

The background is a vibrant, abstract graphic. It features a central bright white light source from which numerous colorful rays emanate, creating a sunburst or starburst effect. The rays transition through a spectrum of colors including yellow, orange, red, and various shades of blue and green. Overlaid on this are large, flowing, wavy shapes in similar colors, giving the overall impression of energy, movement, and a digital or network theme.

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The bridge to possible

Extending CML

Terraforming the Lost City

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@qsnyder

DEVNET-3008



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- 4 Enter messages/questions in the Webex space

Webex spaces will be moderated by the speaker until June 9, 2023.



<https://ciscolive.ciscoevents.com/ciscolivebot/#DEVNET-3008>

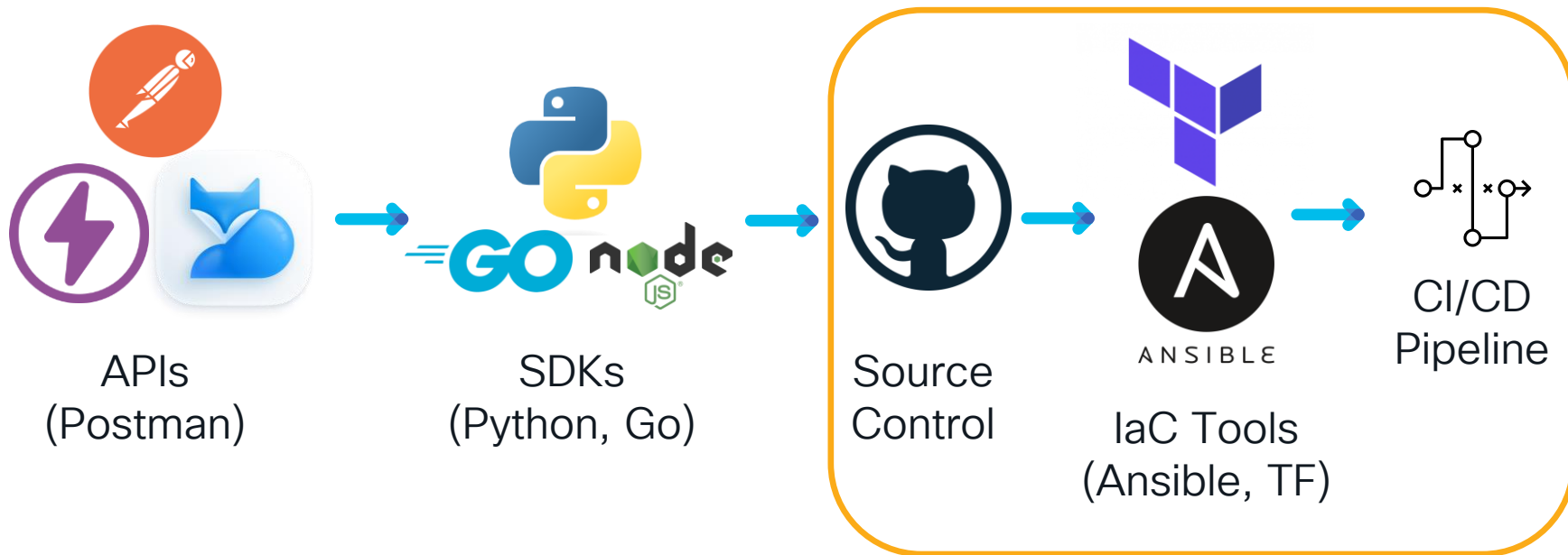
Agenda

- Introduction
- Current state of pipelines
- Abstracting complexity with OTS apps
- Tools of the trade
- Demo
- Conclusion

The current state of pipelines



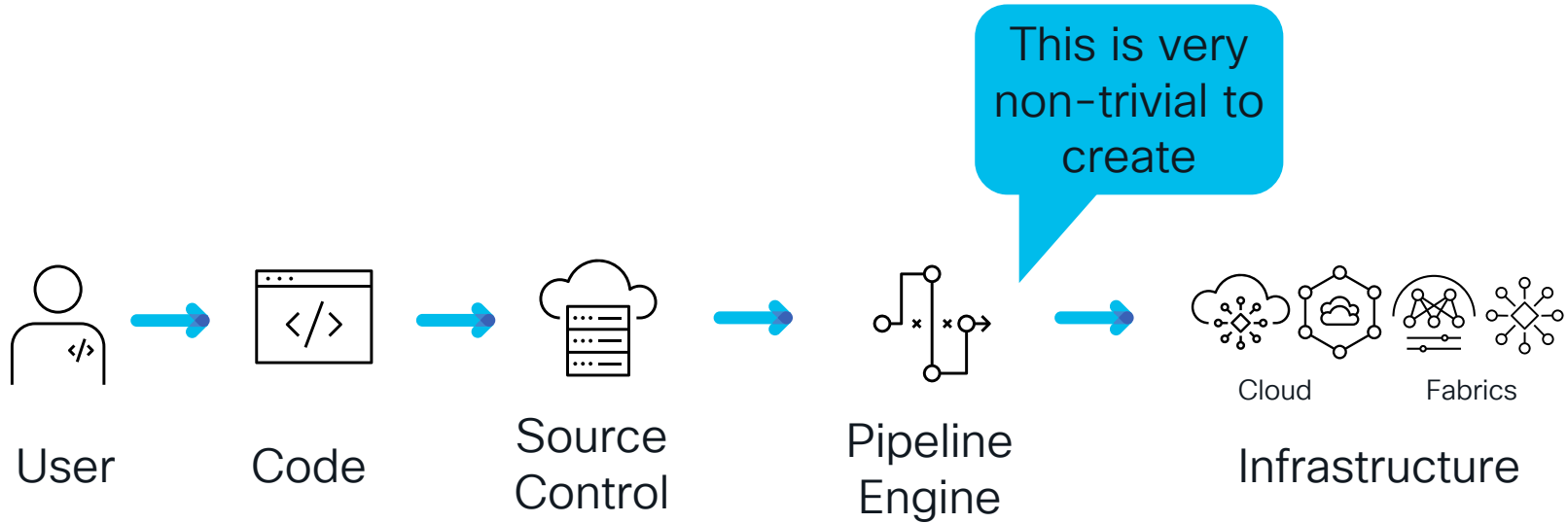
The Progression of Network Automation (so far)



Infrastructure as Code (IaC) – What/Why/How

- Automate the provisioning and management of the technology stack
- Translate manual tasks into reusable, robust, distributable code
- Rely on practices that have been successfully used for years in software development (version control, automated testing, release tagging, continuous delivery, etc.)
- Benefits: much higher delivery speed; significant reliability boost

The Infrastructure as Code journey



Typical pipeline functions



Linting of source code



Deploy to test/dev/QA environment



Validation of test environment functionality



Deploy to production environment



Validation of production environment

That's a lot of YAML-wrapped-bash

```
stages:
  - validate
  - deploy_to_prod
  - deploy_to_test
  - verify_deploy_to_prod
  - verify_deploy_to_test
  - verify_website_reachability

lint:
  stage: validate
  image: geerlingguy/docker-centos8-ansible:latest
  variables:
  script:
    - ansible-playbook --syntax-check -i inventory/prod.yaml site.yaml
    - ansible-playbook --syntax-check -i inventory/test.yaml site.yaml

deploy_to_prod:
  image: geerlingguy/docker-centos8-ansible:latest
  stage: deploy_to_prod
  script:
    - echo "Deploy to prod env"
    - ansible-playbook -i inventory/prod.yaml site.yaml
  environment:
    name: production
  only:
  - master

deploy_to_test:
  image: geerlingguy/docker-centos8-ansible:latest
  stage: deploy_to_test
  script:
    - echo "Deploy to test env"
    - ansible-playbook -i inventory/test.yaml site.yaml
  environment:
    name: test
  only:
  - test
```

```
verify_test_environment:
  image: ciscotestautomation/pyats:latest-robot
  stage: verify_deploy_to_test
  environment:
    name: test
  script:
    - pwd
    - cd tests
    # important: need to add our current directory to PYTHONPATH
    - export PYTHONPATH=$PYTHONPATH:$(pwd)
    - robot test.robot

artifacts:
  name: "TEST_${CI_JOB_NAME}_${CI_COMMIT_REF_NAME}"
  when: always
  paths:
    - ./tests/log.html
    - ./tests/report.html
    - ./tests/output.xml
  only:
  - test

verify_prod_environment:
  image: ciscotestautomation/pyats:latest-robot
  stage: verify_deploy_to_prod
  environment:
    name: test
  script:
    - pwd
    - cd tests
    # important: need to add our current directory to PYTHONPATH
    - export PYTHONPATH=$PYTHONPATH:$(pwd)
    - robot prod.robot
```

```
artifacts:
  name: "PROD_${CI_JOB_NAME}_${CI_COMMIT_REF_NAME}"
  when: always
  paths:
    - ./tests/log.html
    - ./tests/report.html
    - ./tests/output.xml
  only:
  - master

internet_sites:
  image: ciscotestautomation/pyats:latest-robot
  stage: verify_website_reachability
  environment:
    name: test
  script:
    - pwd
    - cd tests/websites/
    - make test
  only:
  - master
```

Abstracting complexity with OTS apps

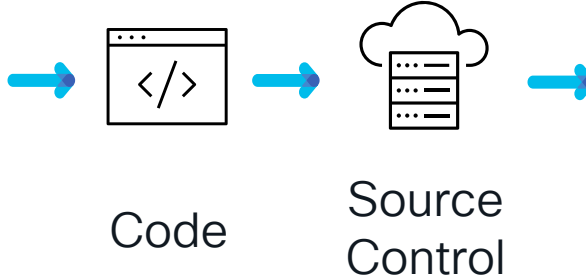


What does this abstraction provide?

- Prebuilt apps perform actions using driver from IaC files
- Common “boiler plate” services (linting, validation) can be handled by app
- Integrates using open methods (webhooks, access tokens) to connect SCM to app and build server
- BUT -
- Typical OTS platforms require specific tooling/code/etc; loss of flexibility

Our YAML-bash becomes...

```
atlantis server \  
--atlantis-url="$URL" \  
--gh-user="$GH_USER" \  
--gh-token="$TOKEN" \  
--gh-webhook-secret="$SECRET" \  
--repo-allowlist="$GH_REPO"
```



The screenshot displays a GitHub Actions workflow for Terraform. It includes a 'Show Output' section showing the Terraform plan for creating an 'aci_tenant' resource. The plan indicates that the resource will be created with specific annotations and names. Below the plan, there are instructions for applying the plan, deleting the plan, and planning again. The workflow also includes a 'Plan: 1 to add, 0 to change, 0 to destroy' summary. The bottom section shows the 'atlantis apply' step, which successfully creates the 'aci_tenant' resource.

qsnryder commented 4 minutes ago

Ran Plan for dir: . workspace: default

▼ Show Output

Terraform used the selected providers to generate the following execution plan. Resource actions are indicated with the following symbols:
+ create

Terraform will perform the following actions:

```
# aci_tenant.atlantis-testing will be created
+ resource "aci_tenant" "atlantis-testing" {
  + annotation = "orchestrator:terraform"
  + description = "This tenant is created by terraform using atlantis"
  + id         = (known after apply)
  + name       = "atlantis-testing"
  + name_alias = (known after apply)
}
```

Plan: 1 to add, 0 to change, 0 to destroy.

- 🔍 To apply this plan, comment:
 - atlantis apply -d .
- 🗑️ To delete this plan click [here](#)
- 🔍 To plan this project again, comment:
 - atlantis plan -d .

Plan: 1 to add, 0 to change, 0 to destroy.

- 🔍 To apply all unapplied plans from this pull request, comment:
 - atlantis apply
- 🗑️ To delete all plans and locks for the PR, comment:
 - atlantis unlock

qsnryder commented 3 minutes ago

atlantis apply

qsnryder commented 3 minutes ago

Ran Apply for dir: . workspace: default

```
aci_tenant.atlantis-testing: Creating...
aci_tenant.atlantis-testing: Creation complete after 0s [id=uni/tn-atlantis-testing]

Apply complete! Resources: 1 added, 0 changed, 0 destroyed.
```

Tools of the trade



Terraform

- Open-source infrastructure provisioning tool
- Commercial support from HashiCorp
- Declarative and idempotent
- Immutable infrastructure concept
- Can manage a wide range of systems:
 - VMs, network devices, cloud instances, etc.
- Agentless, single binary file
- Zero server-side dependencies



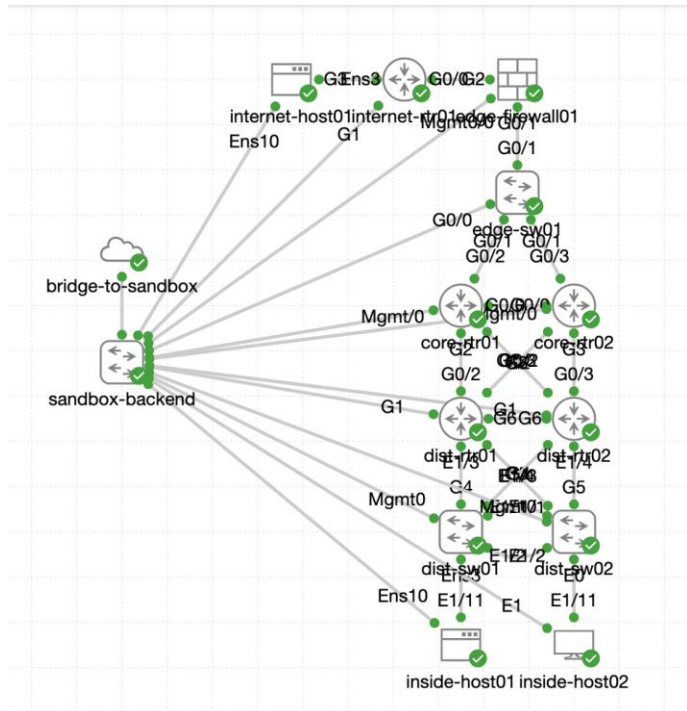
Atlantis (runatlantis.io)



- Open-source tool to automate Terraform workflows using SCM PRs
- Connects to SCM using webhooks, comments results of plan, apply, import into PR
- Runs locally (Go binary or Docker container); no commit of credentials to SCM
- All history logged, full collaboration and visibility amongst teams

CML²

- IYKYK
- API-driven VNF topology builder and simulation software
 - Includes support for Ansible, Terraform
- Sandboxen available on DevNet
- You're already using it to study, why not study more with it?





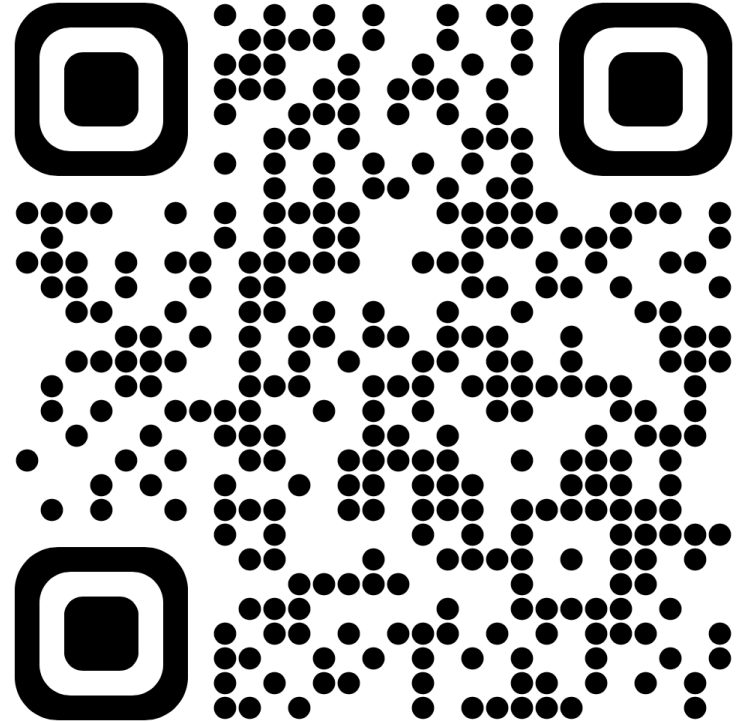
Demo

Bringing it all
together



In conclusion...

- <https://github.com/qsnyder/devnet-3008>
 - QR code is nextdoor
- Contains sample code, scripts, etc to help bootstrap your Atlantis install
- Includes README with cross-links to other software as appropriate



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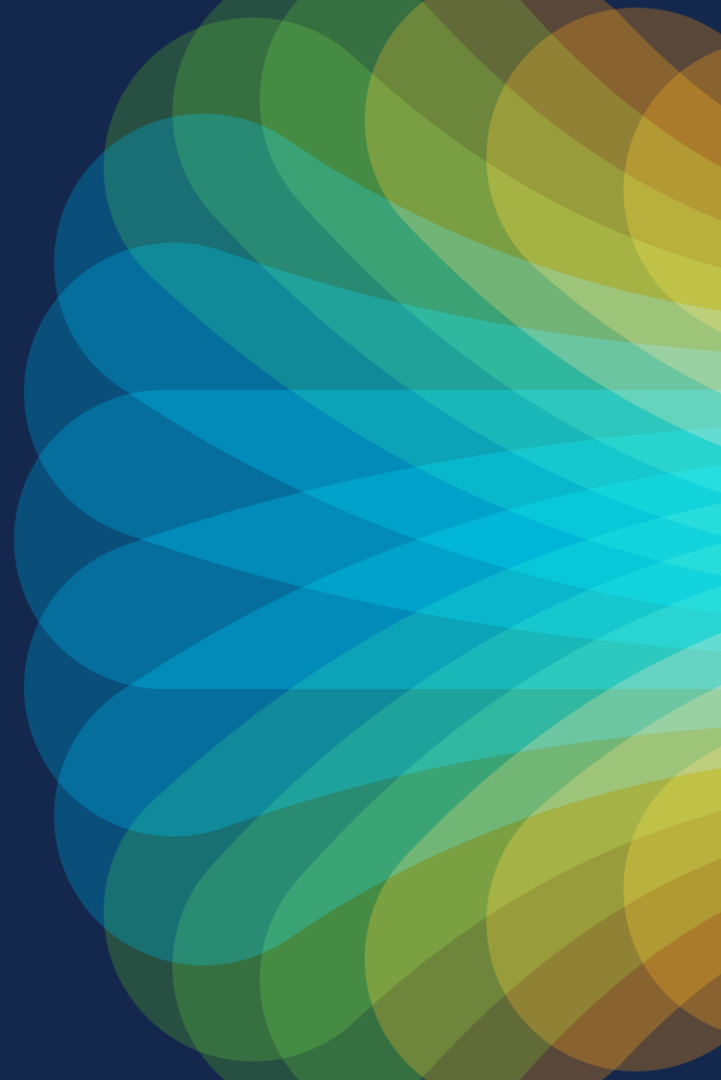


The bridge to possible

Thank you

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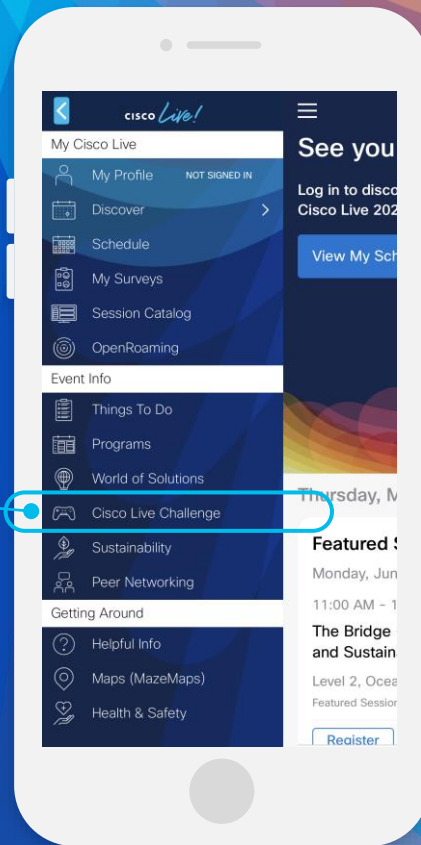
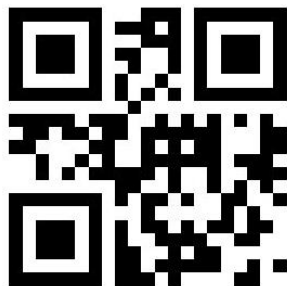


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The background features a vibrant, multi-colored abstract design. On the left, there are overlapping, wavy, organic shapes in shades of red, orange, and yellow. On the right, a bright white light source emits a series of sharp, radiating lines in various colors, including blue, green, and yellow, creating a sunburst or starburst effect. The overall color palette is a spectrum of rainbow colors.

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