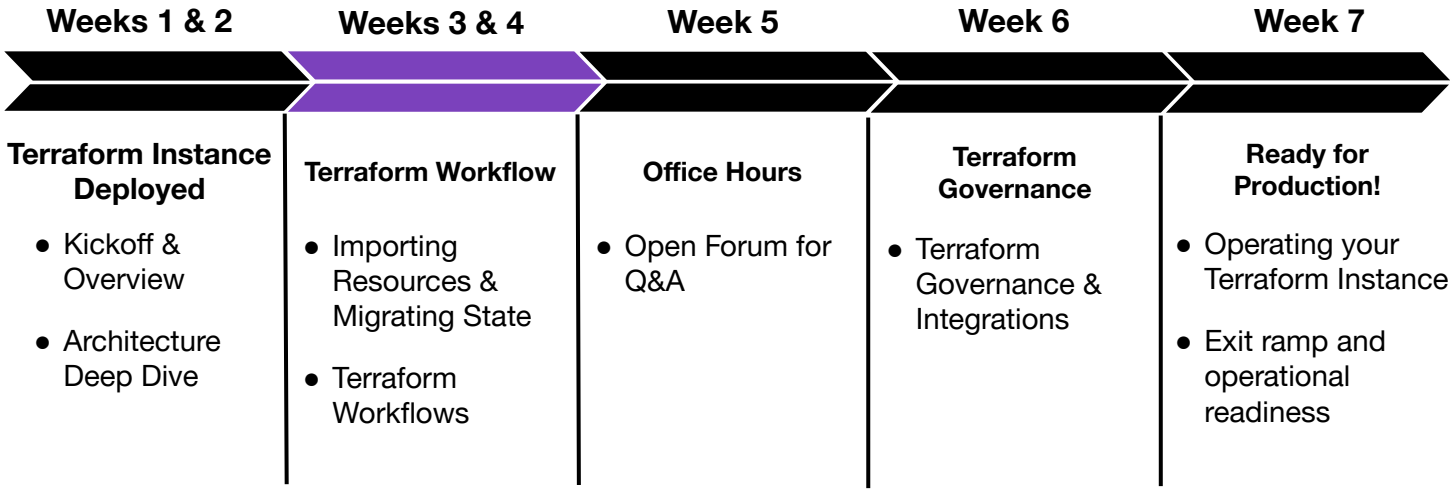
HashiCorp Terraform

Importing Resources & Migrating State into Terraform Enterprise

February 2023

Terraform Enterprise Path to Production



Agenda

1. Terraform Basics
2. Importing Existing Infrastructure
3. Migrating from OSS to Enterprise

Terraform Basics

Infrastructure as Code

Using HashiCorp Configuration Language (HCL) infrastructure and services from any provider can be provisioned in a codified, secure, and automated fashion

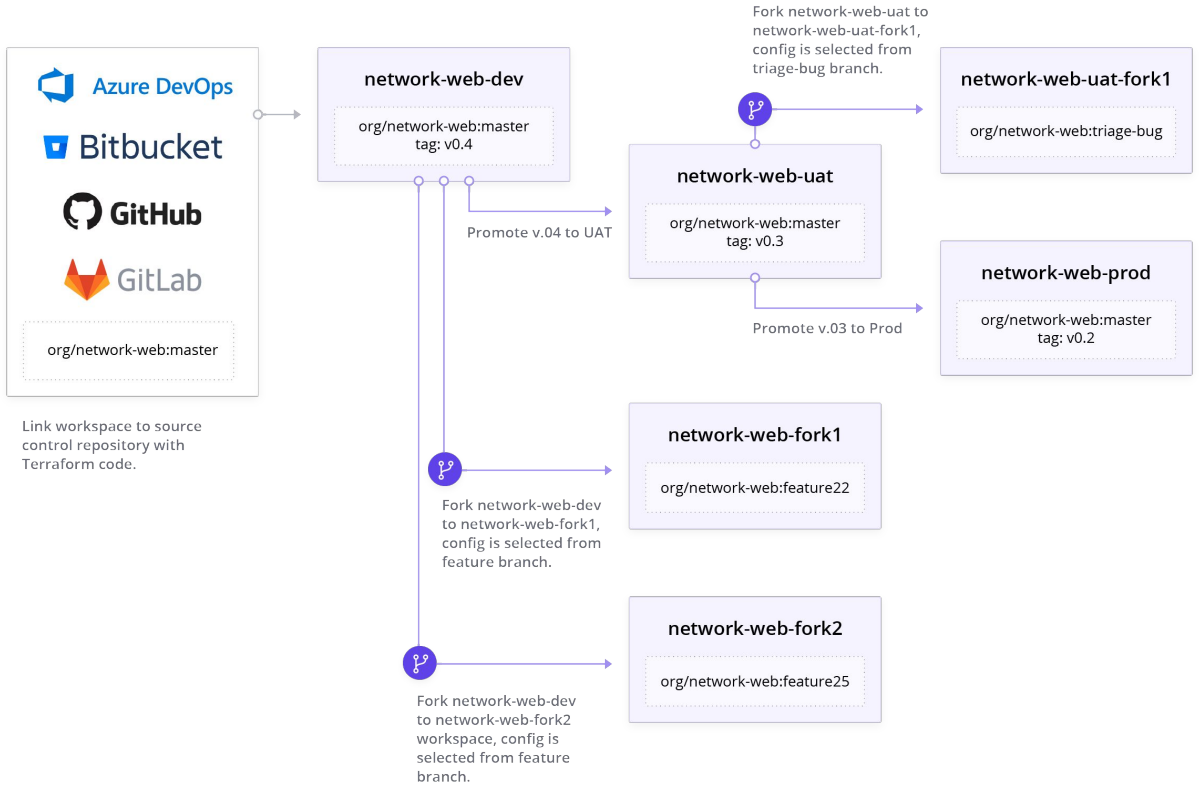
- HCL is human readable and machine executable
- HCL is a declarative, Turing-Complete language
- Used to automate, version, and collaborate on infrastructure

CODE EDITOR

```
resource "google_compute_instance" "svr" {
  name         = "server"
  machine_type = "g1-small"
  zone         = "us-central1-a"
  disk {
    image = "ubuntu-1404-trusty-v20160114e"
  }
}

resource "dnsimple_zone_record" "hello" {
  zone_name = "example.com"
  name   = "server"
  value  =
google_compute_instance.svr.network_interface.0.
address
  type   = "A"
}
```

Benefits of Infrastructure as Code

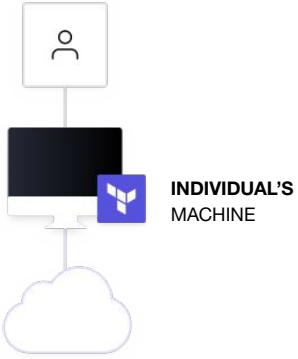
- Versioning
- Collaboration
- Promotion
- Forking



Ways to interact with Terraform

CLI

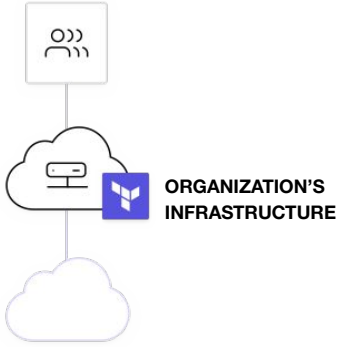
Terraform CLI



- No requirements for collaboration
- No requirements for centralized reusable configs
- No policy or governance requirements

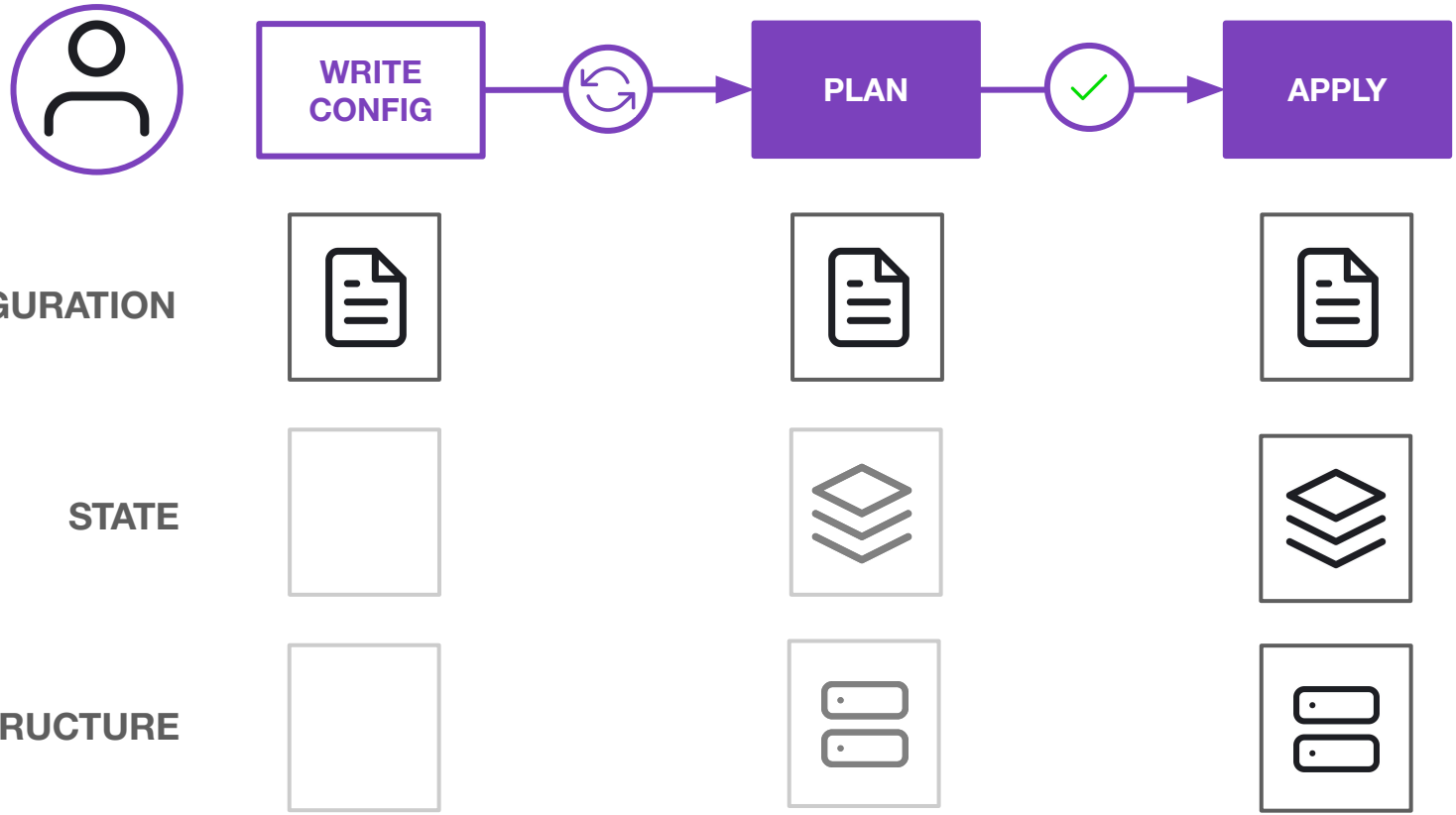
Enterprise / Cloud

Self-Hosted / SaaS



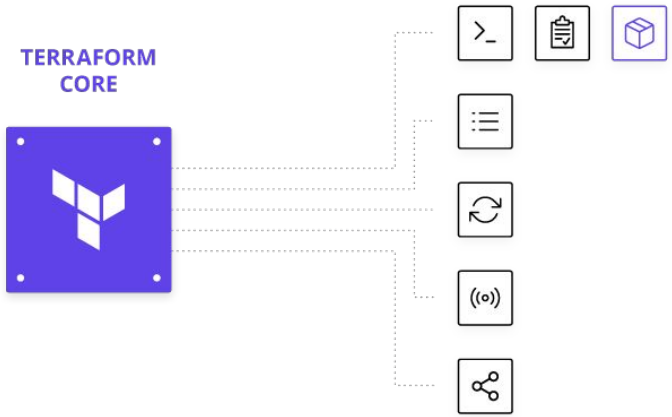
- Air gapped infrastructure and applications
- Data sovereignty requirements
- Regulatory compliance requirements
- Stringent reliability and availability requirements

Terraform Workflow



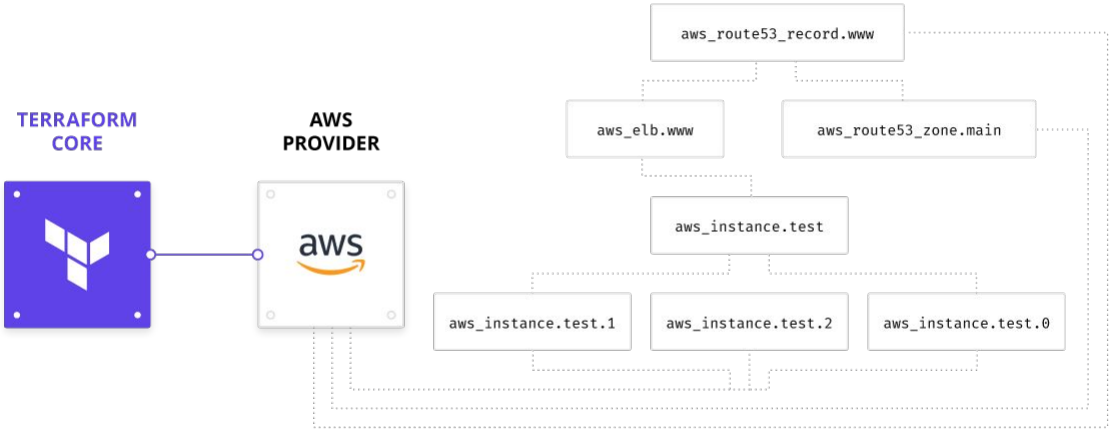
Terraform Core Engine

- The “engine” driving Terraform Enterprise
- Loads providers as needed
- OSS hosted on Github
- Responsible for:
  - Reading and Interpolating configuration files and modules
  - State Management
  - Executing plan
  - Communicating with providers
  - Constructing resource graphs



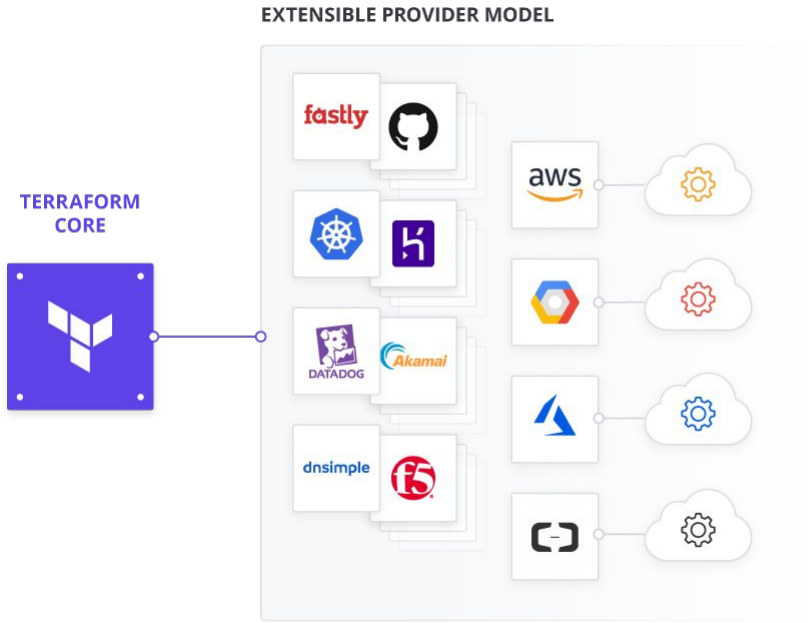
Resource Graph

- Safely provision and change infrastructure
- See planned infrastructure changes before execution
- No need to manually coordinate dependent resources



Provider Plugins

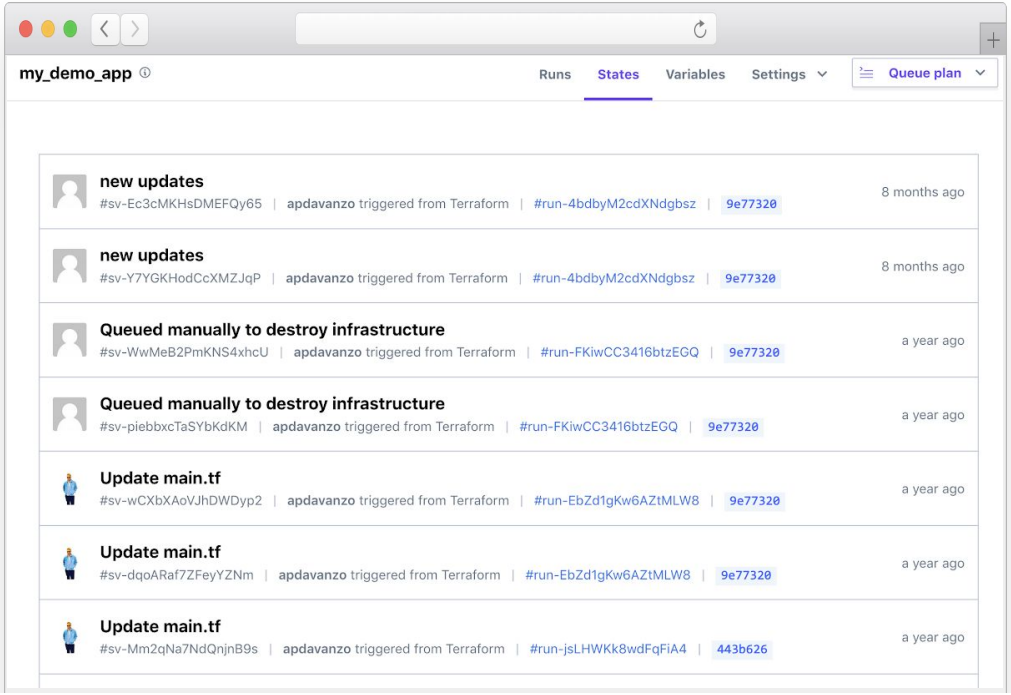
- Expose implementation for specific services
- Offer extensible layer for ‘Core’ to learn how to talk to anything with an API without any upgrades
- Responsible for:
  - Initializing libraries for API calls
  - Authenticating with the provider
  - Defining resources that map to services
  - Executing commands or scripts for designated resources



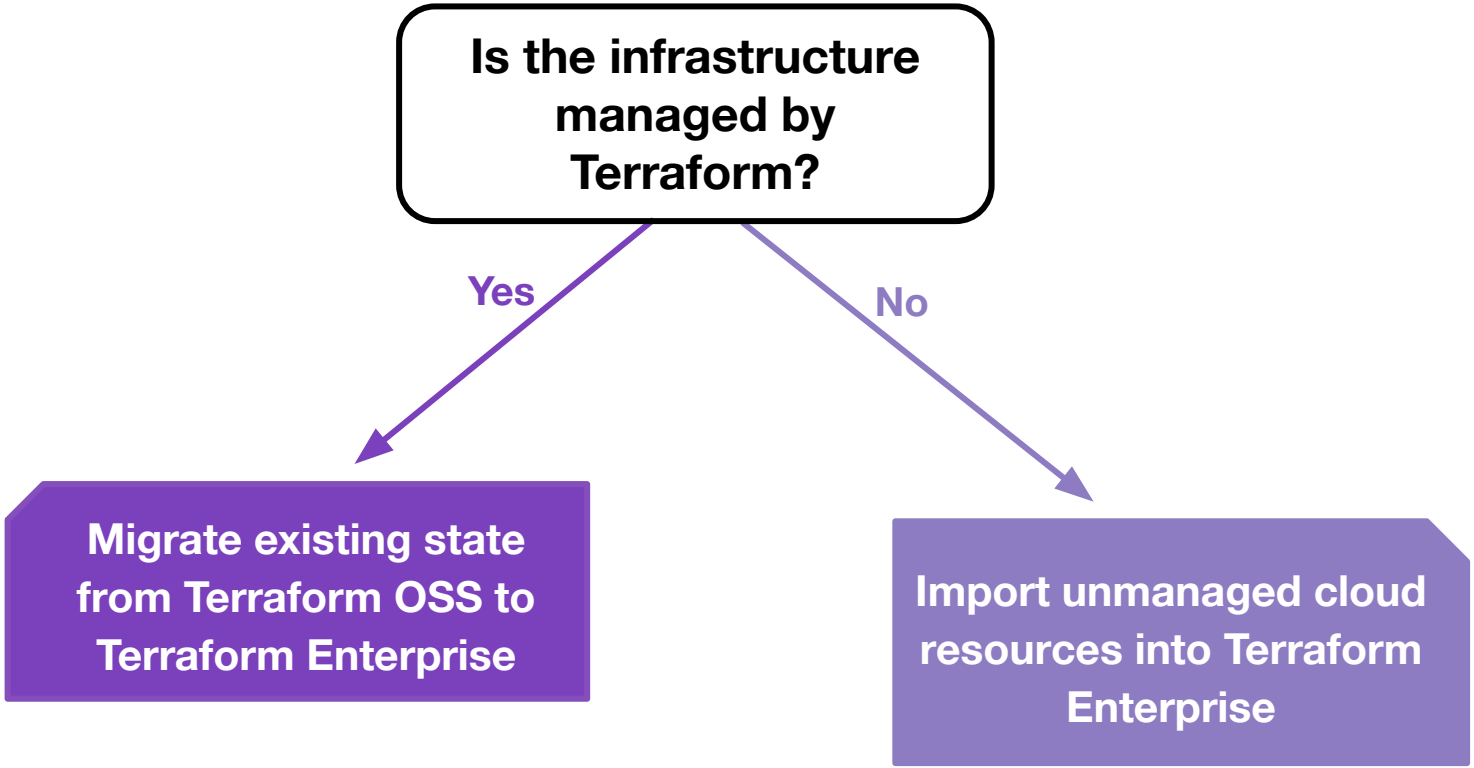
Infrastructure State

State is Terraform's understanding of an infrastructure

- Used by Terraform to provide an understanding of resources under its control
- TFE can use it it to show where previous runs have made changes to infrastructure
- TFE provides remote state management which encrypts the state file



Managing existing infrastructure with TFE

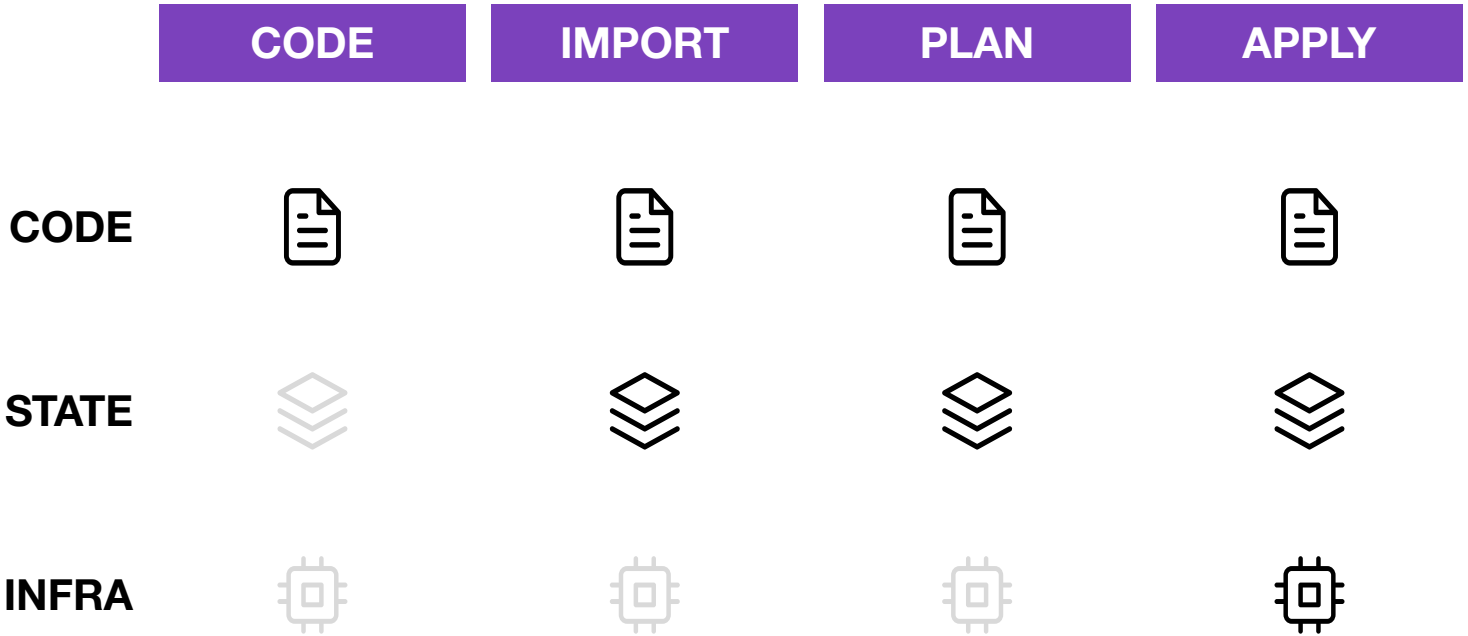


Import Unmanaged Cloud Resources

Terraform Import

- Terraform is able to import existing infrastructure
- Importing takes resources created by some other method and bring it under Terraform management
- This is a great way to slowly transition infrastructure to Terraform

Terraform Import Workflow



Importing Prerequisites

Before you can import existing infrastructure into Terraform Enterprise you must have completed the following:

- Installed Terraform CLI locally
- Deployed Terraform Enterprise
- Tutorial

Steps

1. Write Terraform code that matches your infrastructure
2. Import infrastructure into your Terraform state file using **`terraform import`**
3. Review plan output from **`terraform plan`** to ensure the configuration matches expected state
4. Apply the configuration to update your Terraform state by running **`terraform apply`**

Step 1

Write Terraform code that matches your infrastructure.

TERMINAL

[main.tf]

```
provider "aws" {
    region = "eu-west-1"
}

resource "aws_vpc" "testvpc" {
    cidr_block = "10.0.0.0/16"
}

output "vpcid" {
    value = aws_vpc.testvpc.id
}
```

Step 2

Initialize Terraform with `terraform init`

TERMINAL

```
$ terraform init

Initializing the backend...

Initializing provider plugins...
- Finding latest version of hashicorp/aws...
- Installing hashicorp/aws v3.68.0...
- Installed hashicorp/aws v3.68.0 (signed by HashiCorp)

Terraform has created a lock file .terraform.lock.hcl to record the provider
selections it made above. Include this file in your version control repository
so that Terraform can guarantee to make the same selections by default when
you run "terraform init" in the future.

Terraform has been successfully initialized!

You may now begin working with Terraform. Try running "terraform plan" to see
any changes that are required for your infrastructure. All Terraform commands
should now work.

If you ever set or change modules or backend configuration for Terraform,
rerun this command to reinitialize your working directory. If you forget, other
commands will detect it and remind you to do so if necessary.
```

Step 3

Import infrastructure into your Terraform state file using `terraform import`

TERMINAL

```
$ terraform import aws_vpc.testvpc "vpc-aabbccdd"

aws_vpc.testvpc: Importing from ID "vpc-aabbccdd"...
aws_vpc.testvpc: Import prepared!
  Prepared aws_vpc for import
aws_vpc.testvpc: Refreshing state... [id=vpc-aabbccdd]

Import successful!

The resources that were imported are shown above. These resources are now in
your Terraform state and will henceforth be managed by Terraform.
```

Step 4

Review the plan output from `terraform plan` to ensure the configuration matches expected state

TERMINAL

```
$ terraform plan

aws_vpc.testvpc: Refreshing state... [id=vpc-aabbccdd]

Changes to Outputs:
  + vpcid = "vpc-aabbccdd"

You can apply this plan to save these new output values to the Terraform state,
without changing any real infrastructure.

_____________________________________________________________________________
_____________________________________________________________________________

Note: You didn't use the -out option to save this plan, so Terraform can't
guarantee to take exactly these actions if you run "terraform apply" now.
```

Step 5

Apply the configuration to update your Terraform state by running `terraform apply`

TERMINAL

```
$ terraform apply

aws_vpc.testvpc: Refreshing state... [id=vpc-aabbccdd]

Changes to Outputs:
  + vpcid = "vpc-aabbccdd"

You can apply this plan to save these new output values to the Terraform state,
without changing any real infrastructure.

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

Outputs:

vpcid = "vpc-aabbccdd"
```

Migrating Existing State

Prerequisites

Before you can migrate Terraform OSS state into Terraform Enterprise you must have completed the following:

- Installed Terraform CLI locally
- Deployed Terraform Enterprise
- Optionally: Acquired an API token for Terraform Enterprise

Migration Steps

Before:

- Take a backup!
- Ensure that you have initialized your existing state
- Create and configure the Workspace in Terraform Enterprise

During:

- Login to Terraform Enterprise and generate an API Token
- Add the Terraform remote backend
- Reinitialize Terraform and confirm state migration

After:

- Verify that the state has been migrated to the workspace
- Move old state (to another backup)
- Trigger a remote run within Terraform Enterprise
- Check everything worked as expected

Before

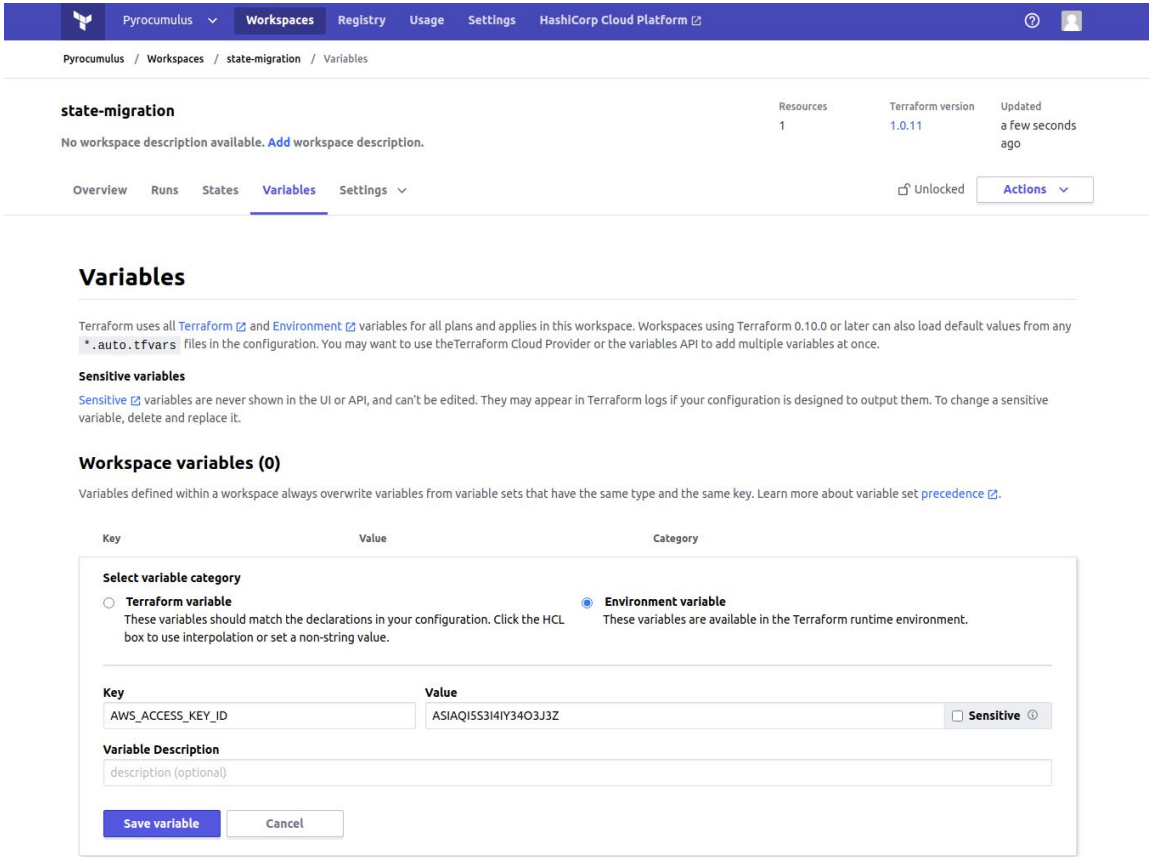
Review the existing Terraform code

CODE EDITOR

[main.tf]

```
terraform {
  required_providers {
    aws = {
      source = "hashicorp/aws"
      version = ">= 3.68.0"
    }
  }
  required_version = ">= 1.0.7"
}

provider "aws" {
    region = "eu-west-1"
}

resource "aws_vpc" "testvpc" {
    cidr_block = "10.0.0.0/16"
}

output "vpcid" {
    value = aws_vpc.testvpc.id
}
```

Create and configure the workspace to include AWS credentials



Step 1

Login to Terraform Enterprise and generate an API Token

TERMINAL

```
$ terraform login

Terraform will request an API token for tfe.mycompany.com using your browser.

If login is successful, Terraform will store the token in plain text in
the following file for use by subsequent commands:
    /home/demouser/.terraform.d/credentials.tfrc.json

Do you want to proceed?
  Only 'yes' will be accepted to confirm.

  Enter a value: yes

---------------------------------------------------------------------------

Terraform must now open a web browser to the tokens page for tfe.mycompany.com.

If a browser does not open this automatically, open the following URL to proceed:
    https://tfe.mycompany.com/app/settings/tokens?source=terraform-login

---------------------------------------------------------------------------

Generate a token using your browser, and copy-paste it into this prompt.

Terraform will store the token in plain text in the following file
for use by subsequent commands:
    /home/demouser/.terraform.d/credentials.tfrc.json

Token for tfe.mycompany.com:
  Enter a value:


Retrieved token for user  demouser
```

Step 2

Add the Terraform Remote Backend

TERMINAL

[main.tf]

```
terraform {
  required_providers {
    aws = {
      source = "hashicorp/aws"
      version = ">= 3.68.0"
    }
  }
  required_version = ">= 1.0.7"
  cloud {
    organization = "<ORG_NAME>"
    workspaces {
      name = "Example-Workspace"
    }
  }
}
…
```

Step 3

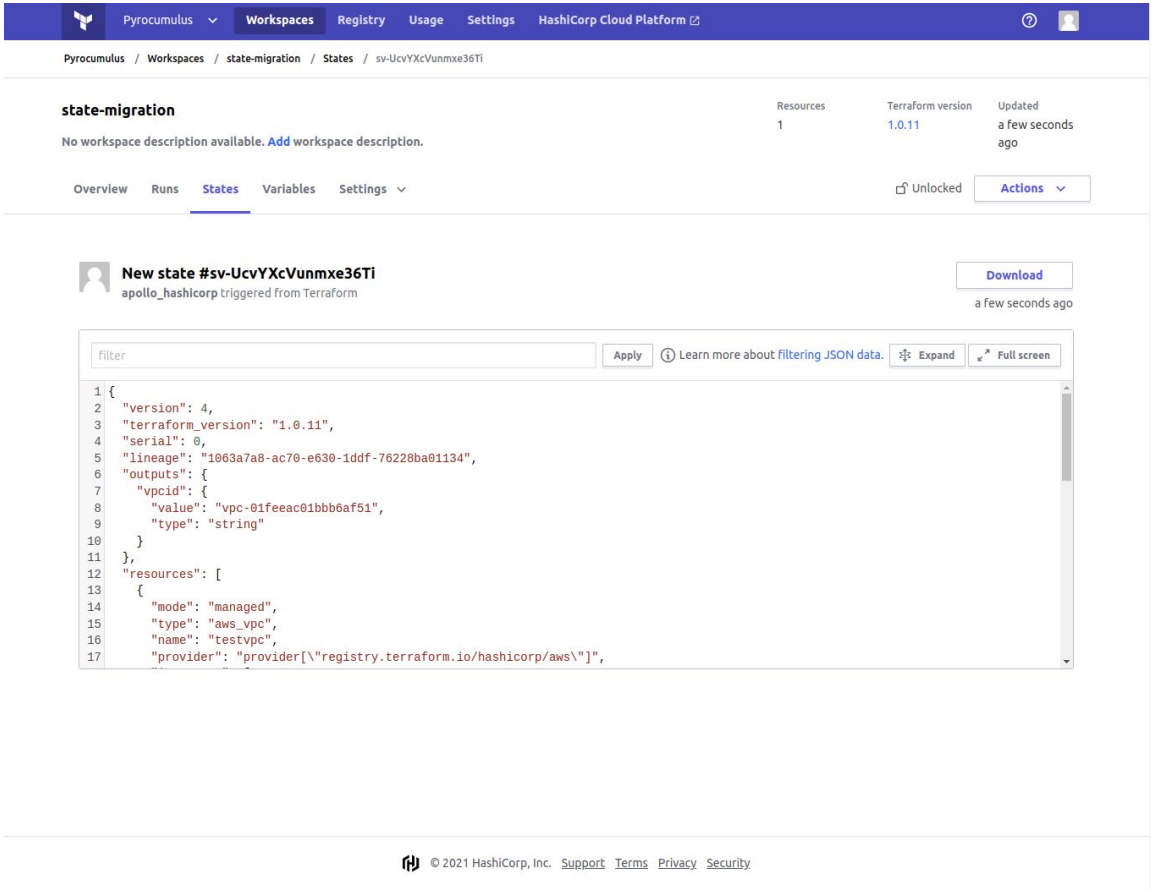
Reinitialize Terraform and confirm state migration

TERMINAL

```
$ terraform init

Initializing Terraform Cloud...
Do you wish to proceed?
  As part of migrating to Terraform Cloud, Terraform can optionally copy your
  current workspace state to the configured Terraform Cloud workspace.

  Answer "yes" to copy the latest state snapshot to the configured
  Terraform Cloud workspace.

  Answer "no" to ignore the existing state and just activate the configured
  Terraform Cloud workspace with its existing state, if any.

  Should Terraform migrate your existing state?

  Enter a value:
```

After

Verify the workspace exists and that the state file has been uploaded

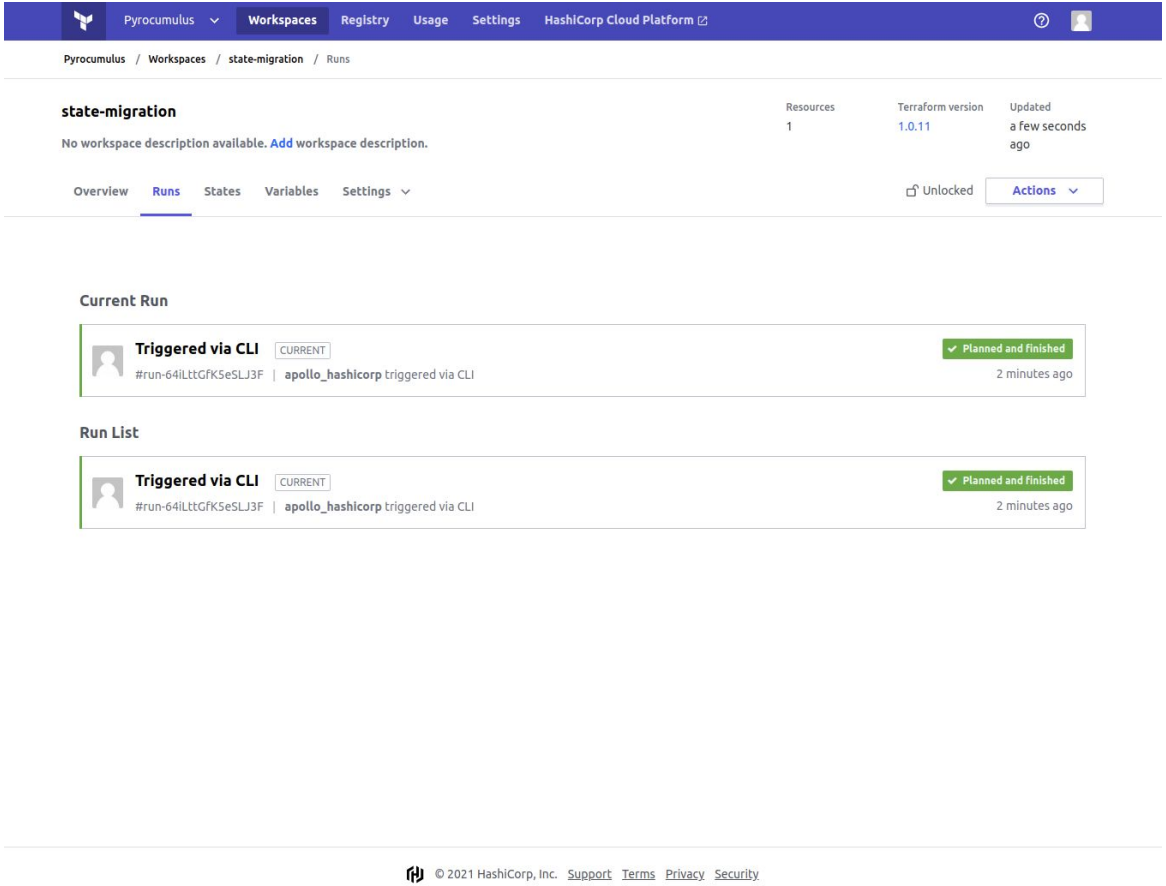


Trigger a remote run within Terraform Enterprise

TERMINAL

```
$ mv terraform.tfstate terraform.tfstate.local

$ terraform apply

Running apply in the remote backend. Output will stream here. Pressing Ctrl-C
will cancel the remote apply if it's still pending. If the apply started it
will stop streaming the logs, but will not stop the apply running remotely.

Preparing the remote apply...

To view this run in a browser, visit:
https://tfe.mycompany.com/app/myorganization/state-migration/runs/run-64iLttGfK5eSLJ3F

Waiting for the plan to start...

Terraform v1.0.11
on linux_amd64
Configuring remote state backend...
Initializing Terraform configuration...
aws_vpc.testvpc: Refreshing state... [id=vpc-01feeac01bbb6af51]

Note: Objects have changed outside of Terraform

Terraform detected the following changes made outside of Terraform since the
last "terraform apply":

  # aws_vpc.testvpc has been changed
  ~ resource "aws_vpc" "testvpc" {
        id                               = "vpc-01feeac01bbb6af51"
      + tags                             = {}
        # (15 unchanged attributes hidden)
    }

Unless you have made equivalent changes to your configuration, or ignored the
relevant attributes using ignore_changes, the following plan may include
actions to undo or respond to these changes.

─────────────────────────────────────────────────────────────────────────────

No changes. Your infrastructure matches the configuration.
```

Verify a remote run has been triggered by the CLI

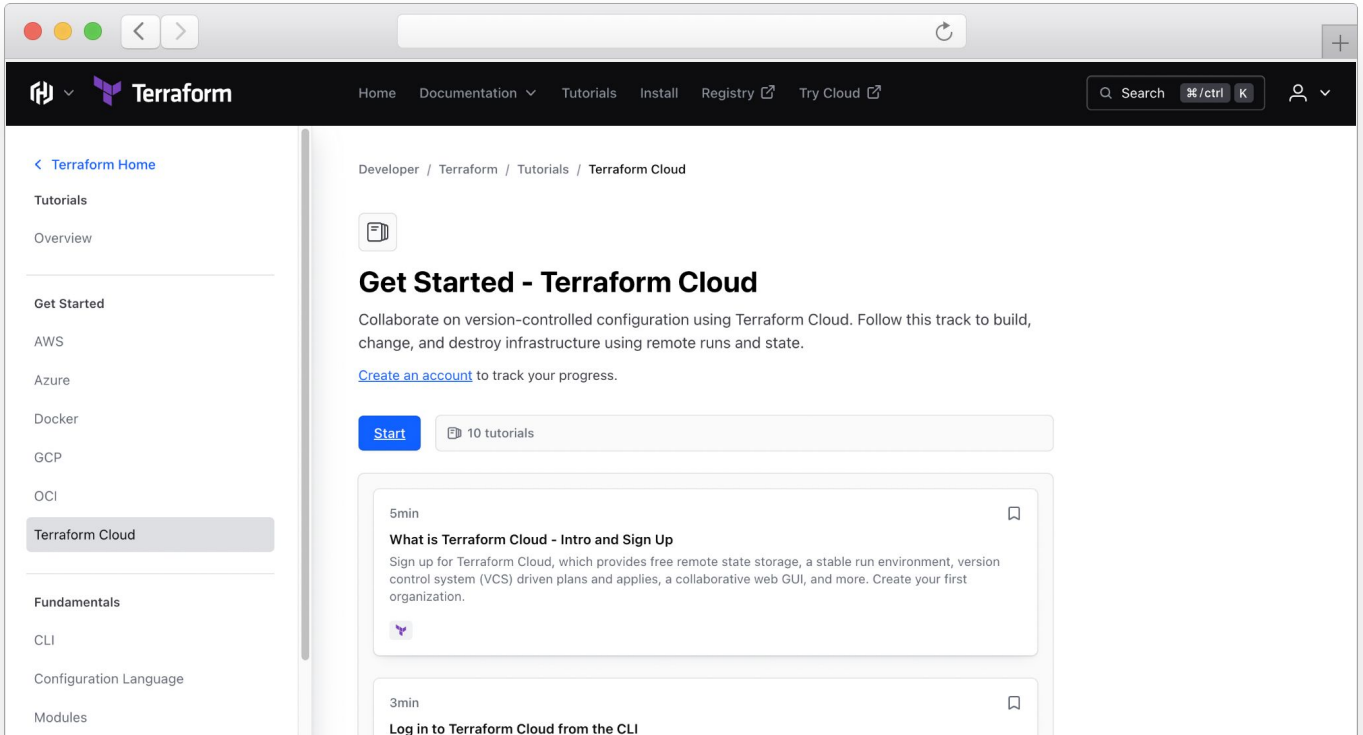


Next Steps

Tutorials

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

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



Resources

- HCL Reference
- Terraform Resource Graph
- Migrating Terraform OSS to Terraform Enterprise
- Importing Existing Infrastructure into Terraform Enterprise
- Terraform Import
- Community Tools for importing resources*
  - aws2tf
  - Terraformer

* Community projects are **not maintained, supported or endorsed** by HashiCorp.

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

Office Hours

Bring your questions to Office Hours!

Terraform Governance

Learn best practices and guidance for implementing key TFE features like Cloud Agents, RBAC, Sentinel, and run triggers and notifications

Action Items

- Share to customer.success@hashicorp.com
  - Authorized technical contacts for support
  - Stakeholders contact information (name and email addresses)
- Take an inventory of your current resources and begin your migration planning
- Select version control system(s)

Q & A

Thank You

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