University
Carlos III of Madrid

Distributed Systems Security

Denial of Service (DoS) Detection

IT Security Group

Guillermo Suárez de Tangil
(guillermo.suarez.tangil@uc3m.es)

Remembering module 1…

- Firewall configuration
  - All users should have granted access to Fakebook
  - The machine should have granted access to security updates
  - Any other access should’ve not be granted
  - Remote access and PING should be logged
  - Remote connections only from a specific IP address
- SSH
  - Remote administration (SSH)
- File-system Permissions
  - New web administrator user

Today

- Denial of Service Attack
  - We will see how to detect a DoS…
- Snort
  - … by means of **Snort**,
  - an Intrusion Detection System (IDS)

Denial of Service Detection

- Attempt to make a computer resource unavailable
- Prevent an internet site or service from functioning efficiently or at all, temporarily or indefinitely:
  - Web servers
  - Gateways such as credit card payments
  - Root name server
- Techniques:
  - Saturation
  - Malformed packets
- Techniques:
  - Http Flood, ICMP Flood, SYN Flood, etc.

Prevention and Response

- How to detect DoS?
  - Blocking malicious packets
    - *Ping of the dead*
  - Blocking saturation
    - Counting number of connections per second from the same source IP
- Yes! But what about…?
  - Low-rate Denial-of-Service attacks
  - Permanent denial-of-service attacks

Prevention and Response

- Effective prevention and response:
  - Firewalls
    - Deny some protocols
  - Switches and routers
    - Rate limiting capability
  - **Intrusion Detection and Prevention Systems**

Intrusion Detection Systems (IDS)*

- Network and computer intrusions presents behavioral patterns
- Intrusion Detections
  - Methods and techniques used to detect suspicious activities
  - Matching of data with a set of known rules
  - Generate alerts and logs suspicious activities
- Classification
  - Network IDS (NIDS)
    - Sniffs network traffic
  - Host IDS (HIDS)
    - Monitors computers

Intrusion Detection Systems (IDS)

- Pattern
  - Signatures revealing malicious activities
  - In network packets:
    - Patterns can be related to any of the attributes of the packet
- Alerts
  - Anomalous activity is notified to the user and/or admin
  - Stored in a log file or a data base
- False Alert
  - Generated by non-malicious activity
- Sensor
  - Machine in which the IDS is running

Snort

- NIDS tool
- Anomaly-based inspection
  - Packet headers
- Misuse detection (pattern)
  - Packet content
- Open source multiplatform
- Rule files grouped into categories: **/etc/snort/rules**
- Configuration file: **/etc/snort/snort.conf**

Snort Components

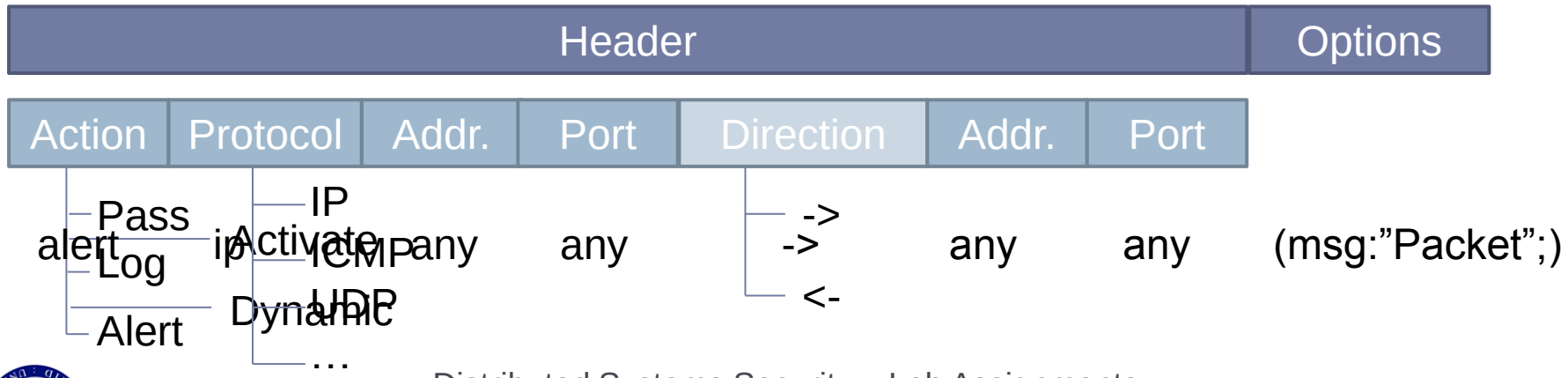
- Packet decoder
  - Sniffs packets and decode them
- Preprocessor
  - Run before the detection engine is called, but after the packet has been decoded
  - The packet can be modified or analyzed in an out-of-band manner
- Detector engine
  - Pattern matching according to pre-configured rules
- Alert system
  - **/var/log/snort**
- Output modules
  - Plug-ins -> Logs and alarms

Snort commands

- Verification
  - ./snort –dvi eth0
- Start and stop
  - /etc/init.d/snortd start/stop
  - ./snort –A full snort.conf
- Help
  - ./snort -?
- Alerts
  - tail -f /var/log/snort/alerts

Snort Rules

- Rules
  - Header
    - **Matching** conditions
    - Post-condition **actions**
  - Options
    - Alert message
    - Additional criterions



Snort Rule Options

- Options
  - msg: message
  - dsize: size of the payload
  - content: content of the payload (most used)
  - classtype: keyword is used to categorize a rule
  - **sid: snort id**
- Example
  - alert tcp any any -> 192.168.1.0/24 21 (content: "USER root"; nocase; msg: "FTP root user access attempt";)

Snort Rule Options

- **flags**:
  - F - FIN (LSB inTCP Flags byte)
  - S - SYN
  - R - RST
  - P - PSH
  - A - ACK
  - U - URG

- **Logic operators**
  - * - ANY flag
  - ! - NOT flag

Example

- alert any any -> 192.168.1.0/24 any (flags: SF; msg: "Possible SYN FIN scan";)

Preparing the environment

- DoS:
  - Small test:
    - **HttpFloodDoS.java**
  - Optionally:
    - http://www.joedog.org/index/siege-home
- Installing snort
  - Execute **cleanUbuntu.sh**
  - Execute **sudo –i**
  - Execute **installSnort.sh**
  - Configure:
    - Configuring snort Interface(s): eth2
    - Address range for the local network: 192.168.0.0/16

DoS Detection in Fakebook

- Task:

> Provide the server with an Intrusion Detection System (IDS) so that the system's administrator will be alerted whenever a machine is performing a large number of connections to Fakebook.

- Documentation:
  - http://www.snort.org/assets/166/snort_manual.pdf
- Tips
  - Detection filters (3.7.10):
    - You can use detection filters to specify a threshold that must be exceeded before a rule generates an event.
  - Event filters (2.4.2)
    - You can use event filters to reduce the number of logged events for noisy rules. This can be tuned to significantly reduce false alarms

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Lets work!

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