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The bridge to possible

Extending CML

Terraforming the Lost City

Quinn Snyder | Technical Advocate, Cisco Learning and Certifications

@qsnyder

DEVNET-3008



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

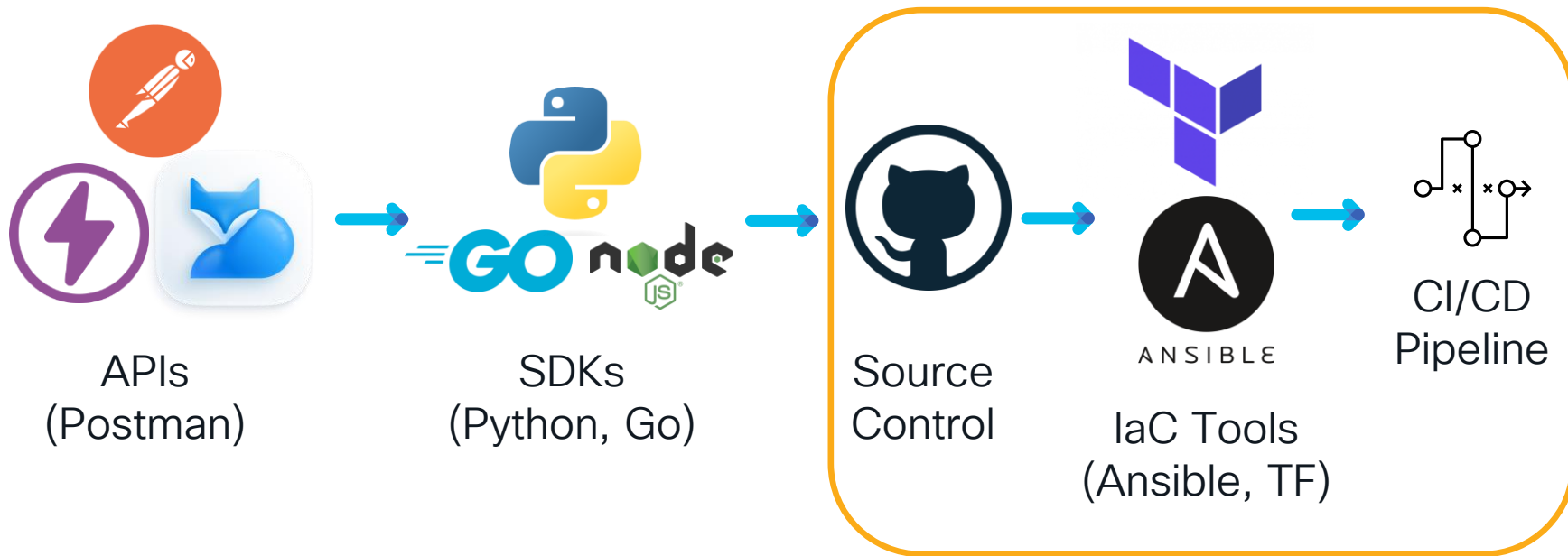
Agenda

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

The current state of pipelines



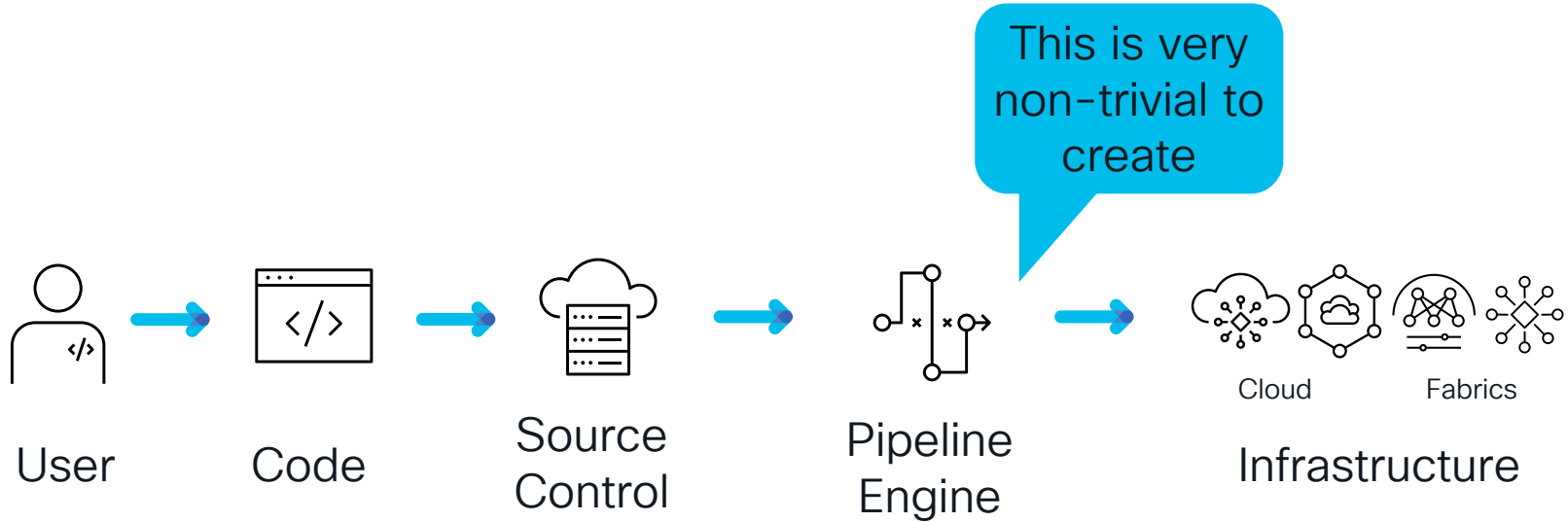
The Progression of Network Automation (so far)



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

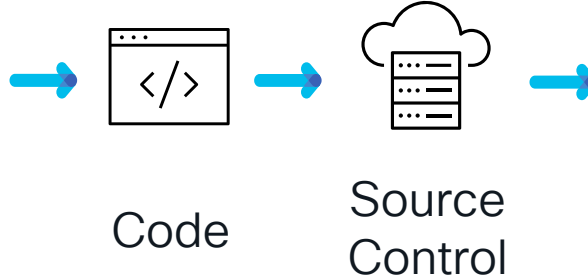


What does this abstraction provide?

- 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"
```



Code

Source
Control

The screenshot shows a GitHub Actions workflow run for the Atlantis project. The workflow is triggered by a pull request. The output shows the Terraform plan and the Atlantis apply command. The plan indicates that a new resource, `aci_tenant.atlantis-testing`, will be created. The Atlantis apply command is executed, and the output shows that the resource was successfully created.

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.

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



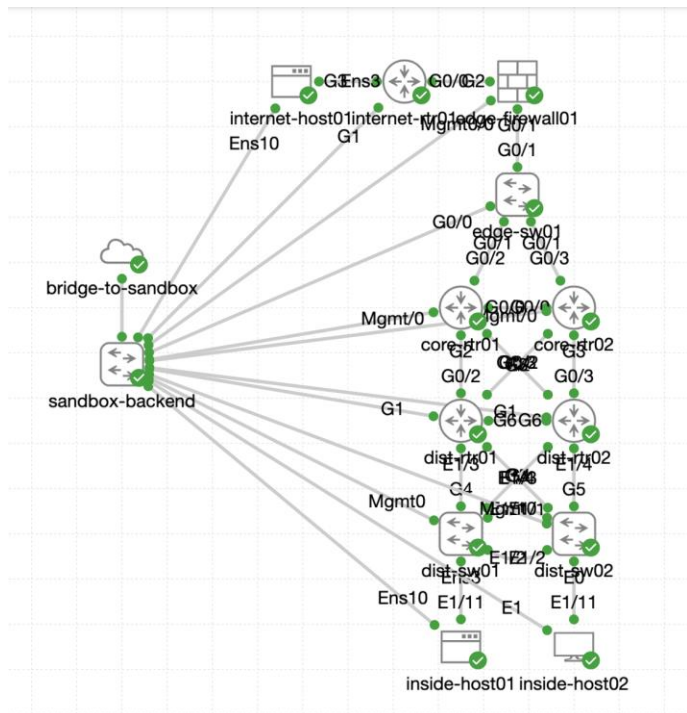
Atlantis (runatlantis.io)



- 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?





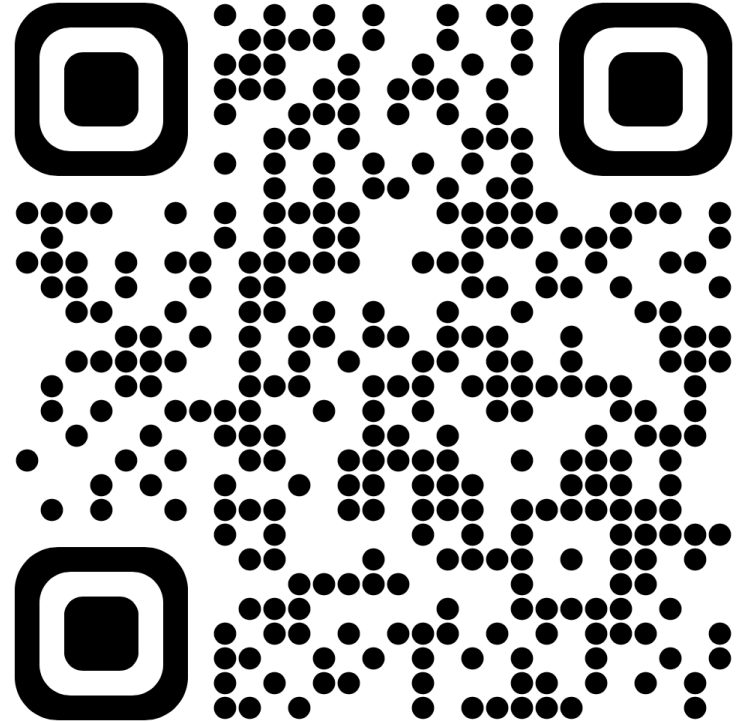
Demo

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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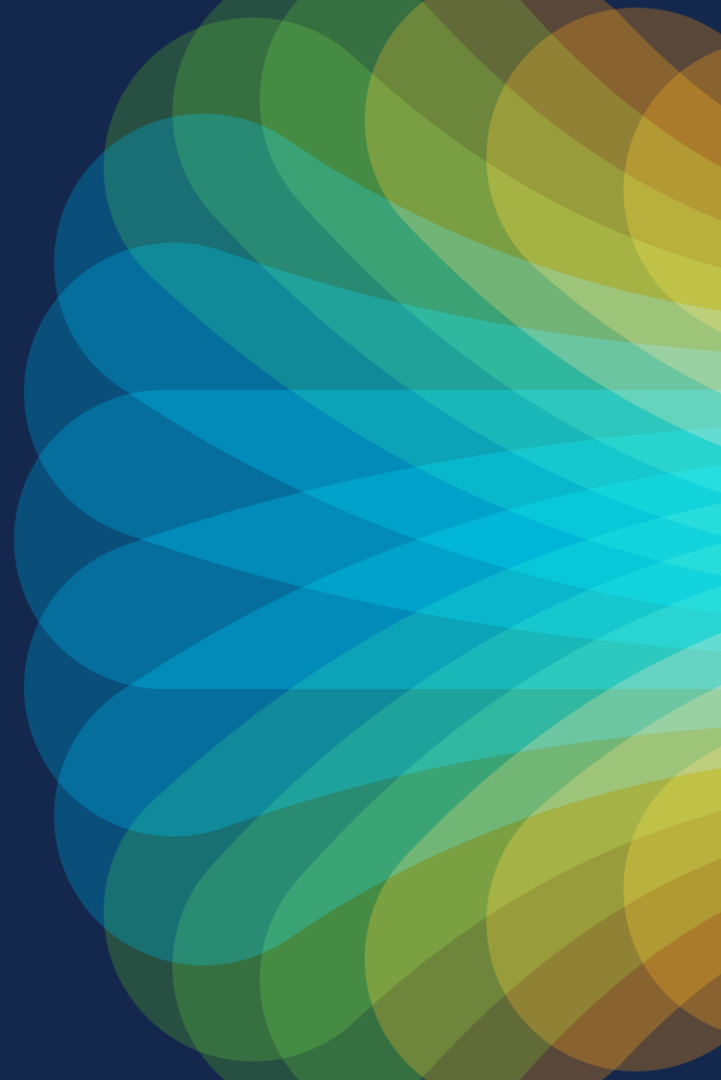


The bridge to possible

Thank you

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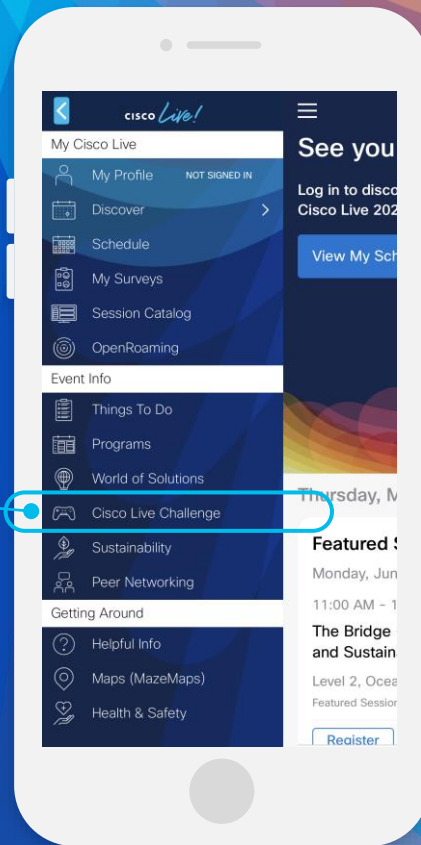
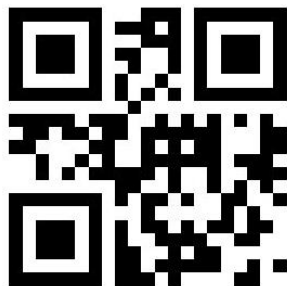


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