

The background features a vibrant, multi-colored abstract design. On the left, there are horizontal, wavy bands of color in shades of red, orange, yellow, and green. On the right, a bright white light source emits a series of sharp, triangular rays in various shades of blue and cyan, creating a sunburst effect that spreads across the right half of the image.

cisco *Live!*

Let's go

#CiscoLiveAPJC



The bridge to possible

Version Control Tools Integrations – Cisco Catalyst Center Infrastructure-as-Code Use Cases

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@zapodeanu
DEVNET-2632



#CiscoLiveAPJC

Cisco Webex App

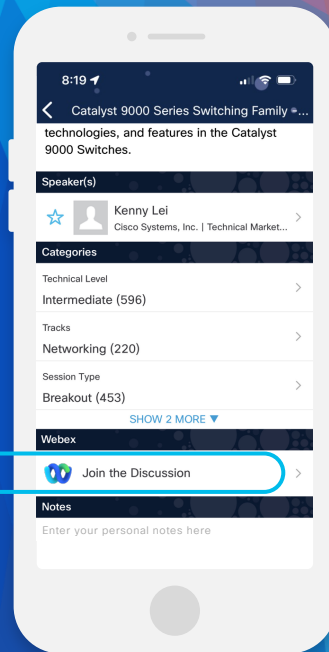
Questions?

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

How

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

Webex spaces will be moderated by the speaker until December 22, 2023.



<https://ciscolive.ciscoevents.com/ciscolivebot/#DEVNET-2632>

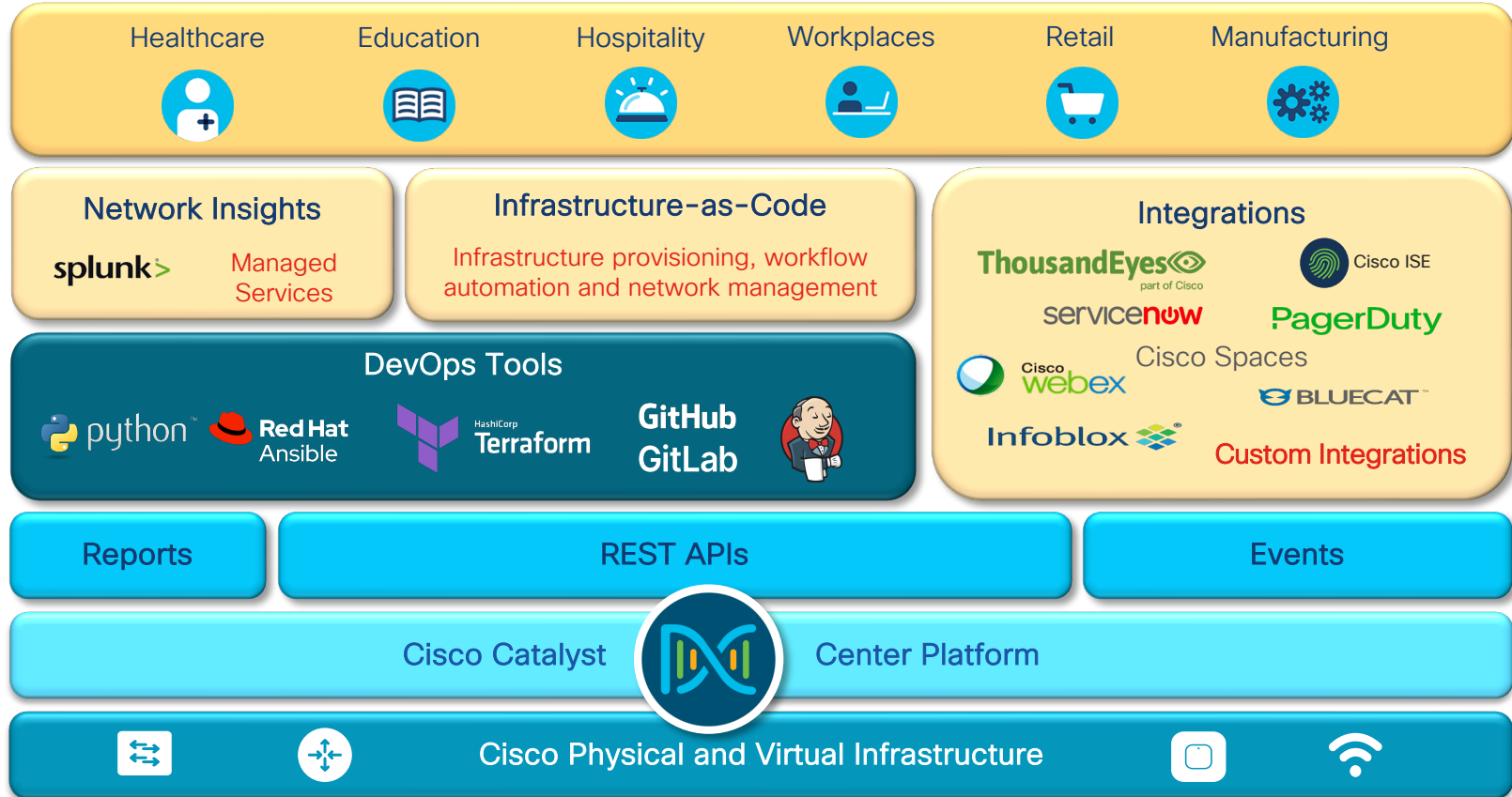
Agenda

- Platforms
- GitHub Sync Integration
- Network State Sync
- Security
- Developer Resources
- Lessons Learned

Agenda

- Platforms
 - Catalyst Center
 - GitHub
- GitHub Sync Integration
- Network State Sync
- Security
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Cisco Catalyst Center Platform



Catalyst Center Platform – Overview

Platform / Overview

Welcome to the Cisco DNA Center Platform. Programmatically access your network through Intent APIs, integrate with your preferred IT systems to create end-to-end solutions and add support for multi-vendor devices.

Bundles

Bundles are easy to use feature sets for consuming Intent APIs, integrations, events and notifications. View all the available bundles, enable relevant bundles and customize the configuration preferences to consume events as per your application(s) or IT system(s) needs.

Developer Toolkit

Discover APIs to manage your network, configure integration flows and access network data to analyze, export and visualize complex reports.

Runtime Dashboard

Get insights into API usage, view events published to IT systems such as number of API calls, response time(s), events published, bundles activated etc.

Configurations

View and set global or bundle specific settings to manage your integration configurations and modify event specific settings.

Notifications

Find

BUNDLE UPDATE

The Cisco DNA Center REST API bundle is enabled.

Nov 17 2023, 07:51 pm

[View Details](#) | [Dismiss](#)

BUNDLE UPDATE

A new version of Cisco DNA Center REST API bundle is auto-updated and made available.

Nov 17 2023, 07:50 pm

[View Details](#) | [Dismiss](#)

BUNDLE UPDATE

Cisco DNA Center Automation events for ITSM (ServiceNow) successfully configured.

GitHub APIs

<https://docs.github.com/en/rest>

GitHub Docs | Version: Free, Pro, & Team

Search GitHub Docs

← All products

REST API

API Version: 2022-11-28 (latest)

Quickstart Overview

GitHub REST API documentation

To create integrations, retrieve data, and automate your workflows, build with the GitHub REST API.

Start here [View all →](#)

[Getting started with the REST API](#)
Learn how to use the GitHub REST API.

[Authenticating to the REST API with an OAuth App](#)
Learn about the different ways to authenticate with some examples.

[Best practices for integrators](#)
Build an app that reliably interacts with the GitHub API and provides the best experience for your users.

Popular

[Resources in the REST API](#)

[API Versions](#)

[Authenticating to the REST API](#)

[Troubleshooting](#)

[Scripting with the REST API and JavaScript](#)

What's new [View all →](#)

[Repository archive date in C](#)
April 11

[Delete Organizations with R](#)
March 30

[SAMLIdentity GraphQL object now supports 'read' scope](#)
March 30

- Comprehensive REST API catalog, very well documented
- PyGithub library if developing in Python

GitHub APIs Personal Access Token

<https://github.com/settings/tokens/new>

- The integration requires the use of personal access tokens
- Login in GitHub, Settings/Developer Settings
- Name your token, select an expiration and define access configuring scopes

Note:

- Copy your personal access token. You won't be able to see it again!

Settings / Developer settings

GitHub Apps
Auth Apps
Personal access tokens
Fine-grained tokens
Tokens (classic)

New personal access token (classic)

Personal access tokens (classic) function like ordinary OAuth access tokens. They can be used instead of a password for Git over HTTPS, or can be used to authenticate to the API over Basic Authentication.

Note

Cisco DNA Center GitHub Sync

What's this token for?

Expiration

30 days The token will expire on Wed, May 17 2023

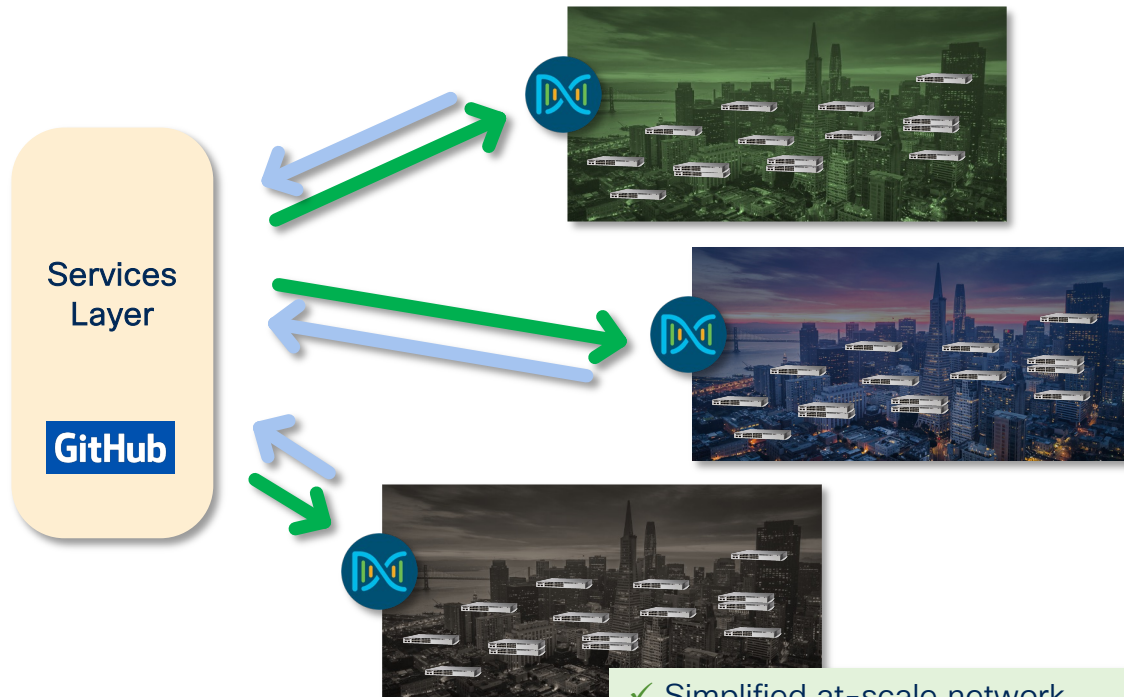
Select scopes

Scopes define the access for personal tokens. [Read more about OAuth scopes.](#)

☒ repo	Full control of private repositories
☒ repo:status	Access commit status
☒ repo_deployment	Access deployment status
☒ public_repo	Access public repositories
☒ repo:invite	Access repository invitations
☒ security_events	Read and write security events
☐ workflow	Update GitHub Action workflows

Git Hosted Configurations + Network State

- CLI templates and profiles
- Network settings
- SDA-as-Code configurations
- Custom events notifications and subscriptions
- Reports and inventory
- Compliance



Note:

- *Configurations may be CLI templates, profiles, or YAML/JSON intent configurations*

- ✓ Simplified at-scale network management
- ✓ Consistent and efficient service delivery across clusters

Integration Apps

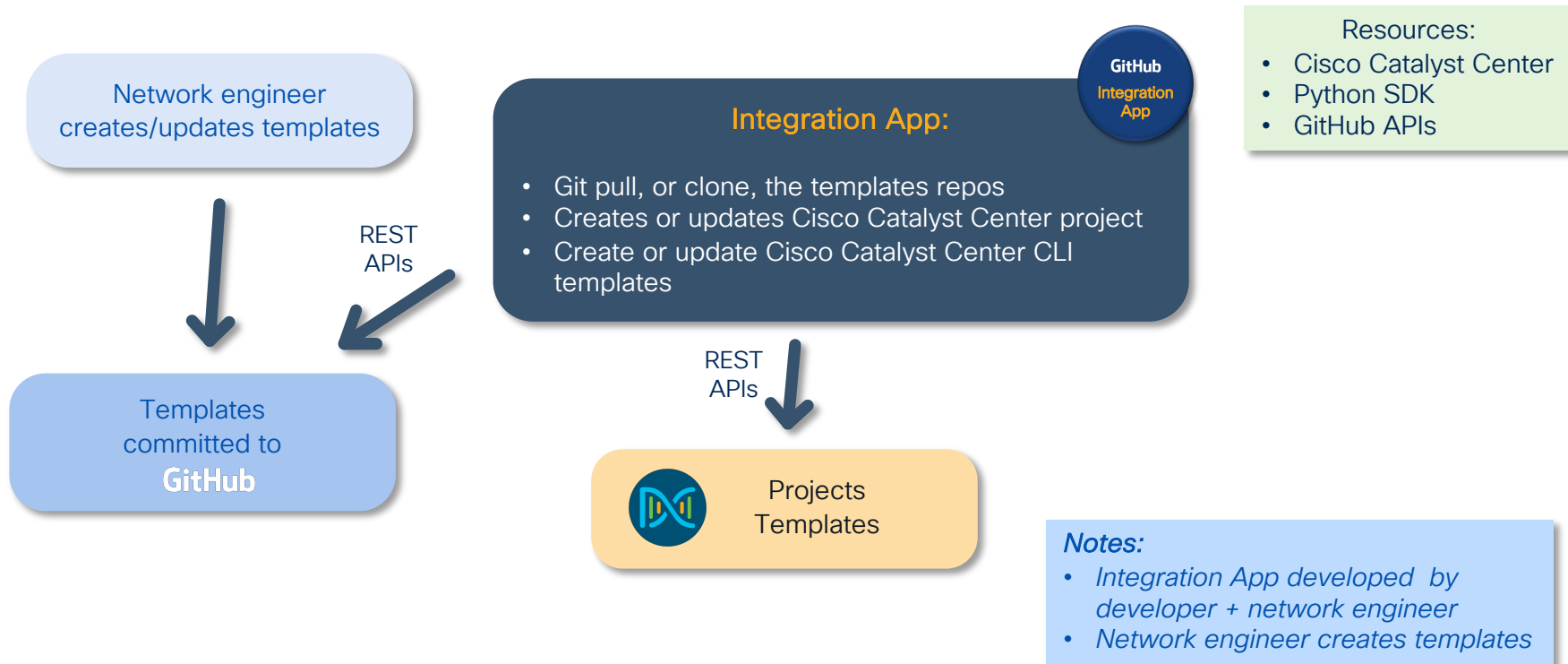
- Rich features, innovation and maximum extensibility
- Supports non-matching API architectures, auth options, data encoding and data structures
- Ability to build custom integrations with any platforms
- May be needed to proxy the communication between Cisco Catalyst Center and cloud platforms



Agenda

- Platforms
- GitHub Sync Integration
- Network State Sync
- Security
- Developer Resources
- Lessons Learned

GitHub Integration App Workflow – Baseline

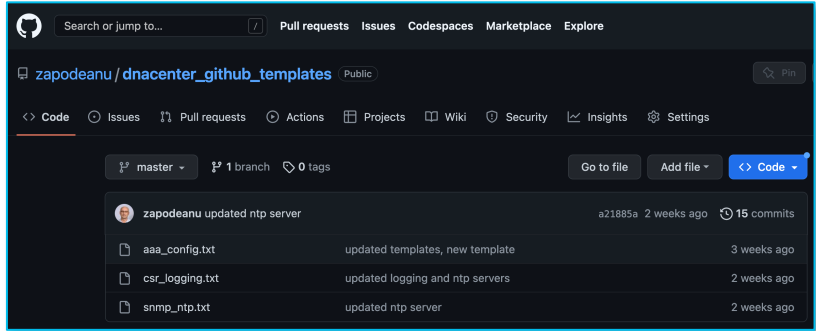
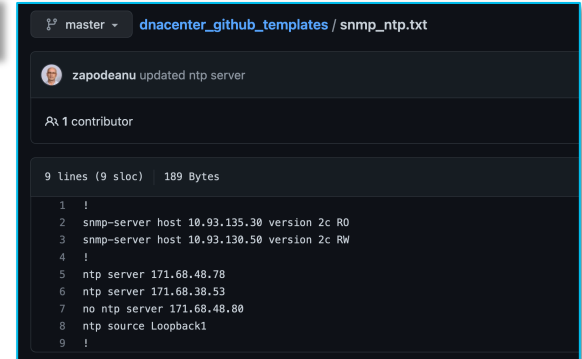


Network Engineer – Commit Templates to GitHub

```
csr_logging.txt x
1  !
2  logging buffered 81920
3  logging host 10.93.141.37 transport udp port 8514
4  logging source-interface Loopback100
5  no logging host 10.93.141.1 transport udp port 8514
6  !
7  service timestamps debug datetime localtime
8  service timestamps log datetime localtime

snmp_ntp.txt x
1  !
2  snmp-server host 10.93.135.30 version 2c R0
3  snmp-server host 10.93.130.50 version 2c RW
4  !
5  ntp server 171.68.48.78
6  ntp server 171.68.38.53
7  no ntp server 171.68.48.80
8  ntp source Loopback1
9

aaa_config.txt x
1  !
2  aaa new-model
3  aaa authentication login default local
4  aaa authorization exec default local
5  !
```



Note:

- *Templates verified, approved, and validated*

GitHub APIs – Repos and Files Details

```
41
42 def get_repos(username):
43     """
44     This function will return all repos for user
45     :param: username: user for which to return the repos
46     :return: repos_list
47     """
48     url = GITHUB_URL + '/users/' + username + '/repos?per_page=100&sort=updated&direction=desc'
49     header = {'Accept': 'application/vnd.github+json', 'Authorization': 'token ' + GITHUB_TOKEN}
50     response = requests.get(url, headers=header, verify=True)
51     response_json = response.json()
52     repos_list = []
53     for repo in response_json:
54         repos_list.append(repo['name'])
55     return repos_list
56
57 def get_repo_content(username, repo_name):
58     """
59     This function will return the contents of a repository
60     :param: username: user for which to return the repos
61     :param: repo_name: repository name
62     :return: files_list
63     """
64     url = GITHUB_URL + '/repos/' + username + '/' + repo_name + '/contents'
65     header = {'Accept': 'application/vnd.github+json', 'Authorization': 'token ' + GITHUB_TOKEN}
66     response = requests.get(url, headers=header, verify=True)
67     response_json = response.json()
68     files_list = []
69     for file in response_json:
70         files_list.append(file['name'])
71     return files_list
72
73
```

Get all repos for user

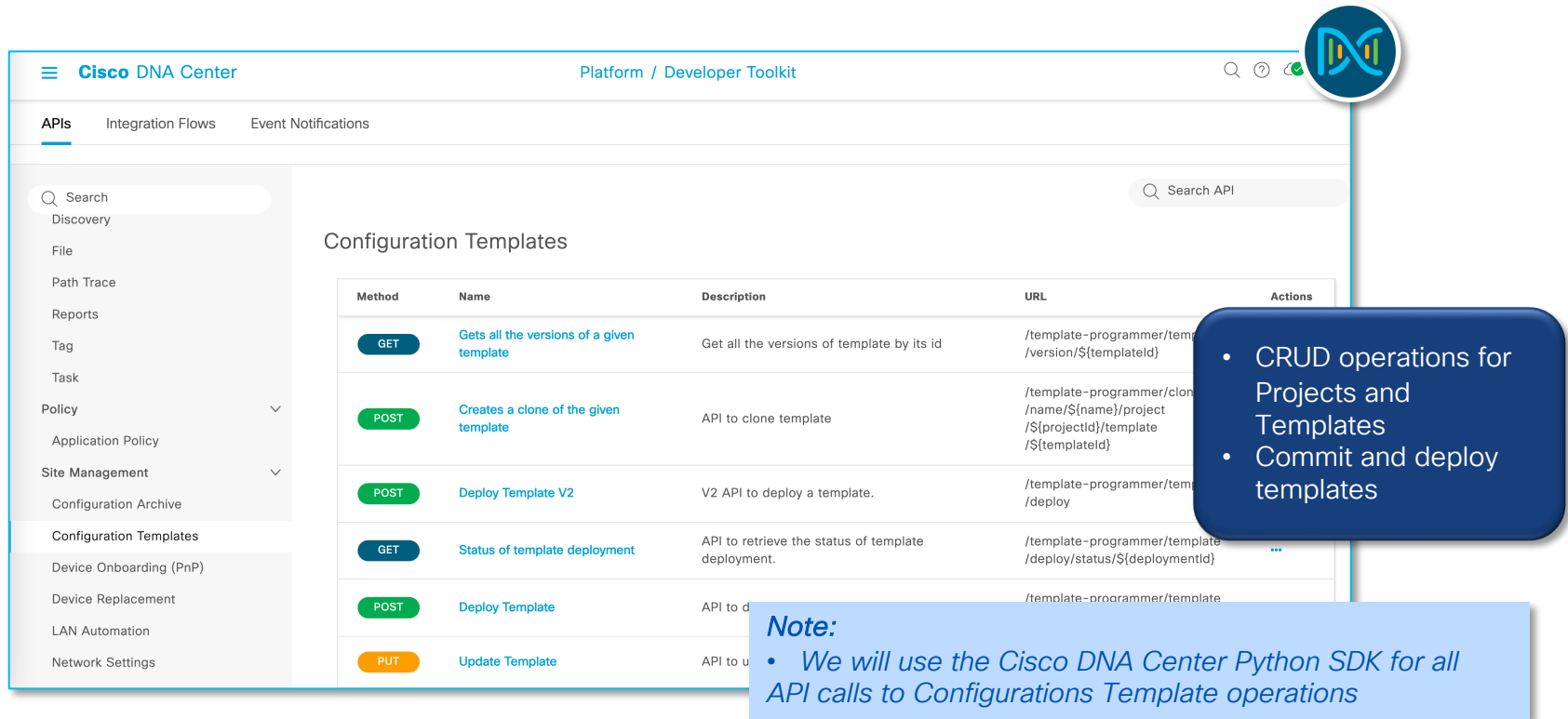
GitHub
Integration
App

Get repo files list

Notes:

- GitHub APIs authentication is using the personal GitHub access token {token ghp_11odbsFBIYL...}
- The accept/content type {application/vnd.github+json} is recommended
- Verify the API pagination limits
- Be aware of some APIs returning only public repos, not private

Cisco Catalyst Center Configuration Templates APIs



The screenshot displays the Cisco DNA Center Developer Toolkit interface. The left sidebar contains a navigation menu with categories like APIs, Integration Flows, and Event Notifications. The main content area is titled 'Configuration Templates' and lists several APIs with their methods, names, descriptions, and URLs. A callout box on the right highlights the CRUD operations for Projects and Templates. A note at the bottom states that the Cisco DNA Center Python SDK will be used for all API calls to Configuration Template operations.

Method	Name	Description	URL	Actions
GET	Gets all the versions of a given template	Get all the versions of template by its id	/template-programmer/template/version/\${templateId}	
POST	Creates a clone of the given template	API to clone template	/template-programmer/clone/name/\${name}/project/\${projectId}/template/\${templateId}	
POST	Deploy Template V2	V2 API to deploy a template.	/template-programmer/template/deploy	
GET	Status of template deployment	API to retrieve the status of template deployment.	/template-programmer/template/deploy/status/\${deploymentId}	...
POST	Deploy Template	API to d	/template-programmer/template	
PUT	Update Template	API to u		

- CRUD operations for Projects and Templates
- Commit and deploy templates

Note:

- We will use the Cisco DNA Center Python SDK for all API calls to Configurations Template operations

Cisco Catalyst Center Projects and Templates APIs

```
109
110 # check if existing Catalyst Center project, if not create a new project
111 projects_list = catalyst_center_api.configuration_templates.get_projects(name=CATALYST_CENTER_PROJECT)
112 if not projects_list:
113     # unable to find the project, create new project
114     logging.info(' Project ' + CATALYST_CENTER_PROJECT + ' not found, will create project')
115     report += 'Project ' + CATALYST_CENTER_PROJECT + ' not found, created\n'
116     # create new project
117     response = catalyst_center_api.configuration_templates.create_project(name=CATALYST_CENTER_PROJECT)
118     time.sleep(10)
119
```

Create or update Cisco
Catalyst Center Project

GitHub
Integration
App

Notes:

- Project names must be unique
- Template names must be unique when part of the same project
- Language options: Jinja or Velocity, in our use case will be "JINJA"
- Parameters (not shown) are supported

```
149
150 # identify if template exists
151 template_id = None
152 templates_list = project_info[0]['templates']
153 for template in templates_list:
154     if template_name == template['name']:
155         template_id = template['id']
156
157 device_types = [...]
158 if template_id is None:
159
160     # create new template
161     response = catalyst_center_api.configuration_templates.create_template(project_id=project_id,
162                                                                           templateContent=new_template,
163                                                                           language='JINJA',
164                                                                           name=template_name,
165                                                                           deviceTypes=device_types,
166                                                                           softwareType='IOS-XE',
167                                                                           author='Jenkins automation',
168                                                                           description='Created by Python automation')
169
170 logging.info(' New template ' + template_name + ' created')
171 task_id = response['response']['taskId']
172 logging.info(' Task id: ' + task_id)
173
174
175
```

Create or update Cisco
Catalyst Center Templates

GitHub Integration App Baseline



GitHub

- Verify if repo exists
- Retrieve the content of each file

- Create or update project
- Create or update CLI template

master dnacenter_github_templates / csr_logging.txt

zapodeanu updated logging and ntp servers

1 contributor

9 lines (9 sloc) 253 Bytes

```
1 !
2 logging buffered 81920
3 logging host 10.93.141.37 transport udp port 8514
4 logging source-interface Loopback100
5 no logging host 10.93.141.1 transport udp port 8514
6 !
7 service timestamps debug datetime localtime
8 service timestamps log datetime localtime
9 !
```

GitHub
Integration
App

Cisco DNA Center Template Editor

Find template... +

csr_logging * x

Actions Edit Properties

Template

```
1 !
2 logging buffered 81920
3 logging host 10.93.141.37 transport udp port 8514
4 logging source-interface Loopback100
5 no logging host 10.93.141.1 transport udp port 8514
6 !
7 service timestamps debug datetime localtime
8 service timestamps log datetime localtime
9 !
```

Template History

Search

Latest Content
Author: python

Version 10
Author: python | 07 December 2023, 9:44 AM

Jenkins automation committed

Compare View

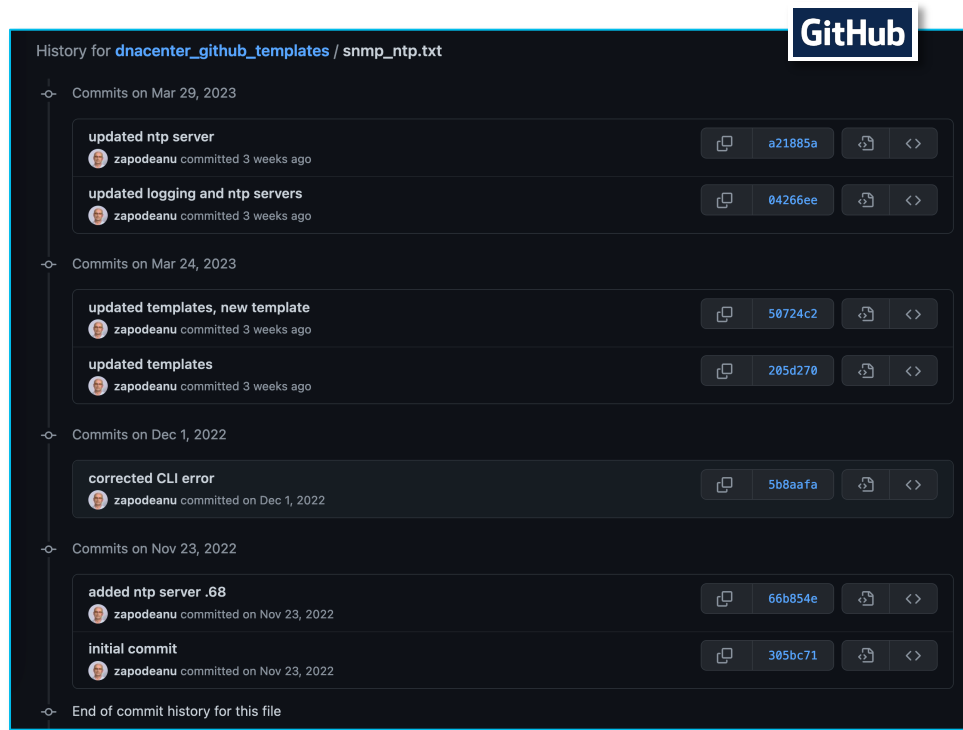
Version 9
Author: python | 07 December 2023, 9:31 AM

Version 8
Author: python | 02 December 2023, 3:50 AM

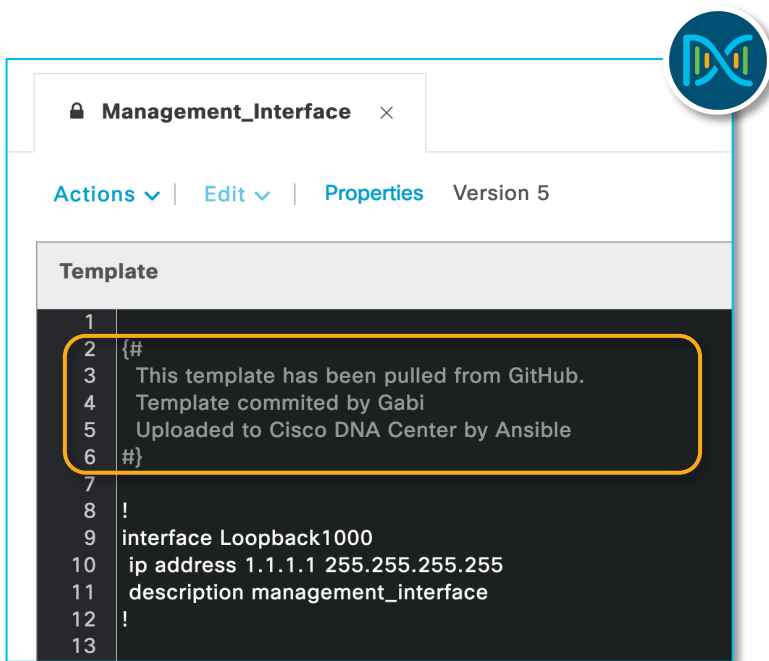
GitHub Integration App Enhancement

GitHub Commit Details to Cisco Catalyst Center

- Provide visibility in Cisco Catalyst Center for:
 - Commit author
 - Date
 - Comment
 - Changes
- Network engineer will be able to map all changes to the source



How to Include Comments in Jinja Templates



- Jinja templates allow to add comments not included in the output:
{# This is a comment #}
- Comments add useful information for other template designers or network engineers

GitHub Commits Details APIs

```
93
94 def get_repo_commits(username, repo_name):
95     """
96     This function will return the repo's commits SHA
97     :param: username: repo owner
98     :param: repo_name: repository name
99     :return: SHA List
100    """
101    url = GITHUB_URL + '/repos/' + username + '/' + repo_name + '/commits'
102    header = {'Accept': 'application/vnd.github+json', 'Authorization': 'token ' + GITHUB_TOKEN}
103    response = requests.get(url, headers=header, verify=True)
104    response_json = response.json()
105    sha_list = []
106    for commit in response_json:
107        sha_list.append(commit['sha'])
108    return sha_list
109
```

Step 1:
Get the repo commits SHA

Step 2:
Get commit details
for each SHA:
author, comments,
date, diff ...

GitHub
Integration
App

Notes:

- Git assigns each commit a unique ID, called a SHA or hash, that identifies file changes, who made the changes, date, comment, ...
- Commit SHA example:
"205d2701c44c3e8f7ab0df024bb609ed34cbf442"

```
109
110 def get_repo_commit_sha(username, repo_name, sha):
111     """
112     This function will return commits details: author, message, date, file
113     :param: username: repo owner
114     :param: repo_name: repository name
115     :param: sha: commit SHA
116     :return: commits details
117    """
118
119    url = GITHUB_URL + '/repos/' + username + '/' + repo_name + '/commits/' + sha
120    header = {'Accept': 'application/vnd.github+json', 'Authorization': 'token ' + GITHUB_TOKEN}
121    response = requests.get(url, headers=header, verify=True)
122    response_json = response.json()
123    commit_author = response_json['commit']['author']['email']
124    commit_date = response_json['commit']['author']['date']
125    commit_message = response_json['commit']['message']
126    commit_file = response_json['files'][0]['filename']
127    commit_url = response_json['html_url']
128    commit_diff = response_json['files'][0]['patch']
129    commit_info = {'filename': commit_file, 'date': commit_date, 'message': commit_message, 'url': commit_url,
130                  'author': commit_author, 'diff': commit_diff}
131    return commit_info
132
```

GitHub Integration App Enhancement

GitHub Commit Details to Cisco Catalyst Center

GitHub

zapodeanu / dnacenter_github_templates Public

Code Issues Pull requests Actions Projects Wiki Security Insights Settings

updated ntp server [Browse files](#)

master

zapodeanu committed 3 weeks ago 1 parent 04266ee commit a21885a

Showing 1 changed file with 1 addition and 1 deletion. [Split](#) [Unified](#)

snmp_ntp.txt

```
@@ -3,7 +3,7 @@ snmp-server host 10.93.135.30 version 2c RO
3 snmp-server host 10.93.135.30 version 2c RW
4 !
5 ntp server 171.68.48.78
6 - ntp server 171.68.38.68
7 no ntp server 171.68.48.80
8 ntp source Loopback1
9 !
```

```
3 snmp-server host 10.93.135.30 version 2c RW
4 !
5 ntp server 171.68.48.78
6 + ntp server 171.68.38.53
7 no ntp server 171.68.48.80
8 ntp source Loopback1
9 !
```

```
1 !
2 snmp-server host 10.93.135.30 version 2c RO
3 snmp-server host 10.93.135.30 version 2c RW
4 !
5 ntp server 171.68.48.78
6 ntp server 171.68.38.53
7 no ntp server 171.68.48.80
8 ntp source Loopback1
9 !
```

GitHub
Integration
App

- Commit message, date and author
- Diff - what's changed
- File content = CLI template



snmp_ntp * x

Actions v | Edit | Template System Variables

Template

```
1 {#
2 This template has been pulled from GitHub.
3 Uploaded to Cisco DNA Center by GitHub_Sync App
4 Author: gzapodea@cisco.com
5 Date: 2023-03-30T05:36:35Z
6 Commit message: updated ntp server
7 Commit URL: https://github.com/zapodeanu/dnacenter_github_templates/commit/a21885a
8 Commit Diff: @@ -3,7 +3,7 @@ snmp-server host 10.93.135.30 version 2c RO
9 snmp-server host 10.93.135.30 version 2c RW
10 !
11 ntp server 171.68.48.78
12 -ntp server 171.68.38.68
13 +ntp server 171.68.38.53
14 no ntp server 171.68.48.80
15 ntp source Loopback1
16 !
17 \ No newline at end of file
18 #}
19 !
20 !
21 snmp-server host 10.93.135.30 version 2c RO
22 snmp-server host 10.93.135.30 version 2c RW
23 !
24 ntp server 171.68.48.78
25 ntp server 171.68.38.53
26 no ntp server 171.68.48.80
27 ntp source Loopback1
28 !
```

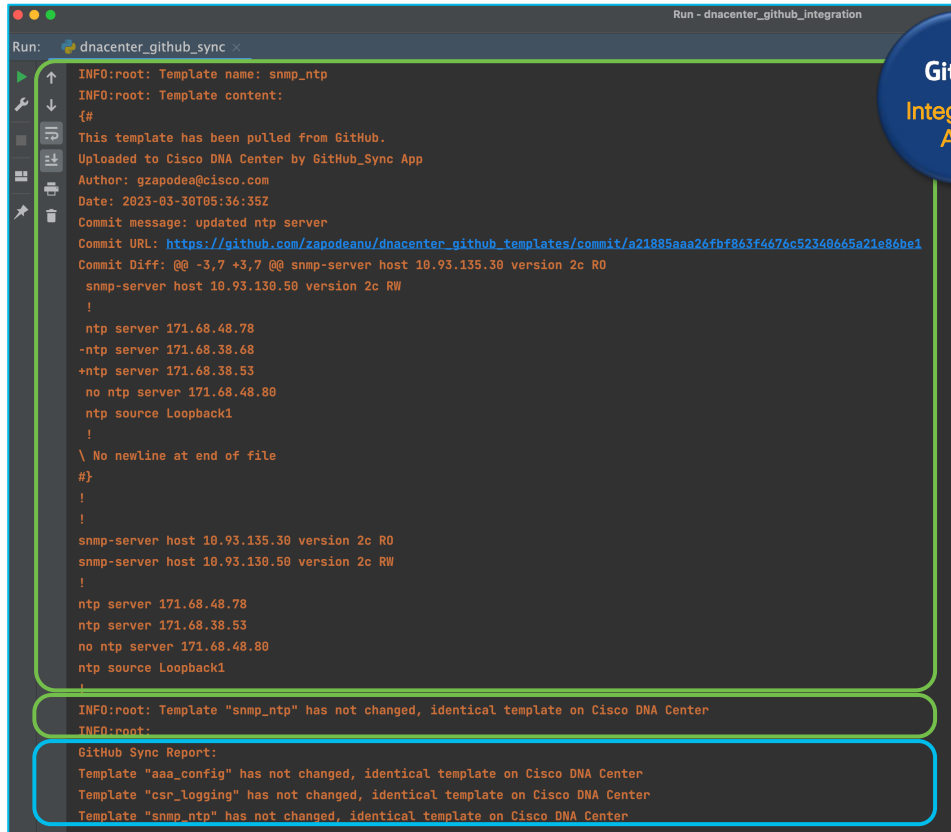
GitHub Integration App Enrichment

Template Updates and Commits

- Identify if existing Cisco Catalyst Center template matches the content from GitHub
- We need to version the new, or updated, templates
- No versioning if no changes
- Templates ready for deployment

The screenshot displays the Cisco Catalyst Center interface for the 'snmp_ntp' template. The left pane shows the template content, which includes a header with metadata (pulled from GitHub, author: gzapodea@cisico.com, date: 2023-03-30T05:36:35Z, commit message: updated ntp server, commit URL: https://github.com/zapodea, commit diff: @@ -3,7 +3,7 @@ snmp-server host 10.93.130.50 version 2) and configuration lines (ntp server 171.68.48.78, ntp server 171.68.38.68, ntp server 171.68.38.53, no ntp server 171.68.48.80, ntp source Loopback1). The right pane shows a list of versions (Local, Version 7, Version 6, Version 5, Version 4, Version 3, Version 2, Version 1) with 'Edit' and 'View' links for each.

Verify if Template Changed



The screenshot shows a terminal window titled 'Run - dnacenter_github_integration'. The terminal output displays the following information:

```
Run: dnacenter_github_sync x
INFO:root: Template name: snmp_ntp
INFO:root: Template content:
{#
This template has been pulled from GitHub.
Uploaded to Cisco DNA Center by GitHub_Sync App
Author: gzapodea@cisco.com
Date: 2023-03-30T05:36:35Z
Commit message: updated ntp server
Commit URL: https://github.com/zapodeanu/dnacenter_github_templates/commit/a21885aaa26fbf863f4676c52340665a21e86be1
Commit Diff: @@ -3,7 +3,7 @@ snmp-server host 10.93.135.30 version 2c R0
    snmp-server host 10.93.130.50 version 2c RW
    !
    ntp server 171.68.48.78
    -ntp server 171.68.38.68
    +ntp server 171.68.38.53
    no ntp server 171.68.48.80
    ntp source Loopback1
    !
    \ No newline at end of file
#}
!
!
snmp-server host 10.93.135.30 version 2c R0
snmp-server host 10.93.130.50 version 2c RW
!
ntp server 171.68.48.78
ntp server 171.68.38.53
no ntp server 171.68.48.80
ntp source Loopback1
!

INFO:root: Template "snmp_ntp" has not changed, identical template on Cisco DNA Center
INFO:root:
GitHub Sync Report:
Template "aaa_config" has not changed, identical template on Cisco DNA Center
Template "csr_logging" has not changed, identical template on Cisco DNA Center
Template "snmp_ntp" has not changed, identical template on Cisco DNA Center
```

A blue circular badge with the text 'GitHub Integration App' is overlaid on the top right of the terminal window.

- Compose the new template
- Check if new template matches existing Cisco Catalyst Center template
- Log activities during the Integration App execution
- Create report

GitHub Integration App Summary

Network Engineer

GitHub
Integration
App

GitHub

- Verify if repo exists and not empty
- Retrieve the content of each file
- Read the commit details: comments, author, date, diff
- Create, or update, project
- Build a new Cisco Catalyst Center template including the GitHub commit details
- Create CLI template, or update, if changes
- Commit the template
- Create report

```
Commit to master
Changes 1 file
snmp_ntp.txt ~/PythonCode/dna
Unversioned Files 7 files
snmp-server host 10.93.135.30 version 2c RO
snmp-server host 10.93.130.50 version 2c RW
ntp server 171.68.48.78
ntp server 171.68.38.53
no ntp server 171.68.48.80
ntp source Loopback1
```

zapodeanu /dnacenter_github_template

Code Issues Pull req

updated ntp source

master

zapodeanu committed 1 minute ago

Showing 1 changed file with 2 additions:

```
snmp_ntp.txt
@@ -5,5 +5,6 @@ snmp-server
5 ntp server 171.68.48.78
6 ntp server 171.68.38.53
7 no ntp server 171.68.48.80
8 - ntp source Loopback1
9 !
```

snmp_ntp x

Actions Edit Properties Template System Variables

Template

```
1 {#
2 This template has been pulled from GitHub.
3 Uploaded to Cisco DNA Center by GitHub_Sync App
4 Author: gzapodea@cisco.com
5 Date: 2023-04-19T22:28:26Z
6 Commit message: updated ntp source
7 Commit URL: https://github.com/zapodeanu/dnacenter_github_templates/commit/82ed7d6
8 Commit Diff: @@ -5,5 +5,6 @@ snmp-server host 10.93.130.50 version 2c RW
9 ntp server 171.68.48.78
10 ntp server 171.68.38.53
11 no ntp server 171.68.48.80
12 -ntp source Loopback1
13 +no ntp source Loopback1
14 +ntp source Loopback0
15 !
16 \ No newline at end of file
17 #}
18 !
19 !
20 snmp-server host 10.93.135.30 version 2c RO
21 snmp-server host 10.93.130.50 version 2c RW
22 !
23 ntp server 171.68.48.78
24 ntp server 171.68.38.53
25 no ntp server 171.68.48.80
26 no ntp source Loopback1
27 ntp source Loopback0
28 !
```

```
ntp source Loopback0
!
INFO:root: Template "snmp_ntp" has changed, different template on Cisco DNA Center
INFO:root: Updating existing template "snmp_ntp" id: 27c28fe5-b66b-4884-8d82-94c841805c9f
INFO:root: Template "snmp_ntp" committed
```

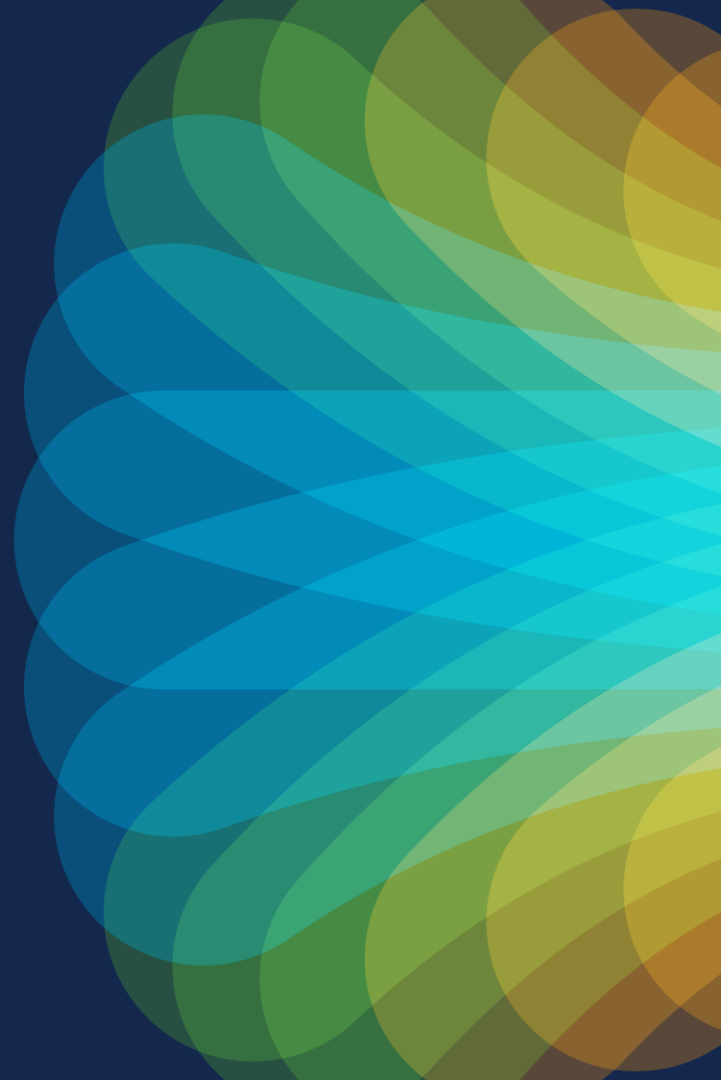
Running the Integration App

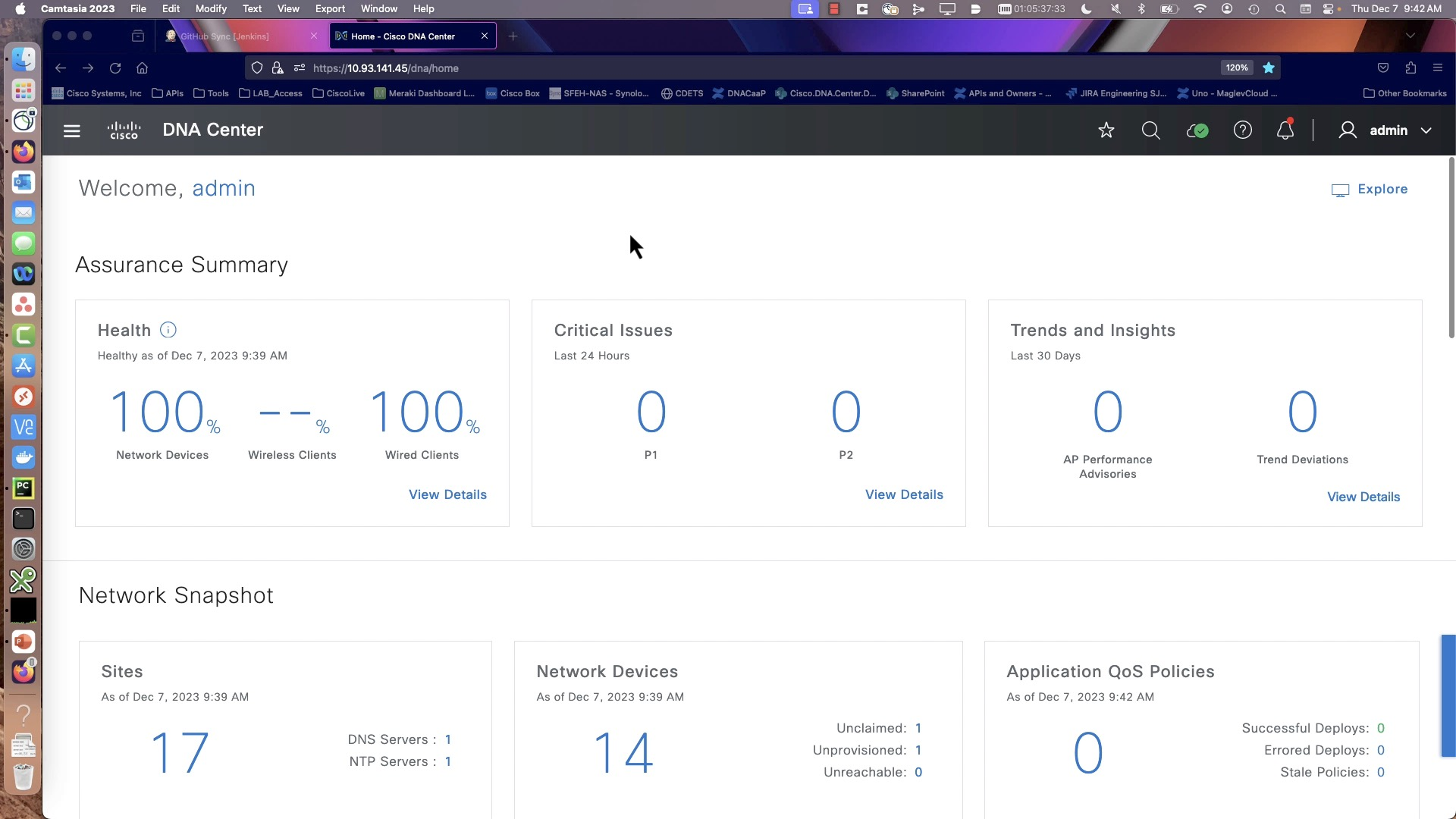
- Manually, on-demand
- Scheduled – every hour, daily, ...
- GitHub Actions triggered when repo changes
- API calls to run sync
- CI/CD pipelines

A terminal window titled "Run - dnacenter_github_integration" showing the output of the "dnacenter_github_sync" command. The output includes file paths, repository information, file names, and a detailed commit message for a new template.

```
Run: dnacenter_github_sync
/Users/gzapodea/PythonCode/dnacenter_github_integration/dnacenter_github_sync.py
INFO:root: App "dnacenter_github_sync.py" Start, 2023-04-19 15:31:38
INFO:root: Repo "dnacenter_github_templates" found!
INFO:root: Repo "dnacenter_github_templates" files:
INFO:root: File: aaa_config.txt
INFO:root: File: csr_logging.txt
INFO:root: File: snmp_ntp.txt
INFO:root: Collected all commit comments for "dnacenter_github_templates" repo
INFO:root: Project "GitHub_Project" id: bf74f896-b802-49b1-9e8d-9ec7fac04dcb
INFO:root: Template name: aaa_config
INFO:root: Template content:
{#
This template has been pulled from GitHub.
Uploaded to Cisco DNA Center by GitHub_Sync App
Author: gzapodea@cisco.com
Date: 2023-03-24T21:19:42Z
Commit message: updated templates, new template
Commit URL: https://github.com/zapodeanu/dnacenter_github_templates/commit/5b724c246f747e6e435bafbdb61419adf648cc41f
Commit Diff: @@ -0,0 +1,5 @@
+!
+aaa new-model
+aaa authentication login default local
+aaa authorization exec default local
+!
\ No newline at end of file
#}
!
!
aaa new-model
aaa authentication login default local
aaa authorization exec default local
!
INFO:root: Template "aaa_config" has not changed, identical template on Cisco DNA Center
INFO:root: Template name: csr_logging
INFO:root: Template content:
```

GitHub Sync Integration App Demo





Welcome, admin

Assurance Summary

Health

Healthy as of Dec 7, 2023 9:39 AM

100%

Network Devices

--%

Wireless Clients

100%

Wired Clients

[View Details](#)

Critical Issues

Last 24 Hours

0

P1

0

P2

[View Details](#)

Trends and Insights

Last 30 Days

0

AP Performance Advisories

0

Trend Deviations

[View Details](#)

Network Snapshot

Sites

As of Dec 7, 2023 9:39 AM

17

DNS Servers : 1

NTP Servers : 1

Network Devices

As of Dec 7, 2023 9:39 AM

14

Unclaimed: 1
Unprovisioned: 1
Unreachable: 0

Application QoS Policies

As of Dec 7, 2023 9:42 AM

0

Successful Deploys: 0
Errored Deploys: 0
Stale Policies: 0

Agenda

- Platforms
- GitHub Sync Integration
- Network State Sync
 - Device Inventory
 - Site Hierarchy
 - Network Settings
- Security
- Developer Resources
- Lessons Learned

Catalyst Center Network State Sync to GitHub



+

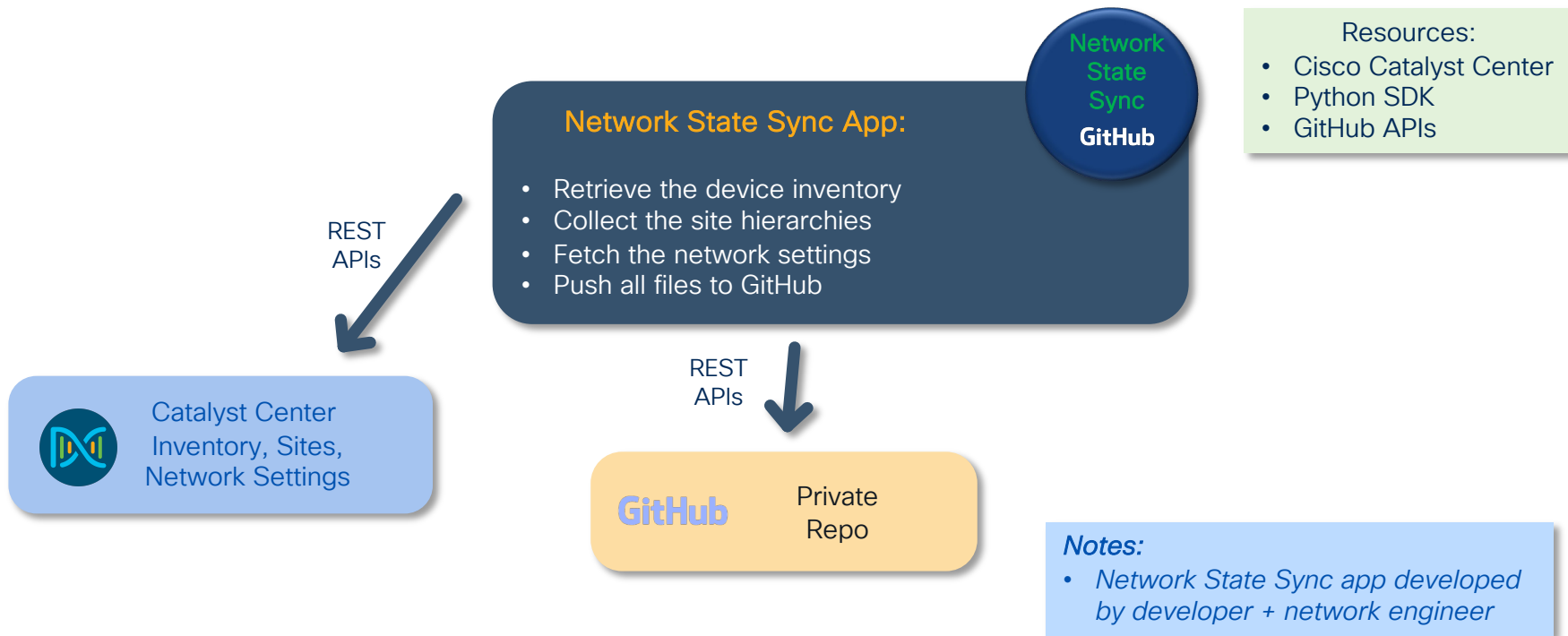
Version Control
Platforms
GitHub

Network state saved in GitHub

- Data retention and state at specific timestamps
- Diffs provide high value to identify changes, including those not approved
- Critical support for restoring network config after catastrophic events
- Support network compliance checks
- Multi Catalyst Center clusters, network wide inventory and config, multi-Network Controllers support

Will support **Cisco Catalyst Center Infrastructure-as-Code** solutions

App Workflow



Device Inventory - Catalyst Center REST APIs

Try 'Get Device list'

Method: **GET** Public URL :https://10.93.141.45/dna/intent/api/v1/network-device

PARAMETERS

QUERY PARAMETERS

☐ Select All

☒ hostname ⓘ
NYC-ACCESS

☐ managementIpAddress ⓘ

☐ macAddress ⓘ

☐ locationName ⓘ

☐ serialNumber ⓘ

Reset Run

Response Headers Status

```
1 {
2   "response": [
3     {
4       "memorySize": "NA"
5       "lastUpdateTime": "2023-08-24T14:30:00Z"
6       "macAddress": "30:8B:B2:85:32:00"
7       "softwareType": "IOS-XE"
8       "deviceSupportLevel": "Standard"
9       "serialNumber": "FJ2325T0SL"
10      "collectionInterval": "30"
11      "dnsResolvedManager": "Cisco"
12      "inventoryStatus": "Success"
13      "managementState": "Active"
14      "pendingSyncRequest": "None"
15      "reasonsForDeviceFailure": []
16    }
17  ]
18 }
```

Try 'Get Device Detail'

Method: **GET** Public URL :https://10.93.141.45/dna/intent/api/v1/device-detail

PARAMETERS

QUERY PARAMETERS

☐ timestamp ⓘ

☒ identifier* ⓘ
nwDeviceName

☒ searchBy* ⓘ
NYC-ACCESS

Response Headers Status Code: 200

```
11 "ip_addr_managementIpAddr": "10.93.141.26",
12 "stackType": "NA",
13 "nwDeviceType": "Cisco Catalyst 9300 Switch",
14 "haStatus": "Non-redundant",
15 "serialNumber": "FJC2325T0SL",
16 "nwDeviceName": "NYC-ACCESS",
17 "deviceGroupHierarchyId": "/b5e8f515-c26c-409b-8b6c-820aedfb8b0/c2e72448-0a33-4b3a-9a33-4b3a",
18 "cpu": "4.75",
19 "platformId": "C9300-24UX",
20 "productVendor": "Cisco",
21 "nwDeviceId": "20937bce-b8d8-42c2-b3a0-08cda93fae1e",
22 "siteHierarchyGraphId": "/15ab86e1-706e-41df-8400-ee1a974bc1f3/8602a02a-9a33-4b3a-9a33-4b3a",
23 "memoryScore": 10,
24 "nwDeviceFamily": "Switches and Hubs",
25 "macAddress": "30:8B:B2:85:32:00",
26 "deviceSeries": "Cisco Catalyst 9300 Series Switches",
27 "collectionStatus": "SUCCESS",
28 "lastBootTime": 1698271835051,
29 "location": "Global/NY/NYC/Floor-8",
30 "maintenanceMode": false,
31 "maintenanceModeReason": "Device is in maintenance mode.",
32 "maintenanceModeReasonCode": "MAINTENANCE_MODE",
33 "maintenanceModeReasonDescription": "Device is in maintenance mode.",
34 "maintenanceModeReasonTimestamp": "2023-08-24T14:30:00Z",
35 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
36 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
37 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
38 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
39 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
40 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
41 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
42 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
43 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
44 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
45 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
46 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
47 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
48 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
49 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
50 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
51 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
52 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
53 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
54 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
55 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
56 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
57 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
58 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
59 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
60 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
61 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
62 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
63 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
64 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
65 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
66 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
67 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
68 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
69 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
70 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
71 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
72 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
73 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
74 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
75 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
76 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
77 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
78 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
79 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
80 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
81 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
82 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
83 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
84 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
85 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
86 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
87 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
88 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
89 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
90 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
91 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
92 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
93 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
94 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
95 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
96 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
97 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
98 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
99 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
100 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
101 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
102 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
103 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
104 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
105 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
106 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
107 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
108 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
109 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
110 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
111 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
112 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
113 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
114 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
115 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
116 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
117 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
118 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
119 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
120 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
121 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
122 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
123 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
124 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
125 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
126 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
127 "maintenanceModeReasonTimestampUTC": "2023-08-24T14:30:00Z",
128 "maintenanceModeReasonTimestampUTC": "2023-
```

Device Inventory App Code

```
96 # collect device inventory
97 # get the device count
98 response = catalyst_center_api.devices.get_device_count()
99 device_count = response['response']
100 logging.info(' Number of devices managed by Cisco DNA Center: ' + str(device_count))
101
102 # get the device info list
103 offset = 1
104 limit = 500
105 device_list = []
106 while offset <= device_count:
107     response = catalyst_center_api.devices.get_device_list(offset=offset, limit=limit)
108     device_list.extend(response['response'])
109     offset = offset + limit
110 logging.info(' Collected the device list from Cisco DNA Center')
```

Get all devices managed by Catalyst Center

```
112 for device in device_list:
113     # select which inventory to add the device to
114     if device.family != "Unified AP":
115         device_id = device['id']
116         device_management_ip_address = device['managementIpAddress']
117         device_details = {'hostname': device['hostname']}
118         device_details.update({'device_ip': device['managementIpAddress']})
119         device_details.update({'device_id': device['id']})
120         device_details.update({'version': device['softwareVersion']})
121         device_details.update({'device_family': device['type']})
122         device_details.update({'role': device['role']})
123
124         # get the device site hierarchy
125         response = catalyst_center_api.devices.get_device_detail(identifier='uuid', search_by=device_id)
126         site = response['response']['location']
127         device_details.update({'site': site})
128
129         # get the device fabric role
130         device_sda_roles = []
131         try:
132             response = catalyst_center_api.sda.get_device_role_in_sda_fabric(device_management_ip_address=device_management_ip_address)
```

Loop to get additional details and prepare device inventory

Parse device details

Find the device location

Retrieve the SDA role

Device and AP Inventory

“device_inventory.json”

“ap_inventory.json”

```
1  {
2    {
3      "hostname": "AP3800i",
4      "device_ip": "10.93.141.67",
5      "device_id": "fca3a1ae-4735-407c-abda-74d23a144afc",
6      "version": "17.3.7.36",
7      "device_family": "Cisco 3800I Unified Access Point",
8      "role": "ACCESS",
9      "site": "Global/OR/PDX/Floor-2",
10     "sda_roles": []
11   },
12   {
13     "hostname": "AP682C.7B4C.0510",
14     "device_ip": "10.93.141.66",
15     "device_id": "a93bfd65-9cbe-490e-83bd-dda85f784027",
16     "version": "17.3.7.36",
17     "device_family": "Cisco 3800I Unified Access Point",
18     "role": "ACCESS",
19     "site": "Global/France/ParisOlympics/Floor-0",
20     "sda_roles": []
21   }
22 }
```

Notes:

- There are more details available for devices – reachability, compliance, issues, ...
- Inventory files may be saved as JSON, YAML, CSV, ...

```
26 {
27   "hostname": "L0-CN",
28   "device_ip": "10.93.141.20",
29   "device_id": "6a612b05-1c89-4d0a-a4d3-94ec5e5a7a57",
30   "version": "17.9.4a",
31   "device_family": "Cisco Catalyst 9300 Switch",
32   "role": "ACCESS",
33   "site": "Global/OR/L0/Floor-3",
34   "sda_roles": [
35     "Control Plane"
36   ],
37 },
38 {
39   "hostname": "L0-EDGE",
40   "device_ip": "10.93.141.19",
41   "device_id": "cd7c74bc-8301-4be8-bcbb-0547be8d03b7",
42   "version": "16.12.7",
43   "device_family": "Cisco Catalyst 38xx stack-able ethernet switch",
44   "role": "ACCESS",
45   "site": "Global/OR/L0/Floor-3",
46   "sda_roles": [
47     "Edge Node"
48   ],
49 },
50 {
51   "hostname": "NYC-ACCESS",
52   "device_ip": "10.93.141.26",
53   "device_id": "20937bce-b8d8-42c2-b3a0-08cda93fae1e",
54   "version": "17.9.4a",
55   "device_family": "Cisco Catalyst 9300 Switch",
56   "role": "DISTRIBUTION",
57   "site": "Global/NY/NYC/Floor-8",
58   "sda_roles": []
59 }
```

GitHub Inventory File Diff

Device Inventory change after adding device to SDA Fabric

committed by Jenkins - Network State Sync

main

zapodeanu committed 2 weeks ago

Showing 1 changed file with 3 additions and 1 deletion.

device_inventory.json

Line	Old	New
31	"device_family": "Cisco Catalyst 9300 Switch",	"device_family": "Cisco Catalyst 9300 Switch",
32	"role": "ACCESS",	"role": "ACCESS",
33	"site": "Global/0R/L0/Floor-3",	"site": "Global/0R/L0/Floor-3",
34	- "sda_roles": []	+ "sda_roles": [
		+ "Control Plane"
		+]
35	},	},
36	{	{
37	"hostname": "L0-EDGE",	"hostname": "L0-EDGE",

Notes:

- "-" - removed lines
- "+" - added lines

GitHub Inventory File Diff

Device Inventory change after deleting devices from inventory

device_inventory.json

deleting devices from inventory

@@ -47,26 +47,6 @@

47 "Edge Node"

48]

49 },

50 {

51 "hostname": "NYC-ACCESS",

52 "device_ip": "10.93.141.26",

53 "device_id": "20937bce-b8d8-42c2-b3a0-08cda93fae1e",

54 "version": "17.9.4a",

55 "device_family": "Cisco Catalyst 9300 Switch",

56 "role": "DISTRIBUTION",

57 "site": "Global/NY/NYC/Floor-8",

58 "sda_roles": []

59 },

60 {

61 "hostname": "NYC-RO",

62 "device_ip": "10.93.141.25",

63 "device_id": "3c4aea42-2e1e-4f45-8fcd-530cb97f934f",

64 "version": "17.3.7",

65 "device_family": "Cisco Cloud Services Router 1000V",

66 "role": "BORDER ROUTER",

67 "site": "Global/NY/NYC/Floor-8",

68 "sda_roles": []

69 },

70 {

71 "hostname": "PDX-CORE1",

72 "device_ip": "10.93.141.18",

47 "Edge Node"

48]

49 },

50 {

51 "hostname": "PDX-CORE1",

52 "device_ip": "10.93.141.18",

Notes:

- "–" – *removed lines*
- "+" – *added lines*

Site Hierarchy - REST API

Get Site V2

GET https://10.93.141.45/dna/intent/api/v2/site

API to get site(s) by site-name-hierarchy or siteId or type. List all sites if these parameters are not given as an input.

[Cisco DevNet API Guide](#)

Parameters Responses Code Preview

Request Query Parameters

Name	Description
groupNameHierarchy	Site name hierarchy (E.g. Global/USA/CA)
id	Site Id
type	Site type (Acceptable values: area, building, floor)
offset	Offset/starting index for pagination
limit	Number of sites to be listed. Default and max supported

Try 'Get Site V2'

Method: GET Public URL :https://10.93.141.45/dna/intent/api/v2/site

QUERY PARAMETERS

☐ Select All

☐ groupNameHierarchy

☐ id

☐ type

☐ offset

☐ limit

Reset

Run

Response

Headers

Status Code: 200

```
1 {
2   "response": [
3     {
4       "parentId": "3e110c92-db46-4977-86f9-ad2d5584d25",
5       "groupTypeList": [
6         "SITE"
7       ],
8       "groupHierarchy": "15ab86e1-706e-41df-8400-ee1a974bc1f3/dd031bf6-603b-4ec0-a112-0fb4ad073522/3e110c92-db46-4977-86f9-ad2d5584d25/f",
9       "additionalInfo": [
10        {
11          "nameSpace": "Location",
12          "attributes": {
13            "address": "9155 East Nichols Avenue, Centennial, Colorado 80112, United States",
14            "addressInheritedFrom": "3e110c92-db46-4977-86f9-ad2d5584d25",
15            "type": "floor"
16          }
17        }
18      ],
19       "groupNameHierarchy": "Global/CO/ENGL/Floor-5",
20       "name": "Floor-5",
21       "instanceTenantId": "5f7f7b4e22689d00c4c923e7",
22       "id": "f2a3bd0d-4ec9-44ed-bf6a-a43b12378f1",
23     },
24     {
25       "parentId": "245892a8-21e9-4d30-9e36-67c44a120d3b",
26       "groupTypeList": [
```

Site Hierarchy App Code

```
179
180 # collect site hierarchy
181 # get number of sites
182 response = catalyst_center_api.sites.get_site_count()
183 sites_number = response['response']
184 logging.info(' Number of sites in Catalyst Center: ' + str(sites_number))
185
186 # get the Global site id
187 response = catalyst_center_api.sites.get_site(name='Global')
188 global_site_id = response['response'][0]['id']
189 logging.info(' Global site id: ' + global_site_id)
190
191 # get all the sites
192 response = catalyst_center_api.sites.get_site()
193 site_hierarchy = response['response']
194
195 site_list = []
196 for site in site_hierarchy:
197     site_details = {'site_name_hierarchy': site['siteNameHierarchy'], 'site_id': site['id']}
198     site_list.append(site_details)
199 # sort the list of sites details
200 site_list_sorted = sorted(site_list, key=lambda x: x['site_name_hierarchy'])
201
202 # save site_hierarchy to json formatted file
203 with open(NETWORK_STATE_PATH + 'site_hierarchy.json', 'w') as f:
204     f.write(json.dumps(site_list_sorted, indent=4))
205 logging.info(' Saved the site hierarchy to file "site_hierarchy.json"')
206
```

Get all sites' hierarchy
Select only site name
hierarchy and unique
identifier

Save info to file

How Git Diff Identifies Changes

- 28 additions/deletions
- Diff identifies changes based on the lines order
- Solution – sort files using the most logical param

committed by Jenkins - Network State Sync

main

zapodeanu committed 5 minutes ago

Showing 1 changed file with 28 additions and 28 deletions.

Whitespace Ignore whitespace Split Unified

56 site_hierarchy.json

```
@@ -3,6 +3,14 @@
3     "site_name_hierarchy": "Global",
4     "site_id": "15ab86e1-706e-41df-8400-ee1a974bc1f3"
5 },
6 + {
7 +     "site_name_hierarchy": "Global/C0/ENGL/Floor-5",
8 +     "site_id": "f2a5bd0d-4ec9-44ed-bf6a-a43b12378ff1"
9 + },
10 + {
11 +     "site_name_hierarchy": "Global/OR/L0",
12 +     "site_id": "e7c23ba2-e665-4b9e-aefc-090b28cc8bc6"
13 + },
14 {
15     "site_name_hierarchy": "Global/C0",
16     "site_id": "dd031bf6-603b-4ec0-a112-0fb4ad073522"
17 + {
18 +     "site_name_hierarchy": "Global/C0/ENGL",
19 +     "site_id": "3e110c92-db46-4977-86f9-ad2d55584d25"
20 + },
21 }
```

Identical, site not changed

Sorting Network State Data

Get project(s) details

GET

https://10.93.141.45/dna/intent/api/v2/template-programmer/project

Get project(s) details

[Cisco DevNet API Guide](#)

Parameters

Responses

Code Preview

Request Query Parameters

Name	Description	DataType	
id	Id of project to be searched	string	No
name	Name of project to be searched	string	No
offset	Index of first result	integer	No
limit	Limits number of results	integer	No
sortOrder	Sort Order Ascending (asc) or Descending (dsc)	string	No

```
190
191 # get all the sites
192 response = catalyst_center_api.sites.get_site()
193 site_hierarchy = response['response']
194
195 site_list = []
196 for site in site_hierarchy:
197     site_details = {'site_name_hierarchy': site['siteNameHierarchy'], 'site_id': site['id']}
198     site_list.append(site_details)
199
200 # sort the list of sites details
201 site_list_sorted = sorted(site_list, key=lambda x: x['site_name_hierarchy'])
202
```

- Using the API sort order parameter
- Using Python sorted function after parsing the data

Before and After Sorting Site Hierarchy

```
1  [
2    {
3      "site_name_hierarchy": "Global",
4      "site_id": "15ab86e1-706e-41df-8400-ee1a974bc1f3"
5    },
6    {
7      "site_name_hierarchy": "Global/C0/ENGL/Floor-5",
8      "site_id": "f2a5bd0d-4ec9-44ed-bf6a-a43b12378ff1"
9    },
10   {
11     "site_name_hierarchy": "Global/OR/L0",
12     "site_id": "e7c23ba2-e665-4b9e-aefc-090b28cc8bc6"
13   },
14   {
15     "site_name_hierarchy": "Global/C0",
16     "site_id": "dd031bf6-603b-4ec0-a112-0fb4ad073522"
17   },
18   {
19     "site_name_hierarchy": "Global/C0/ENGL",
20     "site_id": "3e110c92-db46-4977-86f9-ad2d55584d25"
21   },
22   {
23     "site_name_hierarchy": "Global/France",
24     "site_id": "4088ff4c-348c-40be-bcd2-d80283d3d6ed"
25   },
26   {
27     "site_name_hierarchy": "Global/France/ParisOlympics",
28     "site_id": "2465f196-8656-4e58-80f8-4c76173b657f"
29   },
30   {
31     "site_name_hierarchy": "Global/NY/NYC/Floor-8",
32     "site_id": "d81d4346-0cf4-4099-bcbb-3ce514c0180f"
33   },
34 ]
```



```
1  [
2    {
3      "site_name_hierarchy": "Global",
4      "site_id": "15ab86e1-706e-41df-8400-ee1a974bc1f3"
5    },
6    {
7      "site_name_hierarchy": "Global/C0",
8      "site_id": "dd031bf6-603b-4ec0-a112-0fb4ad073522"
9    },
10   {
11     "site_name_hierarchy": "Global/C0/ENGL",
12     "site_id": "3e110c92-db46-4977-86f9-ad2d55584d25"
13   },
14   {
15     "site_name_hierarchy": "Global/C0/ENGL/Floor-5",
16     "site_id": "f2a5bd0d-4ec9-44ed-bf6a-a43b12378ff1"
17   },
18   {
19     "site_name_hierarchy": "Global/France",
20     "site_id": "4088ff4c-348c-40be-bcd2-d80283d3d6ed"
21   },
22   {
23     "site_name_hierarchy": "Global/France/Parc des Princes",
24     "site_id": "0d34c6f6-3b49-4adc-9269-832f5d23517a"
25   },
26   {
27     "site_name_hierarchy": "Global/France/ParisOlympics",
28     "site_id": "2465f196-8656-4e58-80f8-4c76173b657f"
29   },
30   {
31     "site_name_hierarchy": "Global/France/ParisOlympics/Floor-0",
32     "site_id": "72d3d-f84c-494c-8ff2-596252f4fc6e"
33   },
34 ]
```

Ordered, tree structure
for site hierarchy

Network Settings - Catalyst Center REST APIs

Get Network V2

GET <https://10.93.141.45/dna/intent/api/v2/network>

API to get SNMP, NTP, Network AAA, Client and Endpoint AAA, and/or DNS center server settings

[Cisco DevNet API Guide](#)

Parameters Responses Code Preview

Request Query Parameters

Name	Description	Data Type	Yes
siteId	Site Id to get the network settings associated with the site.	string	Yes

Try 'Get Network V2'

Method: **GET** Public URL: <https://10.93.141.45/dna/intent/api/v2/network>

PARAMETERS

QUERY PARAMETERS

siteId [🔗](#)
8d8-b8aa-66f1f9dee8f3

[Response](#) [Headers](#) Status Code: 200

```
1 {
2   "response": [
3     {
4       "instanceType": "banner",
5       "instanceUid": "30352a4a-3d2e-48c5-9136-609e7d75f3d9",
6       "namespace": "global",
7       "type": "banner.setting",
8       "key": "device.banner",
9       "version": 37,
10      "value": [
11        {
12          "bannerMessage": "This device is managed by Catalyst Center 10.93.141.45",
13          "retainExistingBanner": false
14        }
15      ],
16      "groupUid": "03fb1c90-5ef9-48d8-b8aa-66f1f9dee8f3",
17      "inheritedGroupUid": "-1",
18      "inheritedGroupName": "Global"
19    },
20    {
21      "instanceType": "timezone",
22      "instanceUid": "4d1ba8e9-70ee-4b8b-8412-a2ad6ae9c4ab",
23      "namespace": "global",
24      "type": "timezone.setting",
25      "key": "timezone.site",
26      "version": 7,
```

Notes:

- The API requires the site unique identifiers, already available from the `site_hierarchy.json` file
- The input file is already sorted based on the site hierarchy name, the network settings file will maintain the order

The Get Network v2 API returns these parameters:

Banner, Syslog and NetFlow settings
AAA config, DHCP, DNS and NTP
servers, time zone, and more

Network Settings File Diff

374 network_settings.json

@@ -6366,379 +6366,5 @@

6366 "inheritedGroupName": "Global"

6367 }

6368]

6369 - },

6370 - {

6371 - "site_name_hierarchy": "Global/France/Paris",

6372 - "network_settings": [

6373 - {

6374 - "instanceType": "banner",

6375 - "instanceUid": "30352a4a-3d2e-48c5-9136-609e7d75f3d9",

6376 - "namespace": "global",

6377 - "type": "banner.setting",

6378 - "key": "device.banner",

6379 - "version": 37,

6380 - "value": [

6381 - {

6382 - "bannerMessage": "This device is managed by Catalyst Center 10.93.141.45",

6383 - "retainExistingBanner": true,

6384 - }

6385 -],

6386 - "groupUid": "0d34c6f6-3b49-4adc-9269-832f5d23517a",

6387 - "inheritedGroupUid": "-1",

6388 - "inheritedGroupName": "Global"

6389 - }

Time zone changes

1143 },

1144 {

1145 "instanceType": "timezone",

1146 - "instanceUid": "4d1ba8e9-70ee-4b8b-8412-a2ad6ae9c4ab",

1147 - "namespace": "global",

1148 - "type": "timezone.setting",

1149 - "key": "timezone.site",

1150 - "version": 7,

1151 - "value": [

1152 - "PST8PDT"

1153 -],

1154 - "groupUid": "f2a5bd0d-4ec9-44ed-bf6a-a43b12378ff1",

1155 - "inheritedGroupUid": "-1",

1156 - "inheritedGroupName": "Global"

1157 - },

1158 {

1159 "instanceType": "syslog",

@@ -2641,17 +2641,17 @@

2641 },

2642 {

2643 "instanceType": "timezone",

2644 - "instanceUid": "4d1ba8e9-70ee-4b8b-8412-a2ad6ae9c4ab",

2645 - "namespace": "global",

2646 - "type": "timezone.setting",

2647 - "key": "timezone.site",

2648 - "version": 7,

2649 - "value": [

2650 - "PST8PDT"

2651 -],

2652 - "groupUid": "8602a02a-9a33-405c-acda-2513c83842a7",

2653 - "inheritedGroupUid": "-1",

2654 - "inheritedGroupName": "Global"

2655 - },

2656 {

Network settings updated after site deleted

Commit Network State Files to GitHub

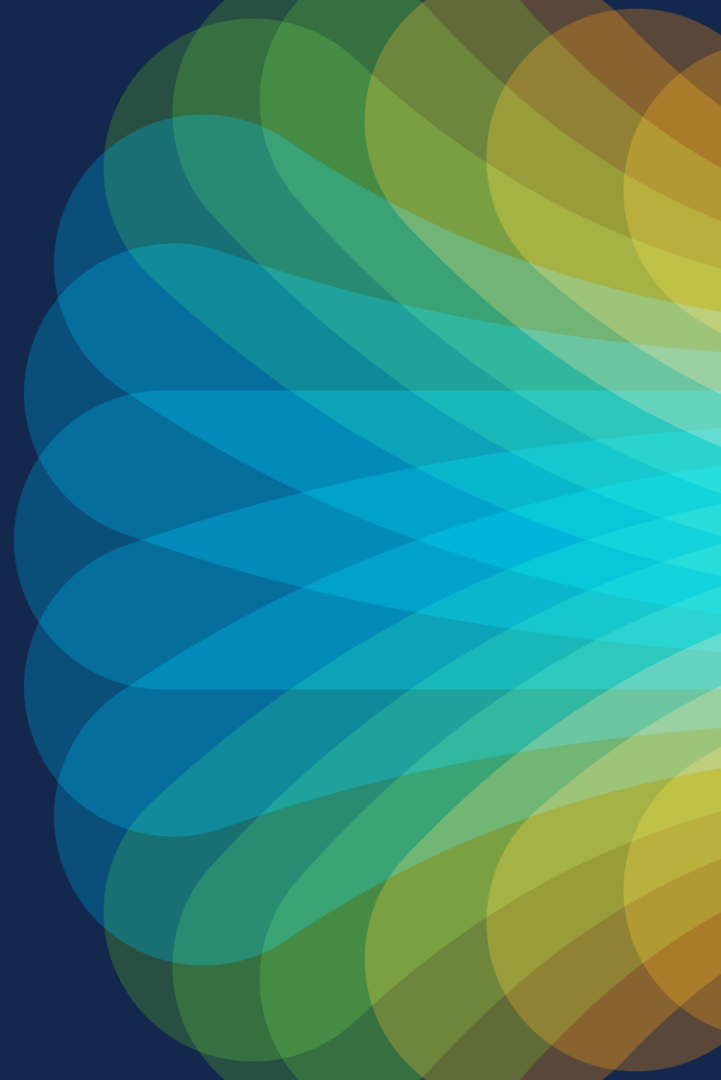
```
235
236 # Git push network state files
237
238 for filename in files_list:
239     try:
240         contents = github_apis.get_repo_file_content(username=GITHUB_USERNAME, repo_name=GITHUB_REPO, file_name=filename)
241         update = True
242     except:
243         update = False # file does not exist
244
245     with open(filename) as f:
246         file_content = f.read()
247
248     # create or push the file
249     github_apis.github_push(github_repo=GITHUB_REPO, filename=filename,
250                             message="committed by Jenkins - Network State Sync", content=file_content,
251                             update=update)
252     report.append('    GitHub push for file: ' + filename + ', file existing: ' + str(update))
253
254 logging.info(' Catalyst Center Network State Sync Report:')
255 for item in report:
256     logging.info(item)
257
258 # save report to JSON formatted file
259 with open('report.json', 'w') as f:
260     f.write(json.dumps(report, indent=4))
261 logging.info(' Saved the report to file "report.json"')
262
263 date_time = str(datetime.now().replace(microsecond=0))
264 logging.info(' End of Application "catalyst_center_network_state_sync.py" Run: ' + date_time)
265
```

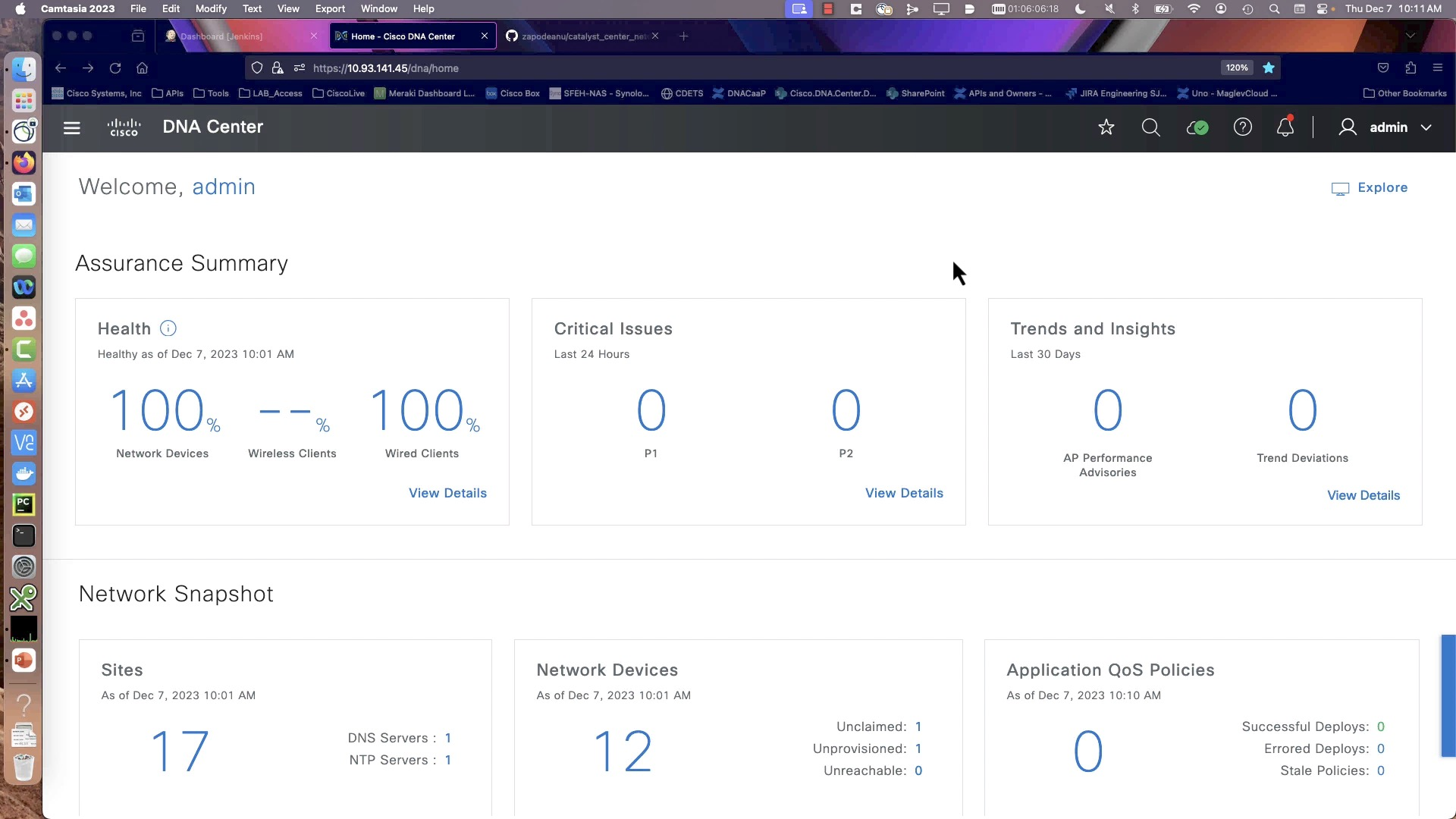
Identify if existing file in repo

True: update existing file
False: commit new file

Logging, create report and save to folder

Network State Sync to GitHub Demo



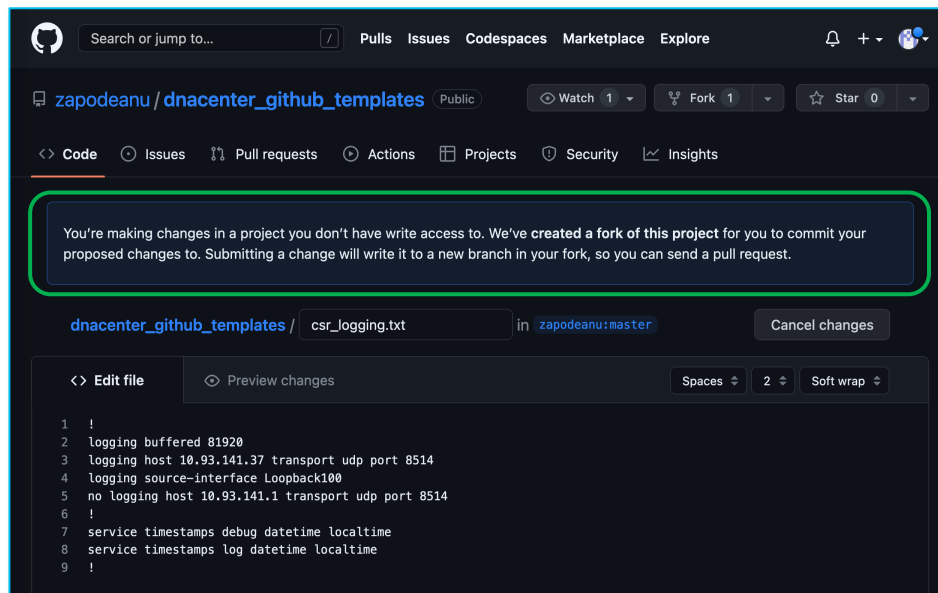


Agenda

- Platforms
- GitHub Sync Integration
- Network State Sync
- Security
- Developer Resources
- Lessons Learned

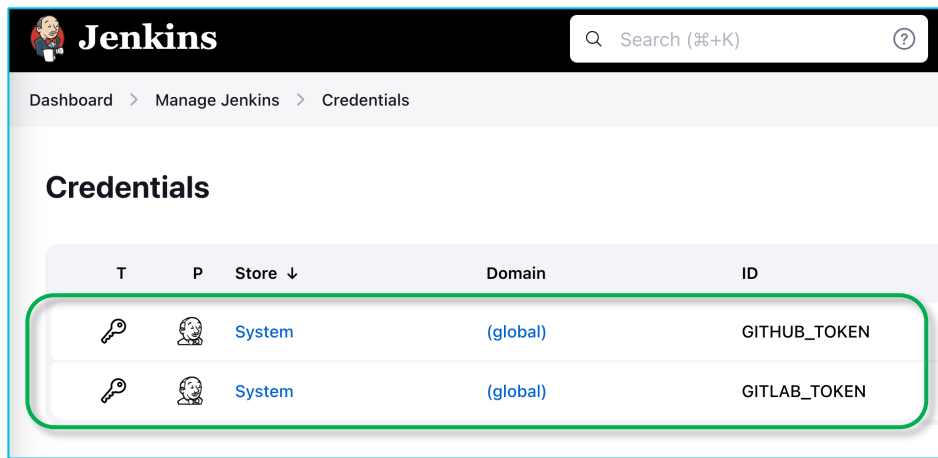
Role Based Access to Configurations and Apps

- Use Enterprise Git servers
- Private repos
- Restrict user access to read only, disable write access



Manage Platform Credentials

- .env file
- Environment variables
- HashiCorp Vault
- Jenkins credentials
- Be careful not to commit any files with sensitive information
- If you did, this may help: [Removing sensitive data from a repository](#)



GitHub Security

Search or jump to...

Pull requests Issues Marketplace Explore

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Edit Pins

<> Code Issues Pull requests 2 Actions Projects Wiki **Security** Insights Settings

Overview

Reporting

Policy

Advisories

Vulnerability alerts

Dependabot

Code scanning

Security overview

Security policy • Disabled
Define how users should report security vulnerabilities for this repository [Set up a security policy](#)

Security advisories • Enabled
View or disclose security advisories for this repository [View security advisories](#)

Private vulnerability reporting • Enabled
Allow users to privately report potential security vulnerabilities [See reported vulnerabilities](#)

Dependabot alerts • Enabled
Get notified when one of your dependencies has a vulnerability [View Dependabot alerts](#)

Code scanning alerts • Enabled
Automatically detect common vulnerability and coding errors [View alerts](#)

GitHub Security – Code Scanning

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Overview

Reporting

Policy Advisories

Vulnerability alerts

Dependabot

Code scanning

Code scanning

Latest scan	Branch	Workflow	Lines scanned	Duration
1 hour ago	main	CodeQL	153 / 226	5m 56s

is:open branch:main

0 Open 0 Closed

No code scanning alerts found

Keep up the good work!

Found 61 workflows

- Dependency Review** By GitHub
Scans Pull Requests on each push for the introduction and/or resolution of vulnerable dependencies to the repository.
Configure Dependency review
- CodeQL Analysis** By GitHub
Security analysis from GitHub for C, C++, C#, Go, Java, JavaScript, TypeScript, Python, and Ruby developers.
Configure Code scanning
- APIsec Scan** By APIsec
APIsec provides the industry's only automated and continuous API testing platform that uncovers security vulnerabilities and logic flaws in APIs.
Configure Code scanning
- Checkmarx** By Checkmarx
Best vulnerabilities with more secure code. Scan your code with Checkmarx One and see results in the GitHub code scanning.
Configure Code scanning
- CxSAST** By Checkmarx
Scan your code with Checkmarx CxSAST and see your results in the GitHub security tab.
Configure Code scanning
- Codacy Security Scan** By Codacy
Free, out-of-the-box, security analysis provided by multiple open source static analysis tools.
Configure Code scanning
- Red Hat CodeReady Dependency Analytics** By Red Hat
Scan your project's dependencies with CodeReady Dependency Analytics.
Configure Code scanning
- DevSkim** By Microsoft CST-E
DevSkim is a security linter that highlights common security issues in source code.
Configure Code scanning
- EthicalCheck** By APIsec
EthicalCheck provides the industry's only free & automated API security testing service that uncovers security vulnerabilities using OWASP API list.
Configure Code scanning
- Fortify on Demand Scan** By Micro Focus
Integrate Fortify's comprehensive static code analysis (SAST) for 27+ languages into your DevOps workflows to build secure software faster.
Configure Code scanning
- Frogbot Scan and Fix** By JFrog
Automatically creates pull requests with fixes for vulnerable project dependencies. Uses JFrog Xray to scan the project. Included as part of JFrog's free subscription.
Configure Code scanning
- Frogbot Scan Pull Request** By JFrog
Automatically scans new pull requests for security vulnerabilities. Uses JFrog Xray to scan the project. Included as part of JFrog's free subscription.
Configure Code scanning

GitHub Security – Dependencies Alerts

<> Code Issues Pull requests Actions Projects Wiki Security 6 Insights Settings

Overview

Reporting

Policy

Advisories

Vulnerability alerts

Dependabot 6

Code scanning

Dependabot alerts

is:open

6 Open 0 Closed

Package Ecosystem Manifest Severity Sort

- ☐ **ixml NULL Pointer Dereference allows attackers to cause a denial of service** High
#8 opened 4 months ago • Detected in lxml (pip) • requirements.txt
- ☐ **ixml's HTML Cleaner allows crafted and SVG embedded scripts to pass through** High
#6 opened 11 months ago • Detected in lxml (pip) • requirements.txt
- ☐ **CRLF injection** Moderate
#5 opened 17 months ago • Detected in urllib3 (pip) • requirements.txt
- ☐ **ixml before 4.6.3 vulnerable to Cross-Site Scripting** Moderate
#3 opened 2 years ago • Detected in lxml (pip) • requirements.txt
- ☐ **ixml vulnerable to Cross-site Scripting** Moderate
#2 opened 2 years ago • Detected in lxml (pip) • requirements.txt
- ☐ **RSA decryption vulnerable to Bleichenbacher timing vulnerability** Moderate
#1 opened 2 years ago • Detected in cryptography (pip) • requirements.txt

Dependabot alerts surface known security vulnerabilities in some dependency manifest files. Dependabot security updates automatically keep your application up-to-date by updating dependencies in response to these alerts. Dependabot version updates can also help keep dependencies updated.

Agenda

- Platforms
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- Developer Resources
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Catalyst Center Version Control Integration

https://github.com/zapodeanu/catalyst_center_version_control

zapodeanu / catalyst_center_version_control

Type to search

<> Code Issues Pull requests Actions Projects Wiki Security Insights Settings

catalyst_center_version_control Public

Pin Unwatch 1 Fork 0 Star 0

main 1 branch 0 tags

Go to file Add file <> Code

zapodeanu initial commit 1eb6d84 1 minute ago 3 commits

.gitignore	initial commit	14 minutes ago
CODE_OF_CONDUCT.md	initial commit	1 minute ago
CONTRIBUTING.md	initial commit	1 minute ago
LICENSE	initial commit	1 minute ago
NOTICE	initial commit	1 minute ago
README.md	initial commit	1 minute ago
catalyst_center_github_sync.py	initial commit	1 minute ago
catalyst_center_network_state_syn...	initial commit	1 minute ago
github_apis.py	initial commit	1 minute ago
requirements.txt	initial commit	1 minute ago

About

Repo for Catalyst Center Integration with GitHub - Templates/Projects sync from GitHub and Network State sync to GitHub

Readme View license Code of conduct Activity 0 stars 1 watching 0 forks

Releases

No releases published [Create a new release](#)

Python SDK

Cisco DNA Center Version Support 1.2.10 to 2.3.5.3

Docs » dnacentersdk [Edit on GitHub](#)

dnacentersdk

Simple, lightweight, scalable Python API wrapper for the DNA Center APIs

Welcome to the docs! dnacentersdk is a community developed Pythonic wrapping of the DNA Center APIs (for API versions: 1.2.10, 1.3.0, 1.3.1, 1.3.3, 2.1.1 and 2.1.2). The package represents all of the Cisco DNA Center API interactions via native Python tools. Making working with the Cisco DNA Center APIs in Python a native and natural experience.

dnacentersdk helps you get things done faster. We take care of the API semantics, and you can focus on writing your code.

With dnacentersdk, you can easily:

- Interact with the DNA Center APIs in an interactive Python session
- Quickly create code that enables you get something done in DNA Center
- Leverage the API wrapper to cleanly add DNA Center functionality to your project without having to write the boilerplate code for working with the DNA Center APIs

To dive in and see how dnacentersdk makes your life better, check out the [Quickstart](#)!

The User Guide

- [Installation](#)
 - [PIP Install](#)
 - [PIP Upgrade](#)
 - [Get the Source Code](#)
- [Introduction](#)
 - [Work with the DNA Center APIs in Native Python!](#)
 - [MIT License](#)
 - [dnacentersdk License](#)
- [Quickstart](#)
 - [Get your DNA Center Access Token](#)
 - [Set credentials as environment variables](#)

<https://dnacentersdk.readthedocs.io>

- Includes all Cisco Catalyst Center REST APIs
- Support for Cisco Catalyst Center version 2.3.5.3, (2.3.7.3 pending release)
- First SDK version August 2019
- Downloads last month 6,200+

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cisco-en-programmability / dnacentersdk Public

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<> Code Issues 2 Pull requests 1 Actions Projects Wiki Security 8 Insights Settings

master 4 branches 31 tags Go to file Add file <> Code

bvargasre Merge pull request #79 from cisco-en-programmability/develop	7eda9b1 3 weeks ago	186 commits
.github/ISSUE_TEMPLATE	New onmpatibility matrix	3 weeks ago
dnacentersdk	- Offset and limit now support basestring and int	3 weeks ago
docs	New version 2.5.6	3 weeks ago
script	Update LICENSE reference	last year
tests	### Fixed	6 months ago
.flake8	Update tests (lint, mock server order, validators)	last year
.gitattributes	Initial commit	3 years ago
.gitignore	Change some request in the test files and .DS_Store were added to L...	7 months ago
.readthedocs.yml	Update project dependencies & settings	last year

About

Cisco DNA Center Python SDK

[dnacentersdk.readthedocs.io/en/latest/](#)

Readme

MIT license

42 stars

13 watching

19 forks

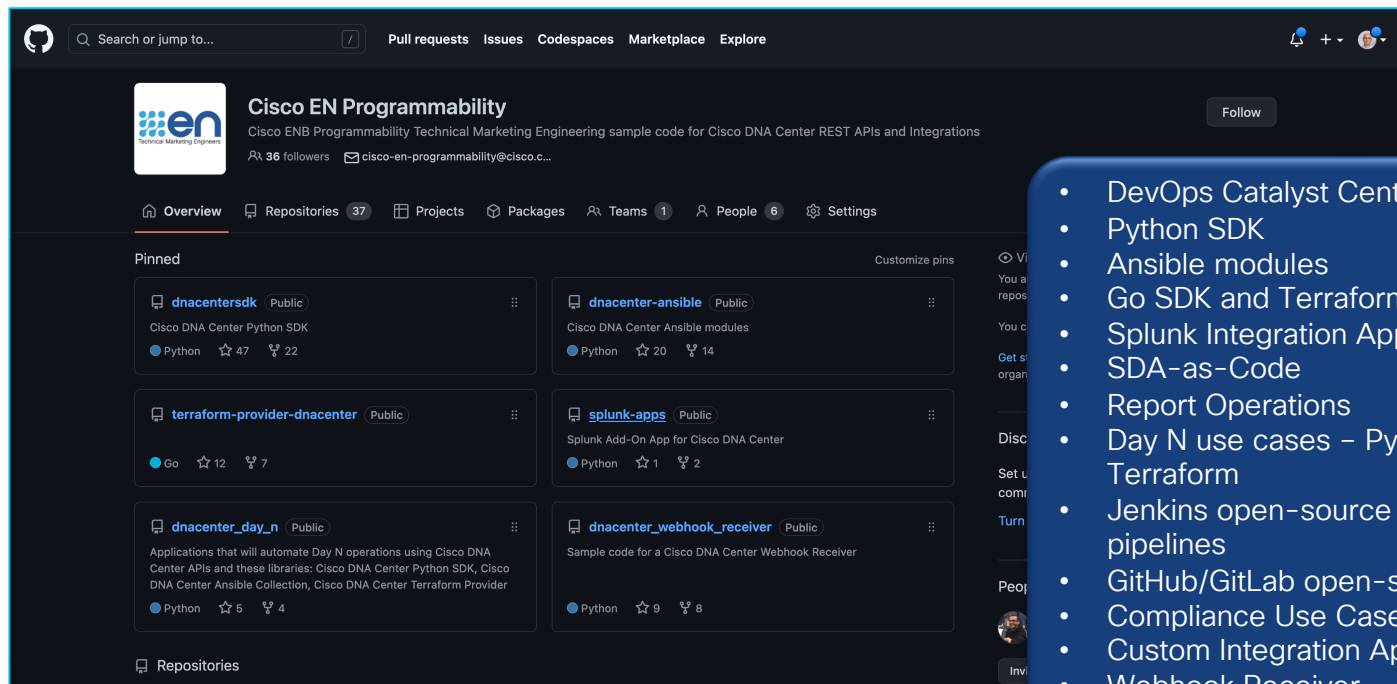
Releases 26

v2.5.6 (Latest) 3 weeks ago

+ 25 releases

<https://github.com/cisco-en-programmability/dnacentersdk>

Cisco EN Programmability GitHub Org



<https://github.com/cisco-en-programmability>

- DevOps Catalyst Center use cases
- Python SDK
- Ansible modules
- Go SDK and Terraform provider
- Splunk Integration Apps
- SDA-as-Code
- Report Operations
- Day N use cases – Python SDK, Ansible, Terraform
- Jenkins open-source Integration and pipelines
- GitHub/GitLab open-source Integrations
- Compliance Use Case
- Custom Integration App
- Webhook Receiver
- Other sample code

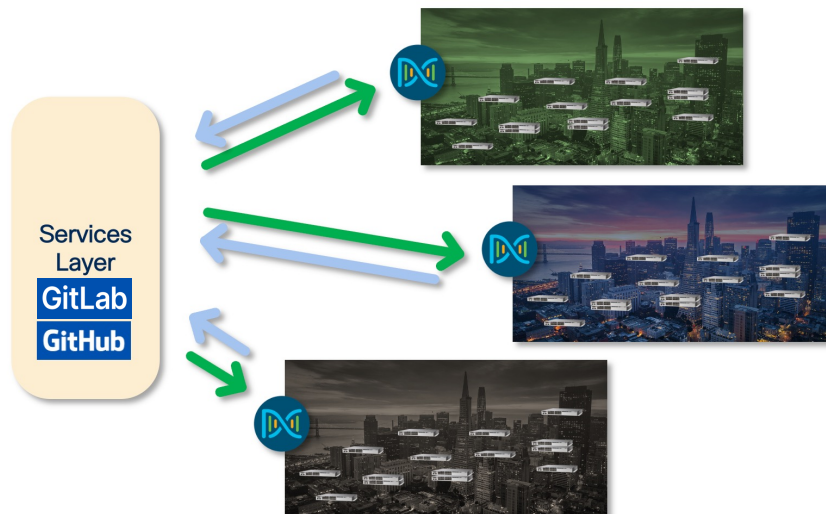
Agenda

- Platforms
- GitHub Integration
- GitLab Integration
- Security
- Developer Resources
- Lessons Learned

Version Control Tools Integrations



- Support of Infrastructure-as-Code initiatives
- Simplified at-scale network management
- Consistent intent configurations, profiles and policies
- Use of approved intents and workflow automations
- Support for multi-Cisco Catalyst Center clusters and platforms
- Visibility, security and reporting





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Thank you

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#CiscoLiveAPJC

The background features a vibrant, multi-colored abstract design. On the left, there are horizontal, wavy bands of color in shades of red, orange, yellow, and green. On the right, a bright white light source emits a series of colorful rays in shades of blue, green, and yellow, creating a sunburst effect.

cisco *Live!*

Let's go

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