HashiCorp Terraform

Terraform Cloud Onboarding Program

Agenda

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Code of Conduct

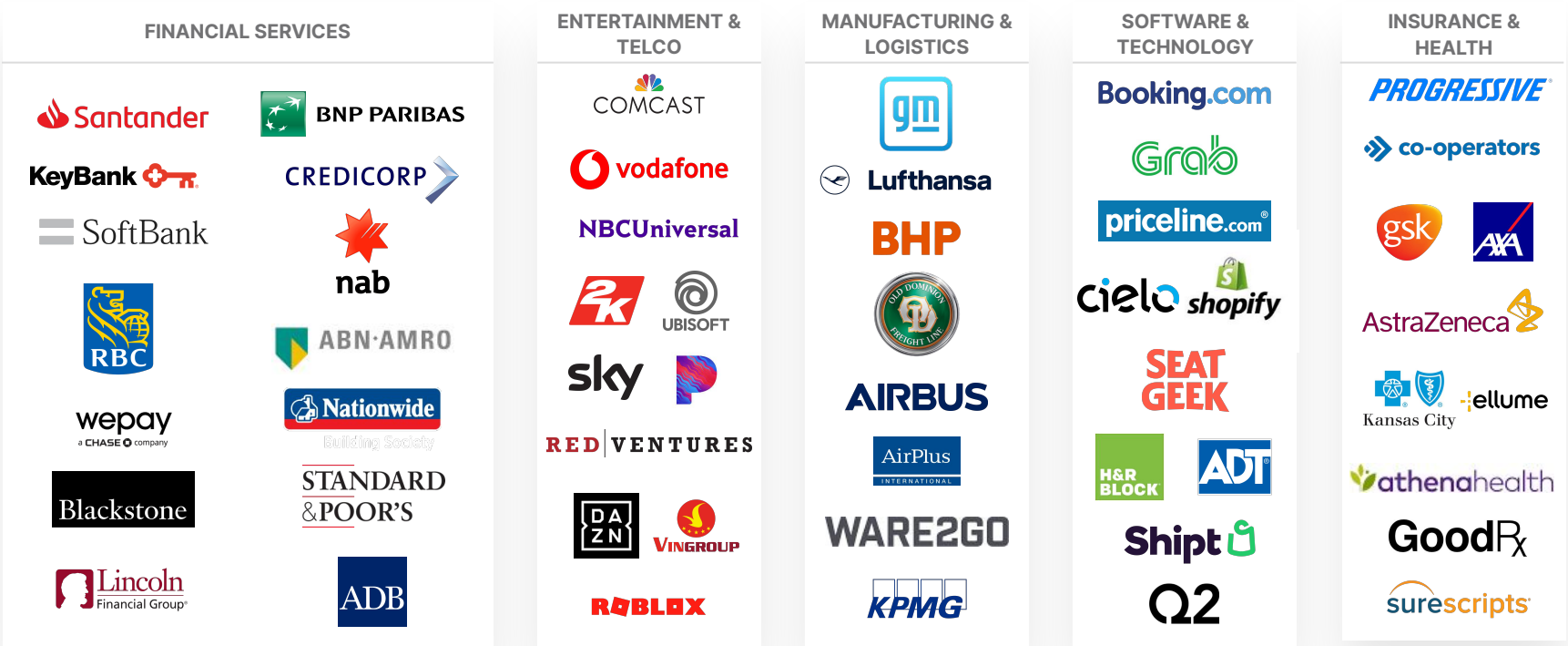
HashiCorp is dedicated to providing a harassment-free Terraform Cloud OnBoarding experience for everyone, regardless of gender, gender identity, sexual orientation, disability, physical appearance, body size, race, national origin, or religion. We value your attendance and do not wish anyone to feel uncomfortable or threatened at any time.

The bottom line is that we do not tolerate harassment of conference participants in any form. Harassment includes but is not limited to offensive verbal comments related to gender, gender identity, sexual orientation, disability, physical appearance, body size, race, national origin, religion; sexual or inappropriate images in public spaces; deliberate intimidation; stalking; trolling; sustained disruption of talks or other events; and unwelcome sexual attention. Participants asked to stop any harassing behavior are expected to comply immediately. If you are being harassed, notice that someone else is being harassed, or have any other concerns, please let the HashiCorp event representative know immediately or email customer.success@hashicorp.com.

01

Customer Success Overview

HashiCorp Customers



What You Can Expect from CS

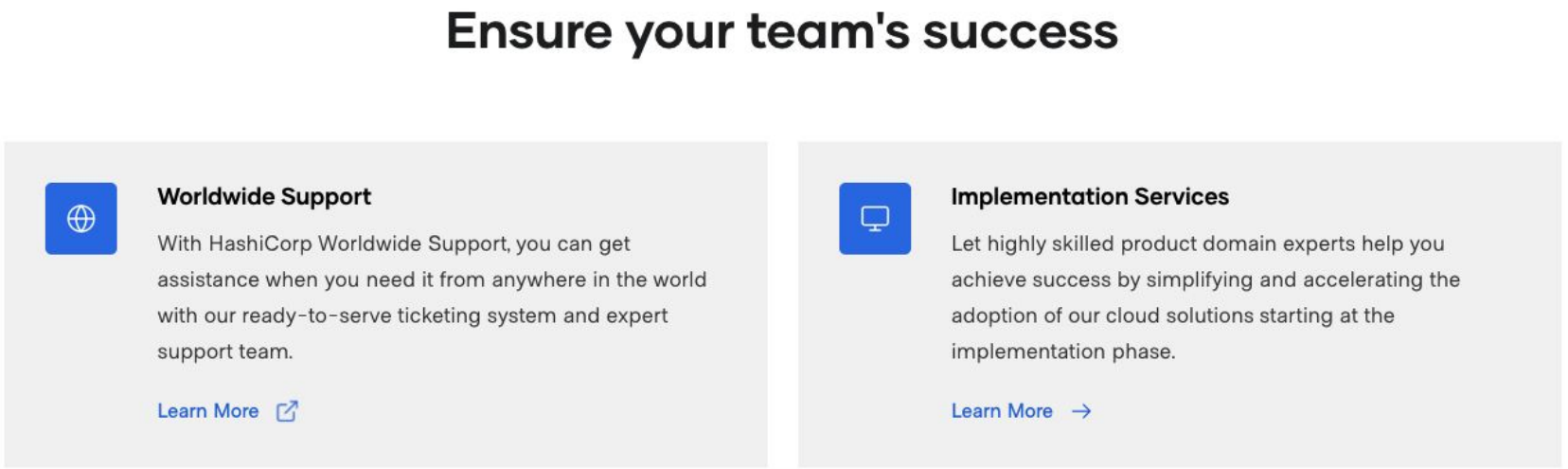
Customer Success Manager (CSM)
Account & Success Management

- Providing a community-based onboarding program designed to get you up and running quickly
- Facilitating sessions to keep your team current with HashiCorp technology
- Joint discovery of objectives and success criteria
- Your customer advocate within HashiCorp

Solutions Architecture Specialist (SA)
Technical Success & Advisory

- Technical resource for the onboarding process
- Providing product reference architecture information for better decision-making
- Thought leadership on best practices of product architecture and use-case patterns
- Timely education and enablement from a technical perspective

Other Resources Available to You



Further information located at http://hashicorp.com/customer-success

02

TFCB Onboarding Program

Customer Responsibilities

These are critical for your onboarding success

Training Consumption

Ensure team members attend workshops, training

Use Case Guidance

Provide timely information on your intended use cases

Project Team Participation

Inclusive of any stakeholder required for successful completion of your onboarding

Single Point of Contact

Main contact for decision making

Escalation Process

Understanding of escalation process

Surveys Responses

Provide timely responses to surveys

Onboarding Checklist

Terraform Cloud Configured

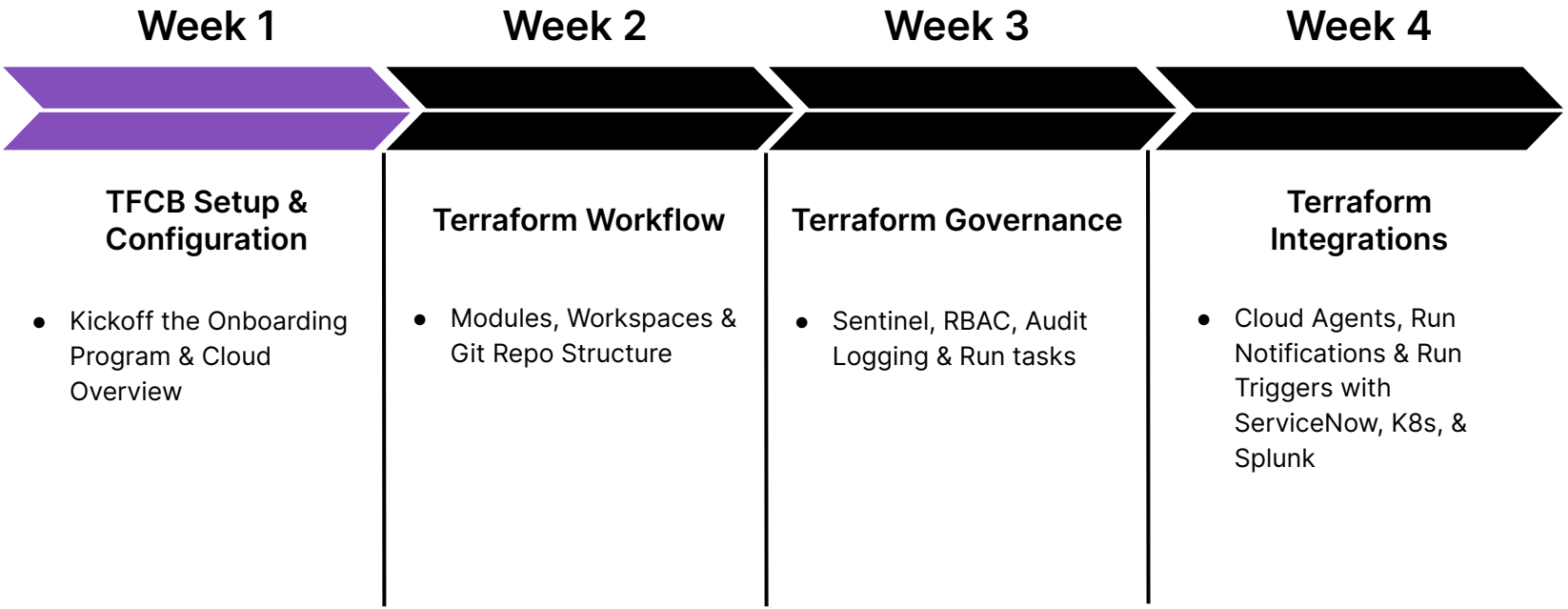
- Terraform Organization created
- Terraform workspaces configured to at least 1 workflow (i.e.: API,CLI,VCS or UI)
- Standardize deployments using modules and private registry
- Enforce policy across workspaces

Terraform Cloud Adoption

- Getting the first use case (team/service/application) onboarded and consuming Terraform Cloud
- A roadmap created for onboarding additional use cases and validated with a HashiCorp CSM

Completed within 30 days

TFCB Path to Production



03

Customer Support

Support Levels

This info can also be accessed from our [Support SLA Page]

		BRONZE	SILVER	GOLD
Hours of availability		N/A	9-5, Monday - Friday US PACIFIC TIME EUROPEAN CENTRAL TIME AUSTRALIA EASTERN TIME INDIA STANDARD TIME	24 X 7 (SEV-1 URGENT)
SEVERITY 1 Urgent	FIRST RESPONSE	N/A	4 business hours*	60 minutes
	UPDATE FREQUENCY	N/A	8 business hours*	4 hours
SEVERITY 2 High	FIRST RESPONSE	N/A	8 business hours	4 business hours
	UPDATE FREQUENCY	N/A	2 business days	8 business hours
SEVERITY 3 Normal	FIRST RESPONSE	N/A	24 business hours	8 business hours
	UPDATE FREQUENCY	N/A	5 business days	3 business days
SEVERITY 4 Low	FIRST RESPONSE	24 business hours	24 business hours	24 business hours
	UPDATE FREQUENCY	Reasonable best effort	Reasonable best effort	Reasonable best effort
Technical contacts allowed		2	3	4

* Clock hours for HCP Cluster down and TFC Stuck Runs

Severity Definitions

Sev-1 (Urgent)	A Sev-1 incident is an operational outage as defined below: Any error reported by customer where majority of the users for a particular part of the software are affected, the error has high visibility, **there is no workaround**, and **it affects the customer's ability to perform its business**.
Sev-2 (High)	Any error reported by customer where the majority of the users for a particular part of the software are affected, the error has high visibility, **a workaround is available**; however, **performance may be degraded or functions limited and it is affecting revenue**.
Sev-3 (Normal)	Any error reported by customer where the majority of the users for a particular part of the software are affected, the error has high visibility, a workaround is available; however, performance may be degraded or functions limited and it is NOT affecting revenue.
Sev-4 (Low)	Any error reported by customer where a single user is severely affected or completely inoperable or a small percentage of users are moderately affected or partially inoperable and the error has limited business impact.

For reference only - Subject to Change
Current info can also be accessed at the bottom of our Support SLA Page

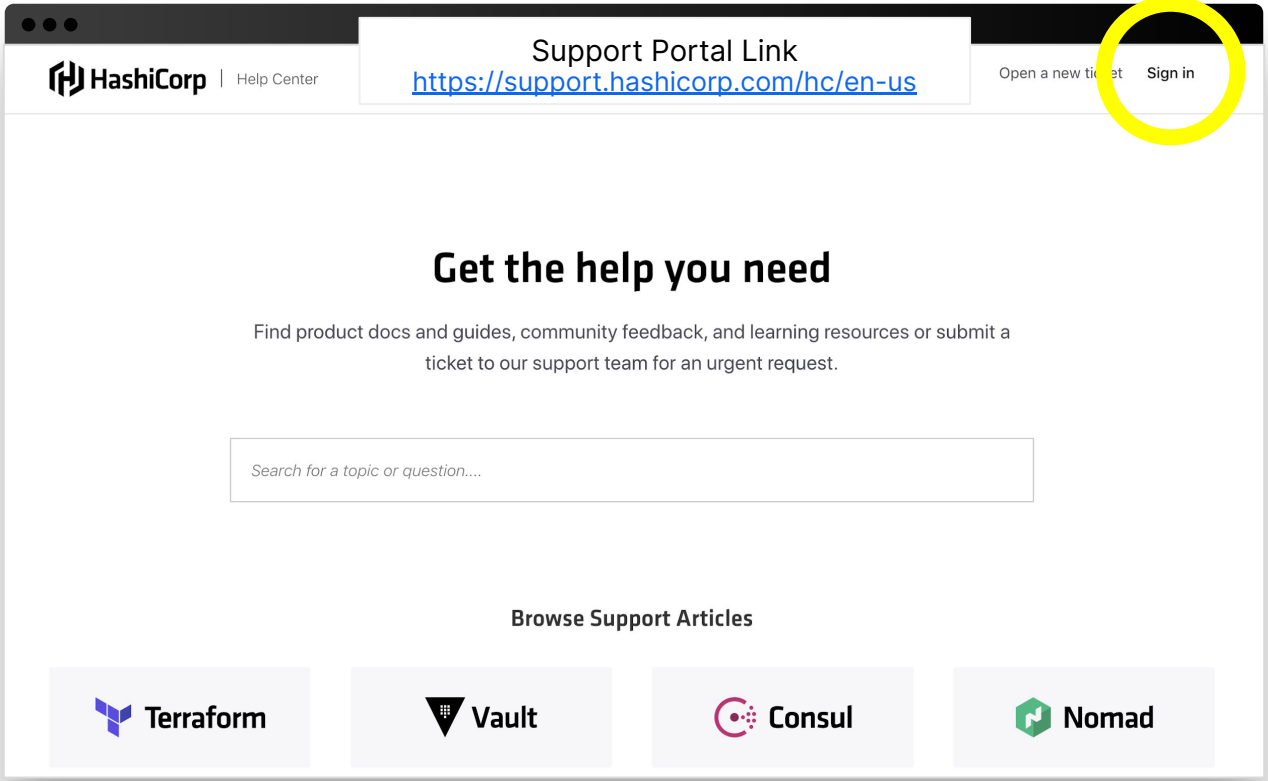
Contacting Support

There are two ways to contact our support team:

1. **Support Portal**: Open a ticket through our support portal
   - Once customer access is setup, authorized users can submit a ticket using the email address they provided us
   - The portal provides faster routing via product and sub-product selection, the ability to send encrypted attachments, and set ticket priority
2. **Email Support**: Send an email to support@hashicorp.com
   - All emailed support tickets default to “normal” priority - and cannot be changed
   - Do not raise a SEV-1 over email, please use the support portal

Support Portal

Authorized technical contacts can log in through the “Sign in” button



Interacting with HashiCorp Support

Terraform - Best Practices

When submitting a ticket, provide as much detail as possible...

Terraform Cloud Specific	
Organization Name & Workspace Name	• Name of your organization in Terraform Cloud and the name of the workspace you are working with directly.
Run ID	• The ID for the run you are working with. (e.g. #run-XXX1234)
Run Errors	• Provide debug logs by setting `TF_LOG` environment variable.
Terraform CLI Version	• Terraform version can be found within Workspace settings • If using Terraform CLI, the CLI version can be found using `terraform version`.

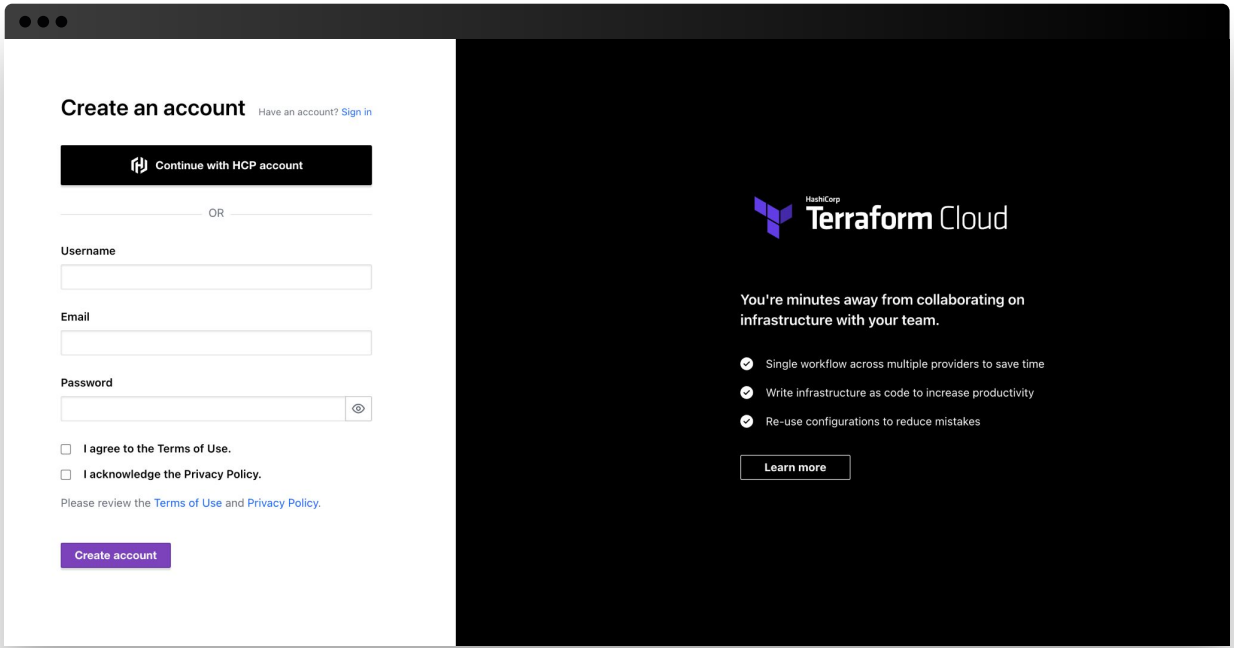
If using CLI, provide...
Operating System (version)
Platform Details (physical/virtual)
Cloud Provider(s)

04

Terraform Cloud for Business (TFCB) Getting Started

Terraform Cloud for Business

- Central platform running in the cloud, that HashiCorp manages for you
- Terraform was built to establish a Producer/Consumer model, to create a separation of duties across your ops and devs teams (covered in depth during Terraform Workflows webinar)



Terraform Cloud for Business

Terraform Cloud has a robust set of enterprise-ready features including:

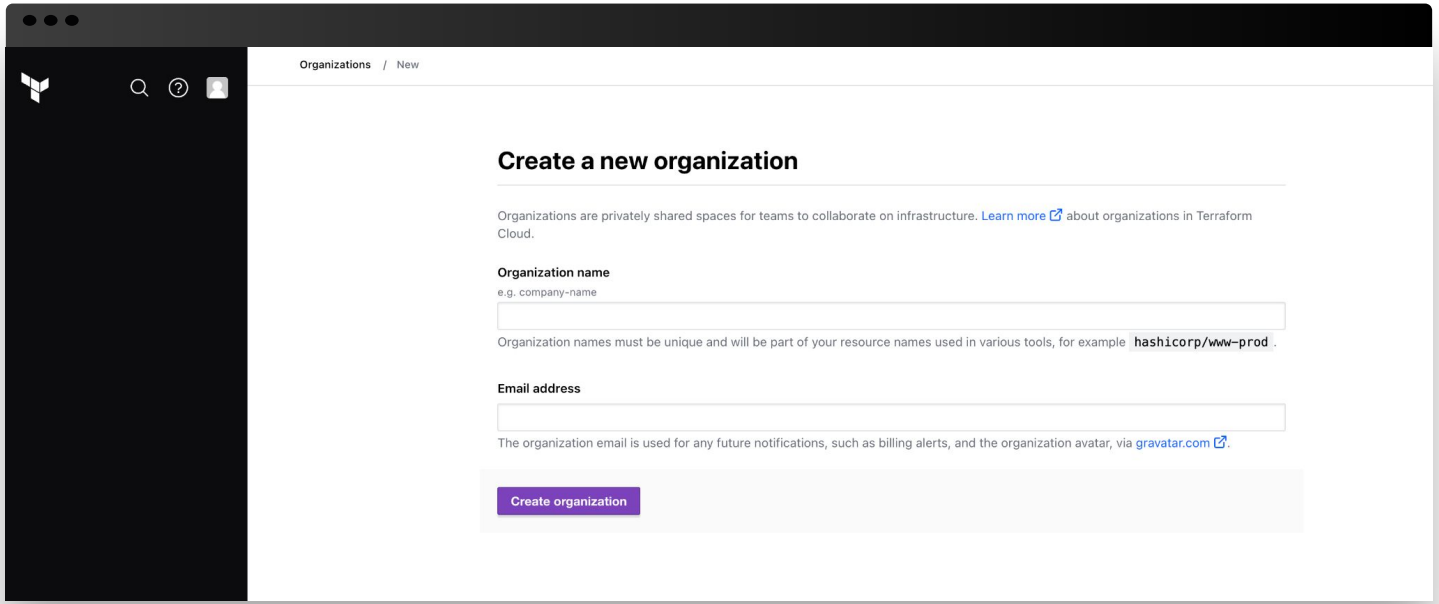
SSO, Teams, Users, Tokens, RBAC which are **a priority to set up** during our onboarding initiatives

VCS Connections, Private Module Registry, Workspaces, State Management, Variables to **facilitate collaboration** across your users and teams

Cost Estimation, Run Triggers, Run Tasks, Run Notifications, Policy as Code with Sentinel to **support governance and compliance** needs

Organizations

- Security boundary and shared space for teams to collaborate on workspaces
- Users can belong to multiple organizations, the UI allows users to self-select and operate in the organization they choose

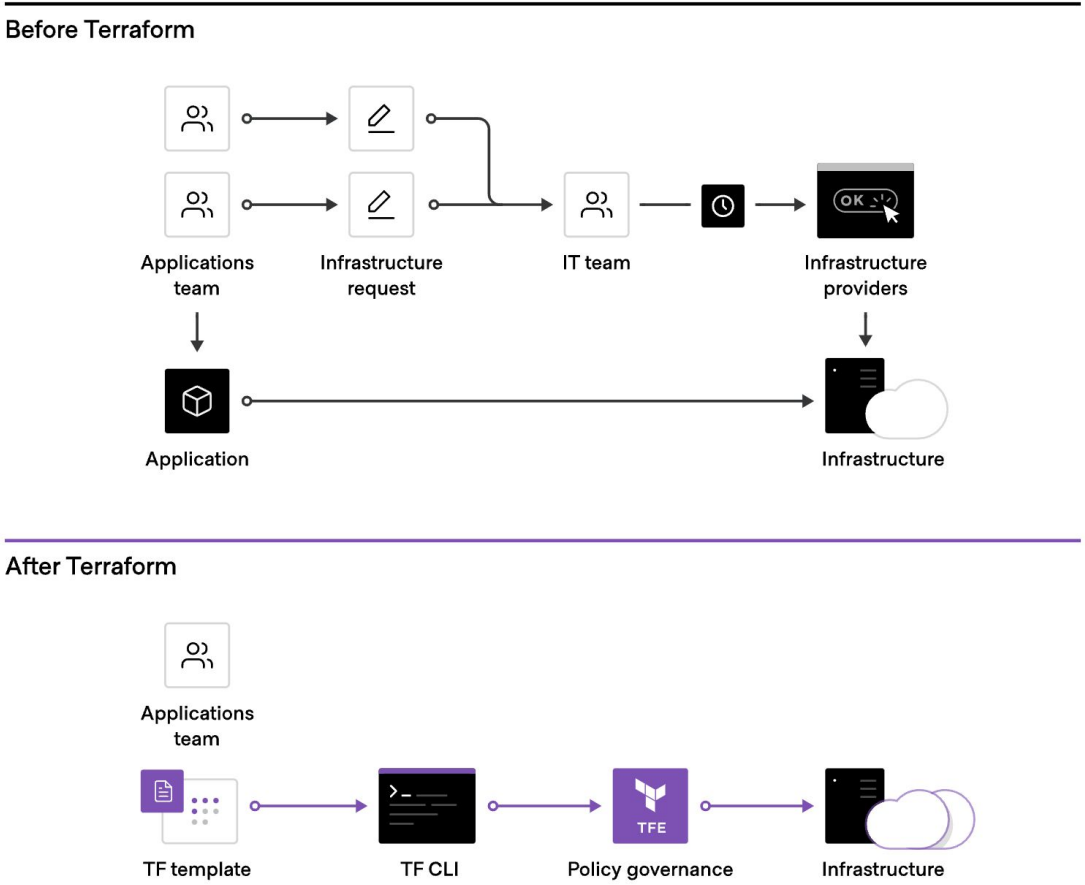


Organizations Components

- SSO Settings
- Teams
- Users
- API Tokens (Org, Teams, Users)
- VCS Provider / Git Connections
- Private Module Registry
- Workspaces (TF Code + Statefile)
- Variables, ENV Variables, CLI Flags
- SSH Keys
- Sentinel Policy Sets
- Cloud Agents

Teams

- Teams are groups of users within an organization that can be assigned to workspaces within the organization
- Teams can be assigned to multiple workspaces and have different permissions in each workspace



Teams + Organizations

- Teams can also be assigned organization-level permissions including:
  - Managing Policies
  - Manage Workspaces
  - Manage VCS Settings
- Each organization contains an Owners team which has all of the above permissions

Users

- Users in TFCB are members of Teams within Organizations
- When TFCB is not configured with an identity provider, users can self-register
- Users do not belong to any organization or workspaces until an owner of them has added them to a team

User Settings

Users can control these account level settings:

- Username
- Email
- Avatar
- Password
- Two Factor Authentication
- Multiple User API Tokens

Authentication Methods

Username/Password

- Default authentication method
- Allows users to self register
- Requires users to provide an email address and password

SAML SSO

- Direct integrations with Azure AD and Okta for single sign on are included
- TFCB can also integrate with your SAML capable identity provider

API Tokens

Once logged in, users can generate API token(s)

API tokens are necessary for:

- Auth with TFCB API
- Auth with TF remote backend for CLI runs
- Using private modules in command-line runs on local machine

SAML SSO

- TFCB supports integrating with SAML 2.0 compliant identity solutions
- Enabling SAML causes the login prompt to redirect users to the IDP for login and then redirects back to TFCB upon authentication
- Team membership mapping can be enabled so users are added to teams based on SAML attribute assertion

Identity Provider Guides
Azure Active Directory
Okta
SAML

Service Accounts

Team Service Accounts

- Designed to perform API operations on workspaces
- API token will have the same access and permissions as team
- Token is generated in the team page and can be used interactively

Organization Service Accounts

- Designed to create and configure workspaces and teams
- Not recommended to be used for all-purpose interface to TFCB
- Should be used for initial setup and delegation of workspace(s) to team(s)
- Team service account should be used for regular operations

Workspaces

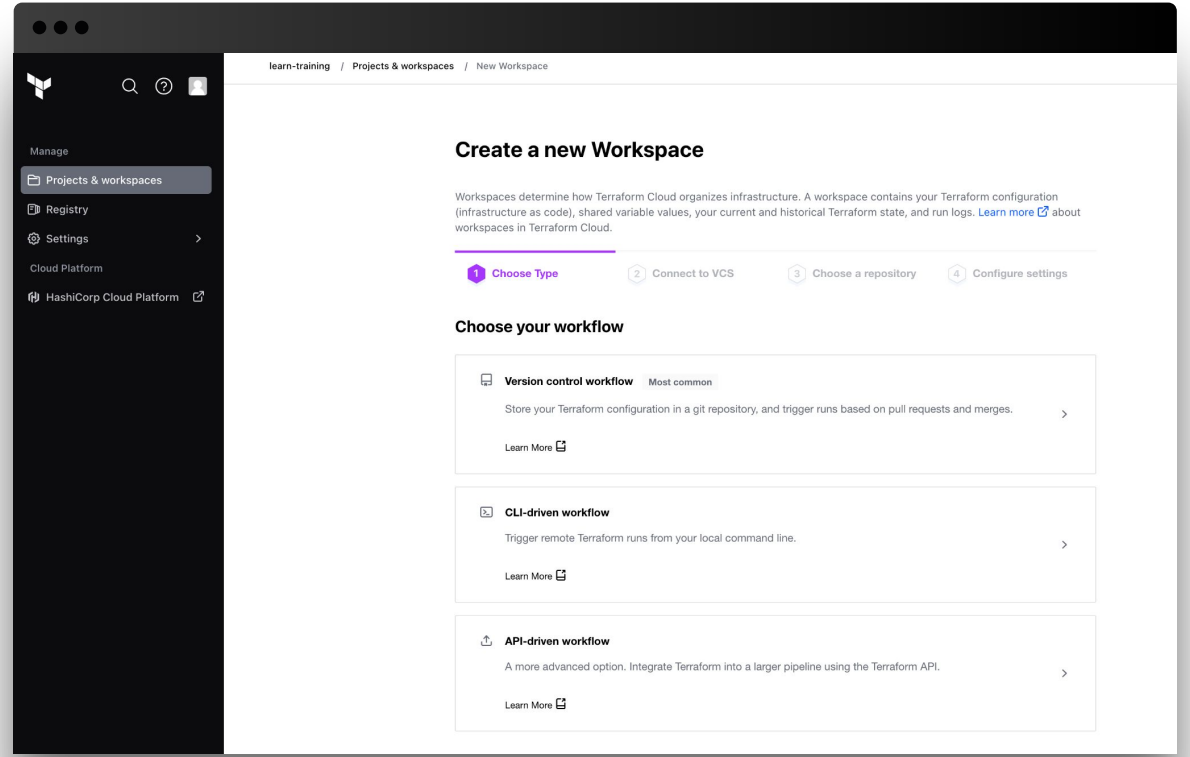
Workspaces consist of...

- Terraform Code, from a VCS Git Repo or uploaded as a .zip file to the API
- Variables (can be marked as Sensitive)
- Environment Variables
- Persistently stored TF Statefiles for cloud resources that are managed
- Historical TF Statefiles and Run logs

Workspaces

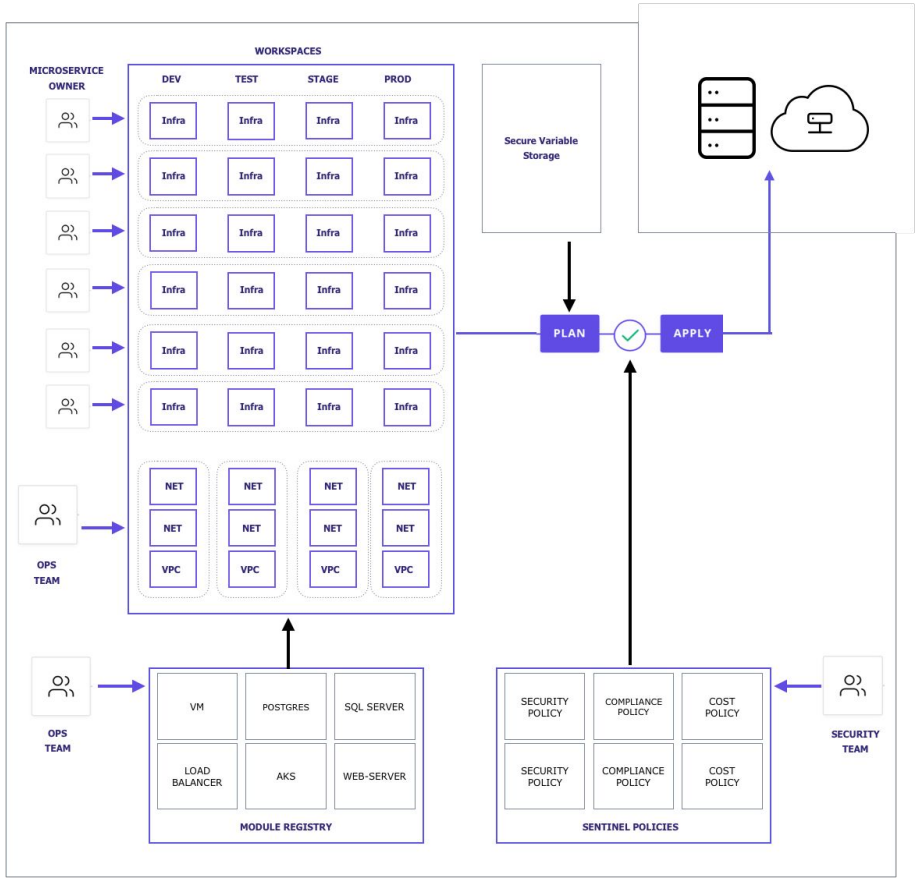
Workspaces can be run in the following ways:

1. Uploading a .zip file of TF code via the API
2. Connected to a Git Repository from your VCS provider and will monitor for changes using Git Webhooks

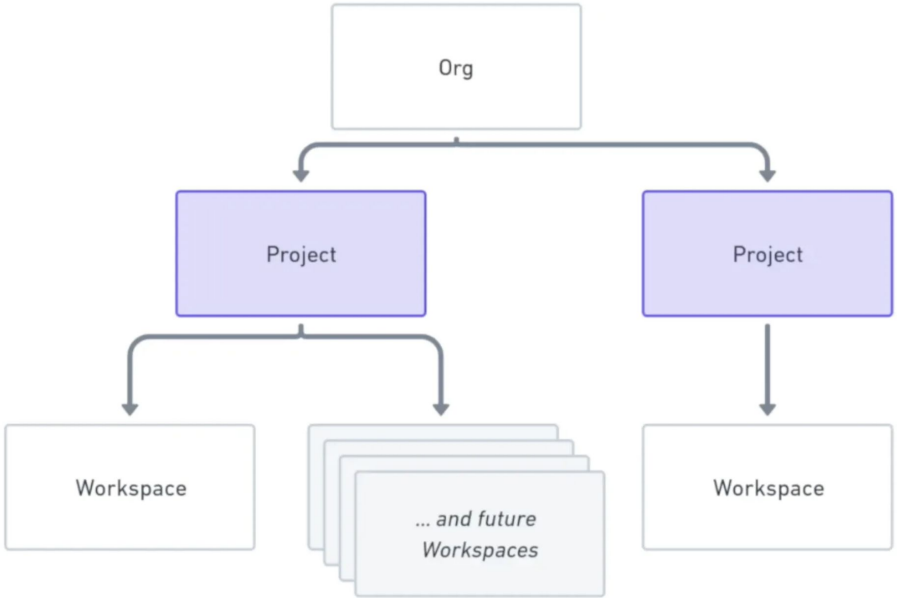


Workspaces

- Organize and decompose monolithic infrastructure into micro-infrastructures
- Match the organization of your application or teams with your infrastructure
- “Micro-infrastructures” are linked to create the complete infrastructure for the application



Projects



- Projects let you organize workspaces and scope access to workspace resources
- Each project has a separate permissions set which can be used to manage access to all workspaces in the project
- Project-level permissions
  - More granular than Org-level permissions
  - More specific than workspace-level grants
- Projects added in TFE 202302-1 (Feb 2023)

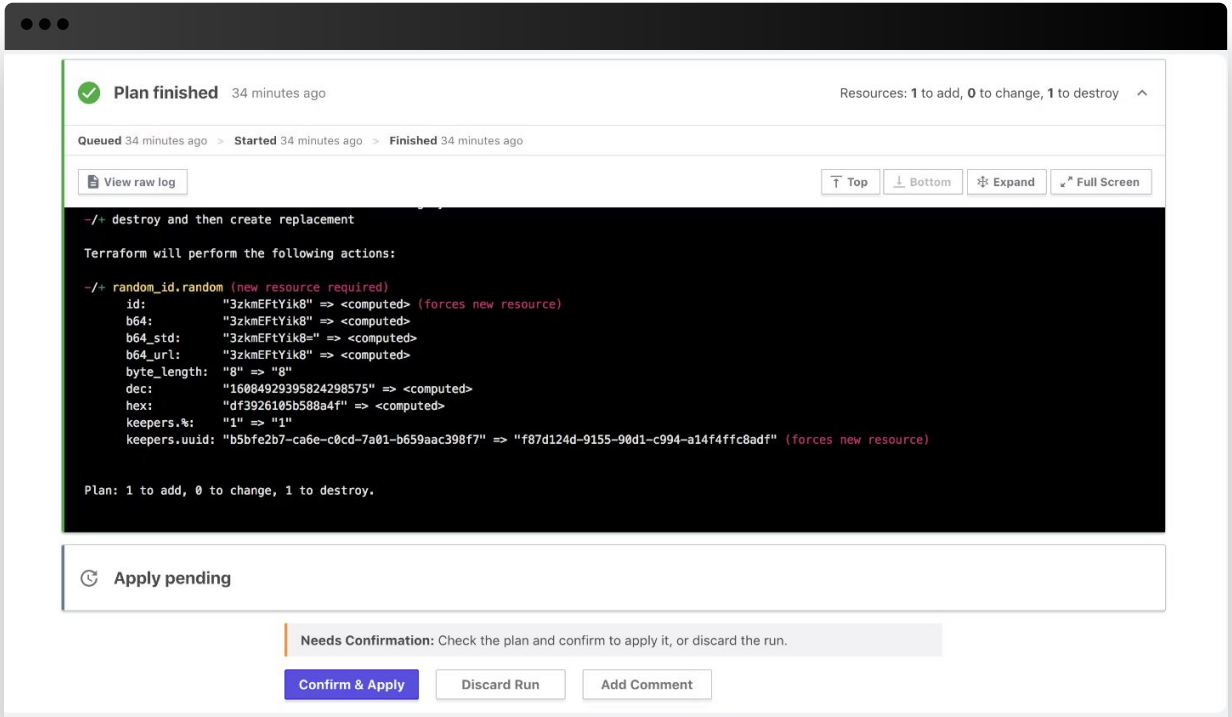
UI/VCS-Driven Runs

- UI and VCS workflows are the primary mode of operation in TFCB
  - Each Workspace is connected with a specific Git Branch in a Git Repo on your VCS Provider
  - TFCB registers Git Webhooks with your VCS Provider during Workspace creation
  - As new Git Commits are Merged into a Git Branch, TFCB will automatically queue a Workspace Run

UI/VCS-Driven Runs

Auto-apply

1. By default, runs require confirmation before TFCB will apply them
2. Auto-apply can be configured in the workspaces “General Settings” page



VCS Integration

- TFCB will interact with most providers using the providers API and OAuth token
- Azure DevOps Server & BitBucket Server require an SSH key for downloading repo contents
- TFCB supports integrating with multiple VCS providers within an Organization
- During workspace creation a configured Git provider is selected

Supported VCS Providers
GitHub
GitHub Enterprise
GitLab.com
GitLab EE and CE
BitBucket Cloud
BitBucket Server
Azure DevOps

CLI-Driven Runs

Remote Backend

- Enables developers who are already familiar with Terraform CLI workflow to integrate with Terraform Cloud for Business
- Runs execute remotely in TFCB while displaying progress in the terminal where the run is executed

Terraform CLI Tool

- Provides a CLI interface that leverages the Terraform Cloud for Business API
- Useful for modifying variables and workspace settings from the terminal

```
hashicorp@root ~ % terraform -help
Usage: terraform [global options] <subcommand> [args]
The available commands for execution are listed below.
The primary workflow commands are given first, followed by
less common or more advanced commands.
Main commands:
  init          Prepare your working directory for other commands
  validate      Check whether the configuration is valid
  plan          Show changes required by the current configuration
  apply         Create or update infrastructure
  destroy       Destroy previously-created infrastructure
All other commands:
  console       Try Terraform expressions at an interactive command prompt
  fmt           Reformat your configuration in the standard style
  force-unlock  Release a stuck lock on the current workspace
  get           Install or upgrade remote Terraform modules
  graph         Generate a Graphviz graph of the steps in an operation
  import        Associate existing infrastructure with a Terraform resource
  login         Obtain and save credentials for a remote host
  logout        Remove locally-stored credentials for a remote host
  metadata      Metadata related commands
  output        Show output values from your root module
  providers     Show the providers required for this configuration
  refresh       Update the state to match remote systems
  show          Show the current state or a saved plan
  state         Advanced state management
  taint         Mark a resource instance as not fully functional
  test          Experimental support for module integration testing
  untaint       Remove the 'tainted' state from a resource instance
  version       Show the current Terraform version
  workspace     Workspace management
Global options (use these before the subcommand, if any):
  -chdir=DIR    Switch to a different working directory before executing the
                given subcommand.
  -help         Show this help output, or the help for a specified subcommand.
  -version      An alias for the "version" subcommand.
```

API-Driven Runs

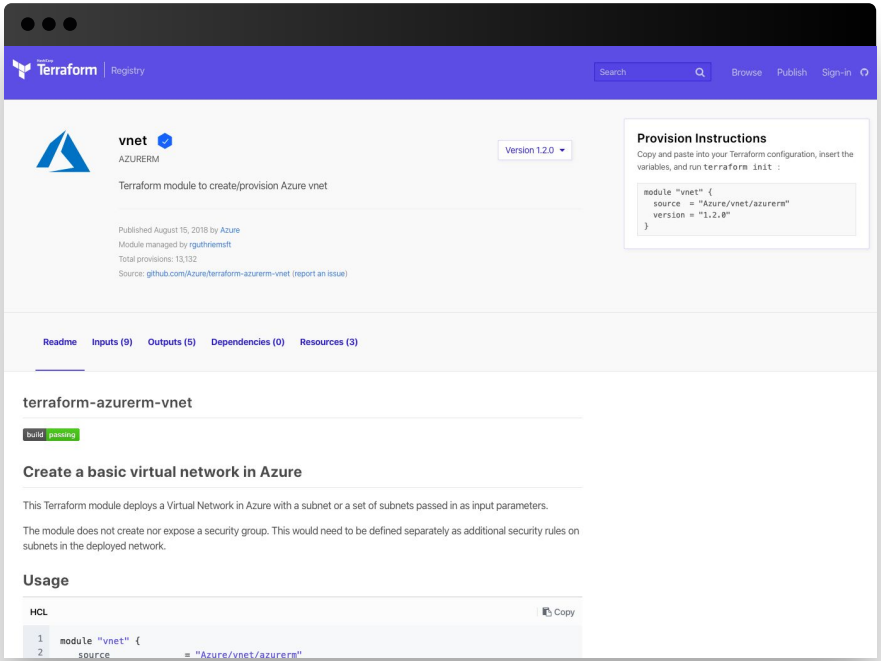
- Provide a flexible workflow for teams to build tooling to determine when configuration has changed and a run should occur
- Allows for custom integration and configuration from unsupported version control systems
- Automatically generate Terraform configurations from a non-VCS source of data
- Build a variety integrations

Terraform Cloud Agents

- Terraform Cloud Agents allow TFCB to communicate with isolated, private, or on-premises infrastructure
- Deployed as lightweight docker container or a binary on x86_64 Linux within a specific network segment
- Useful for on-premises infrastructure types such as vSphere, Nutanix, OpenStack, enterprise networking providers, and anything in a protected enclave
- **The agent architecture is pull-based, so no inbound public internet connectivity is required**
- Agents poll Terraform Cloud for work and carry out execution of that work locally

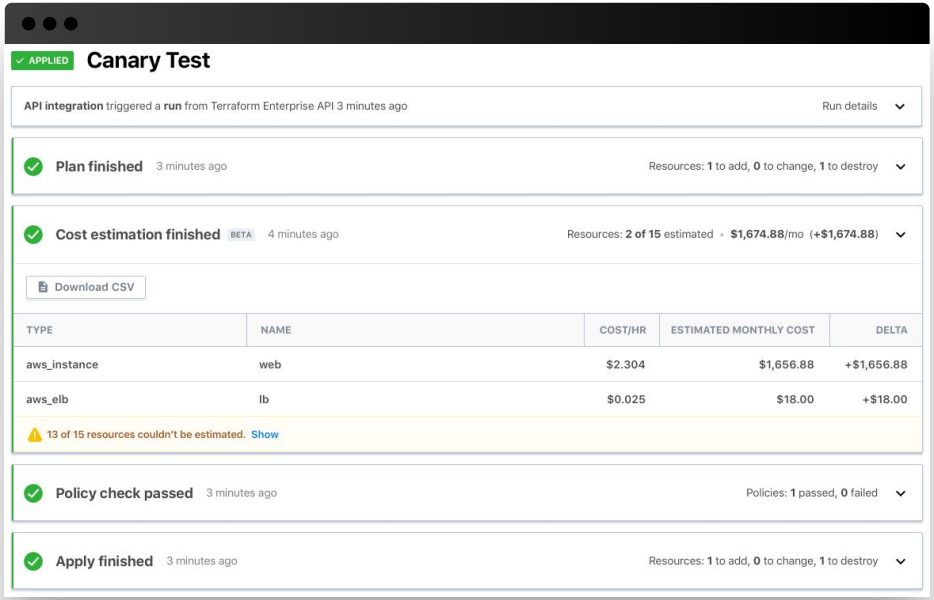
Private Module Registry

- Terraform modules are a container for multiple cloud resources that are used together
- Modules can be used to create lightweight abstractions, to describe infrastructure in terms of its architecture, rather than directly in terms of specific cloud resources
- The Private Module Registry (PMR) works similarly to the public registry and includes support for versioning and a searchable list



Cost Estimation

- TFCB provides cost estimates for many resources found in Terraform configuration
- For each resource an hourly and monthly cost is shown, along with the monthly delta
- The display includes total cost and delta of all estimable resources



Sentinel

Sentinel is a framework for Policies as Code (PaC) similar to how Terraform implements Infrastructure as Code (Iac)

- Sandboxing
- Codification
- Version Control
- Automation
- Testing

Sentinel is covered in detail later in the program

```
import "tfconfig"
import "strings"

# Require all modules directly under root module
# to come from Terraform
validate_modules_from_pmr  = func() {
 validated = true
 for tfconfig.modules as _, m {
   if not strings.has_prefix(m.source, "app.terraform.io/jrx") {
     print("Module with source", m.source, "is not in the PMR" )
     validated = false
   }
 }
 return validated
}
```

TF OSS to TFCB Migration

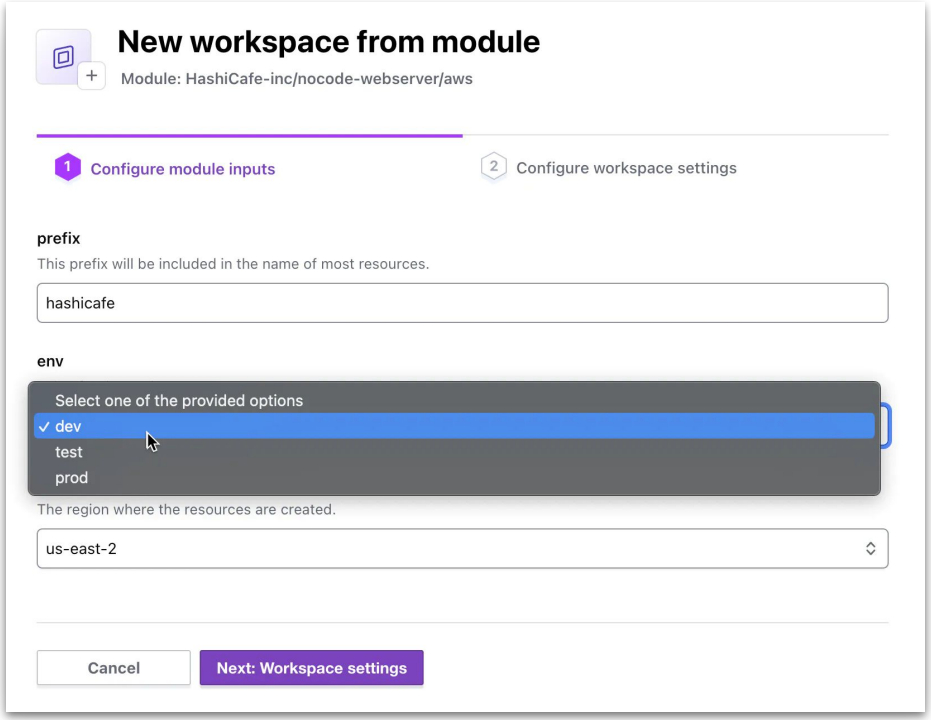
- Migrating Terraform state to Terraform Cloud allows teams to continue managing infrastructure without de-provisioning anything
- Migrating to Terraform Cloud or Terraform Enterprise
- Medium Blog on State Migration via Terraform API

Recent Terraform Additions & Feature Updates

No-Code Provisioning

Deploy cloud resources using Terraform, without learning HCL

Teams can spend less time defining configurations and rebuilding the wheel, and spend more time building off the work of others and supporting the business

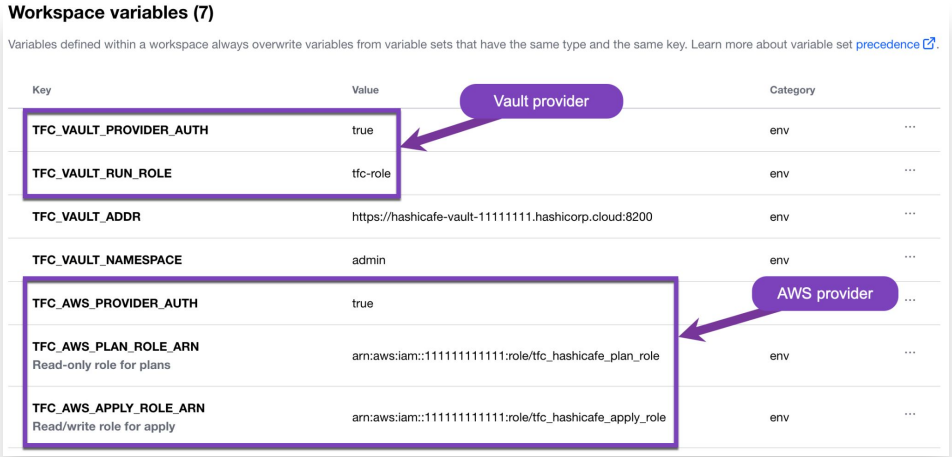


Dynamic Provider Credentials

Native just-in-time (JIT) provider authentication

A native solution for JIT access built on top of Terraform Workload Identity and provider OIDC support. Configure dynamic credential injection via workspace variables for:

- Vault
- AWS
- Azure
- Google Cloud

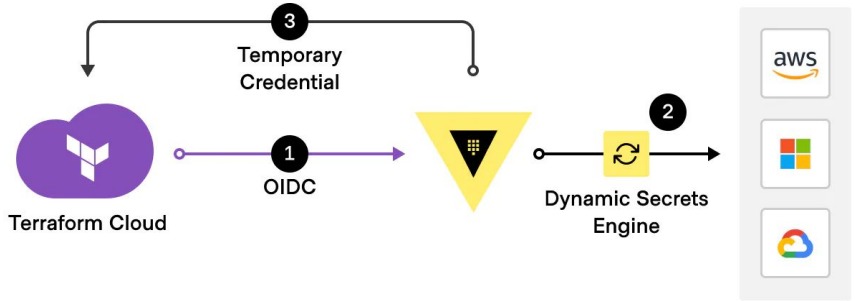


Dynamic Provider Credentials

Vault-backed Dynamic Credentials

Combine the power of dynamic provider credentials and Vault dynamic secrets engines

- Authenticate Terraform runs to Vault using JWT/OIDC auth method
- Vault generates temporary cloud credentials for AWS, Azure, or Google Cloud
- Secrets are injected into the Terraform agent environment for use with providers
- Credentials are revoked immediately after each run phase



Notable/Recent Additions & Changes

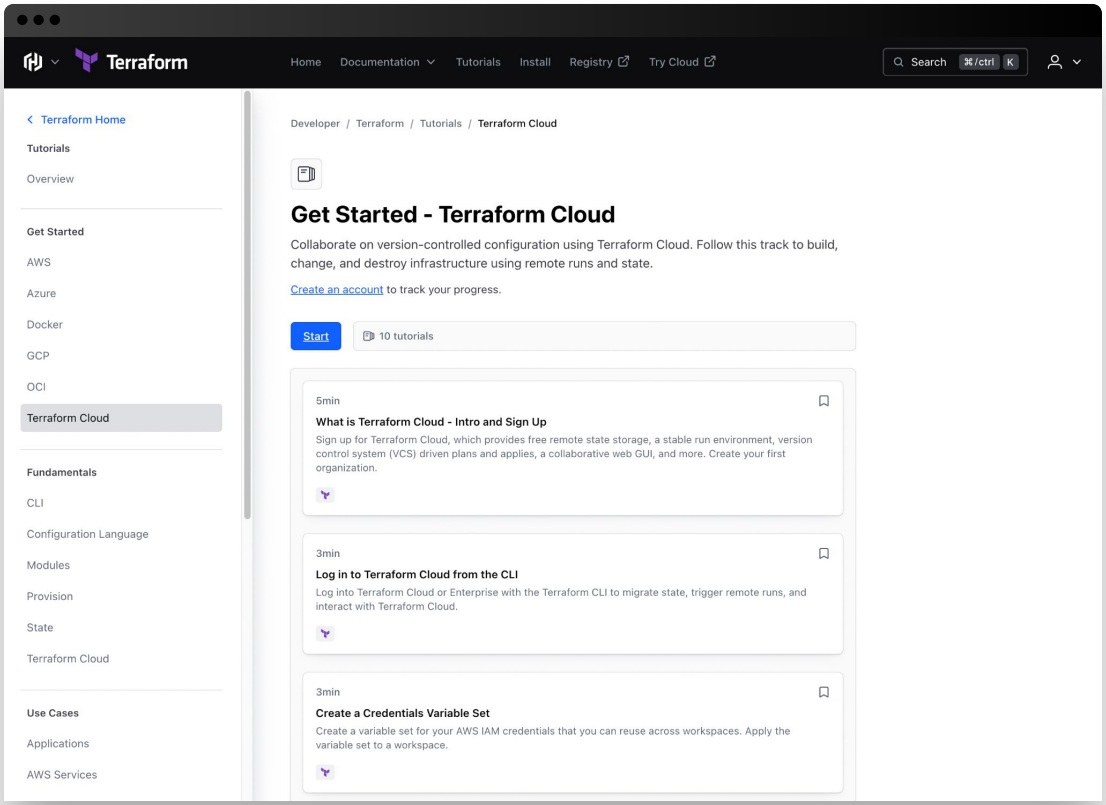
- Projects
- Terraform Changelog
- Run Tasks
- Terraform 1.2
- Terraform 1.3
- Drift Detection

Next Steps

Tutorials

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

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



Additional Resources

We strongly urge you to subscribe to the Terraform Cloud status web page, this can be done here: https://status.hashicorp.com/

We also recommend and hope you will take an active part in the Hashicorp community, you can find more information about that here: https://www.hashicorp.com/community

- Automation script examples
- Tutorial: API-driven runs
- Create a Workspace
- API-driven Workflow
- CLI-driven Workflow
- UI/VCS-driven Workflow

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

Technical Support

Something not working quite right? Engage with HashiCorp Technical Support by opening a ticket for your issue at:

support.hashicorp.com.

Discuss

Engage with the HashiCorp Cloud community including HashiCorp Architects and Engineers

discuss.hashicorp.com

Upcoming Webinars

Terraform Workflow Management

Deep dive into best practices around run workflows, workspaces, variables, modules, and Git repo structure

Terraform Governance

Topics include TFCB's RBAC model and usage, along with using Sentinel, Run Tasks, and Audit logging for governance and guardrails for your teams and infrastructure

Terraform Integrations & Series Closing

Discussion of TFCB integration with Splunk, ServiceNow, & Kubernetes alongside best practices for run triggers & notifications and Production Readiness guidelines

Action Items

- Identify your use case and define your goals with TFCB
- Share to customer.success@hashicorp.com
  - Authorized technical contacts for support
  - Stakeholders contact information (name and email addresses)
  - TFCB Organization Name
- Terraform Cloud Configured
  - Terraform Organization created
  - Terraform workspaces configured to at least 1 workflow (i.e.: API, CLI, VCS, or UI)

05

Q&A

Thank you

customer.success@hashicorp.com

www.hashicorp.com/customer-success