



Load Balancing and Redundancy

Cybersecurity
Cloud Security Day 3



11.3 - Cloud 3

Class Preparation

1. Check into BCS
2. Update your git repository with ``git pull``
3. Launch/login to your **PERSONAL** Azure Portal
 - If your account shows that you have no credit left (instead of something like \$200), make sure you're in your personal account

Homeworks Due

- Unit 10 (Network Security): due Sunday December 13
 - I know it shows "Crypto" in BCS (updates pending)
- Unit 11 (Cloud): due Sunday December 20

Upcoming Units

- Week 12: Project Week (12/14 - 12/19)
- Week 13: Cryptography (1/04 - 1/09)

Schedule Notes

Project 1 (Individual; Required)

- Mon 12/14 - Sat 12/19

Winter Break - No Class

- Last class on Sat 12/19
- Off: Mon 12/21 - Sat 1/02
- Return on Monday 1/04

Schedule Change

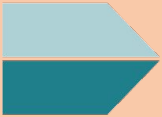
- Crypto delayed until after Winter Break

Class Objectives

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



Write an Ansible Playbook to configure VMs.



Create a load balancer on the Azure platform.



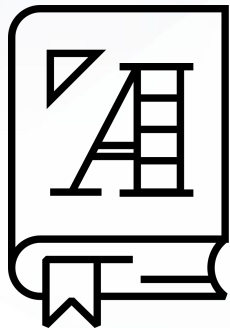
Create firewall and load balancer rules to allow traffic to the correct VMs.

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 VMs. Now
we will write code that will be “infrastructure as
code” for this vulnerable web server.



Ansible reads **YAML** code.

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



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

YAML

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

```
---
```

```
- name: My first playbook
```

```
  hosts: webservers
```

```
  become: true
```

```
  tasks:
```

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

```
  apt:
```

```
    name: apache2
```

```
    state: present
```

Ansible reads
YAML code.

Ansible Modules

- `name:` Use apt to install something
`apt:`
`name:` apache2
- `name:` Use pip to install something
`pip:`
`name:` docker
- `name:` Use docker-container to do something
`docker-container:`
`name:` dvwa

Ansible reads
YAML code.



Instructor Demonstration

YAML Walkthrough



Activity: Ansible Playbooks (03_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



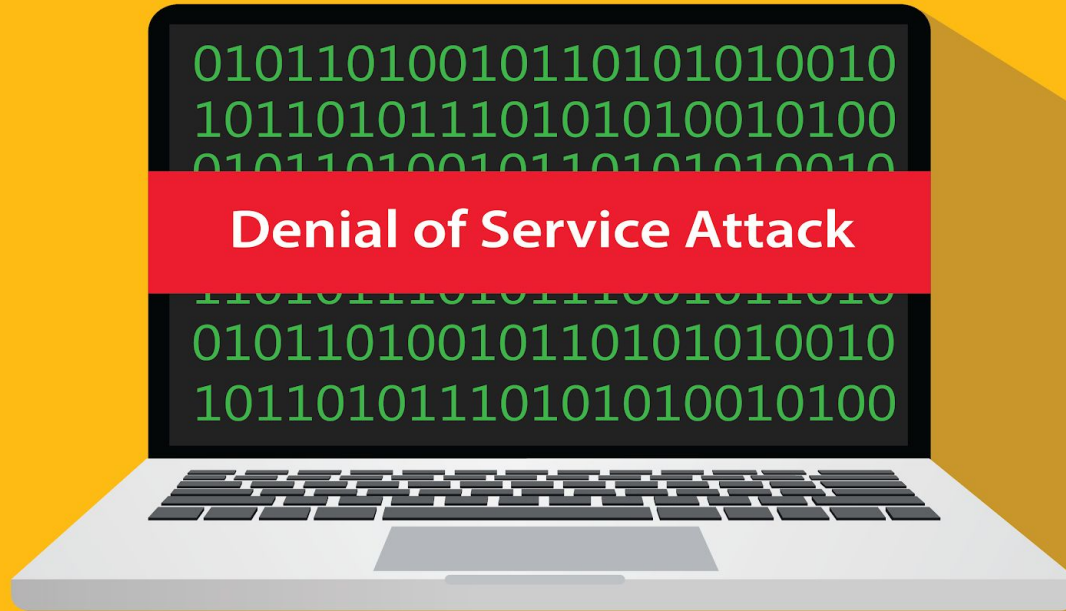
Load Balancing



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.

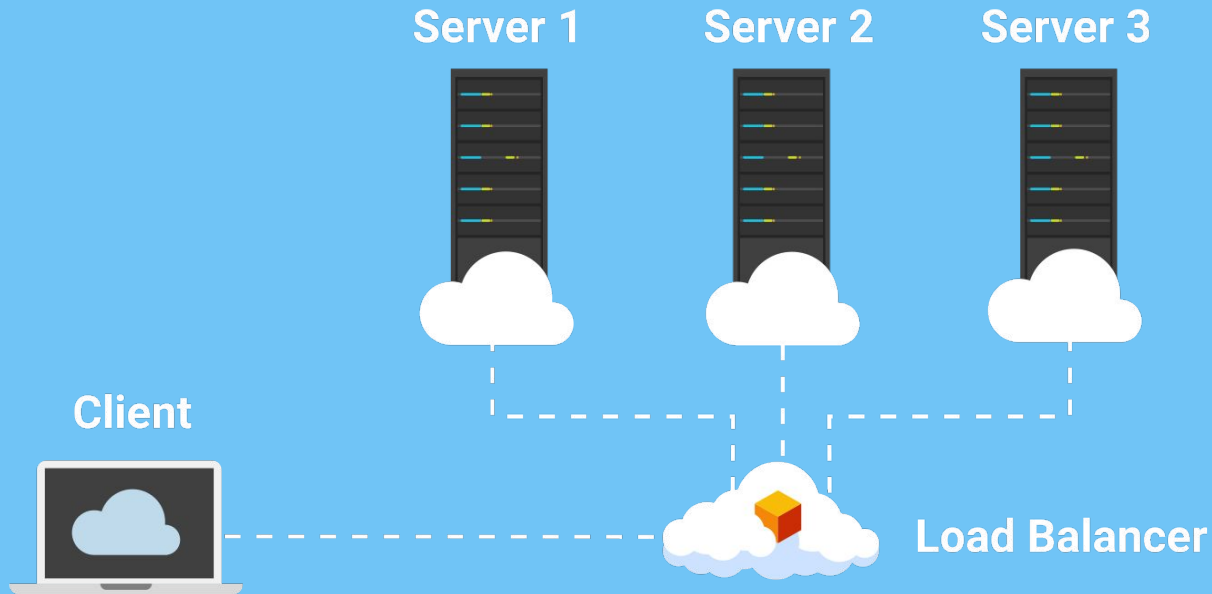
Load Balancing

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.

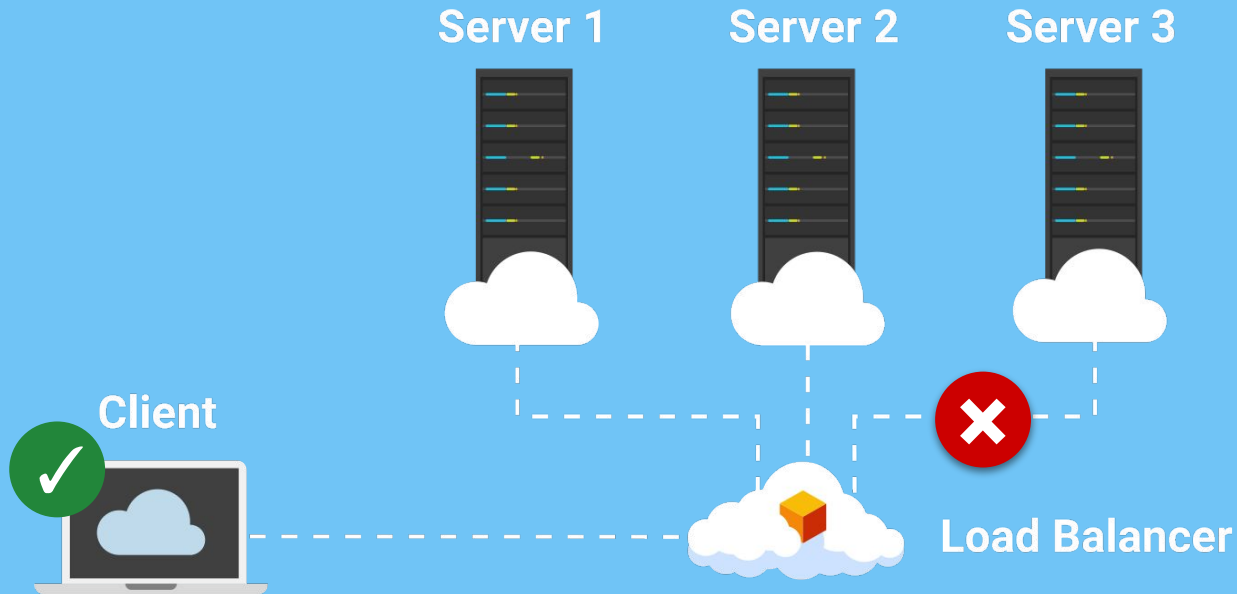


As websites receive more traffic, more servers can be added to the group ("pool") of servers that the load balancer has access to.

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

Load Balancers

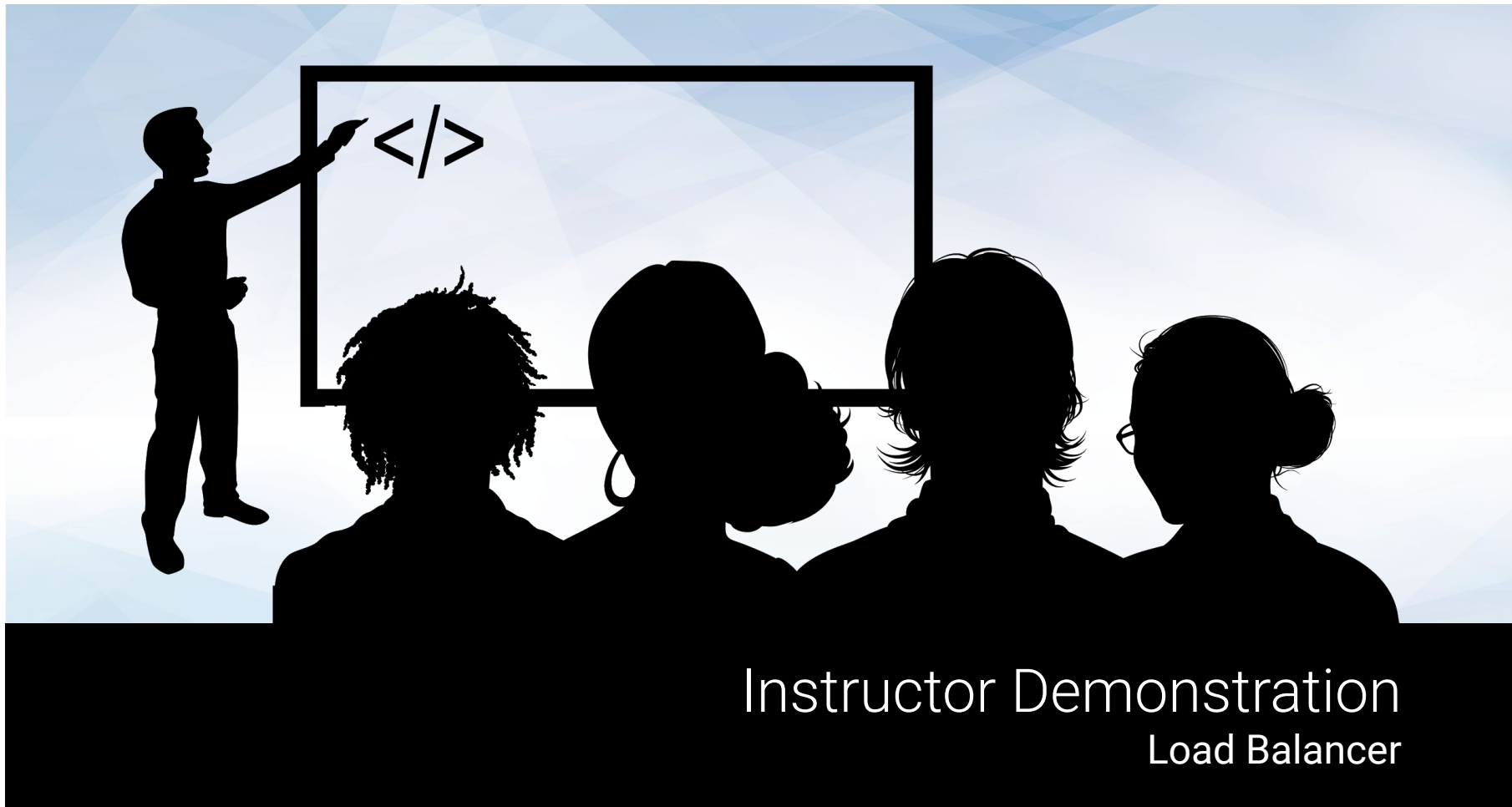
Load balancers offer a **health probe** function to regularly check all the machines behind the load balancer. Machines with issues are reported, and the load balancers stop sending traffic to those machines.





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

Load Balancer



Activity: Load Balancing (06_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



Firewall Configuration



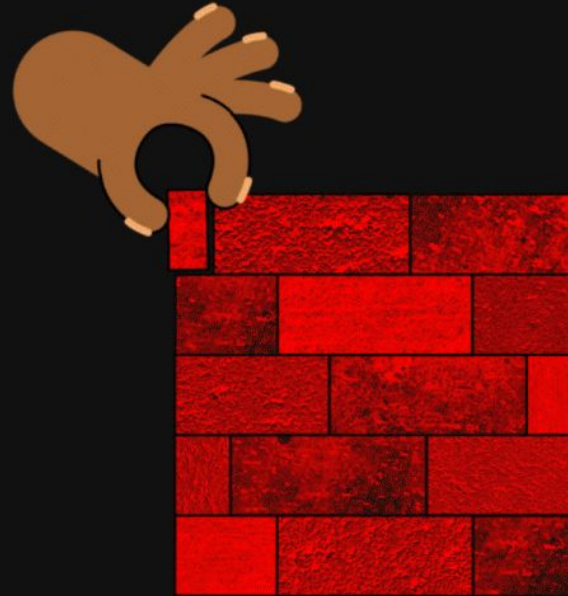
Now that we have a load balancer running, we want to make sure it is configured properly to allow traffic to the VM backend pool.

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 walkthrough, we'll create a load balancing rule.





Instructor Demonstration

Load Balancing Rule



Activity: Security Configuration (09_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



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.



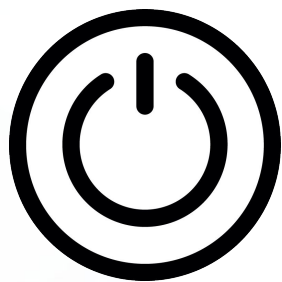
The Web VMs are running a DVWA Docker container.



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 machines!