
# Action Orchestrator DR Workflow

## Workflow Overview

## June 1, 2020

## Version 1.0

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# About This Workflow Overview

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|---|---|
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| DCP Reference | N.A. |
| Project ID | N.A. |

## History

| Version No. | Issue Date | Status | Reason for Change |
|---|---|---|---|
| 1 | June 2, 2020 | Released | Initial Release |
| | | | |

## Document Conventions

Alerts readers to take note. Notes contain helpful suggestions or references to material not covered in the document.

Alerts readers to be careful. In this situation, you might do something that could result in equipment damage or loss of data.

Alerts readers of a situation that could cause bodily injury. They need to be aware of the hazards involved with electrical circuitry and familiarize themselves with standard practices for preventing accidents.

Alerts the reader that they can save time by performing the action described in the paragraph affixed to this icon.

Alerts the reader that the information affixed to this icon will help them solve a problem. The information might not be troubleshooting or even an action, but it could be useful information similar to a Timesaver.

# 1 Introduction

## 1.1 Preface

This document covers the Disaster Recovery (DR) workflow functionality developed and offered to the Action Orchestrator community by Cisco Customer Experience (CX).

## 1.2 Audience

This document is appropriate for Action Orchestrator workflow designers and administrators.

## 1.3 Scope

This document covers the AO workflow, the operational model, how to install and configure and basic operational use.

## 1.4 Assumptions

It is assumed that the workflow implementer has basic understanding of Action Orchestrator and how to do basic workflow modifications to suite specific site requirements.

## 1.5 Related Documents

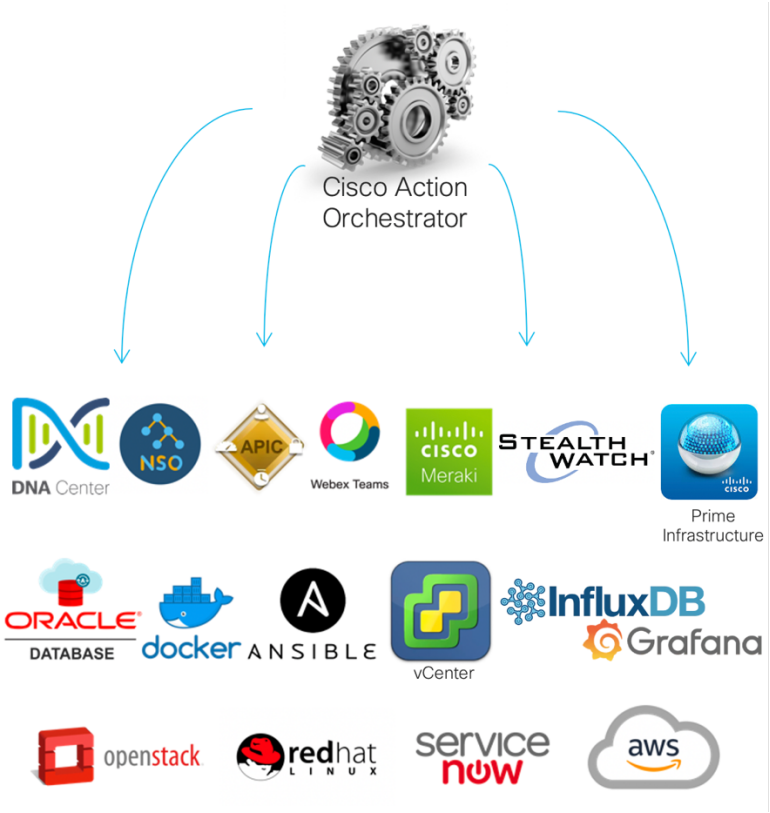
Action Orchestrator documentation
https://docs.cloudmgmt.cisco.com/display/AO/Action+Orchestrator+Home

Action Orchestrator Software Center
https://software.cisco.com/download/home/286323192/type/286309561/release/5.2(0)

Cisco CloudCenter [suite containing Action Orchestrator]
https://www.cisco.com/c/en/us/products/cloud-systems-management/cloudcenter/index.html

# 2 Action Orchestrator Overview

Action Orchestrator (AO) is part of the Cisco CloudCenter suite of products. It is a cross-domain, technology-agnostic automation and orchestration solution providing a graphical 'drag-and-drop' workflow development and execution environment. AO is diverse in its ability to integrate with many systems that have an API or CLI to integrate with.



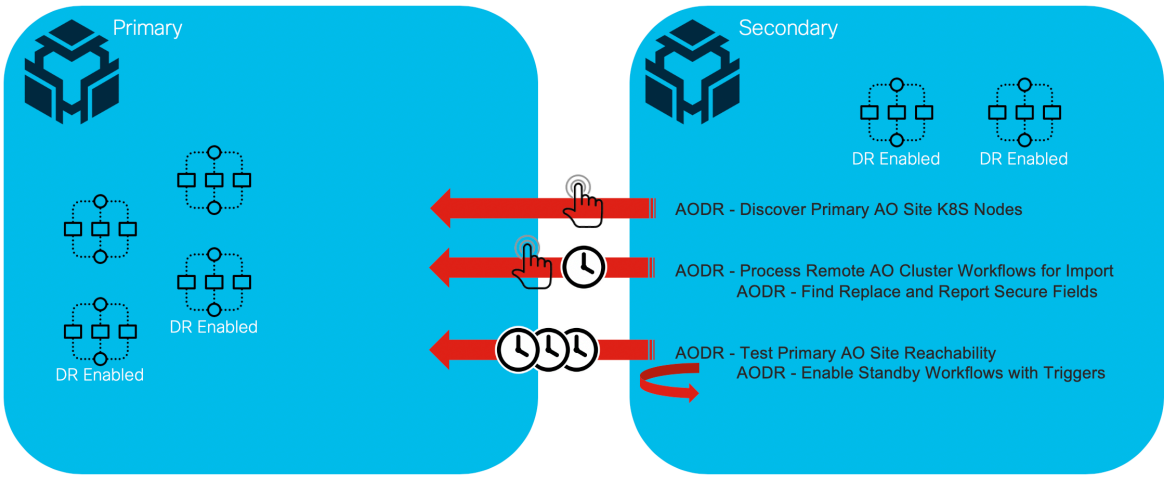

AO's flexibility allows customers to 'glue together' their operational management and provisioning tools to achieve end-to-end life-cycle management through workflows that reflect their business processes.

Cisco's professional services division, Customer Experience (CX), and many customers find AO useful for data collection, dashboarding, alerting, provisioning, operational state checks, assisted troubleshooting and cross-domain data analytics.

# 3 Disaster Recovery (DR) Concept

## 3.1 Overview

AO is a very robust solution that leverages an underpinning Kubernetes cluster of multiple master and worker nodes, including a clustered database in release 5.2(1). However, it does not currently have a native site-survivable DR function. Cisco CX set out to build workflow logic to incorporate basic DR capabilities for customers that deploy multiple AO clusters and wish for key workflows in the primary AO cluster to be available and triggered to run in the secondary AO cluster, when needed upon primary site failure.




### 3.1.1 Workflow model

Several requirements were considered for site-survivable DR with AO:

- Initial Synchronization of Workflows from Primary to Secondary
- Suspension of workflow triggers using schedules
- Discovery of Primary AO Cluster Kubernetes nodes
- Monitoring of Primary AO Cluster Kubernetes nodes' reachability and API responsiveness
- Enabling workflow triggers previously disabled on Secondary on Primary failure

### 3.1.2 Target, Runtime User and Secure String Considerations

AO provides an ability to share workflows through importing JSON text, file references or git/bitbucket integration. However, for security sake target information (hostname, IP Address, port definitions, etc) must be reconciled on import. This allows portability and re-use of workflows without fixing target information.
Additionally, if there are any Secure String variables, such as passwords, API keys, etc., those must also be reconciled by re-entering the values. The importing AO system will re-

encrypt the Secure Strings using its localized key/hash algorithms. This is a one-time process that will not be necessary for follow-on workflow updates, as the targets will be found and re-used.

### 3.1.3 Installation

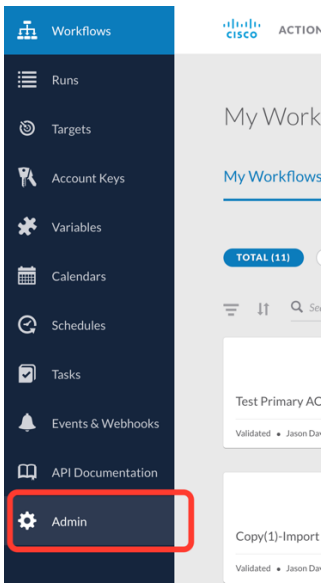
The following workflows should be retrieved from the CX Action Orchestrator git repo at https://github.com/cisco-cx-workflows/cx-ao-shared-workflows

- AODR - Discover Primary AO Site K8S Nodes
- AODR - Process Remote AO Cluster Workflows for Import
- AODR - Find Replace and Report Secure Fields
  [child workflow of 'Process Remote AO Cluster Workflows for Import']
- AODR - Test Primary AO Site Reachability
- AODR - Enable Standby Workflows with Triggers
  [child workflow of 'Test Primary AO Site Reachability']

You add workflows through the 'My Workflow' Import feature. Git/Bitbucket integration is supported or workflow JSON contents can be copied/pasted. Follow the next section for Git/Bitbucket import or jump to section 3.1.5 for copy/paste method.

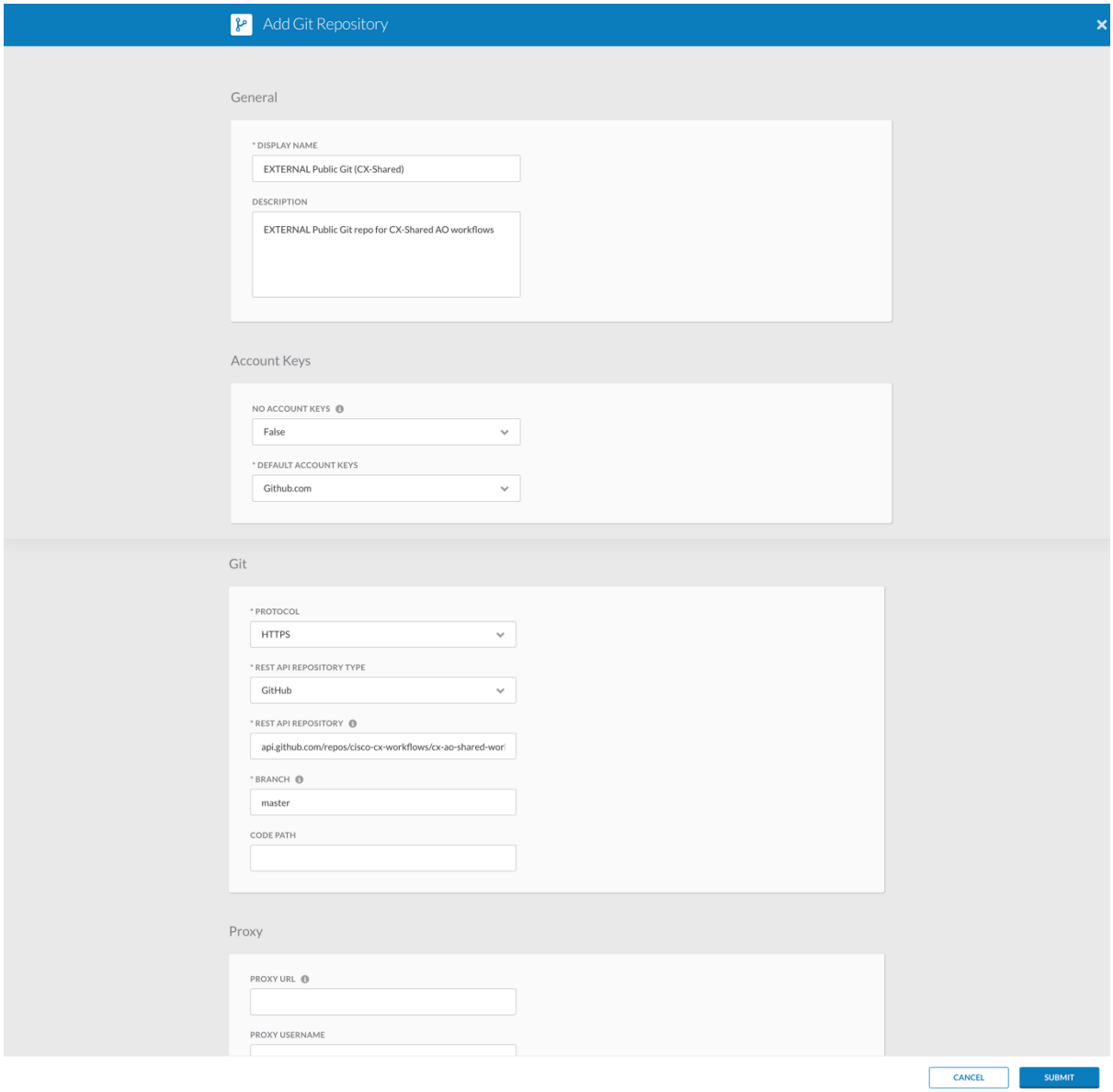
### 3.1.4 Git/Bitbucket Workflow Import Method

To use git/bitbucket integration first use the AO 'Admin' panel to ensure the CX Shared repository is configured for use. This process is needed only on the Secondary AO cluster.



Select the *Git Repositories* menu option and the *NEW GIT REPOSITORY* button.

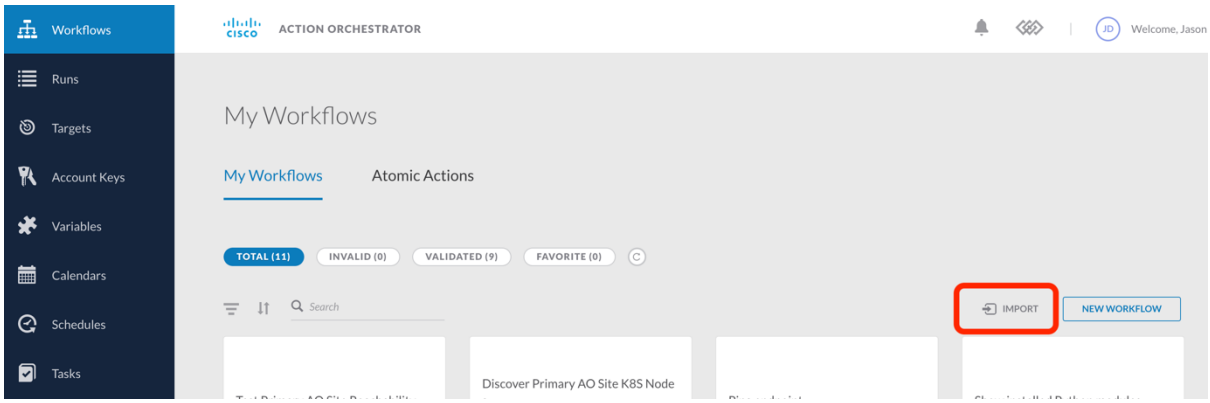

Fill in the *Add Git Repository* fields similar to the following.




*REST API REPOSITORY TYPE* should be
api.github.com/repos/cisco-cx-workflows/cx-ao-shared-workflows

Then click *SUBMIT* button.

Now go back to *Workflows* section and click the *Import* option.

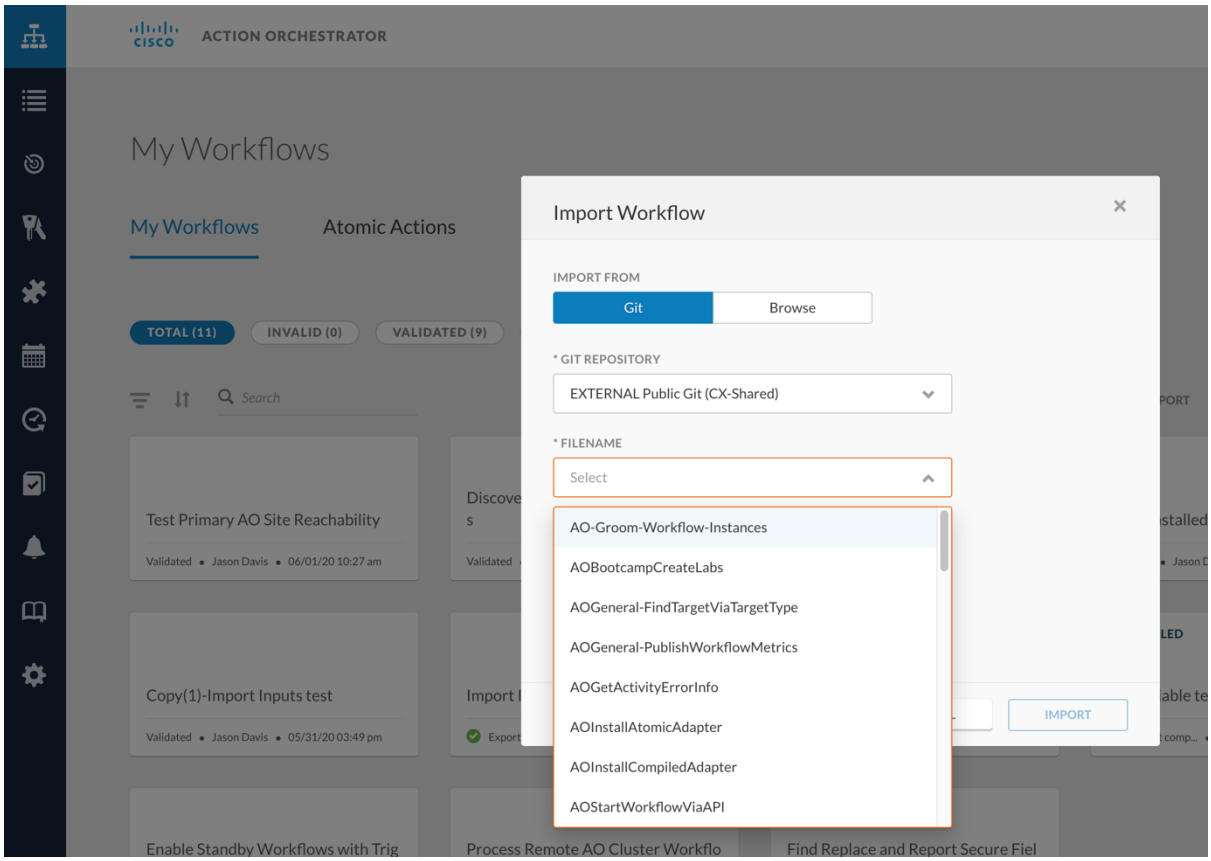



With the Git option highlighted, select the Git Repository created earlier. In the Filename drop-down selector pick the workflows named:

- AODR - Discover Primary AO Site K8S Nodes
- AODR - Process Remote AO Cluster Workflows for Import
- AODR - Test Primary AO Site Reachability

The following workflows should be imported automatically as part of their parent workflows above.

- AODR - Find Replace and Report Secure Fields
  [child workflow of 'AODR - Process Remote AO Cluster Workflows for Import']
- AODR - Enable Standby Workflows with Triggers
  [child workflow of 'AODR - Test Primary AO Site Reachability']




The workflows will need Target, Runtime User and Secure String variables resolved.

### 3.1.5 Cut/Paste Workflow Import Method

The workflow definitions as JSON text files can be copied/pasted into AO, if Git repo integration is not desired or possible.

The most practical method is to get the raw JSON files representing the workflows and save them locally for copy/paste or file selection.

Use your browser 'Save file as…' feature when clicking the following links:

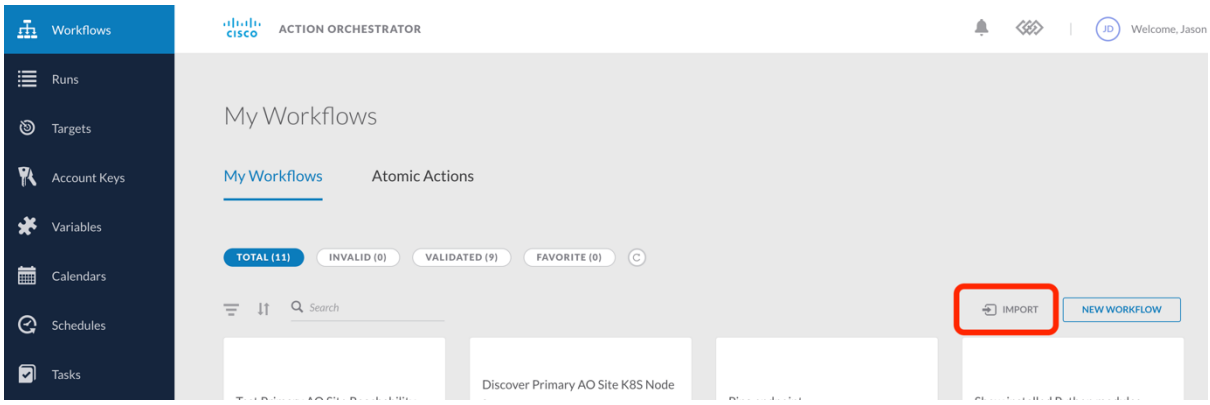
- AODR - Discover Primary AO Site K8S Nodes
  URL: https://github.com/cisco-cx-workflows/cx-ao-shared-workflows/tree/master/AODR-DiscoverPrimaryAOSiteK8SNodes__definition_workflow_01G3Y96KDYHNT0HW8qeICNHTyRJsMPzR1w6

- AODR - Process Remote AO Cluster Workflows for Import
  URL: https://github.com/cisco-cx-workflows/cx-ao-shared-workflows/tree/master/AODR-

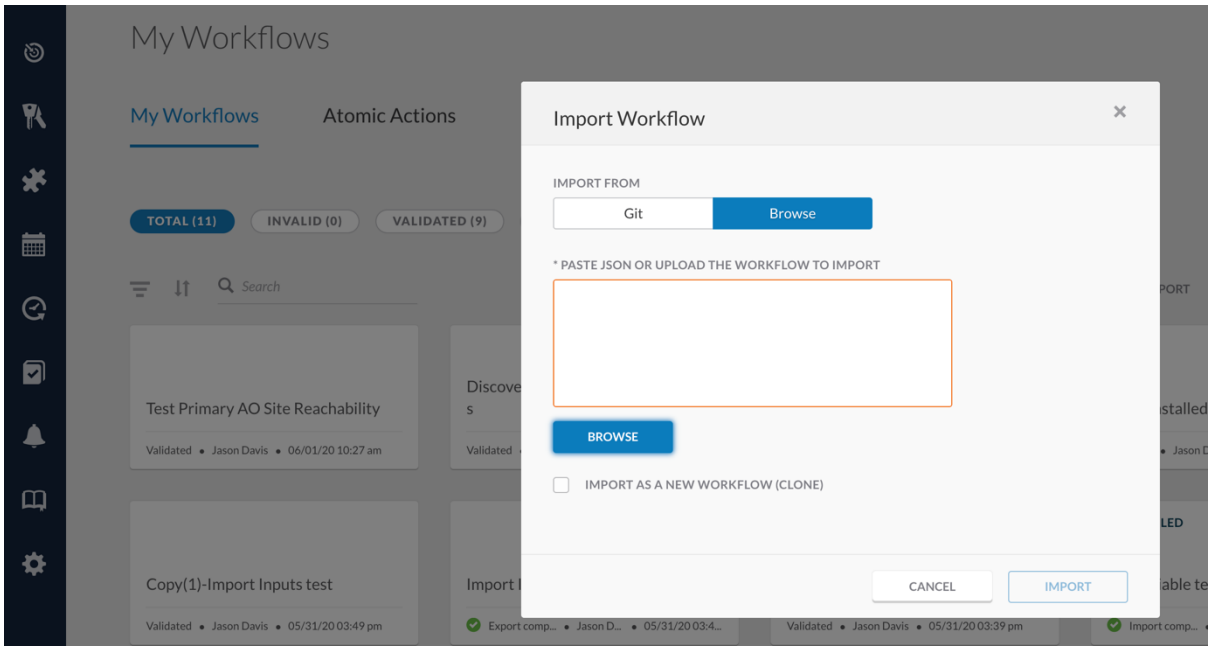
ProcessRemoteAOClusterWorkflowsForImport__definition_workflow_01G4M9LQS478M7KDwglXfy1UN8sF3Sx6yTl

- AODR - Test Primary AO Site Reachability
  URL: https://github.com/cisco-cx-workflows/cx-ao-shared-workflows/tree/master/AODR-TestPrimaryAOSiteReachability__definition_workflow_01G3ZX1H2YYBS3reMfYULSVmv1iSIRyV5Ux

Now go back to *Workflows* section and click the *Import* option.




With the *Browse* option selected either paste the raw JSON workflow definition into the text-box OR select the *Browse* button at the bottom and use the file picker to select the JSON files downloaded earlier.



# 4 Workflow Descriptions

This section will describe the workflows comprising the AO DR function. Some site-specfic customization will be necessary.

## 4.1 *AODR - Discover Primary AO Site K8S Nodes* Workflow

This workflow is used by the Secondary AO Cluster to discover the Kubernetes nodes in the Primary AO Cluster. It is not expected that this workflow will need to be run that often as the cluster should not reconfigure often.

The workflow generates a Global variable 'Primary AO Cluster Nodes JSON' which contains JSON date of the primary cluster's nodes as Node names, IP addresses and Role. This Global variable is used as input to the *AODR - Test Primary AO Site Reachability* workflow.

No customization is need for this workflow, unless a Trigger with Schedule is desired. This may be a schedule to run weekly, monthly, or as desired.

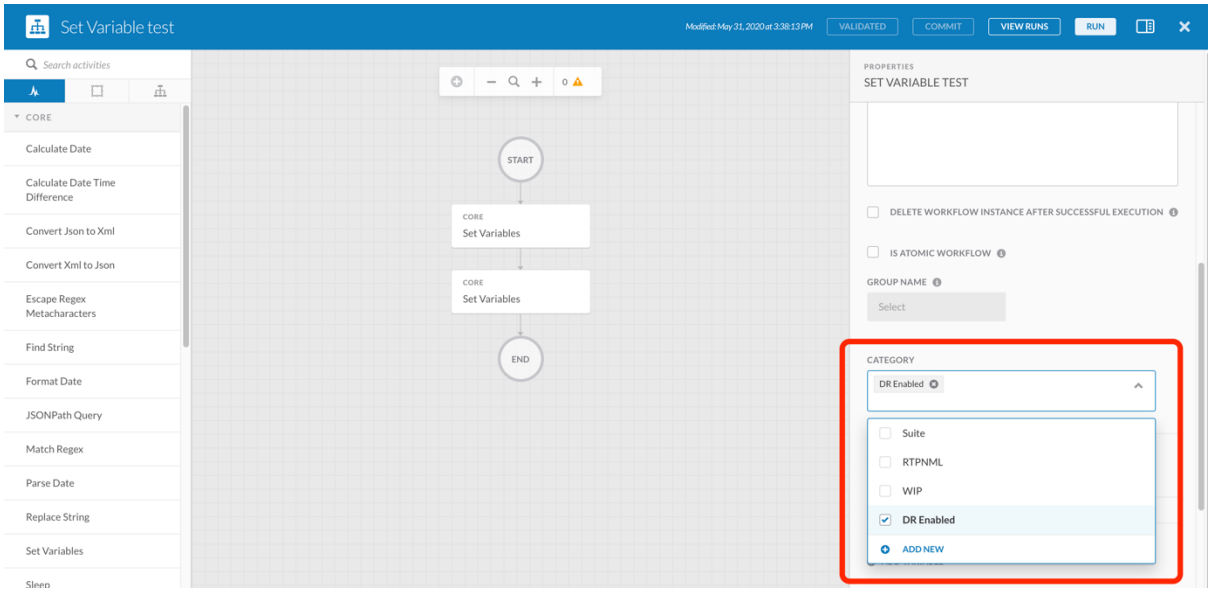
## 4.2 *AODR - Process Remote AO Cluster Workflows for Import* Workflow

This workflow is used by the Secondary AO Cluster to import the workflows from the Primary AO Cluster. It should be run as often as the Primary Cluster's workflows are modified/updated. It may be run on-demand or a workflow Trigger may be scheduled daily, weekly or more frequently based on your change control frequency.
The workflow will determine if there have been changes to the incoming workflow from prior imports.
Any workflow with incoming target definitions, runtime users or secure strings will need to be reconciled on the secondary AO cluster in order for it to run with proper access and permissions.
Importing this workflow will also import *AODR - Find Replace and Report Secure Fields*. This child workflow scans the imported workflow for Secure Strings and replaces the unknown, encrypted values with 'CHANGE_ME'. When the *AO – Process Remote AO Clust Workflows for Import* workflow runs it may generate an email detailing what variables and targets need to be updated.
This workflow will analyze incoming workflows for triggers enabled with schedules. Those triggers will be disabled so there are not two AO clusters operating on the same workflow(s) and target(s). The workflows and triggers are stored in a Global table variable 'DR Workflows Tracker'. It is referenced by the *AODR - Enable Standby Workflows with Triggers* workflow for later restoration, if needed.

### 4.2.1 Customizations

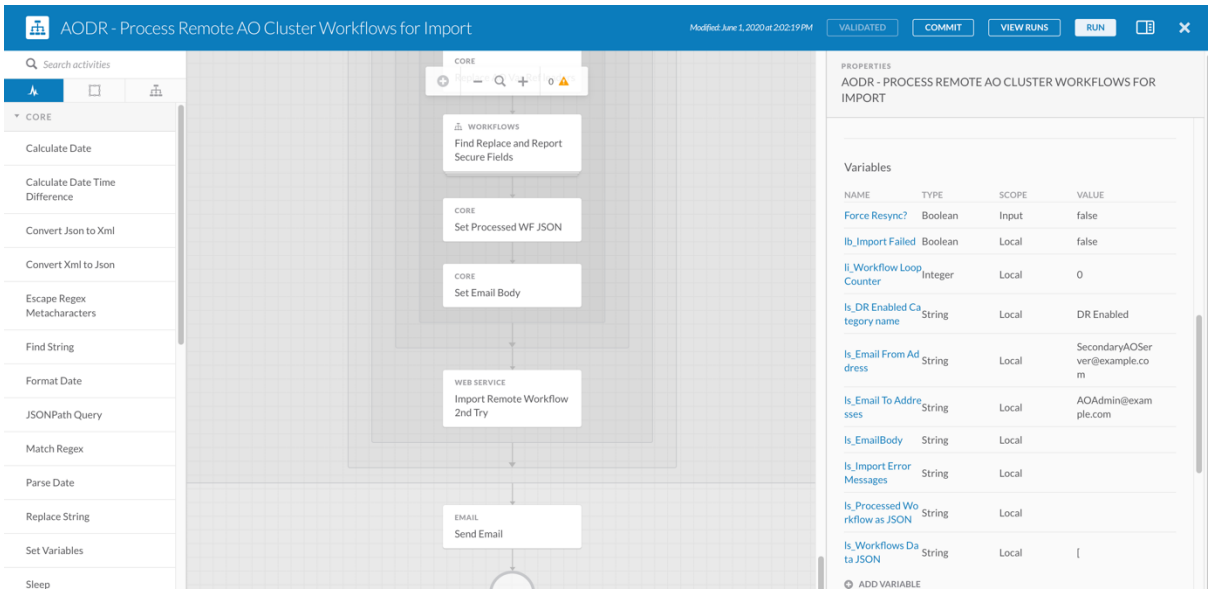
A helpful feature of this DR process is to only synchronize workflows that have a specific Category tag. Currently the workflow is using the 'DR Enabled' category to denote which

workflows should be synchronized.  Go to the **Primary** AO Cluster, edit each workflow you want synchronized and create/select ‘DR Enabled’ as a category tag or use your own category tag.




Back on the Secondary AO Cluster, after the *AODR – Process Remote AO Cluster Workflows for Import* workflow is imported the administrator will need to reconcile the Email Server target, ensuring proper hostname/IP Address and any authentication requirements.  The workflow will send an email denoting which workflow targets and/or Secure Strings should be updated to ensure proper access.

Additionally, the ‘ls_EmailFromAddress’ and ‘ls_EmailToAddresses’ should be updated to reflect what account the email should come from and what email address(es) it should be sent.




## 4.3 *AODR - Test Primary AO Site Reachability* Workflow

This workflow is used by the Secondary AO Cluster to monitor the state of the Primary AO cluster. It uses the Global variable 'Primary AO Cluster Nodes JSON' which was created by the *AODR - Discover Primary AO Site K8S Nodes* Workflow.
The workflow currently checks for 4 service ports being open on each Kubernetes node on the primary AO cluster. It also checks the REST API reachability for the Primary AO cluster.
If the Primary AO cluster has port status or reachability issues, then it will trigger the *AODR - Enable Standby Workflows with Triggers* child workflow. This child workflow will look at the Global table 'DR Workflows Tracker'

### 4.3.1 Customizations

This workflow has no customization requirement beyond setting a Trigger and schedule that suite your specific monitoring and enabling requirements. You can create a trigger for the workflow to run every 10 minutes, every 5 minutes or whatever schedule suites your needs.

# 5 Operation

After the *AODR - Process Remote AO Cluster Workflows for Import* workflow has run you will note the 'DR Enabled' category tagged workflows [or whatever category tag you defined] from the Primary AO cluster will exist on the Secondary AO cluster. They will have the same tag for ease of identification. They will also have any Triggers with active scheduled disabled to prevent multiple systems processing the same workflow.

If the *AODR - Test Primary AO Site Reachability* workflow determines a failure on the Primary AO cluster it will enable the trigger schedules. When the primary AO cluster returns to proper operation the Secondary workflows will need their triggers disabled. A future version of this DR model will also disable Secondary on restoration.

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