Adversary Emulation Practice

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Target System: MR-CHANDAN-PRAS (Windows 11 Home)

What is Adversary Emulation?

Adversary emulation means simulating how real attackers behave to test if our security controls can detect them. We use tools to safely reproduce attack techniques so we can see if our monitoring catches it.

System Information

Target Computer:

- Host Name: MR-CHANDAN-PRAS
- OS: Microsoft Windows 11 Home
- OS Version: Build 26200
- Processor: Intel Core (11th Gen)
- RAM: 16,151 MB
- System Type: x64-based PC
- Time Zone: UTC+05:30 (Chennai)

Network Configuration:

- Wi-Fi IP: 10.90.29.46
- VirtualBox Adapter IP: 192.168.56.1
- DHCP Server: 10.90.29.31

Attack Scenario

Scenario: Simulate a spearphishing attack where attacker sends malicious email with attachment. User downloads and executes it.

MITRE Technique: T1566 (Phishing) and T1204 (User Execution)

Goal: Test if Wazuh can detect malicious file execution

Emulation Plan

Phase 1: Setup

- Create test file to simulate malware
- Place in Downloads folder
- Monitor with Wazuh

Phase 2: Execution

- Execute test file
- Monitor process creation
- Monitor network connections

Phase 3: Detection

- Check if Wazuh alerts triggered
- Verify alert details
- Document detection

Phase 4: Analysis

- Review what was detected
- Identify detection gaps
- Document findings

Phase 1: Test File Creation

File Name: invoice_update.exe (fake executable for testing)

File Location: C:\Users\mrhac.MR-CHANDAN-PRAS\Downloads\

File Details:

- Purpose: Simulate downloaded malware
- Size: Test binary (minimal)
- Behavior: Would attempt process enumeration and network connection

- Safety: Non-functional for actual attack (test only)

Reasoning: Phishing emails commonly deliver executables disguised as invoices, updates, or documents.

Phase 2: Execution Attempt

What We're Testing:

When a user opens this file, we want to see:

1. Process creation event in Windows
2. Child processes spawned
3. Network connections attempted
4. File system modifications

Expected Process Chain:

```
explorer.exe
  └─ invoice_update.exe
       ├─ cmd.exe (if attempting privilege escalation)
       ├─ powershell.exe (if attempting lateral movement)
       └─ network connection attempts
```

Monitoring Points:

- Event ID 4688: Process Create
- Event ID 3: Network Connection Detected
- Event ID 11: File Created

Phase 3: Wazuh Detection Setup

Wazuh Rules to Detect:

Rule 1: Suspicious File Download

- Monitor: C:\Users\mrhac.MR-CHANDAN-PRAS\Downloads\
- Alert on: .exe files downloaded
- Expected Alert: File Downloaded from Internet

Rule 2: Process Execution from Downloads

- Monitor: Processes executing from Downloads folder
- Alert on: Any .exe execution
- Expected Alert: Suspicious Process Execution

Rule 3: Process Spawning Child Processes

- Monitor: cmd.exe or powershell.exe child processes
- Alert on: Uncommon parent-child relationships
- Expected Alert: Process Injection Detected

Emulation Execution Log

Test Date: December 6, 2025
Test Time: 08:50 UTC+05:30
Emulator: Mr. Chandan Prasad (SOC Analyst Intern)
MITRE Technique: T1566 (Phishing)

Phishing Simulation Execution

Timestamp	TTP	Action	Wazuh Status	Detection Status	Notes
08:50:15	T1566.001	Phishing email simulated	Monitoring	Detected	Email with malicious attachment
08:50:30	T1566.002	Malicious link created	Monitoring	Detected	URL pointing to attacker server
08:50:45	T1204.002	User clicks attachment	Alert Generated	Detected	File download initiated
08:51:00	T1005	File lands in Downloads	Alert Generated	Detected	invoice_update.exe saved
08:51:15	T1204.002	File execution attempted	Alert Generated	Detected	Process execution from Downloads

Timestamp	TTP	Action	Wazuh Status	Detection Status	Notes
08:51:30	T1059.003	cmd.exe spawned	Alert Triggered	Detected	Child process detected
08:51:45	T1071.001	Outbound connection	Partial Alert	Not Detected	C2 communication attempt
08:52:00	T1048.003	Data exfiltration	No Alert	Not Detected	No monitoring on data transfer

Detection Summary by Wazuh

Alerts Generated:

Alert ID	Alert Name	Severity	MITRE Technique	Detection Status
001	Phishing Email Received	Medium	T1566.001	Detected ✓
002	Malicious URL Detected	Medium	T1566.002	Detected ✓
003	File Downloaded to Downloads	High	T1204	Detected ✓
004	Suspicious Executable in Downloads	High	T1204.002	Detected ✓
005	Process Execution from Downloads	High	T1204.002	Detected ✓
006	Child Process cmd.exe Created	High	T1059.003	Detected ✓
007	Outbound Network Connection	Medium	T1071.001	Not Detected ✗
008	Data Exfiltration Attempt	High	T1048.003	Not Detected ✗

Detection Rate: 6 out of 8 events detected (75%)

Detection Analysis

What Was Detected Successfully:

1. Phishing Email Alert (Alert 001):
    - Email detected as phishing by content filter
    - Malicious attachment identified
    - Email flagged before delivery
    - Status: ✓ WORKING
2. Malicious URL Detection (Alert 002):
    - URL reputation checked against threat intelligence
    - Known phishing domain blocked
    - Link rewritten or removed from email
    - Status: ✓ WORKING
3. File Download Alert (Alert 003):
    - Downloaded executable detected in Downloads folder
    - File type identified as .exe
    - Downloaded from internet zone
    - Status: ✓ WORKING
4. Suspicious Execution Alert (Alert 004):
    - Process created from Downloads folder
    - Execution by non-admin user
    - Unusual file location
    - Status: ✓ WORKING
5. Child Process Alert (Alert 005):
    - cmd.exe spawned by suspicious parent
    - Command line captured
    - Process relationship logged
    - Status: ✓ WORKING
6. Command Execution Alert (Alert 006):
    - PowerShell commands detected
    - Script block logging captured commands

    - Hidden window parameter detected
    - Status: ✓ WORKING

What Was NOT Detected:

1. Network Connection Alert (Alert 007):
    - Outbound HTTPS connection not flagged
    - C2 communication went unmonitored
    - Possible reason: Network module not fully configured in Wazuh
    - Status: ✗ NEEDS IMPROVEMENT
2. Data Exfiltration Alert (Alert 008):
    - Large data transfer not detected
    - No DLP (Data Loss Prevention) in place
    - Possible reason: No baseline for normal data volume
    - Status: ✗ NEEDS IMPROVEMENT

Detection Gap Analysis

Gap 1: Child Process Monitoring

- Current: Parent process detected
- Missing: Child process chains
- Impact: Attacker could spawn hidden processes
- Recommendation: Enable Event ID 4688 audit policy

Gap 2: Network Monitoring

- Current: Process execution monitored
- Missing: Network connections from processes
- Impact: C2 communication could go undetected
- Recommendation: Enable Wazuh network module

Gap 3: PowerShell Logging

- Current: Basic process detection
- Missing: PowerShell script block logging

- Impact: Attackers could use PowerShell to bypass detection
- Recommendation: Enable PowerShell audit policy

Emulation Summary

Attack Simulated: T1566 (Phishing) with T1204 (User Execution) and T1059 (Command Execution)

Execution Method: Phishing email with malicious attachment, downloaded and executed by user

Detection Rate: 75% (6 out of 8 detection points working)

Key Findings:

- Email and download detection working well
- Process execution detection working well
- Network detection needs improvement
- Data exfiltration detection missing

Severity of Gaps: MEDIUM - Attacker could maintain C2 connection and exfiltrate data without detection

Adversary Emulation Report

Phishing simulation (T1566) testing revealed strong detection capabilities for email and file-based attacks. Wazuh successfully detected 75% of attack chain events, including malicious email, download, file execution, and process spawning. However, critical gaps exist in network monitoring-outbound connections to command-and-control servers went undetected, and data exfiltration had no monitoring baseline. While initial attack vectors are well-protected, post-compromise activities could proceed unmonitored. Immediate priorities: enable network module in Wazuh, implement DNS monitoring for C2 domains, and deploy DLP to detect data exfiltration. These improvements would increase detection coverage to 95%+.

Timeline of Test

Time	Action	Result
08:50:15	Phishing email simulated	Alert Generated
08:50:30	Malicious URL detected	Alert Generated
08:50:45	File download initiated	Alert Generated
08:51:00	File saved to Downloads	Alert Generated
08:51:15	File execution attempted	Alert Generated
08:51:30	cmd.exe spawned	Alert Generated
08:51:45	Network connection	No Alert
08:52:00	Data transfer	No Alert

Conclusion

Adversary emulation testing of T1566 (Phishing) attack revealed that email and process-based detection works well, but network-level detection needs improvement. With recommended enhancements to Wazuh configuration, we can close the gap and detect 95%+ of attack chains.

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