The Splunk Derp Gun

Automating Splunk deployments in the Cloud with Ansible and Terraform

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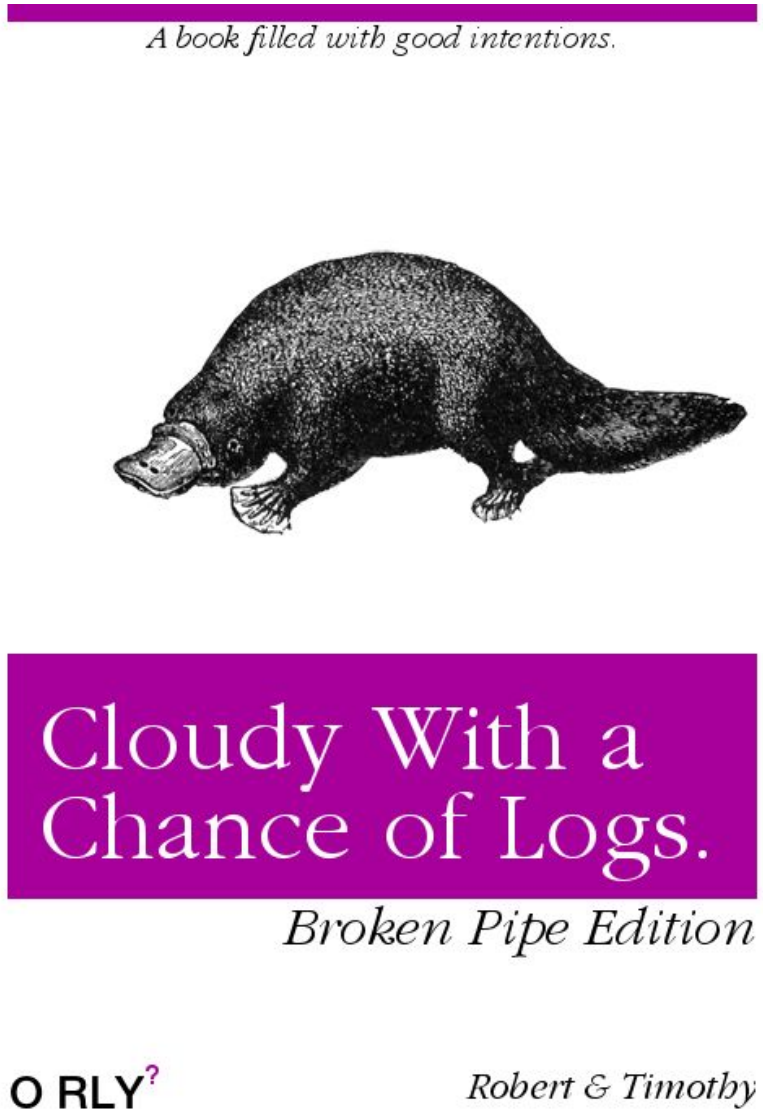
About us:

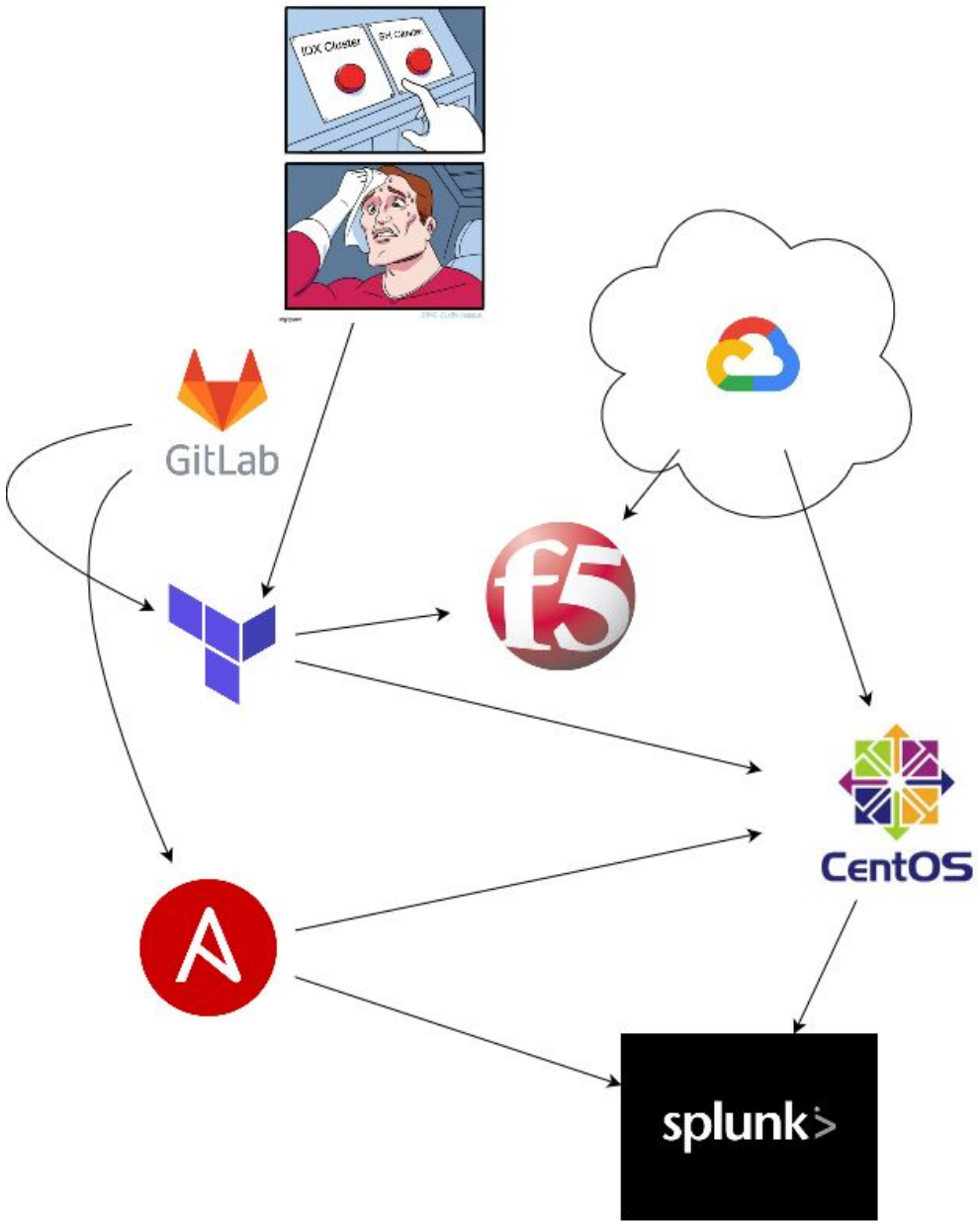
- SecureLink Malmö
- Managed SIEM Team
- Book release 2020/04/01



A little background:

- Build a Splunk environment in GCP
- Be lazy, automate as much as possible
- Create “single button” deployment.

The plan:



What is a ”Derp Gun”

- In Online Gaming - A gun that causes a lot of damage with one shot *urbandictionary.com
- In this context a Derp Gun is a “one shot” Splunk deployment.

Provisioning with a Derp Gun in GCP

- Streamline Provisioning of New Resources in GCP
- Automate complicated setups such as Load Balancers
- Rapidly provision hosts, disk, network infrastructure

Configuration with a Derp Gun in GCP

- Automate configuration of Splunk hosts by role.
- Maintain configurations as repos in Git.
- Allow for new Splunk hosts to be configured as quickly as they can be provisioned.
- Maintain consistent configurations across the entire deployment.

The Tools of the Trade

- GCP Console
- Ansible AWX
- Terraform
- Gitlab
- Vault

- Obviously: Cloud Infrastructure
- IAM
- Autoscaling of Instance Groups

Google Cloud

- Create infrastructure as code
- Providers and Resources
- Available by default in GCP
- Works with Azure, AWS, AliCloud, etc
- Idempotent
- Can be used with anything that has an API: SignalFX, Dominos Pizza, etc

Terraform

- Perform Automated Tasks
- Configuration of Hosts
- Deployment of Apps, Indexes

Ansible

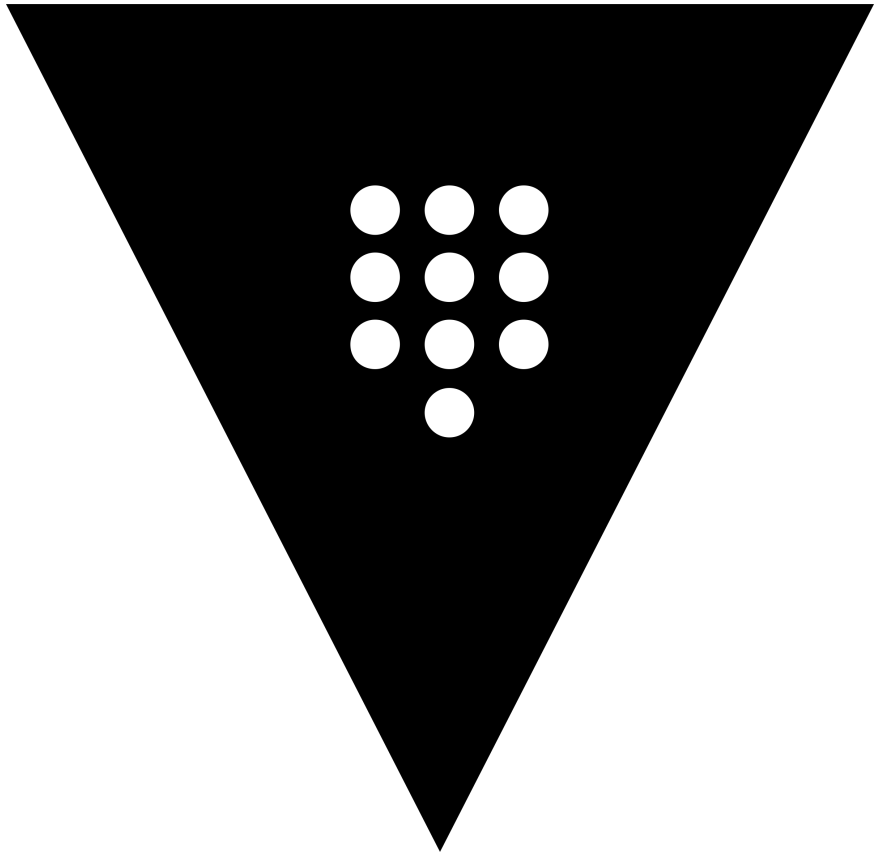
- Store configurations used by Terraform and Ansible
- Revision Control
- Collaboration
- CI/CD
- More Dev/Ops buzzwords..

Gitlab, Github, etc

GitLab

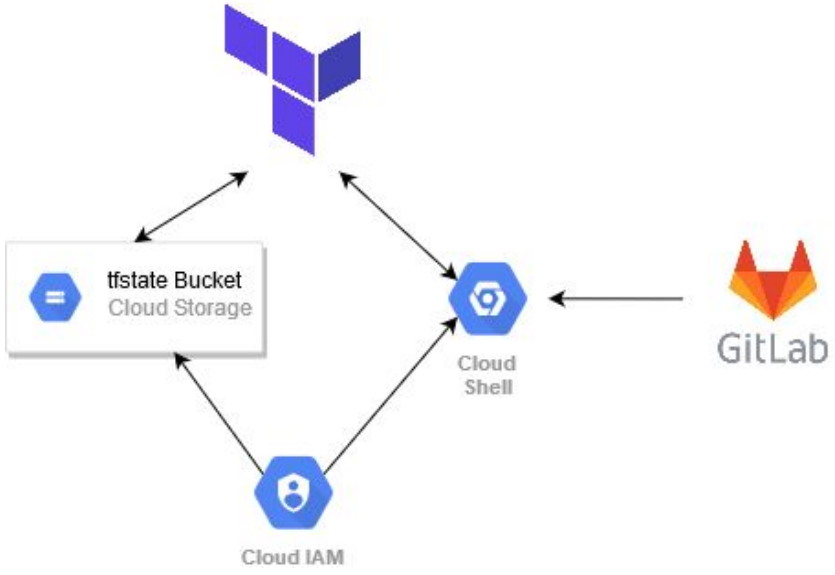
Vault

- Stores secrets
- Works with Terraform, Ansible
- Token based access
- Intgrates with Cloud KMS, IAM
- Can act as a Certificate Authority
- Can perform encryption services



Setting up a Terraform Environment

- Use bucket storage to allow tfstate to be shared
- Enable versioning on the bucket to retain backups of the state file in case of corruption
- Use a cloud ACL to limit access to the state file
- Bucket is accessible from the cloud shell
- Bucket provides state locking



Simple Terraform Example: State Bucket

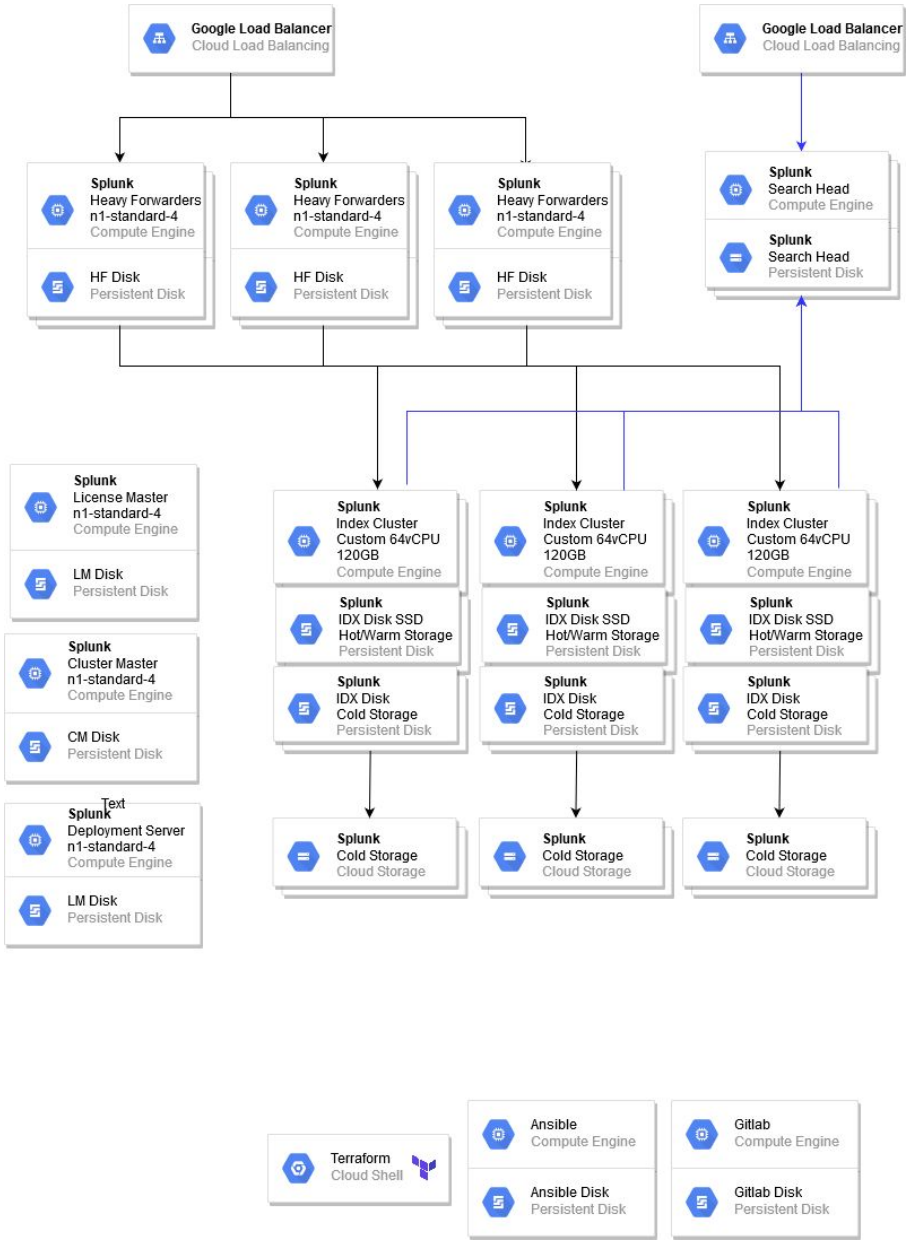
```
terraform {
  backend "gcs" {
    bucket = "ikea-splunk-prod-tf-state-bucket"
    prefix = "terraform/tfstate"
  }
}
```

Start with a sturdy bucket.

- Bucket to store tfstate file
- Keep last 50 versions of the file
- ACL to protect access

```
// GCP Provider Config

provider "google" {
  // Credentials not needed as this tf is run from a cloud shell with Terraform.
  project   = "${var.provider_project}"
  region    = "${var.provider_region}"
  zone      = "${var.splunk_gcp_zone}"

}

resource "google_storage_bucket" "ikea-splunk-gcp-tf-state" {
  name     = "${format("%s","${var.provider_project}-tf-state-bucket")}"
  versioning {
    enabled = "true"
  }
  location = "eu"
  force_destroy = "true"
  lifecycle_rule {
    action {
      type = "Delete"
    }
    condition {
      NumberOfNewerVersions = "50"
    }
  }
}

resource "google_storage_bucket_acl" "image-store-acl" {
  bucket = "${google_storage_bucket.ikea-splunk-gcp-tf-state.name}"
  predefined_acl = "projectprivate"
}
```

Provisioning the Needed Resources



Google Load Balancer
Cloud Load Balancing

Google Load Balancer
Cloud Load Balancing

Splunk
Heavy Forwarders
n1-standard-4
Compute Engine

HF Disk
Persistent Disk

Splunk
Heavy Forwarders
n1-standard-4
Compute Engine

HF Disk
Persistent Disk

Splunk
Heavy Forwarders
n1-standard-4
Compute Engine

HF Disk
Persistent Disk

Splunk
Search Head
Compute Engine

Splunk
Search Head
Persistent Disk

Splunk
License Master
n1-standard-4
Compute Engine

LM Disk
Persistent Disk

Splunk
Cluster Master
n1-standard-4
Compute Engine

CM Disk
Persistent Disk

Text

Splunk
Deployment Server
n1-standard-4
Compute Engine

LM Disk
Persistent Disk

Splunk
Index Cluster
Custom 64vCPU
120GB
Compute Engine

Splunk
IDX Disk SSD
Hot/Warm Storage
Persistent Disk

Splunk
IDX Disk
Cold Storage
Persistent Disk

Splunk
Cold Storage
Cloud Storage

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IDX Disk
Cold Storage
Persistent Disk

Splunk
Cold Storage
Cloud Storage

Terraform
Cloud Shell

Ansible
Compute Engine

Ansible Disk
Persistent Disk

Gitlab
Compute Engine

Gitlab Disk
Persistent Disk

Terraforming a Single Host

- Variables declared in tfvars file
- Tags are used by other resources such as load balancers, instance groups and firewalls
- Labels are used by Ansible
- Boot disk is created by default, destroyed if the host is changed.

```
resource "google_compute_instance" "indexer" {
  count          = "${var.indexer_count}"
  name           = "${format("%s","idx${count.index}-${var.cluster_name}-gcp-${var.region}")}"
  machine_type   = "${var.index_machine_type}"
  tags           = [ "${var.cluster_name}", "index", "ssh"]
  labels = {
    environment = "${var.cluster_name}"
    function    = "idx"
    ansible_group = "splunk_${var.cluster_name}_idx"
    splunk_group = "splunk_${var.cluster_name}"
  }

  boot_disk {
    initialize_params {
      image = "${var.index_image}"
      type  = "${var.index_disk_type}"
     }
  }
```

Provisioning Storage

- Disks for Splunk, Warm and Cold
- Persistent Disks are not destroyed by host changes.
- Disks can be increased in size and filesystems resized with Ansible
- Prevent_destroy lifecycle function doesn't really work as expected.

```
// Index Splunk

resource "google_compute_disk" "idx-hot-warm-disk" {
  count = "${var.indexer_count}"
  name  = "${format("idx${count.index}-${var.cluster_name}-gcp-${var.region}-warm")}"
  type  = "${var.index_hot_warm_disk_type}"
  size  = "${var.index_hot_warm_disk_size}"
  labels    = {
    environment = "splunk"
  }
  physical_block_size_bytes = 4096
  lifecycle {
//    prevent_destroy = true
  }
}

// Index Cold

resource "google_compute_disk" "idx-cold-disk" {
  count = "${var.indexer_count}"
  name  = "${format("idx${count.index}-${var.cluster_name}-gcp-${var.region}-cold")}"
  type  = "${var.index_cold_disk_type}"
  size  = "${var.index_cold_disk_size}"
  labels = {
    environment = "splunk"
  }
  physical_block_size_bytes = 4096
  lifecycle {
//    prevent_destroy = true
  }
}
```

Attaching Provisioned Disks

- Declared in compute resource.
- Name declared in configuration is also visible in /dev/disk/by-id/

```
boot_disk {
  initialize_params {
    image = "${var.index_image}"
    type  = "${var.index_disk_type}"
   }
}

attached_disk {
  source      = "${format("idx${count.index}-${var.cluster_name}-gcp-${var.region}")}-splunk"
  device_name = "${format("idx${count.index}-${var.cluster_name}-gcp-${var.region}")}-splunk"
}


attached_disk {
  source      = "${format("idx${count.index}-${var.cluster_name}-gcp-${var.region}")}-warm"
  device_name = "${format("idx${count.index}-${var.cluster_name}-gcp-${var.region}")}-warm"
}

attached_disk {
  source      = "${format("idx${count.index}-${var.cluster_name}-gcp-${var.region}")}-cold"
  device_name = "${format("idx${count.index}-${var.cluster_name}-gcp-${var.region}")}-cold"
}
```

Compute Host Network Settings

- Public and Private subnets and interfaces
- Public IPs use NAT
- Firewall rules set globally upstream

```
  network_interface {
    subnetwork  = "${var.pub_subnetwork}"

    access_config {
      nat_ip = "${google_compute_address.static[count.index].address}"
    }
  }

  network_interface {
    subnetwork  = "${var.pri_subnetwork}"
    access_config {
    }
  }
}
```

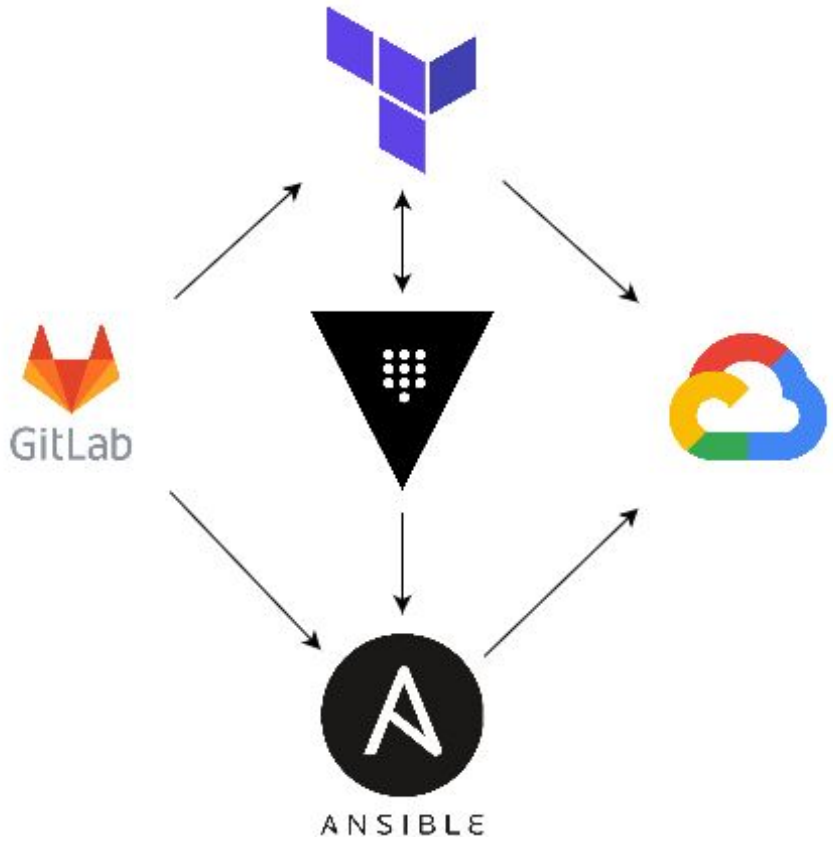
Using Modules to Create Clusters

- Variables declared in Module
- Module is a subfolder of the project
- Indexer_count builds number of hosts

```
// Index Clusters

module "alpha_index_cluster" {
  source                    = "./modules/index_cluster"
  project                   = "${var.provider_project}"
  region                    = "${var.provider_region}"
  cluster_name              = "alpha"
  indexer_count             = "3"
  //index_machine_type        = "custom-64-122880"
  index_machine_type        = "n1-standard-2"
  index_image               = "gce-uefi-images/centos-7"
  index_disk_type           = "pd-ssd"
  index_disk_size           = "30"
  index_hot_warm_disk_type  = "pd-ssd"
  index_hot_warm_disk_size  = "50"
  index_cold_disk_type      = "pd-standard"
  index_cold_disk_size      = "50"
  cm_machine_type           = "n1-standard-2"
  cm_image                  = "gce-uefi-images/centos-7"
  cm_disk_type              = "pd-ssd"
  cm_disk_size              = "30"
  pub_subnetwork                = "${google_compute_subnetwork.public_subnet.name}"
  pri_subnetwork            = "${google_compute_subnetwork.private_subnet.name}"
  create_cm                 = "1"
  splunk_disk_type          = "pd-ssd"
  splunk_disk_size          = "30"
  dns_name_dmz              = "${google_dns_managed_zone.ikea-splunk-prod.dns_name}"
  dns_name_int              = "${google_dns_managed_zone.ikea-splunk-prod-int.dns_name}"
  managed_zone_dmz          = "${google_dns_managed_zone.ikea-splunk-prod.name}"
  managed_zone_int          = "${google_dns_managed_zone.ikea-splunk-prod-int.name}"
  num_reserved_ips          = 32
}
```

Workflow with Vault

- Gitlab Configuration
- Vault Secrets
- Terraform Provisioning
- Ansible Configuration



Generate Secrets

- Generate Splunk Secrets
- Easily done in Terraform
- Don’t ask about randomness

```
// Generate Vault Secrets


resource "random_password" "discover_pass4SymmKey" {
  length = 64
  special = true
  override_special = "./"
}
resource "random_password" "pass4SymmKey" {
  length = 64
  special = true
  override_special = "./"
}
resource "random_password" "admin_passwd" {
  length = 64
  special = true
  override_special = "./"
}
```

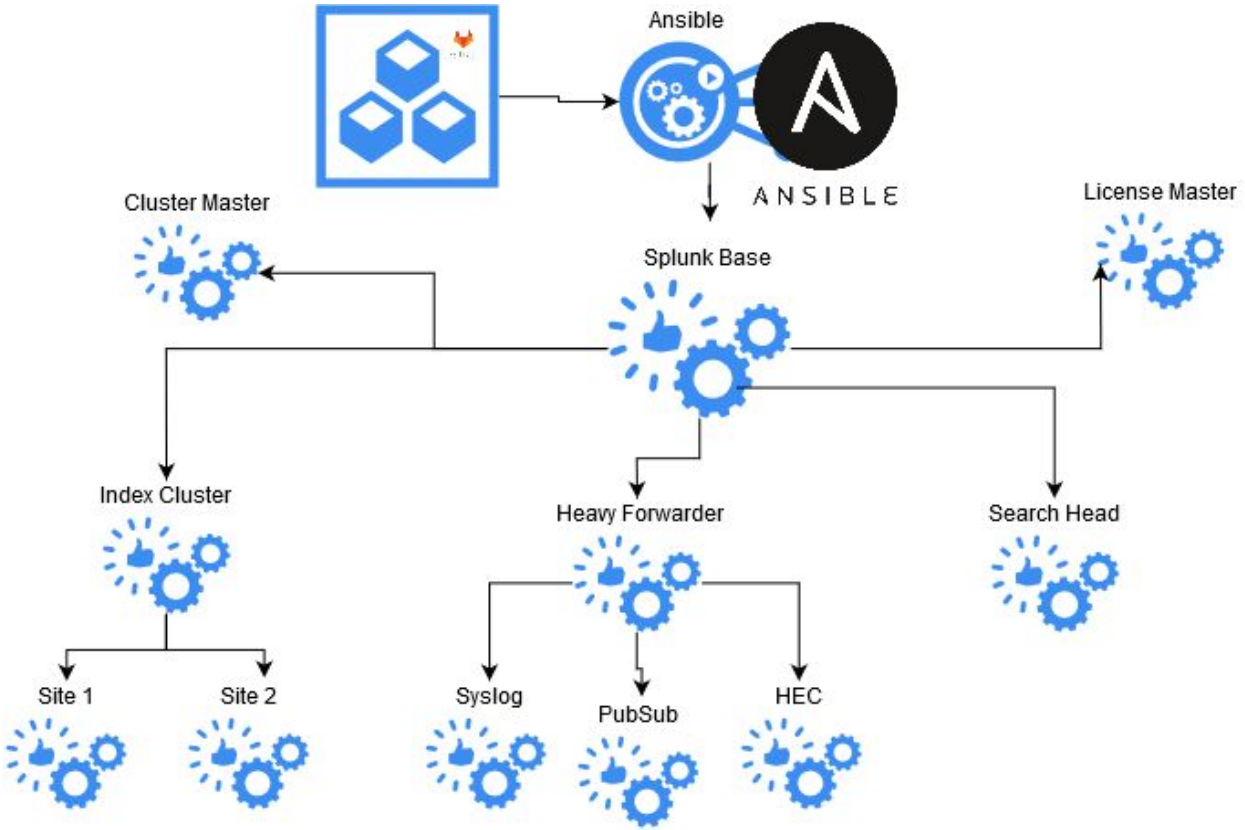
Store Secrets in Vault

- Write config data to Vault
- Used later by Ansible for configuration
- Minimize configuration required to build a new Splunk cluster.

```
resource "vault_generic_secret" "index_cluster_vault" {
  path = "/secret/splunk/${var.cluster_name}"

  data_json = <<EOT
    {
    "splunk_cluster_discovery_pass4SymmKey": "${random_password.discover_pass4SymmKey.result}",
    "splunk_cluster_pass4SymmKey": "${random_password.pass4SymmKey.result}",
    "splunk_cluster_sslPassword": "${data.vault_generic_secret.sslPassword.data["sslPassword"]}",
    "splunk_current_admin_password": "changeme",
    "splunk_default_admin_password": "${random_password.admin_passwd.result}",
    "splunk_ds": "${var.ds_name}",
    "splunk_hf_label": "${var.cluster_name}",
    "splunk_ixc_label": "${var.cluster_name}",
    "splunk_lm": "${var.lm_name}",
    "splunk_master_ip": "${google_dns_record_set.cm-int.0.name}",
    "splunk_old_admin_password": "changme",
    "splunk_serverCertName": "splunkmanagementdata.v4.pem",
    "splunk_sslRootCAPathName": "IKEA-CA-bundle.v4.pem"
    }
  EOT
}
```


GREAT PITCH, AMAZING PRODUCT
I'M OUT
quickmeme.com

Ansible Workflow



Ansible Playbooks

- Uses Labels in GCP set by Terraform
- Applies to Roles in Ansible

```yaml
---
# Configure all splunk nodes with common configuration
- name: Setup base config on Splunk servers
  hosts: "{{ servers | default('splunk_alpha') }}"
  roles:
    - { role: common, tags: ['common', 'common-base'] }
    - { role: splunk-base, tags: ['splunk-base', 'common-base'] }

# Configure the Cluster Master
- name: Setup config on Splunk Cluster Master
  hosts: "{{ cm_servers | default('splunk_alpha_cm') }}"
  roles:
    - { role: splunk-cluster-master, tags: splunk-cluster-master }
    - { role: splunk-web-interface, tags: splunk-web-interface }

# Add the Peer Nodes to the cluster
- name: Setup config on Splunk Peer Nodes
  hosts: "{{ idx_servers | default('splunk_alpha_idx') }}"
  roles:
    - { role: splunk-peer-nodes, tags: splunk-peer-nodes }

# Install Heavy Forwarder for Adapters
- name: Heavy Forwarder for Adapters
  hosts: "{{ hf_adapter_servers | default('splunk_alpha_hf_adapter') }}"
  roles:
    - { role: splunk-heavy-forwarder, tags: splunk-heavy-forwarder }
    - { role: splunk-heavy-forwarder-adapter, tags: splunk-heavy-forwarder-adapter }
    - { role: splunk-web-interface, tags: splunk-web-interface }

# Install Heavy Forwarder for UF trafic
- name: Heavy Forwarder for traffic to 9997 config
  hosts: "{{ hf_9997_servers | default('splunk_alpha_hf_ir') }}"
  roles:
    - { role: splunk-heavy-forwarder, tags: splunk-heavy-forwarder }
    - { role: splunk-heavy-forwarder-9997, tags: splunk-heavy-forwarder-9997 }

# Install Heavy Forwarder HEC
- name: Heavy Forwarder HEC config
  hosts: "{{ hf_hec_servers | default('splunk_alpha_hf_hec') }}"
  roles:
    - { role: splunk-heavy-forwarder, tags: splunk-heavy-forwarder }
    - { role: splunk-heavy-forwarder-hec, tags: splunk-heavy-forwarder-hec }
```

Ansible Roles

Name
..
cluster-uninstall/tasks
common/tasks
git
splunk-base
splunk-cluster-master
splunk-deployment-server
splunk-heavy-forwarder
splunk-heavy-forwarder-9997
splunk-heavy-forwarder-adapter
splunk-heavy-forwarder-hec
splunk-license-master
splunk-peer-nodes
splunk-web-interface

Variables and Secrets

```yaml
---
# Override default values
# Specific configuration for global staging
deploy_stage: "alpha"

# Packages
# Use wget to grab the latest package from splunk.com
# Place file in roles folder under -> splunk-base/files
splunk_package_file: 'splunk-7.2.4-8a94541dcfac.x86_64.rpm'
splunk_version: '7.2.4'
splunk_base: '/opt/splunk'
splunk_vg_name: vg_splunk
splunk_lv_name: lv_splunk
file_system: xfs

# Set mountpoints for buckets
idx_warm_path: "{{ splunk_base }}/var/lib/splunk"
idx_cold_path: "{{ splunk_base }}/var/lib/splunk/cold"
warm_vg_name: vg_warm
warm_lv_name: lv_warm
cold_vg_name: vg_cold
cold_lv_name: lv_cold

# Use multisite or single site cluster config
#splunk_cluster_pass4SymmKey: 'located in secrets file'
use_multisite_config: "false" #set to false when not using

# Multisite config options
site: "site0"
cluster_label: "alpha_Cluster"
search_site: "site0"
available_sites: "site0"
```

```yaml
alpha:
  splunk_ixc_label: "alpha"
  splunk_hf_label: "alpha"
  splunk_master_ip: "cm-alpha-gcp-europe-west1.ikea-splunk-prod.int"
  splunk_ds: 'ds0-gcp-europe-west1.ikea-splunk-prod.int'
  splunk_lm: 'lm.ikea-splunk-prod.int'
  splunk_default_admin_password: 'changeme'
  splunk_old_admin_password: 'changeme'
  splunk_current_admin_password: 'changeme'
  splunk_cluster_pass4SymmKey: 'someRandomKey'
  splunk_cluster_discovery_pass4SymmKey: 'differentRandomKey'
  ssl:
    splunk_cluster_sslPassword: 'IDon'tThinkSo'
    splunk_sslRootCAPathName: "IDon'tThinkSo"
    splunk_serverCertName: "IDon'tThinkSo"
```

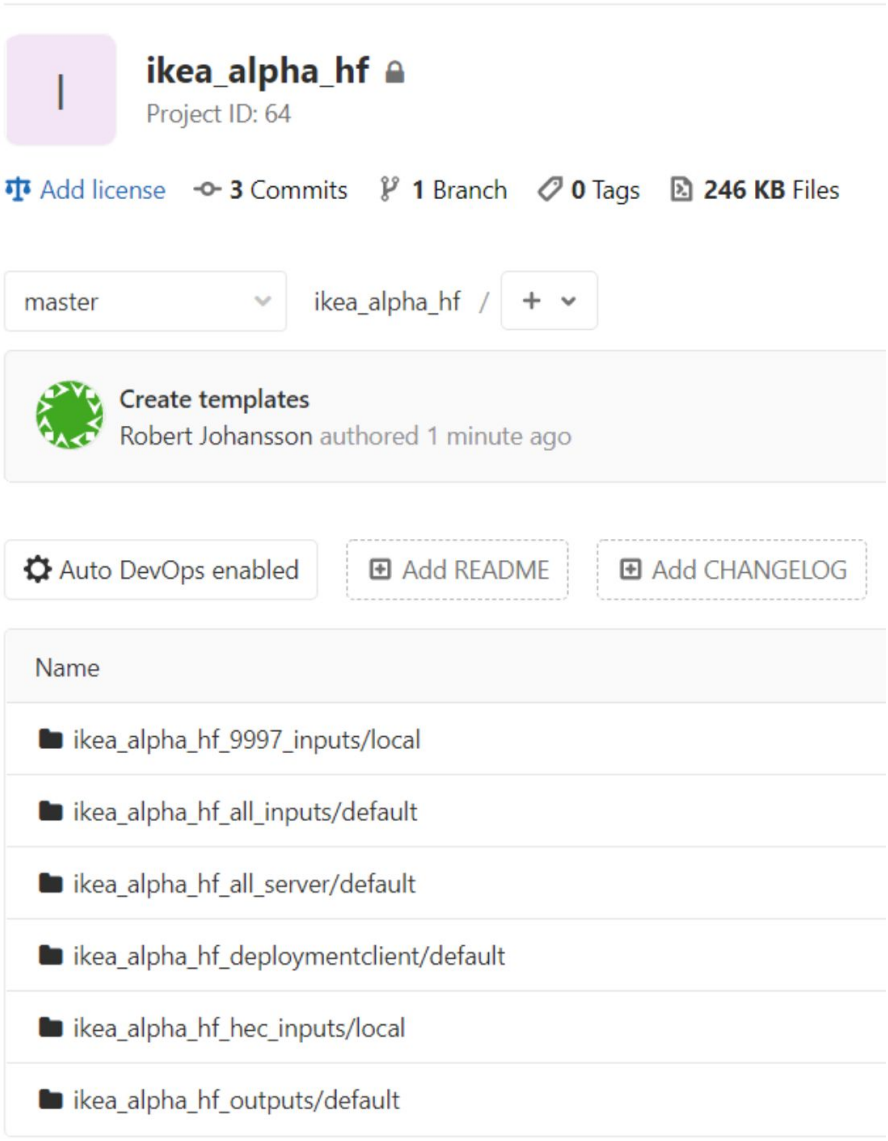
Push and Pull to Git

- Use Ansible to create projects in GitLab from templates
- Pull config from project if it already exists
- One place for all the current configs

```yaml
- name: Create Gitlab Project
  gitlab_project:
    server_url: "{{ git_server }}"
    api_token: "{{ git_token }}"
    group: "{{ git_group }}"
    name: "{{ customer_name }}_{{ stage.splunk_ixc_label }}_idx"
    state: present
    validate_certs: no
  delegate_to: localhost
  run_once: true
  register: gitCreate

- name: Populate new Git project
  import_tasks: create_conf.yml
  when: gitCreate.changed

- name: "Git: is it up-to-date?"
  git:
    repo: "{{ git_address }}:{{ git_group }}/{{ customer_name }}_{{ stage.splunk_ixc_label }}_idx"
    dest: "{{ git_tmp }}/{{ customer_name }}_{{ stage.splunk_ixc_label }}_idx"
    update: yes
    version: master
  register: git
  delegate_to: localhost
  run_once: true
- debug:
    var: git

- name: "Create {{ customer_name }}_{{ stage.splunk_ixc_label }}_master_base/local directories"
  file:
    path: "{{ item }}"
    owner: splunk
    group: splunk
    mode: u=rwX,g=rX,o-rwx
    recurse: yes
    state: directory
  with_items:
    - "{{ splunk_base }}/etc/apps/{{ customer_name }}_{{ stage.splunk_ixc_label }}_master_base/
    - "{{ splunk_base }}/etc/apps/{{ customer_name }}_{{ stage.splunk_ixc_label }}_master_base/
```

Git Project

- Separate project for each cluster and function
- All Splunk config is in apps, nothing in system/local
- Using Splunk base apps standard



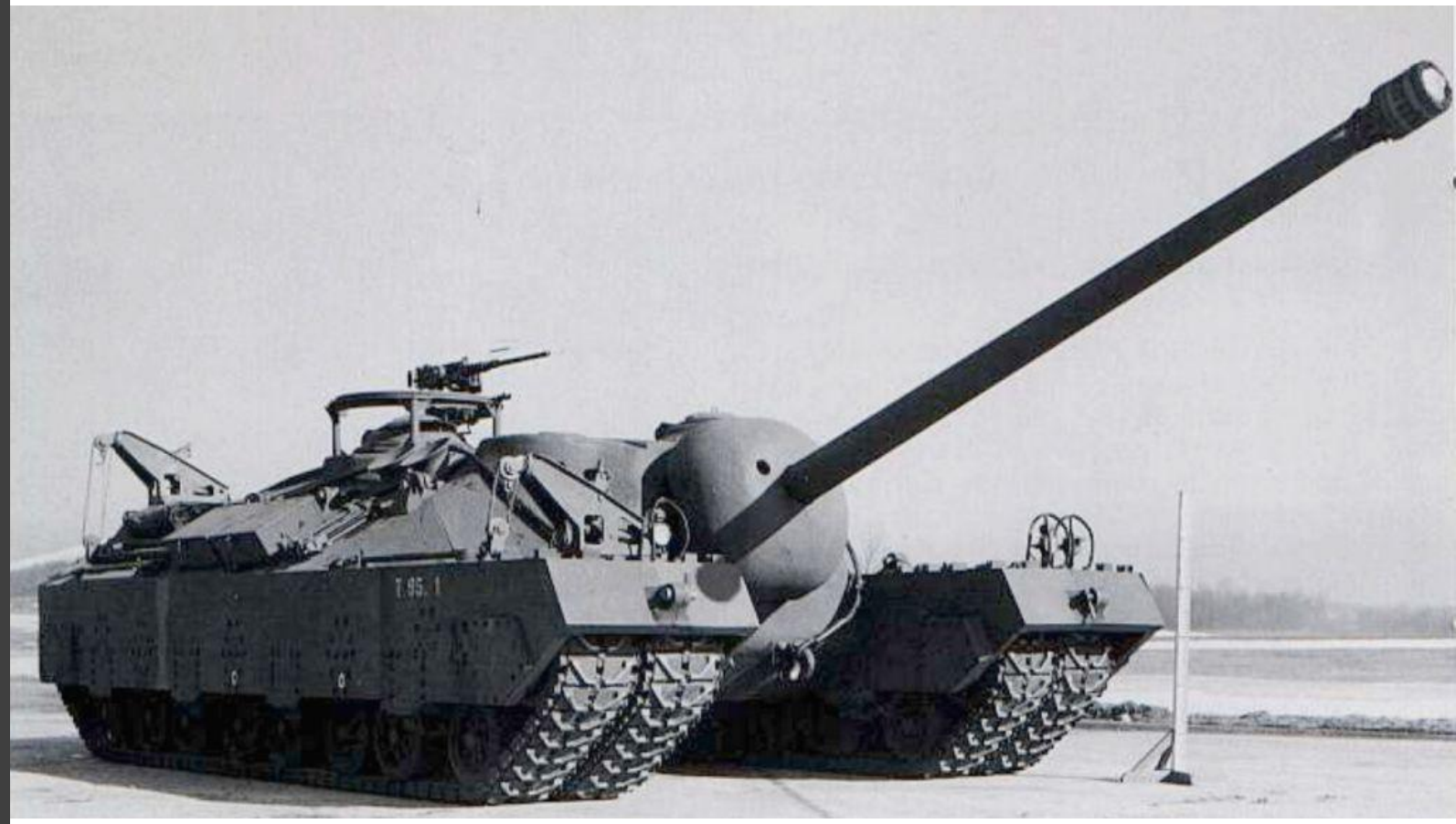
What could possibly go wrong?

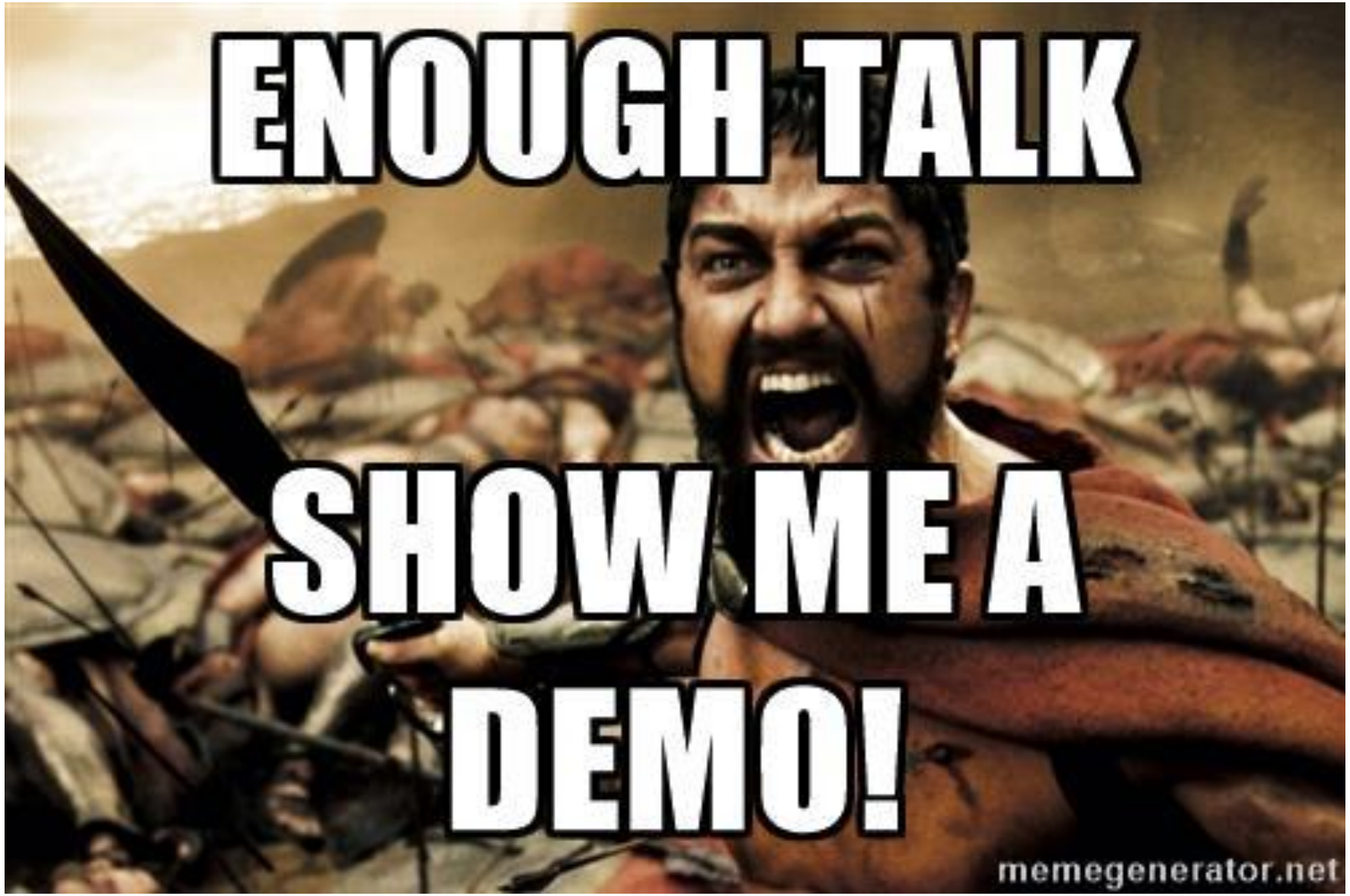
- Easy come, easy go
- Corrupt Terraform Statefile
- Terraform Lifecycle doesn’t work if code is removed.
- Restarting the cluster all at once

Some assembly required.

Bigger, Better, More Derpy

- Autoscaling
- Further Vault Integration
- Single Configuration Source
- Log All The Things to Splunk
- SmartStore for Cold Buckets
- Automagic PubSub
- Consul for Connectivity

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