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The bridge to possible

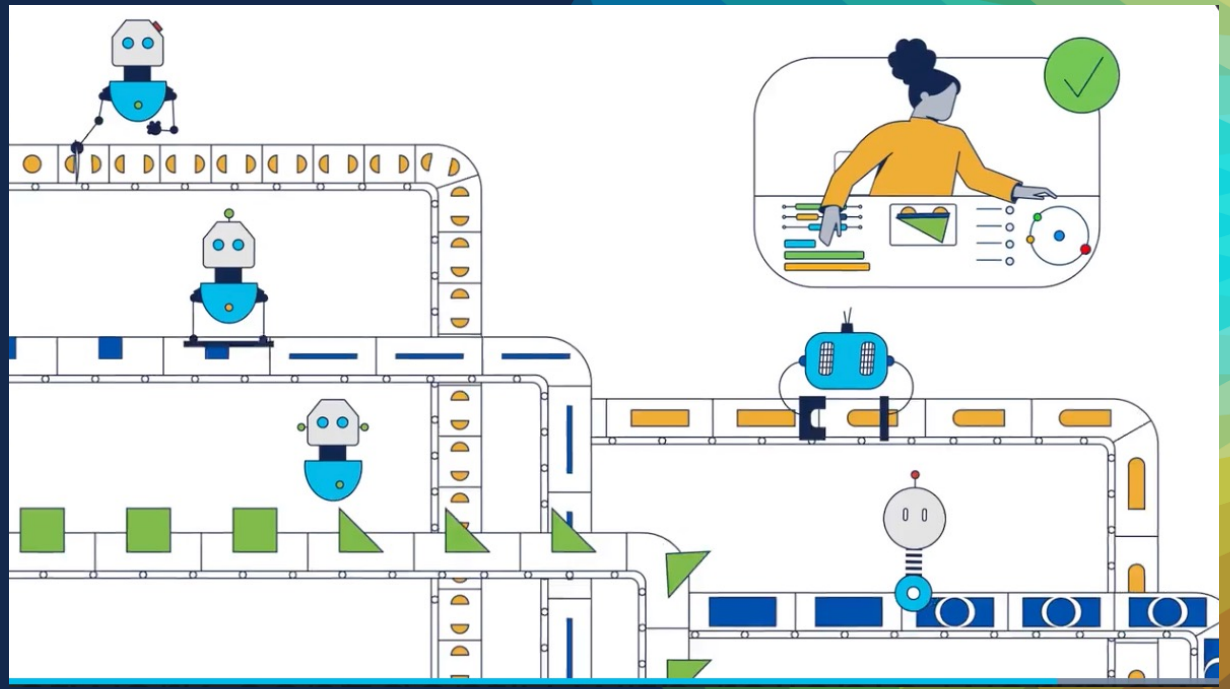
Crosswork Workflow Manager (CWM)

Automating Network Changes with Cisco Crosswork Workflow Manager

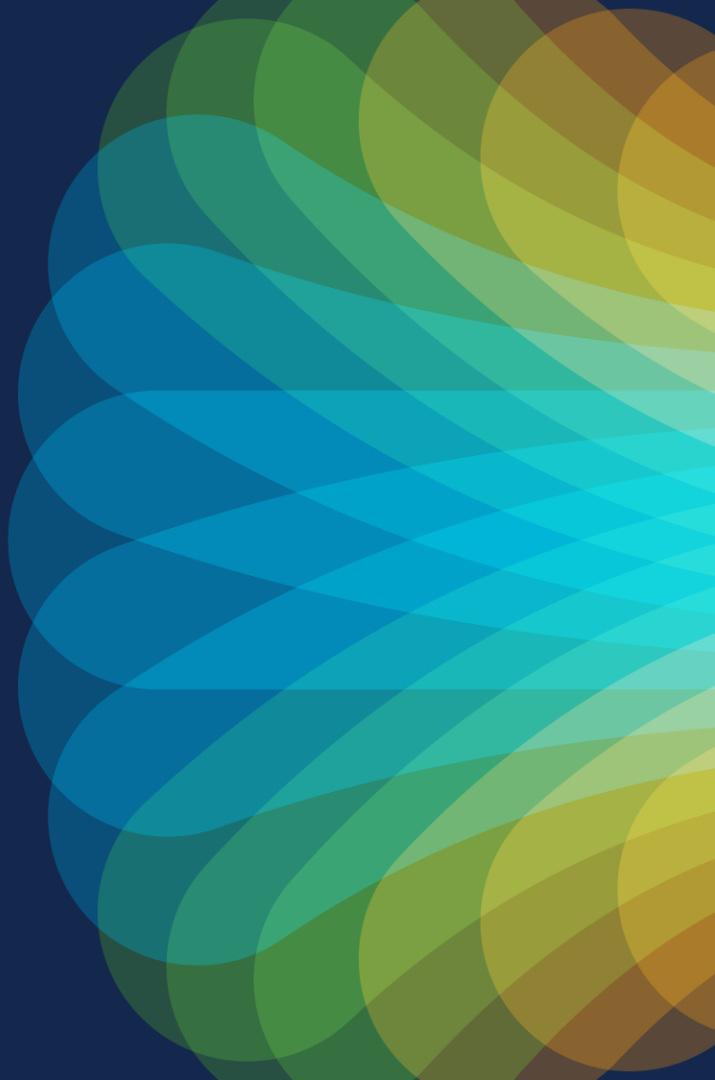
Louis Menditto,
Product Line Manager
Session ID: BRKSPG-1242

Workflows:

- Multiple streams of automation
- Preparing the inputs
- Allow multiple processing stages leading to the final results



Introduction to CWM



Crosswork Workflow Manager

Ability to Visualize, Test, and Reuse automation workflows

Strengths of the CWM component

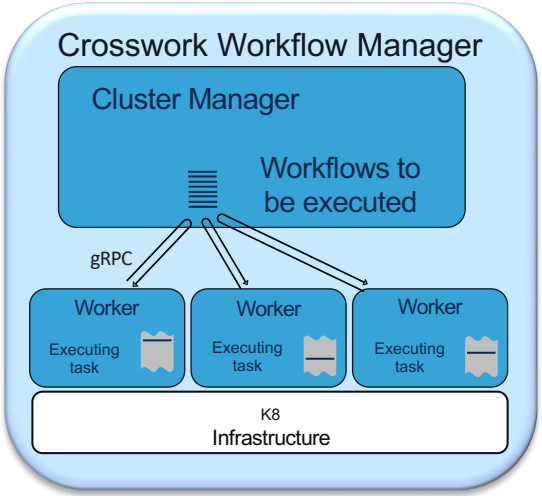
Ultra Reliability – Never Drop Any Work

- Workflows as critical tasks:
  - Resumable (suspend/resume)
  - Recoverable from failures
  - Responsive to outside signaling

Result: fault-tolerant code that is guaranteed to finish execution

Flexibility

- Workflow language from CNCF supports JSON format
  https://github.com/serverlessworkflow/specification
- Integrate to customer OSS/BSS via Adapters.
  - Adapter SDK provides ability to build your own custom adapters



High Scalability

- Capable of running thousands of workflows
- Architecturally can scale horizontally
  - (in 1.0, within a single node).
- Workers consume workflows as they become available.

APIs for Machine-to-Machine integration

- REST API is available for all interactions with the system.
- Includes publishing workflows, instantiating instances, managing workers, etc.

Management

- Logging of all progress
- Metrics reporting

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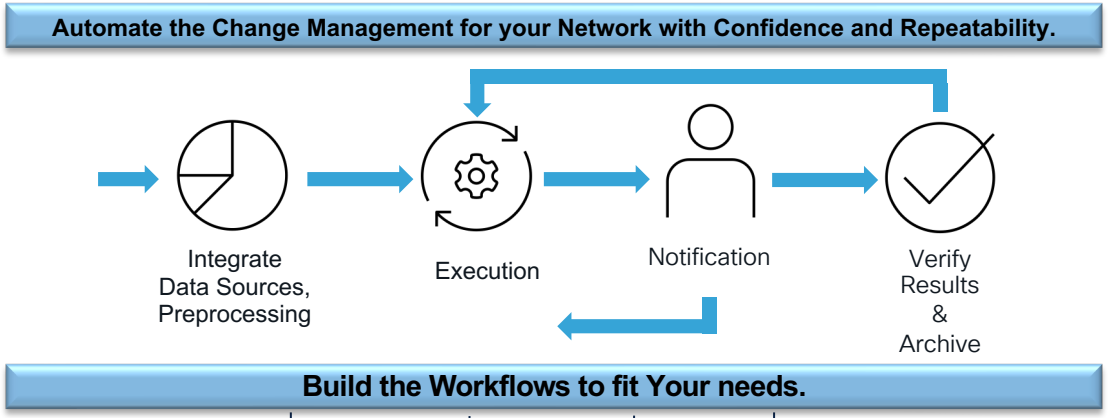
Crosswork Workflow Manager 1.0



Workflows may be initiated by:

- a Controller,
- or by Operator,
- or by general API caller

Also, Workflows can drive actions:

- Application query
- Output to a messaging app
- Action to a controller (such as onboarding)

Example actions:

- AWS for instantiating a virtual router
- NSO for provisioning
- On-boarding to CNC for mgmt
- Webex for messaging
- Netbox for IPAM

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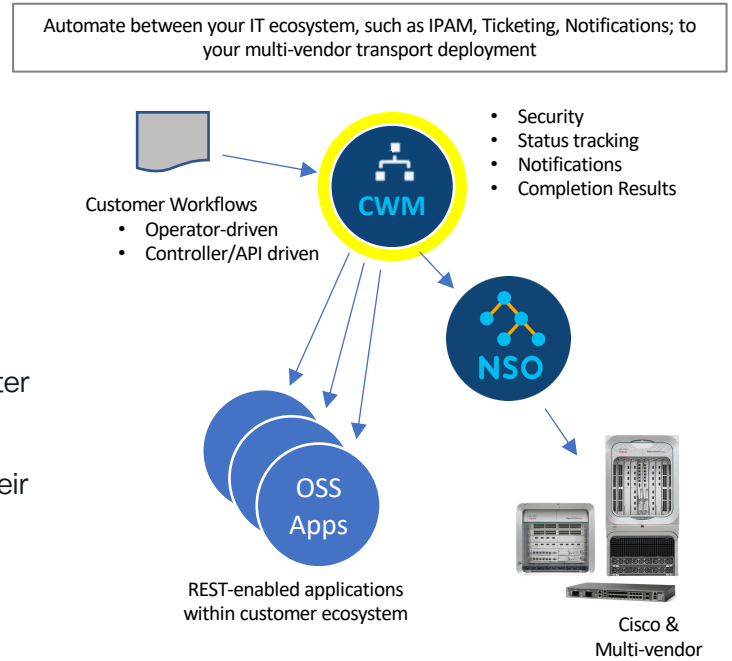
CWM Offering

As a workflow engine, CWM allows you to define all manner of workflows.
The CWM package contains:

- ✓ Workflow Engine. On-prem, multi-user.
- ✓ Kubernetes-based infrastructure and management interfaces.
- ✓ **Pre-packaged adapters**
  - NSO
  - Generic REST
    - Enables general communication to any number of controllers or BSS/OSS systems with REST interfaces
- ✓ **Sample workflows**
  - Simple Router file download (CSR1Kv with IOS-XE) using NSO Adapter
  - Using REST adapter to interface NetBox for IPAM
- ✓ Adapter SDK which enables administrator to build custom integrations to their management applications
- ✓ Simple installation as a VMware OVA with Alma Linux
  - Minimum footprint is single VM



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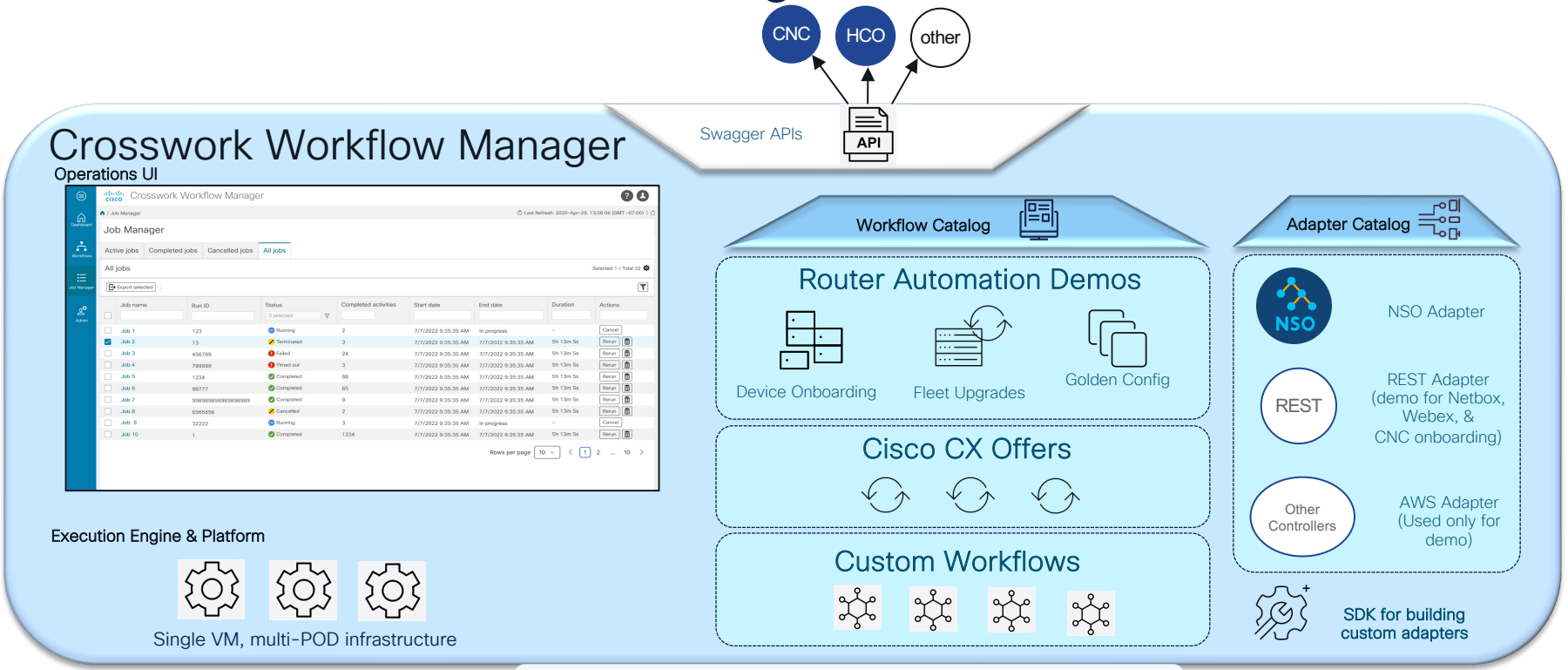
Crosswork Workflow Manager & Router Automation Kit



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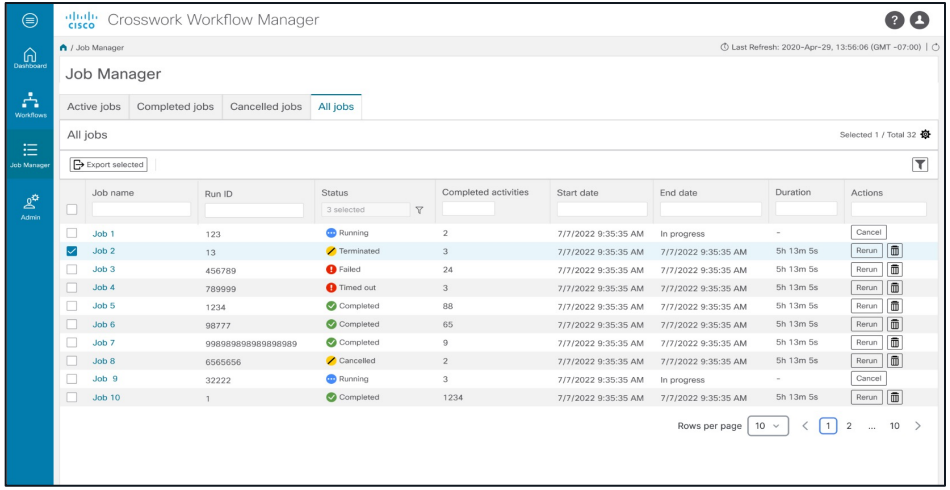
CWM – Job Tracking

The following are aimed at Operational Awareness for Workflows that have been scheduled, running, or completed.

- Conceptually a customer may have hundreds of workflows once the platform becomes key for their operational needs.
- An admin must have the ability to track workflows, and then be able to dive further for more details.

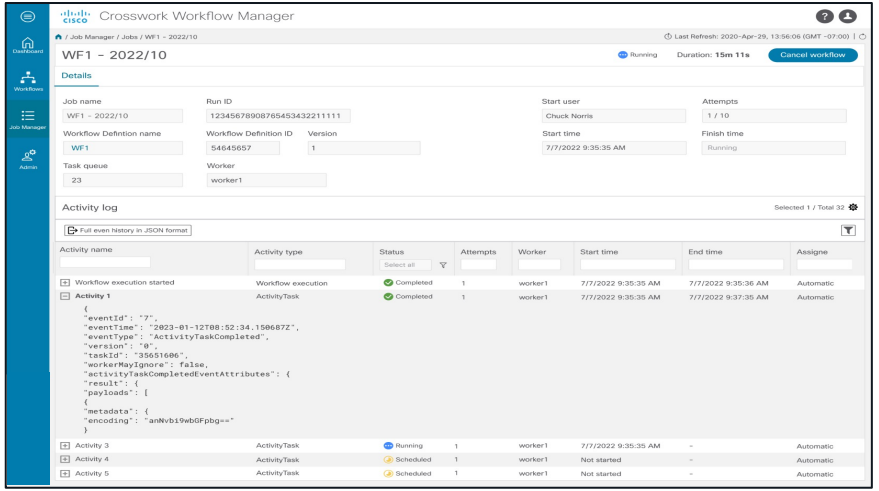
Managing large numbers of Workflows, by list

Each executing workflow is tracked by the USERID who started it, and specific information about the job. Filtering capability is available.



Job Details

Within a scheduled workflow, the customer can display the set of activities and expand further into the activity itself.



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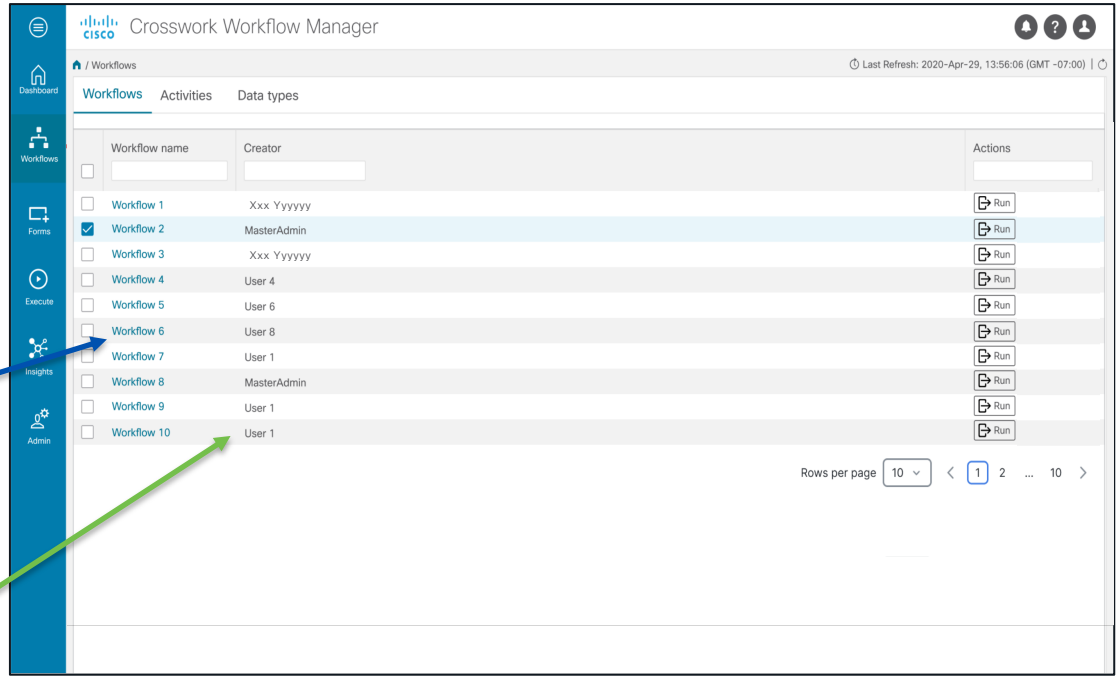
CWM – Library of Defined Workflows

Library of Workflows enabled for use:

- Where you save your workflows.
- Workflows and adapters are installed on the system and saved for use when desired.
- Separate libraries for Workflows vs Adapters.

Operator, or other authorized personnel, can choose one or more pre-defined workflows and schedule them to run.

Each workflow definition also displays the name of the author. Filtering is enabled for workflows by name and by author.



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Example Use Case:

Instantiating Virtual Router on AWS

CWM example: Deploying a virtual router on AWS

Use a workflow to:

- Deploy a Cisco virtual router on Amazon Web Services
- Register the new router onto Cisco Crosswork Network Controller
- On-board the router onto Cisco NSO to add it to the network model
- Perform a Sync-from with NSO to archive the router configuration
- Notify the operator group of each step (Cisco Webex Demo)

Integrations used within the workflow:

- New demo adapter
- REST adapter
- NSO adapter
- Crosswork REST adapter

Online Demo shows visualizations from AWS, CNC, and NSO to show that the device was successfully created and integrated.

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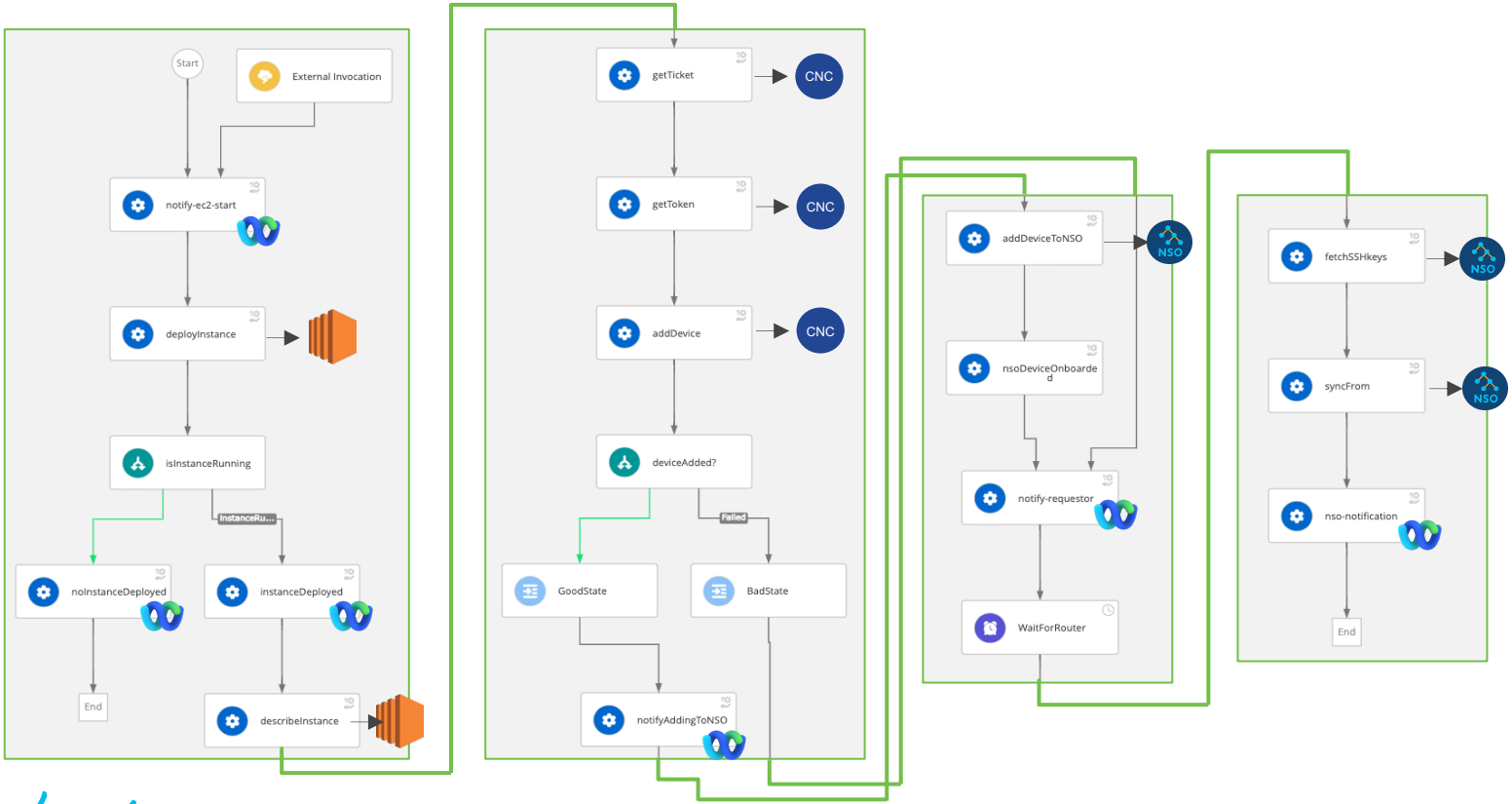
AWS Example – flow diagram



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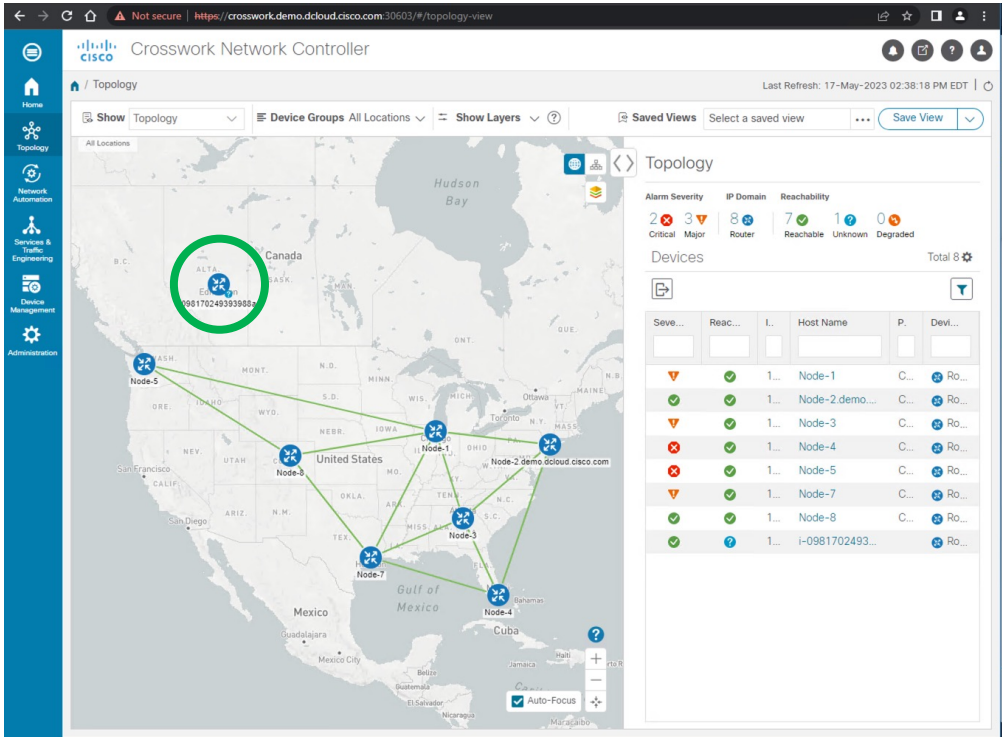
End Result: Device is available and onboarded

Device shown on Crosswork Network Controller topology map.

Ready for deployment of services.



Recorded demo is available on YouTube

- Search “Cisco Crosswork Workflow Manager 1.0”

www.youtube.com/watch?v=uBI7XMC-JT4

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General Considerations Use Cases

With support for integrating multiple provisioning approaches using adapters, CWM is ideal for repeatable workhorse use cases. Food for thought:

Possible triggers for starting the workflow:
- Change Management System
- Predefined schedule
- Controller
- Operations team

Multi-vendor capable
- Cisco NSO, REST, or other custom adapters can be used.

Pre-checks
- Integration to multiple systems, for data such as device status, location, health.
- Also queries to device.

Notifications
- Identify messaging system to be used for communications of milestones, successes, failures

Structure:
- Vendor differences can be isolated within Child Workflows and adapters as appropriate for the device type.
- Re-usable sub-functions can be separated into child workflows for multiple uses

Post-checks
- Multiple post-checks. Success, Status.

Remediation
- Define workflow logic to be triggered on error. E.g., restore system to prior levels

Close
- Archive all traceability data

All is under control of the workflow developer.

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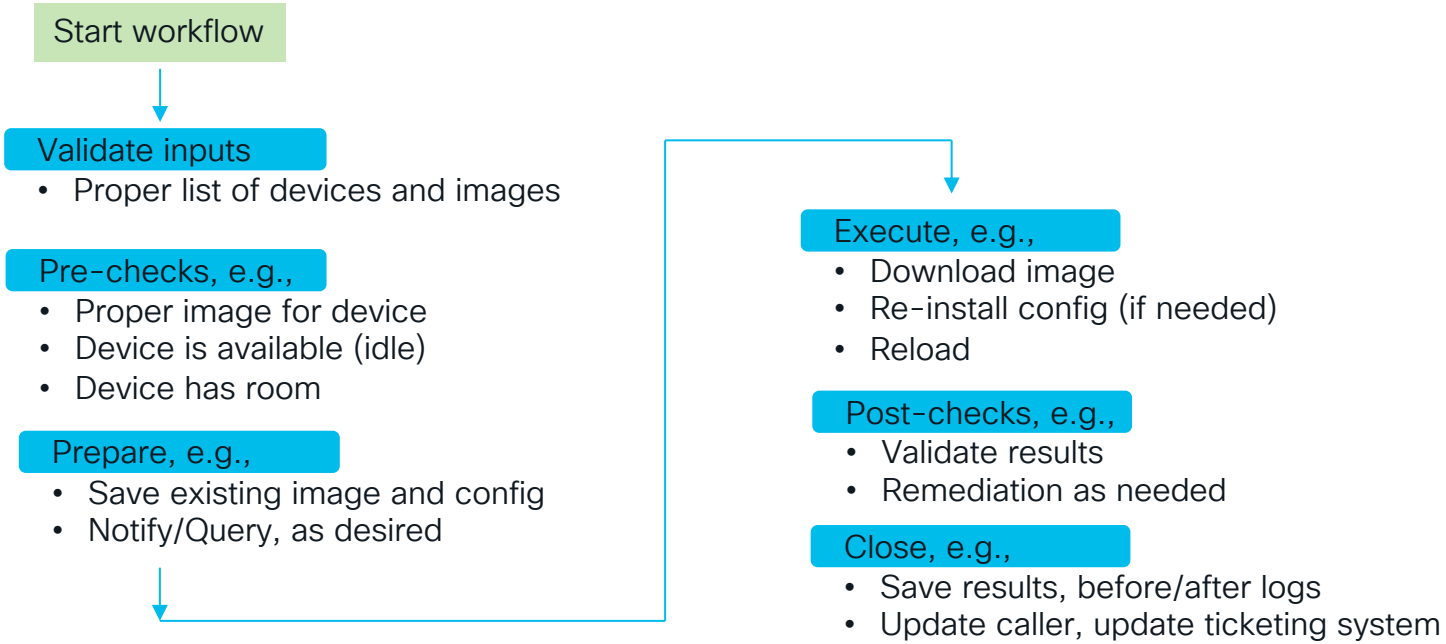
Example Use Case:

Router OS Upgrade

Considering Router OS Upgrades using CWM



Possible extensions could include offloading traffic before the upgrade and restoring traffic after. Workflows can be created for this as well.

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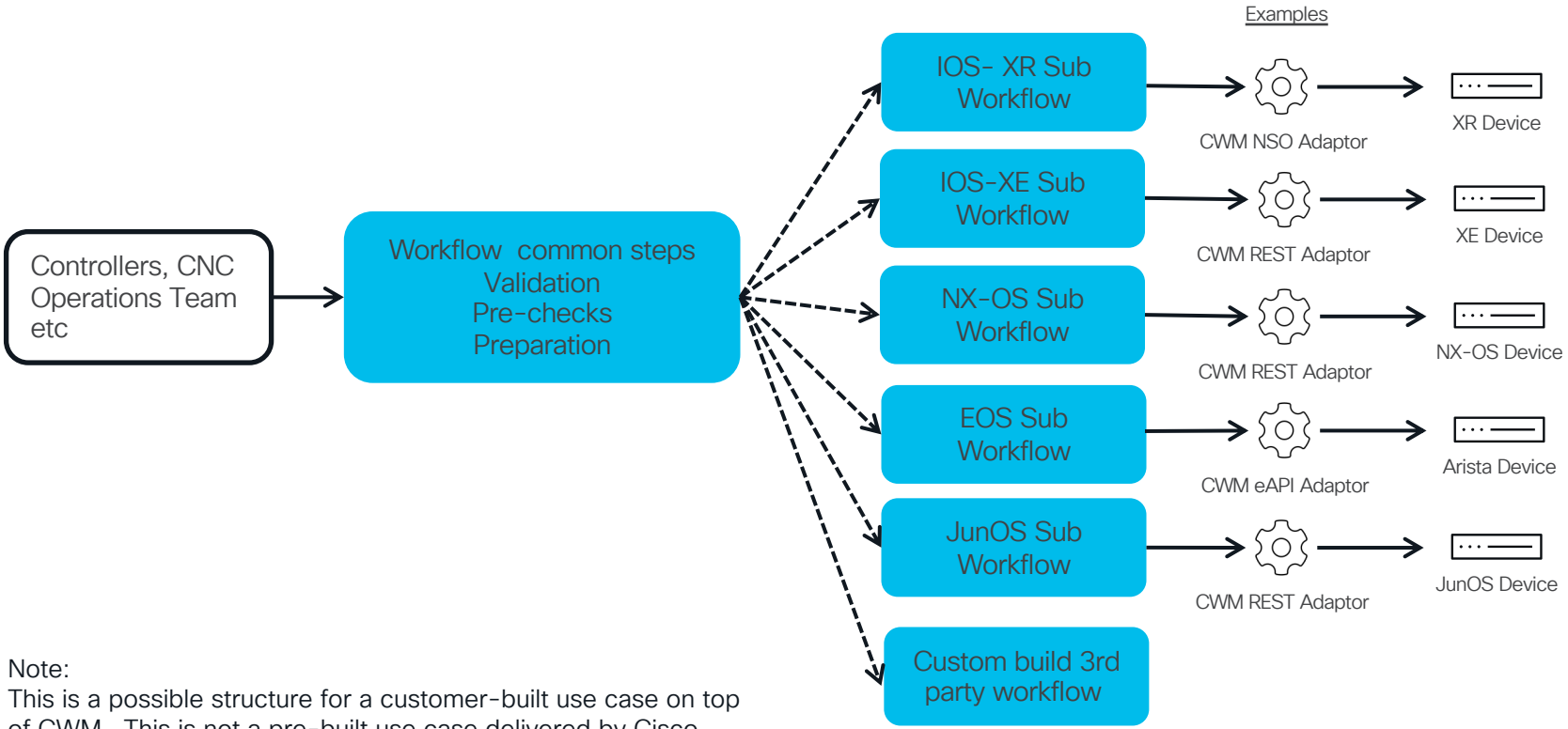
Using Child Workflows to isolate device differences



Note:
This is a possible structure for a customer-built use case on top of CWM. This is not a pre-built use case delivered by Cisco.

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Example Use Case:

Router Config Compliance

Note:
This is a possible structure for a customer-built use case on top of CWM. This is not a pre-built use case delivered by Cisco.

Considerations for Config Compliance using CWM

All is under control of the workflow developer.

Many principles from Router OS Upgrade use case apply also to Configuration Compliance use case.

Conceptually this is two use cases:

Recommended as two use cases:

Workflow 1: Discovery

1. Network crawl to compare running configs vs Golden Config
2. Create report (e.g. diff & summary) for analysis
3. exit

Workflow 2: Repair

1. Using the refined list of devices approved by Operations to be served the updated config
2. Backup old config
3. Pre-checks
4. NSO Dry Run can be used as well
5. Push the Golden Config
6. Restart the device with the Golden Config enabled
7. Post-checks for proper operation

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Product Availability

Getting Crosswork Workflow Manager

Product access

Crosswork Workflow Manager is orderable today:
Product ID: SPAUTO-CWM

It is also available as an included element when ordering the Crosswork Automation Suite:
Product ID: SPAUTO-CWS

A Router Automation Kit will be orderable in the first half of 2024 under an additional feature license.

Documentation for CWM

Cisco.com/go/workflow

- Base landing page
- Data Sheet
- Product manuals
- Tutorial for creating a workflow
- Product Release Notes

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Summary

Crosswork Workflow Manager serves as a platform for:

- Programming your workflows
- Managing those workflows
- Integrating with necessary systems
- Controlling their execution

The Domain Specific Language used for CWM provides the guideposts while allowing extreme flexibility in how your workflows are structured.

www.cisco.com/go/workflow

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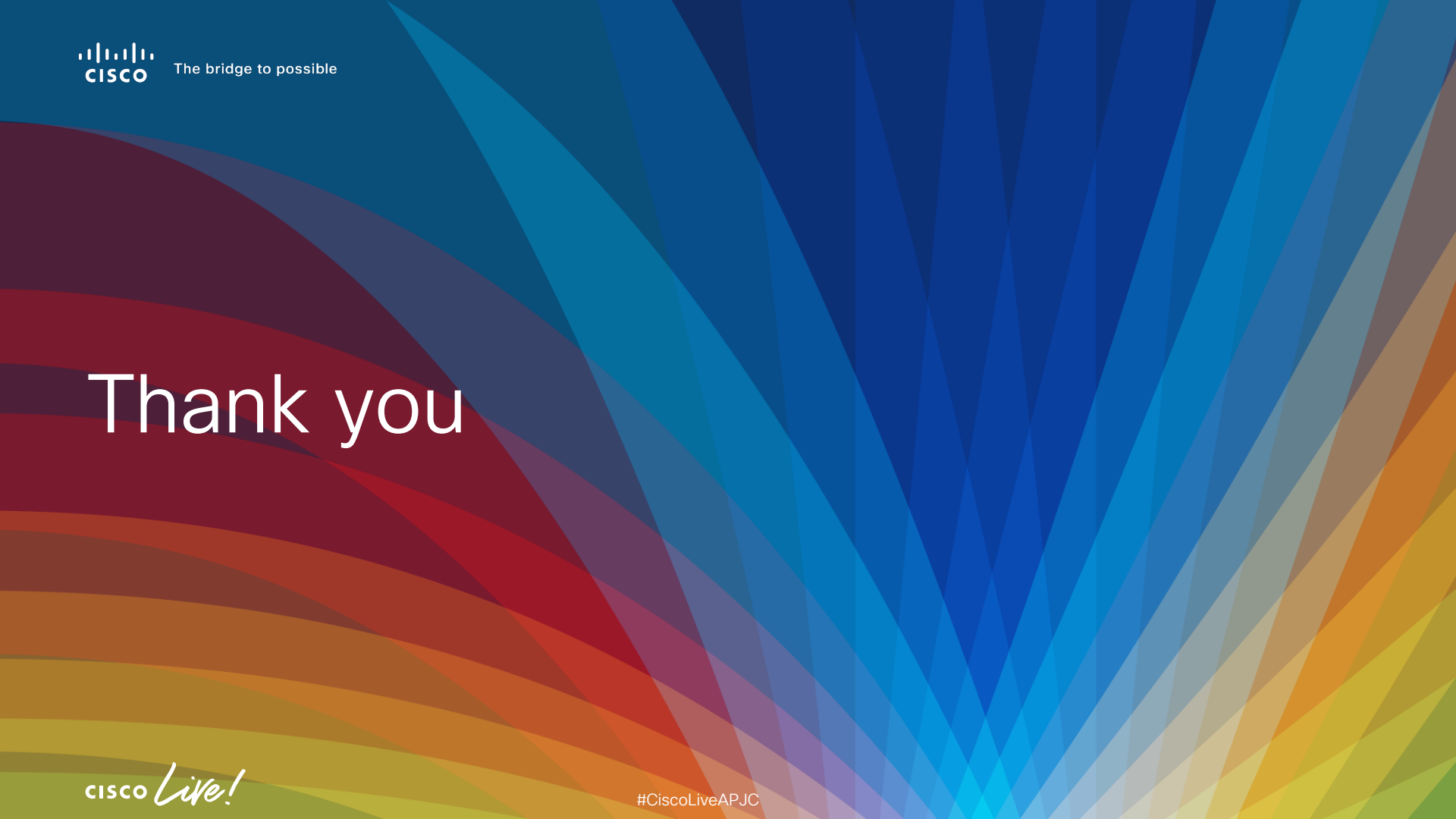
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