**Implementing Load Balancer**

**Overview**

In this practice, you will create a public load balancer, which will involve:

* Two Instances
* Two Public Subnets
* Security list with 80 port opened
* Listeners
* Back-end sets
* Path route sets
* Host names
* Work Requests

You will also install web servers on the VMs using boot strapping.

**Tasks**

Create a new directory called loadbalancer and place the below contents in a new file called

loadbalance.tf. Remember to replace the namespace value with your tenancy name in the

code below. The code provided here is long. You can use the lab file provided on the Oracle

provided instance from which you are connecting to OCI to copy and paste the code.

*[opc@terraformserver terraform]$ mkdir -p loadbalancer*

*[opc@terraformserver terraform]$ cd loadbalancer*

*[opc@terraformserver loadbalancer]$ vi loadbalance.tf*

*[opc@terraformserver loadbalancer]$ cat loadbalance.tf*

*# ---- use variables*

*variable "tenancy\_ocid" {}*

*variable "user\_ocid" {}*

*variable "fingerprint" {}*

*variable "private\_key\_path" {}*

*variable "compartment\_ocid" {}*

*variable "region" {}*

*variable "ssh\_public\_key" {}*

*#variable "AD" {}*

*#--- provider*

*provider "oci" {*

*#region = "${var.region}"*

*tenancy\_ocid = "${var.tenancy\_ocid}"*

*user\_ocid = "${var.user\_ocid}"*

*fingerprint = "${var.fingerprint}"*

*private\_key\_path = "${var.private\_key\_path}"*

*}*

*variable "instance\_image\_ocid" {*

*type = "map"*

*default = {*

*// See https://docs.us-phoenix-1.oraclecloud.com/images/*

*// Oracle-provided image "Oracle-Linux-7.5-2018.10.16-0"*

*us-phoenix-1 =*

*"ocid1.image.oc1.phx.aaaaaaaaoqj42sokaoh42l76wsyhn3k2beuntrh5maj*

*3gmgmzeyr55zzrwwa"*

*us-ashburn-1 =*

*"ocid1.image.oc1.iad.aaaaaaaageeenzyuxgia726xur4ztaoxbxyjlxogdhr*

*eu3ngfj2gji3bayda"*

*eu-frankfurt-1 = "ocid1.image.oc1.eu-frankfurt-*

*1.aaaaaaaaitzn6tdyjer7jl34h2ujz74jwy5nkbukbh55ekp6oyzwrtfa4zma"*

*uk-london-1 = "ocid1.image.oc1.uk-london-*

*1.aaaaaaaa32voyikkkzfxyo4xbdmadc2dmvorfxxgdhpnk6dw64fa3l4jh7wa"*

*}*

*}*

*variable "instance\_shape" {*

*default = "VM.Standard2.1"*

*}*

*variable "availability\_domain" {*

*default = 3*

*}*

*data "oci\_identity\_availability\_domains" "ADs" {*

*compartment\_id = "${var.tenancy\_ocid}"*

*}*

*/\* Network \*/*

*resource "oci\_core\_virtual\_network" "vcn-web" {*

*cidr\_block = "10.0.0.0/16"*

*compartment\_id = "${var.compartment\_ocid}"*

*display\_name = "vcn-web"*

*dns\_label = "vcnweb"*

*}*

*resource "oci\_core\_security\_list" "LB-Security-List" {*

*display\_name = "LB-Security-List"*

*compartment\_id = "${oci\_core\_virtual\_network.vcnweb.*

*compartment\_id}"*

*vcn\_id = "${oci\_core\_virtual\_network.vcn-web.id}"*

*egress\_security\_rules = [{*

*protocol = "all"*

*destination = "0.0.0.0/0"*

*}]*

*ingress\_security\_rules = [*

*{*

*protocol = "6"*

*source = "0.0.0.0/0"*

*tcp\_options {*

*"min" = 80*

*"max" = 80*

*}*

*},*

*{*

*protocol = "6"*

*source = "0.0.0.0/0"*

*tcp\_options {*

*"min" = 443*

*"max" = 443*

*}*

*},*

*]*

*}*

*resource "oci\_core\_default\_security\_list" "default-securitylist"*

*{*

*manage\_default\_resource\_id = "${oci\_core\_virtual\_network.vcnweb.*

*default\_security\_list\_id}"*

*egress\_security\_rules = [{*

*protocol = "all"*

*destination = "0.0.0.0/0"*

*}]*

*ingress\_security\_rules = [*

*{*

*protocol = "6"*

*source = "10.0.0.0/24"*

*tcp\_options {*

*"min" = 80*

*"max" = 80*

*}*

*},*

*{*

*protocol = "6"*

*source = "10.0.1.0/24"*

*tcp\_options {*

*"min" = 80*

*"max" = 80*

*}*

*},*

*]*

*}*

*resource "oci\_core\_default\_route\_table" "default-route-table" {*

*manage\_default\_resource\_id = "${oci\_core\_virtual\_network.vcnweb.*

*default\_route\_table\_id}"*

*route\_rules {*

*destination = "0.0.0.0/0"*

*destination\_type = "CIDR\_BLOCK"*

*network\_entity\_id =*

*"${oci\_core\_internet\_gateway.internetgateway1.id}"*

*}*

*}*

*resource "oci\_core\_internet\_gateway" "internetgateway1" {*

*compartment\_id = "${var.compartment\_ocid}"*

*display\_name = "internetgateway1"*

*vcn\_id = "${oci\_core\_virtual\_network.vcn-web.id}"*

*}*

*resource "oci\_core\_route\_table" "LB-Route-Table" {*

*compartment\_id = "${var.compartment\_ocid}"*

*display\_name = "routetable1"*

*route\_rules {*

*destination = "0.0.0.0/0"*

*destination\_type = "CIDR\_BLOCK"*

*network\_entity\_id =*

*"${oci\_core\_internet\_gateway.internetgateway1.id}"*

*}*

*vcn\_id = "${oci\_core\_virtual\_network.vcn-web.id}"*

*}*

*resource "oci\_core\_subnet" "lb-subnet1" {*

*availability\_domain =*

*"${lookup(data.oci\_identity\_availability\_domains.ADs.availability\_domains[var.availability\_domain -3],"name")}"*

*cidr\_block = "10.0.0.0/24"*

*display\_name = "lb-subnet1"*

*dns\_label = "lbsubnet1"*

*security\_list\_ids = ["${oci\_core\_security\_list.LB-Security-*

*List.id}"]*

*compartment\_id = "${var.compartment\_ocid}"*

*vcn\_id = "${oci\_core\_virtual\_network.vcn-web.id}"*

*route\_table\_id = "${oci\_core\_route\_table.LB-Route-*

*Table.id}"*

*dhcp\_options\_id = "${oci\_core\_virtual\_network.vcnweb.*

*default\_dhcp\_options\_id}"*

*provisioner "local-exec" {*

*command = "sleep 5"*

*}*

*}*

*resource "oci\_core\_subnet" "lb-subnet2" {*

*availability\_domain =*

*"${lookup(data.oci\_identity\_availability\_domains.ADs.availabilit*

*y\_domains[var.availability\_domain -2],"name")}"*

*cidr\_block = "10.0.1.0/24"*

*display\_name = "lb-subnet2"*

*dns\_label = "lbsubnet2"*

*security\_list\_ids = ["${oci\_core\_security\_list.LB-Security-*

*List.id}"]*

*compartment\_id = "${var.compartment\_ocid}"*

*vcn\_id = "${oci\_core\_virtual\_network.vcn-web.id}"*

*route\_table\_id = "${oci\_core\_route\_table.LB-Route-*

*Table.id}"*

*dhcp\_options\_id = "${oci\_core\_virtual\_network.vcnweb.*

*default\_dhcp\_options\_id}"*

*provisioner "local-exec" {*

*command = "sleep 5"*

*}*

*}*

*resource "oci\_core\_subnet" "web-server" {*

*availability\_domain =*

*"${lookup(data.oci\_identity\_availability\_domains.ADs.availabilit*

*y\_domains[var.availability\_domain -1],"name")}"*

*cidr\_block = "10.0.2.0/24"*

*display\_name = "web-server"*

*dns\_label = "webserver"*

*# security\_list\_ids = ["${oci\_core\_security\_list.vcnweb.*

*default\_security\_list\_id}"]*

*compartment\_id = "${var.compartment\_ocid}"*

*vcn\_id = "${oci\_core\_virtual\_network.vcn-web.id}"*

*# route\_table\_id = "${oci\_core\_route\_table.vcnweb.*

*default\_route\_id}"*

*dhcp\_options\_id = "${oci\_core\_virtual\_network.vcnweb.*

*default\_dhcp\_options\_id}"*

*provisioner "local-exec" {*

*command = "sleep 5"*

*}*

*}*

*/\* Instances \*/*

*resource "oci\_core\_instance" "websrv1" {*

*availability\_domain =*

*"${lookup(data.oci\_identity\_availability\_domains.ADs.availabilit*

*y\_domains[var.availability\_domain -1],"name")}"*

*compartment\_id = "${var.compartment\_ocid}"*

*display\_name = "websrv1"*

*shape = "${var.instance\_shape}"*

*subnet\_id = "${oci\_core\_subnet.web-server.id}"*

*hostname\_label = "websrv1"*

*metadata {*

*ssh\_authorized\_keys = "${var.ssh\_public\_key}"*

*}*

*source\_details {*

*source\_type = "image"*

*source\_id = "${var.instance\_image\_ocid[var.region]}"*

*}*

*}*

*resource "oci\_core\_instance" "websrv2" {*

*availability\_domain =*

*"${lookup(data.oci\_identity\_availability\_domains.ADs.availabilit*

*y\_domains[var.availability\_domain -1],"name")}"*

*compartment\_id = "${var.compartment\_ocid}"*

*display\_name = "websrv2"*

*shape = "${var.instance\_shape}"*

*subnet\_id = "${oci\_core\_subnet.web-server.id}"*

*hostname\_label = "websrv2"*

*metadata {*

*ssh\_authorized\_keys = "${var.ssh\_public\_key}"*

*}*

*source\_details {*

*source\_type = "image"*

*source\_id = "${var.instance\_image\_ocid[var.region]}"*

*}*

*}*

*/\* Load Balancer \*/*

*resource "oci\_load\_balancer" "lb1" {*

*shape = "100Mbps"*

*compartment\_id = "${var.compartment\_ocid}"*

*subnet\_ids = [*

*"${oci\_core\_subnet.lb-subnet1.id}",*

*"${oci\_core\_subnet.lb-subnet2.id}",*

*]*

*display\_name = "LB-Web-Servers"*

*}*

*resource "oci\_load\_balancer\_backend\_set" "lb-bes1" {*

*name = "lb-bes1"*

*load\_balancer\_id = "${oci\_load\_balancer.lb1.id}"*

*policy = "ROUND\_ROBIN"*

*health\_checker {*

*port = "80"*

*protocol = "HTTP"*

*url\_path = "/"*

*}*

*}*

*resource "oci\_load\_balancer\_listener" "lb-listener1" {*

*load\_balancer\_id = "${oci\_load\_balancer.lb1.id}"*

*name = "http"*

*default\_backend\_set\_name =*

*"${oci\_load\_balancer\_backend\_set.lb-bes1.name}"*

*port = 80*

*protocol = "HTTP"*

*connection\_configuration {*

*idle\_timeout\_in\_seconds = "8"*

*}*

*}*

*resource "oci\_load\_balancer\_backend" "lb-be1" {*

*load\_balancer\_id = "${oci\_load\_balancer.lb1.id}"*

*backendset\_name = "${oci\_load\_balancer\_backend\_set.lbbes1.*

*name}"*

*ip\_address = "${oci\_core\_instance.websrv1.private\_ip}"*

*port = 80*

*backup = false*

*drain = false*

*offline = false*

*weight = 1*

*}*

*resource "oci\_load\_balancer\_backend" "lb-be2" {*

*load\_balancer\_id = "${oci\_load\_balancer.lb1.id}"*

*backendset\_name = "${oci\_load\_balancer\_backend\_set.lbbes1.*

*name}"*

*ip\_address = "${oci\_core\_instance.websrv2.private\_ip}"*

*port = 80*

*backup = false*

*drain = false*

*offline = false*

*weight = 1*

*}*

*output "lb\_public\_ip" {*

*value = ["${oci\_load\_balancer.lb1.ip\_addresses}"]*

*}*

**Execute the template.**

[*opc@terraformserver loadbalancer]$ terraform init*

*[opc@terraformserver loadbalancer]$ terraform plan -out file*

*[opc@terraformserver loadbalancer]$ terraform apply file*

1. Log in to the OCI console and verify the components.

2. SSH to the Web Servers and run the following commands on both instances:

Note: For Oracle Linux VMs, the default username is opc.

**Install HTTP Server:**

$ sudo yum install httpd -y

**Start the apache server and configure it to start after system reboots:**

$ sudo apachectl start (or) systemctl start httpd

$ sudo systemctl enable httpd (or) systemctl status httpd

**Run a quick check on apache configurations:**

$ sudo apachectl configtest

**Create firewall rules to allow access to the ports on which the HTTP server listens.**

$ sudo firewall-cmd --permanent --zone=public --add-service=http

$ sudo firewall-cmd --reload

**Create an index file for your websrv1:**

$ sudo bash -c 'echo This is my Web-Server-1 running on Oracle Cloud Infrastructure >> /var/www/html/index.html'

**Create an index file for your websrv2:**

$ sudo bash -c 'echo This is my Web-Server-2 running on Oracle Cloud Infrastructure >> /var/www/html/index.html'

**3. Test the functionality of the load balancer by navigating to its public IP address on a web**

**browser.**

http://<Public-IP-Address> (or) in command line -> curl <public-ipAddress>