Load Balancing and Redundancy

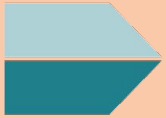
Cybersecurity

Cloud Security Day 3

Class Objectives

By the end of today's class, you will be able to:

Create an Ansible Playbook to configure VMs.



Create a load balancer on the Azure platform.

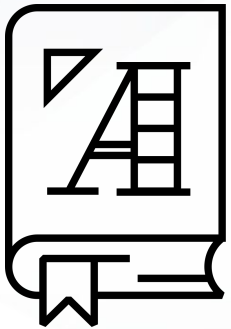
Create firewall and load balancer rules to allow traffic to the correct VMs.

Ansible Playbooks

We have implemented a jump box that is running an Ansible container.

The Ansible container has full access to our VNet and can connect with our new VM. Now we will write code that will be “infrastructure as code” for this vulnerable web server.

(Ansible.com)



Ansible reads **YAML** code.

YAML stands for *YAML ain't markup language* and is designed to be very readable and easy to use.

Today, we'll get started
with a guided tour of YAML.

YAML

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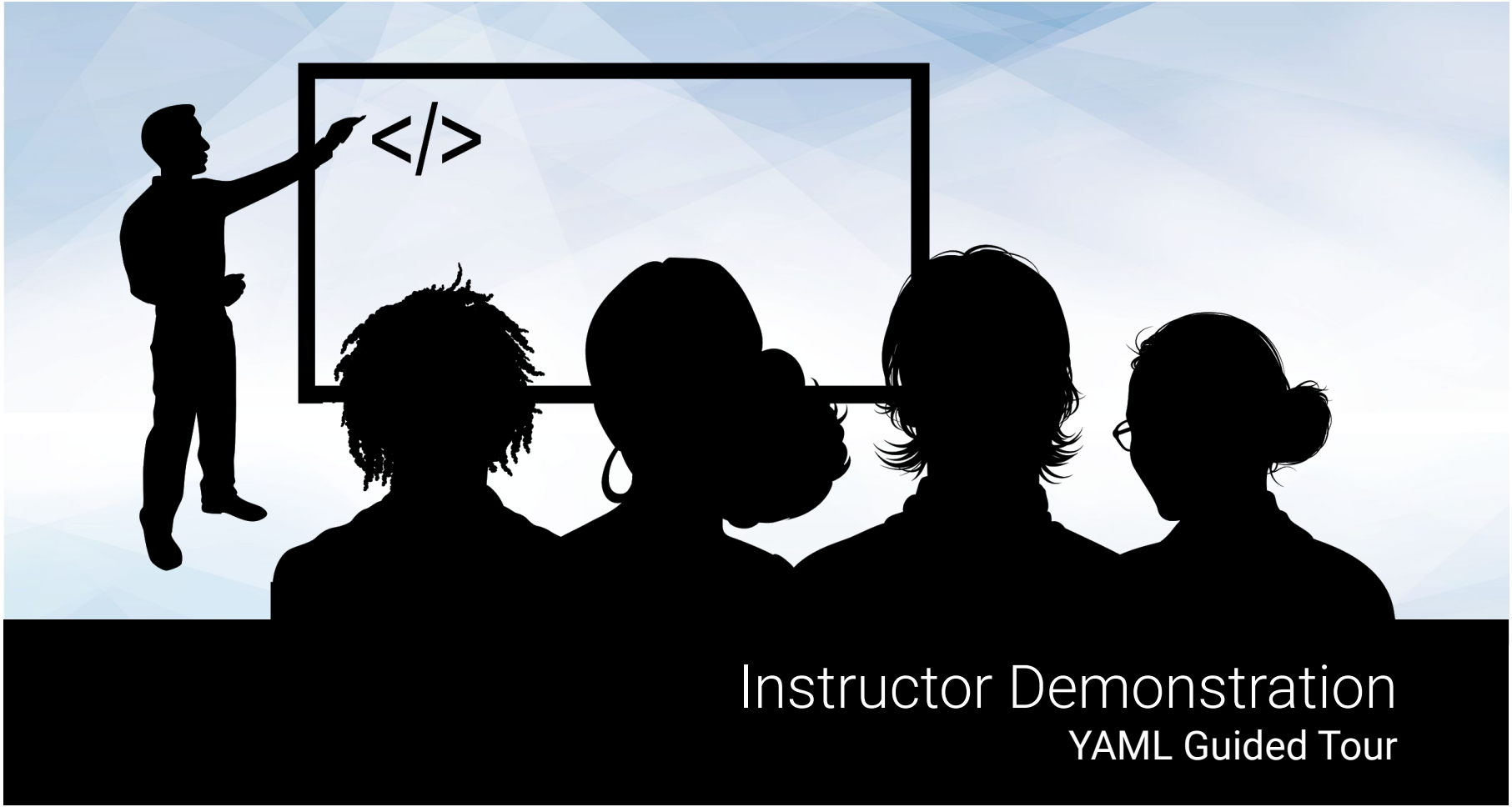
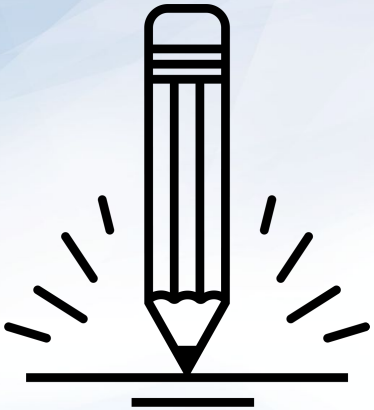
```
---
  - name: My first playbook
    hosts: webservers
    become: true
    tasks:

    - name: Install apache httpd  (state=present is optional)
      apt:
        name: apache2
        state: present
```



Instructor Demonstration

YAML Guided Tour



Activity: Ansible Playbooks

In this activity, you will create an Ansible playbook that installs Docker and configures a VM with the DVWA web app.

Suggested Time:
20 Minutes

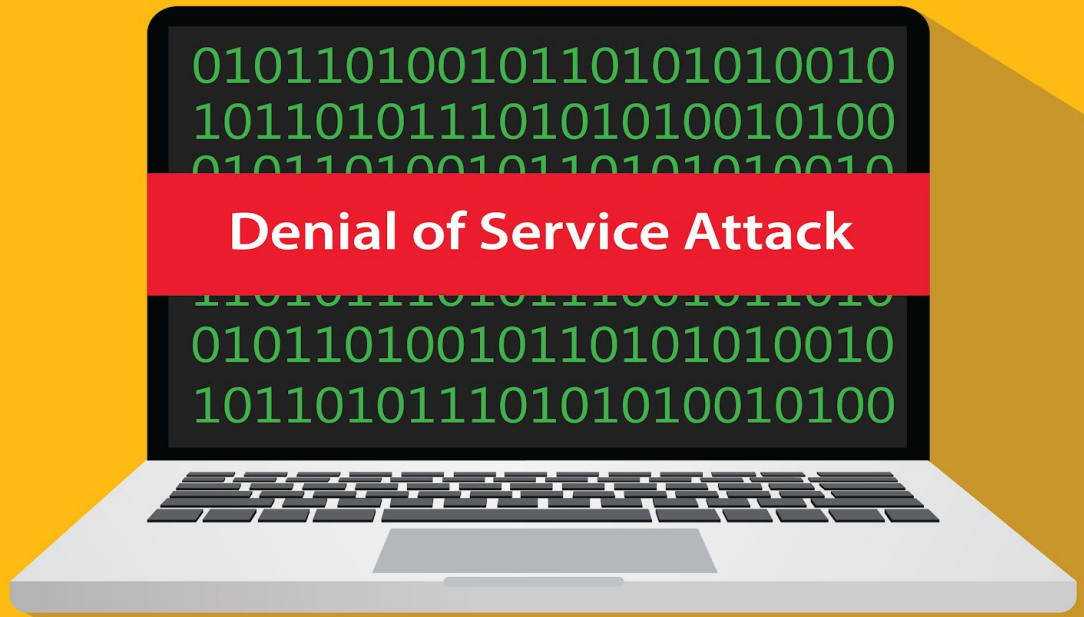
Time’s Up! Let’s Review.

Load Balancing

So far, we created a virtual network, deployed a jump box running an Ansible Docker container, and used that container to configure another VM running a DVWA container.

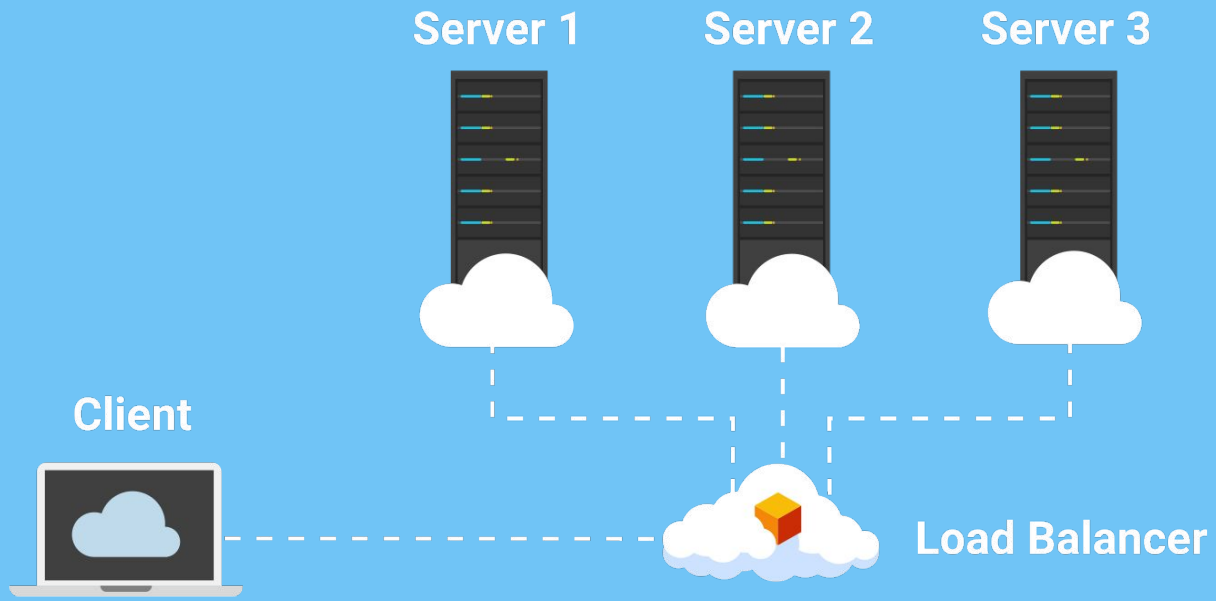
Load Balancing

If the Red Team attacks this DVWA container with enough traffic, they may be able to trigger a Denial of Service on the machine.



Load Balancers

A load balancer provides the external IP address that the rest of the internet can access. Then, it receives traffic that comes into the website and distributes it across multiple servers.

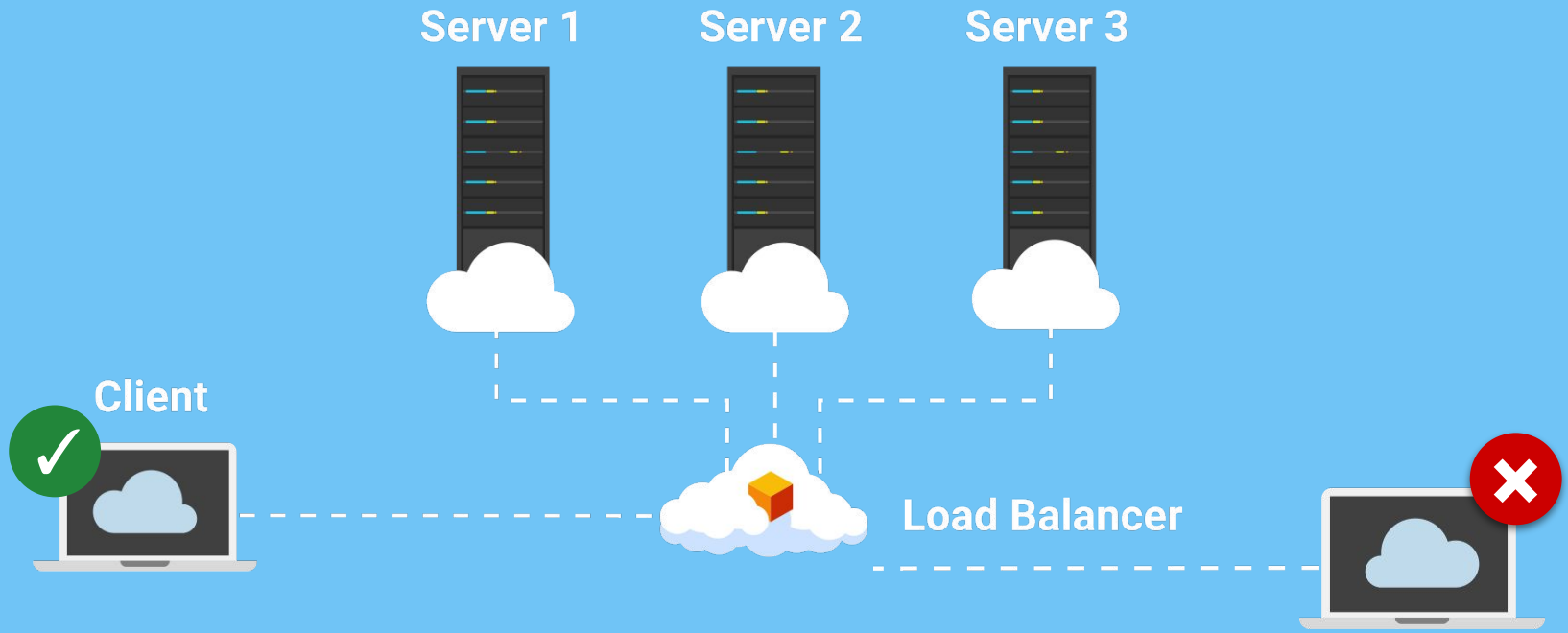


As websites receive more traffic, more servers can be added to the group (“pool”) of servers that the load balancer has access to.

This helps distribute traffic evenly across the servers and mitigates DoS attacks.

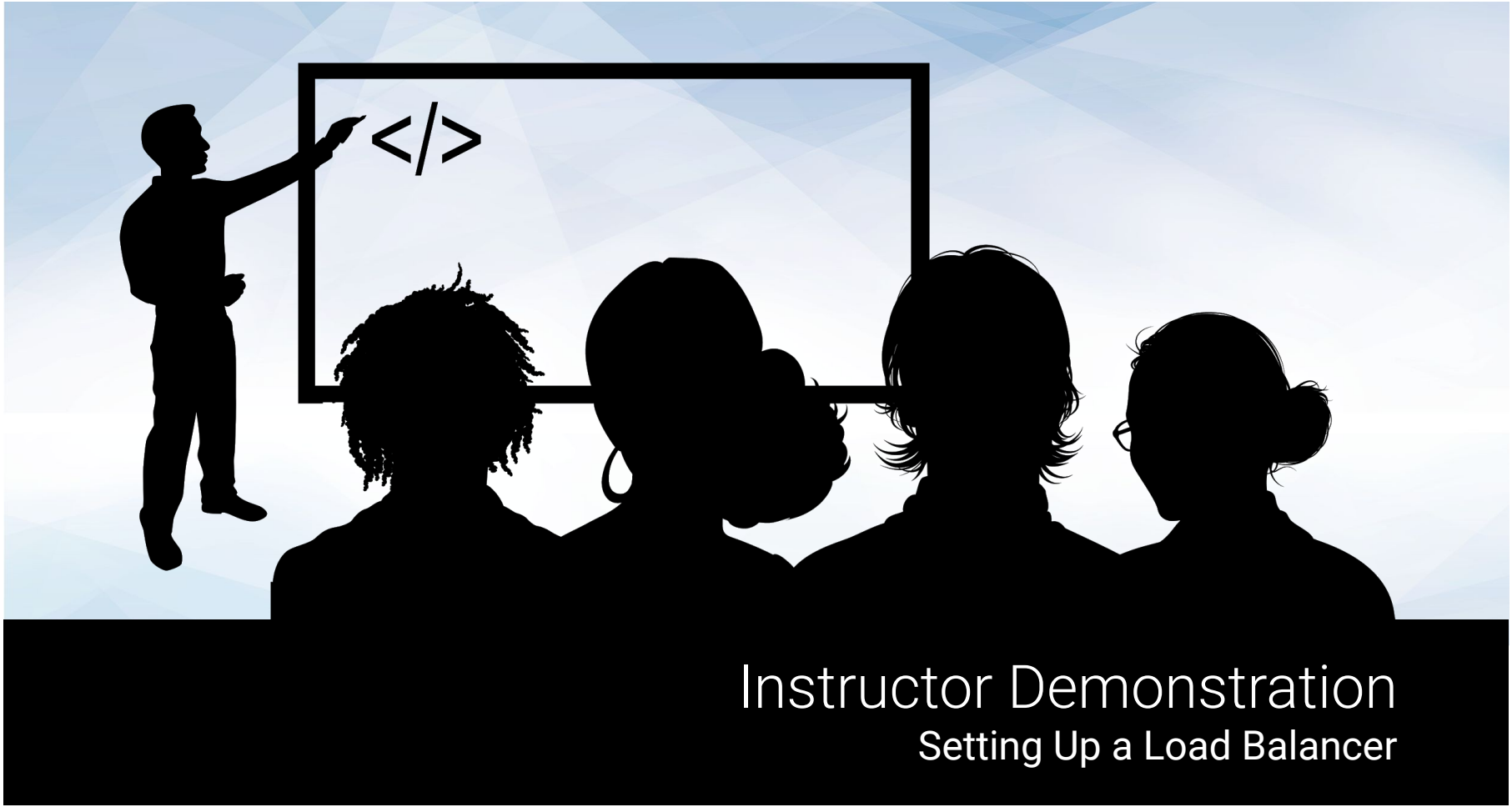
Load Balancers

Load balancers offer a **health probe** function to regularly check all the machines behind the load balancer. Machines with issues are reported, and the load balancers stop sending traffic to those machines.



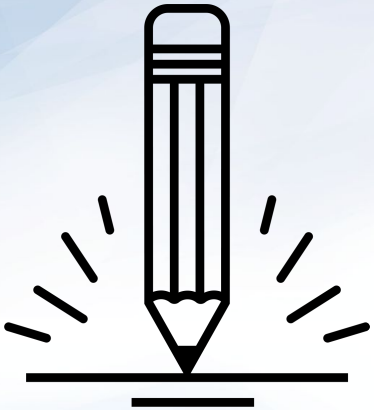
The DVWA VM we set up is not accessible from the internet at this time. This is intentional.

The next step is to set up a load balancer that has an external IP, and point it to the VM.



Instructor Demonstration

Setting Up a Load Balancer



Activity: Load Balancing

In this activity, you will install a load balancer in front of the VM to distribute the traffic across more than one VM.

Suggested Time:
20 Minutes

Time’s Up! Let’s Review.

Firewall Configuration

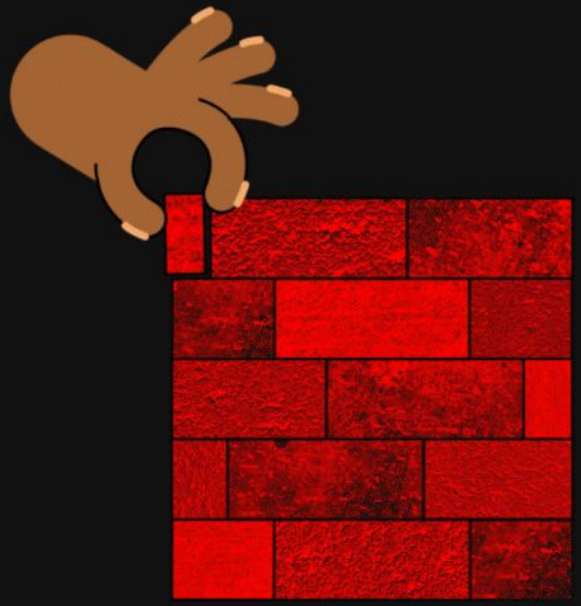
Now that we have a load balancer running, we want to make sure it is configured properly to allow traffic to the VM backend pool.

By the end of the next activity, we will be able to reach the DVWA website from the internet.

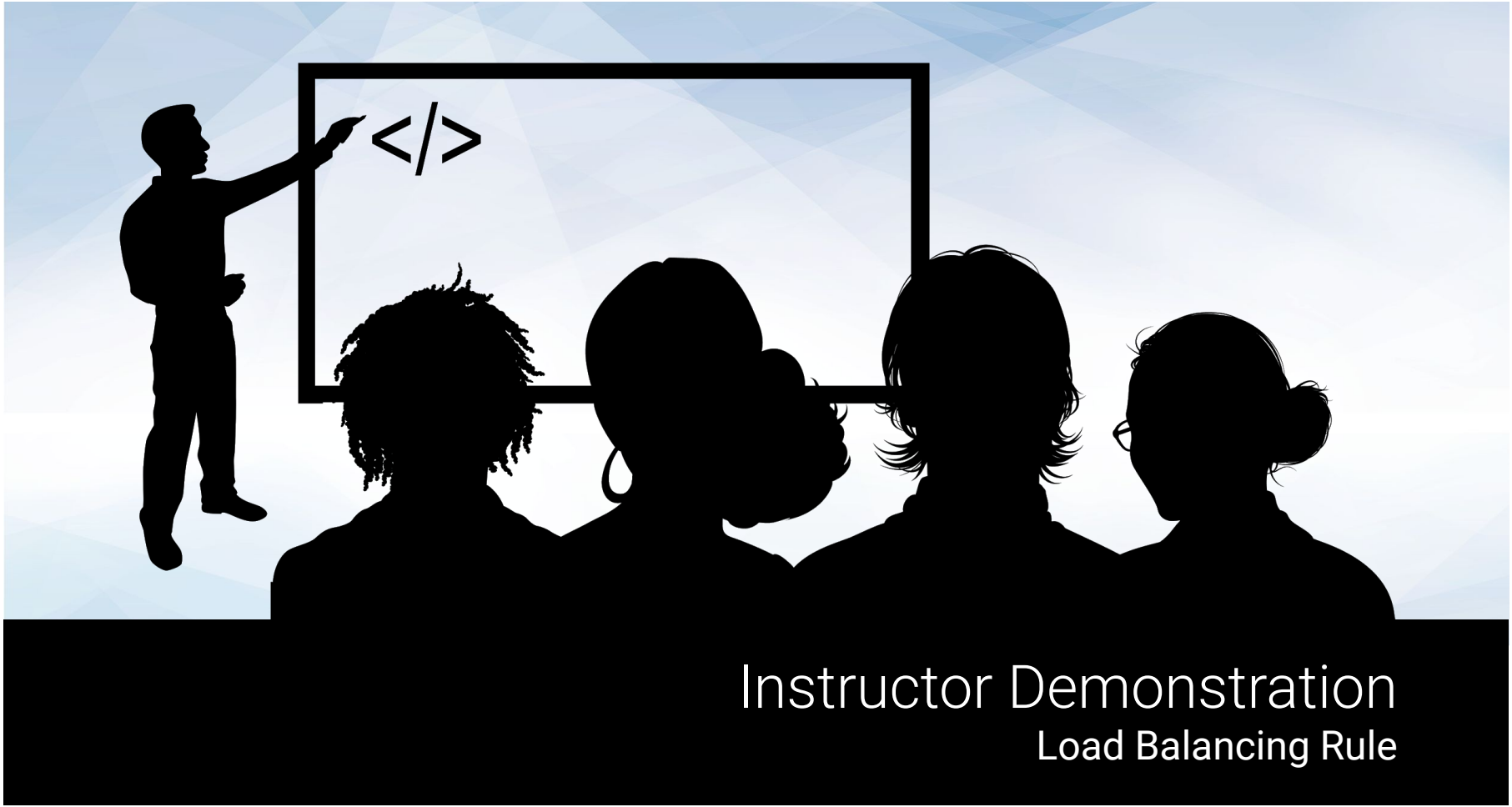
Firewall Configuration

We need to configure a security group to allow web traffic into the VNet from the load balancer.

In the following guided tour, we'll create a load balancing rule.

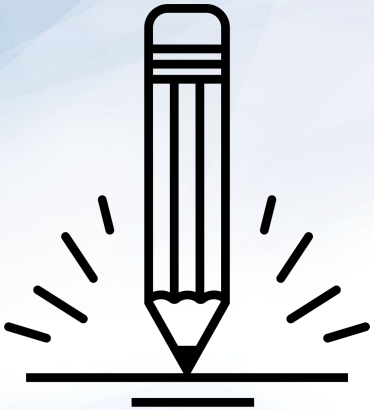


(Source)



Instructor Demonstration

Load Balancing Rule



Activity: Security Configuration

In this activity, you will configure the load balancer and security group to work together to expose port `80` of the VM to the internet.

Suggested Time:
20 Minutes

Time’s Up! Let’s Review.


Break

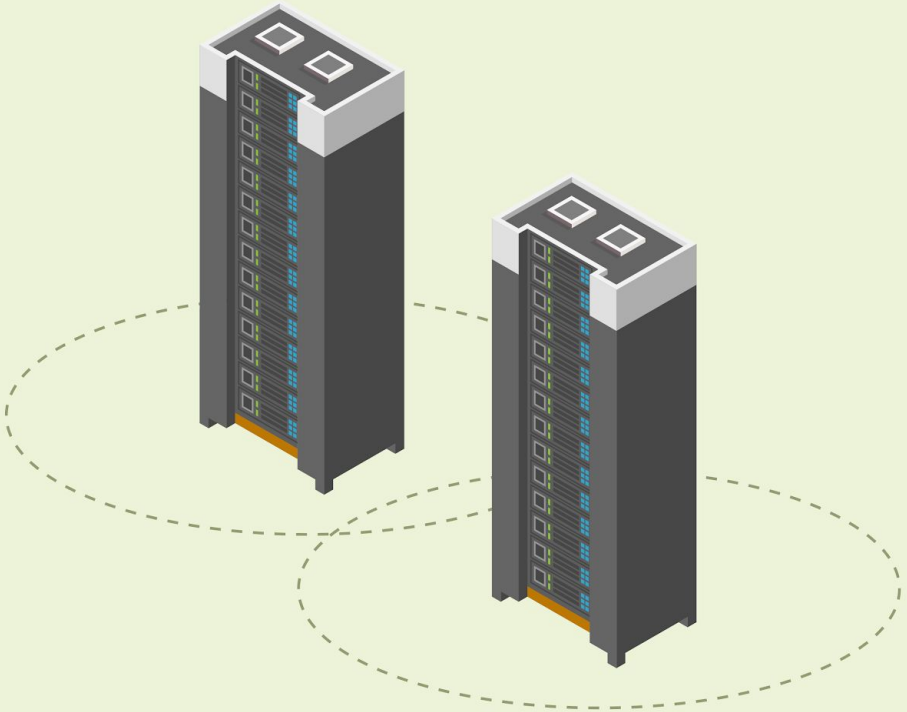
Redundancy

Next, we want to configure a new VM and place it behind our load balancer.

Redundancy

Placing another VM behind our load balancer provides redundancy for our DVWA server.

- Multiple servers are often used in a setup like this. The more servers you use, the more resilient the website.
- Setting up a second server will complete our highly available setup. If the Red Team takes down one server, the second will step in.
- Many modern websites use this setup to stay up and running.



Redundancy

You have all the knowledge to set up a redundant server for your next activity:

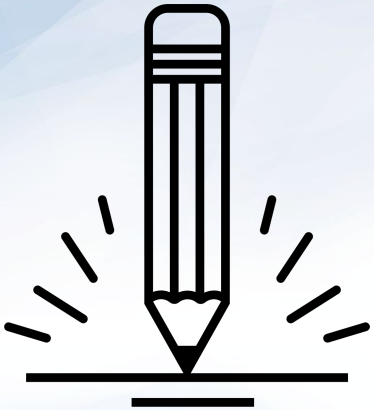
01 Get your SSH key from the Ansible container on your jump box.

02 Create a new VM using that key and the same admin name you used on the first VM.

03 Edit your Ansible configuration to include the new VM.

04 Use Ansible to configure the new VM with a DVWA container.

05 Place the new VM behind your load balancer.



Activity: Redundancy

In this task, you will create a copy of your VM using Ansible for the configuration and place it in the backend pool for your load balancer.

Suggested Time:
40 Minutes

Time’s Up! Let’s Review.

Daily Checklist

By the end of today, you should have completed the following critical tasks:

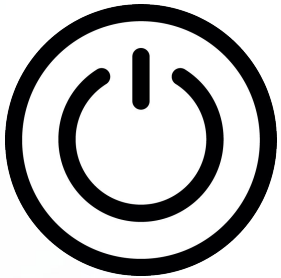
An Ansible playbook has been created that configures Docker and downloads a container.

The Ansible playbook is able to be run on the Web VMs.

The Web VMs are running a DVWA Docker container.

A load balancer has been created and at least two Web VMs placed behind it.

The DVWA site is able to be accessed through the load balancer from the internet.



Don’t forget to power off your machine!


The End