of its immediate predecessor tasks have been Skipped, the successor task is Skipped. If at least one of its immediate predecessor tasks has run to completion, the successor task will run if the specified dependency condition matches the condition of the predecessor task.

For example, if a task has four immediate predecessor tasks, and three of the immediate predecessor tasks have been Skipped and the fourth predecessor task has failed, and the dependency condition between the fourth predecessor task and the successor task is Failure, the successor task will run. (Likewise, if the fourth predecessor task has run to Success, and the dependency condition between the fourth predecessor task and the successor task is Success, the successor task will run.)

The status of the tasks in the conditional paths leading to the immediate predecessor tasks do not affect whether or not the successor tasks will run. All tasks leading to an immediate predecessor tasks do not have to have run in order for the successor task to run.

Moving Workflow Elements

After you have positioned tasks and connectors on the Workflow Editor canvas, you can move these elements as needed.

Move a Single Task
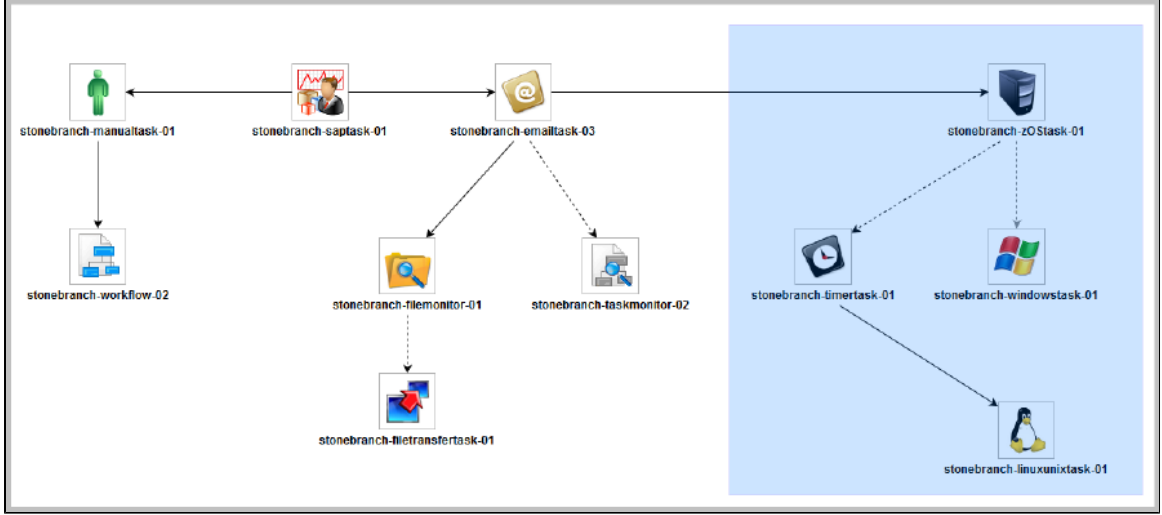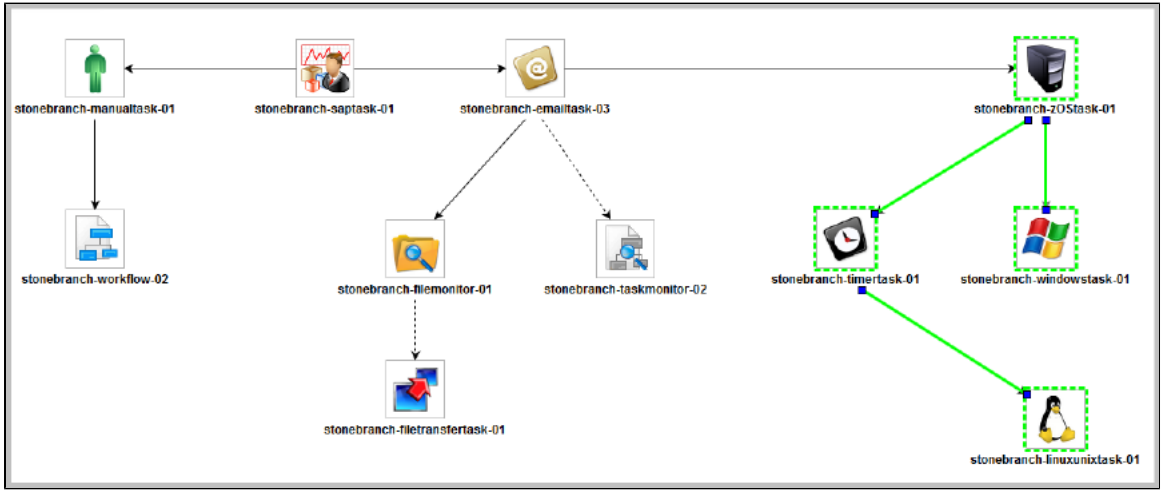
Click a task and drag it to a new location. If the task has any connectors attached, they remain connected, and lengthen or shorten as necessary. |

Move a Single Connector

Step 1	Click the connector you want to move.
Step 2	Position your cursor over either end of the connector (at the predecessor or successor task) and, when the cursor changes to a "pointing hand" icon, drag that end of the connector so that it connects to a different task.
Step 3	As desired, repeat Step 2 for the other end of the connector.

Move a Group of Tasks and Connectors

Step 1	Click the Select icon or either Connect icon.

Step 2	Position the cursor near the group that you want to move.
Step 3	Click the Workflow Editor canvas and begin dragging. A blue shaded box appears. This identifies the selection area.
Step 4	Drag the selection area over the tasks you want to select, as shown in the following example:
Step 5	When you have selected the group of tasks and connectors that you want to move, release the mouse. The tasks and connectors included in the group are highlighted, as shown:
Step 6	Hover your cursor over any element in the group until the Move cursor displays, then click that element and drag the group to the new location. All selected elements are moved.
Step 7	To deselect the group, click elsewhere in the Workflow Editor canvas.

> ⚠️ **Note**
> You also can use Ctrl+click to select a group of elements or a selection of individual elements and drag them to a new location.

Deleting Workflow Elements

Step 1	Click an element, drag your cursor across the Workflow Editor canvas to select a group of elements, or use Ctrl+click to select one element, a group of elements, or a selection of individual elements. (You cannot drag your cursor across the Workflow Editor canvas in Pan mode.)
Step 2	Click the Delete icon. The selected element or group of elements is deleted.

Copying Workflow Elements

Step 1	Click an element, drag your cursor across the Workflow Editor canvas to select a group of elements, or use Ctrl+click to select one element, a group of elements, or a selection of individual elements. (You cannot drag your cursor across the Workflow Editor canvas in Pan mode.)
Step 2	Click the Copy icon to create a copy of the selected elements.
Step 3	Click the Paste icon to paste the copied element(s) into the Workflow next to the original element(s).
Step 4	Click the copied element (or any element in a copied group) and drag it to a new location. > ⚠️ **Note:** > You can paste copied (or cut) element(s) into the same Workflow or into the Workflow Editor of any other Workflow.

Undoing and Redoing Workflow Changes

To undo the most recent change, click the Undo icon. To redo a change you just undid, click the Redo icon.

Zooming In and Out

Several features are available for zooming in and out on large Workflows:

- Click the Fit icon to fit the entire Workflow onto the display.
- Click the Zoom In icon to increase the size of the Workflow (to view details).
- Click the Zoom Out icon to decrease the size of the Workflow (to view the entire Workflow)

- Click the Actual Size icon to return the Workflow to its actual (original) size.
- Click the Zoom icon to enter a zoom percentage.

Panning Around in Large Workflows

For large Workflows that cannot be viewed entirely on your screen, you can pan around from area to area.

Two methods are provided:

- Pan mode
- Outline tool (in any mode)

Pan Mode Method

Step 1	Click the Pan icon to enter Pan mode.
Step 2	Click the Workflow Editor canvas and drag the Workflow so that it displays the area you want to work on.

Outline Tool Method

Step 1	Click the Outline icon icon to open the **Outline** window.
Step 2	In the **Outline** window, move and/or resize the blue box to identify the area of the Workflow you want to work on. The display repositions itself as indicated in the **Outline** window.

> ⚠️ **Note**
> You also can move to different areas of a Workflow by using the Find in Workflow... tool.

Workflow Coordinates

If you use Pan mode (or Find in Workflow...) to view different areas of a Workflow, the Controller preserves the coordinates of the last area that you viewed. If you leave the Workflow and return to it in the same browser session, the last viewed area of the Workflow displays.

To restore the displayed Workflow to its default, top-left position, you can either:

- Right-click anywhere in the Workflow Editor canvas to display a pop-up menu and click **Pan To Top**.
- Start a new browser session.

Automatically Formatting a Workflow

You can apply automatic formatting to your Workflow. This process does not change any connections or content, but reorganizes the Workflow into a more legible display.

- To create a horizontal layout, click the Horizontal Layout icon.
- To create a vertical layout, click the Vertical Layout icon.

Displaying Workflow Documentation

To display documentation on monitoring Workflows, click the Help icon.

Displaying Processing Messages

While a Workflow is running, you can click the Console icon to display processing messages. For more details, see Monitoring Workflows.

Saving the Workflow

Click the Save icon.

Switching Between Workflows

You can switch between Workflows without using the navigation pane (see Designing, Modifying, or Viewing Multiple Workflows.

Adding Skip/Run Criteria for Specific Tasks

You can add special instructions that specify conditions under which a specific task (or sub-Workflow) within the Workflow should be run or skipped. The Controller evaluates these instructions when determining whether to run each task within a Workflow.

For example, you might want to skip a specific task in a Workflow on a certain day or date, or you might want to run a specific task only if a certain variable is set to a specific value.

> ⚠️ **Note**
> Calendar-based criteria are always evaluated using the task instance Trigger Time (or the task instance Created time, if the workflow was launched manually).

When a workflow is launched or triggered, the Task Run Criteria provide a mechanism to decide whether a specific task (or sub-Workflow) within the Workflow should be run or skipped. If no Task Run Criteria are specified, a task will always run when the Workflow is launched or triggered. If Task Run Criteria are specified to run or skip a task, these will be evaluated as follows:

- Skip criteria will run the task unless the skip criteria is met. For example, a workflow is triggered every business day, and a task has a skip criteria of Tuesday. The task will run Monday, Wednesday, Thursday, and Friday. The task will not run on Tuesday.
- Run criteria will only run the task when the run criteria is met. For example, a workflow is triggered every business day and a task has a run criteria of Tuesday, The task will run on Tuesday. The task will be skipped on Monday, Wednesday, Thursday, and Friday.

Multiple conditions can be specified in a single Task Run Criteria definition. In this case, all of the conditions need to be met. For example, if in a single Task Run Criteria you specify for the task to run on a specific day of Tuesday, and if the variable RUN_ME resolves to the value YES at Run Time, the task will be skipped unless both of these conditions are true.
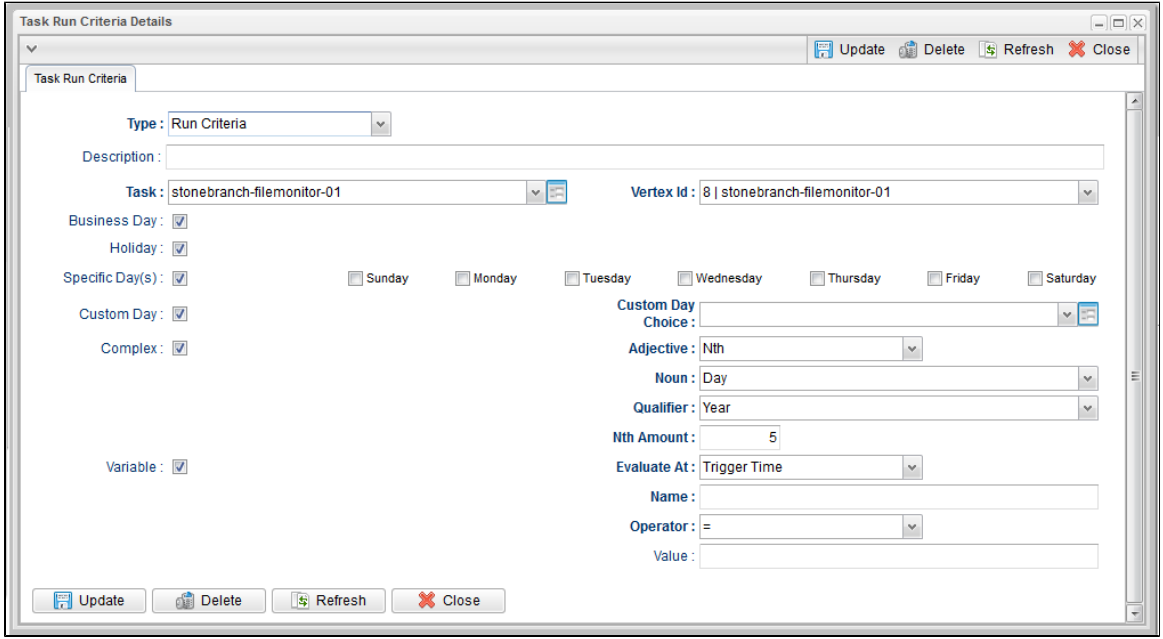
When multiple Task Run Criteria definitions are specified for a single task, these are evaluated independently.

> ⚠ **Note**
> If skip criteria and run criteria both are met (true) on a given day, the skip criteria will take precedence.

Creating Skip/Run Criteria

Step 1	Display the Details of the Workflow for which you want to specify skip/run criteria.
Step 2	Click the **Task Run Criteria** tab. The Task Run Criteria list displays a list of any existing skip/run criteria for that task.
Step 3	Click **New**. **Task Run Criteria Details** displays:

Step 4	Using the field descriptions, below, as a guide, complete the fields as needed. For example, to tell the Controller not to run a specific task on business days or holidays, select **Skip Criteria** in the Type field, select the task and enable **Business Day** and **Holiday**.
Step 5	Click the **Save** button to save the record.

Skip/Run Criteria Field Descriptions

The following table provides descriptions for each field in the Task Run Criteria Details.

Field Name	Description

Type	User-defined; indicates whether this is providing instructions on when to run or not run the task.
	
	Options:
	
	   • **Run Criteria** - Provides instructions on when to run the task.
	   • **Skip Criteria** - Provides instructions on when to skip the task.

Description	Description of this record. (Maximum = 200 characters.)
Task	User-defined; task for which you are specifying run or skip criteria. Select a task from the drop-down list of all tasks in this Workflow.
Vertex ID	Vertex ID of the task selected in the **Task** field. Each task within a Workflow has a unique Vertex ID, which distinguishes it from other tasks of the same name, if any.
Business Day	If enabled, the task runs or skips on all business days.
Holiday	If enabled, the task runs or skips on holidays.
Specific Day(s) – Sunday through Saturday	If enabled, the task runs or skips on the day(s) you select in the right-hand column.
Custom Day	If enabled, the task runs or skips on the day you select in the Custom Day Choice field. ⚠️ **Note** The Custom Day and Custom Day Choice fields display in the Task Run Criteria Details only if the Custom Day Global Permitted Universal Controller system property is set to **true** (the default).
Custom Day Choice	If Custom Day is enabled, select the custom day for which you are specifying run or skip criteria. Enter the name of an existing Custom Day, select a Custom Day from the drop-down list of all existing Custom Days, or click the Details icon to create a new Custom Day. ⚠️ **Note** You cannot use a custom day defined as a period as part of the task run criteria.
Complex	If enabled, the task runs or skips on the day(s) indicated in the Adjective, Noun, and Qualifier fields.

Adjective	If Complex is enabled, you can use this field to specify which in a series of days you want to select. Used in conjunction with the Noun, Qualifier, and Nth Amount (if Adjective = Nth) fields. For example, to specify "the 15th business day of the month," select Adjective: Nth, Noun: Business Day, Qualifier: Month, Nth Amount: 15. Options: • Every • 1st • 2nd • 3rd • 4th • Nth • Last

Noun	If Complex is enabled, you can use this field to specify the type of day you want to select. Used in conjunction with the Adjective, Qualifier, and Nth Amount (if Adjective = Nth) fields. For example, to specify "the 1st business day of the month," select Adjective: 1st, Noun: Business Day, Qualifier: Month.
	
	Options:
	
	• Sunday through Saturday
	• Day = any day
	• Business Day = The business days specified in the calendar selected in the Workflow definition Default Calendar field.
	• Custom Days specified in the calendar selected in the Workflow definition Default Calendar field.
	    • If the Custom Day Strict Mode Universal Controller system property is set to **true**, the calendar used for the Workflow must contain the custom day that you specify in the Custom Day Choice field; otherwise, the task will not run or skip as expected on the custom day:
	        • If you launch a Workflow manually, the Workflow Default Calendar is used. If a Default Calendar is not specified, the **System Default** calendar is used.
	        • If you launch a Workflow using a trigger, the calendar specified in the trigger is used unless Override Inherited Calendar is enabled.

Qualifier	If Complex is enabled, you can use this field to specify the period for your selection formula. Used in conjunction with the Adjective, Noun, and Nth Amount (if Adjective = Nth) fields. For example, to specify "the 1st business day of the month," select Adjective: 1st, Noun: Business Day, Qualifier: Month. Options: • Month • Year • January through December • Custom Period (see Creating Custom Days)
Nth Amount	If Adjective = Nth; Sequential occurrence of the day selected in Noun within the selected Qualifier.
Variable	If enabled, instructs the Controller to run or not run the task, depending on the value of a specific variable. Used in conjunction with fields: Evaluate At, Name, Operator, and Value.

Evaluate At	If Variable = enabled; Allows you to specify when you want the Controller to evaluate the variable. Options: - Trigger Time -- Evaluate the variable when the Workflow is triggered. - Run Time -- Evaluate the variable when the task is about to run. ⚠ **Note** **Evaluate At** is applicable only to Variable criteria (it is hidden until the Variable field is enabled). **Evaluate At** has no impact on other criteria, which will resolve the same way whether the **Evaluate At** value is **Trigger Time** or **Run Time**; calendar-based criteria is always evaluated using the task instance Trigger Time (or the task instance Created time, if the workflow was launched manually).
Name	If Variable = enabled; Specifies the name of the variable being evaluated. The variable does not need to exist when this record is created.
Operator	If Variable = enabled; Allows you to select the operator to be used in the evaluation. Options: =, !=, >, >=, <, <=, regex (regular expression).
Value	If Variable = enabled; Allows you to specify the value or regular expression (up to 40 alphanumeric characters) that the Controller should look for when evaluating the variable.
Buttons	This section identifies the buttons displayed above and below the Task Run Criteria that let you perform various actions.
Save	Saves a new record in the Controller database.
Update	Saves updates to the record.
New	Displays empty (except for default values) Details for creating a new Database Connection.
Delete	Deletes the current record.
Refresh	Refreshes any dynamic data displayed in the Details.
Close	For pop-up view only; closes the pop-up view of this Database Connection.

Copying Skip/Run Criteria

You can copy the skip/run criteria of a task in a Workflow and copy it to any other task in that Workflow.

Step 1	Display the Details of the Workflow task for which you want to copy the skip/run criteria of one of its tasks.
Step 2	Click the **Task Run Criteria** tab. The Task Run Criteria list displays a list of any existing skip/run criteria for that task.
Step 3	Click the Details icon for the skip/run criteria that you want to copy. The Task Run Criteria Details for that task displays.
Step 4	Click the **Task** field drop-down list to display a list of all tasks in the Workflow.

Step 5	Select a task from the drop-down list and then right-click anywhere in the Task Run Criteria Details to display an Action menu.
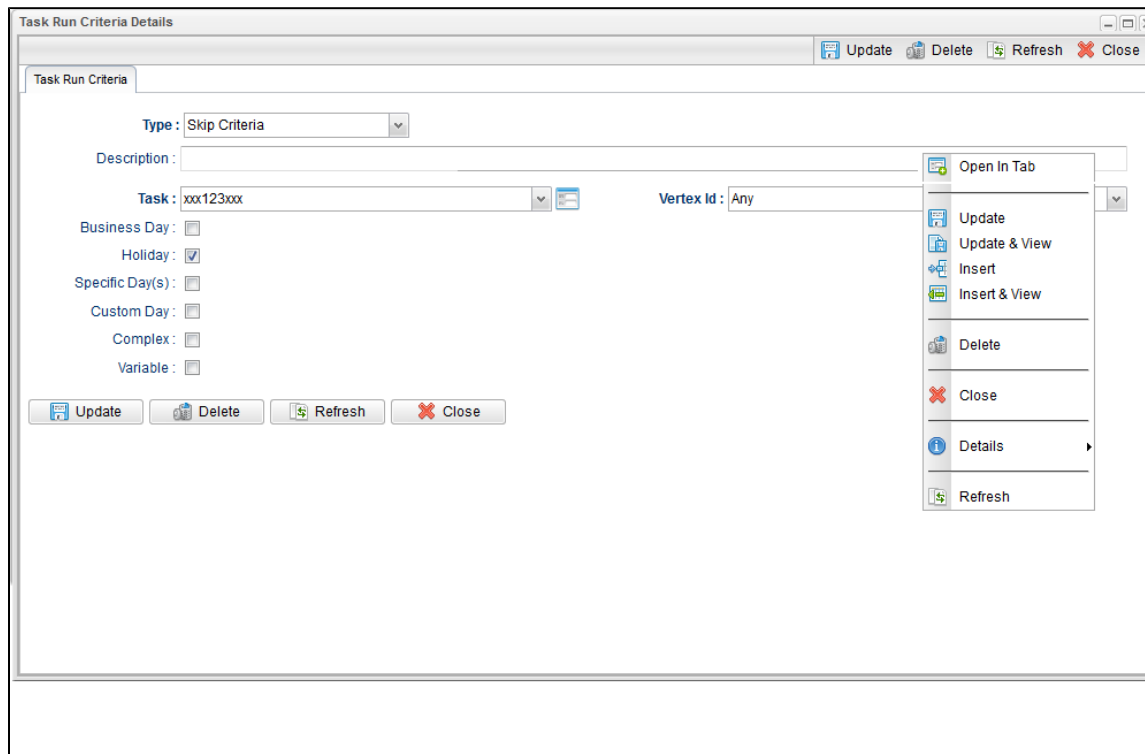
Step 6	Click **Insert** to copy the skip/run criteria to the selected task and re-display the Task Run Criteria list, or click **Insert & View** to copy the skip/run criteria to the selected task and continue viewing the Task Run Criteria Details for that task, which you can Update or Close.

Specifying When a Workflow Runs

As with other task types, you can run a Workflow manually or specify triggers that run the Workflow task automatically based on times or events.

You also can specify skip and run criteria for specific tasks within the Workflow.

Monitoring Workflow Execution
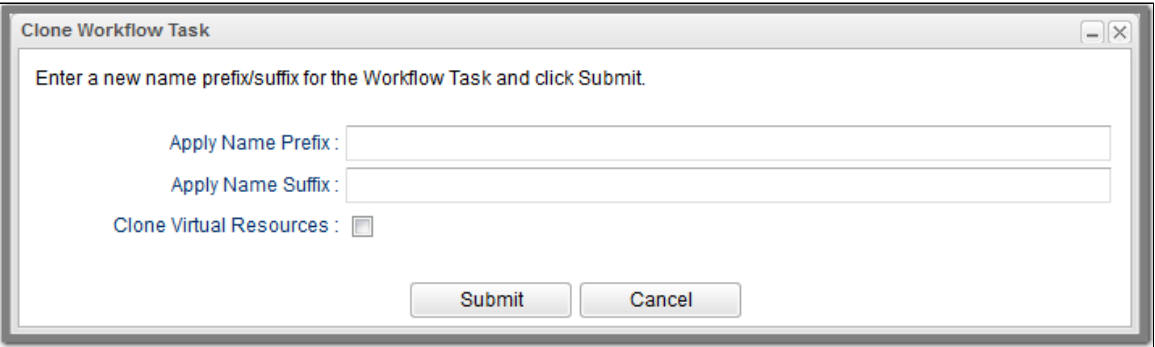
You can monitor all Controller activity from the Activity Monitor.

Modifying an Existing Workflow

Step 1	From the **Automation Center** navigation pane, select **Tasks > Workflow Tasks**. The Workflow Tasks list displays.
Step 2	Click the Task Name of the Workflow task that you want to modify. Workflow Task Details for that task displays.
Step 3	Click **Edit Workflow** to display the Workflow Editor.
Step 4	Modify the Workflow and click the Save icon.

Cloning a Workflow

You can clone a Workflow to create a copy of it and a copy of every task in the Workflow. Optionally, cloning a Workflow will also create a copy of its Virtual Resources.
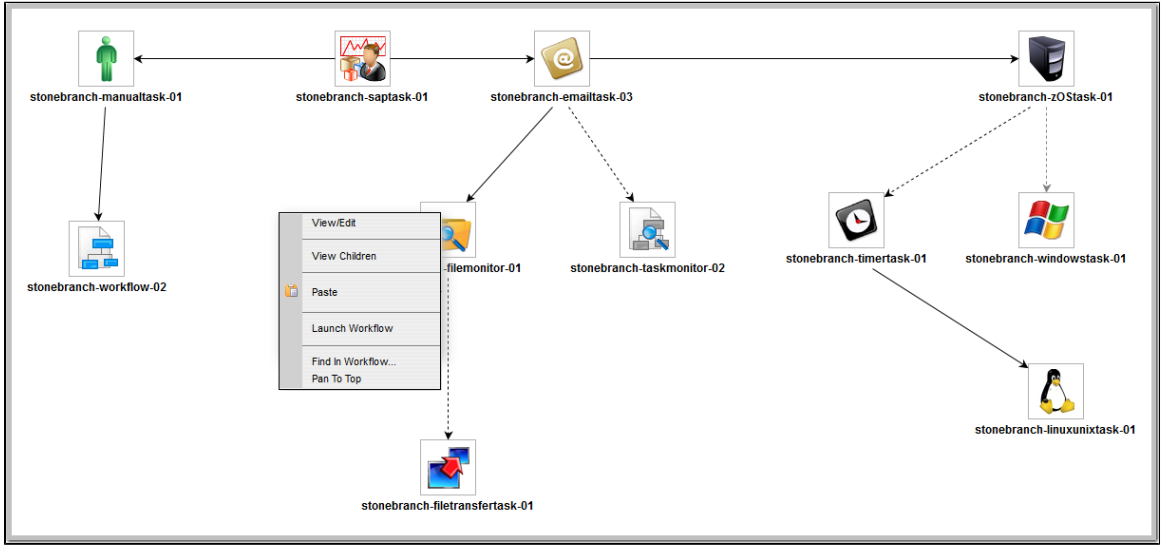
Step 1	From the **Automation Center** navigation pane, select **Tasks > Workflow Tasks**. The Workflow Tasks list displays.
Step 2	Right-click the Workflow that you want to clone, or open the Workflow and right-click anywhere in the Details, to display an Action menu for that Workflow.
Step 3	Click Clone... in the Action menu to display the Clone Workflow Task pop-up: **Clone Workflow Task** Enter a new name prefix/suffix for the Workflow Task and click Submit. Apply Name Prefix : Apply Name Suffix : Clone Virtual Resources : ☐ Submit Cancel
Step 4	Enter a Prefix and/or Suffix, which will be applied to the Workflow clone and all of its tasks.
Step 5	If you want to clone all Virtual Resources of the Workflow, click the Clone Virtual Resources check box.
Step 6	Click **Submit** to clone the Workflow. The Workflow clone will display in the Workflows list. In the Workflow Editor, each task clone will have the same prefix and/or suffix as the Workflow clone, and the task clones will display in the task lists for those task types.

Deleting a Workflow

Step 1	From the **Automation Center** navigation pane, select **Tasks > Workflow Tasks**. The Workflow Tasks list displays.
Step 2	Right-click the Workflow that you want to delete to display an Action menu. (If you want to delete multiple Workflows, use **Ctrl+click** to select each one and then right-click any of the selected Workflows.)
Step 3	Click **Delete**.

Finding a Task in a Workflow

For any Workflow task, or any Workflow task instance (running or complete), you can find the location of any task (or multiple tasks) within that Workflow:

Step 1	On the Workflow Tasks list, right-click a Workflow task to display an Action menu.
Step 2	Click **Edit Workflow** to display the Workflow Editor for that Workflow.
Step 3	Right-click any white space in the Workflow Editor canvas. A pop-up menu displays.

Step 4	Click **Find in Workflow...** to display a Find in Workflow dialog.
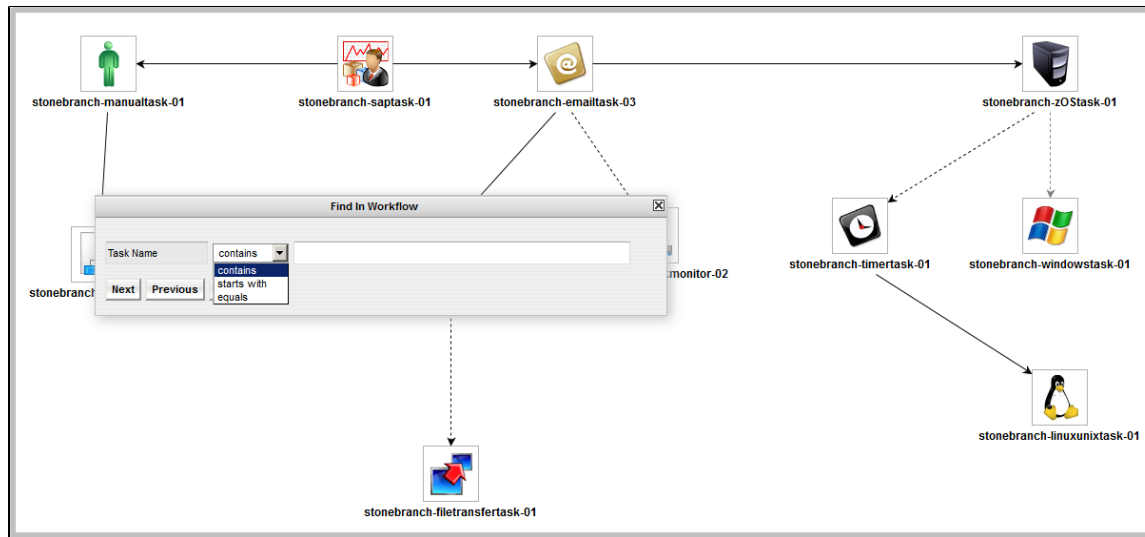
Step 5	Select an operator for the search (**contains**, **starts with**, or **equals**), enter the full or partial name of the task(s) that you want to find, and click OK. The Controller locates and displays the first task within the Workflow that matches the search criteria. Click the **Next** and/or **Previous** buttons to find any other tasks that match the search criteria.
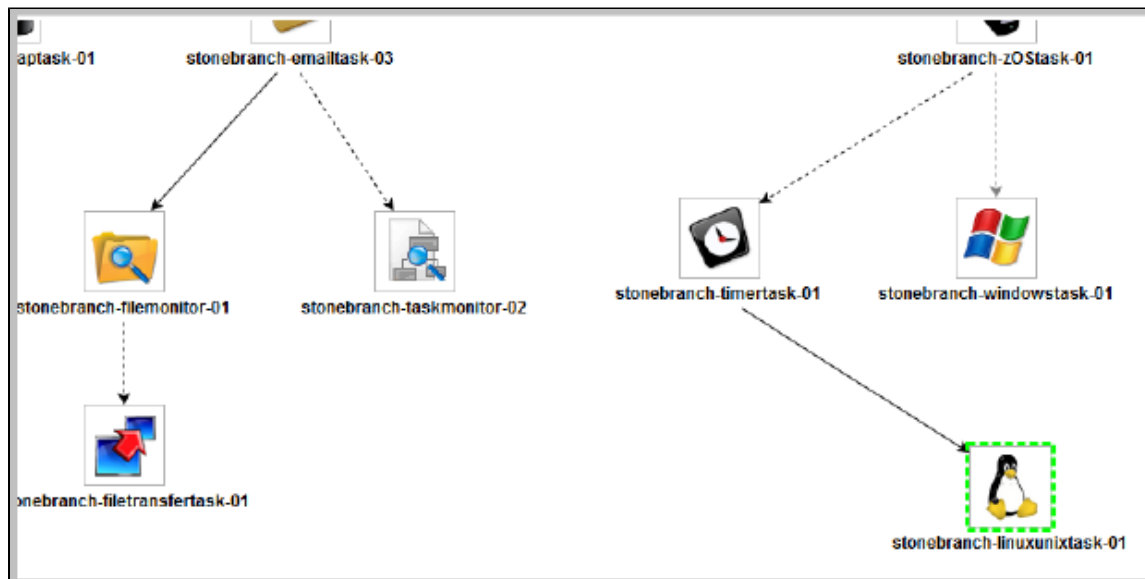
> ⚠️ **Note**
> You also can locate a task in a Workflow by using the Pan tool.

Workflow Coordinates

If you use Find in Workflow... (or Pan mode) to view different areas of a Workflow, the Controller preserves the coordinates of the last area that you viewed. If you leave the Workflow and return to it in the same browser session, the last viewed area of the Workflow displays.

To restore the displayed Workflow to its default, top-left position, you can either:

- Right-click any white space in the Workflow Editor canvas to display a pop-up menu and click **Pan To Top**.
- Start a new browser session.

Viewing a Task Instance in a Workflow from the Activity Monitor or Task Instances List

From the Activity Monitor or Task Instances list, you can view the location and status of a task instance in a Workflow.

Step 1	Open the Activity Monitor or Task Instances List.
Step 2	Right-click a task instance to display the Action menu.
Step 3	Click **View in Workflow**. The parent Workflow of the selected task instance displays, with that task instance highlighted.

> ⚠️ **Note**
> You also can view any predecessor or successor task instance of a task instance in a Workflow from the View Predecessors/Successors pop-up dialog.

Inserting a Task in an Active Workflow

After a Workflow has been launched, you can insert a new task (including a Workflow task) into an active Workflow task instance.

You can insert the task as a predecessor or successor of another task instance within the Workflow instance using the Insert Task as Predecessor or Insert Task as Successor command, respectively. Alternatively, you can use the Insert Task... command to insert a task with any number of predecessors and successors.

If you are inserting a Workflow task into an active Workflow task instance, and that Workflow task (or any sub-Workflow within that Workflow task) has the Calculate Critical Path field enabled, that field will be disabled automatically. However, if the active Workflow task instance has the Calculate Critical Path field enabled, and any task (including a Workflow task) that you are inserting into the Workflow task instance impacts the Critical Path of the Workflow task instance, the Critical Path will adjust accordingly.

See the following sections:

- Insert Non-Workflow Task as Predecessor
- Insert Workflow Task as Predecessor
- Insert Non-Workflow Task as Successor
- Insert Workflow Task as Successor

- Insert Task with Multiple Predecessors/Successors

Insert Non-Workflow Task as Predecessor

Step 1	In the Workflow Monitor, right-click a task instance.
Step 2	Click **Insert Task As Predecessor...**. The Task Insert > Task Selection dialog displays.
Step 3	Find the task you want to insert (see Searching For and Adding Tasks) and drag the task's icon onto the Workflow Editor canvas where you would like it to be inserted. The Controller inserts the task as a predecessor to the task instance that you right-clicked, and the inserted task will start to run when all of its dependencies (for example, virtual resources) have been met. If the selected task instance had not already started, it will wait until the inserted task completes and all of its other dependencies have been satisfied. For inheritance of actions on Defined status, refer to Universal Controller property Inherit Actions On Defined For Insert Task.
Step 4	By default, the inserted task will inherit the Trigger Time of the parent Workflow. If the Trigger Time of the parent Workflow is undefined, the Launch Time will be inherited as the Trigger Time instead. If you do not want the task to inherit the Trigger Time of the parent Workflow, use the Insert Task command to insert the task and de-select the Inherit Trigger Time field.

Insert Workflow Task as Predecessor

Step 1	In the Workflow Monitor, right-click a task instance.
Step 2	Click **Insert Task As Predecessor...**. The Task Insert > Task Selection dialog displays.

| **Step 3**	Find the Workflow that you want to insert (see Searching For and Adding Tasks) and drag the Workflow's icon onto the Workflow Editor canvas where you would like it to be inserted. The Task Insert > Predecessor/Successor Selection dialog displays and identifies the task that you right-clicked, which the selected Workflow will be the Predecessor of.
	Task Insert > Predecessor/Successor Selection
	Predecessors:
	sb1- universal stonebranch-emailtask-03 stonebranch-filemonitor-01 stonebranch-filetransfertask-01 stonebranch-linuxunixtask-01 stonebranch-manualtask-01 stonebranch-saptask-01 stonebranch-taskmonitor-02 stonebranch-timertask-01 stonebranch-windowstask-01
	Successors:
	sb1- universal **stonebranch-emailtask-03** stonebranch-filemonitor-01 stonebranch-filetransfertask-01 stonebranch-linuxunixtask-01 stonebranch-manualtask-01 stonebranch-saptask-01 stonebranch-taskmonitor-02 stonebranch-timertask-01 stonebranch-windowstask-01
	Inherit Trigger Time: ☑
	OK Cancel
Step 5	Optionally, you can modify the selection of Predecessors and Successors before proceeding.

Step 6	By default, the inserted Workflow will inherit the Trigger Time of the parent Workflow. If the Trigger Time of the parent Workflow is undefined, the Launch Time will be inherited as the Trigger Time instead. Therefore, by default, for task instances within an inserted Workflow, Run Criteria will be evaluated using the inherited Trigger Time. If you do not want the inserted Workflow to inherit the Trigger Time of the parent Workflow, de-select the Inherit Trigger Time field (by default, it is pre-selected). For task instances within an inserted Workflow that did not inherit the Trigger Time of the parent Workflow, Run Criteria will be evaluated using the Created Time.
Step 7	Click **OK**. The Controller inserts the Workflow task as a predecessor to the selected task instance. For inheritance of actions on Defined status, refer to Universal Controller property Inherit Actions On Defined For Insert Task.

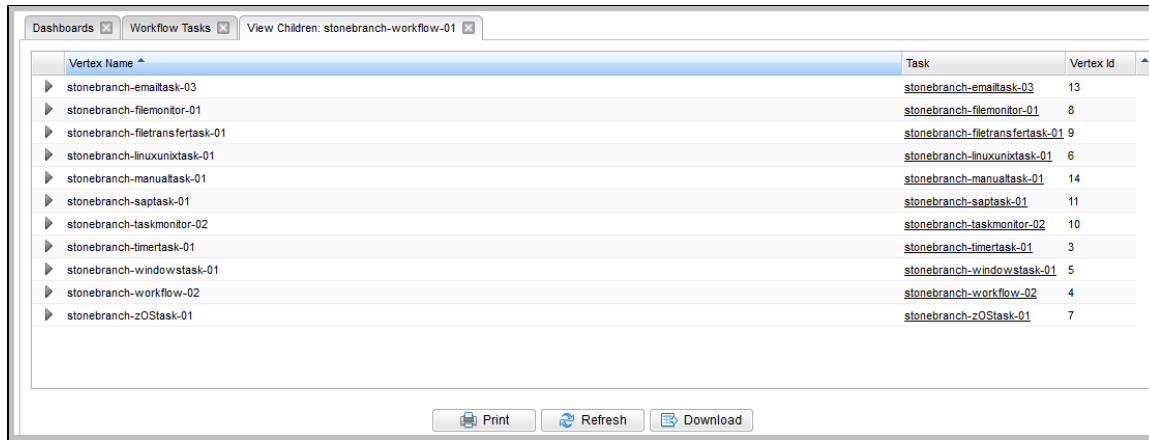## Insert Non-Workflow Task as Successor

Step 1	In the Workflow Monitor, right-click a task instance.
Step 2	Click **Insert Task As Successor...**. The Task Insert > Task Selection dialog displays.
Step 3	Find the task you want to insert (see Searching For and Adding Tasks) and drag the task's icon onto the Workflow Editor canvas where you would like it to be inserted. The Controller inserts the task as a successor to the task instance that you right-clicked. When that task instance completes, the inserted task will start to run, assuming that all of its dependencies (for example virtual resources) have been met. For inheritance of actions on Defined status, refer to Universal Controller property Inherit Actions On Defined For Insert Task.
Step 4	By default, the inserted task will inherit the Trigger Time of the parent Workflow. If the Trigger Time of the parent Workflow is undefined, the Launch Time will be inherited as the Trigger Time instead. If you do not want the task to inherit the Trigger Time of the parent Workflow, use the Insert Task command to insert the task and de-select the Inherit Trigger Time field.

Insert Workflow Task as Successor

Step 1	In the Workflow Monitor, right-click a task instance.
Step 2	Click **Insert Task As Successor...**. The Task Insert > Task Selection dialog displays.

Step 3	Find the Workflow that you want to insert (see Searching For and Adding Tasks) and drag the Workflow's icon onto the Workflow Editor canvas where you would like it to be inserted. The Task Insert > Predecessor/Successor Selection dialog displays and identifies the task that you right-clicked, which the selected Workflow will be the Successor of.
	Task Insert > Predecessor/Successor Selection **Predecessors:** sb1- universal stonebranch-emailtask-03 stonebranch-filemonitor-01 stonebranch-filetransfertask-01 stonebranch-linuxunixtask-01 stonebranch-manualtask-01 stonebranch-saptask-01 stonebranch-taskmonitor-02 stonebranch-timertask-01 stonebranch-windowstask-01 **Successors:** sb1- universal stonebranch-emailtask-03 stonebranch-filemonitor-01 stonebranch-filetransfertask-01 stonebranch-linuxunixtask-01 stonebranch-manualtask-01 stonebranch-saptask-01 stonebranch-taskmonitor-02 stonebranch-timertask-01 stonebranch-windowstask-01 **Inherit Trigger Time:** ☑ OK Cancel
Step 5	Optionally, you can modify the selection of Predecessors and Successors before proceeding.

Step 6	By default, the inserted Workflow will inherit the Trigger Time of the parent Workflow. If the Trigger Time of the parent Workflow is undefined, the Launch Time will be inherited as the Trigger Time instead. Therefore, by default, for task instances within an inserted Workflow, Run Criteria will be evaluated using the inherited Trigger Time.
	If you do not want the inserted Workflow to inherit the Trigger Time of the parent Workflow, de-select the Inherit Trigger Time field (by default, it is pre-selected).
	For task instances within an inserted Workflow that did not inherit the Trigger Time of the parent Workflow, Run Criteria will be evaluated using the Created Time.
Step 7	Click **OK**. The Controller inserts the Workflow task as a successor to the selected task instance.
	For inheritance of actions on Defined status, refer to Universal Controller property Inherit Actions On Defined For Insert Task.

Insert Task with Multiple Predecessors/Successors

Step 1	In the Workflow Monitor, right-click any white space in the Workflow Editor canvas.
Step 2	Click **Insert Task...**. The Task Insert > Task Selection dialog displays.
Step 3	Find the task you want to insert (see Searching For and Adding Tasks) and drag the task's icon onto the Workflow Editor canvas where you would like it to be inserted.

Step 4	The Task Insert > Predecessor/Successor Selection dialog displays.
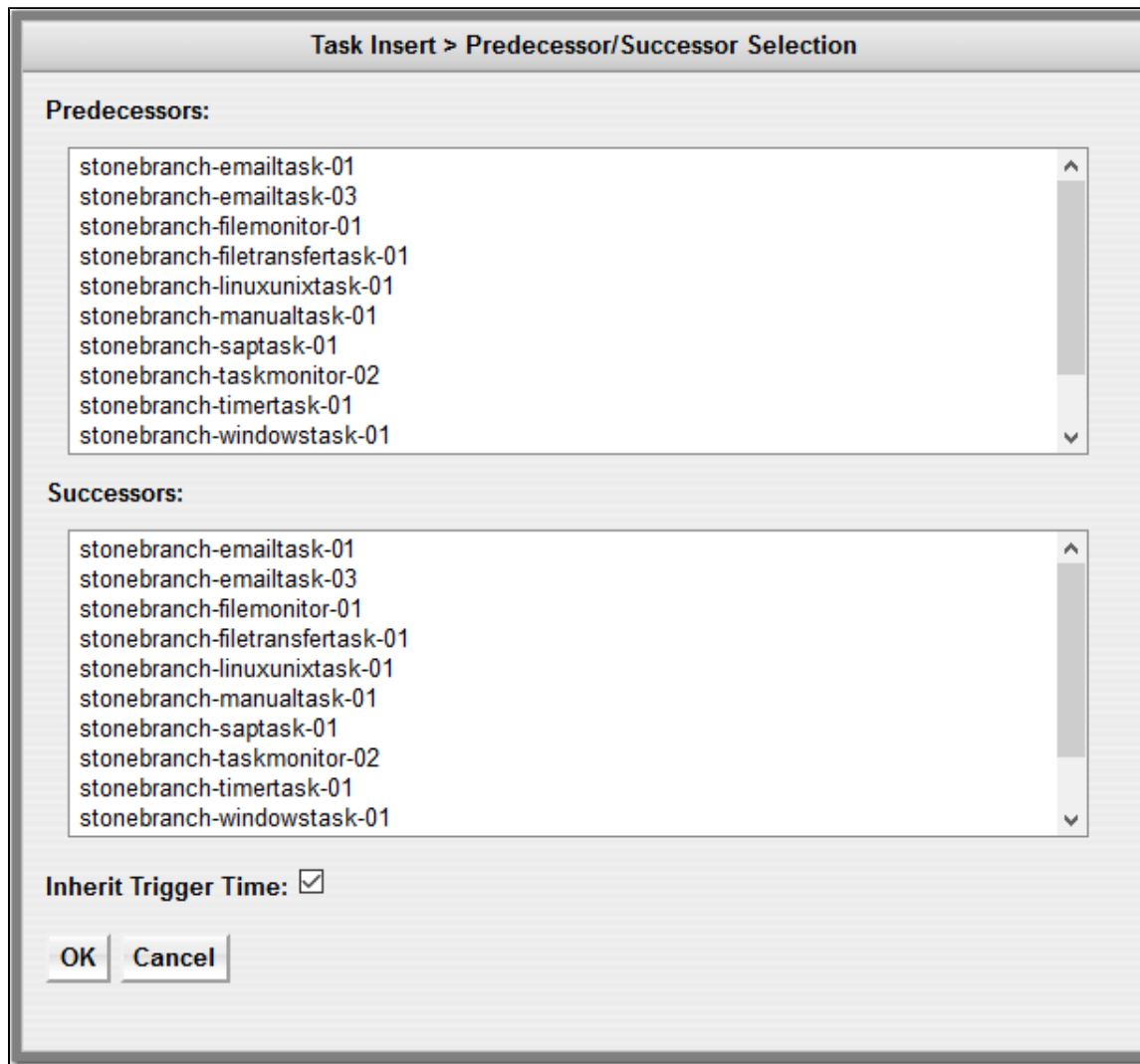
Step 5	Select zero or more predecessors and zero or more Successors for the inserted task.
Step 6	By default, the inserted task will inherit the Trigger Time of the parent Workflow. If the Trigger Time of the parent Workflow is undefined, the Launch Time will be inherited as the Trigger Time instead. For task instances within an inserted Workflow, Run Criteria will be evaluated using the inherited Trigger Time.
	If you do not want the inserted task to inherit the Trigger Time of the parent Workflow, de-select the Inherit Trigger Time field (by default, it is pre-selected).
	For task instances within an inserted Workflow that did not inherit the Trigger Time of the parent Workflow, Run Criteria will be evaluated using the Created Time.

Step 7	Click **OK**. The Controller inserts the task as a successor to the selected predecessor task instance(s) and as a predecessor to the selected successor task instance(s).

- When the selected predecessor task instances complete, the inserted task will start to run, assuming that all of its dependencies (for example, virtual resources) have been met.
- If the selected successor task instances had not already started, they will wait until the inserted task completes and all of their other dependencies have been satisfied.

> ⚠️ **Note**
> Any predecessor task that is in a SUCCESS, FINISHED, or SKIPPED status will not prevent the inserted task from running.

For inheritance of actions on Defined status, refer to Universal Controller property Inherit Actions On Defined For Insert Task.

Viewing Children Tasks

You can view workflow children tasks for a Workflow task and a Workflow task instance.

Viewing Children Tasks of a Workflow Task

You can view all children tasks of a Workflow task (and children tasks of any sub-workflow) from any of the following locations:

All Tasks list	Right-click any workflow task in the list to access the View Children action from the Workflow Task Commands menu.
Workflow Tasks List	Right-click any workflow task in the list to access the View Children action from the Workflow Task Commands menu.
Workflow Task Details	Right-click anywhere in the Details to access the View Children action from the Workflow Task Commands menu.
Workflow Editor	Right-click any white-space or workflow task vertex to access the View Children action.
Workflow Forecast	Right-click any white-space or workflow task vertex to access the View Children action.

Viewing Children Tasks of a Workflow Task Instance

You can view all children tasks of a Workflow task instance (and children tasks of any sub-workflow) from any of the following locations:

Activity Monitor	Right-click any workflow task instance in the list to access the View Children action from the Workflow Task Commands menu.
Task Instances list	Right-click any workflow task instance in the list to access the View Children action from the Workflow Task Commands menu.
Workflow Task Instance Details	Right-click anywhere in the Details to access the View Children action from the Workflow Task Commands menu.
Workflow Monitor	Right-click any white-space or workflow task instance vertex to access the View Children action.
Workflow Task Details	Click the Instances tab of any workflow task, then right-click any workflow task instance in the list to access the View Children action from the Workflow Task Commands menu.

Viewing a Workflow Tree

You can view a Workflow tree (that is, a hierarchical display of the workflow and its tasks) for a Workflow task and a Workflow task instance.

> ⚠️ **Note**
> You can apply the same layout to a Workflow Tree as you can to any list.

Viewing a Workflow Tree for a Workflow Task

You can view a Workflow Tree for a workflow task from any of the following locations.

All Tasks list	Right-click any workflow task in the list to access the View Tree action from the Workflow Task Commands menu.
Workflow Tasks List	Right-click any workflow task in the list to access the View Tree action from the Workflow Task Commands menu.
Workflow Task Details	Right-click anywhere in the Details to access the View Tree action from the Workflow Task Commands menu.
Workflow Editor	Right-click any white-space or workflow task vertex to access the View Tree action.
Workflow Forecast	Right-click any white-space or workflow task vertex to access the View Tree action.
Tree View	Right-click any workflow task within a Tree View to access the View Tree action from the Workflow Task Commands menu. The Tree View for that workflow task will display in a new tab.
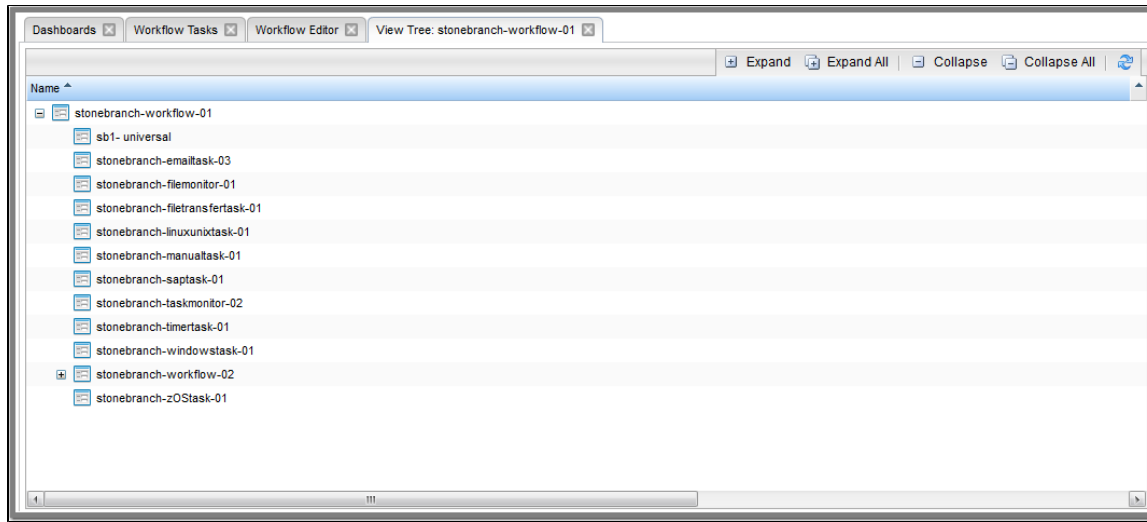
Viewing a Workflow Tree for a Workflow Task Instance

You can view a Workflow Tree for a workflow task instance from any of the following locations.

Activity Monitor	Right-click any workflow task instance in the list to access the View Tree action from the Workflow Task Commands menu.
Task Instances list	Right-click any workflow task instance in the list to access the View Tree action from the Workflow Task Commands menu.
Workflow Task Instance Details	Right-click anywhere in the Details to access the View Tree action from the Workflow Task Commands menu.
Workflow Monitor	Right-click any white-space or workflow task instance vertex to access the View Tree action.
Workflow Task Details	Click the Instances tab of any workflow task, then right-click any workflow task instance in the list to access the View Tree action from the Workflow Task Commands menu.
Tree View	Right-click any workflow task instance within a Tree View to access the View Tree action from the Workflow Task Commands menu. The Tree View for that workflow task instance will display in a new tab.
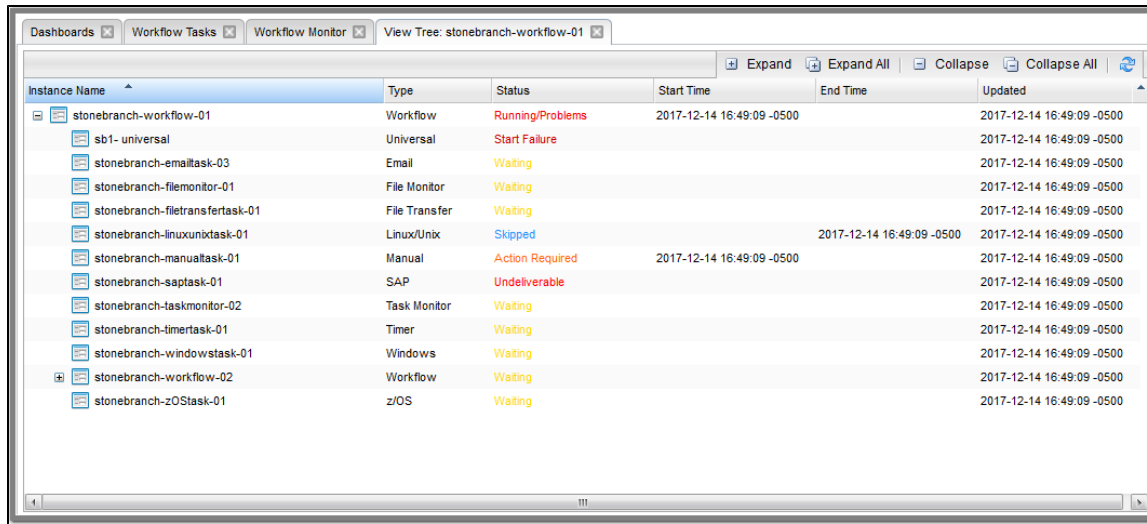
> ⚠️ **Note**
> If the Critical Path Calculations Permitted Universal Controller system property is set to true, the Details icon for any task instance on the Critical Path will display in red.

Expanding/Collapsing the Tree View

To view the child tasks of any sub-Workflow in a tree, click the **+** to expand the tree view for that sub-Workflow.

To hide the child tasks of any sub-Workflow in a tree, click the **-** to collapse the tree view for that sub-Workflow.

Additionally, you can use the **Expand**, **Expand All**, **Collapse**, and **Collapse All** buttons in the toolbar along the top of the Tree View.

Expand	Expands any collapsed and visible workflow nodes one level.
Expand All	Expands all nodes in the tree.
Collapse	Collapses one level of workflow nodes, starting from the open workflow node at the deepest level.
Collapse All	Collapses all open workflow nodes, excluding the root-level workflow node.

Refreshing the Tree View

To refresh the Tree View, click the refresh icon in the toolbar along the top of the Tree View.

Viewing Task Predecessors/Successors

You can view all predecessors and successors of a task (or task instance) in a Workflow from:

- Activity Monitor
- Task Instances list
- Workflow Editor
- Workflow Monitor

You also can view all predecessors and successors of all tasks (or task instances) in a Workflow from:

- Workflows list
- Workflow task Details
- Activity Monitor
- Task Instances list
- Workflow task instance Details

See the following sections:

- Viewing Predecessors/Successors of a Single Task Instance from the Activity Monitor or Task Instances List
- Viewing Predecessors/Successors of a Single Task from the Workflow Editor
- Viewing Predecessors/Successors of a Single Task Instance from the Workflow Monitor
- Viewing Detailed Status of Predecessors/Successors of a Single Task Instance from Workflow Monitor
- Viewing Predecessors/Successors of All Tasks in a Workflow Task
- Viewing Predecessors/Successors of All Task Instances in a Workflow Task Instance

Viewing Predecessors/Successors of a Single Task Instance from the Activity Monitor or Task Instances List

Step 1	Display the Activity Monitor or Task Instances List.
Step 2	Right-click a task instance to display an Action menu.

Step 3	Click **View Predecessors/Successors** to display the View Predecessors/Successors pop-up dialog.
	The View Predecessors/Successors pop-up dialog provides separate lists of all predecessor and successor task instances of the selected task instance in the Workflow, and status information for each of the predecessor/successor dependencies.
Step 4	If you want to view the task instance Details of any predecessor or successor task instance, click that task instance.
Step 5	If you want to view a predecessor or successor task instance of the selected task instance within the Workflow, right-click that task instance to display an Action menu, and then click **View Workflow**.
	The parent Workflow of the selected task instance displays, with the selected predecessor or successor task instance highlighted.
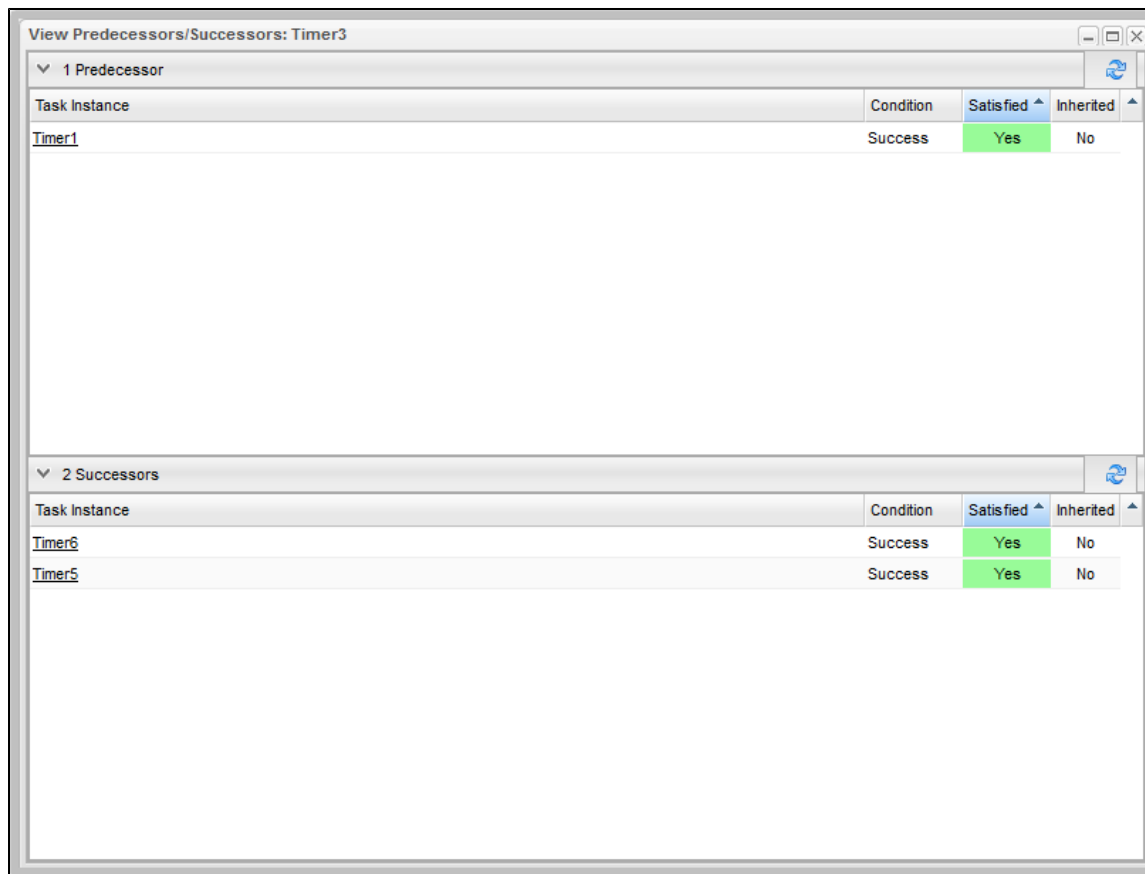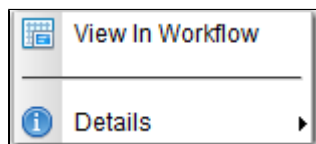
Viewing Predecessors/Successors of a Single Task from the Workflow Editor

Step 1	Open the Workflow Editor.
Step 2	Right-click a task to display an Action menu.
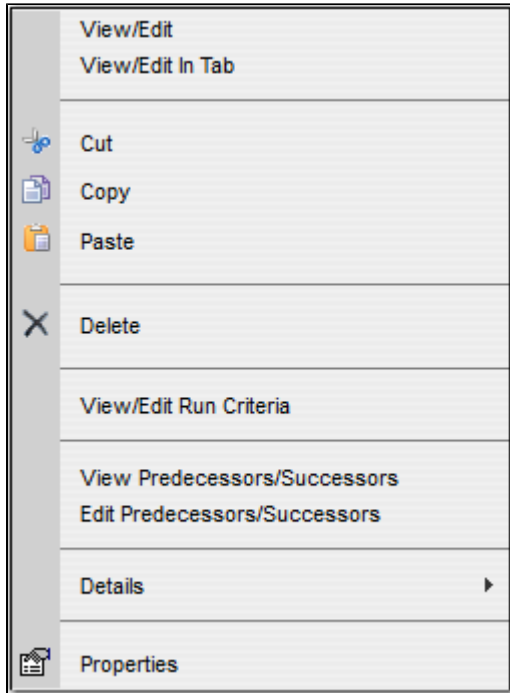
Step 3	Right-click **View Predecessors/Successors** to display the View Predecessors/Successors pop-up.
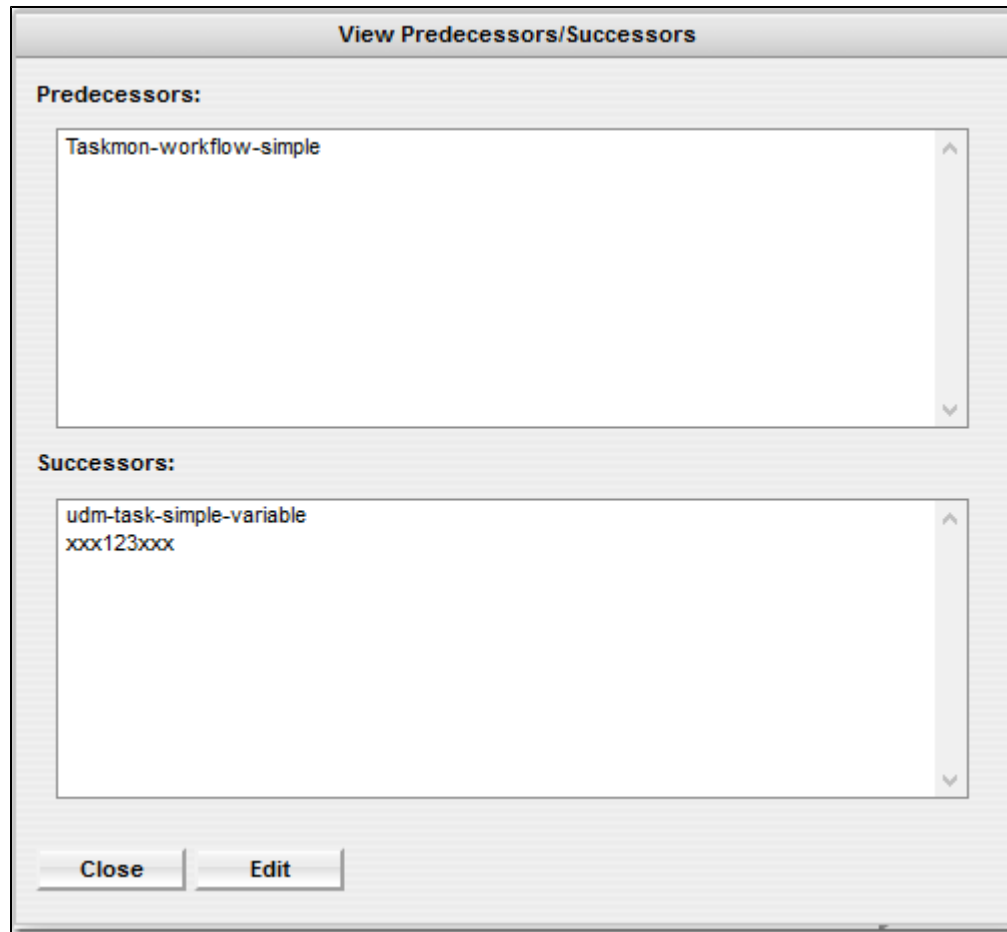
The View Predecessors/Successors pop-up provides separate lists of all predecessor and successor tasks of the selected task in the Workflow.

- Click a task in either list to select and center it within the Workflow Editor display.
- Double-click a task in either list to select and center it within the Workflow Editor display and close the View Predecessors/Successors pop-up.

Step 4	Click **Edit** if you want to edit the predecessors and successors of this task in the workflow.

Viewing Predecessors/Successors of a Single Task Instance from the Workflow Monitor

> ⚠ **Note**
> To view more detailed task instance predecessor/successor information from the Workflow Monitor than is available via this procedure, see Viewing Detailed Status of Predecessors / Successors of a Single Task Instance from Workflow Monitor, below.

Step 1	Open the Workflow Monitor.
Step 2	Right-click a task instance to display an Action menu.

Step 3	Right-click **View Predecessors/Successors** to display the View Predecessors/Successors pop-up.

The View Predecessors/Successors pop-up provides separate lists of all predecessor and successor task instances of the selected task instance in the Workflow.

- Click a task in either list to select and center it within the Workflow Monitor display.
- Double-click a task in either list to select and center it within the Workflow Monitor display and close the View Predecessors/Successors pop-up.

Viewing Detailed Status of Predecessors/Successors of a Single Task Instance from Workflow Monitor

Step 1	Open the Workflow Monitor.
Step 2	Double-click a task instance, or right-click and select **View/Edit**, to see its Task Instance Details.
Step 3	Right-click in the Task Instance Details to display an Action menu.

Step 4	Click **View Predecessors/Successors** to display a detailed view of the View Predecessors/Successors pop-up dialog.
	The View Predecessors/Successors pop-up dialog provides separate lists of all predecessor and successor task instances of the selected task instance in the Workflow, and status information for each of the predecessor/successor dependencies.
Step 5	If you want to view the task instance Details of any predecessor or successor task instance, click that task instance.
Step 6	If you want to view a predecessor or successor task instance of the selected task instance within the Workflow, right-click that task instance to display an Action menu, and then click **View Workflow**.
	The parent Workflow of the selected task instance displays, with the selected predecessor or successor task instance highlighted.
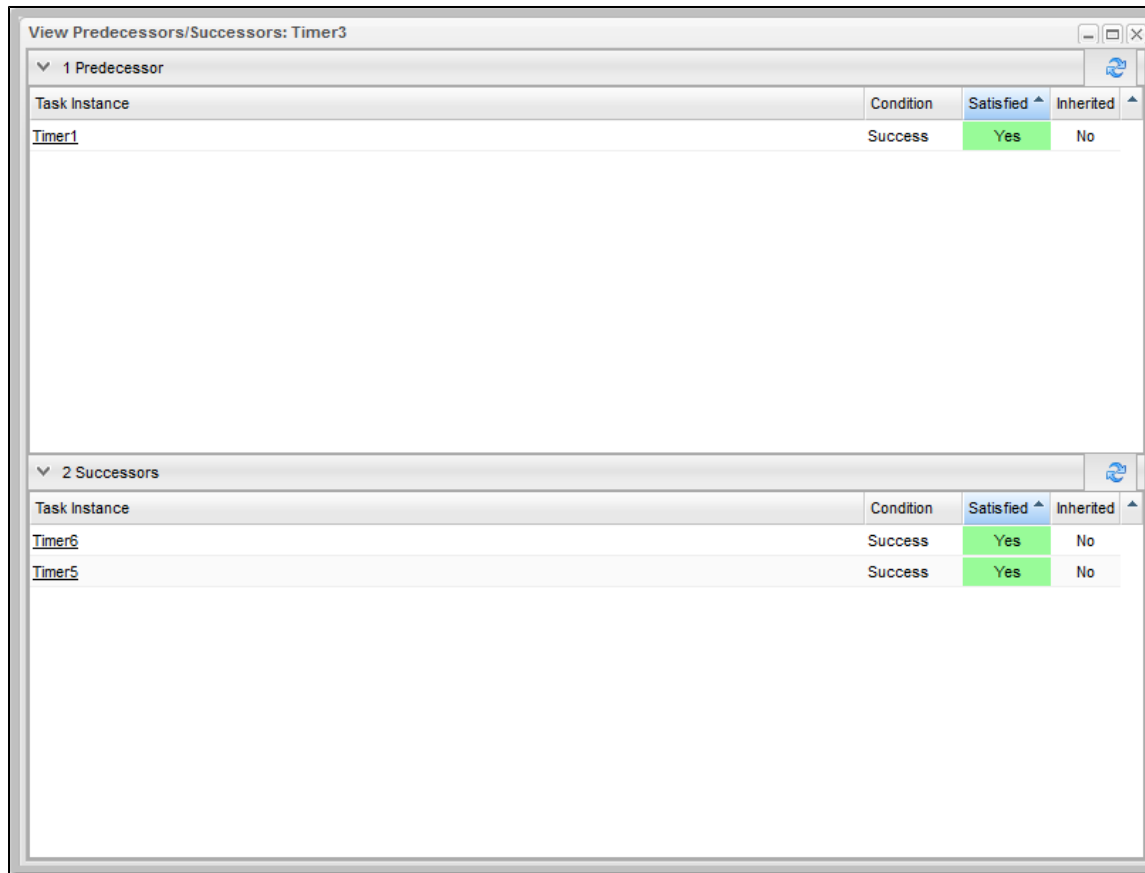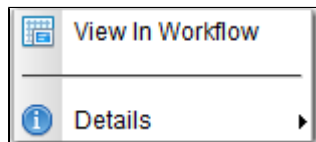
Viewing Predecessors/Successors of All Tasks in a Workflow Task

You can view the predecessors/successors of all tasks in a Workflow task from:
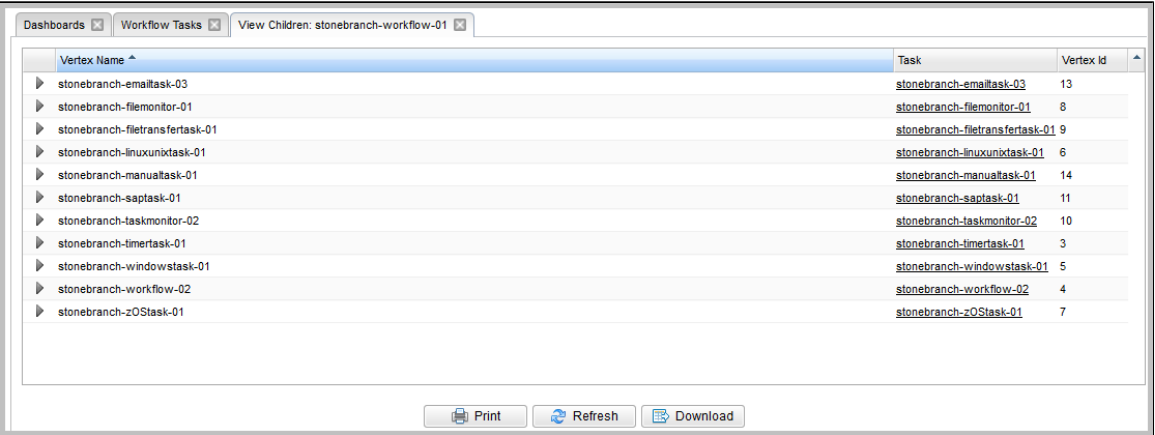
- Workflow task on Workflows list
- Workflow task Details
- Workflow Editor
- Workflow Forecast
- Workflow Vertex in Workflow Editor and Workflow Forecast

Viewing predecessors/successors of all tasks in a Workflow task also lets you:

- View task run criteria for all tasks in the Workflow.
- View and/or download a list of predecessors/successors and task run criteria for all tasks in the Workflow.

Step 1	Display the Workflows list.
Step 2	Right-click a Workflow on the list and select **View Children** from the Action menu, or right-click within the task Details for the Workflow and select **View Children**. A list of child tasks within that Workflow displays.

Step 3	Click the Expand icon (▷) next to any child task to display additional content for that child task, including Task Run Criteria, Predecessors, and Successors.
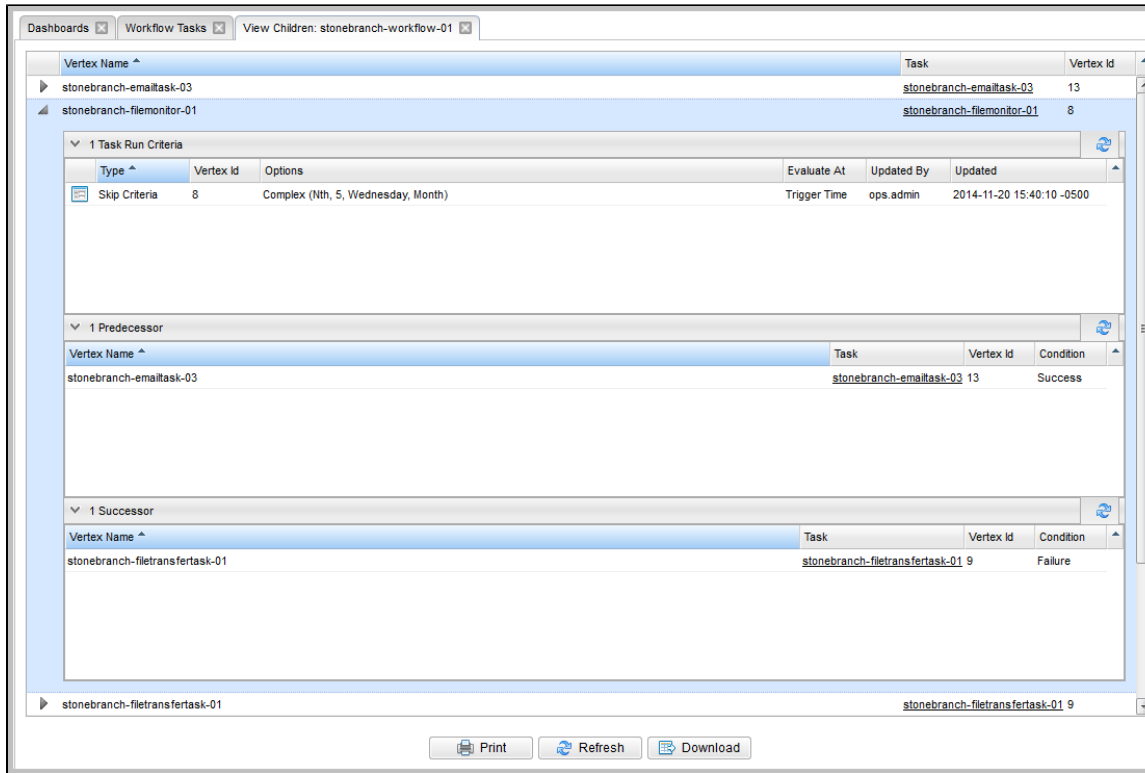
Step 4	For any Task Run Criteria on the list, click the Details icon to displays its record Details, or right-click it to display a menu of options available for that Task Run Criteria.
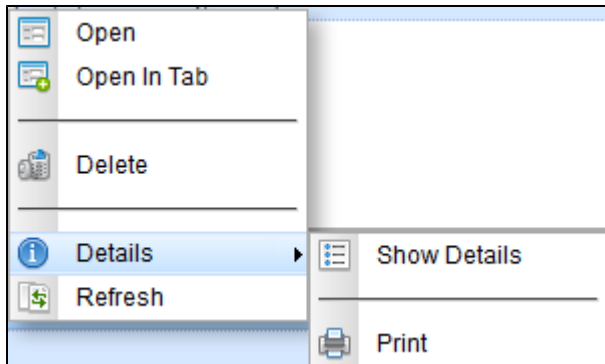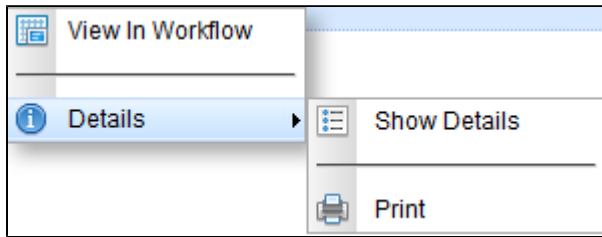
Step 5	For any Predecessor / Successor on the list, right-click it to display a menu of options available for that predecessor/successor.
Step 6	To view and/or save a list of all predecessors/successors and task run criteria for all child tasks within the Workflow, click the **Download** button on the View Children list.

```
stonebranch-workflow-01 {Number Of Tasks=11}

stonebranch-emailtask-03 {Vertex Id=13}
  1 Predecessor
    stonebranch-saptask-01 {Vertex Id=11, Condition=Success}
  3 Successors
    stonebranch-filemonitor-01 {Vertex Id=8, Condition=Success}
    stonebranch-taskmonitor-02 {Vertex Id=10, Condition=Success/Failure}
    stonebranch-zOStask-01 {Vertex Id=7, Condition=Success}

stonebranch-filemonitor-01 {Vertex Id=8}
  1 Task Run Criteria
    Complex (Nth, 5, Wednesday, Month) {Type=Skip Criteria, Vertex Id=8, Evaluate At=Trigger Time}
  1 Predecessor
    stonebranch-emailtask-03 {Vertex Id=13, Condition=Success}
  1 Successor
    stonebranch-filetransfertask-01 {Vertex Id=9, Condition=Failure}

stonebranch-filetransfertask-01 {Vertex Id=9}
  1 Predecessor
    stonebranch-filemonitor-01 {Vertex Id=8, Condition=Failure}

stonebranch-linuxunixtask-01 {Vertex Id=6}
  1 Predecessor
    stonebranch-timertask-01 {Vertex Id=3, Condition=Success}

stonebranch-manualtask-01 {Vertex Id=14}
  1 Predecessor
    stonebranch-saptask-01 {Vertex Id=11, Condition=Success}
  1 Successor
    stonebranch-workflow-02 {Vertex Id=4, Condition=Success}

stonebranch-saptask-01 {Vertex Id=11}
  2 Successors
    stonebranch-emailtask-03 {Vertex Id=13, Condition=Success}
    stonebranch-manualtask-01 {Vertex Id=14, Condition=Success}

stonebranch-taskmonitor-02 {Vertex Id=10}
  1 Predecessor
    stonebranch-emailtask-03 {Vertex Id=13, Condition=Success/Failure}

stonebranch-timertask-01 {Vertex Id=3}
  1 Predecessor
```

```
stonebranch-zOStask-01 {Vertex Id=7, Condition=Exit Code(s): 20}
   1 Successor
      stonebranch-linuxunixtask-01 {Vertex Id=6, Condition=Success}

stonebranch-windowstask-01 {Vertex Id=5}
   1 Predecessor
      stonebranch-zOStask-01 {Vertex Id=7, Condition=Step Condition(s): STEP2:PS1:USAP:220}

stonebranch-workflow-02 {Vertex Id=4}
   1 Predecessor
      stonebranch-manualtask-01 {Vertex Id=14, Condition=Success}

stonebranch-zOStask-01 {Vertex Id=7}
   1 Predecessor
      stonebranch-emailtask-03 {Vertex Id=13, Condition=Success}
   2 Successors
      stonebranch-timertask-01 {Vertex Id=3, Condition=Exit Code(s): 20}
      stonebranch-windowstask-01 {Vertex Id=5, Condition=Step Condition(s): STEP2:PS1:USAP:220}
```

| Step 7 | To print all currently displayed information on the list, click the **Print** button. |
| Step 8 | To refresh all information on the list, click the **Refresh** button. |

Viewing Predecessors/Successors of All Task Instances in a Workflow Task Instance

You can view the predecessors/successors of all task instances in a Workflow task instance from:

- Activity Monitor
- Task Instances list
- Workflow task instance Details
- Workflow Monitor

| Step 1 | Display the Activity Monitor or Task Instances list. |
| Step 2 | Right-click a Workflow on the Activity Monitor or Task Instances list, or open a Workflow on the Activity Monitor or Task Instances list and then right-click within that Workflow Details, to display an Action menu. |

Step 3 Select **Workflow Task Commands > View Children** to display a list of child task instances within that Workflow.

		Instance Name ▲	Type	Status	Start Time	End Time	Updated
▶		stonebranch-zOStask-01	z/OS	Waiting			2016-02-02 17:33:03 -0500
▶		stonebranch-workflow-02	Workflow	Waiting			2016-02-02 17:33:03 -0500
▶		stonebranch-windowstask-01	Windows	Waiting			2016-02-02 17:33:03 -0500
▶		stonebranch-timertask-01	Timer	Waiting			2016-02-02 17:33:03 -0500
▶		stonebranch-taskmonitor-02	Task Monitor	Waiting			2016-02-02 17:33:03 -0500
▶		stonebranch-saptask-01	SAP	Undeliverable			2016-02-02 17:33:04 -0500
▶		stonebranch-manualtask-01	Manual	Waiting			2016-02-02 17:33:03 -0500
▶		stonebranch-linuxunixtask-01	Linux/Unix	Waiting			2016-02-02 17:33:03 -0500
▶		stonebranch-filetransfertask-01	File Transfer	Waiting			2016-02-02 17:33:03 -0500
▶		stonebranch-filemonitor-01	File Monitor	Waiting			2016-02-02 17:33:03 -0500
▶		stonebranch-emailtask-03	Email	Waiting			2016-02-02 17:33:03 -0500
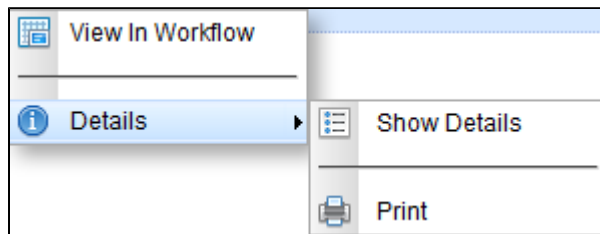
Tabs: Dashboards | Workflow Tasks | Activity | View Children: stonebranch-workflow-01

[Print] [Refresh]

Step 4	Click the Expand icon (▶) next to any child task instance to display additional content for that child task instance, including Predecessors and Successors.

Step 5	For any Predecessor / Successor on the list, right-click it to display a menu of options available for that predecessor/successor.

Step 6	To print all currently displayed information on the list, click the **Print** button.
Step 7	To refresh all information on the list, click the **Refresh** button.

Editing Task Predecessors/Successors

You can edit all predecessors and successors of a task in a Workflow from the Workflow Editor.

Editing predecessors and successors refers to adding predecessors and successors to a selected task and/or removing predecessors and successors from a selected task.

When adding a predecessor or successor through the Edit Predecessors/Successors dialog, the condition for the dependency will always be added as a Success condition, using a straight edge.

Conditions for any existing predecessor or successor dependencies will be preserved, assuming the predecessor or successor dependencies are not removed.

Step 1	Open the Workflow Editor.
Step 2	Right-click a Task to display an Action menu.

Step 3	Click **Edit Predecessors/Successors** to display the Edit Predecessors/Successors pop-up dialog.
	All predecessor and successor tasks of the selected task are highlighted; all other tasks are not highlighted.
	⚠ **Note** You also can choose to edit predecessors and successors from the View Predecessors/Successors dialog.
Step 4	To add a task as a predecessor or successor to the selected task, hold the Ctrl key and click the name of that task. To remove a task as a predecessor or successor to the selected task, hold the Ctrl key and click the name of that task.
Step 5	To add a task as a predecessor or successor to the selected task and remove all other predecessors or successors, click the name of that task.
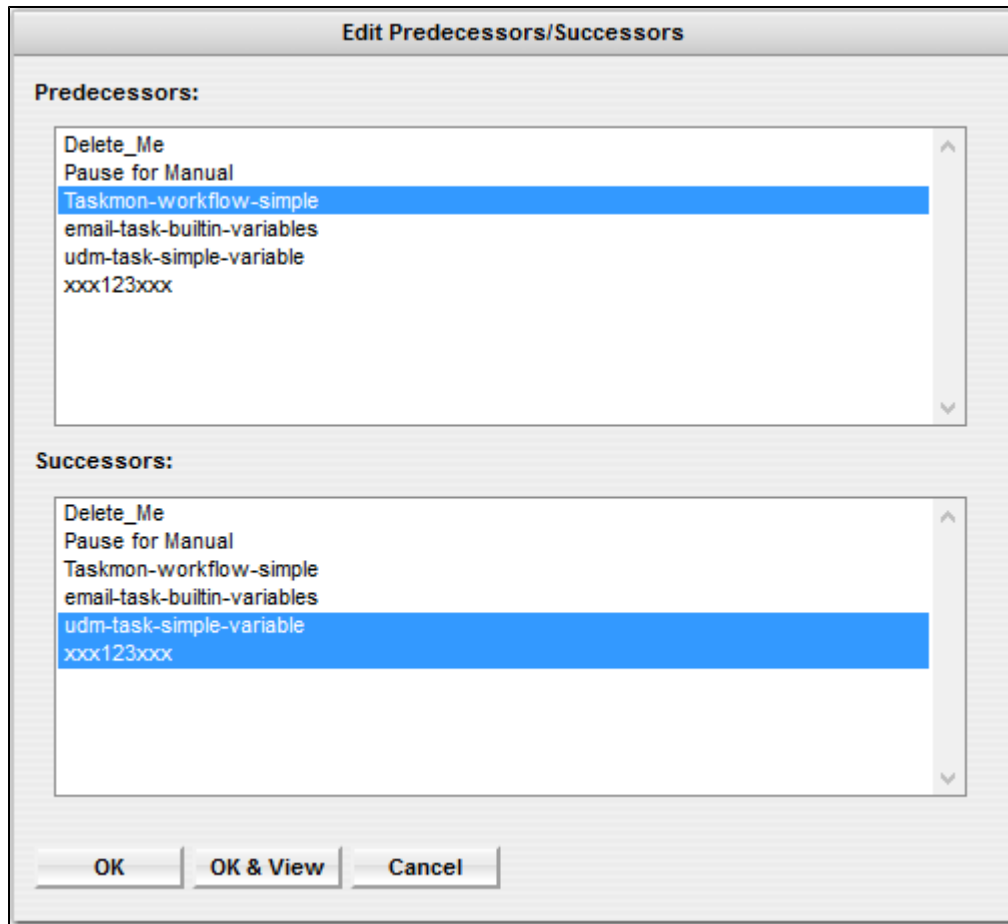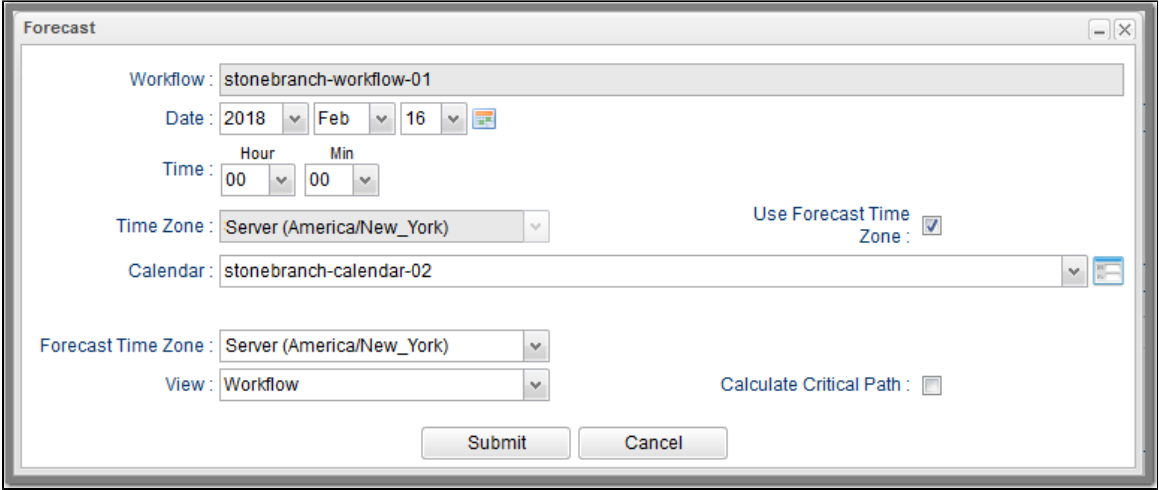
Forecasting a Workflow for a Specific Date/Time

You can display forecast information for a Workflow for a specific date and time. This provides a view of how a Workflow will look based on the Run/Skip Criteria for that date and time.

You can forecast a Workflow, without requiring a Trigger or Trigger forecast data, for any date/time within a span of five years in the past and 10 years in the future.

Step 1	From the **Automation Center** navigation pane, select **Tasks > All Tasks** or **Tasks > Workflow Tasks**.

Step 2	Display an Action menu either of three ways:
	
	    • Right-click the Workflow in the **All Tasks** or **Workflow Tasks** list.
	    • Open the Workflow and right-click in the Details.
	    • Open the Workflow, click the Triggers tab, and right-click a Trigger on the list.

Step 3	Click **Forecast...** to display a Forecast dialog.

Step 4	Select a Date, Time, Time Zone, and Calendar for when you want to forecast the Workflow (and all of its sub-Workflows, if any).
	- If you selected Forecast from the **All Tasks** list, **Workflow Tasks** list, or Workflow Details, the default Calendar of the Workflow displays. - If you selected Forecast from the Triggers tab list, the default Calendar of the selected Trigger displays.
	By default, the **Time Zone** field is read-only and displays the time zone in the **Forecast Time Zone** field, since the **Use Forecast Time Zone** field is checked.
	; The Forecast Time Zone field allows you to change what time zone this forecast of the Workflow will evaluate in. It defaults to the time zone of the Controller but can be modified to another time zone.
	Uncheck the **Use Forecast Time Zone** field if you want to enable the **Time Zone** field and enter a different time zone.
	The **Forecast Time Zone** and **Use Forecast Time Zone** fields allow the forecast to evaluate as if in one time zone, and also allow the Date and Time of the forecast to be based upon another time zone. The time zone associated with the Date and Time is used only for calculating the Date and Time at which the forecast starts.
	For example, a Forecast could be executed to run at a specific date and time with respect to **Time Zone**, and yet the Forecast itself will execute, and evaluate Run Criteria and Execution Restrictions, based upon the Forecast Time Zone.
Step 5	Select a **View** in which you want to display the Forecast: **Workflow** or **List**.
Step 6	If you selected **Workflow View**, a **Calculate Critical Path** field displays. Enable/disable this field depending on whether or not you want to calculate the Critical Path of the Workflow.
Step 7	

Click **Submit** to display the Forecast in the selected View.

Workflow View
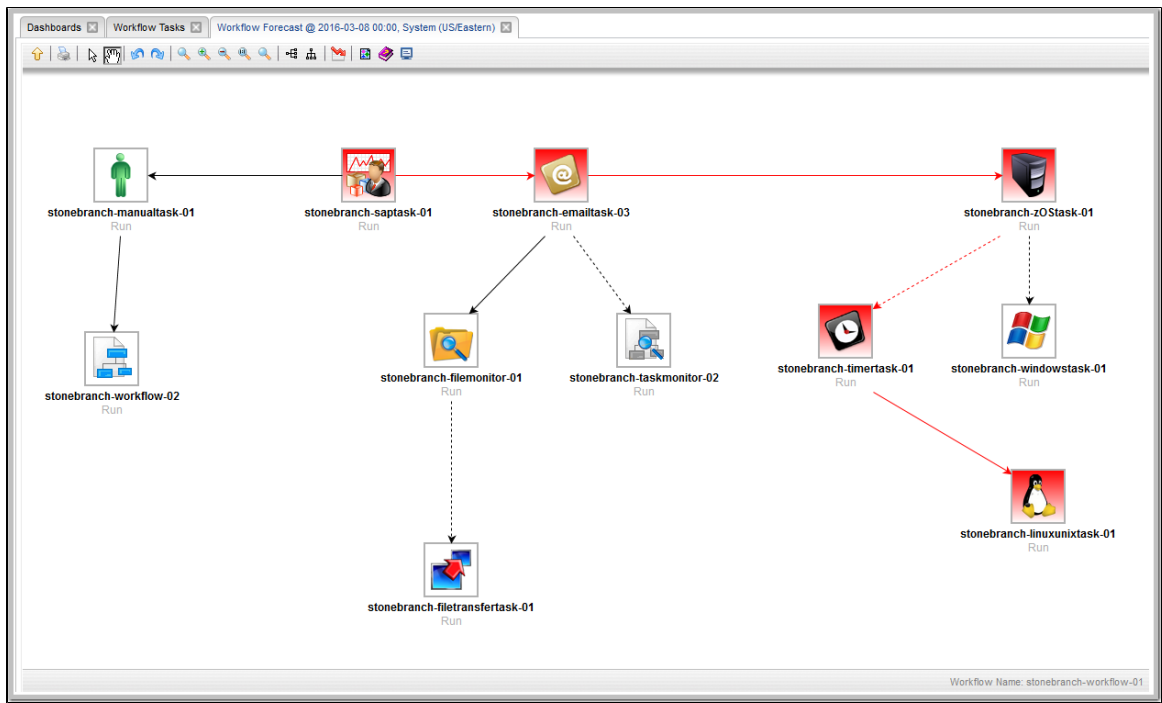
In the Workflow View, each task has a Run Criteria evaluation label:

- Run - Task border is gray and solid.
- Skip - Task border is red and solid.
- Not Evaluated - Task border is gray and dotted. (Run/skip criteria for this task is dependent on variable resolution; could not be evaluated.)

If you enabled **Calculate Critical Path**:

- Task instances and connectors in the Critical Path display in the color specified by the Critical Path Color system property.
- Run/skip criteria is resolved based upon the date specified in the Forecast option.
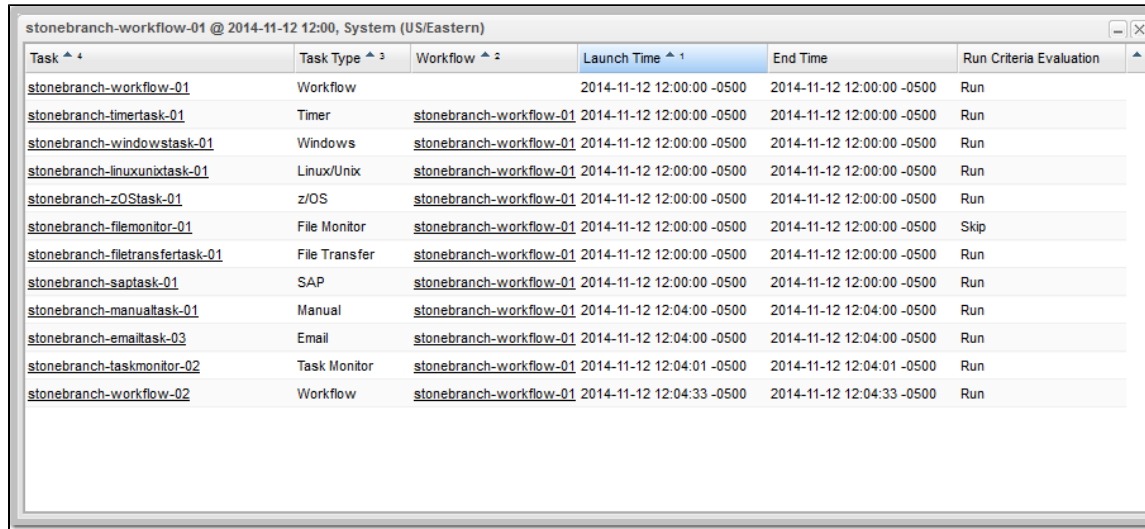
> ⚠️ **Note**
> You can choose to show or hide skipped tasks in the Workflow View of the Forecast just as you can on a Workflow Monitor.
>
> If **Calculate Critical Path** is enabled, skipped task instances are hidden, and the Show Skipped/Restore and Hide Skipped context-menu items are not available.
>
> If **Calculate Critical Path** is enabled, but you want to see skipped task instances, you can restore the standard view by clicking the Toggle Critical Path View icon in the Workflow Forecast toolbar (see Workflow Editor Toolbar for a description of the tools in this toolbar).

The Workflow View lets you navigate into sub-Workflows (by double-clicking them) and back to the parent Workflow (via the Go to Parent icon).

List View

stonebranch-workflow-01 @ 2014-11-12 12:00, System (US/Eastern)						
Task ▲ 4	**Task Type ▲ 3**	**Workflow ▲ 2**	**Launch Time ▲ 1**	**End Time**	**Run Criteria Evaluation**	
stonebranch-workflow-01	Workflow		2014-11-12 12:00:00 -0500	2014-11-12 12:00:00 -0500	Run	
stonebranch-timertask-01	Timer	stonebranch-workflow-01	2014-11-12 12:00:00 -0500	2014-11-12 12:00:00 -0500	Run	
stonebranch-windowstask-01	Windows	stonebranch-workflow-01	2014-11-12 12:00:00 -0500	2014-11-12 12:00:00 -0500	Run	
stonebranch-linuxunixtask-01	Linux/Unix	stonebranch-workflow-01	2014-11-12 12:00:00 -0500	2014-11-12 12:00:00 -0500	Run	
stonebranch-zOStask-01	z/OS	stonebranch-workflow-01	2014-11-12 12:00:00 -0500	2014-11-12 12:00:00 -0500	Run	
stonebranch-filemonitor-01	File Monitor	stonebranch-workflow-01	2014-11-12 12:00:00 -0500	2014-11-12 12:00:00 -0500	Skip	
stonebranch-filetransfertask-01	File Transfer	stonebranch-workflow-01	2014-11-12 12:00:00 -0500	2014-11-12 12:00:00 -0500	Run	
stonebranch-saptask-01	SAP	stonebranch-workflow-01	2014-11-12 12:00:00 -0500	2014-11-12 12:00:00 -0500	Run	
stonebranch-manualtask-01	Manual	stonebranch-workflow-01	2014-11-12 12:04:00 -0500	2014-11-12 12:04:00 -0500	Run	
stonebranch-emailtask-03	Email	stonebranch-workflow-01	2014-11-12 12:04:00 -0500	2014-11-12 12:04:00 -0500	Run	
stonebranch-taskmonitor-02	Task Monitor	stonebranch-workflow-01	2014-11-12 12:04:01 -0500	2014-11-12 12:04:01 -0500	Run	
stonebranch-workflow-02	Workflow	stonebranch-workflow-01	2014-11-12 12:04:33 -0500	2014-11-12 12:04:33 -0500	Run	

The List View displays forecast data for the Workflow and all of its tasks, including all sub-Workflows and their tasks.

Forecasting with Override Calendar Options

A workflow being forecasted by the **Forecast...** command will use the Calendar specified on the Forecast... dialog; the Override Calendar options (Default Calendar and Override Inherited Calendar) on the workflow being directly forecasted do not apply.

Any sub-workflow within the workflow being directly forecasted will honour its own Override Calendar options. If no Override Calendar options are defined, the command-specified Calendar is used.

If the sub-workflow within the workflow being directly forecasted contains a deeper sub-workflow, that deeper sub-workflow will honour its own Override Calendar options or, if none are specified, the Override Calendar options of a parent workflow (excluding the directly forecasted workflow for which the Calendar was specified on the **Forecast...** command). If no Override Calendar options are defined, the command-specified Calendar is used.

Modifying Tasks in a Workflow

You can make the following modifications for tasks in a Workflow:

- Changing the Priority of a Task Instance
- Re-running a Task Instance
- Cancelling a Task Instance

- Force Finishing a Task Instance
- Putting a Task Instance on Hold
- Releasing a Task Instance from Hold
- Skipping a Task Instance
- Showing or Hiding Skipped Task Instances
- Unskipping a Task Instance
- Clearing All Predecessor Dependencies for a Task Instance
- Marking a Task Instance Dependency as Satisfied

Monitoring Workflows

Overview

Universal Controller allows you to monitor running Workflows in graphical format. As the Workflow progresses, the display provides up-to-date textual and color-coded status information for each task instance in the Workflow. You can also intervene in processing where necessary.

Monitoring a Running Workflow

⚠ **Note**
A Workflow already must be running in order for you to monitor its status.

Step 1	From the Automation Center navigation pane, select **Task Instances > Activity**.
Step 2	Click the Details icon for the Workflow you want to monitor. The Workflow Task Instance Details for that Workflow displays.

Step 3 Click the View Workflow button to display the Workflow Monitor for that Workflow, as shown in the following example.
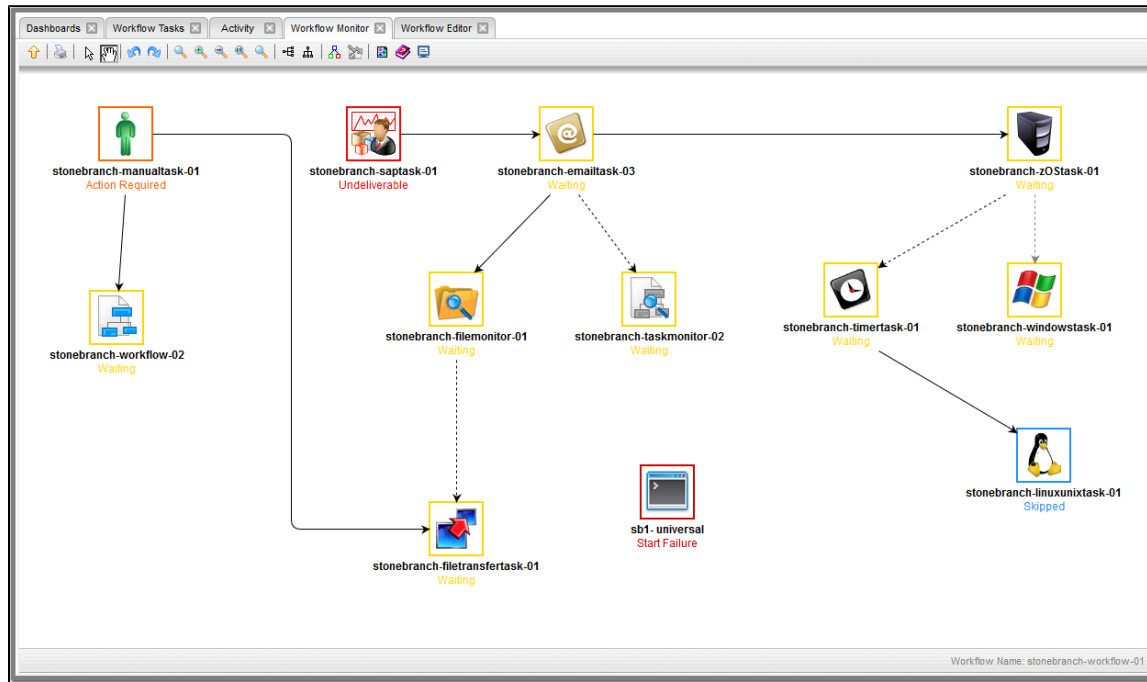
⚠️ **Note**

The name of the workflow that you are monitoring is shown:

1. At the bottom right corner of the Workflow Monitor.
2. By hovering over the Workflow Monitor tab at the top of the Workflow Monitor.

Workflow Monitor Modes

The Workflow Monitor has two modes. Each mode, which you select by clicking the appropriate icon in the Workflow Monitor toolbar, allows you to use one or more specific Workflow Monitor tools.

Icon	Mode	Description
▷	Select	Clicking the Select icon on the Workflow Monitor toolbar places the Workflow Editor in **Select** mode, which allows you to use all Workflow Monitor tools except Connect and Pan. The **Select** mode is the default mode for the Workflow Monitor.

	Pan	Clicking the Pan icon on the Workflow Monitor toolbar places the Workflow Monitor in **Pan** mode, which allows you to scroll around in the Workflow. (You also can use the Outline tool in any mode) to scroll around in the Workflow.
		In **Pan** mode, you also can use all other Workflow Monitor tools. ⚠️ **Note** **Pan** mode does not allow you to use the drag and drop method for moving, deleting, and copying groups of Workflow elements.

Viewing Predecessors/Successors of Task Instances in a Workflow

You can view the predecessors/successors of all task instances in a workflow from the Activity Monitor, Task Instances list, and the Workflow task instance Details.

You can view the predecessors/successors of a single task instance in a workflow from the Activity Monitor, Task Instances list, and the Workflow Monitor.

(You can also view the predecessors/successors of all task instances in a workflow, or the predecessors/successors of a single task instance in a workflow.)

See Viewing Task Predecessors/Successors.

Workflow Monitor Toolbar

The Workflow Monitor toolbar, which displays above the Workflow Monitor, contains icons for every tool that you need to monitor a Workflow.

A shadowed outline around the icon in the toolbar indicates the currently selected Workflow Monitor mode.

The following example shows that the Workflow Monitor is in **Select** mode.

Workflow Monitor Tools

The following table describes the tools used to monitor Workflows, including the tools associated with the two Workflow Monitor modes. The tools are listed by icon, as they appear - left to right - in the Workflow Monitor toolbar.

Icon	Tool	Description

	View Parent	If this Workflow is embedded in another Workflow, navigates to the parent. If this Workflow has more than one parent, clicking this icon displays a list of all parent Workflows; in this case, to navigate to a parent Workflow, double-click the Workflow's icon. To return to your original Workflow, click its name. (The current Workflow name displays in the lower right corner of the editor.) ⚠ **Note** To open an embedded Workflow (sub-Workflow) from its Parent Workflow, double-click the embedded Workflow.
	Print	Prints the current Workflow.
	Select	Places the Workflow Monitor in Select mode.
	Pan	Places the Workflow Monitor in Pan mode. To pan around the Workflow, click anywhere in the Workflow Monitor canvas and drag your cursor to display any section of the Workflow. To return to your original location, click the Actual Size icon.
	Undo	Click to undo the most recent change.
	Redo	Click to redo the most recent change that you undid by clicking Undo.
	Fit	Fits the Workflow into the display. If necessary, this shrinks the icons and size of the Workflow in order to make it fit. You can undo a Fit by clicking the Actual Size icon.
	Zoom In	Zooms in (enlarges) the Workflow. To return the Workflow to its default size, click the Actual Size icon.
	Zoom Out	Zooms out (diminishes) the Workflow. To return the Workflow to its default size, click the Actual Size icon.
	Actual Size	Returns the Workflow to its default size after a Fit or Zoom.
	Zoom	Opens a window that allows you to specify a zoom ratio. For example, to double the size of the Workflow, enter 200 and click **OK**. To return the Workflow to its default size, click the Actual Size icon.
	Horizontal Layout	Reformats the Workflow into a horizontal layout.
	Vertical Layout	Reformats the Workflow into a vertical layout.
	Toggle Vertex Style	For running Workflows, switches the icon display between status-related icons and task-related icons (see Workflow Monitor Display Mode). This icon only appears on the icon bar when you are monitoring a running Workflow.

	Toggle Critical Path View	Toggles between the normal view of the Workflow and the Critical Path View. ⚠️ **Note** This icon displays in the toolbar only if the Critical Path Calculations Permitted Universal Controller system property is set to **true**.
	Outline	For large Workflows, the outline provides a way of positioning a specific area of the Workflow in the display, without using the Pan mode. 1. Click the **Outline** icon. The **Outline** window opens. 2. In the **Outline** window, move and/or resize the blue box to identify the area of the Workflow you want to work on. The display repositions to show only the area within the blue box.
	Help	Displays help documentation for Workflows.
	Console	While a Workflow is running, you can click the Console icon to display processing messages.

Workflow Monitor Display Mode

The default display mode for the Workflow Monitor identifies each task instance in the workflow by:

- Task name
- Task type
- Task instance status

Task Name

The task name is the name given to a task when it was created (see Creating Tasks).

Task Type

The task type of each task instance is represented by an icon that displays above the task instance name.

Application Control	Email	Email Monitor	File Monitor
File Transfer	FTP File Monitor	Linux/Unix	Manual
PeopleSoft	SAP	SQL	Stored Procedure

...

System Monitor	Task Monitor	Timer	Universal
Universal Command	Variable Monitor	Web Service	Windows
Workflow	z/OS		

⚠️ **Note**
You can change the Workflow Monitor so that the icon above each task instance name represents the current status of that task instance (see Displaying Task Status Icons).

Task Instance Status

The current status of each task instance displays below the task instance name.

The Controller assigns a default color for each status, which you can change. See Colors for a list all statuses and the default colors assigned to them, and for information on how to change any of the colors.

Task Instance Details

You can display the following detailed information (including status) for any task instance by hovering your mouse over the task instance.

Task Instance Name: stonebranch-linuxunixtask-01

Task Instance UUID:
1494431284735829408FPXO9A4SV9BQ0

Task UUID: 6a8cfdcc05ad49d1b2e9153e831a3334

Vertex Id: 6

Status: Failed

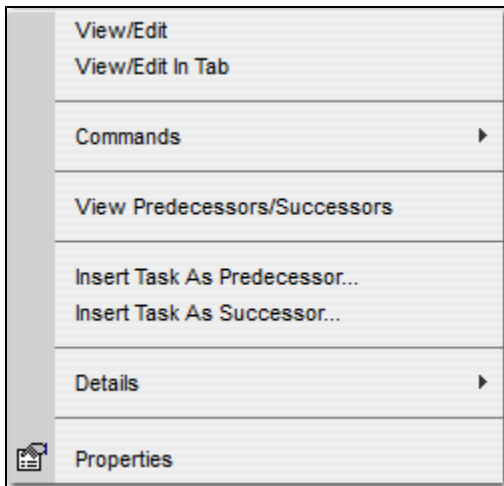**Next Retry Time**: 2017-05-12 10:25:21 -0400

> ⚠️ **Note**
> The Next Retry Time field displays in the menu only if the task instance is in Failed status and scheduled for retry.

Task Instance Actions

For each task instance in a Workflow, the Controller provides a menu of actions that you can take on that task instance. You can perform task instance actions in either Workflow Monitor mode: Select or Pan.

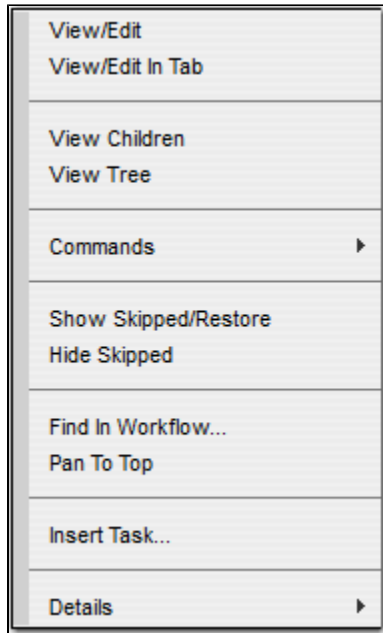To display the menu of task instance actions, right-click a task instance.

Action	Description
View/Edit	Allows you to view and edit the Task Instance Details for this task instance.
View/Edit In Tab	Allows you to view and edit the Task Instance Details for this task instance in a new tab.
View Children	For a workflow task instance only; Allows you to view a list of children task instances of this workflow task instance.
View Tree	For a workflow task instance only; Allows you to view a tree of this workflow task instance and its tasks, including children tasks of any sub-Workflow task, and, optionally, lets you display the Details for any of those tasks.
Commands	Allows you to run a command against the task instance.
View Predecessors/Successors	Allows you to view all predecessors and successors of this task instance in the Workflow.
Insert Task As Predecessor	Allows you to insert a task as a predecessor to this task instance.

Insert Task As Successor	Allows you to insert a task as a successor to this task instance.
Details > Show Details	Allows you to display complete database details for this task instance.
Details > Show Variables	Allows you to display a list of all variables available to this task instance.
Properties	Displays a menu of properties for the task instance.

Task Instance Actions for Workflow

For a workflow task instance being monitored, the Controller provides a menu of actions that you can take on that workflow task instance. You can perform these actions in any Workflow Monitor mode.

To display the menu of workflow task instance actions, right-click anywhere in the Workflow Monitor canvas.

Action	Description
View/Edit	Allows you to view and edit the Task Instance Details for this workflow task instance.
View/Edit In Tab	Allows you to view and edit the Task Instance Details for this workflow task instance in a new tab.
View Children	Allows you to view a list of children task instances of this workflow task instance.
View Tree	Allows you to view a tree of this workflow task instance and its tasks, including children tasks of any sub-Workflow task, and, optionally, lets you display the Details for any of those tasks.

Commands	Allows you to run a command against this workflow task instance.
Show Skipped/Restore	Allows you to show any skipped tasks for this workflow task instance.
Hide Skipped	Allows you to hide any skipped tasks for this workflow task instance.
Find In Workflow...	Allows you to find a task instance in this workflow task instance.
Pan To Top	Allows you to restore the displayed Workflow Monitor for this workflow task instance to its default, top-left position.
Insert Task...	Allows you to insert a task.
Details > Show Details	Allows you to display complete database details for this workflow task instance.
Details > Show Variables	Allows you to display a list of all variables available to this workflow task instance.

Task Instance Properties

One of the task actions available for any task instance in a Workflow is to display a list of properties for that task instance.

Properties	
ID	4
top	270
left	200
width	58
height	58
Style	strokeColor=#3366FF;stroke
name	stonebranch-workflow-02
sys_class_name	ops_task_workflow
sys_id	d579188e223c4b8abee53e504 7b242d6
exec_vertex_id	4
exec_sys_id	14944312847358441408WR50C QVGXILTN
exec_sys_class_name	ops_exec_workflow
exec_name	stonebranch-workflow-02
status_code	200
status_desc	
retry_time	
tw_enabled	false

OK **Cancel**

Connector Details

You can display the following detailed information for any Connector by hovering your mouse over the connector.

```
Condition(s): Success

Source {
Task Instance Name: stonebranch-timertask-01
Task Instance UUID: 14944312847358164O8NFAFUZI3UL2HX
Vertex Id: 3
Status: Waiting
}

Target {
Task Instance Name: stonebranch-linuxunixtask-01
Task Instance UUID: 14944312847358294O8FPXO9A4SV9BQ0
Vertex Id: 6
Status: Failed
Next Retry Time: 2017-05-12 11:36:32 -0400
}
```

Connector Actions

For each connector in a Workflow, the Controller provides a menu of actions that you can take on that connector. You can perform connector actions in any Workflow Monitor mode.

To display the menu of connector actions, right-click a connector.

```
Conditions

Go To Source
Go To Target

Commands        ▶

🖳  Properties
```

The following table describes each action in the menu:

Action	Description
Conditions	Allows you to select a dependency condition for the connecor.

Go To Source	Highlights the predecessor task for the connector and moves it to the center of the Workflow Editor display.
Go To Target	Highlights the successor task for the connector and moves it to the center of the Workflow Editor display.
Commands	Allows you to run a command (Mark as Satisfied) against the connector.
Properties	Displays a menu of properties for the connector.

Connector Properties

One of the connector actions available for any connector in a Workflow is to display a list of properties for that connector.
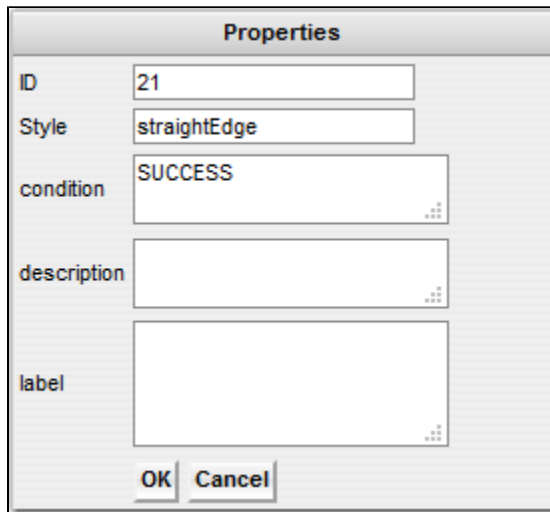
The information in the Connector properties is view-only.

Displaying Task Instance Status Icons

Each task instance status is categorized into one of five task instance status types: Running, Complete, Not Running, Problem, and Status Unknown.

Each task instance status type has a corresponding icon.

You can switch the Workflow Monitor display mode, which by default shows icons that represent task instance types, so that the icons represent task instance status types, as shown in the following example.
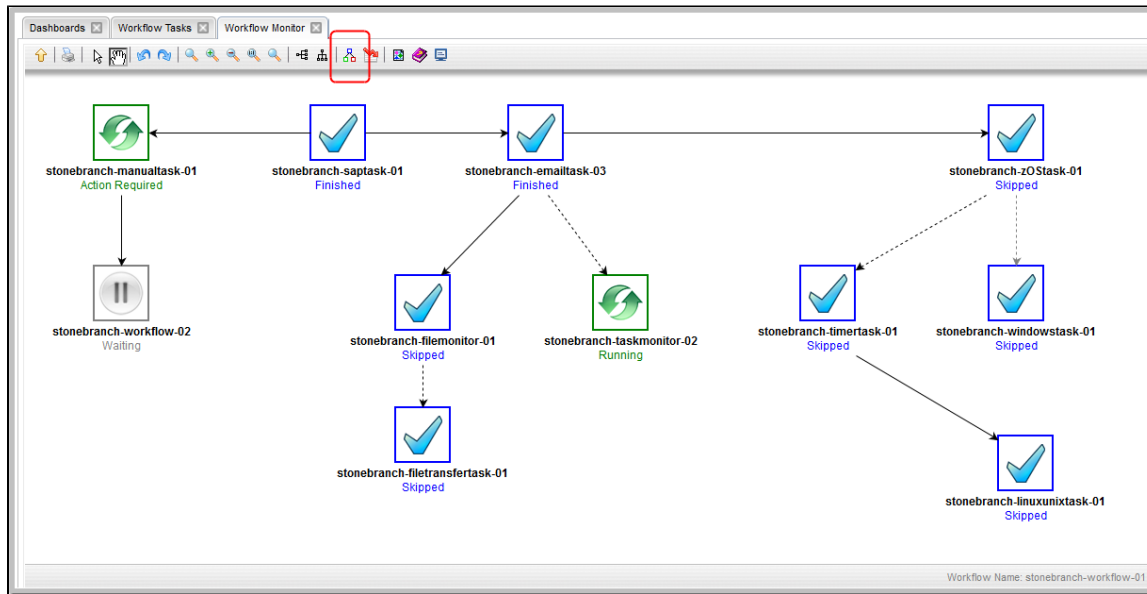

To switch display modes, click the **Toggle Vertex Style** icon.

Manually Intervening in a Workflow

You can take action on a task instance in a running workflow by right-clicking the task instance and selecting an action from the Actions menu.

You also can take action on the running workflow itself by right-clicking any white space in the Workflow Monitor canvas and selecting an action from the Actions menu.

If you select a command from either Actions menu, the Console window automatically opens and displays processing information.
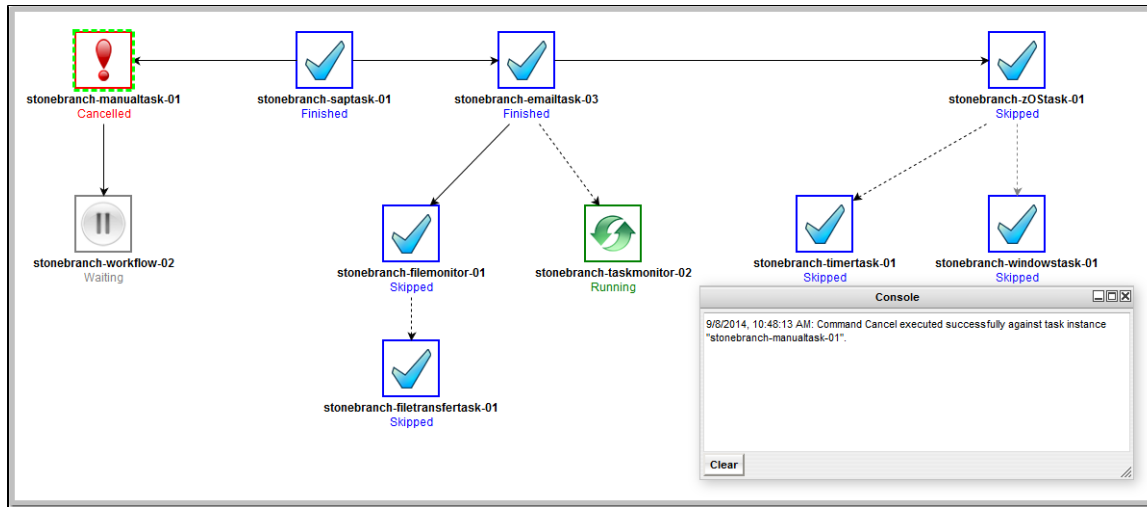
Monitoring the Critical Path in a Workflow

You can instruct the Controller to calculate the Critical Path of a Workflow, which is the path of task instances in the Workflow that will take the longest time to complete.

The Controller bases the Critical Path on:

- Current historical average duration statistics for each task in the Workflow. (If no statistics exist for a task - that is, it has never been run - the Controller assigns it a run time of 1 second).
- Critical Path Duration time that you can specify in the task Details for any task in the Workflow, which will override the run-time statistics.

> ⚠️ **Note**
> Critical Path settings for tasks and Workflows are not exported/imported.

Critical Path Settings

To monitor the Critical Path of a Workflow, you must set the following:

- In **Configuration > Properties**, set the Critical Path Calculations Permitted system property to **true**.
- In the Workflow Details, enable the Calculate Critical Path field.
- In the Workflow Monitor toolbar, click the Toggle Critical Path View icon.

By default, any Workflow with the Calculate Critical Path field enabled will be displayed in the Workflow Monitor in Critical Path View. To toggle in and out of Critical Path View, click the Toggle Critical Path View icon.

> ⚠️ **Note**
> If you are using View In Workflow to open the Workflow Monitor, or the Workflow being opened has a status of Skipped, Critical Path View will be toggled off by default.

## Running a Workflow Enabled for Critical Path

When you run a Workflow enabled for Critical Path, the Workflow Monitor initially displays the Critical Path based on historical average duration statistics and any CP Duration override values for any tasks in the Workflow. When a task instance completes, the Critical Path could change, based on the actual time it took the task instance to complete. For example, if you specified a Critical Path Duration of 5 minutes for a task, but the task instance completed in 30 seconds, the Controller might adjust the Critical Path to show a path that it now estimates will take the longest to complete.

> ⚠️ **Note**
> For a top-level Workflow that has been enabled for Critical Path, its sub-Workflows display Critical Paths only if they themselves have been enabled for Critical Path.

In Critical Path View, Task instances and connectors in the Critical Path display in the color specified by the Critical Path Color system property.
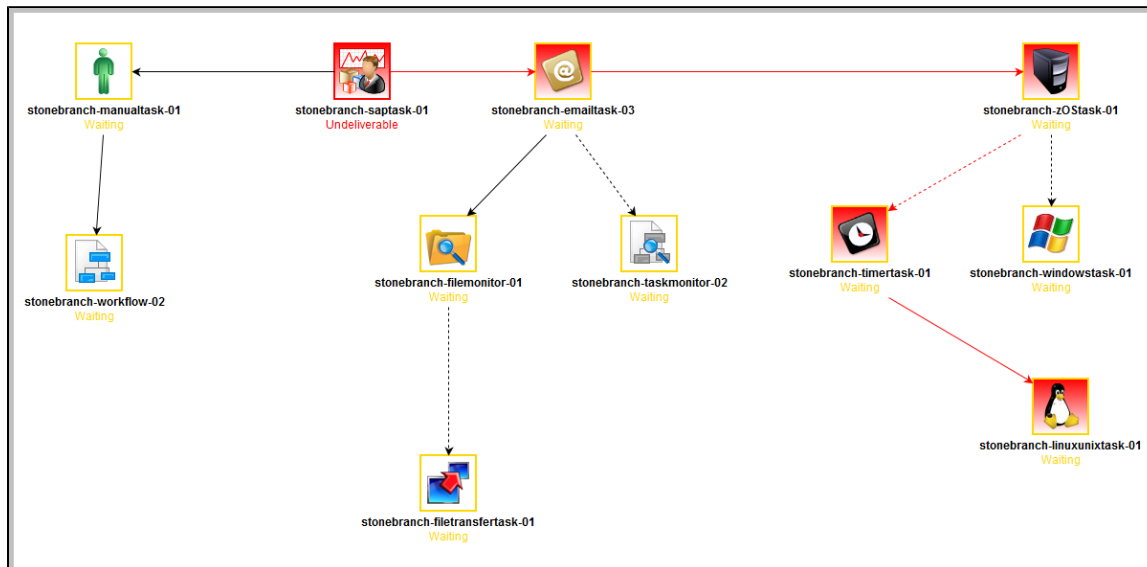

The Critical Path View is dynamic; if task instances are Skipped in a Workflow, and they longer are part of the Critical Path, they no longer display on the Workflow Monitor while it is in Critical Path View.

If you are in Critical Path View, but you want to see Skipped task instances, you can restore the standard view by clicking the Toggle Critical Path View icon in the Workflow Monitor toolbar.

Also, in Critical Path View, Show Skipped / Restore and Hide Skipped are disabled in the Workflow Monitor pop-up menu of commands and options.
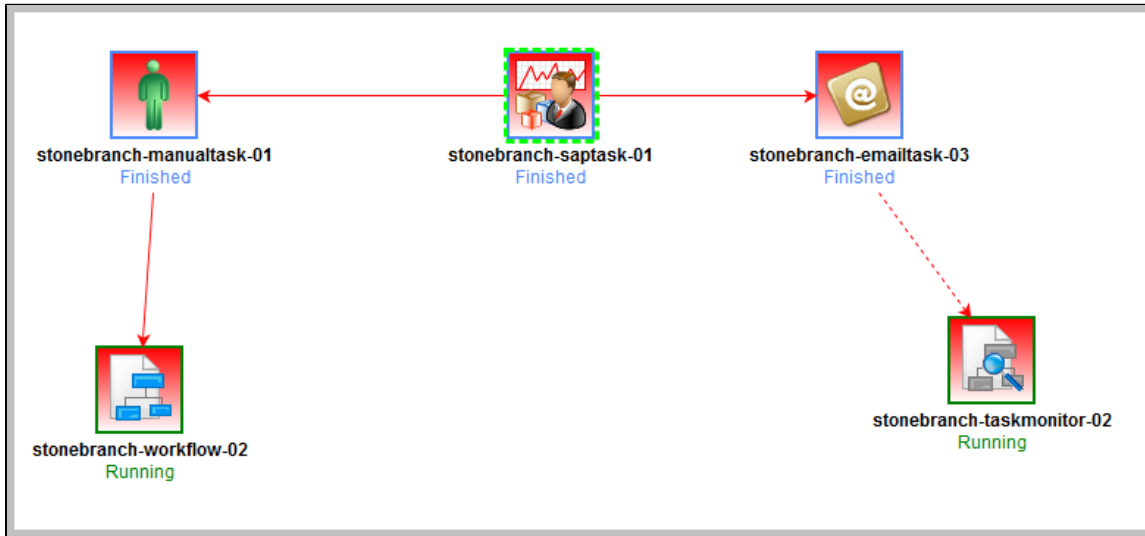
When the Workflow completes, the final Critical Path displays.
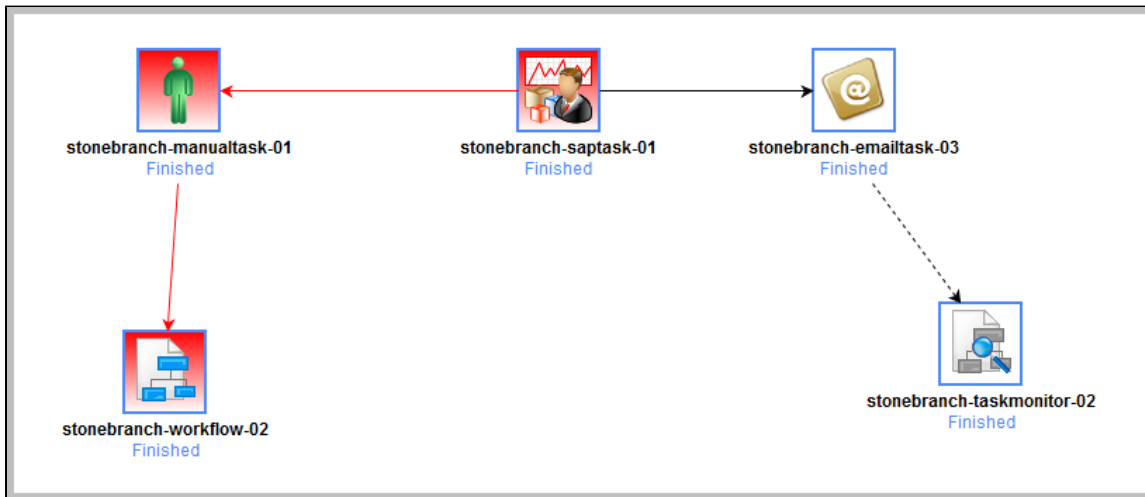
Critical Path Status

Activity Monitor and Task Instances List

You can monitor whether a task instance is critical (or along a critical path) in a Workflow from the Activity Monitor and Task Instances List.

The task instance Details icon for task instances that are critical (or along in a Critical Path) is tinted red.

Reports

You can enhance existing Task Instance reports or create new Task Instance reports by utilizing the Critical and Projected End Time fields. For example, you might want to report on task instances that have not completed and are on the critical path, or you might want to report on task instances that have a failure status and are on the critical path.