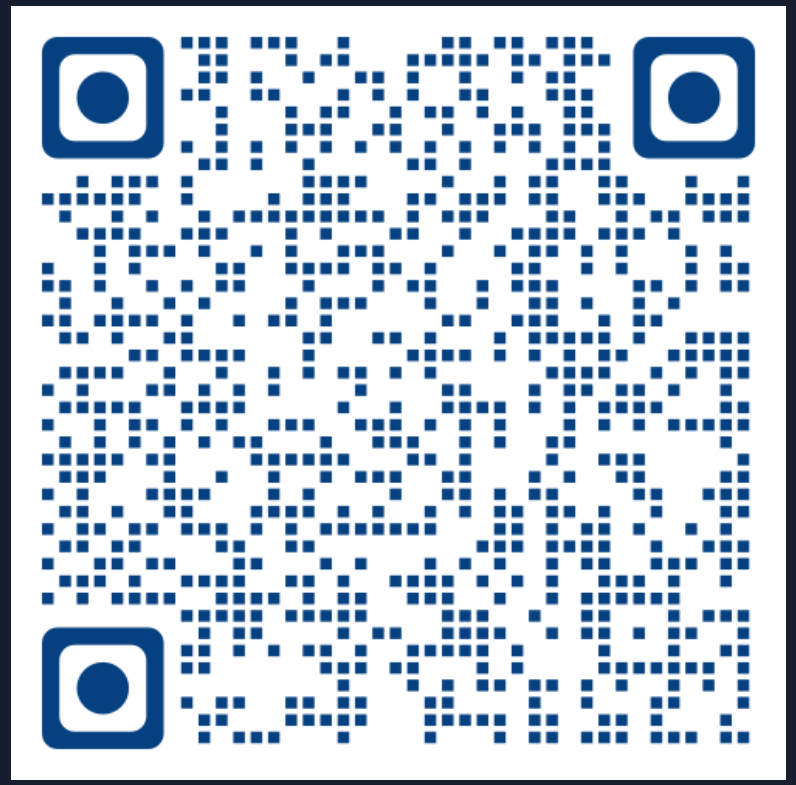
AWS Terraform Small Environment

→ Maxim Crucovschii, Cloud Engineer



→ https://github.com/mcrucovschii/SmallEnvironment

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Contents

Statement Of Work

→ Assignment for the work

Small Environment, the Requirements:

2 LBs (Custom Hardened Linux AMI)

2 Application-Server (default AWS AMI)

3 DB-Nodes (default AWS AMI)

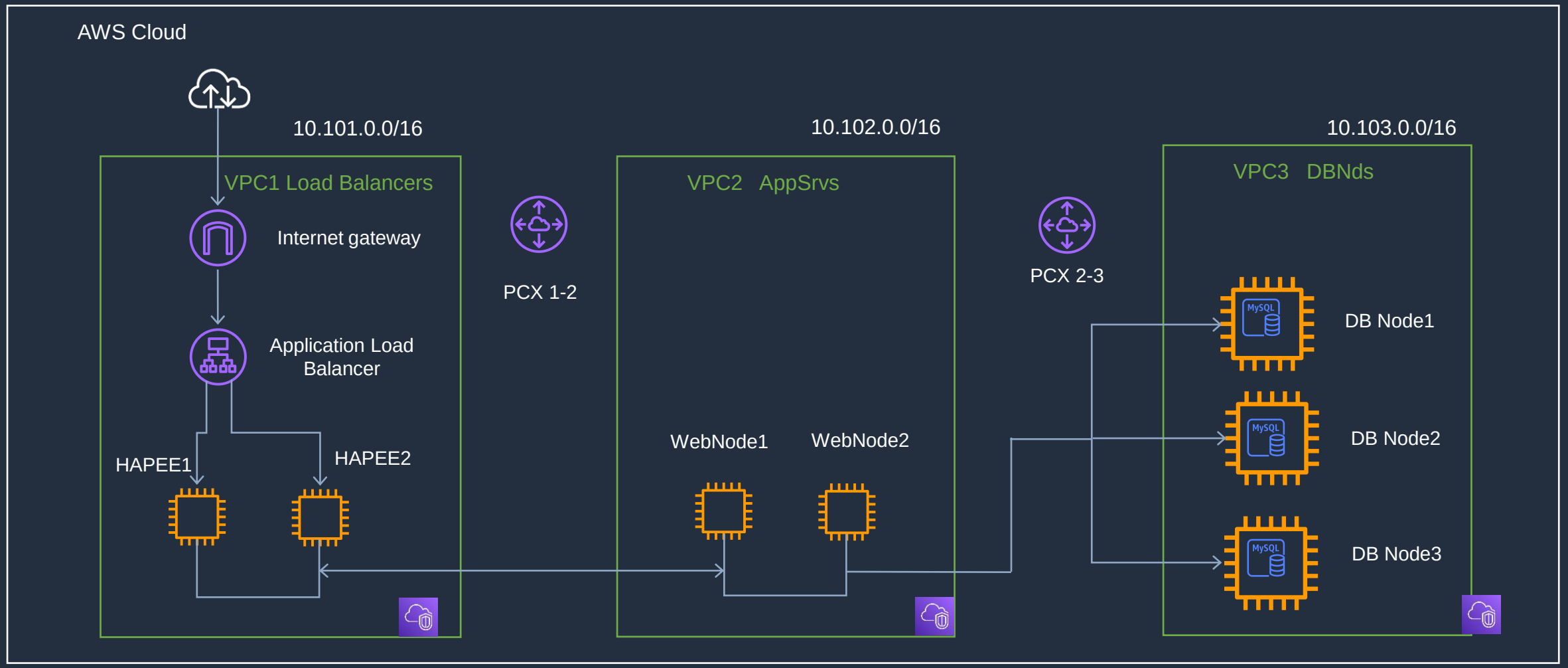
3 Different VPCs/Networks & Sec-Groups to Isolate Application from DB from Public-Access to LB

- How can this be put into a GitHub Action Pipeline to get applied when merged?
- Is there any other way to integrate it into our AWX(Ansible Tower) infrastructure to Reflect a IaaC Approach?
- What could be the best way to distribute Traffic over 2 LBs or would you prefer Active/Passive? How can this be done without any interaction?
- Finally present the examples and you thoughts about the Challenges and mind-gaps in this Request?

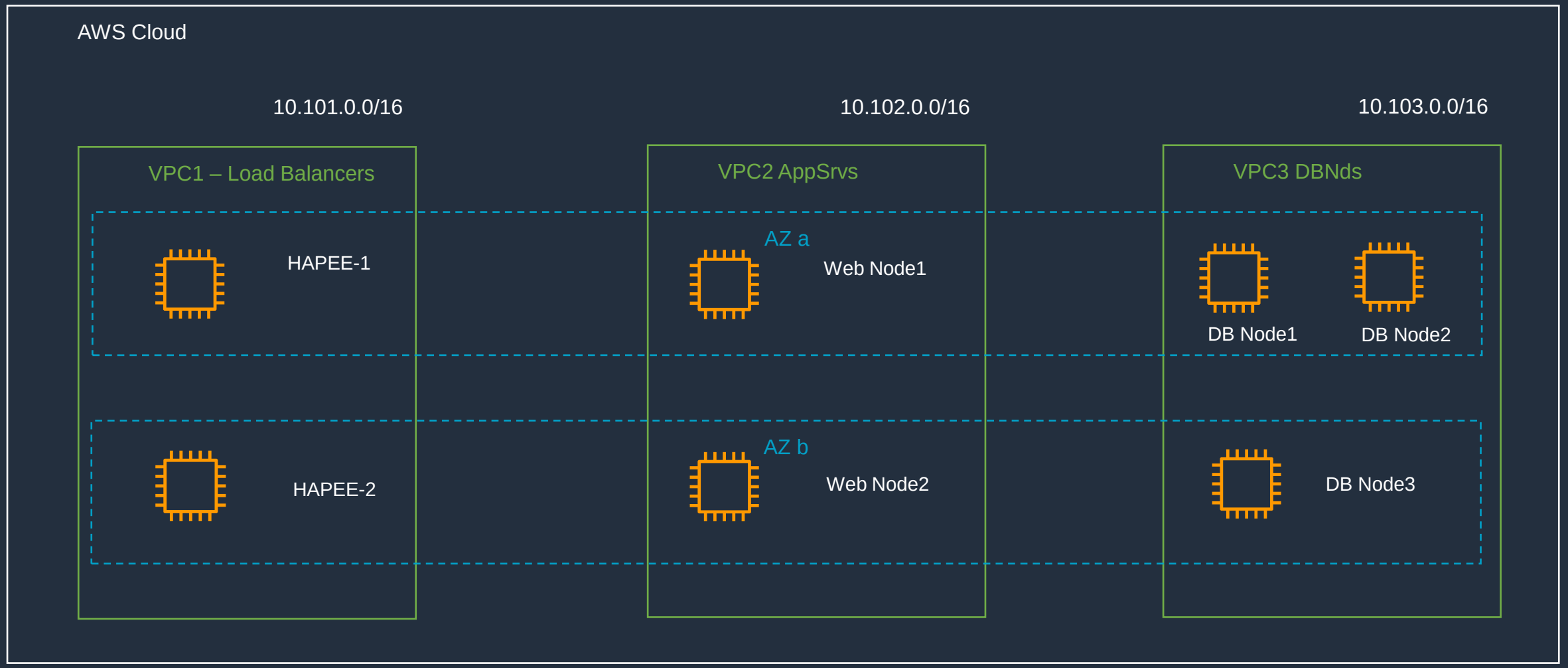
Architecture

Architecture that was applied

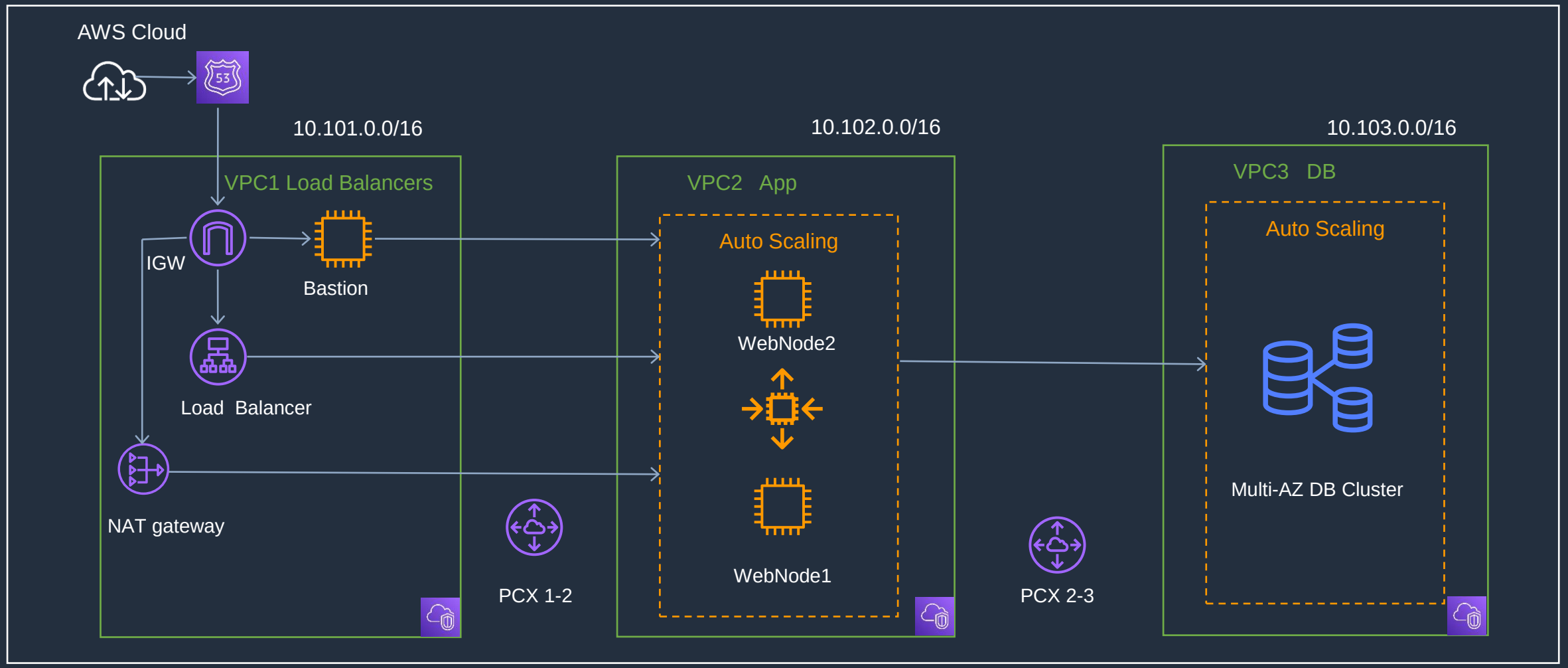
AWS Small Environment Architecture



AWS High Availability Multi AZ

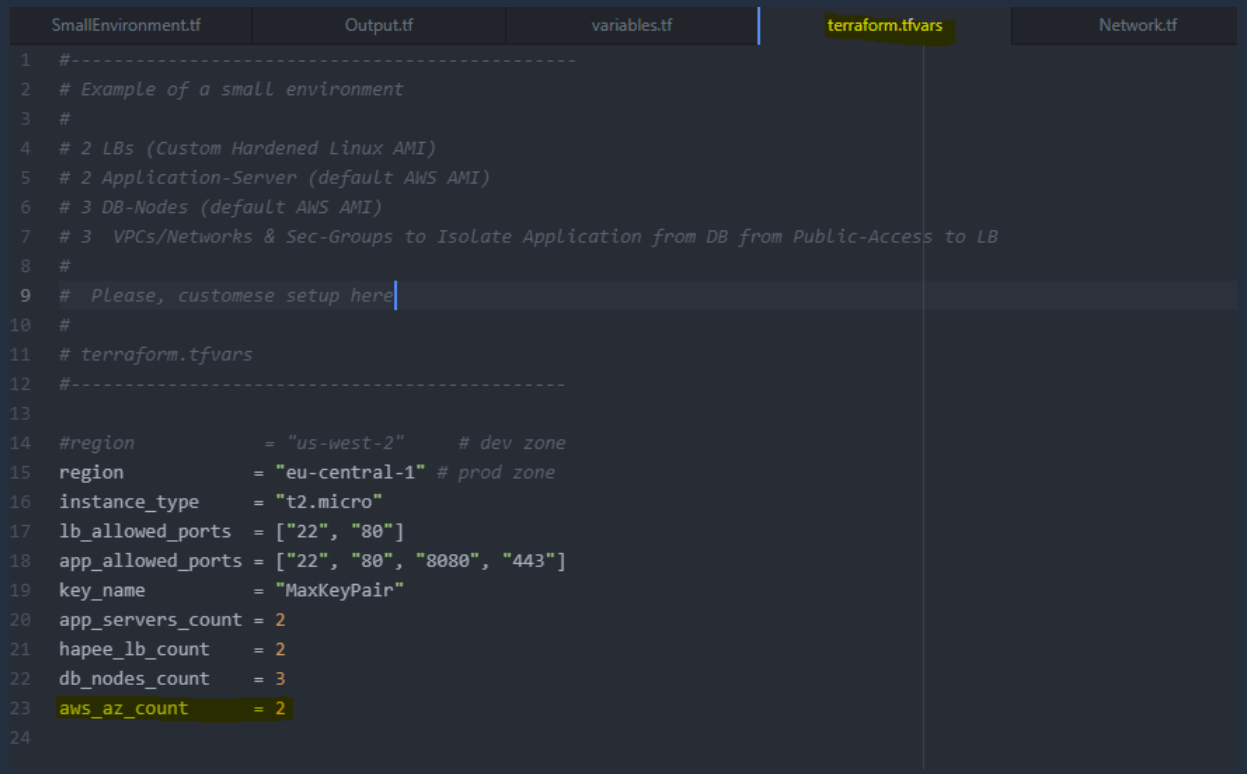


AWS Small Environment Architecture



AWS High Availability Multi AZ

AWS Cloud

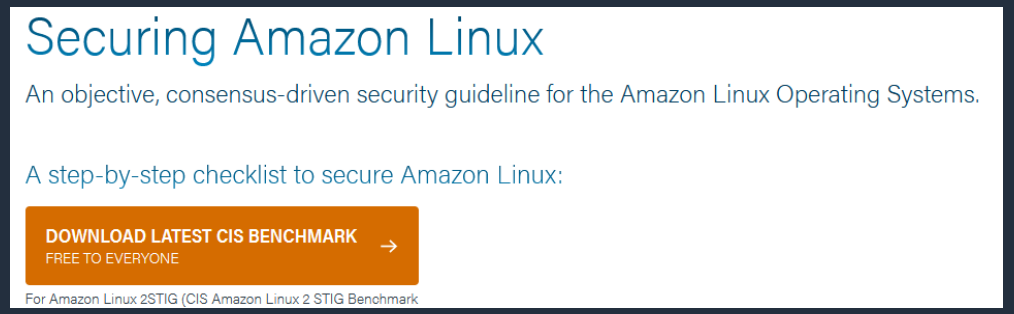


The Solution

→ Development considerations

Small environment: LBs hardening

Bootstrap script for Amazon Linux to comply with CIS Amazon Linux Benchmark



LBs hardening - 149 security policies remediated

Ensure sticky bit is set on all world - writable directories

Ensure ntp is configured

Ensure time synchronization is in use

Ensure chrony is configured

Ensure X Window System is not installed

Ensure mail transfer agent is configured for local - only mode

Set Network Parameters(Host Only)

Set Network Parameters(Host and Router)

LBs hardening - 149 security policies remediated

Ensure IPv6 settings disabled

Ensure TCP Wrappers is installed

Ensure /etc/hosts.allow is configured

Ensure permissions on /etc/hosts.allow are configured

Ensure permissions on /etc/hosts.deny are configured

Uncommon Network Protocols are disabled (dccp, sctp, rds, tipc)

Firewall Configuration reviewed and updated

Reconfigured rsyslog settings

LBs hardening - 149 security policies remediated

Ensure permissions on all logfiles are configured

Ensure cron daemon is enabled

Ensure permissions on /etc/ssh/sshd_config are configured

PAM extensively reconfigured

Set Shadow Password Suite Parameters

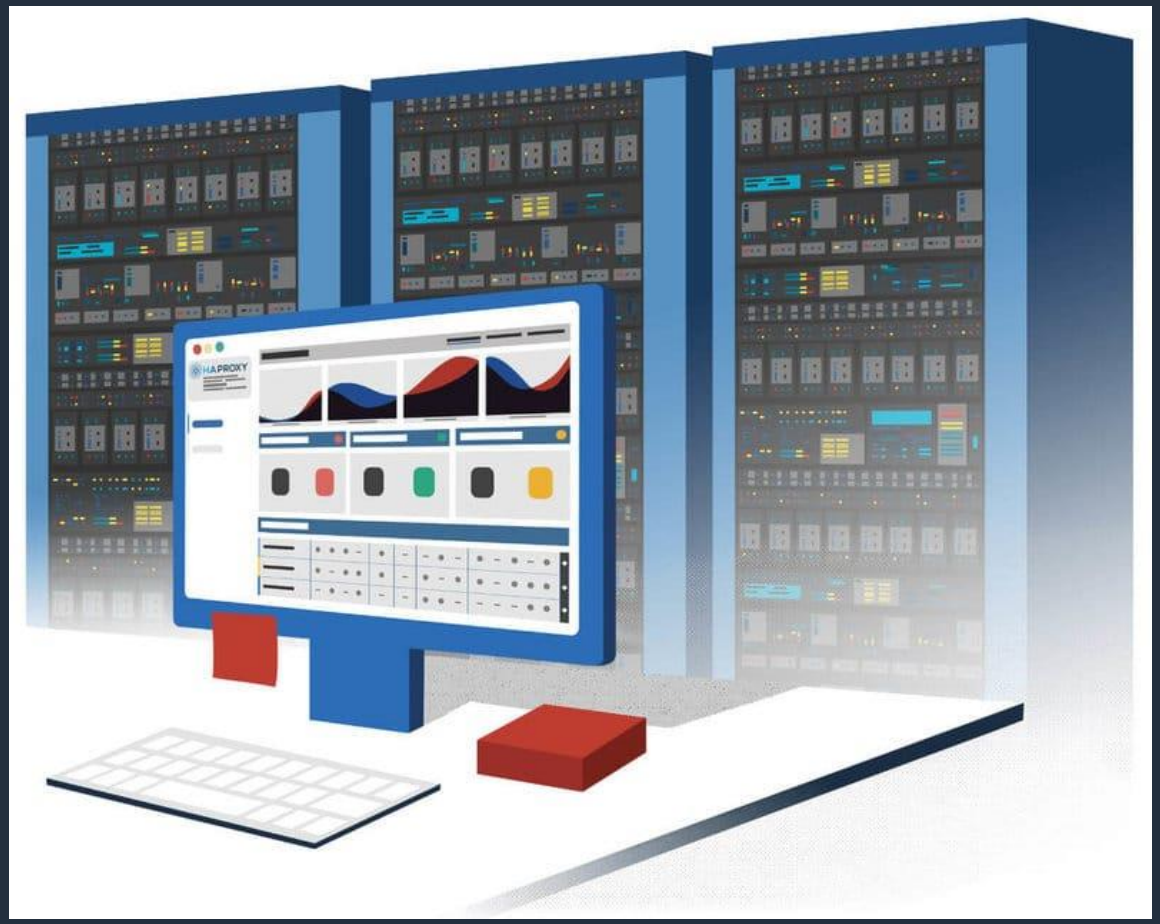
Ensure that access to the su command is restricted

Ensure that Amazon Time Sync Service is available

Small environment: HA Proxy Load Balancer

One of the popular balancers in the market, provides high availability, proxy, TCP/HTTP load-balancing. HAProxy is used by some of the reputed brands in the world, like below.

- Airbnb
- GitHub
- Imgur
- Reddit



Small environment: HA Proxy Load Balancer. haproxy.cfg

```
Global
    log         127.0.0.1 local2
    chroot      /var/lib/haproxy
    pidfile     /var/run/haproxy.pid
    maxconn     4000
    user        haproxy
    group       haproxy
    daemon

defaults
    mode                    http
    log                     global
    option                  httplog
    option                  dontlognull
    option http-server-close
    option forwardfor       except 127.0.0.0/8
    option                  redispatch
    retries                 3
    timeout http-request    10s
    timeout queue           1m
    timeout connect         10s
    timeout client          1m
    timeout server          1m
    timeout http-keep-alive 10s
    timeout check           10s
    maxconn                 3000

frontend http_front
   bind *:80
   stats uri /stats
   default_backend http_back
#---------------------------------------
# round robin balancing
between the various backends
#---------------------------------------
backend http_back
    balance     roundrobin
```

Small environment: HA Proxy. haproxy.cfg.rendered

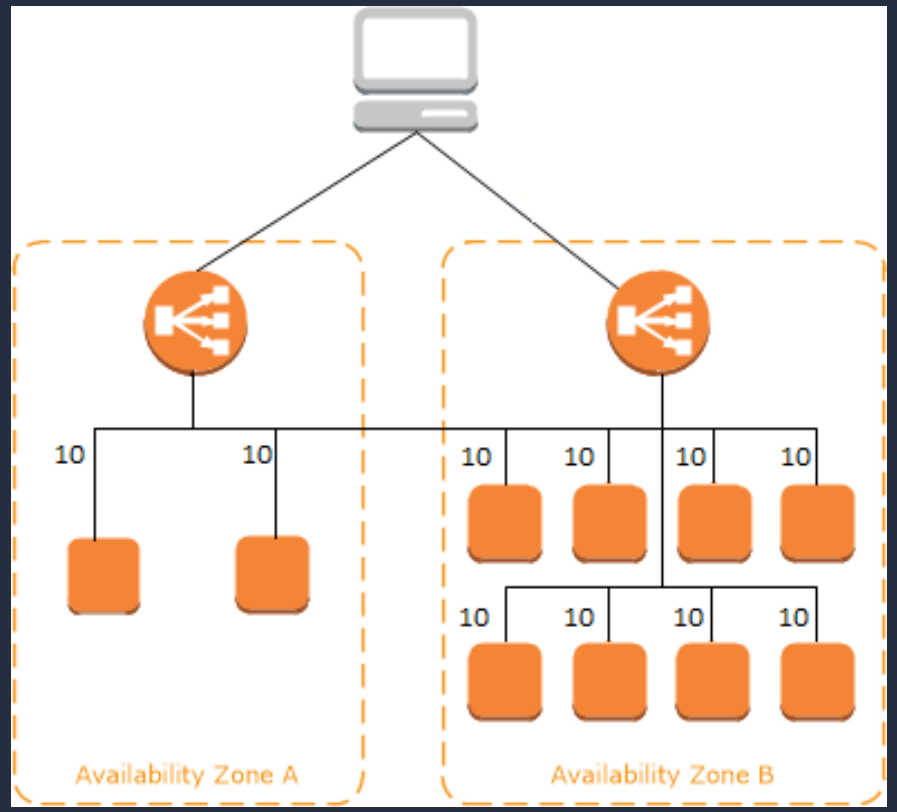
```
data "template_file“    "hapee-userdata" {

  template = file("hapee-userdata.sh.tpl")

  vars = {

    serverlist = join("\n", formatlist("    server app-%v %v:80 cookie app-%v check", aws_instance.web_node.*.id, aws_instance.web_node.*.private_ip, aws_instance.web_node.*.id))

  }

}
```

Amazon Application Load Balancer

An Application Load Balancer functions at the application layer, the seventh layer of the OSI model. After the load balancer receives a request, it evaluates the rules and then selects a target from the target group.

The default routing algorithm is round robin.

Health checks are used to monitor the health of the registered targets so that the load balancer can send requests only to the healthy targets.



Code

→ Solution structure and code review

https://github.com/mcrucovschii/SmallEnvironment

Main.tf – main Terraform file, no provisioning there

SmallEnvironment.tf - instances

Network.tf – VPCs, subnets, security groups, gateway, route tables, ALB, DNS

terraform.tfvars – settings and adjustments

variables.tf – declaration of variables

Output.tf – CLI output

Crucovschii-AWS-SmallEnvironment.pptx (.pdf) – this presentation

SmallEnvironment.tf

resource "aws_instance" "db_node“

resource "aws_instance" "web_node“

resource "aws_instance" "hapee_node"

Network.tf

resource "aws_instance" "db_node“

resource "aws_instance" "web_node“

resource "aws_instance" "hapee_node"

terraform.tfvars

region = region where infrastructure will be deployed

instance_type = instance_type that will be used for hapee, web nodes and db nodes"

key_name = a key pair in the region where you are going to deploy

app_servers_count = a number of app servers (web nodes) to be launched

hapee_lb_count = a number of hapee balancers to be launched

db_nodes_count = a number of db nodes to be launched

aws_az_count = a number of availability zones where infrastructure will be deployed

Output.tf

output "data_aws_caller_identity“

output "data_aws_regions_name“

output "aws_availability_zones“

output "Web_node_public_IPs"

output "HAPEE_nodes_public_IPs“

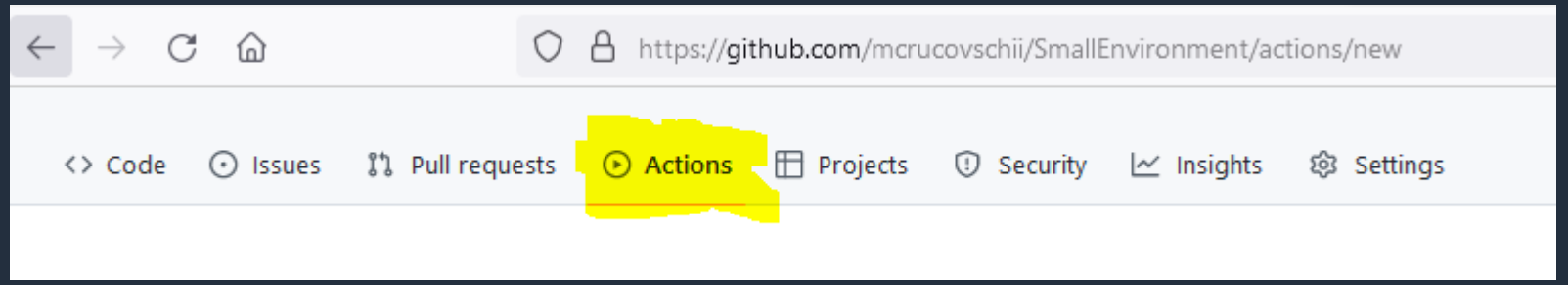
output "LB_HAPEE_DNS_address“

Questions

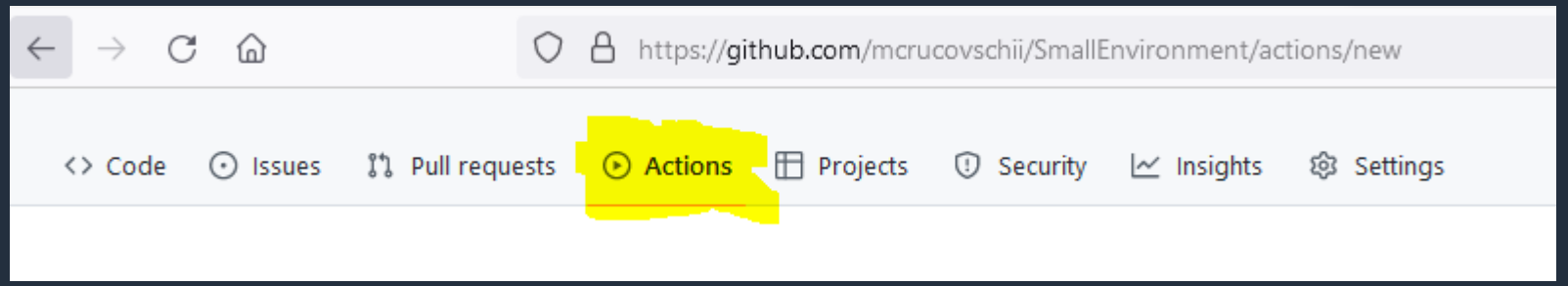
→ Please, ask me whatever you want to know

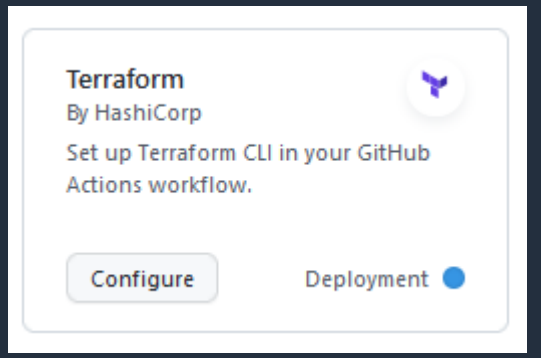
GitHub Action Pipeline

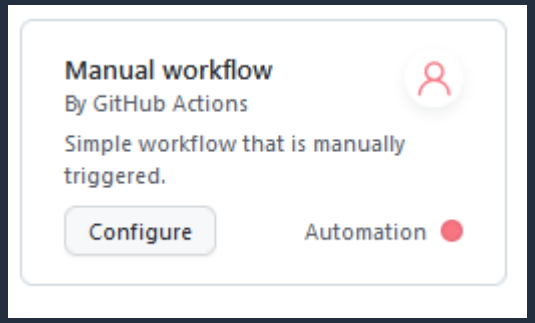
Webhooks allow external services to be notified when certain events happen. When the specified events happen, we'll send a POST request to each of the URLs you provide. Learn more in ou



GitHub Action Pipeline





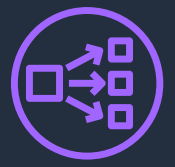


GitHub Action Pipeline. terraform.yml

```
on:  push:    branches:    - “Master“

jobs:  terraform:    name: 'Terraform'    runs-on: ubuntu-latest    environment: production

uses: hashicorp/setup-terraform@v1

                with:        cli_config_credentials_token: ${{ secrets.TF_API_TOKEN }}

 run: terraform init

 run: terraform fmt –check

 run: terraform plan -input=false

 if: github.ref == 'refs/heads/“Master"' && github.event_name == 'push'

                run: terraform apply -auto-approve -input=false
```

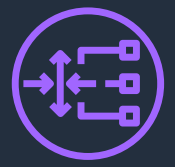
The best way to distribute Traffic over 2 LBs or would you prefer Active/Passive? How can this be done without any interaction?

Application Load Balancer



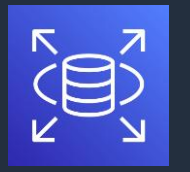
Network Load Balancer

Classic Load Balancer



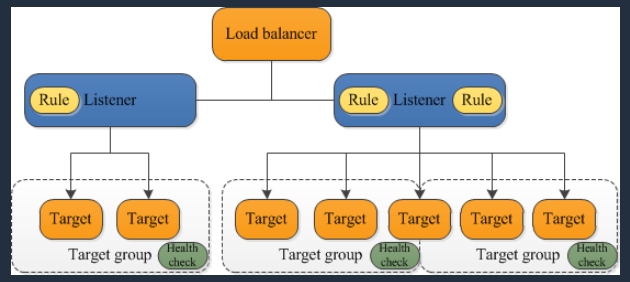
Gateway Load Balancer

Auto Scaling



Amazon Relational Database Service (Amazon RDS)

Amazon EC2



The best way to distribute Traffic over 2 LBs or would you prefer Active/Passive? How can this be done without any interaction?

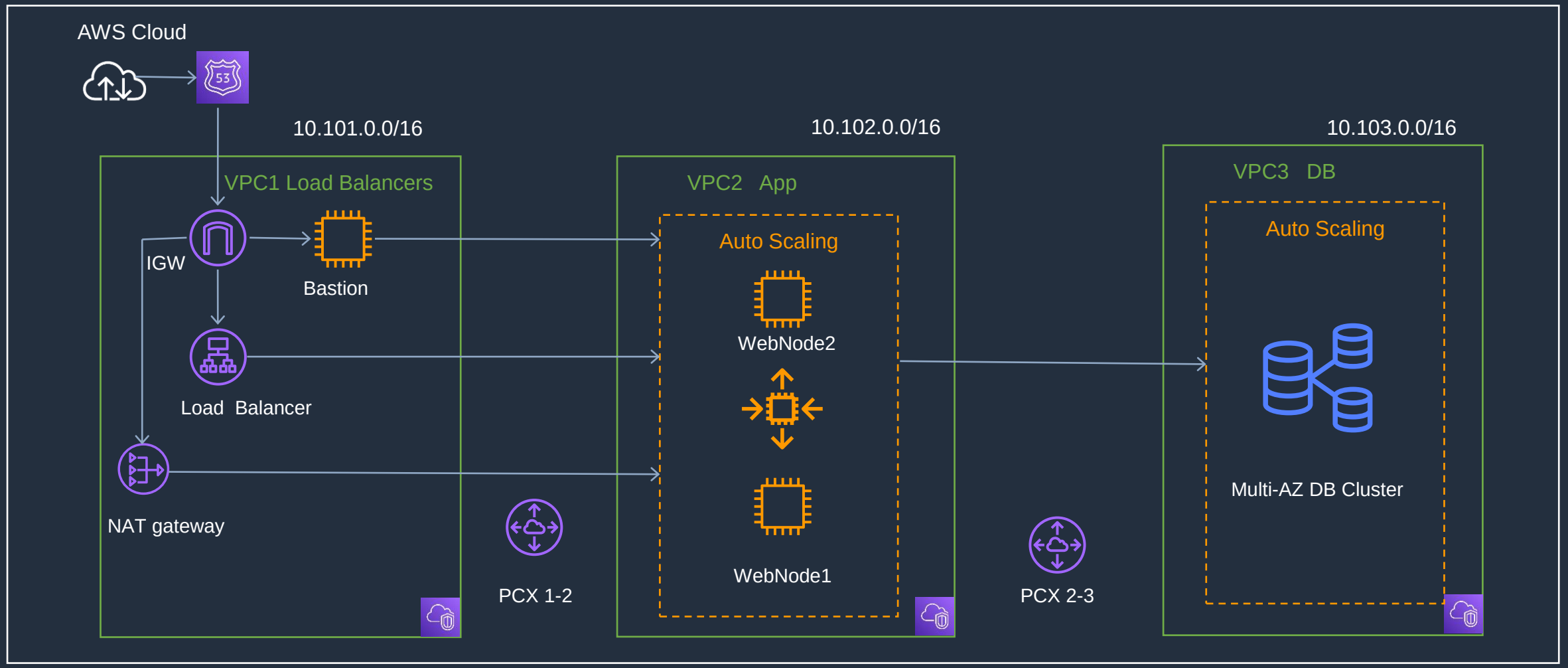
- In an **active-passive** configuration, the load balancer recognizes a failed node and redirects traffic to the next available node.
- In an **active-active** configuration, the load balancer spreads out the workload's traffic among multiple nodes.

integration into our AWX(Ansible Tower) infrastructure

Automatically export deployed stack to AWX inventory:

- Configure terraform output
- https://github.com/adammck/terraform-inventory
- https://github.com/mcrucovschii/terraform-null-ansible
- https://github.com/opencredo/k8s-terraform-ansible-sample/tree/master/terraform

My thoughts / My vision



Questions ?