You make **possible**

Programming with Cisco Cloud Center

Action Orchestrator Engine

Ravi Jandyala, Solution Architect

DEVNET-2907

Barcelona | January 27-31, 2020

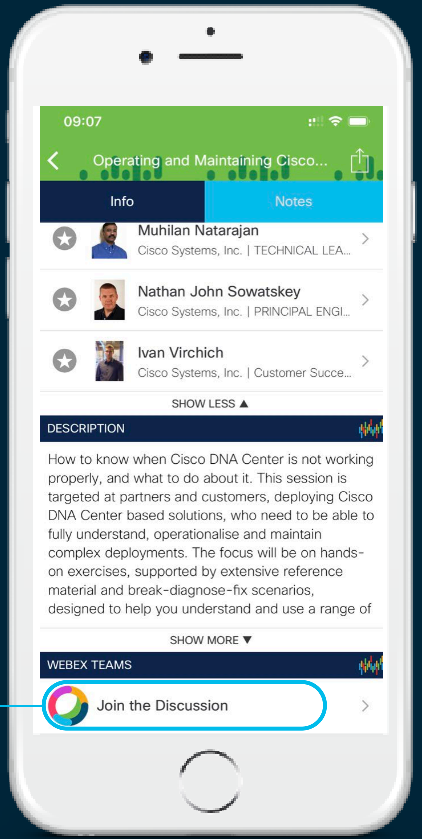
Cisco Webex Teams

Questions?

Use Cisco Webex Teams to chat with the speaker after the session

How

1. Find this session in the Cisco Events Mobile App
2. Click “Join the Discussion”
3. Install Webex Teams or go directly to the team space
4. Enter messages/questions in the team space



09:07

Operating and Maintaining Cisco...

Muhilan Natarajan
Cisco Systems, Inc. | TECHNICAL LEA...

Nathan John Sowatskey
Cisco Systems, Inc. | PRINCIPAL ENGI...

Ivan Virchich
Cisco Systems, Inc. | Customer Succe...

DESCRIPTION

How to know when Cisco DNA Center is not working properly, and what to do about it. This session is targeted at partners and customers, deploying Cisco DNA Center based solutions, who need to be able to fully understand, operationalise and maintain complex deployments. The focus will be on hands-on exercises, supported by extensive reference material and break-diagnose-fix scenarios, designed to help you understand and use a range of

WEBEX TEAMS

Agenda

- Cisco CloudCenter Suite Overview
- Cisco Action Orchestrator Engine Deep Dive
- Demo
- Next Steps

Cisco CloudCenter Suite Overview

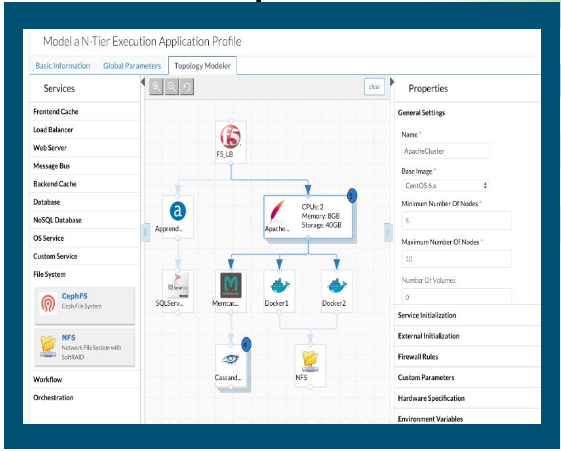
CloudCenter Suite

Multicloud Management Platform
Securely Design, Deploy, and Optimize Anywhere

docker SUGARCRM

Jenkins Cassandra

ORACLE splunk>



Model a N-Tier Execution Application Profile

Basic Information | Global Parameters | Topology Modeler

Services

- Frontend Cache
- Load Balancer
- Web Server
- Message Bus
- Backend Cache
- Database
- NoSQL Database
- OS Service
- Custom Service
- File System
  - CephFS — Ceph File System
  - NFS — Network File System with SoftRAID
- Workflow
- Orchestration

Properties

General Settings

Name *: ApacheCluster

Base Image *: CentOS 6.x

Minimum Number Of Nodes *: 5

Maximum Number Of Nodes *: 10

Number Of Volumes: 0

Service Initialization

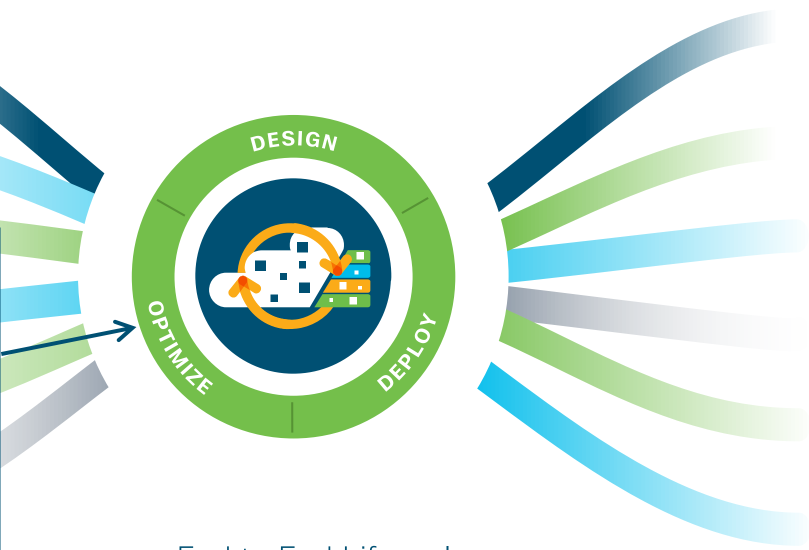
External Initialization

Firewall Rules

Custom Parameters

Hardware Specification

Environment Variables



Data Center — kubernetes, vmware vSphere

Private Cloud — redhat, openstack, PRIVATE, kubernetes, vmware vSphere, Windows Azure Pack

Public Cloud — IBM Cloud, Alibaba Cloud, PUBLIC, kubernetes, amazon web services, Google Cloud Platform, Azure

Container as Service — CONTAINER, kubernetes

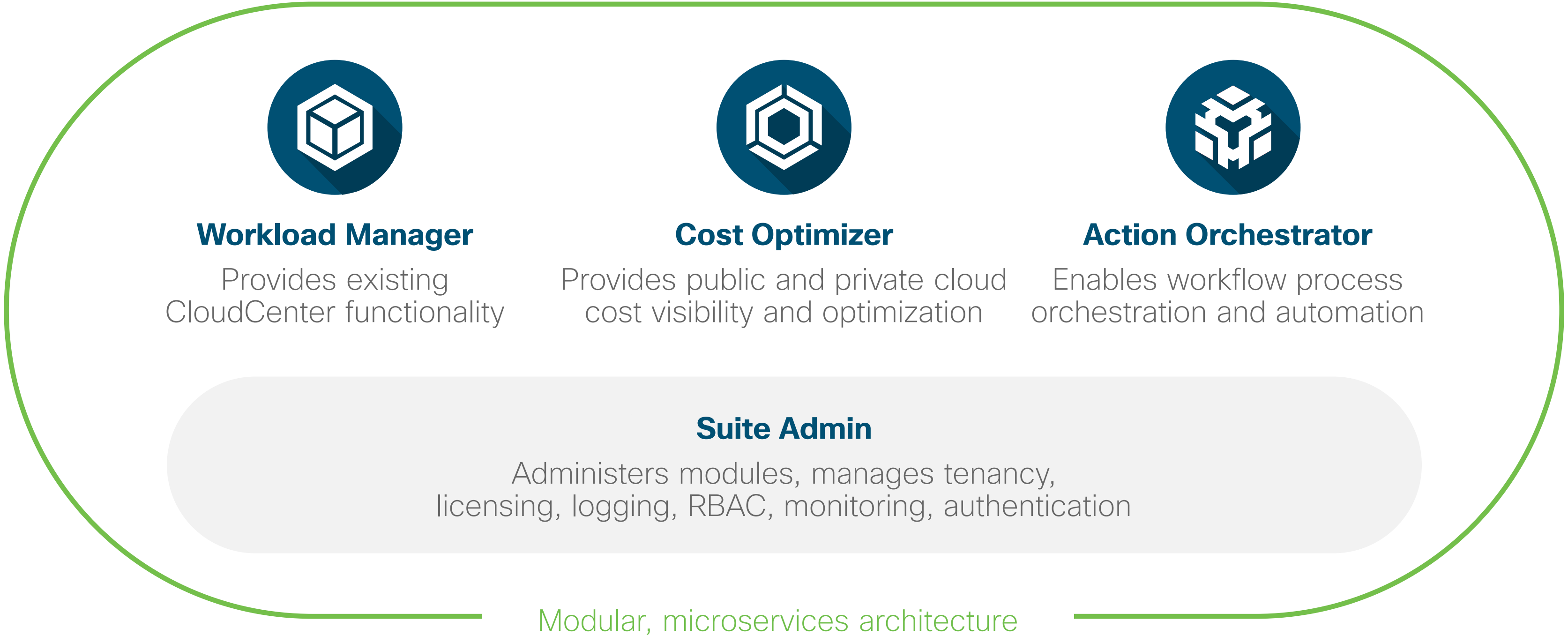
End to End Lifecycle

One Integrated Platform

New and Existing Applications

cisco Live!

CloudCenter Suite



Workload Manager

Provides existing CloudCenter functionality

Cost Optimizer

Provides public and private cloud cost visibility and optimization

Action Orchestrator

Enables workflow process orchestration and automation

Suite Admin

Administers modules, manages tenancy, licensing, logging, RBAC, monitoring, authentication

Modular, microservices architecture

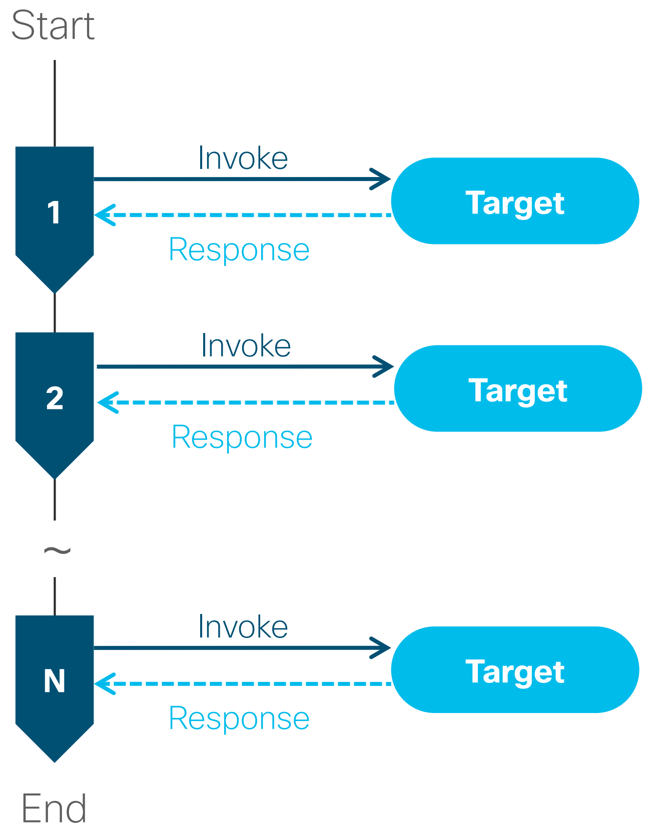
Cisco Action Orchestrator Deep Dive

Action Orchestrator

Ecosystem integration standardized using adapters and workflows

- Extend Workload Manager services and actions
- Execute workflows with business and technical logic
- Use included adapters or create custom adapters

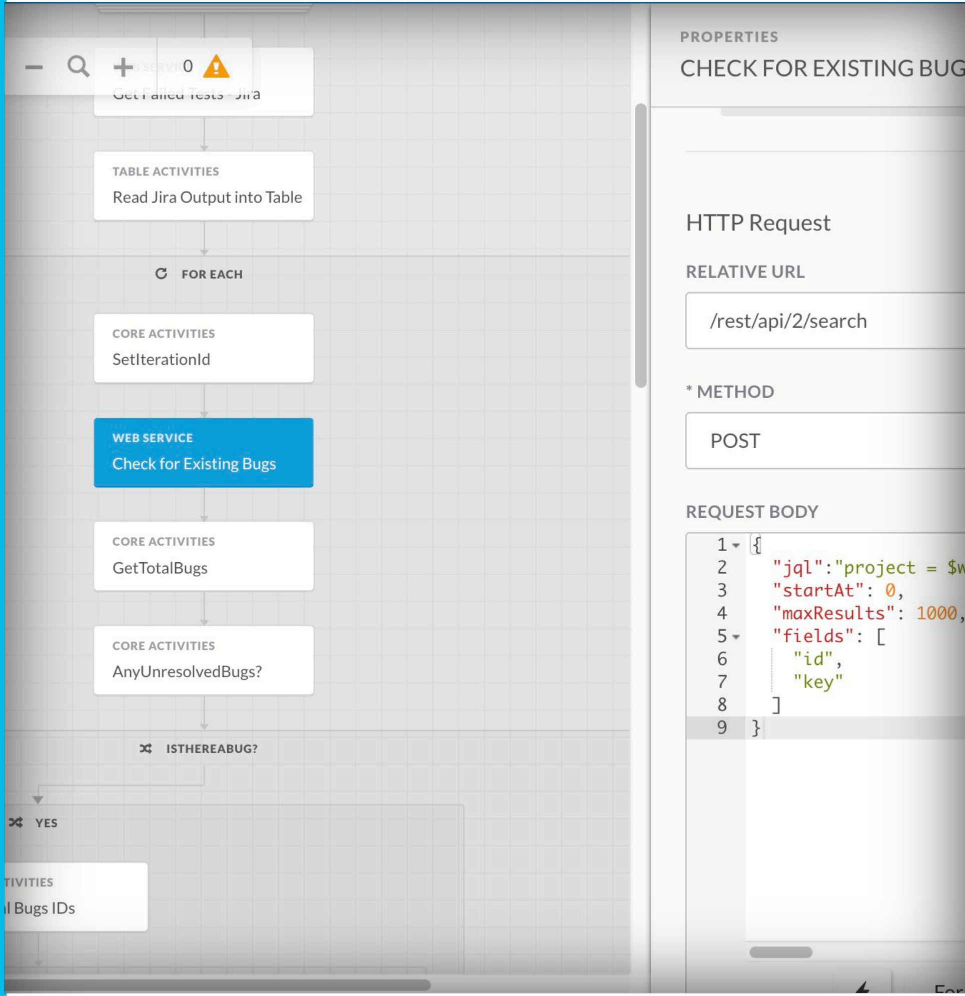
Benefits: Eliminate repetitive tasks and broaden scope of cloud orchestration, simplify business process and reduce human error



Cisco Partner Confidential

Action Orchestrator Overview

- Create actions to drive or be triggered seamlessly from other CCS products
- Combine flexible out of the box adapters to create new integrations
- Automate tasks according to schedules or external events



PROPERTIES

CHECK FOR EXISTING BUG

HTTP Request

RELATIVE URL

/rest/api/2/search

* METHOD

POST

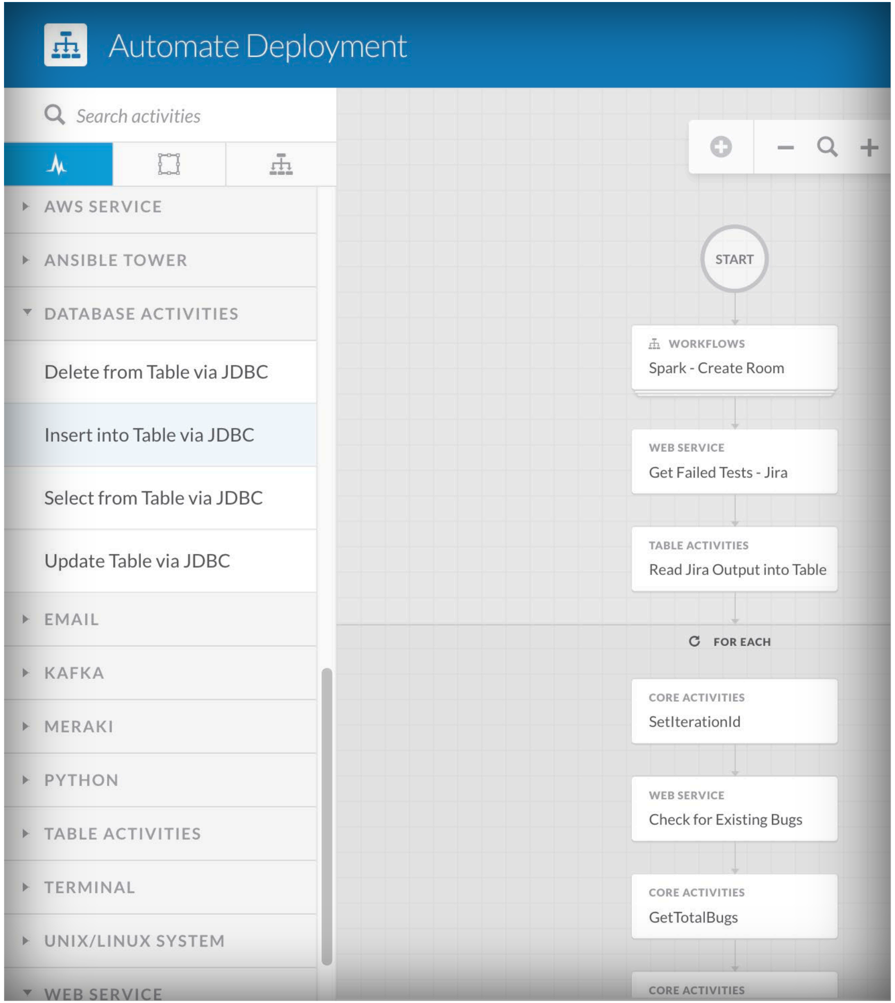
REQUEST BODY

```
{
  "jql":"project = $w
  "startAt": 0,
  "maxResults": 1000,
  "fields": [
    "id",
    "key"
  ]
}
```

Cisco Partner Confidential

Action Orchestrator Overview

- 100% REST API support
- Import/Export/Version workflows and adapters via Git
- Design modular processes with sub workflows
- Read and publish events and approvals
- Create custom variable types
- Scripting interface support



Automate Deployment

Search activities

- AWS SERVICE
- ANSIBLE TOWER
- DATABASE ACTIVITIES
  - Delete from Table via JDBC
  - Insert into Table via JDBC
  - Select from Table via JDBC
  - Update Table via JDBC
- EMAIL
- KAFKA
- MERAKI
- PYTHON
- TABLE ACTIVITIES
- TERMINAL
- UNIX/LINUX SYSTEM
- WEB SERVICE

START

WORKFLOWS
Spark - Create Room

WEB SERVICE
Get Failed Tests - Jira

TABLE ACTIVITIES
Read Jira Output into Table

FOR EACH

CORE ACTIVITIES
SetIterationId

WEB SERVICE
Check for Existing Bugs

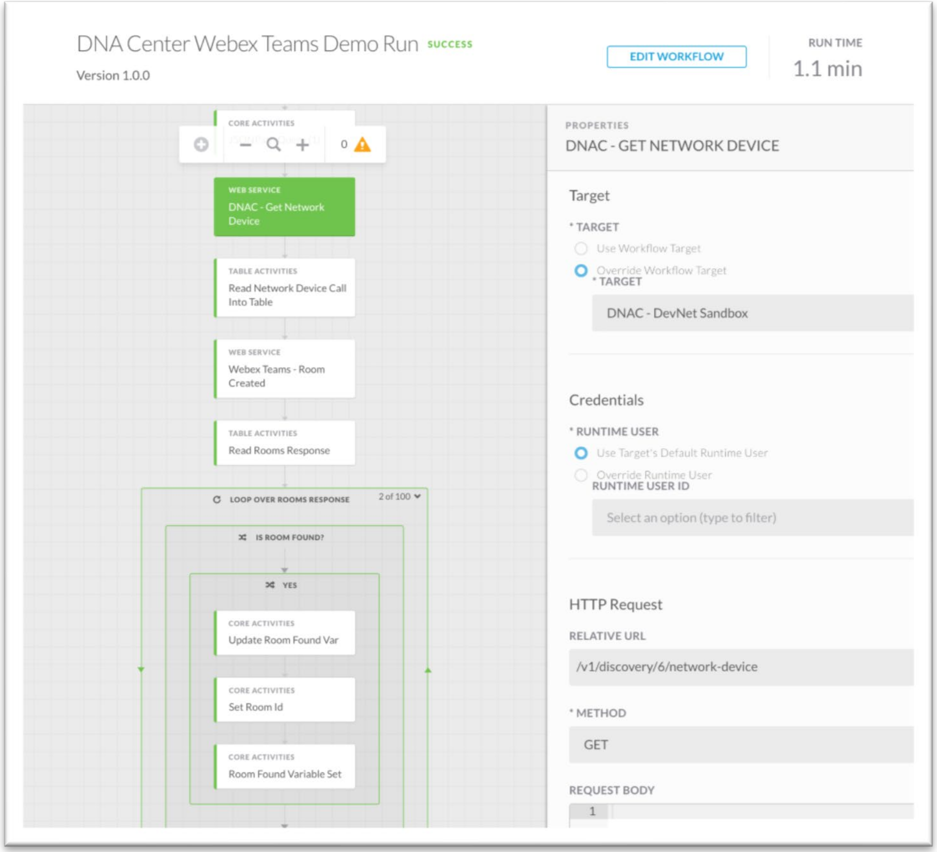
CORE ACTIVITIES
GetTotalBugs

CORE ACTIVITIES

Cisco Partner Confidential

Automation Made Easy

- Graphical interface
- Visual workflow
- No coding required
- Built-in adapters for common systems and activities



DNA Center Webex Teams Demo Run SUCCESS

Version 1.0.0

RUN TIME
1.1 min

PROPERTIES
DNAC - GET NETWORK DEVICE

Target

* TARGET
○ Use Workflow Target
● Override Workflow Target
* TARGET
DNAC - DevNet Sandbox

Credentials

* RUNTIME USER
● Use Target's Default Runtime User
○ Override Runtime User
RUNTIME USER ID
Select an option (type to filter)

HTTP Request

RELATIVE URL
/v1/discovery/6/network-device

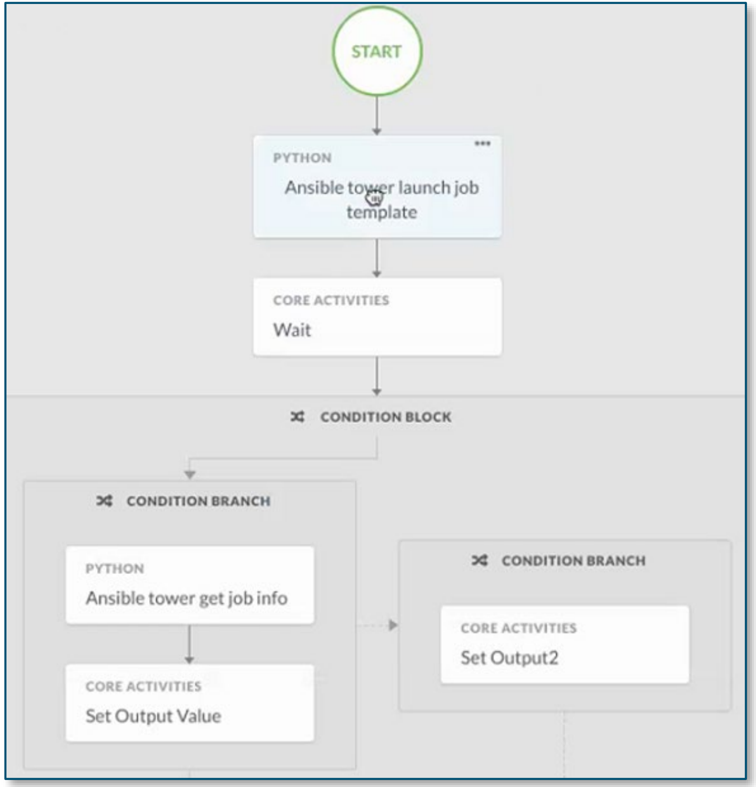
* METHOD
GET

REQUEST BODY
1

Cisco Partner Confidential

Automation Made Easy

- Advanced workflow control
- Data Flow – reference data input/output between activities
- Events and Triggers – from email, Spark, AMQP, Kafka, web hooks…
- Child workflows
- Nested workflows



AO Components

Basic Concepts

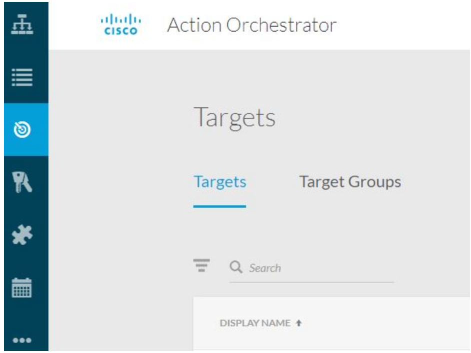
- ✓ **Workflow** : Sequence of activities or actions
- ✓ **Activity**: can be a REST call, Run Terminal, Send Email etc., It is the lowest “level” in AO and is a call to do some action against some endpoint or component
- ✓ **Adapter**: Adapter is like an Interface, it defines one or more Activities that can be run to achieve a particular outcome
- ✓ **Target Type**: identifies the type of Targets that can be defined and used by Activities
- ✓ **Targets**: Identifies the host/endpoint that an action or workflow will use when executing
- ✓ **Runtime User Type**: Identifies the type of Runtime Users(Account Keys) that can be used by Targets
- ✓ **Runtime Users**: Defined set of user credentials, **e.g.** userid and password, that will be used to login into one or more Targets. Also called Account Keys

Basic Concepts

- ✓ **Variable support**: User can define local, input, output, global and custom variables (For e.g. Table Type) for workflow execution
- ✓ **Control Flow**
  - ✓ Condition block
  - ✓ Start Point
  - ✓ For-Each Loop
  - ✓ While Loop
  - ✓ Parallel block
  - ✓ Pause & Resume
- ✓ **Data Flow**: Reference data (input, output) between actions.
- ✓ **Triggers** : Schedule (cron), Events

Targets

- ✓ Component automation is executed against
- ✓ Current Targets: AWS, Amazon Device, Ansible Tower, CloudCenter, Git, Google Cloud Endpoint, HTTP Endpoint, JDBC Database, Kafka, Meraki, Microsoft Windows, POP3, SMTP , Terminal Endpoint, Terraform, Unix/Linux, Azure, DNA Center, Kubernetes, ServiceNow, Vmware, etc..
- ✓ Compiled vs "Atomic" Adapters
- ✓ Custom CX Adapters: Intersight, Webex Teams, CSOne, MongoDB
- ✓ Connection information varies per connection
- ✓ Runtime User or Account Keys give access and authority for target
- ✓ Target Groups – Allow execution of automations against groups of targets based on target type. Can also add individual targets into group
- ✓ Anything else you can think of and build!



Targets

Targets | Target Groups

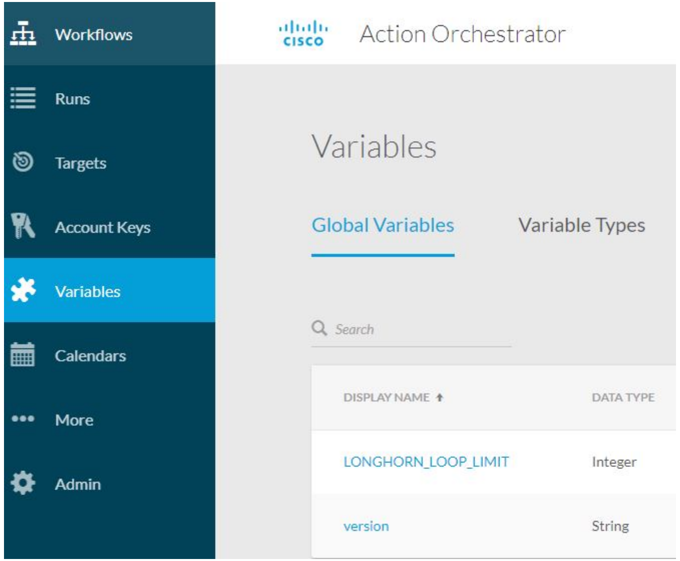
JIRA

splunk>

hadoop

Variables - Scope

- Scopes
  - Global – Accessible Anywhere
  - Environment – Settings for system
  - Process – Part of process only
    - Local – value destroy after runtime
    - Input – Inputs to the process
    - Outputs – outputs from the process
    - Static – like local but value retained

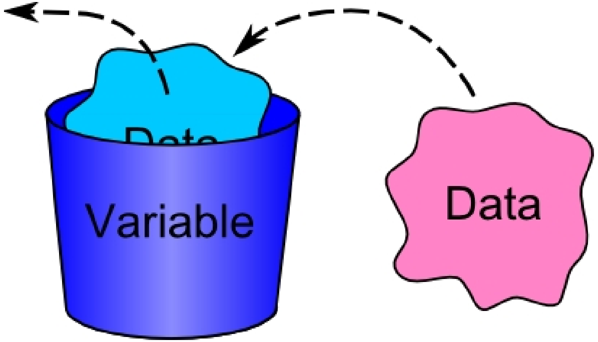


Variables

Global Variables | Variable Types

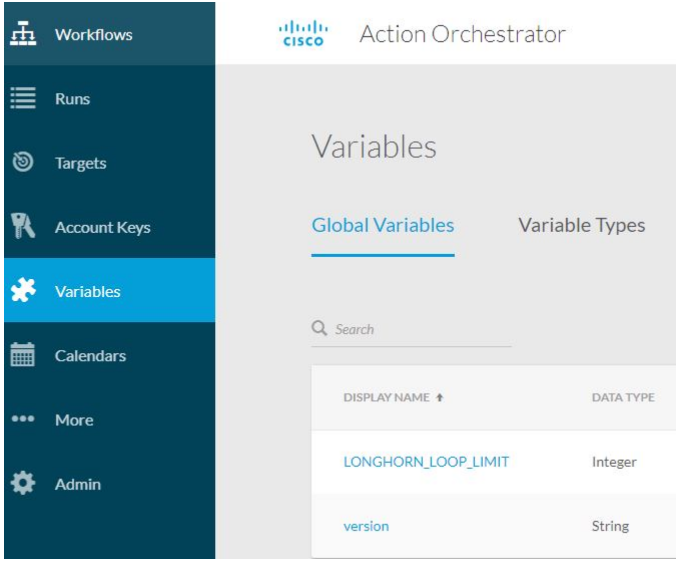
Search

DISPLAY NAME ↑	DATA TYPE
LONGHORN_LOOP_LIMIT	Integer
version	String



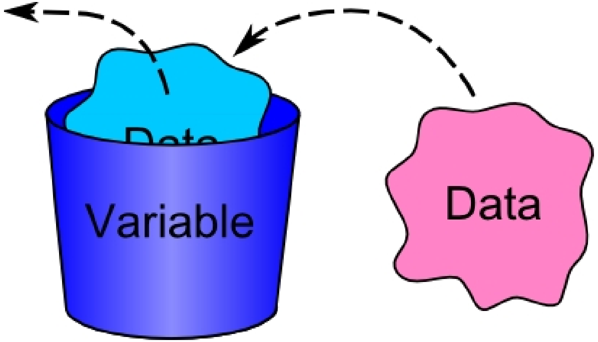
Variables - Types

- Types
  - Basic
    - Boolean – True/False
    - DateTime – Time and Date
    - Decimal – Floating point number
    - Integer – Whole numbers
    - Secure String – String encrypted in the database and UI
    - String – array of characters
  - Advanced
    - Tables – Multi-dimensional array
    - Self Defined – Objects of Table Types



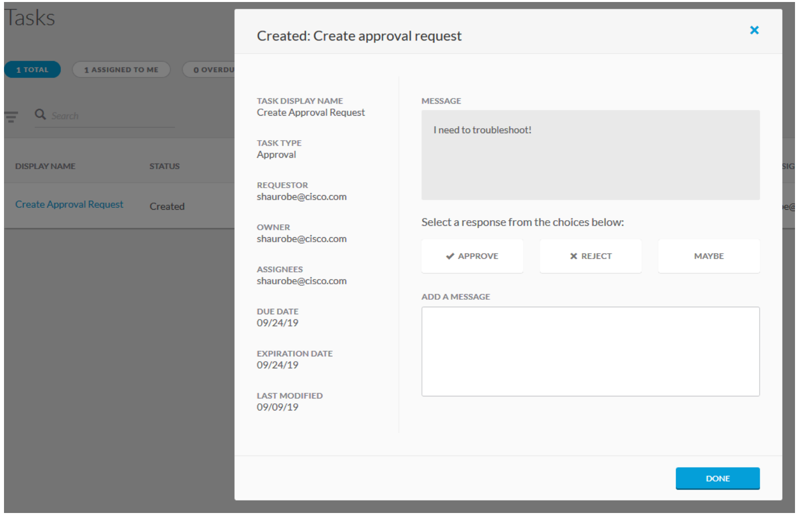
Variables

DISPLAY NAME ↑	DATA TYPE
LONGHORN_LOOP_LIMIT	Integer
version	String



Tasks

- Added in 5.1
- Allows human interaction with workflows
- Can pause/hold workflows
- Can have numerous inputs and options
- Can trigger other workflows



Created: Create approval request

TASK DISPLAY NAME
Create Approval Request

TASK TYPE
Approval

REQUESTOR
shaurobe@cisco.com

OWNER
shaurobe@cisco.com

ASSIGNEES
shaurobe@cisco.com

DUE DATE
09/24/19

EXPIRATION DATE
09/24/19

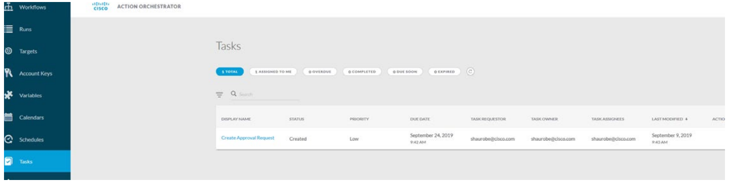
LAST MODIFIED
09/09/19

MESSAGE

I need to troubleshoot!

Select a response from the choices below:

ADD A MESSAGE

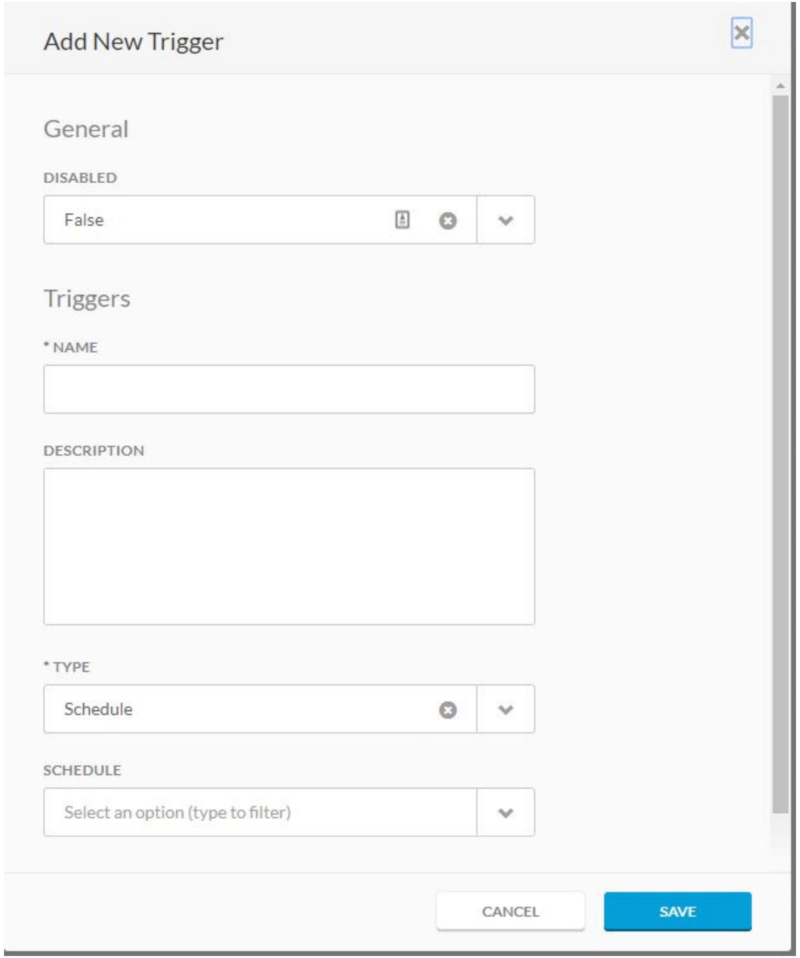


Tasks

DISPLAY NAME	STATUS	PRIORITY	DUE DATE	TASK REQUESTOR	TASK OWNER	TASK ASSIGNEES	LAST MODIFIED	ACTIO
Create Approval Request	Created	Low	September 24, 2019 9:42 AM	shaurobe@cisco.com	shaurobe@cisco.com	shaurobe@cisco.com	September 9, 2019 9:43 AM	

Triggers

- Drive automation in the system
- Types
  - Schedule – Repeatable based on time
  - Events – Some event in another system
    - Kafka
    - AMQP
    - Email
    - Task
- Can be turned on and off
- Most basic is Ad-Hoc



Add New Trigger

General

DISABLED: False

Triggers

* NAME

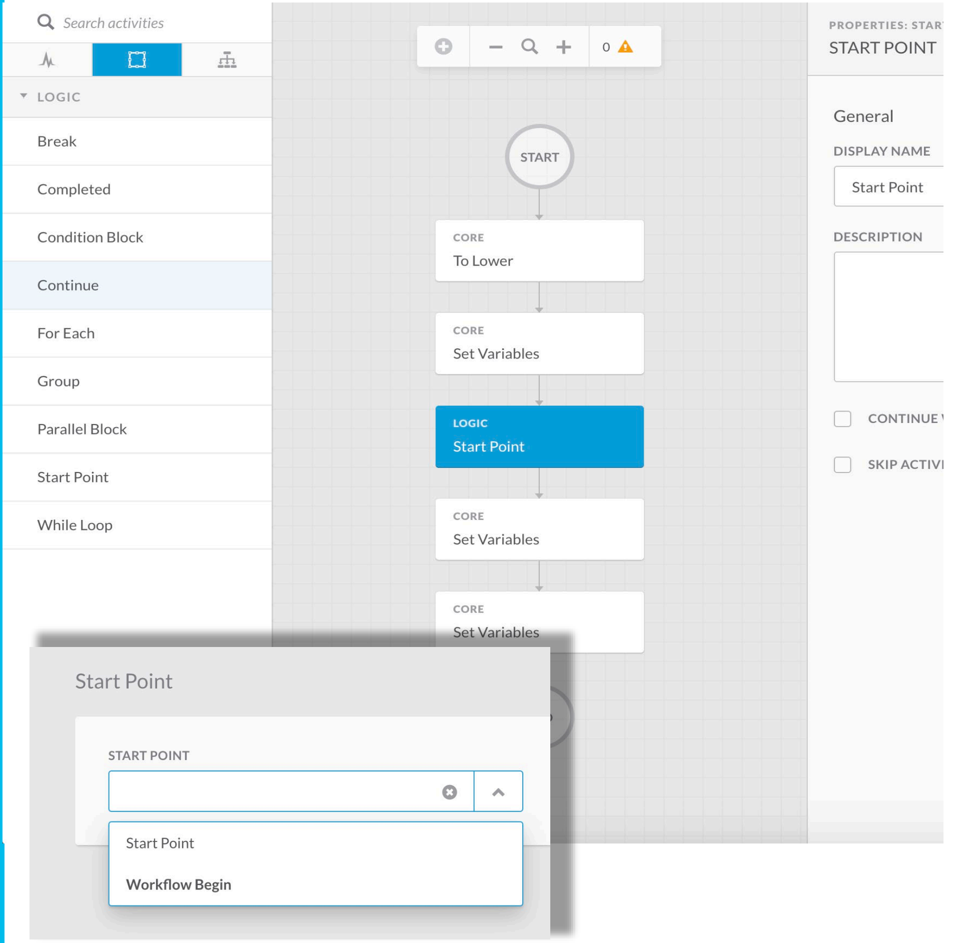
DESCRIPTION

* TYPE: Schedule

SCHEDULE: Select an option (type to filter)

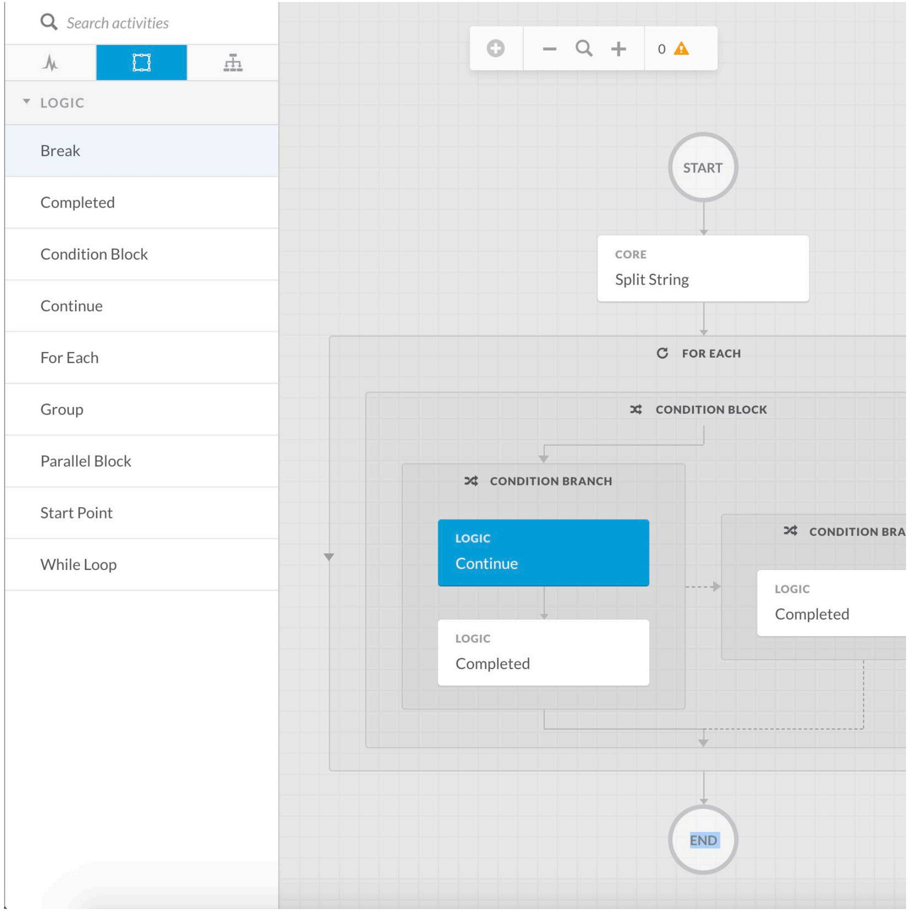
Start Point

- Allows designer to define different start points for a workflow
- Allows user to select different start points when running a workflow as inputs
- Activities before start point selected are not run
- Can be used to create logical workflow branching via input



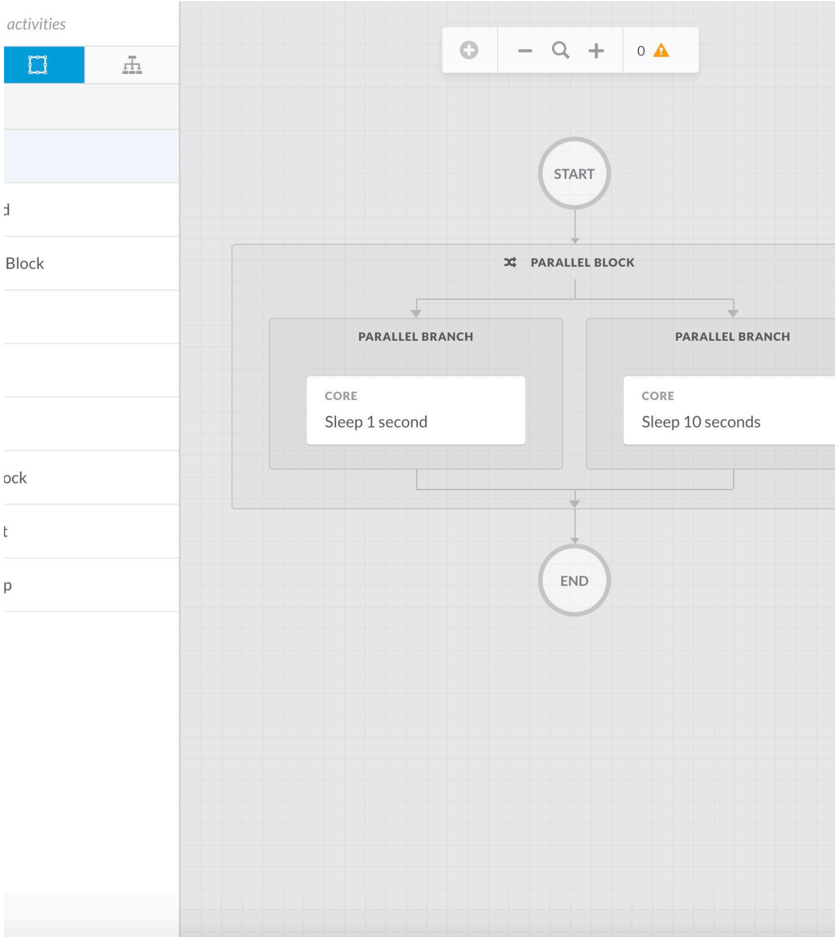
Continue

- Used for interrupting an iteration of a loop and moving to the next iteration – for example, if a condition is met inside of a loop, rather than execute the rest of the loop, move on to next loop iteration
- Works the same as “continue” concepts in most conventional programming languages
- Differs from ”break” in that it will allow the loop to continue, while “break” ends the loop entirely



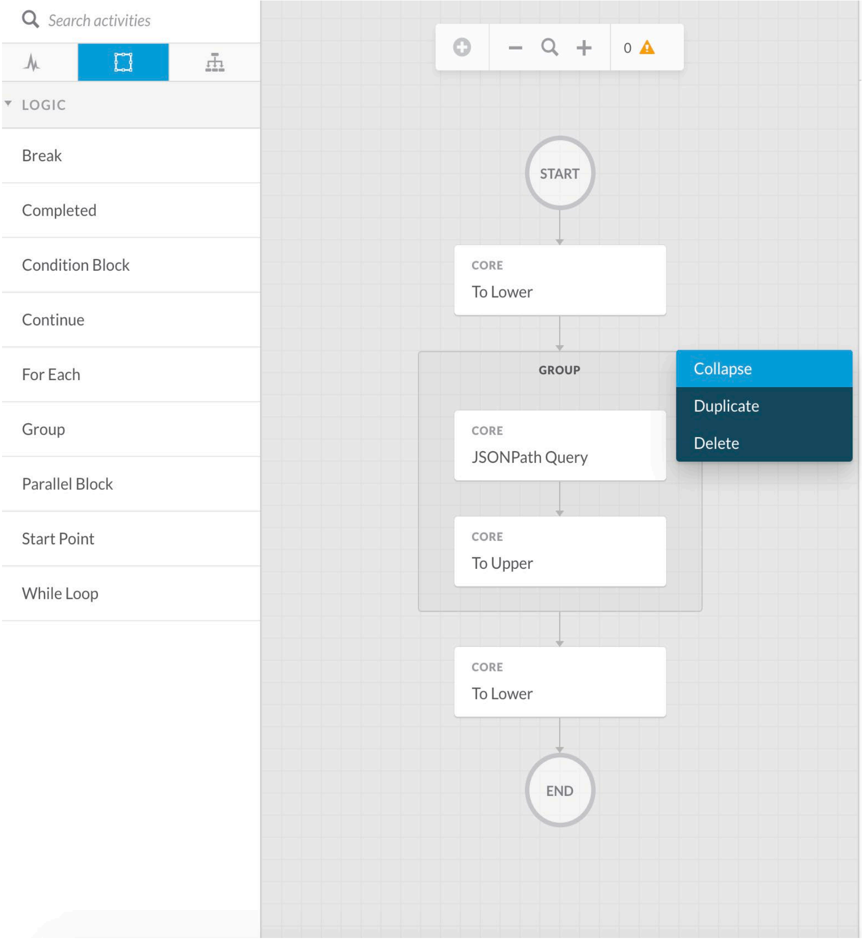
Parallel Block

- Allows a workflow designer to split execution into a number of blocks that execute all at the same time
- Used for processing ”thread safe” actions at the same time
- Blocks will rejoin the workflow together when all blocks are completed, regardless of status of the individual blocks – ie one block fails, however a failure in any of the blocks will fail the workflow when all blocks complete and rejoin
- Blocks cannot refer to each other when running in parallel



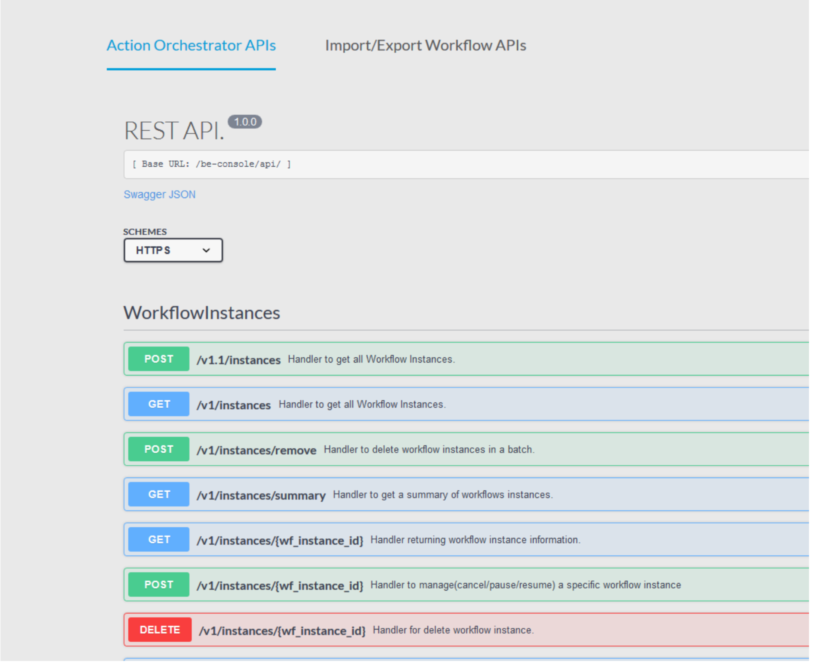
Group

- Allows a workflow designer to create arbitrary grouping of activities
- Allows designer to take action on the groups such as deleting or duplicating
- Allows designer to collapse group if desired to assist with readability of workflow layout
- Allows designer to query downstream of group start/end/elapsed time of group
- Allows designer to catch success/fail of activities within group for the purpose of error handling



Rest API

- Everything is API driven
- Built-in Swagger
- AO APIs and Import/Export APIs
  - AO APIs Endpoint: https://<server>:<port>/be-console/api/v1
  - Import/Export APIs Endpoint: https://<server>:<port>/be-importexport/api/v1
- AO Only Endpoint: https://<server>:<port>/api/v1 where the port is the exposed port of the BE-CONSOLE pod or BE-IMPORTEXPORT



REST API. 1.0.0

[Base URL: /be-console/api/]

Swagger JSON

SCHEMES: HTTPS

WorkflowInstances

POST /v1.1/instances Handler to get all Workflow Instances.

GET /v1/instances Handler to get all Workflow Instances.

POST /v1/instances/remove Handler to delete workflow instances in a batch.

GET /v1/instances/summary Handler to get a summary of workflows instances.

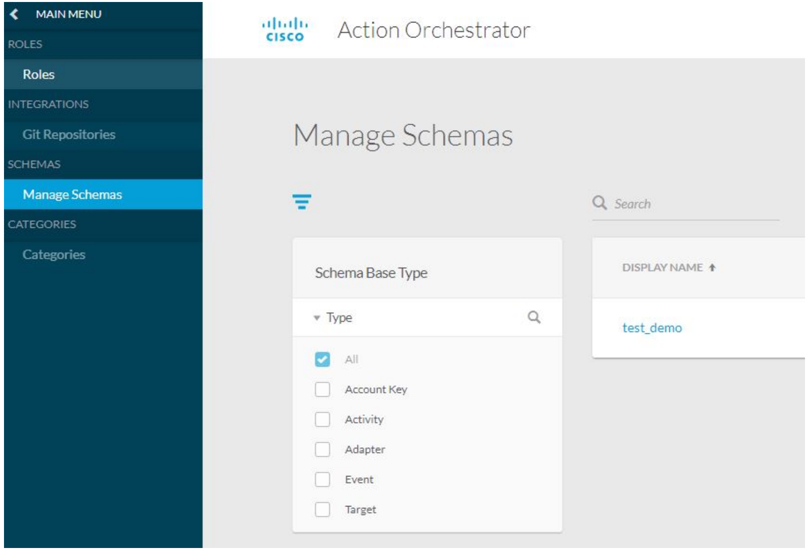
GET /v1/instances/{wf_instance_id} Handler returning workflow instance information.

POST /v1/instances/{wf_instance_id} Handler to manage(cancel/pause/resume) a specific workflow instance

DELETE /v1/instances/{wf_instance_id} Handler for delete workflow instance.

Administration

- Roles – Definitions of security profiles
- Git – integration with repos for exporting/importing of code
- Schema Management – allows create/edit/delete of schemas for your custom adapters, targets, users, and actions
- Categories – Help organize content



Manage Schemas

Search

Schema Base Type

Type

☑ All
□ Account Key
□ Activity
□ Adapter
□ Event
□ Target

DISPLAY NAME
test_demo

Creating a Usecase workflow

Scenario

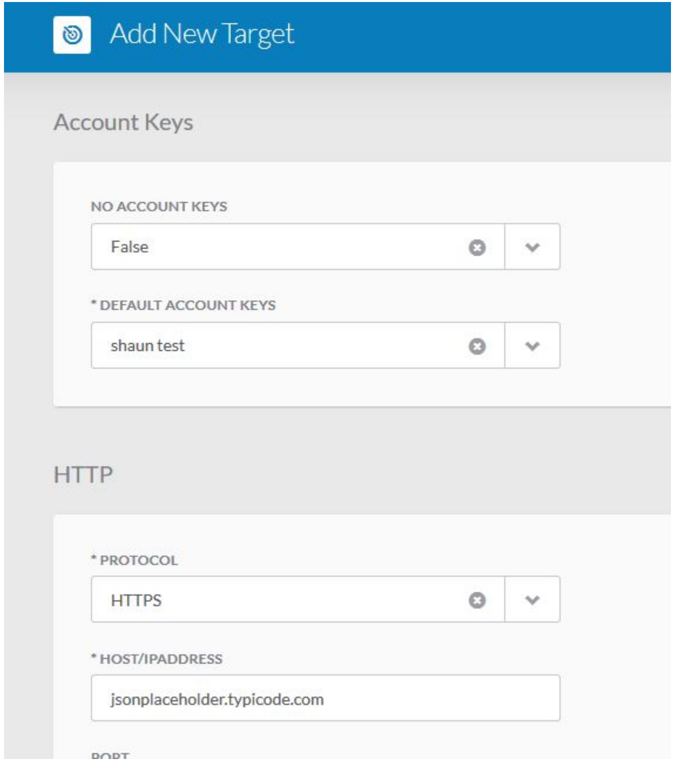
- Write a workflow process that will…
  - Query an API
  - Parse the Data
  - Run conditionals on it
  - Run every hour
  - Email results

What components do we need?

- API Endpoint
- JSON/XML Path
- User with access to endpoint
- Email Server
- Some way to parse data
- Can you think of what these would be in AO?

Setup

- Create a category – Best Practice and helps Organize
- Create the Runtime user
  - Gives access to API
  - HTTP Basic Authentication
- Create the Target
  - What is executed against
  - HTTP Endpoint
- Create SMTP Target
  - Name/Target=smtp.gmail.com
  - Default Account key = your email
  - SMTP Server = smtp.gmail.com
  - Port = 465



Add New Target

Account Keys

NO ACCOUNT KEYS: False

* DEFAULT ACCOUNT KEYS: shaun test

HTTP

* PROTOCOL: HTTPS

* HOST/IPADDRESS: jsonplaceholder.typicode.com

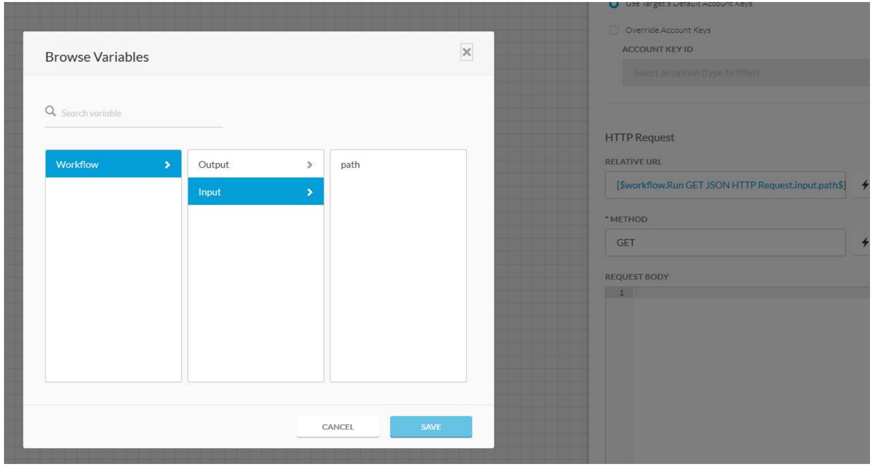
PORT

A New Workflow

- Create a single workflow
- Name it “Run GET AWS HTTP Request”
- Select the category
- Add input as “URL”, make it required
- Add Output as “instanceList”
- Select “AWS endpoint as target type”
- Select “Execute on this Target”, Select your target
- Search for the Sleep activity and drag and drop it
- Set it to 30 seconds. Validate the workflow.

Make it work

- Remove the sleep activity
- Add Generic AWS API Request activity
- Add URL variable to relative URL
  - Click insert variable reference icon
  - Select Workflow->Input->URL
  - Click Save
- Set method to “GET”
- Set content type to “JSON”
- Leave rest the same, validate
- Run it… what happens?
- Inspect your results!



● Use Target's Default Account Keys
○ Override Account Keys

ACCOUNT KEY ID: Select an option (type to filter)

HTTP Request

RELATIVE URL: [$workflow.Run GET JSON HTTP Request.input.path$]

* METHOD: GET

REQUEST BODY: 1

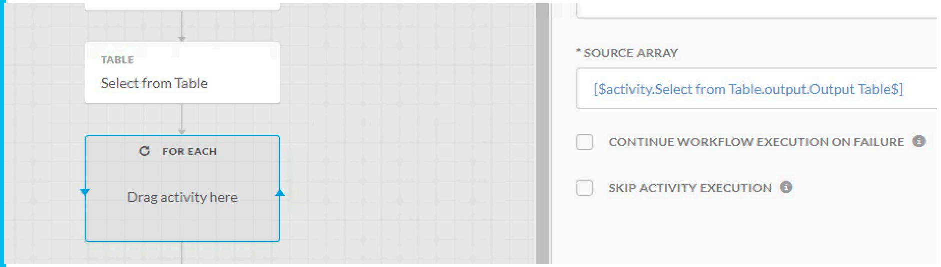
cisco Live!

Handle the output

- Add “Read table from XML” after Web Call
- Set Source XML to the output of the web call
- Set XML Path and columns to read
- Add “Select From Table” activity
  - Set the Input XML to the output of “Read table from XML” activity
  - Select All in the result column
  - Sort by vpcId and Order By Ascending
- Validate and Run Workflow!

For each

- Add a For Each block
  - For Source Array set it to the output of Select From Table activity



* SOURCE ARRAY

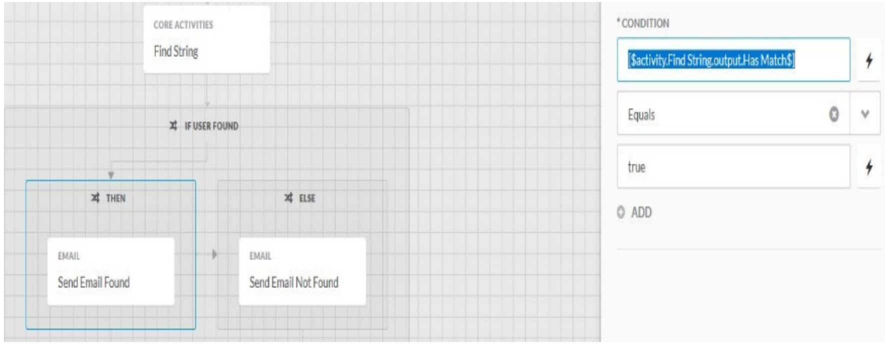
[$activity.Select from Table.output.Output Table$]

□ CONTINUE WORKFLOW EXECUTION ON FAILURE

□ SKIP ACTIVITY EXECUTION

Conditionals

- Add a conditional block
  - On Left side, set conditional to check if the InstanceState is NOT in running state
    - Click Lightning icon on first field of condition and select Activities->For Each->Source Array->Items->instanceState
    - Set Second field to “Does not match wildcard”
    - Type in running*
  - Drag Set Variables activity into the conditional block
    - Add the output variable to the “variables to update” field
    - In the “Variable New Value, add InstanceId, InstanceType and InstanceState fields
  - Delete Right Side conditional block



* CONDITION

$activity.Find String.output.Has Match$

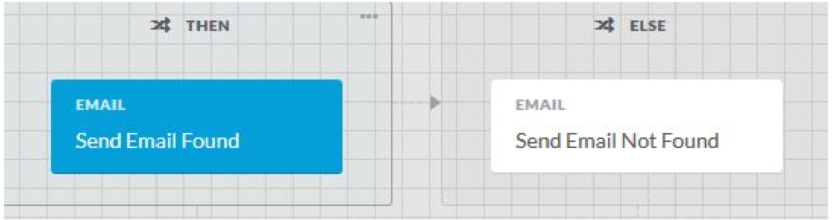
Equals

true

ADD

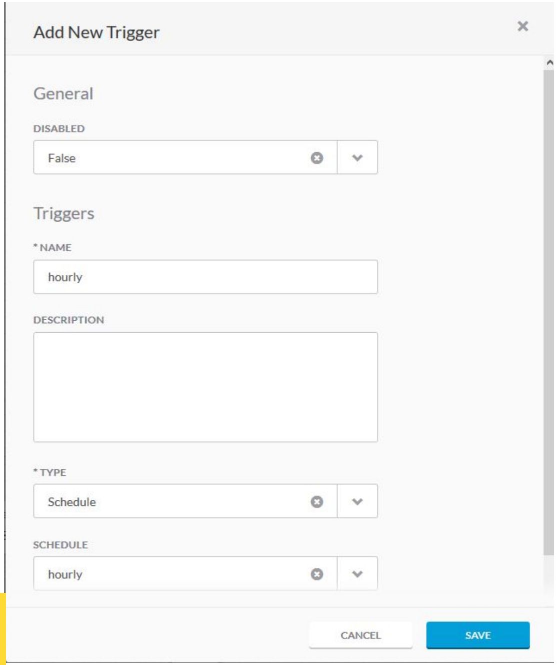
Email

- Add Email Activity
  - Select Override Workflow Target and select your SMTP server
  - Set “TO” your email
  - Set Message to be “There are non-active EC2 instances: <add the output value>
- Click Validate and Run. Did it email you?



Schedule

- Create a schedule
  - Go to Schedule
  - Call it “hourly”
  - Select Daily Calendar, UTC time
  - Start time=12:00am. Times = 23, interval =1
- Create a trigger
  - Edit workflow and add a trigger
  - Call it “hourly”
  - Select schedule type, of hourly schedule



Add New Trigger

General

DISABLED: False

Triggers

* NAME: hourly

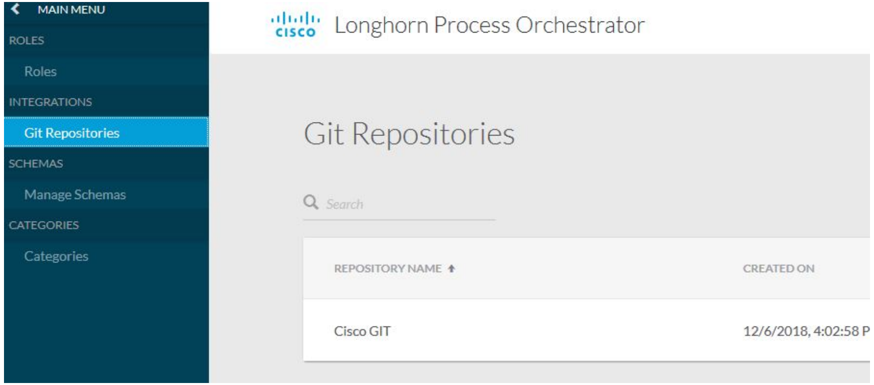
DESCRIPTION:

* TYPE: Schedule

SCHEDULE: hourly

Bringing your workflow to the masses

- AO supports Import/Export via Github or Bitbucket
- Create a workflow repo
  - Go to
  - Click New repository or the plus sign->new repository
  - Call it “ao-workflows” and make it public
  - Create a blank README file
- Setup the integration
  - In AO, go to Admin->integrations->Git Repositories
  - Click NEW GIT REPOSITORY, give it a name
  - Create an account key with user/pass
  - Protocol = HTTPS
  - Type = GitHub
  - REST API = wwwin-github.cisco.com/api/v3/repos/<your userID>/ao-workflows
  - Branch = Master
  - Save



Git Repositories

REPOSITORY NAME	CREATED ON
Cisco GIT	12/6/2018, 4:02:58 P

Export it

- Export your workflow
  - Go to your workflow
  - Under the “VERSION” header, select your new repo in the Git Repository drop-down
  - Click VALIDATE, then click COMMIT and give it a commitment message and submit
- Check it out in your repo
  - Refresh your repo page and look for your workflow
  - Click on it and drill into it, what format is it saved as?
  - Go review your workflow and check out the Git Version information!

Demo

Recap

- Action Orchestrator (AO) can be used by developers, non-developers, and everyone a like
- You can develop in AO by just dragging and dropping Activities or Actions to a canvas and executing it
- AO is an enterprise application that can handle anything you wish to throw at it
- The Sky is the limit
- Any additional questions?

Complete your online session survey

- Please complete your session survey after each session. Your feedback is very important.
- Complete a minimum of 4 session surveys and the Overall Conference survey (starting on Thursday) to receive your Cisco Live t-shirt.
- All surveys can be taken in the Cisco Events Mobile App or by logging in to the Content Catalog on ciscolive.com/emea.

Cisco Live sessions will be available for viewing on demand after the event at ciscolive.com.

Continue your education

Demos in the Cisco Showcase

Walk-In Labs

Meet the Engineer 1:1 meetings

Related sessions

Thank you

You make **possible**