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1. Find this session in the Cisco Live Mobile App
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4. Enter messages/questions in the Webex space

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https://ciscolive.ciscoevents.com/ciscolivebot/#BRKDEV-2291

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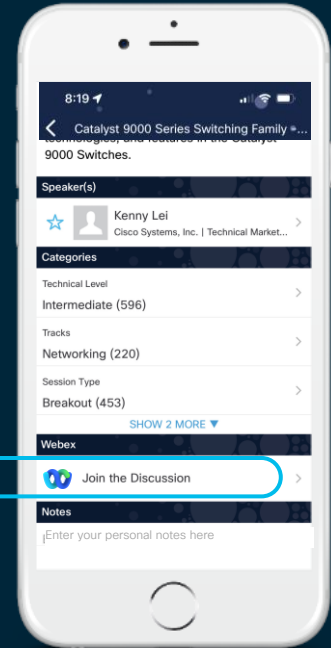
"DevOps isn't about automation, just as astronomy isn't about telescopes."

Christopher Little

Agenda

- DevOps & NetDevOps

- The tools you need

- ACI & DevOps: How to!

- Demo

{Net}DevOps

What is DevOps?

Philosophy

- A Cultural, professional movement with attitude and values

- Assuming Infrastructure is code, and should be developed and managed as such
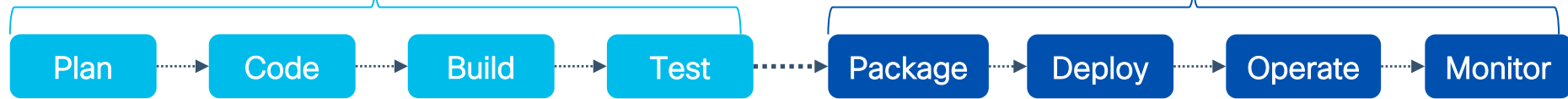
What is NetDevOps?

Use-cases

- Dev or Prod environments
- Automated deployment
- Automated testing
- Troubleshooting
- Optimization

Key elements of {Net}DevOps practices

1. Continuous Integration/Continuous Delivery Pipeline – **Tools Driven**

(CI)   (CD)

| Plan | Code | Build | Test | Package | Deploy | Operate | Monitor |

2. Automating processes – **Tools Driven**

Infrastructure as Code

3. Establishing {Net}DevOps culture – **People Driven**
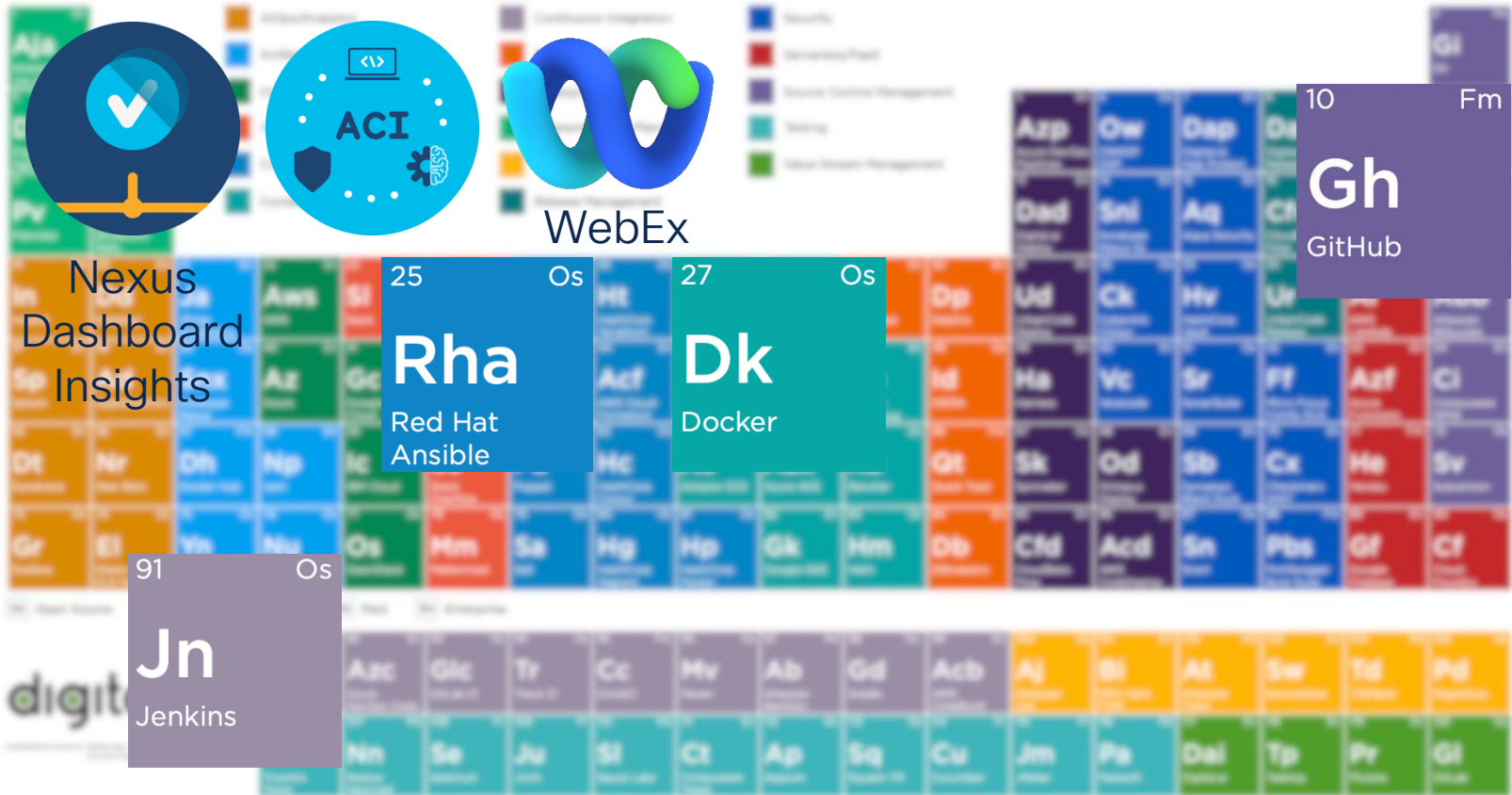
http://agilemanifesto.org/

Individuals and interactions over processes and tools
Working software over comprehensive documentation
Customer collaboration over contract negotiation
Responding to change over following a plan

That is, while there is value in the items on
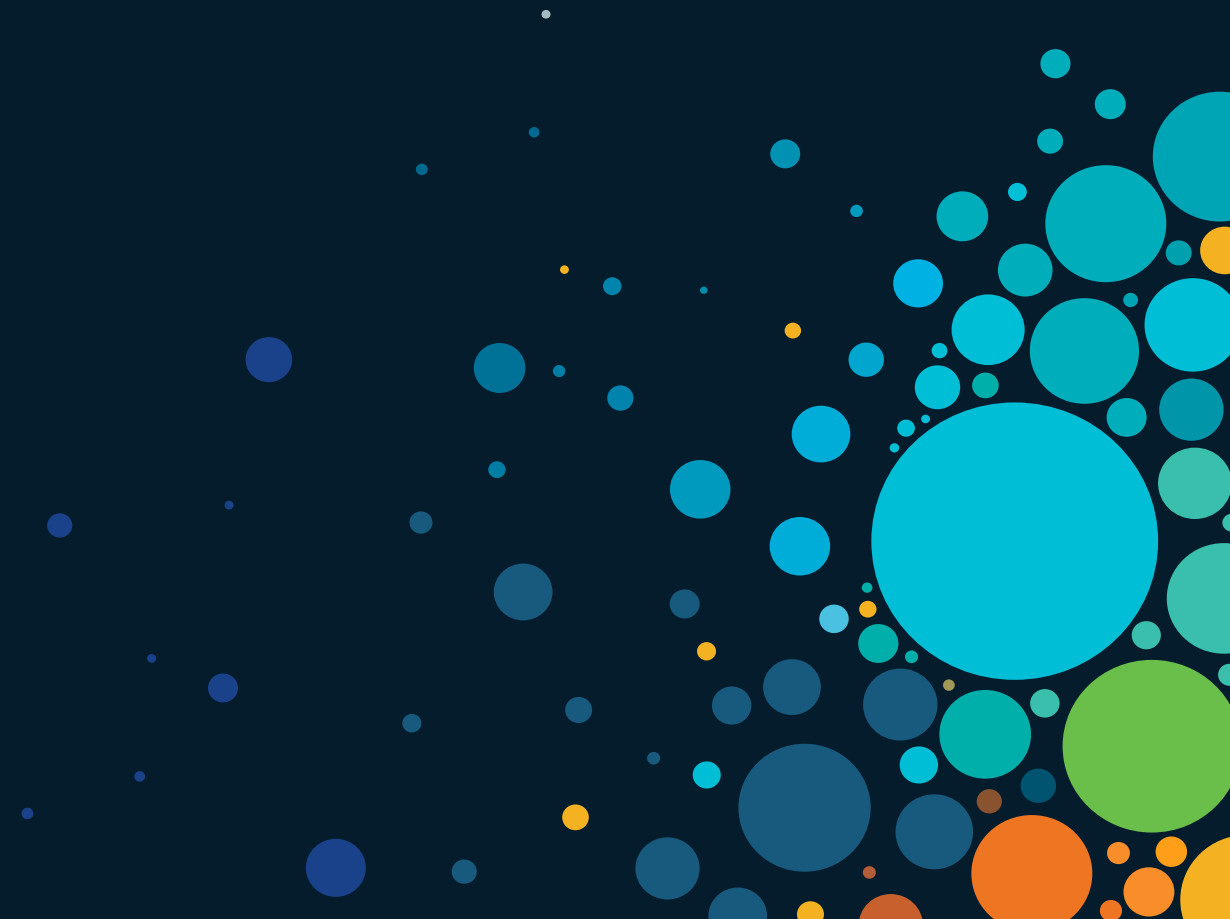the right, we value the items on the left more.

The Tools
You Need

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What tools do I need?

Legend (categories):
- AIOps/Analytics
- Artifact/Package Management
- Cloud
- Collaboration
- Configuration Automation
- Containers
- Continuous Integration
- Database Management
- Deployment
- Enterprise Agile Planning
- Issue Tracking/ITSM
- Release Management
- Security
- Serverless/PaaS
- Source Control Management
- Testing
- Value Stream Management

Key: Os Open Source Fr Free Fm Freemium Pd Paid En Enterprise

#	Type	Symbol	Name
1	En	Aja	Atlassian Jira Align
2	Os	Gi	Git
3	En	Daa	Digital.ai Agility
4	En	Tp	Targetprocess
5	En	Azp	Azure DevOps Pipelines
6	Os	Ow	OWASP ZAP
7	En	Dap	Digital.ai App Protect
8	En	Dar	Digital.ai Release
9	En	Acp	AWS CodePipeline
10	Fm	Gh	GitHub
11		Pv	Planview
12		Br	Broadcom Rally
13		Dad	Digital.ai Deploy
14		Sni	Sonatype Nexus IQ
15		Aq	Aqua Security
16		Cfr	CloudBees Flow
17		Brl	BMC RLM
18		Gls	GitLab SCM
19	Pd	In	Instana
20	En	Dd	Datadog
21		Ja	JFrog Artifactory
22		Aws	AWS
23	En	Sl	Slack
24	En	Mt	Microsoft Teams
25	Os	Rha	Red Hat Ansible
26	Os	Ht	HashiCorp Terraform
27	Os	Dk	Docker
28	En	Rho	Red Hat OpenShift
29		Lb	Liquibase
30	En	Dp	Delphix
31	En	Ud	UrbanCode Deploy
32	Os	Ck	CyberArk Conjur
33	Os	Hv	HashiCorp Vault
34	En	Ur	UrbanCode Release
35		Al	AWS Lambda
36	Os	Abb	Atlassian Bitbucket
37	En	Sp	Splunk
38	En	Ad	AppDynamics
39	Os	Snx	Sonatype Nexus
40	En	Az	Azure
41	En	Gc	Google Cloud
42		Ac	Atlassian Confluence
43	Os	Ch	Chef
44	En	Acf	AWS Cloud Formation
45	Os	Ku	Kubernetes
46	En	Ak	Amazon EKS
47	En	De	Docker Enterprise
48	Os	Id	IDERA
49	En	Ha	Harness
50	En	Vc	Veracode
51	Os	Sr	SonarQube
52	En	Ff	Micro Focus Fortify SCA
53		Azf	Azure Functions
54	En	Ci	Compuware ISPW
55	En	Dt	Dynatrace
56	En	Nr	New Relic
57	Fm	Dh	Docker Hub
58	En	Np	npm
59	En	Ic	IBM Cloud
60	En	So	Stack Overflow
61	Fm	Pu	Puppet
62	Os	Hc	HashiCorp Consul
63	En	Ae	Amazon ECS
64	En	Azk	Azure AKS
65	Os	Ra	Rancher
66	Fm	Qt	Quest Toad
67	Os	Sk	Spinnaker
68	En	Od	Octopus Deploy
69	En	Sb	Synopsys Black Duck
70	En	Cx	Checkmarx SAST
71	Fm	He	Heroku
72	Os	Sv	Subversion
73	Os	Gr	Grafana
74	Os	El	Elastic ELK Stack
75	Os	Yn	Yarn
76	Os	Nu	NuGet
77	Os	Os	OpenStack
78	Os	Mm	Mattermost
79	Fm	Sa	Salt
80	Os	Hg	HashiCorp Vagrant
81	En	Hp	HashiCorp Packer
82	Os	Gk	Google GKE
83	Os	Hm	Helm
84	En	Db	DBmaestro
85	En	Cfd	CloudBees Flow
86	En	Acd	AWS CodeDeploy
87	Os	Sn	Snort
88	Fm	Pbs	PortSwigger Burp Suite
89	En	Gf	Google Firebase
90	Os	Cf	Cloud Foundry
91	Os	Jn	Jenkins
92	En	Azc	Azure DevOps Code
93	Os	Glc	GitLab CI
94	Os	Tr	Travis CI
95	Fm	Cc	CircleCI
96	Os	Mv	Maven
97	Pd	Ab	Atlassian Bamboo
98	Os	Gd	Gradle
99	En	Acb	AWS CodeBuild
100	Os	Aj	Atlassian Jira
101	En	Bi	BMC Helix ITSM
102	Pd	At	Atlassian Trello
103	En	Sw	ServiceNow
104	Pd	Td	TOPdesk
105	Os	Pd	PagerDuty
106	Fr	Tt	Tricentis Tosca
107	Pd	Nn	Neotys NeoLoad
108	Fr	Se	Selenium
109	Fr	Ju	JUnit
110	Pd	Sl	Sauce Labs
111	En	Ct	Compuware Topaz
112	En	Ap	Appium
113	Os	Sq	Squash TM
114	Fr	Cu	Cucumber
115	Fr	Jm	JMeter
116	Pd	Pa	Parasoft
117		Dai	Digital.ai
118	En	Tp	Tasktop
119	En	Pr	Plutora
120	Os	Gl	GitLab

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CollabNetVersionOne, XebiaLabs, Arxan, Numerify & Experitest are now Digital.ai

What tools do I need for this session?

Nexus Dashboard Insights

ACI

WebEx

GitHub (Gh, 10, Fm)

Rha — Red Hat Ansible (25, Os)

Dk — Docker (27, Os)
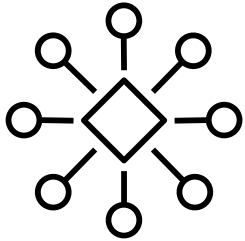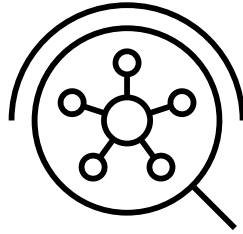
Jn — Jenkins (91, Os)
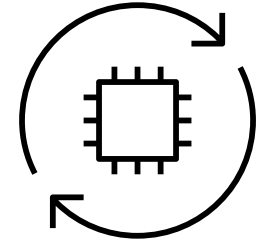
How to use NetDevOps practices for ACI?

Identify your requirements!

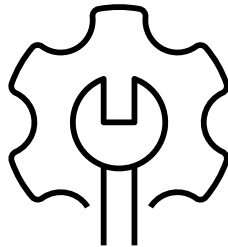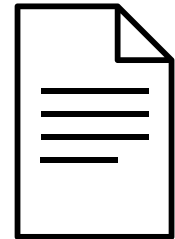| Fabric Discovery	Compliance Checks	Firmware Upgrade

Network Migration	Config Management	Troubleshooting

ACI

Identify Ansible modules

cisco

aci
Ansible Modules for Cisco ACI

| Details | Read Me | Content |

ℹ Info

Installation $ ansible-gal

NOTE: Installing c

⬇ Download tarba

Install Version   2.1.0 released 5 r

🏷 **Tags**   cisco aci clou

---

cisco.aci.aci_rest module – Direct access to the Cisco APIC REST API

ℹ Note

This module is part of the cisco.aci collection (version 2.2.0).

You might already have this collection installed if you are using the `ansible` package. It is not included in `ansible-core`. To check

To install it, use: `ansible-galaxy collection install cisco.aci` .
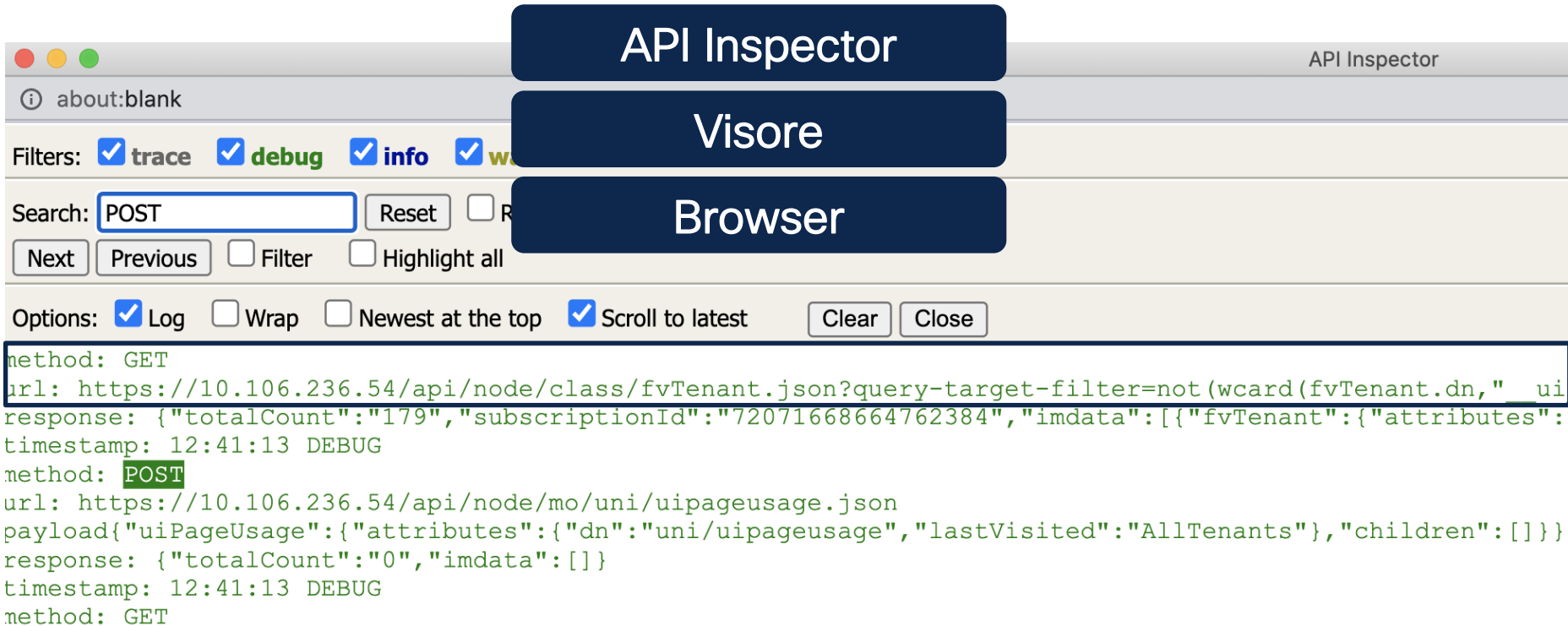
To use it in a playbook, specify: `cisco.aci.aci_rest` .

- Synopsis
- Requirements
- Parameters
- Notes
- See Also
- Examples
- Return Values

Synopsis

- Enables the management of the Cisco ACI fabric through direct access to the Cisco APIC REST API.
- Thanks to the idempotent nature of the APIC, this module is idempotent and reports changes.

.. Or retrieve REST API Payload

API Inspector

Visore

Browser

about:blank

Filters: ☑ **trace** ☑ **debug** ☑ **info** ☑ **w...**

Search: `POST` [Reset] ☐ R...

[Next] [Previous] ☐ Filter ☐ Highlight all

Options: ☑ Log ☐ Wrap ☐ Newest at the top ☑ Scroll to latest [Clear] [Close]

method: GET
url: https://10.106.236.54/api/node/class/fvTenant.json?query-target-filter=not(wcard(fvTenant.dn,"__ui
response: {"totalCount":"179","subscriptionId":"72071668664762384","imdata":[{"fvTenant":{"attributes":
timestamp: 12:41:13 DEBUG
method: POST
url: https://10.106.236.54/api/node/mo/uni/uipageusage.json
payload{"uiPageUsage":{"attributes":{"dn":"uni/uipageusage","lastVisited":"AllTenants"},"children":[]}}
response: {"totalCount":"0","imdata":[]}
timestamp: 12:41:13 DEBUG
method: GET

Commit Your Code on GitHub

Playbook
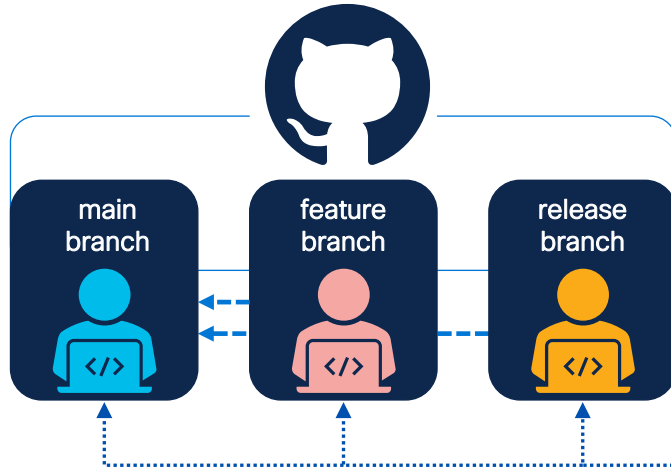
```yaml
- hosts: apic
  gather_facts: no
  connection: local

  vars:
    aci_login: &aci_login
      hostname: '{{ apic_host }}'
      username: '{{ apic.bootstrap.user }}'
      private_key: "{{ private_key }}"
      #password: '{{ apic_password }}'
      use_proxy: '{{ apic_use_proxy }}'
      validate_certs: '{{ apic_validate_certs }}'

  vars_files:
    - vars.yml

  tasks:
  - name:
    block:
      - name: Get Discovered Switch
        aci_rest:
          <<: *aci_login
          path: "{{ api_path.pending_registration }}"
          method: get
        register: result
        retries: 100
        delay: 10
        until: result.totalCount != 0
```

main branch

feature branch

release branch

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Ensure that the commits wont break your ACI infra
Continuous Assurance with Nexus Dashboard Insights
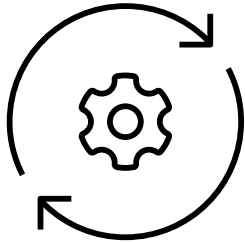
"Did something change in my network?"

"Are the changes I'm about to deploy correct?"
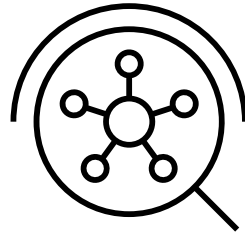
"Is my network compliant with Governance Rules?"

"Is my network compliant with my config standards?"

"Can Endpoint A talk to B?"

"How Can Endpoint A talk to B?"

Ensure that the commits wont break your ACI Infra

Change management - Pre-Change Verification

Before and After Comparison

What if I modify my VRF?

What if I remove leaf interface profile?

What if I add new subnet?

ⓘ Pre-Change Analysis - BRKDEV-2291

Delta Analysis

Epoch Delta for BRKDEV-2291

Later Epoch: 04/13/2022 1:26:55 PM GMT+5:30

| Health Delta | Policy Delta |

Smart Event Count

❌ Critical	⚠ Major	◆ Minor	ⓘ Warning	✅ Info	Total
0 0 0	0 2 2	0 0 0	0 3 0	0 4 0	0 9 2
Earlier Later	Earlier Later	Earlier Later	Earlier Later	Earlier Later	Earlier Later
0 | 0 —	2 | 4 ↑	0 | 0 —	3 | 3 —	4 | 4 —	9 | 11 ↑

Setup Jenkins

Jenkins Controller

- Jobs
- Plugins
- Nodes/Clouds
- Pipeline
- Credentials

SSH

JNLP

JNLP

Cloud

Always-on Agents

On-demand Agents

VM

VM

docker

kubernetes

APIC APIC APIC

APIC APIC APIC
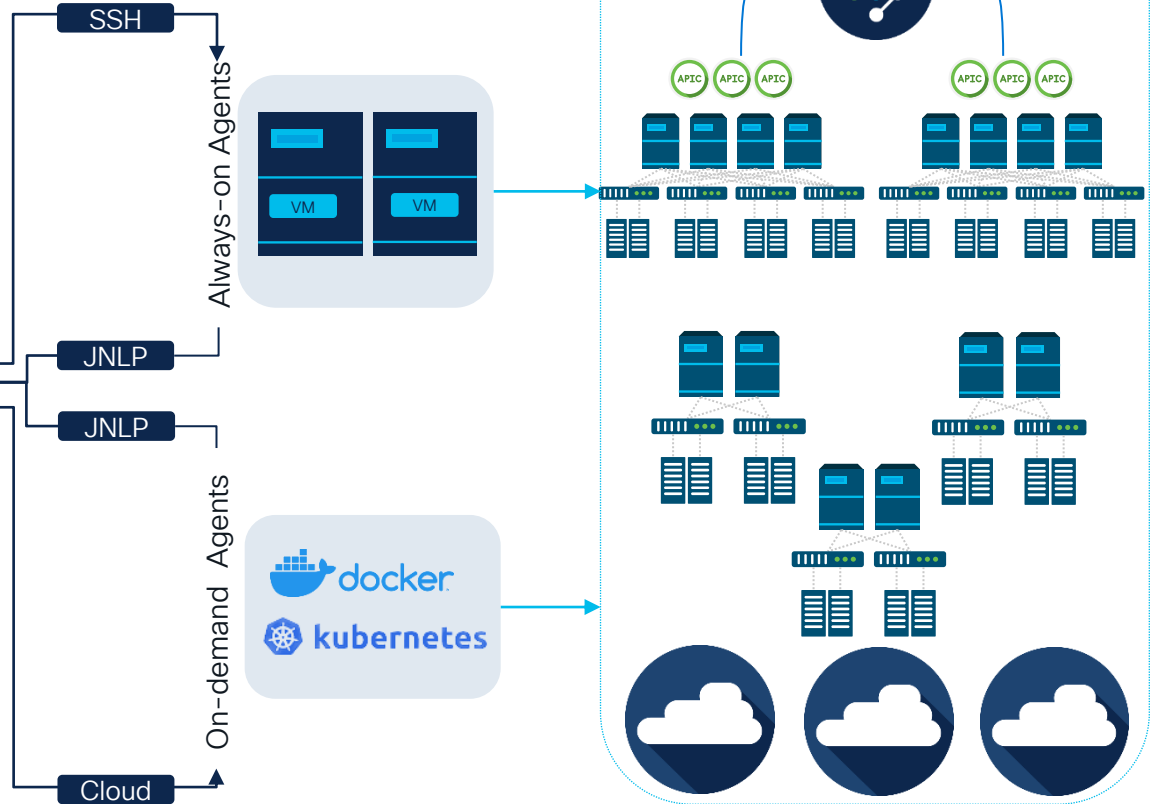
Get a (Cisco WebEx) messaging Bot!


```
curl --location --request POST 'https://webexapis.com/v1/messages' \
--header "Authorization: Bearer ${WEBEXAUTH}" \
--header 'Content-Type: application/json' \
--data-raw '{
  "roomId": "${WEBEXROOM}",

  "markdown": "Hi There"
}'
```

jenkinsbot-saukotha 28/03/22, 12:25 PM

Started at: 2022-03-28 06:54:26 UTC
Author:Saurabh Kothari(saukotha@cisco.com)
Job URL: http://192.168.1.12:8080/job/Pipeline%20test/
Build ID: 62
Build Logs: http://192.168.1.12:8080/job/Pipeline%20test/62/consoleText
Result: SUCCESS

Putting it All Together

CICD Pipeline

Commit to feature branch → Trigger Pipeline → Ansible Validation/Linting → NDI Pre-change Analysis → Notify

docker

Merge to main branch → Trigger Pipeline → Deploy Configuration → NDI Delta Analysis → Notify

docker
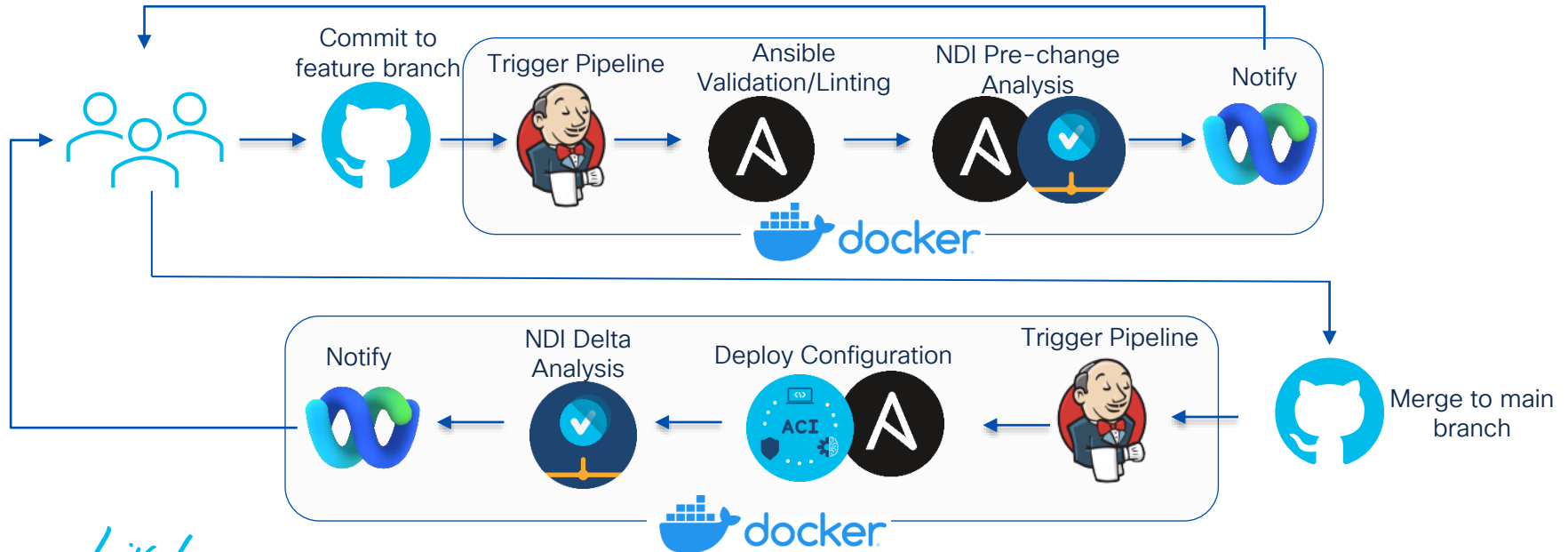
CICD Pipeline as Code

```
pipeline {
    agent {  label 'aci-ansible'    }

    stages {
        stage('Git '){
            steps{
            git branch: 'main', url: 'https://github.com/saurabhkothari/Cisco-ACI.git'
            }
        }
        stage('Bootstrap APIC User'){

            steps {
             withCredentials([file(credentialsId: 'ansible-user-key', variable: 'key')]){
                ansiColor('xterm') {

                    ansiblePlaybook(
                    playbook: 'user-creation-day0.yml' ,
                    inventory: 'inventory',
                    vaultCredentialsId: 'ansible-vault-id',
                    colorized: true)

} } } } } }
```

Where do you want to execute the pipeline?
e.g – docker container

Your first stage
e.g – Git checkout

Your Second Stage
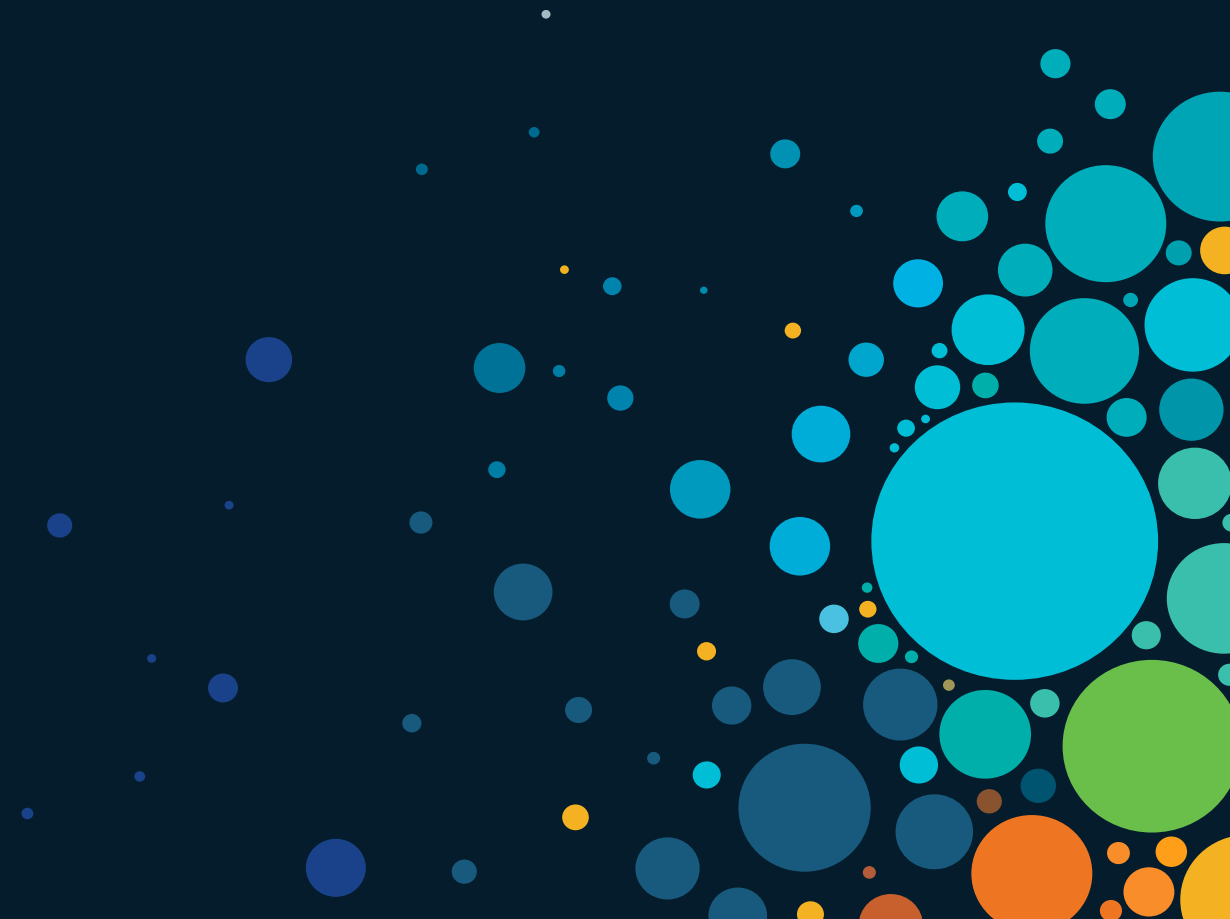e.g – Run ansible Playbook

Demo

Demo Code:
https://github.com/saurabhkothari/CiscoLive-BRKDEV2291

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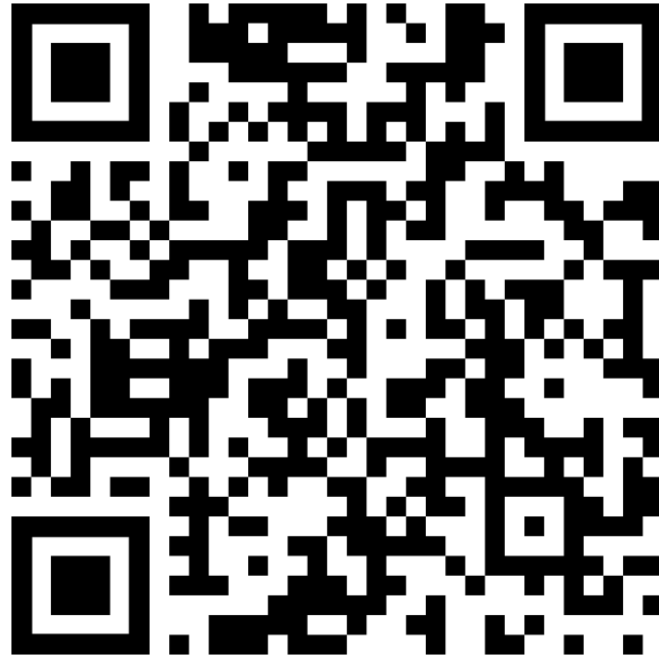
Conclusion

Truths about DevOps!

- It's hard

- There is no one-size fits all

- No need to do it all at once

- Requires practice

Embrace it anyways (at least for ACI)!

- Simplifies Focus

- Faster resolution of problems

- More stable operating environments

- Greater professional development opportunities

Call to Action!

- https://developer.cisco.com/docs/aci/

- https://developer.cisco.com/docs/aci/#!sandbox

- https://developer.cisco.com/netdevops/live/

Technical Session Surveys

- Attendees who fill out a minimum of four session surveys and the overall event survey will get Cisco Live branded socks!

- Attendees will also earn 100 points in the Cisco Live Game for every survey completed.

- These points help you get on the leaderboard and increase your chances of winning daily and grand prizes.

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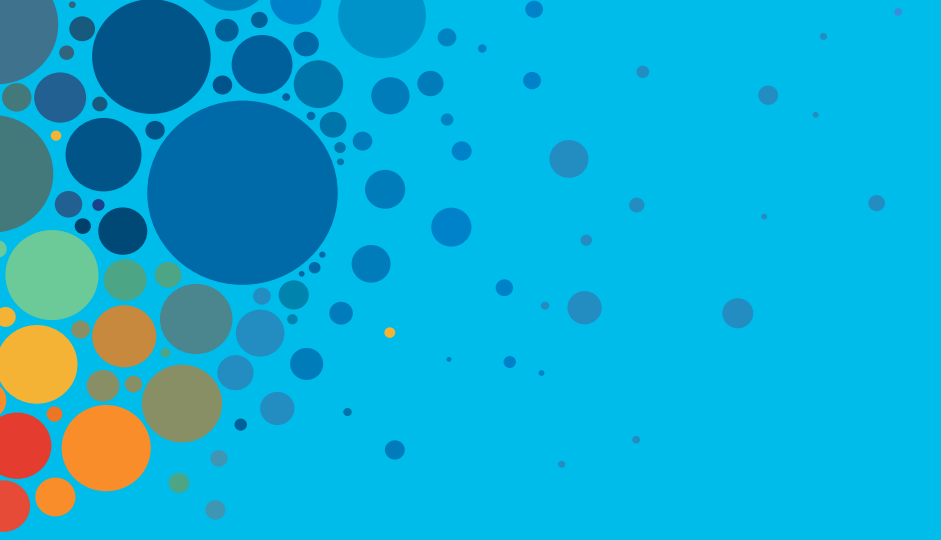
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- Book your one-on-one Meet the Engineer meeting

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Thank you

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