Exercise: Nmap Scan of a Kubernetes Server on Ubuntu 24.04

Objective

By the end of this exercise, you will:

- · Understand which services Kubernetes exposes by default
- Use Nmap to discover open ports and service versions
- Identify security-relevant information from the scan

X Prerequisites

- A **Kubernetes cluster** running (even a single-node cluster like minikube or k3s)
- · A second Ubuntu 24.04 server to act as the scanning machine
- · Root or sudo access on both
- · Nmap installed on the scanning machine

🧩 Part 1: Install Nmap

On the Ubuntu scanning machine

```
sudo apt update
sudo apt install -y nmap
```

Part 2: Identify Target Information

1. Get the IP of the Kubernetes master node

On the Kubernetes server:

ip a

Note the IP address (e.g., 192.168.122.10) to scan from the other machine.



Part 3: Perform Nmap Scans

1. Basic port scan (top 1000 ports)

nmap 192.168.122.10

Nothing should happen, because it's just the top 1000 ports

2. Full port scan (much slower)

```
sudo nmap -p- 192.168.122.10
```

Expected open ports (for Kubernetes):

- 6443: Kubernetes API server (HTTPS)
- 10250: Kubelet API
- 10255: (deprecated, read-only Kubelet API)
- 10257/10259: Controller/Manager
- 2379-2380: etcd ports

3. Service version detection

```
sudo nmap -sV -p 6443,10250,2379,2380 192.168.122.10
```

This reveals software versions, e.g.:

PORT STATE SERVICE VERSION
6443/tcp open https Kubernetes API server 1.28.2

4. OS detection (optional)

sudo nmap -0 192.168.122.10

5. Scan with Nmap NSE scripts for SSL/TLS

sudo nmap --script ssl-cert,ssl-enum-ciphers -p 6443 192.168.122.10

This checks for:

- TLS version support
- · Certificate details
- · Weak ciphers



Answer the following:

- 1. What Kubernetes-related ports were open?
- 2. Was the Kubernetes API secured (HTTPS/TLS)?
- 3. Did any services reveal their version info?
- 4. Was etcd exposed externally (risk!)?

Part 5: Hardening Suggestions (Optional)

If etcd or the kubelet API is exposed:

- · Restrict access via firewall
- Use authentication on exposed APIs

• Verify TLS configurations

Example:

sudo ufw allow from 192.168.122.0/24 to any port 6443 proto tcp

Summary

Scan Type	Command	Purpose
Basic Scan	nmap <ip></ip>	Quick overview
Full Port Scan	nmap -p- <ip></ip>	All 65535 ports
Version Scan	nmap -sV -p <ports> <ip></ip></ports>	Get service versions
TLS Analysis	nmapscript ssl-* -p <port> <ip></ip></port>	Analyze certificate + TLS support

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