Terraform Overview

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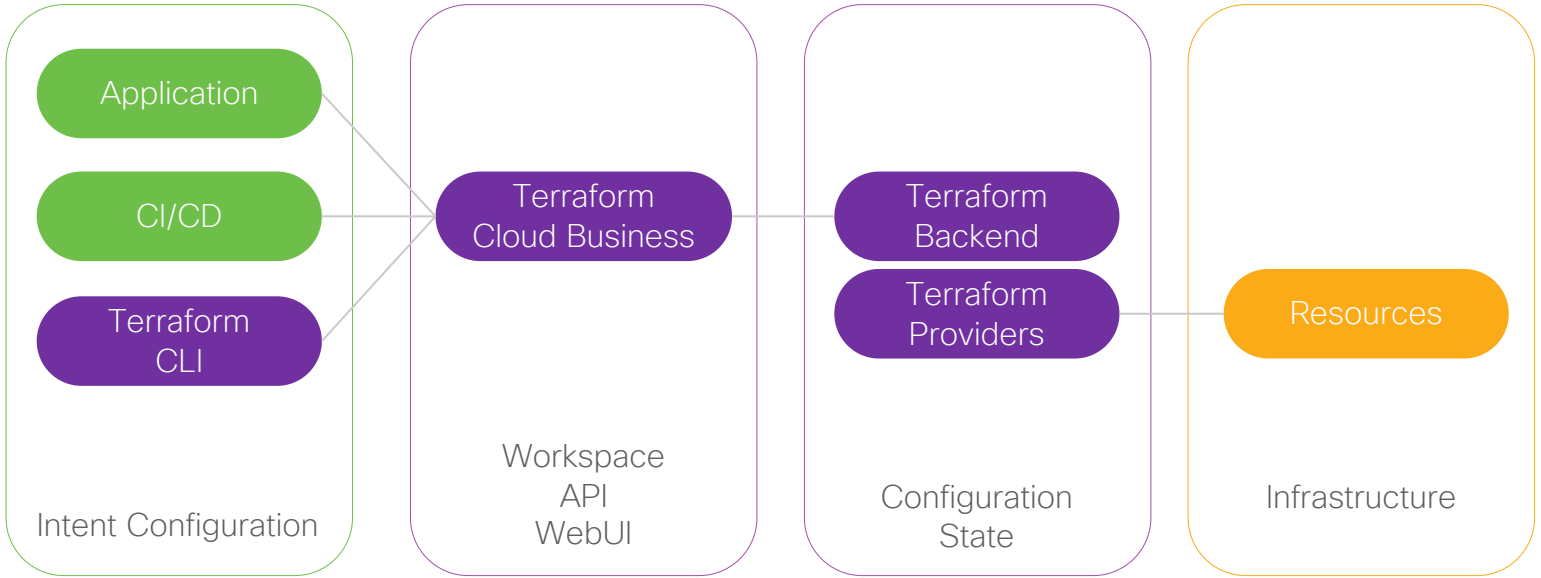
What is Terraform

- Terraform is a tool for building, changing, and versioning infrastructure safely and efficiently.
- Terraform can manage existing and popular cloud infrastructures (AWS, GCP, ...).
- As well as custom in-house infrastructures (Cisco Intersight, Cisco ACI, Kubernetes, VMware, Openstack...).
- Key features:
  - Infrastructure as Code: Infrastructure is described using a high-level and declarative configuration syntax (HCL: HashiCorp Configuration Language).
  - Execution Plans: Terraform has a "planning" step called execution plan, it shows the changes that will be configured when the plan is applied.
  - Resource Graph: Terraform builds a graph of all your resources and parallelizes the creation and modification of any non-dependent resources.
  - Change Automation: Terraform keep configuration states (real view of resources configuration) and figure out the changes and in what order to reach the intent.
- Terraform providers abstract the API layer of real resources (Google Cloud, Azure, AWS, Cisco, ...).

Terraform Architecture with resources reachable from TF Cloud



Terraform workflow

`terraform init`

scan the code, figure out which providers you're using, and download the code for them.

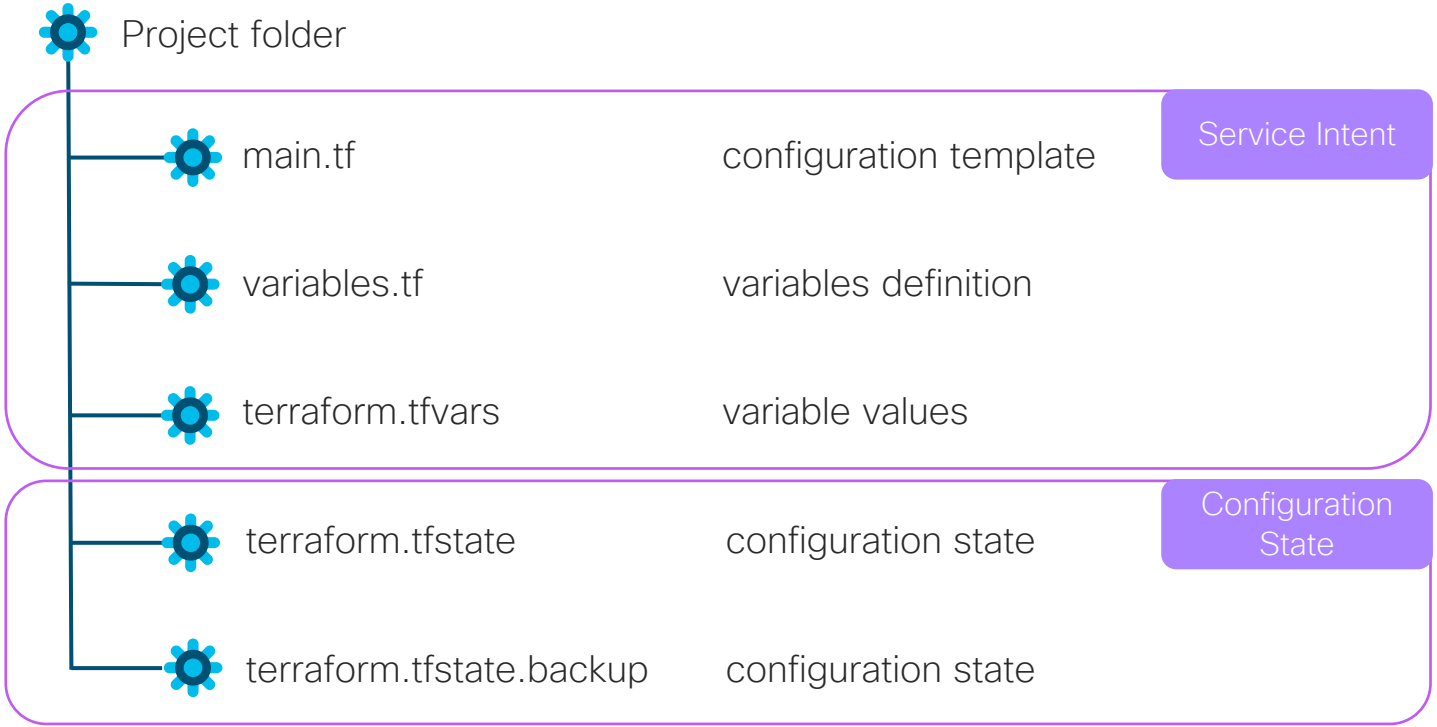
`terraform plan`

let you see what Terraform will do before actually making any changes

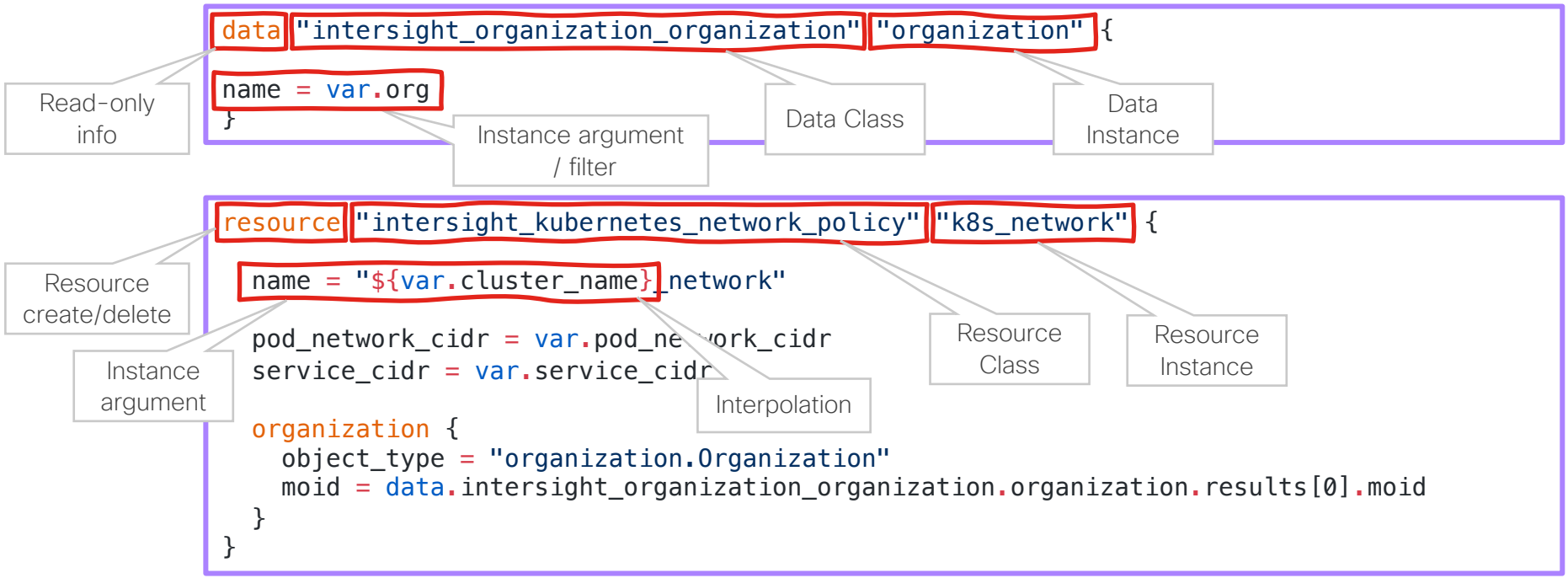
`terraform apply`

to actually create/update/delete the resources

Terraform Project Files



Terraform Configuration Files with HCL
Fetch data and configure Resources



Terraform Configuration Files with HCL Provider and Backend configs

Provider Configuration

```
terraform {
  required_providers {
    intersight = {
      source = "CiscoDevNet/intersight"
      version = "1.0.5”
    }
  }
}

provider "intersight" {
  apikey = var.apikey
  secretkey = var.secretkey
  endpoint = var.endpoint
}
```

main.tf

Configuration to use a 'remote' backend

```
terraform {
  backend "remote" {
    organization = ”telcocloud-iks"

    workspaces {
      name = "intersight-get-clusters"
    }
  }

  required_version = ">= 0.13.0"
}
```

main.tf

Terraform Configuration Files with HCL Variables definition and configs

```
#------------------------------------
# Define Intersight API Credentials
#------------------------------------
variable "apikey" {
  type = string
}
variable "secretkey" {
  type = string
}
variable "endpoint" {
  type = string
}
#------------------------------------
# Define Intersight Variables
#------------------------------------
variable "org" {
type = string
default = "default"
}
variable "ip_pool_name" {
type = string
}
```

variables.tf

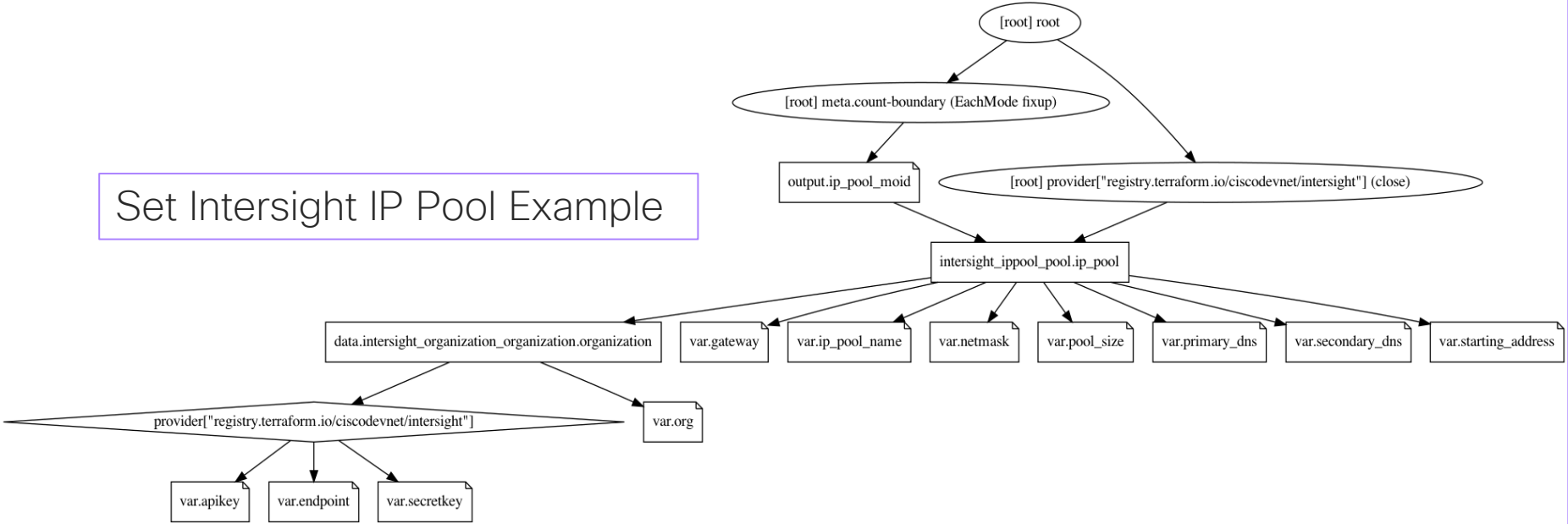
```
#------------------------------------
# Define Intersight API Credentials
#------------------------------------
apikey=”REDACTED"
secretkey="./SecretKey.txt"
endpoint="https://intersight.com"

#------------------------------------
# Define Configuration Values
#------------------------------------
org="EMEAR-SPDC-Specialists"
ip_pool_name="terraform-IPPool-dummy"
```

terraform.tfvars

Terraform Dependencies Graph

Set Intersight IP Pool Example



Terraform State Files

```
{
"version": 4,
"terraform_version": "0.14.6",
"serial": 10,
"lineage": "c8011336-ea75-157d-0235-
90cc56386964",
"outputs": {},
"resources": []
}
```

terraform.tfstate

apply

```
{
"version": 4,
"terraform_version": "0.14.6",
"serial": 12,
"lineage": "c8011336-ea75-157d-0235-90cc56386964",
"outputs": {
"ip_pool_moid": {
"value": "607eed876962752d3060b778",
"type": "string"
}
},
"resources": [
...
"id": "607eed876962752d3060b778",
"ip_v4_blocks": [
{
"additional_properties": "",
"class_id": "ippool.IpV4Block",
"from": "172.16.32.1",
"object_type": "",
"size": 6,
"to": "172.16.32.6"
}
```

terraform.tfstate ...

Terraform Plan:
Terraform will execute the following actions

```
# intersight_ippool_pool.ip_pool will be created
  + resource "intersight_ippool_pool" "ip_pool" {
      + account_moid         = (known after apply)
      ...
      + description          = "configured from tf cli"
      + domain_group_moid    = (known after apply)
      + id                   = (known after apply)
      + ip_v4_blocks         = [
          + {
              + additional_properties = null
              + class_id              = (known after apply)
              + from                  = "172.16.32.1"
              + object_type           = (known after apply)
              + size                  = 6
              + to                    = (known after apply)
            },
        ]
      + ip_v4_config         = [
          + {
              + additional_properties = null
              + class_id              = (known after apply)
              + gateway               = "172.16.32.254"
              ...
Plan: 1 to add, 0 to change, 0 to destroy.
```

```
# intersight_ippool_pool.ip_pool will be updated in-place
  ~ resource "intersight_ippool_pool" "ip_pool" {
      ~ description          = "configured from tf cli" -> "configured and updated
                               from tf cli"
        id                   = "607eed876962752d3060b778"
        name                 = "tf-cli-dummy-pool"
        # (26 unchanged attributes hidden)
    }

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