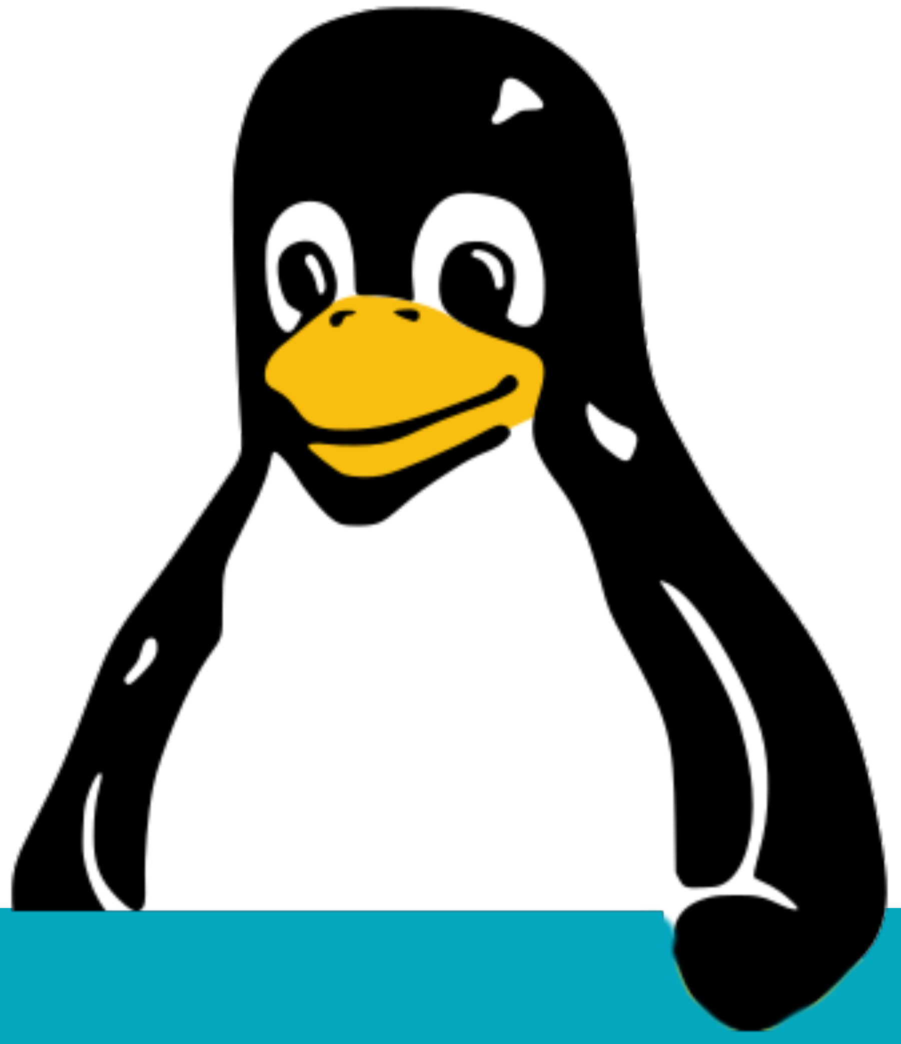
Linux, day 15



Objectives covered

Objective	Summary	Boek
1.3	Monitoring disk space	11
1.5	Monitoring networking	7,20
4.3	Troubleshoot CPU and RAM resources	20,24
4.4	Troubleshoot user access and permissions	7,20
4.5	Troubleshoot common problems	7,20,21,24

LAB: PKill

Assignment

- Write a shell script to start 15x "*sleep 120*".
- Use "*pkill*" to kill all of them in one go.

LAB: Swap space

Preparations

- We made extra disk devices for Fedora a while back.
  - If you still have those, unused, use one of those.
  - If they are in use, make a new device of 100MB.

- The next slide assumes "*/dev/sdc*".
  - Adjust for your situation!

Checking and expanding swap

- Make the (new) device into swap space.
  - Use "*mkswap*" and "*swapon"*.
  - Verify swap space with "*free"* before and after.
  - Add the swap device to "*/etc/fstab*" and reboot.

- After the lab, remove from fstab again,
  - And remove with *"swapoff*".

LAB: System performance

Installing sar

- Install the "*sysstat*" package.
- Check where the "*sa1*" and "*sa2*" scrips were added.
  - You will need the path, to add into *cron*.
  - So far I've seen:
    - */usr/lib/sa/, /usr/lib/sysstat/, /usr/lib64/sa/*

Checking sar cronjobs

- Check */etc/cron.d*.
  - Are there config files for "*sysstat*"?
  - Any other job files that have "*sa1*"?

- **<u>If these cron-jobs exist, skip the next slide.</u>**

Manually creating cron jobs

- Edit the "root" crontab (*sudo crontab -e*).
  - Add *sa1* and *sa2*. For example (check the path):

```
# Collect measurements at 10-minute intervals
*/10 * * * * /usr/lib/sysstat/sa1

# Create daily reports and purge old files
0 0 * * * /usr/lib/sysstat/sa2 -A
```

Manual testing

- Run *sa1* a few times, manually.
- Run *sa2* once.
- Go to "*/var/log/sa/*" (Fedora). Check the files there.
  - On Ubuntu the path is "*/var/log/sysstat*".
  - You should at least have one report.

Querying reports

- Query the "sar" file, for example (check the name).

```
# sar -u -f /var/log/sa/sa03

# sar -r -f /var/log/sa/sa03

# sar -d -f /var/log/sa/sa03
```

LAB: Storage issues

Assignment 1: lsof

- Can you find:
  - Which processes currently access "*system.journal*"?
  - Which processes use files from "*/etc/*"?
  - Which files and resources are used by "*sshd*"?
    - Can you spot port 22?

Assignment 2: iostat

- Choose one of your throw-away disk devices.
  - Like "*/dev/sdc*" that was used for swap space.
- Open two terminals.
  - In one keep a running "*iostat /dev/sdc 1*"
  - In the other we will try a few "*dd*" tests.

Assignment 2: iostat

- The following need "*root*" (use *sudo* or *su*).
- Compare speed, throughput and iostat activity.

```
# dd if=/dev/urandom of=/dev/sdc bs=1M count=50

# dd if=/dev/urandom of=/dev/sdc bs=1024 count=50000
```

- Is there a difference? If so, why?

LAB: Network issues

Assignment 1

- Start a *netcat* listener on port 8080.
- Use *netcat* in a second shell to connect to port 8080.
  - Type a bit of text. Does it arrive?
- Try a file transfer with netcat (example here).
- Try to access a "bind" shell with netcat (example here).
  - See "*Reverse shell without Netcat on the target host*"

Assignment 2

- Let's see how you can connect to www.google.com.
  - Compare "*getent hosts*" and "*nslookup*".
  - Can you ping the host?
  - Do a *traceroute.* Can you see where you leave ITVitae?
  - What does "*mtr --report www.google.com*" tell you?

Assignment 3

- Start a web server on your VM.
- Start a *netcat* listener on port 3389.
- Run an *nmap* scan from your other VM.
  - What services do you find?
  - Can you access both services?
  - Are there any firewalls in the way?

LAB: Extra work, DVWA

Introduction

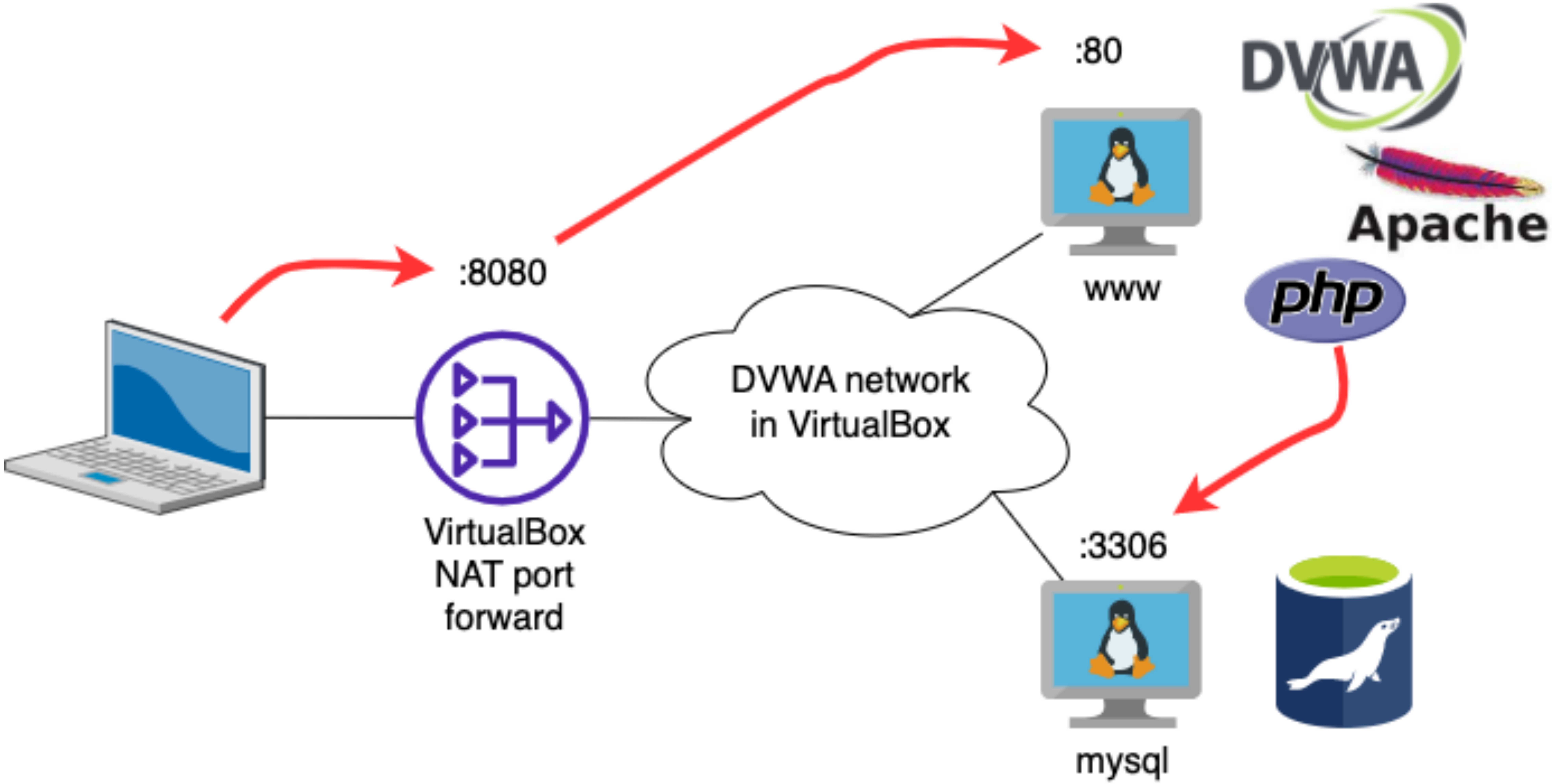
- *D*mn Vulnerable Web App*
  - A learning tool for InfoSec students.
  - A highly vulnerable web application to exploit.

- Vulnhub has plenty more like these.
  - But we're going for a challenge.

What we'll do

- Normally DVWA runs on one host / VM.
- We will use one *Vagrantfile* to define **two** VMs.
  - In a shared network segment, with fixed IPs.
  - One will run MariaDB (MySQL),
  - The other Apache and the web app.

The end result



Don't worry!

- Take things step by step! Don't get flustered. :)
- Remember!
  - Disable the auto-update of vbox guest additions.
  - If Vagrant provisioning fails, no need to rebuild.
  - You can re-run "*vagrant provision*".
  - If you're blocked, open the firewall.

Resources

- *"015-Vagrantfile-start-here"* is your **starting point**.
  - Yes, there is also "*015-Vagrantfile-spoilers*".
  - There's even *a walkthrough video I made*!

- The DVWA Github page has setup guides and wiki.
- MySQL / MariaDB have a getting-started guide.

Step 1: Vagrant + software

- Adjust the example configuration:
  - Run generic/centos7
  - First make sure networking works.

- The "mysql" VM should install MariaDB (MySQL).

Step 1: Vagrant + software

- The "www" VM should install Apache.
  - The DVWA Github page lists all required packages.
  - Don't forget the port forward for 80.

Step 2: Basic networking

- Boot both VMs and login to both.
- Can you confirm that they can communicate?
  - Can you connect between the hosts with *netcat*?
  - Can you connect to the SSH daemon?
    - Logins DO NOT need to work!
- If it doesn't work, let's troubleshoot!

Step 3: MySQL basic checks

- On the database host, verify that MySQL was installed.
  - Or MariaDB of course... depending on your distro.

- Make sure the DB software starts (also at reboot).
  - Can you connect to the database?
  - Check the MySQL getting-started guide.

Step 4: Setup MySQL database

- Follow the DVWA database setup instructions.
  - Login: *mysql -u root -h localhost dvwa*
- You will need to create:
  - A database
  - A user (don't use"*@localhost*", use "@'%'")
  - Access privileges for the user.

Step 5: Testing MySQL

- Can you login to the DB with the new account?
  - On "mysql": *mysql -u dvwa -p -h localhost dvwa*
  - From "www": *mysql -u dvwa -p -h mysql dvwa*

- If the first fails, we troubleshoot MySQL.
- If the second fails, let's check networking!

Step 6: Apache setup

- Make sure that Apache (httpd) starts at boot.
- After starting, can you pull http://localhost with curl?
  - Can you also access the page from your host OS?
    - http://localhost:8080
    - If not, did you set up the port forward?
  - And from mysql? http://www/

Step 7: DVWA install

- Clone the DVWA Git repo to "*/var/www/html/*".
- Edit "*/var/www/html/config/config.php*".
  - Follow the setup guide on Github.
  - At least you should setup the DB connection info.

Step 8: DVWA setup

- Continue the setup guide on Github.
  - http://www/setup.php
  - There are more instructions of things to fix.
  - At the bottom, click the "Reset database" button.

- THIS WILL BE BLOCKED... by SELinux. Fix that! 😘

Closing

Homework

- Reading:
  - Chapter 22
  - Chapter 6

Homework

- Go do:
  - Get DVWA up and running on two VMs.
  - The lab describes all the steps needed.
  - You can first try each step separately or manually.

Reference materials

Resources

- Linux load averages, solving the mystery
- Troubleshooting high load averages
- System Activity Reporter (sar)
- Quick sar explanation
- IOPing tutorial
- In-depth: redis.io performance improvements

Resources

- File transfer with netcat
- Netcat shells, bind and reverse
- Netcat cheatsheet
- CloudFlare: what is MTR?
- Linux ate my RAM!
- Deepdive: Interpreting iostat output