DevSecOps, day 5

1. Lab prep

Lab preparation

- You were asked to:
  - [Request Nessus Essentials activation code]

- We will work with Nessus Essentials.
- Startup takes very long, so we'll do that now.

Lab preparation

- On your lab VM, *cd* into "*~/Nessus*".
- Edit the "*docker-compose.yml*" file,
  - Add your activation code in the right place.
  - Set a username and password.

- Run: *docker-compose up*
- Once ready, it's at https://localhost:8834

Lab preparation

- The Docker container might restart.
  - After a few minutes, login to the web UI.
  - It should say "*plugins are compiling*".

- This will take a long time.
  - The more cores your VM has, the faster it goes.

3. Lab: Vulnerability scanning

Before we start

- Make sure that you have JuiceShop running.
  - Either run "*npm start*",
  - Or use your "*team1:dev*" container,
  - Or use the official container.

- Also test that SSH to user "vagrant" on the VM works.

Before we start

- These Nessus scans can take a long time. 🕰️⌛
  - We will start all three at the same time.

- We will configure the scans, start them...
  - And then grab a drink. ☕

Logging in

- By now, Nessus should be up and running.
- Your username and password were setup,
  - In the *docker-compose.yml* file.
  - So go to https://localhost:8834

- **SKIP** the first discovery scan.

Start: webapp scan

- We will scan our local Juice Shop.

- In the menu choose "*Web application tests*",
  - Set target to your lab VM's IP (**not** localhost).
  - Set a custom discovery, **limit** to port 3000.

Start: network scan

- From the menu select "Basic network scan".
  - Set the target to your lab VM's IP (<u>**not**</u> localhost).
  - Set custom discovery to ports "*1-1000,3000*".

- This takes a lot longer and runs in the background.

Start: credentialed scan

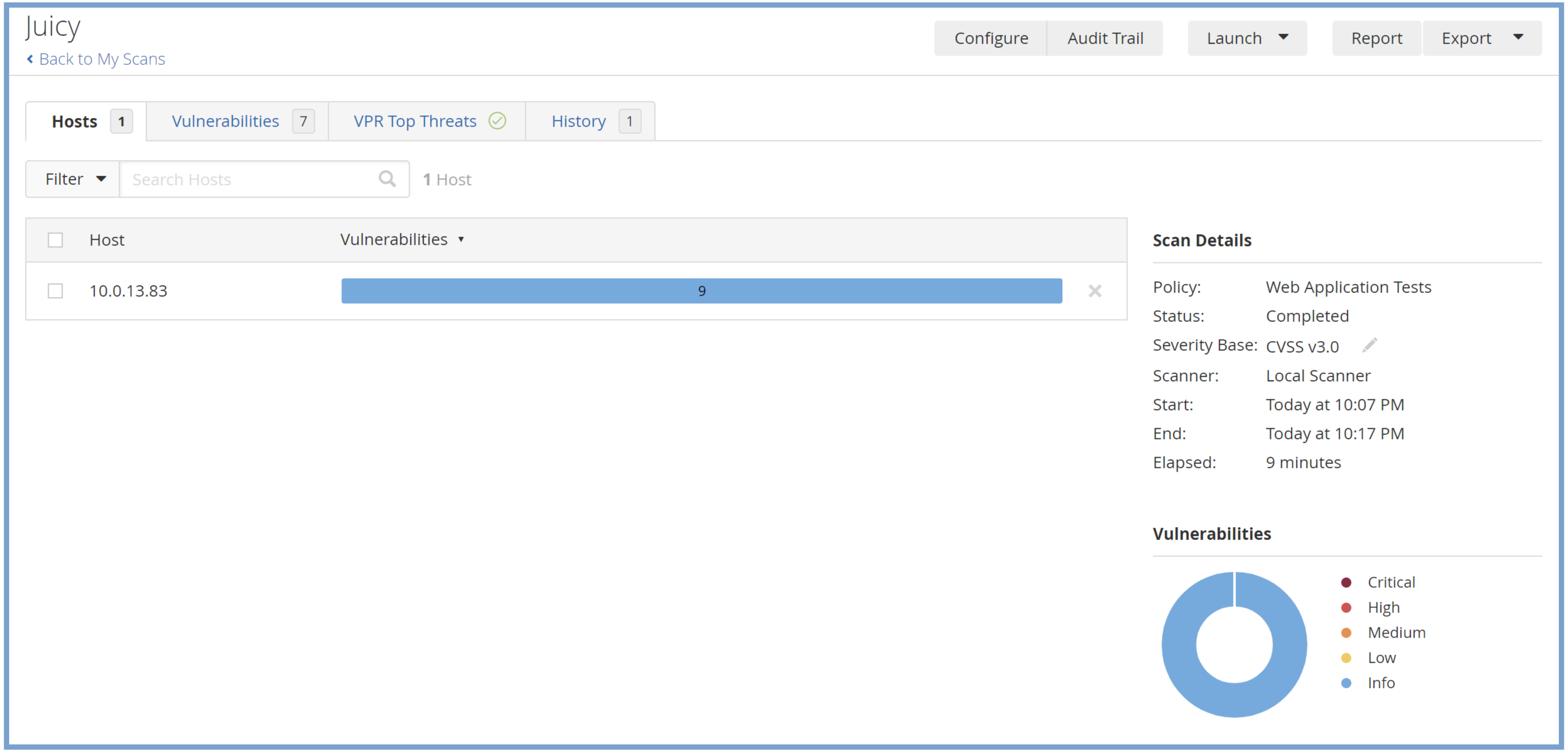
- From the menu select "*Basic network scan*".
  - Set the target to the lab VM's IP (**<u>not</u>** localhost).
  - Set custom discovery to ports "*1-1000,3000*".

- Under the "Credentials" tab, select SSH.
  - Use the settings for your "vagrant" user.
  - Username, password, sudo, sudo password, etc.

The web app scan

- It will take a few minutes to do a quick scan.
- The results will be disappointing!
  - Juiceshop is bug ridden, with lots of vulnerabilities.
  - But these are not CVEs that Nessus detects.

The web app scan



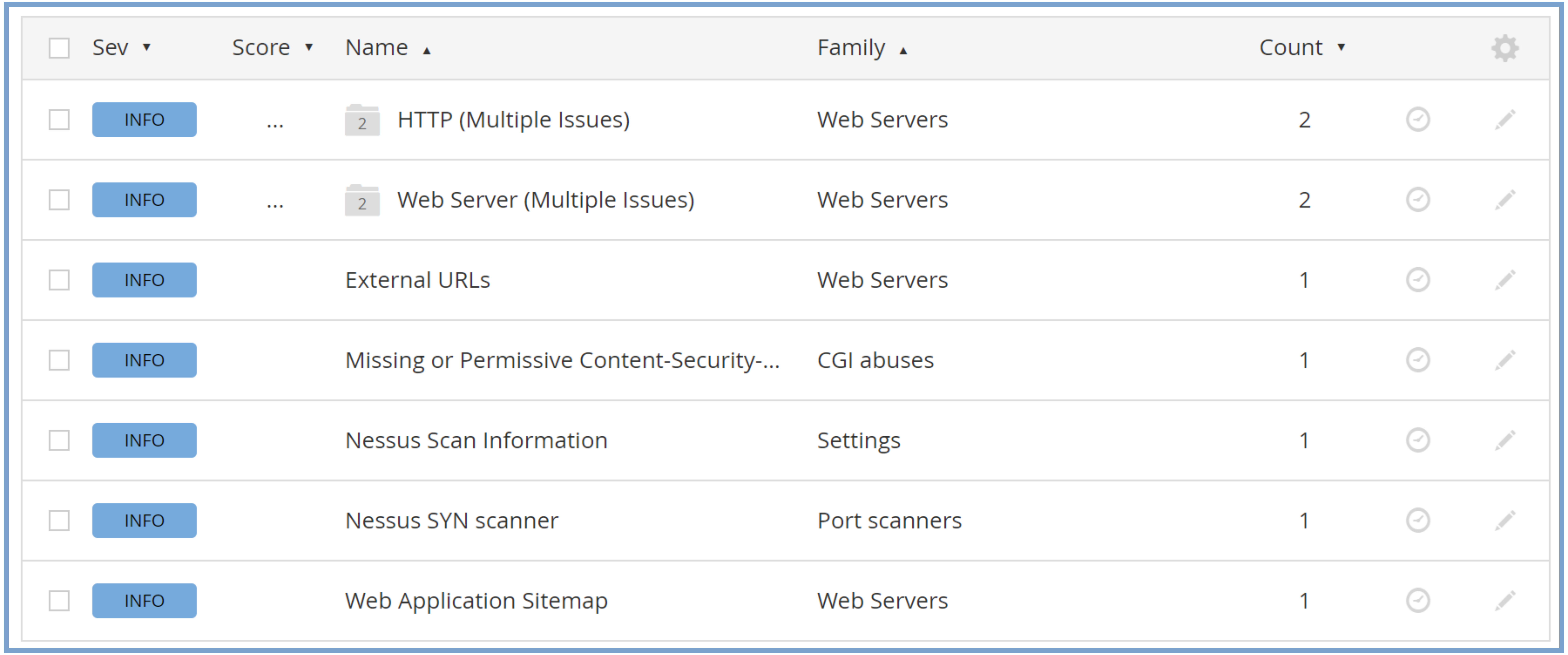
□	Host	Vulnerabilities ▾
□	10.0.13.83	9

Scan Details

Policy:	Web Application Tests
Status:	Completed
Severity Base:	CVSS v3.0
Scanner:	Local Scanner
Start:	Today at 10:07 PM
End:	Today at 10:17 PM
Elapsed:	9 minutes

Vulnerabilities

The web app scan



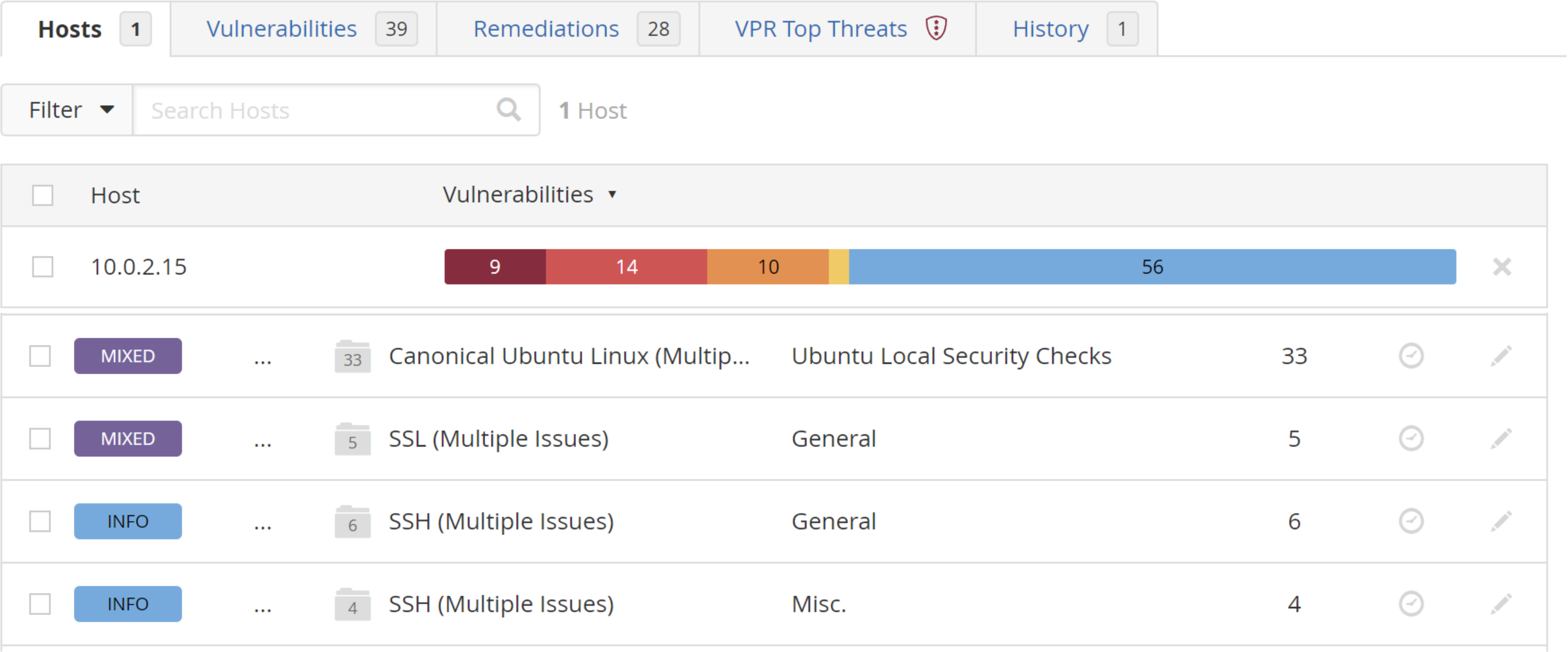
□	Sev ▼	Score ▼	Name ▲	Family ▲	Count ▼	
□	INFO	...	2 HTTP (Multiple Issues)	Web Servers	2	
□	INFO	...	2 Web Server (Multiple Issues)	Web Servers	2	
□	INFO		External URLs	Web Servers	1	
□	INFO		Missing or Permissive Content-Security-...	CGI abuses	1	
□	INFO		Nessus Scan Information	Settings	1	
□	INFO		Nessus SYN scanner	Port scanners	1	
□	INFO		Web Application Sitemap	Web Servers	1	

Why such bad results?

- Nessus can only look at the outside of the host.
  - It can only see running services that are open.

- Better results will be had with a "credentialed scan".
  - Nessus will check all installed packages!

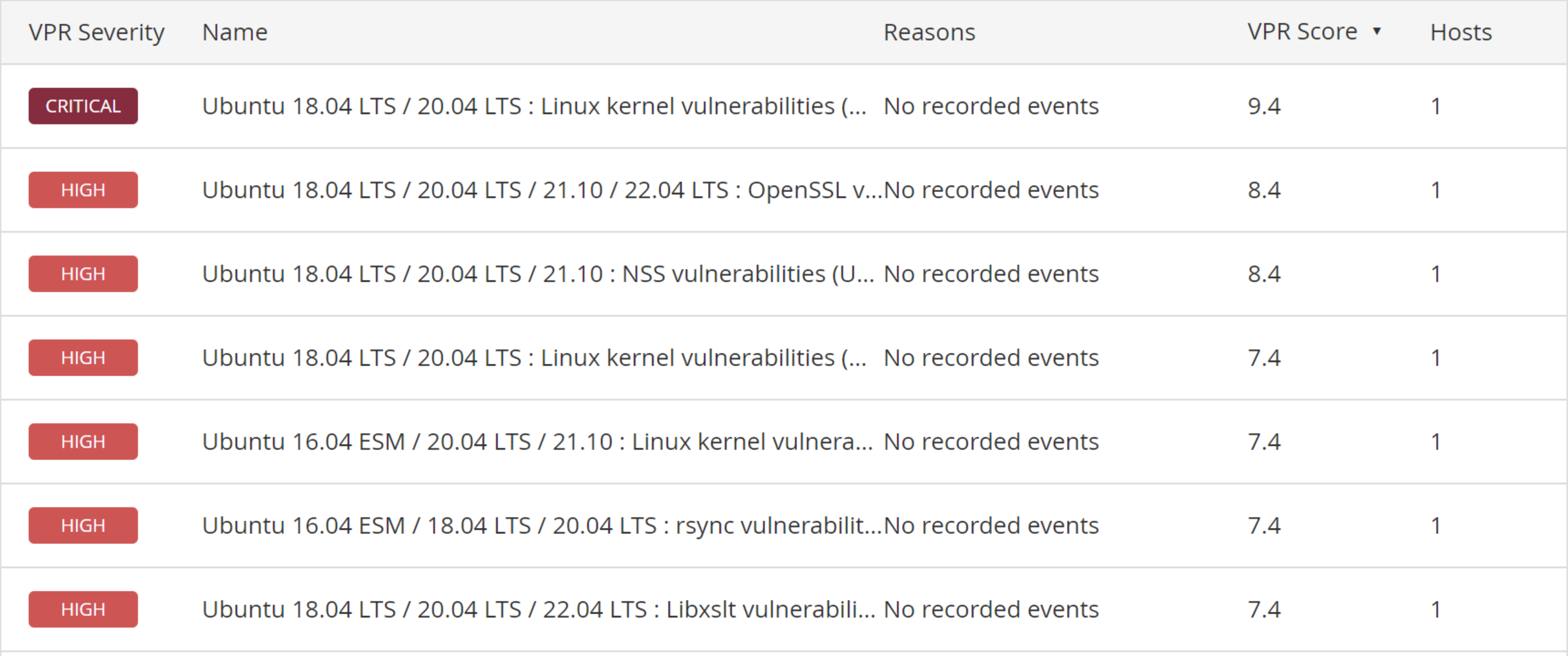
Credentialed scan results



□	Host	Vulnerabilities ▾
□	10.0.2.15	9 / 14 / 10 / 56

□	MIXED	...	33	Canonical Ubuntu Linux (Multip...	Ubuntu Local Security Checks	33		
□	MIXED	...	5	SSL (Multiple Issues)	General	5		
□	INFO	...	6	SSH (Multiple Issues)	General	6		
□	INFO	...	4	SSH (Multiple Issues)	Misc.	4		

Credentialed scan results



VPR Severity	Name	Reasons	VPR Score ▼	Hosts
CRITICAL	Ubuntu 18.04 LTS / 20.04 LTS : Linux kernel vulnerabilities (...	No recorded events	9.4	1
HIGH	Ubuntu 18.04 LTS / 20.04 LTS / 21.10 / 22.04 LTS : OpenSSL v...	No recorded events	8.4	1
HIGH	Ubuntu 18.04 LTS / 20.04 LTS / 21.10 : NSS vulnerabilities (U...	No recorded events	8.4	1
HIGH	Ubuntu 18.04 LTS / 20.04 LTS : Linux kernel vulnerabilities (...	No recorded events	7.4	1
HIGH	Ubuntu 16.04 ESM / 20.04 LTS / 21.10 : Linux kernel vulnera...	No recorded events	7.4	1
HIGH	Ubuntu 16.04 ESM / 18.04 LTS / 20.04 LTS : rsync vulnerabilit...	No recorded events	7.4	1
HIGH	Ubuntu 18.04 LTS / 20.04 LTS / 22.04 LTS : Libxslt vulnerabili...	No recorded events	7.4	1

5. Lab: Pen-testing

Pen-testing is a lot of work

- How would you find this normally?
  - Trial and error
  - Word lists
  - Dedicated, automated tools
  - Experience

Pen-testing is a lot of work

- JuiceShop has a whole scoreboard!
  - And a full "Pwning JuiceShop" ebook.

- We will analyse a number of attacks together.
  - Using *Portswigger Burp Suite*.

Burp Suite

- On your host OS, download and install:
  - Burp Suite Community Edition

- For later: want to really learn Burp Suite?
  - Portswigger Web Security Academy

7. Lab: Dynamic Analysis (DAST)

DAST: ZAP and Nuclei

- DAST scans have varying quality and outcomes.
  - Let's compare two tools in their baseline setting.

- We will compare:
  - OWASP ZAP
  - Nuclei

What is your IP?

- We will run the DAST tools in Docker.
  - Here, "localhost" will not work as target.
  - Make sure you have your Dev Workstation IP.

- For example, we will use:
  - http://10.0.2.15:3000

On your Dev Workstation

- We will use the Docker-based solution:

```
$ docker pull ghcr.io/zaproxy/zaproxy

$ docker run --rm ghcr.io/zaproxy/zaproxy \
  zap-baseline.py \
  -t http://10.0.2.15:3000
```

On your Dev Workstation

- We will use the Docker-based solution:

```
$ docker pull projectdiscovery/nuclei

$ docker run --rm projectdiscovery/nuclei \
  -u http://10.0.2.15:3000
```

Compare the results

- Did any of the scans trigger new flags in JuiceShop?

- How different are the results?
  - In amounts... in severity... in quality?

- Want to optimize Nuclei? Read this article.

In Azure DevOps

- With our pipeline we can use Docker,
  - It's a lot better than getting all dependencies!

- There's a sample pipeline: pipeline-step6-dast.yml

Pipeline additions

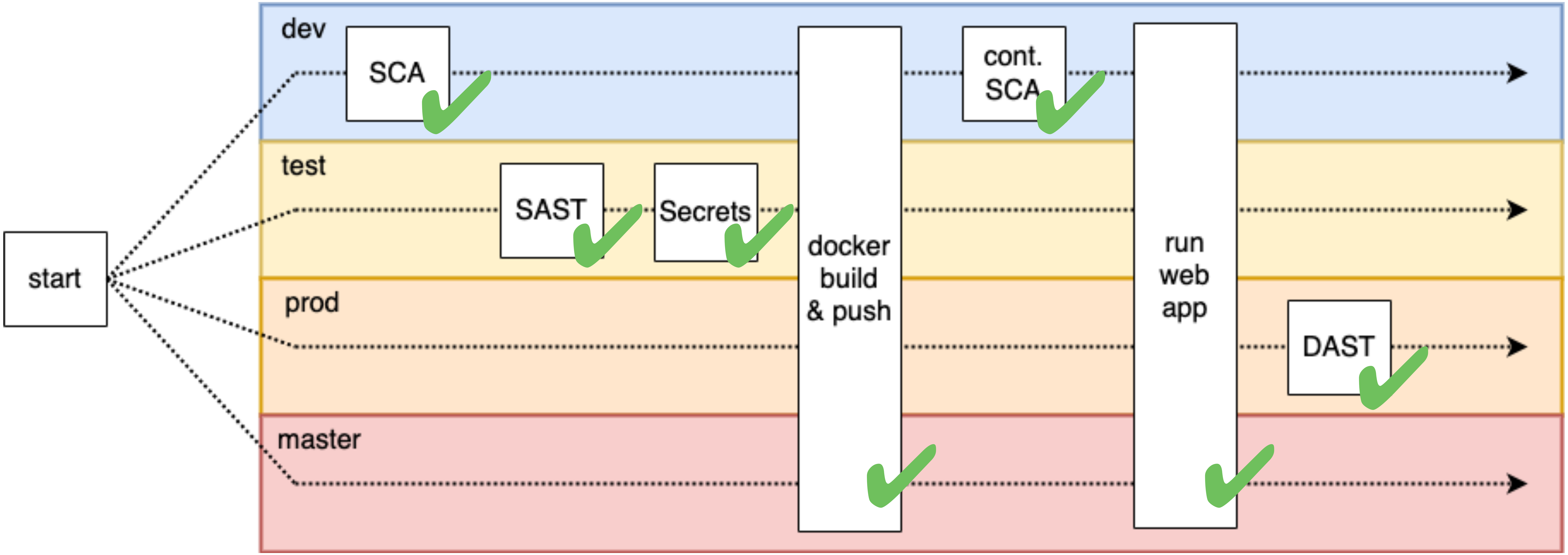
```
- job: owasp_zap
    steps:
    - task: Bash@3
      continueOnError: true
      displayName: run_zap
      inputs:
        targetType: 'inline'
        workingDirectory: '$(Build.SourcesDirectory)'
        script: |
          docker run --rm owasp/zap2docker-stable zap-baseline.py \
          -t '${{ variables.webappurl }}' | tee zap-result.txt

    - publish: '$(Build.SourcesDirectory)/zap-result.txt'
      artifact: zap-result.txt
```

Checkpoint!

- Does everyone have:
  - A pipeline on the "prod" branch.
  - Which adds DAST after deployment?

- Have you tested this?

Our final pipeline goal



9. Demo: Web App Firewall

Azure Application Gateway

- WAF, load balancer and more.
- Requires a lot of settings, and scripting.
  - A bit too much for this week.

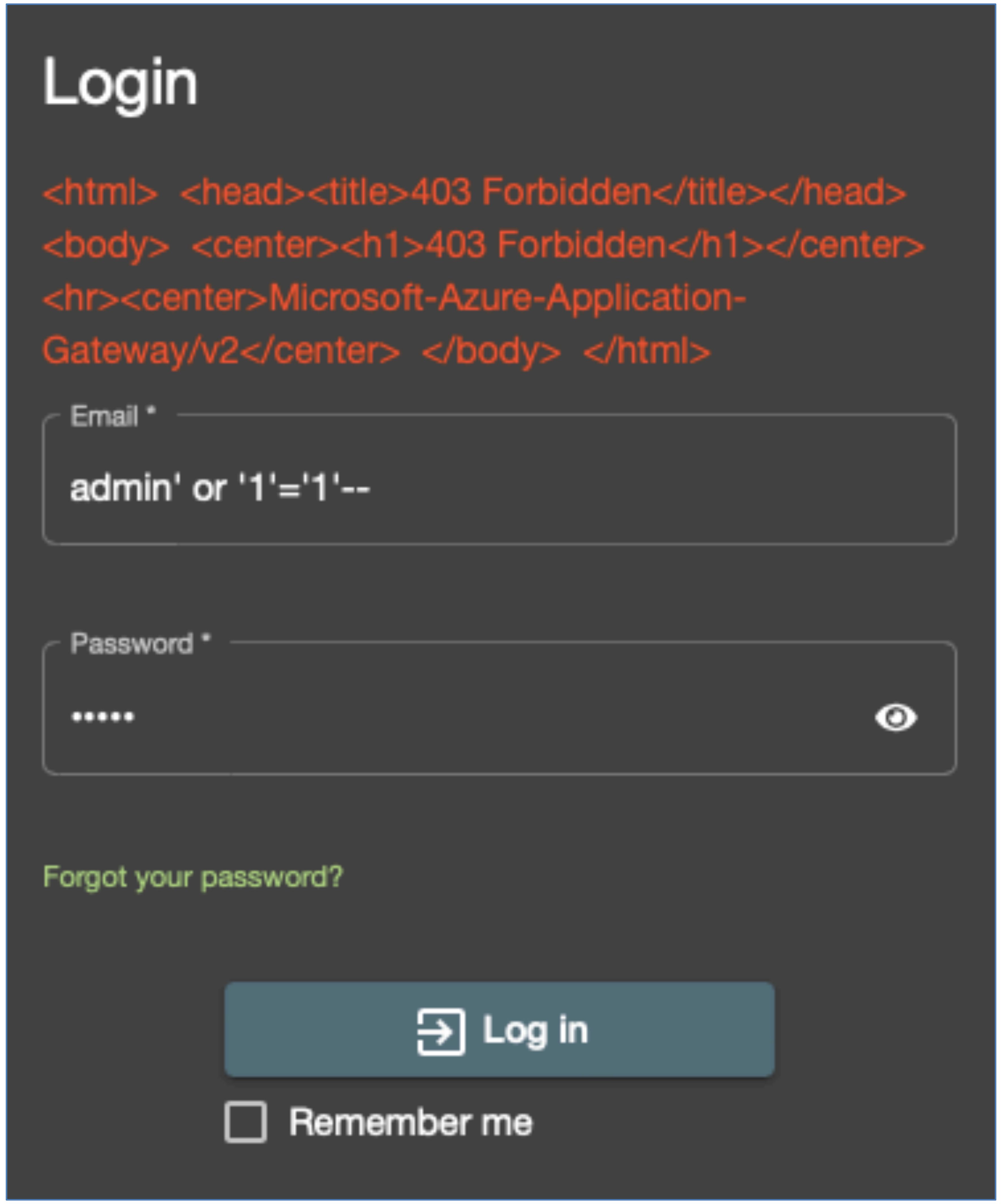
- So I will demo it!

Demo

Let's make an application gateway for Team 1!

Outcome

- Awesome!
  - The SQLi fails!



Login

```
<html> <head><title>403 Forbidden</title></head>
<body> <center><h1>403 Forbidden</h1></center>
<hr><center>Microsoft-Azure-Application-Gateway/v2</center> </body> </html>
```

Email *: admin' or '1'='1'--

Password *: •••••

Outcome

- When protection is enabled,
  - SQL Injection is blocked.
  - Applies to a lot of other attacks too.
  - Logging is created and sent to Sentinel.

Closing

Where to, from here?

- If you really enjoyed this class,
  - There's a new job opportunity to explore!
  - Plus there's more training and even certification!

- For example: PDSO CDP

Thank you!

- It's been an awesome week!
  - I really enjoyed working with you.

Reference materials

Resources

- Comparing Nessus and OpenVAS
- How to give the best pentest of your life
- Professor Messer - Pentesting
- "Pwning JuiceShop" ebook
- Debunking 5 DAST myths
- Vulnerability scanning vs pen-testing
- 7 Myths of AppSec automation

Resources

- "Why developers hate information security"
- Portswigger Web Security Academy
- Setting up an Azure WAF
- The Swiss cheese model
- PDSO CDP
- SBOM and VEX
- VEX use cases