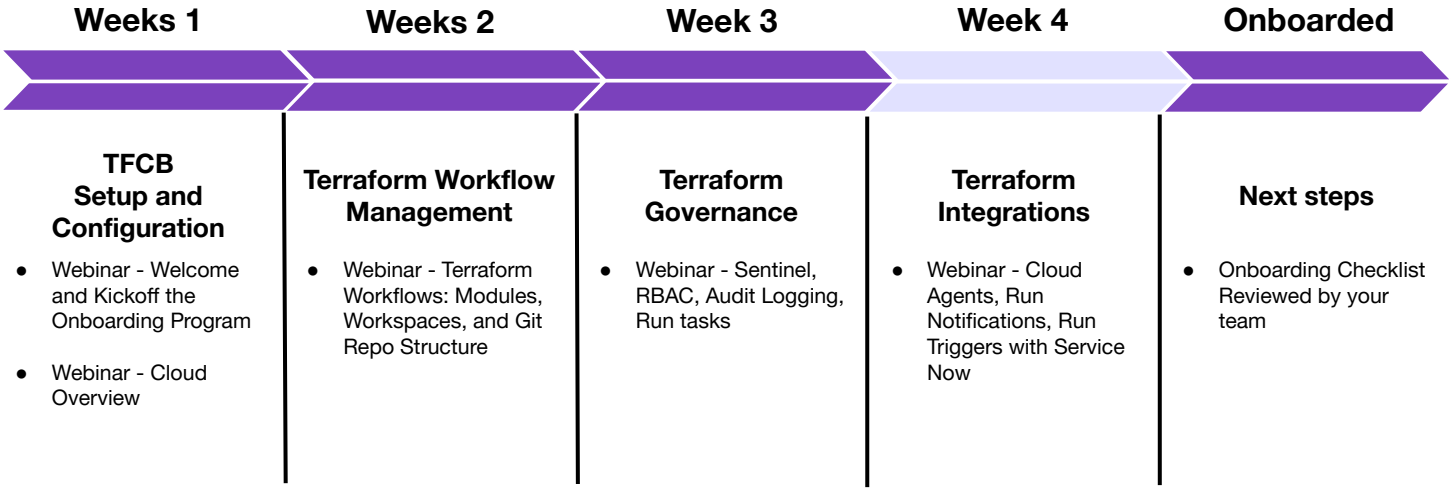
HashiCorp Terraform

Terraform Integrations & Program Closing

Agenda

1. Cloud Agents
2. Kubernetes Integration with TFC
3. ServiceNow Integration
4. Splunk Integration
5. Run Triggers
6. Run Notifications
7. Production Readiness
8. Closing Resources

TFCB Path to Production

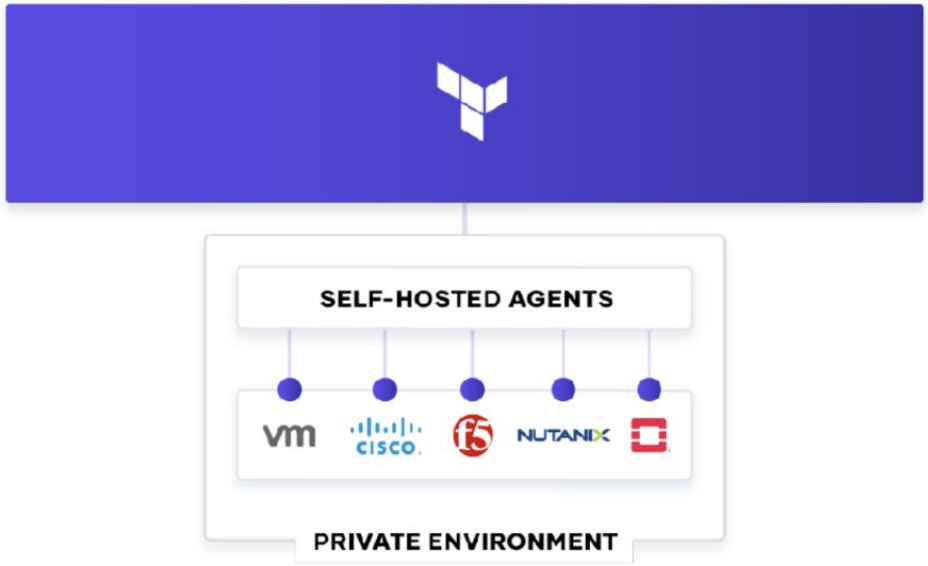


01

Cloud Agents

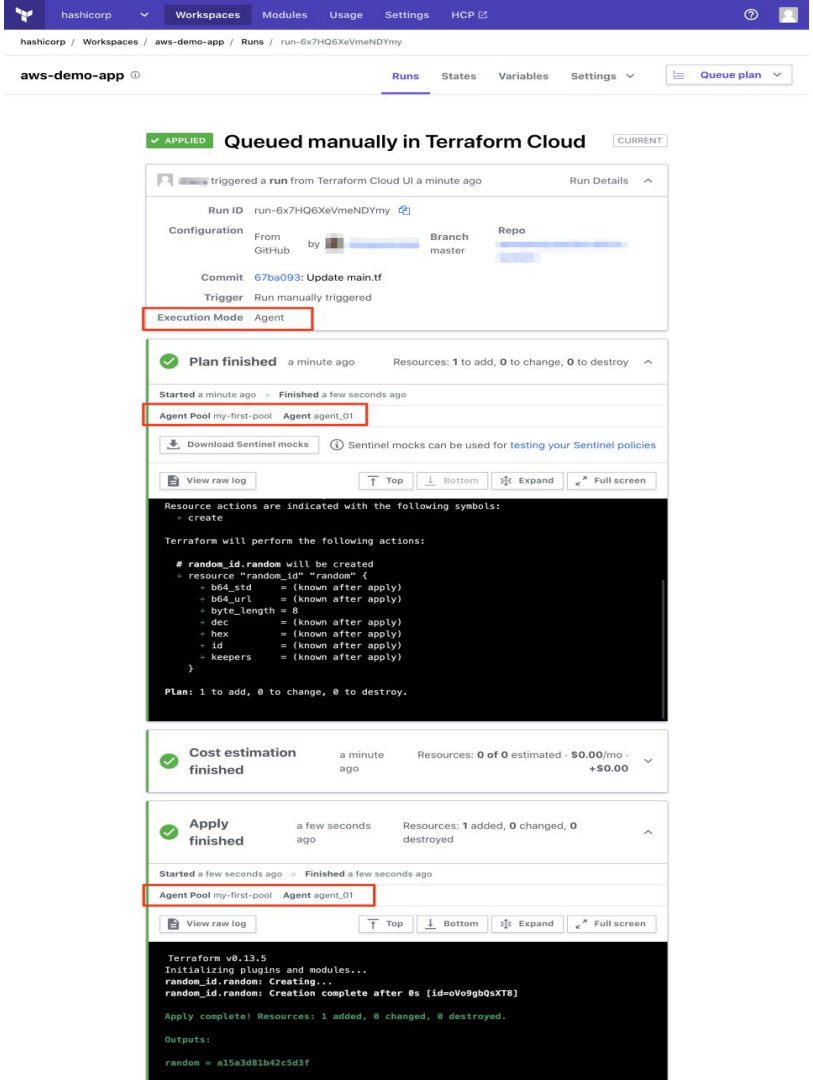
Terraform Cloud Agents

- Communicate with isolated, private, on-premises infrastructure, such as vSphere, Nutanix, & OpenStack, or across multiple cloud accounts
- The Cloud Agent is an x86-based Golang binary
- Deployable on bare metal, in a VM, as a Docker container, or in a Kubernetes cluster



Architecture

- No inbound public internet connectivity is required
- Supports cloud provider IAM systems for security credentials on demand
- Supports multi account, multi-environment strategy



Requirements

Supported Platforms

- Baremetal
- Docker
- Kubernetes (K8S)
- VMware VM
- AWS EC2 VM, EKS, ECS, Fargate EKS, Fargate ECS
- Azure VM, Container Service, AKS
- GCP Compute Engine VM, GKE

Hardware Requirements

- x86-based Linux host
- 2 GB of RAM
- 4 GB of disk space

Networking Requirements

- Public Egress, outbound network connections to app.terraform.io over HTTPS (443)
- Terraform Cloud IP Ranges

Agents

An agent pool represents a group of agents that can be used to allow Terraform Cloud to communicate with isolated, private, or on-premises infrastructure. Each agent pool has its own set of tokens which are not shared across pools. When a workspace is configured to execute runs using agents, any available agent in that workspace's associated agent pool is eligible to complete the run.
Read more in our documentation.

Create your first agent pool

Agents and agent tokens are organized into agent pools, and cannot be shared among multiple agent pools. Once an agent pool is created, you can generate an agent token to allow your agents to securely communicate with Terraform Cloud.

Create agent pool

Learn more about Terraform Agents

Create an agent pool

1 Name agent pool

2 Token management

An agent pool represents a group of agents that can be used to allow Terraform Cloud to communicate with isolated, private, or on-premises infrastructure. When a workspace is configured to execute runs using agents, any available agent in that workspace's associated agent pool is eligible to complete the run. Learn more about agents and agent pools

Agent pool names must be unique, and will be used by workspace administrators when linking workspaces to a specific agent pool.

Agent Pool Name

Dashes, underscores, and alphanumeric characters are permitted.

Cancel

Continue

Create an agent pool

Name agent pool

2 Token management

Token management

Each agent pool has its own set of tokens which are not shared across pools. These tokens allow agents to communicate securely with Terraform Cloud.

Configure your initial tokens for **test** below. Tokens can be created and revoked tokens later, as well.

Tokens

Token description	Created	Last used
No tokens to display		

Add a new token

Choose a description to help you identify this token later.

Description

e.g. us-west-01-token

Create token

Cancel Finish

Token created

Your new agent token, **test**, is displayed below.

```
U2VABqmFKk7UOw.atlasv1.4KqCoYqe5AqpDvFOTsDVPfwaOWS3x4ECsvUCkB6oyFy6KgZLW4ZD5txSae3E0mk1S3o
```

Warning
This token **will not be displayed again**, so make sure to save it to a safe place.

Set up your agents

Connect to your Docker host and set the following environment variables. `TFC_AGENT_NAME` is optional.

```
$ export TFC_AGENT_TOKEN=U2VABqmFKk7UOw.atlasv1.4KqCoYqe5AqpDvFOTsDVPfwaOWS3x4ECsvUCkB6oyF
y6KgZLW4ZD5txSae3E0mk1S3o
$ export TFC_AGENT_NAME=<my_agent_name>
```

Once the environment is configured, run the Docker container with the following command **or** download the agent file.

```
$ docker run -e TFC_AGENT_TOKEN -e TFC_AGENT_NAME hashicorp/tfc-agent:latest
```

Read more in our documentation.

Cancel | Finish

Resources: Cloud Agent

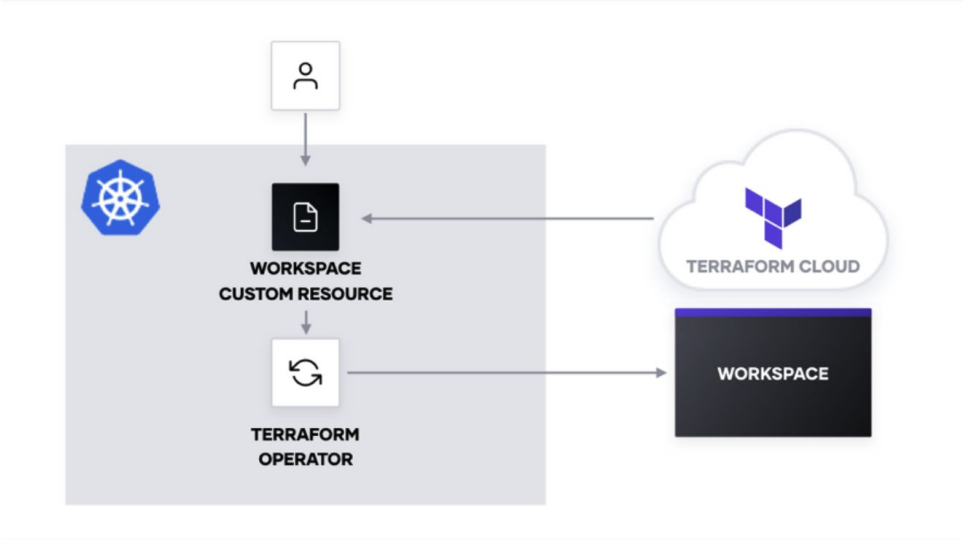
- Releases
- Docker container
- Terraform module for Kubernetes deployment
- HashiCorp Blog - Introduction to Terraform Cloud Agents
- Manage Private Environments with Terraform Cloud Agents

02

Kubernetes Integration

Terraform integration with K8s

Terraform Cloud customers can integrate with Kubernetes to provision infrastructure directly from the K8s control plane. By using the **Terraform Cloud Operator** for Kubernetes to provision infrastructure, you can dynamically create TFC workspaces and variables directly from the K8s control plane.



Use-case

1. Manage the lifecycle of cloud and on-prem infrastructure through a single kubernetes custom resource
2. Provision and manage infra from any cloud provider and other Terraform providers to use them with your existing applications
3. Deploy and manage the Kubernetes resources in a single git repo, or directly from a module in the TF registry.

Steps to Install and Configure

1. Install terraform-k8s via Helm Chart
2. Create the namespace where you will deploy the operator, secrets and workspace resources.
3. Authenticate to TFC via Team API Token and insert it as a TF credentials
4. Create K8s secret named terraformmrc in the namespace. Reference the creds file in the namespace.
5. It is best practice to create a separate team for the operator with “Manage Workspaces” access.

Resources: Kubernetes

- Deployment Tutorial
- HashiCorp Blog - Creating Workspaces with the Operator
- Terraform Cloud Operator for Kubernetes
- Terraform Cloud Operator Helm Chart
- Syncing Kubernetes & Terraform Cloud Workspaces

03

ServiceNow Integration

Terraform Integration with ServiceNow

- The Terraform ServiceNow Service Catalog integration enables end-users to provision self-serve infrastructure via ServiceNow
- Connecting ServiceNow to Terraform Cloud lets users:
  - order Service Items
  - create workspaces
  - perform Terraform runs using prepared Terraform configurations hosted in VCS repositories
- Terraform ServiceNow Service Catalog Integration Setup Instructions

Workflow

Terraform Admin
Prepare an organization for use with the ServiceNow Catalog
Create a team that can manage workspaces in that organization
Create a Team API so the integration can use that team's permission
Retrieve the oAuth token ID's and repository identifiers for TFC to identify your VCS

ServiceNow Admin
Install the Terraform Integration application from the ServiceNow App Store
Connect the integration application with TFC
Add the Terraform Service Catalog to ServiceNow
Configure the VCS repositories in ServiceNow
Configure the Variable Sets for use with the VCS

04

Splunk Integration

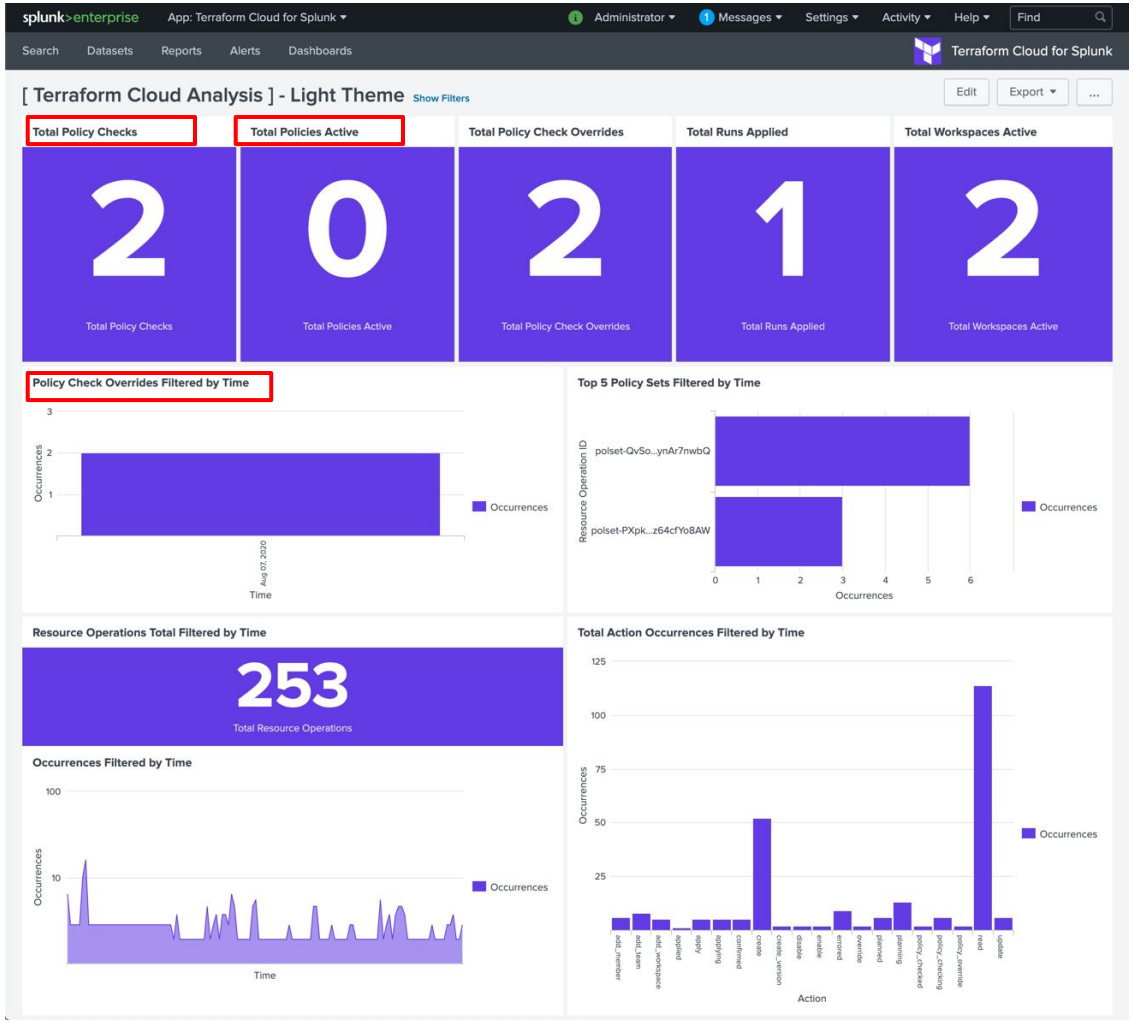
Splunk for Terraform

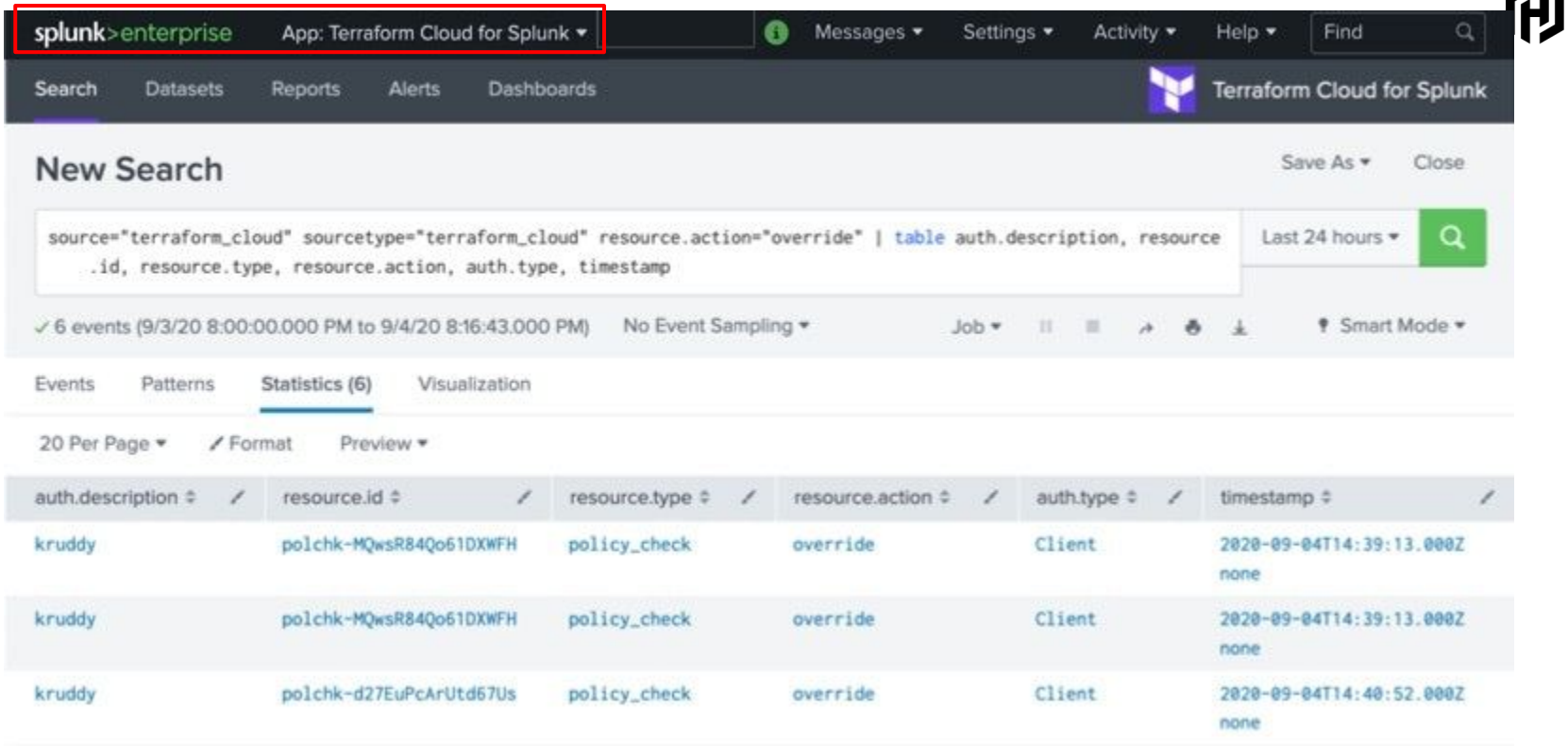
HashiCorp has an official Splunk Dashboard for ingestion of TFC Audit Logs

- Terraform Cloud retains 14 days of audit log information
- Connectivity to Splunk requires HTTPS outbound connectivity to the TFC API

Network Requirements:

Hostname	Port/Protocol	Directionality	Purpose
app.terraform.io	tcp/443, HTTPS	Outbound	Polling for new audit log events via the TFC API


splunk>enterprise
App: Terraform Cloud for Splunk
Administrator
Messages
Settings
Activity
Help
Find
Search
Datasets
Reports
Alerts
Dashboards
Terraform Cloud for Splunk
[Terraform Cloud Analysis] - Light Theme
Show Filters
Edit
Export
...
Total Policy Checks
2
Total Policy Checks
Total Policies Active
0
Total Policies Active
Total Policy Check Overrides
2
Total Policy Check Overrides
Total Runs Applied
1
Total Runs Applied
Total Workspaces Active
2
Total Workspaces Active
Policy Check Overrides Filtered by Time
Occurrences
Aug 07 2020
Time
Top 5 Policy Sets Filtered by Time
Resource Operation ID
polset-QvSo...ynAr7nwbQ
polset-PXpk...z64cfYo8AW
Occurrences
Resource Operations Total Filtered by Time
253
Total Resource Operations
Occurrences Filtered by Time
Time
Total Action Occurrences Filtered by Time
Action


splunk>enterprise
App: Terraform Cloud for Splunk
Messages
Settings
Activity
Help
Find
Search
Datasets
Reports
Alerts
Dashboards
Terraform Cloud for Splunk
New Search
Save As
Close
source="terraform_cloud" sourcetype="terraform_cloud" resource.action="override" | table auth.description, resource.id, resource.type, resource.action, auth.type, timestamp
Last 24 hours
✓ 6 events (9/3/20 8:00:00.000 PM to 9/4/20 8:16:43.000 PM)
No Event Sampling
Job
Smart Mode
Events
Patterns
Statistics (6)
Visualization
20 Per Page
Format
Preview
auth.description
resource.id
resource.type
resource.action
auth.type
timestamp
kruddy
polchk-MQwsR84Qo61DXWFH
policy_check
override
Client
2020-09-04T14:39:13.000Z
none
kruddy
polchk-MQwsR84Qo61DXWFH
policy_check
override
Client
2020-09-04T14:39:13.000Z
none
kruddy
polchk-d27EuPcArUtd67Us
policy_check
override
Client
2020-09-04T14:40:52.000Z
none

Resources: Splunk

- Splunkbase: Terraform Cloud for Splunk
- HashiCorp Blog: Audit Logging with Splunk
- Terraform Installation Documentation
- Splunk Installation Documentation

05

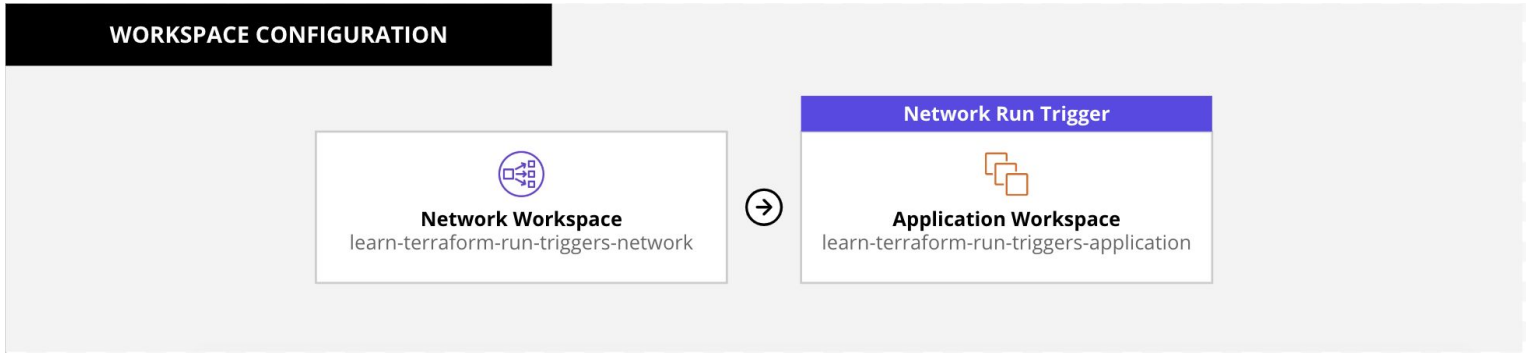
Run Triggers

Run Triggers

- Create infrastructure pipelines in TFCB
- Allow teams to manage complex infrastructure in TFCB by creating infrastructure pipelines between multiple workspaces
- When a source workspace is selected, multiple dependent workspaces can be linked
- When a successful apply is executed in the source workspace, the dependent workspaces have runs triggered and can be configured to auto-apply their configurations

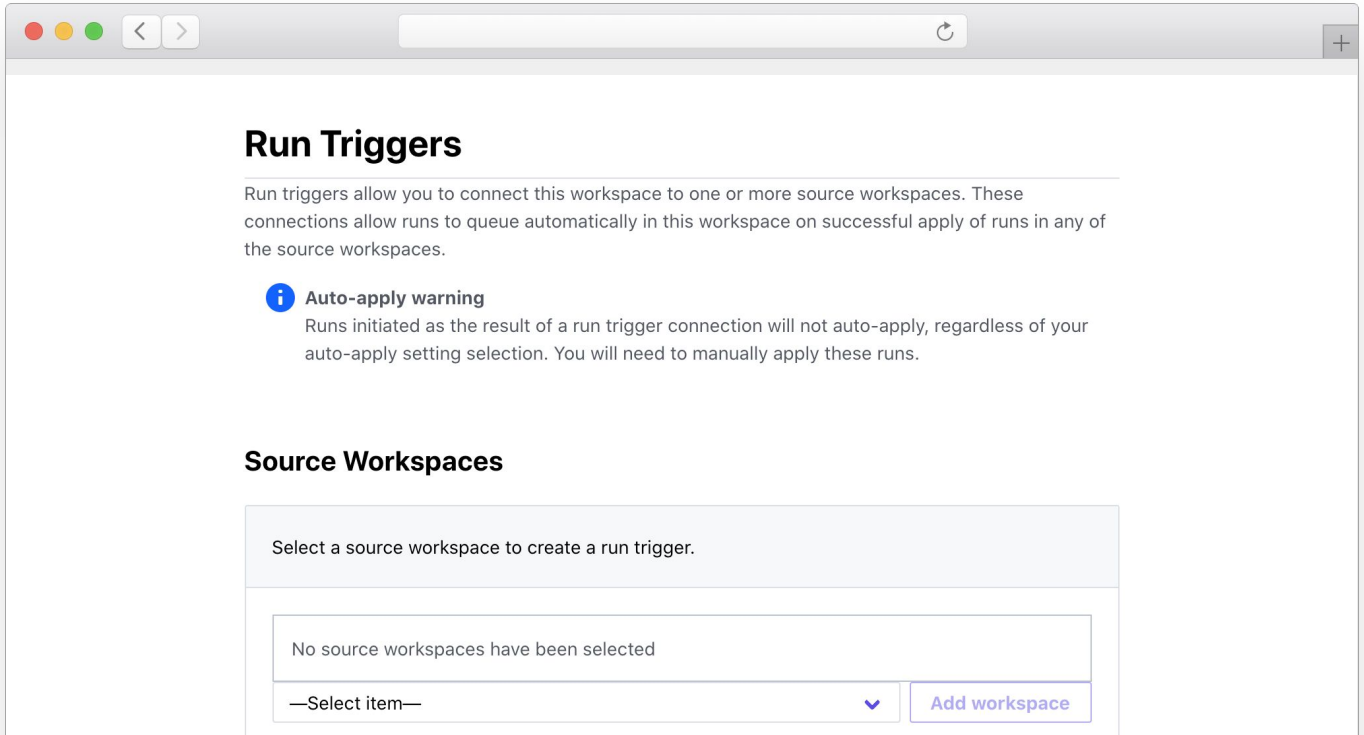
Use-case - Application Configuration Management

Run triggers automatically trigger updates to application configuration to rebalance servers across new subnets once they are successfully provisioned in the network workspace



Create Run Triggers

Workspace Settings → Run Triggers → Select Source Workspace



Resources: Run Triggers

- Tutorial: Connect Workspaces with Run Triggers
- Run Triggers Documentation
- Terraform Registry - tfe_run_trigger

06

Run Notifications

Run Notifications

- Run Notifications send updates/notifications to external services with details on run progress
- Notifications can be sent to up to 20 destinations
- Each workspace can be configured with it’s own notification settings
- Can send either POST message to any URL via webhook, email message, or sent to Slack & post updates in channels

Notification Triggers

	Trigger	Description
Created	“run:created”	When a run is created and enters the "Pending" state.
Planning	“run:planning”	When a run acquires the lock and starts to execute.
Needs Attention	“run:needs_attention”	Human decision required. When a plan has changes and is not auto-applied, or requires a policy override.
Applying	“run:applying”	When a run begins the apply stage, after a plan is confirmed or auto-applied.
Completed	“run:completed”	When the run has completed on a happy path and can't go any further.
Errored	“run:errored”	When the run has terminated early due to error or cancellation.

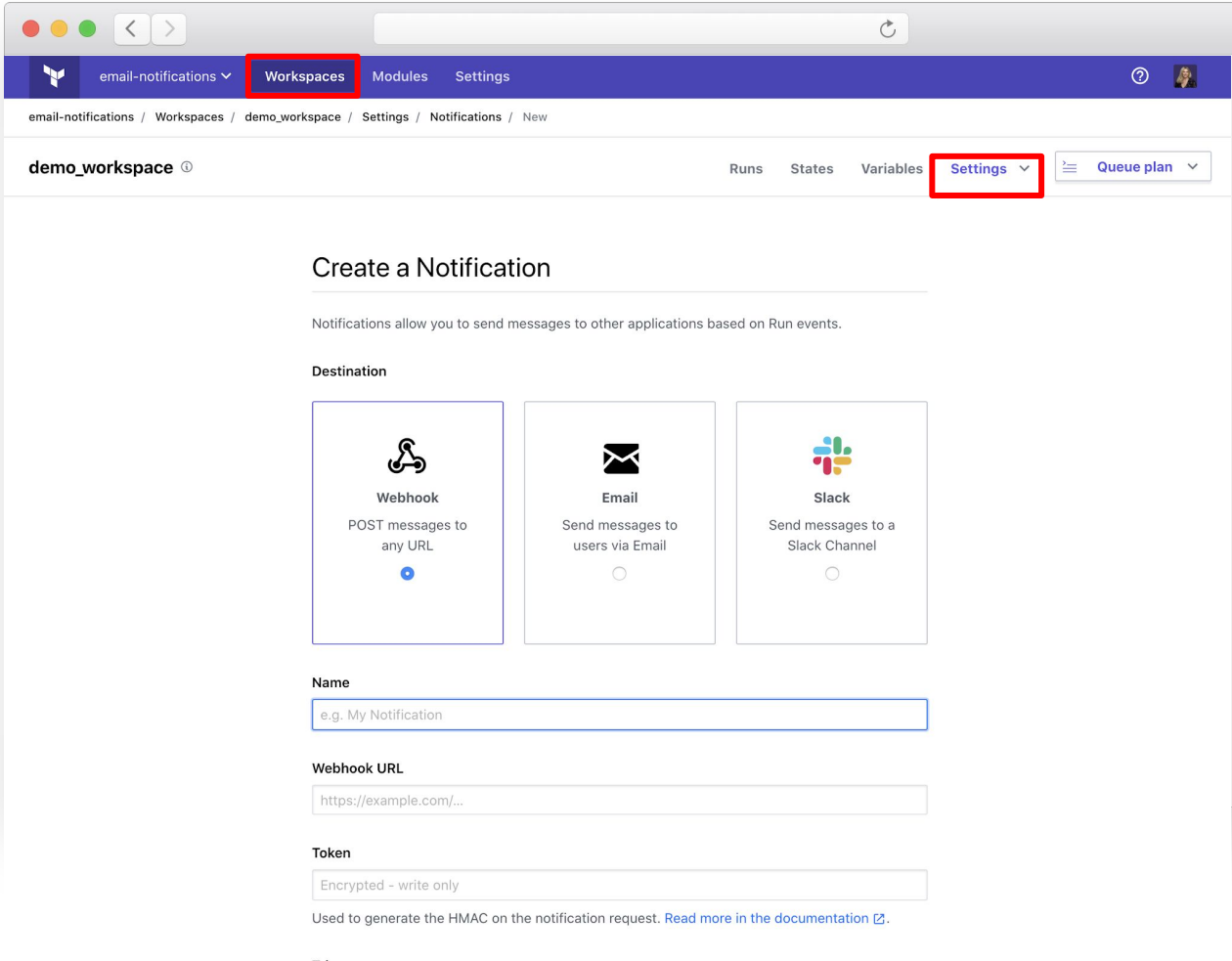
Sample Notification Payload

CODE EDITOR

```
{
  "payload_version": 1,
  "notification_configuration_id": "nc-AeUQ2zfKZzW9TiGZ",
  "run_url":
"https://app.terraform.io/app/acme-org/my-workspace/runs/run-FwnENkvDnrpyFC7M",
  "run_id": "run-FwnENkvDnrpyFC7M",
  "run_message": "Add five new queue workers",
  "run_created_at": "2019-01-25T18:34:00.000Z",
  "run_created_by": "sample-user",
  "workspace_id": "ws-XdeUVMWShTesDMME",
  "workspace_name": "my-workspace",
  "organization_name": "acme-org",
  "notifications": [
    {
      "message": "Run Canceled",
      "trigger": "run:errored",
      "run_status": "canceled",
      "run_updated_at": "2019-01-25T18:37:04.000Z",
      "run_updated_by": "sample-user"
    }
  ]
```

Create Notification Trigger

Workspace → Settings → Notifications



Resources: Run Notifications

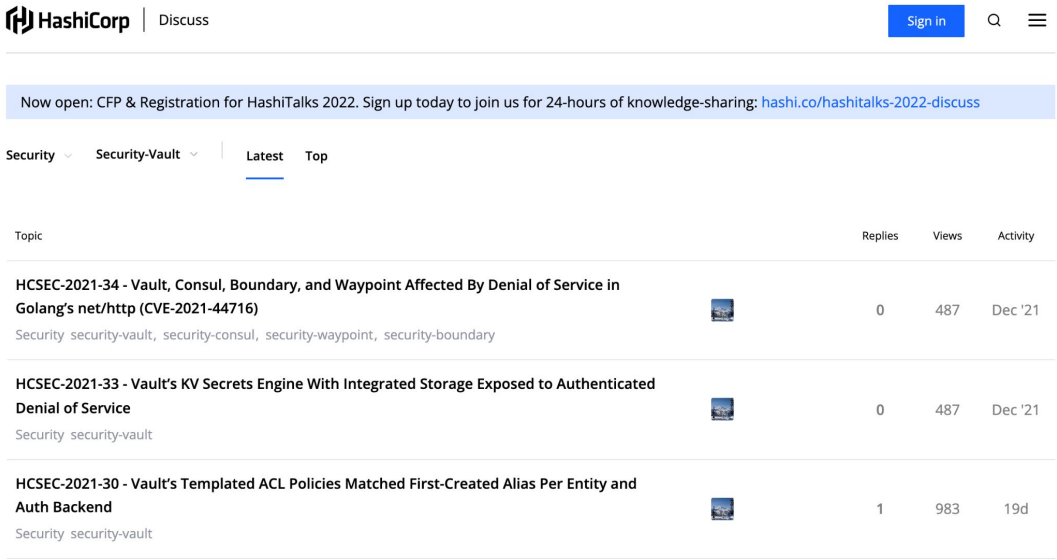
- Documentation: Run Notifications
- Notification Configurations API
- Terraform Registry - tfe_notification_configuration

07

Terraform Cloud Production Readiness

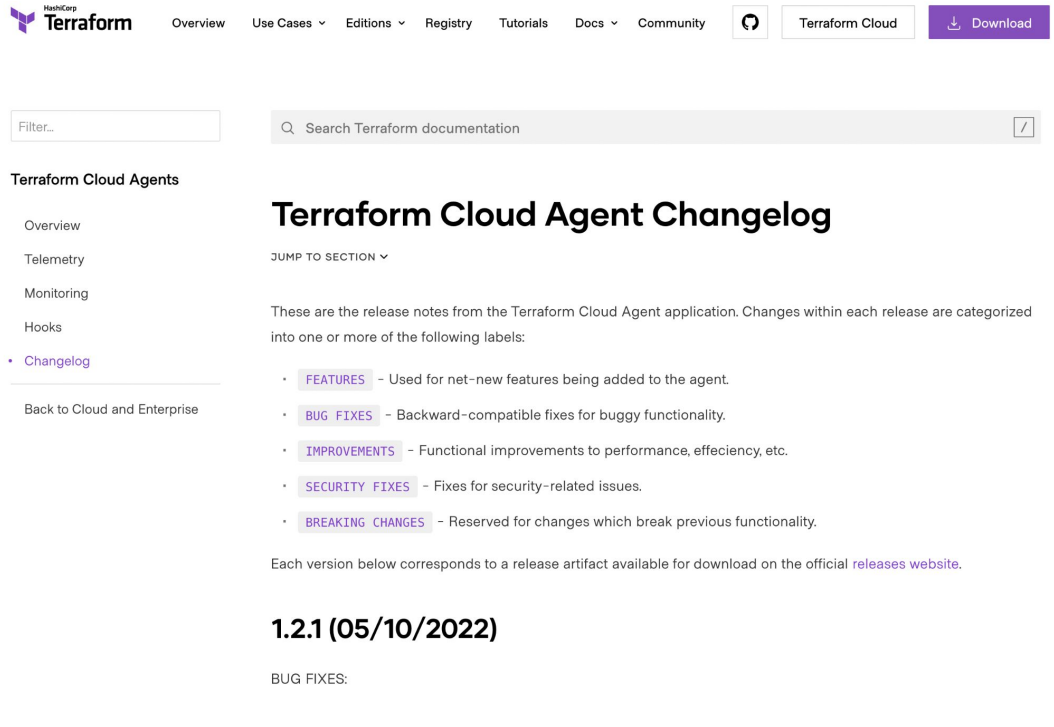
Production Readiness

- Join security & vulnerability announcements list
  https://discuss.hashicorp.com/c/security/52



Production Readiness

Bookmark the Terraform Cloud Agent Changelog
https://www.terraform.io/cloud-docs/agents/changelog



Production Readiness

- Determine key workflows for teams
  - API, CLI, or VCS driven
- SSO and/or MFA configured
- VCS repo standard current and future
- Minimum Terraform code version established
- Internal consumption and training plan created

08

Post-Program Support

TFCB Onboarding Journey Content

- AMER Terraform Cloud June '22 Program Kickoff - password: u7d2gZjq39
- Terraform Cloud Onboarding Workflows June 22' - password: a7d2gZjq44
- Terraform Cloud Onboarding Program Governance June '22 - password:P8ajf3uQ
- AMER TFCB Integrations and Program Closing June 22' - password: C7d2gZjq39

All program materials

TFCB Onboarding Journey Content

Custom Learn Collections

- Week 1 - Learn the Terraform Programming Language
- Week 2 - TFCB basics and an introduction to Infrastructure as Code
- Week 3 - Explore the basics of TFCB and learn how to collaborate on infrastructure with Terraform Cloud
- Week 4 - Use Cases
- Week 5 - Modules, Workspaces, Runs, Git Repo Structure
- Week 6 - Terraform Workspaces, VCS, and Terraform State
- Week 7 - Cloud Agents, Single-sign On (SSO), Role-Based Access Control (RBAC), Sentinel, and Audit Logging

Recommended additional resources

We strongly urge you to subscribe to the Terraform Cloud status web page, this can be done here

https://status.hashicorp.com/

Support will continue to be your resource for resolving technical challenges

support.hashicorp.com

Additional Training Resources

Wanting to Learn More? A Topic Not Covered? See these

- **Developer.hashicorp.com/terraform/tutorials**
  Tutorials on just about everything

- **HashiCorp Events**- https://www.hashicorp.com/events?type=all
  Great place for find HashiCorp events, conferences, webinars

- **HashiCorp User Groups (HUGs)** - https://www.meetup.com/pro/hugs/
  With over 50 countries, and 155 user groups, find a HUG located near you

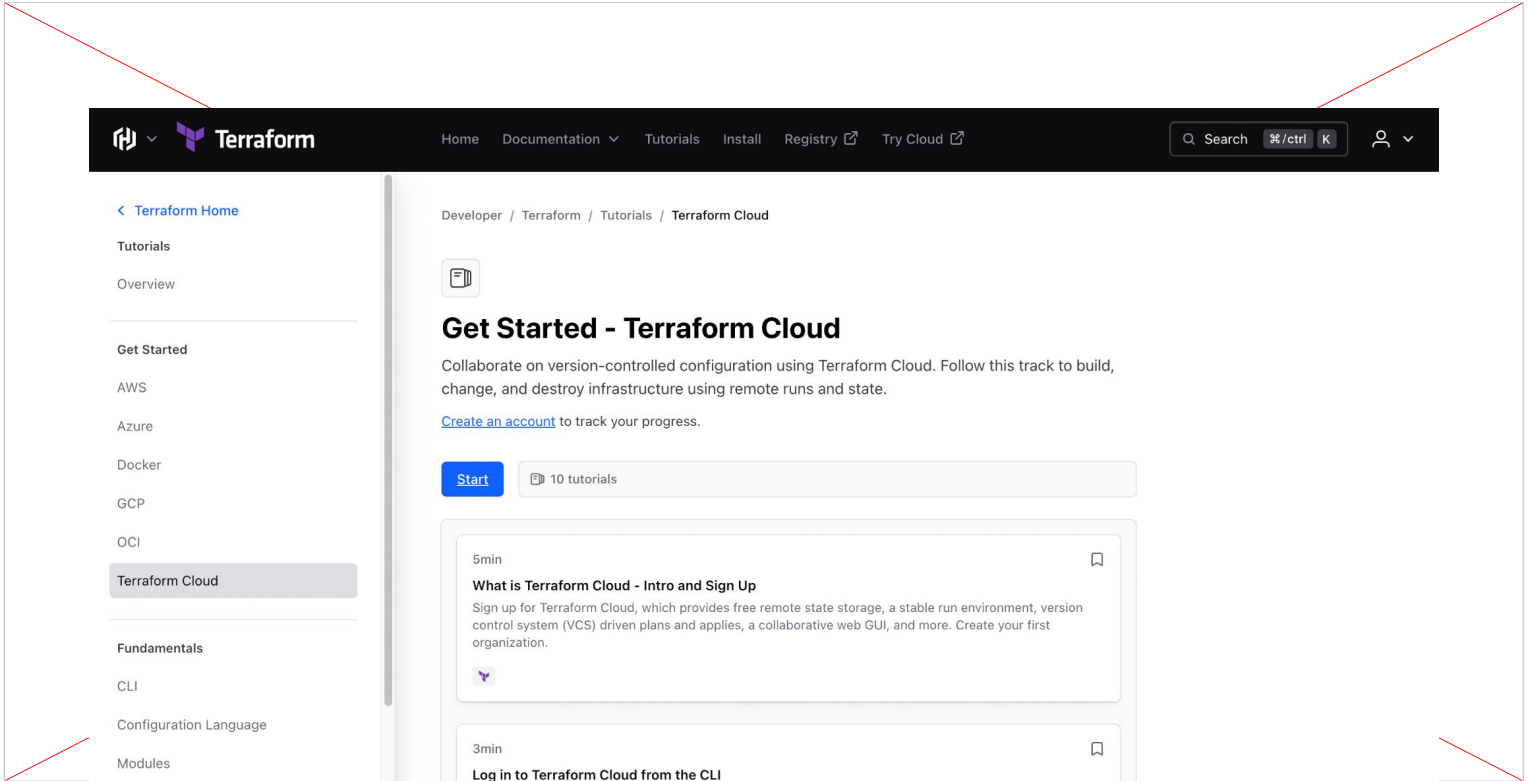
- **HashiCorp Terraform Certification**
  Even if you don't want the certification, the Study Guide is a relevant and useful curriculum to follow especially for team members new to Terraform

- **HashiCorp Instruqt Labs**
  Want more hands-on experience? Visit our Instruqt page
  https://play.instruqt.com/hashicorp

Tutorials

https://developer.hashicorp.com/terraform/tutorials

Step-by-step guides to accelerate deployment of Terraform Cloud



Need Additional Help?

Customer Success

Contact our Customer Success Management team with any questions. We will help coordinate the right resources for you to get your questions answered.

customer.success@hashicorp.com

Discuss

Engage with the HashiCorp Cloud community including HashiCorp Architects and Engineers

discuss.hashicorp.com

Technical Support

Something not working quite right? Engage with HashiCorp Technical Support by opening a ticket for your issue at support.hashicorp.com.

HashiCorp Academy

Terraform Enterprise Academy classes are virtual and delivered by a live instructor with in-depth Terraform knowledge and implementation expertise.

Academy courses include a sandbox environment for hand-on experience in the 10 labs throughout the 3-day course.

Thank You

customer.success@hashicorp.com
www.hashicorp.com/customer-success