NCY-II

Cyber Security Department

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Assignment_3

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Snort Installation and Verification

1.1 Installation Steps:

- **Backing Up the sources.list File:**

  mv /etc/apt/sources.list /etc/apt/sources.list.bak

  - This command creates a backup of the original sources.list file to restore later if needed.

- **Removing Old Update Files:**

  find /var/lib/apt/lists -type f -exec rm {} \;

  - This command removes old package lists to avoid conflicts when updating.

- **Modifying the sources.list to Include Ubuntu Repositories for Snort:**

  nano /etc/apt/sources.list

  deb [arch=arm64] http://ports.ubuntu.com/ubuntu-ports focal main restricted universe multiverse

  deb [arch=arm64] http://ports.ubuntu.com/ubuntu-ports focal-updates main restricted universe multiverse

  deb [arch=arm64] http://ports.ubuntu.com/ubuntu-ports focal-security main restricted universe multiverse

  deb [arch=i386,amd64] http://us.archive.ubuntu.com/ubuntu/ focal main restricted universe multiverse

  deb [arch=i386,amd64] http://us.archive.ubuntu.com/ubuntu/ focal-updates main restricted universe multiverse

  deb [arch=i386,amd64] http://security.ubuntu.com/ubuntu focal-security main restricted universe multiverse

- **Adding Required Public Keys:**

  apt-key adv --keyserver keyserver.ubuntu.com --recv-keys 3B4FE6ACC0B21F32

  apt-key adv --keyserver keyserver.ubuntu.com --recv-keys 871920D1991BC93C

  - These commands add necessary public keys for package verification from the specified repositories.

- **Updating the System Package List:**

  sudo apt update

- **Installing Snort**

  sudo apt install snort

1.2 Verification:

- **Checking Snort Version:**

  snort -V

- **Modifying snort.conf to Set HOME_NET:**
  - Edit the configuration file to define the network IP range for Snort monitoring.

    nano /etc/snort/snort.conf

  - Modify the line to your device IP or network :

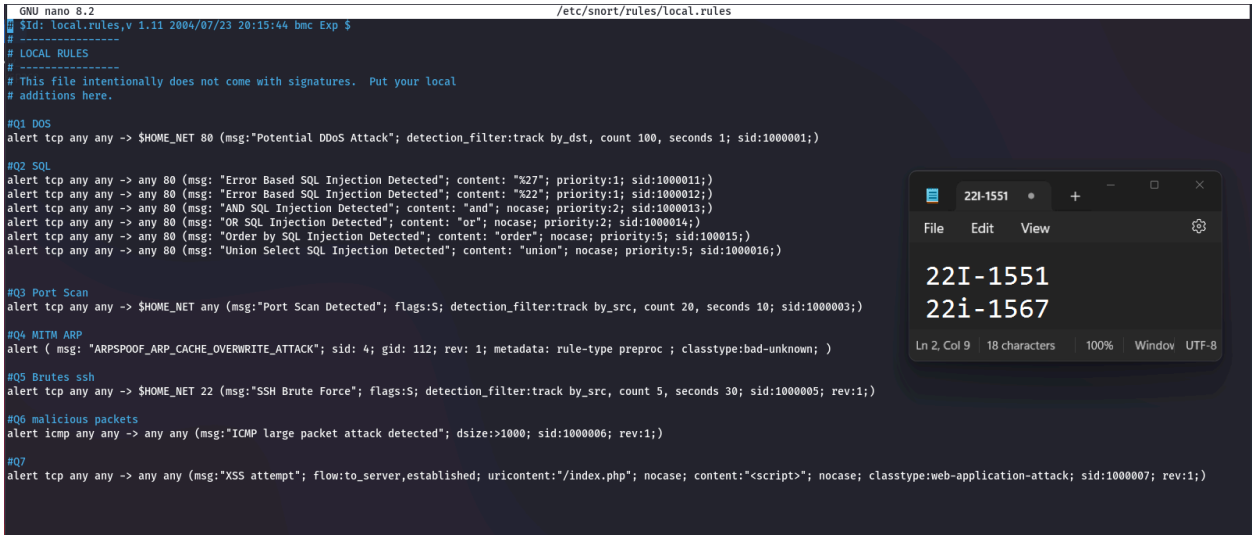
    IPVAR HOME_NET 192.168.20.16/24

- **Running Snort in IDS Mode:**

  snort -A console -q -c /etc/snort/snort.conf -i eth0

  - This command runs Snort in IDS mode, using the specified configuration file and network interface.

2. Custom Snort Rules



The document provides the custom Snort rules we wrote for specific attack scenarios:

- **DDoS/DoS Attack on Web Server:**

  alert tcp any any -> $HOME_NET 80 (msg:"Potential DDoS Attack"; detection_filter:track by_dst, count 100, seconds 1; sid:1000001;)

  - **alert**: Generate alert
  - **tcp**: Protocol
  - **any any**: Any source
  - **->**: Traffic direction
  - **$HOME_NET 80**: Destination, HTTP
  - **msg**: Alert message
  - **detection_filter**: Trigger on 100 packets/sec
  - **sid**: Rule ID

- **SQL Injection on a Web Application:**

alert tcp any any -> any 80 (msg: "Error Based SQL Injection Detected"; content: "%27"; priority:1; sid:1000011;)

alert tcp any any -> any 80 (msg: "Error Based SQL Injection Detected"; content: "%22"; priority:1; sid:1000012;)

alert tcp any any -> any 80 (msg: "AND SQL Injection Detected"; content: "and"; nocase; priority:2; sid:1000013;)

alert tcp any any -> any 80 (msg: "OR SQL Injection Detected"; content: "or"; nocase; priority:2; sid:1000014;)

alert tcp any any -> any 80 (msg: "Order by SQL Injection Detected"; content: "order"; nocase; priority:5; sid:100015;)

alert tcp any any -> any 80 (msg: "Union Select SQL Injection Detected"; content: "union"; nocase; priority:5; sid:1000016;)

- **alert:** Generate alert
- **tcp:** Protocol
- **any any -> any 80:** From any source to port 80 (web server)
- **msg:** Alert message
- **content:** detect single quote (%27)/double quote(%22)/and/or/order/union
- **priority:** Severity level 1
- **sid:** Rule ID

- **Port Scanning and Information Gathering:**

alert tcp any any -> $HOME_NET any (msg:"Port Scan Detected"; flags:S; detection_filter:track by_src, count 20, seconds 10; sid:1000003;)

- **alert**: Issues an alert when the rule matches.
- **tcp**: The protocol monitored is TCP.
- **any any -> $HOME_NET any**: It watches traffic from any source IP/port to any destination within **$HOME_NET** across any ports.
- **msg:"Port Scan Detected"**: The alert message.
- **flags**: Checks for TCP SYN flags (indicates the start of a connection attempt).

- **detection_filter**
  by_src, count 20, seconds 10: The rule will trigger if the same source sends 20 connection attempts (SYN packets) within 10 seconds.
- **sid:1000003**: Unique identifier for the rule.

- **Man-in-the-Middle (MITM) Attack (ARP Spoofing):**

  alert (msg: "ARPSPOOF_ARP_CACHE_OVERWRITE_ATTACK"; sid: 4; gid: 112; rev: 1; metadata: rule-type preproc ; classtype:bad-unknown;)

  - **alert**: Generate alert
  - **msg**: Alert message
  - **sid**: Rule ID
  - **gid**: Preprocessor group
  - **rev**: Rule version
  - **metadata**: Rule type
  - **classtype**: Attack category

- **Brute Force Login Attempts:**

  alert tcp any any -> $HOME_NET 22 (msg:"SSH Brute Force"; flags:S; detection_filter:track by_src, count 5, seconds 30; sid:1000005; rev:1;)

  - **alert**: Generate alert
  - **tcp**: Protocol
  - **any any -> $HOME_NET 22**: Target SSH port on Victim IP
  - **msg**: Alert message
  - **flags**: SYN flag
  - **detection_filter**: 5 attempts in 30 sec
  - **sid**: Rule ID
  - **rev**: Rule version

- **Crafted Malicious Traffic (ICMP Large Packets):**

  alert icmp any any -> any any (msg:"ICMP large packet attack detected"; dsize:>1000; sid:1000006; rev:1;)

- **alert**: Generate alert
- **icmp**: Protocol
- **any any -> any any**: Source to destination
- **msg**: Alert message
- **dsize**: Data size > 1000 bytes
- **sid**: Rule ID
- **rev**: Rule version

- **Research Based Attack (XSS Cross Site Scripting):**

alert tcp any any -> any any (msg:"XSS attempt"; flow:to_server,established; uricontent:"/index.php"; nocase; content:"<script>"; nocase; classtype:web-application-attack; sid:1000007; rev:1;)

- **alert**: Generate alert
- **tcp**: Protocol
- **any any -> any any**: From any source to any destination
- **msg**: Alert message
- **flow**: Direction to server, established connection
- **uricontent**: Look for /index.php in URI
- **nocase**: Case-insensitive match
- **content**: Detect <script> tag
- **classtype**: Classify as web application attack
- **sid**: Rule ID
- **rev**: Rule version

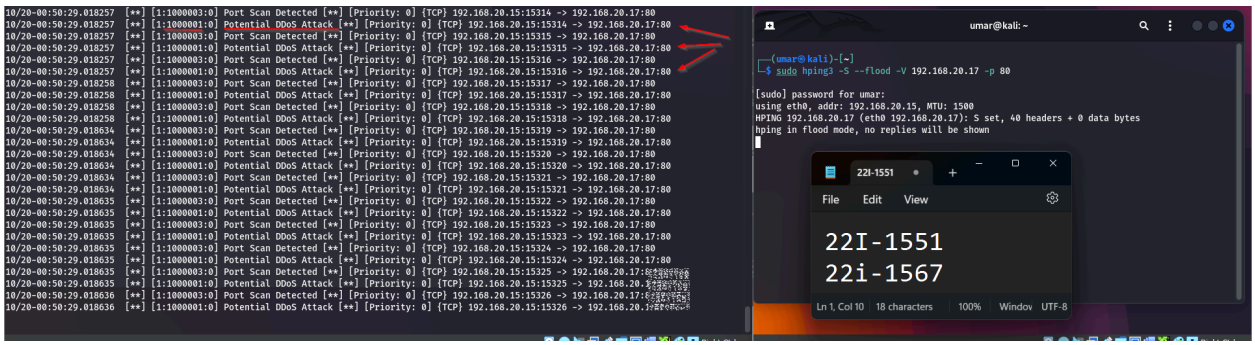
3. Attack Scenarios and Generated Snort Alerts

Scenarios:

- **Scenario 1:** DDoS/DoS attack using hping.

-Attacker's commands:

sudo hping3 -S --flood -V 192.168.20.17 -p 80

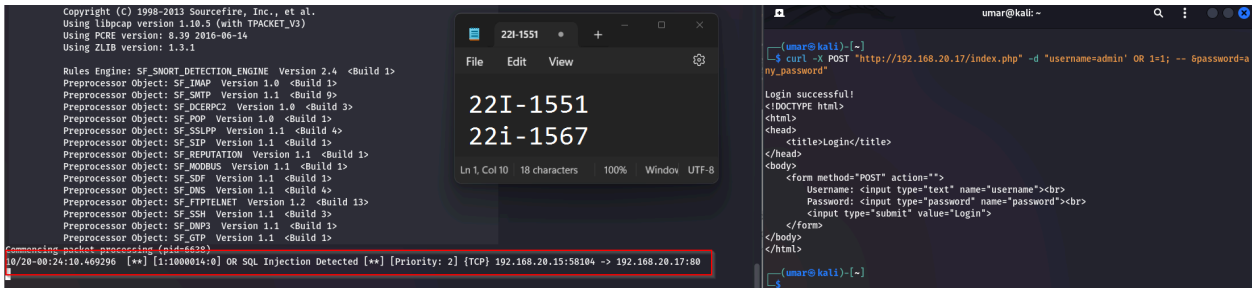


- Left side of the screenshot shows **Potential DDos Attack** alerts generated.

- **Scenario 2:** SQL injection on a simple PHP based website I hosted on the victim's pc.

-Attacker's commands:

curl -X POST "http://192.168.20.17/index.php" -d "username=admin' OR 1=1; -- &password=any_password"

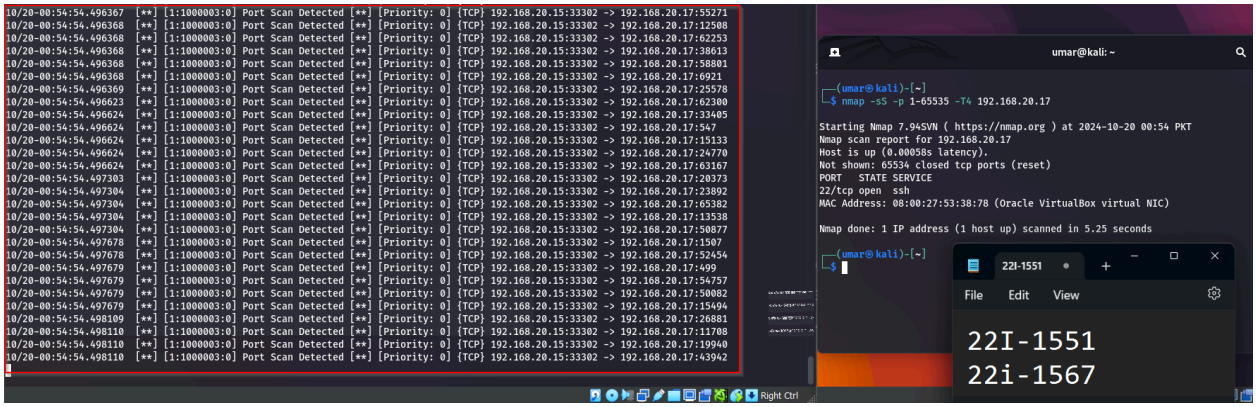


- Left side of the screenshot shows **OR SQL Injection Detected** alert generated.

- **Scenario 3:** Port scanning using nmap

-Attacker's commands:

nmap -sS -p 1-65535 -T4 192.168.20.17

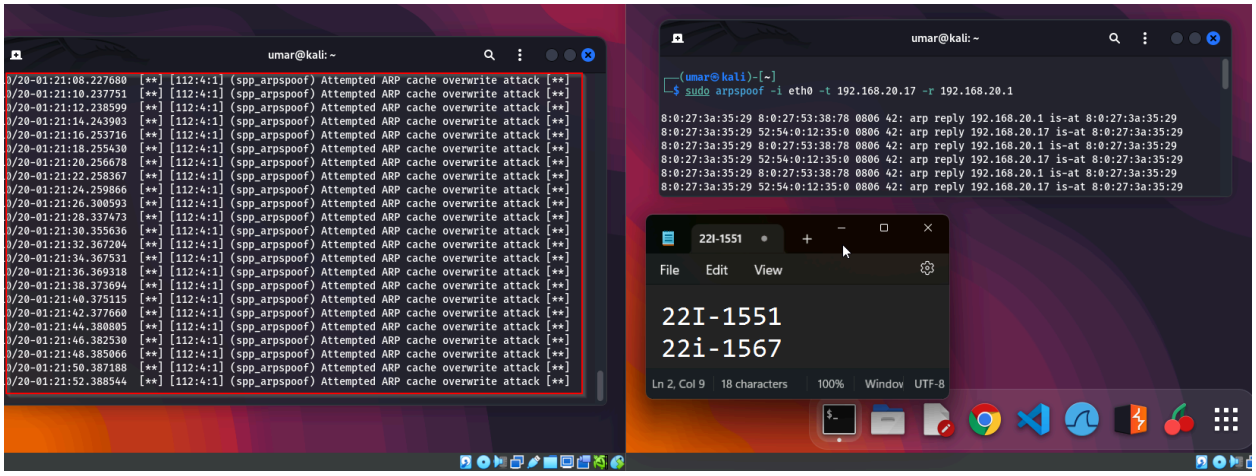


- Left side of the screenshot shows **Port Scan Detected** alert generated.

- **Scenario 4:** MITM attack using arpspoof on victim's gateway ip

-Attacker's commands:

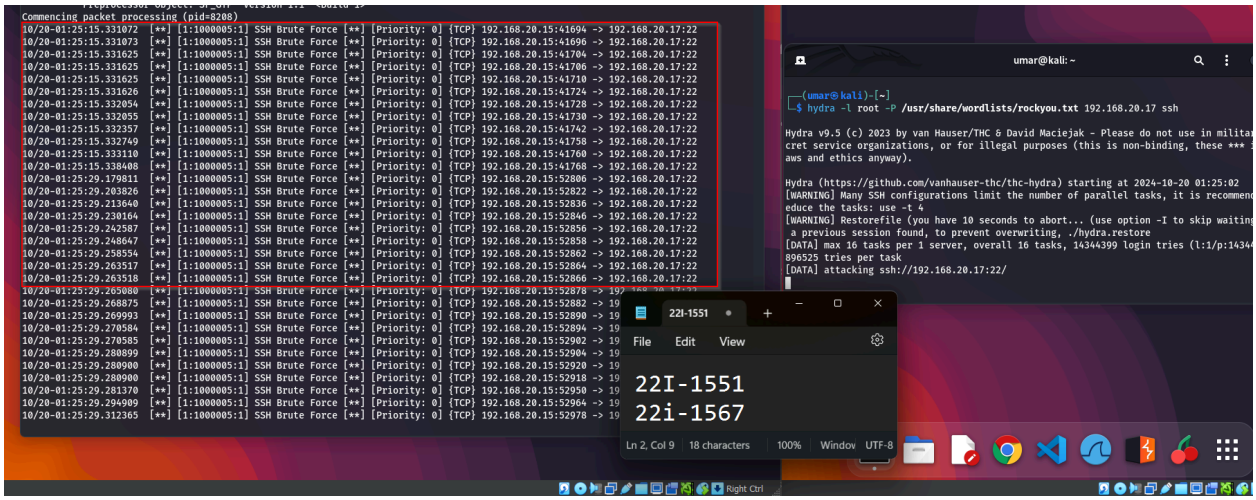
sudo arpspoof -i eth0 -t 192.168.20.17 -r 192.168.20.1



- Left side of the screenshot shows **Attempted ARP cache overwrite** attack alerts generated.

- **Scenario 5:** Brute force SSH login using hydra
  - **Attacker's command:**

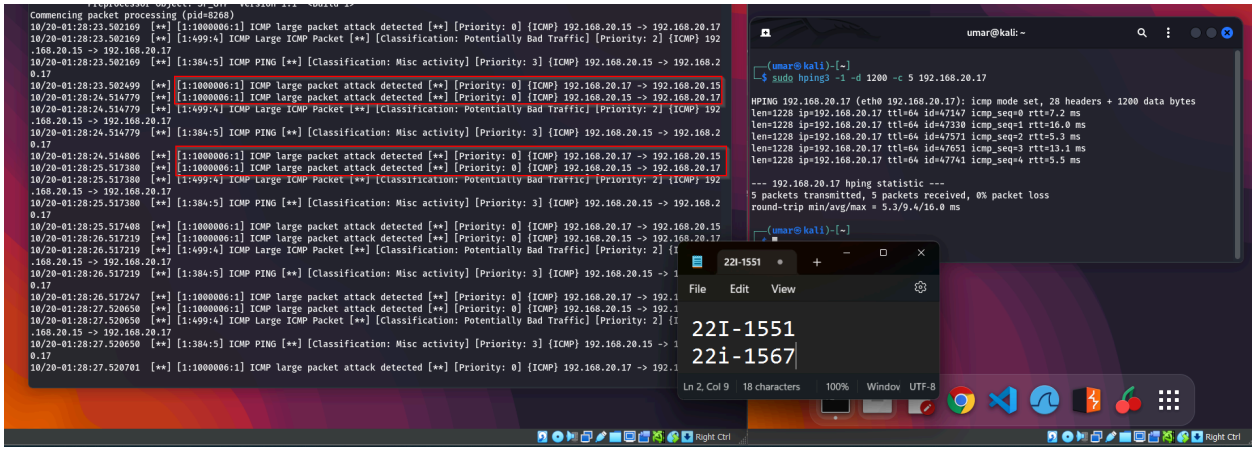
hydra -l root -P /usr/share/wordlists/rockyou.txt 192.168.20.17 ssh



- Left side of the screenshot shows **SSH Brute Force** alerts generated.

- **Scenario 6:** Crafted malicious ICMP traffic using hping3
  - **Attacker's command:**

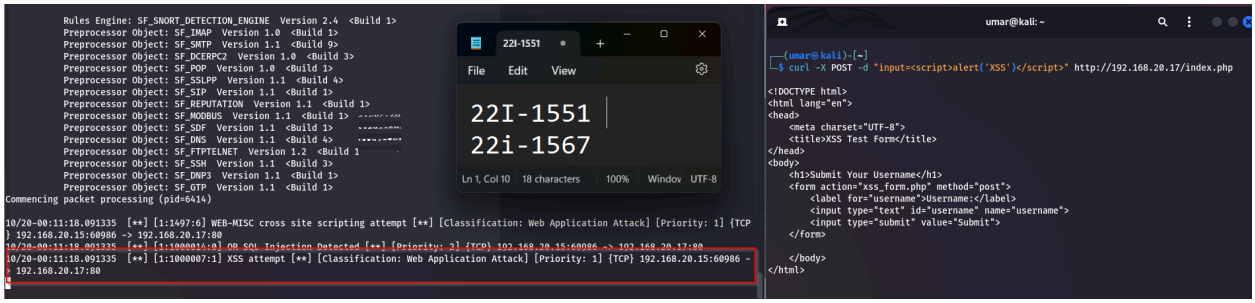
sudo hping3 -S --flood -V 192.168.20.17 -p 80



  - Left side of the screenshot shows **ICMP large packet attack detected** alerts generated.

- **Scenario 7:** Performed XSS cross-site scripting on a PHP based website I hosted on the victim's pc.
  - **Attacker's command:**

curl -X POST -d "input=<script>alert('XSS')</script>" http://192.168.20.17/index.php



  - Left side of the screenshot shows **XSS attempt** alerts generated.

4. Reflection on Snort's Effectiveness

Throughout our project, my partner and I analyzed Snort's performance based on the simulations we conducted together. We found that Snort demonstrated a strong ability to detect various network attacks in real time, including brute-force login attempts, ARP spoofing, and large ICMP packet attacks. Each of these incidents triggered alerts, showcasing Snort's effectiveness in monitoring network traffic.

However, we primarily used generic rules for detection, which sometimes resulted in false positives. For instance, legitimate traffic occasionally triggered alerts meant for specific attack detection. We noticed that sometimes rules for SQL injection were triggered during XSS (Cross-Site Scripting) attempts, highlighting the overlap in attack vectors and the potential confusion in rule applicability. This issue might stem from our surface-level knowledge of the various attacks and corresponding Snort rules. As we are still learning, it’s possible that we didn’t fully understand how to customize rules specifically for the threats we were testing, which emphasized how Snort can generate many false positives if generic commands are used without proper customization.

One thing we learned is that certain attacks, like ARP spoofing, require Snort's preprocessor to handle them. Unlike standard traffic inspections, ARP traffic needs to be processed differently, and the preprocessor is used to analyze this layer of traffic. This is something we weren't entirely familiar with at first, but we began to see how Snort treats ARP packets in a unique way through the preprocessor, inspecting them for patterns typical of spoofing attacks.

Ultimately, the effectiveness of Snort is entirely dependent on the rules implemented. Snort acts like a machine ticking boxes when certain requirements are met, and it will push out alerts based on those conditions. This project provided us with valuable insights into Snort's capabilities and limitations, as well as the importance of refining rules to match the specific context of the network being monitored. Our experience highlighted how critical it is to customize the rules properly to minimize false positives, as using generic rules often led to unnecessary alerts.