



CIRCL
Computer Incident
Response Center
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Introduction to endpoint visibility

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Do you have an idea
how antivirus software works?

How Antivirus Works

- Antivirus software primarily uses signature-based detection:
 - Scans files and processes for known malware signatures
 - Relies on databases regularly updated with new threat signatures
- Some AVs use heuristic or behavior-based detection to catch unknown threats
- However, advanced threats often evade detection by:
 - Using custom or polymorphic malware
 - Employing stealth techniques and zero-day exploits

Antivirus Management in Large Organizations

- Antivirus software is just another IT tool to deploy and maintain
- Often managed by software or IT teams, not specialized security teams
- Limited involvement of security experts in configuring or responding to alerts
- AV alerts often handled as routine IT issues rather than security incidents

Is the traditional antivirus model
effective at detecting
advanced targeted threats?

Not Really!

- Traditional antivirus relies mostly on known signatures (static and dynamic)
- Advanced targeted threats use custom malware, polymorphic code, unknown techniques and sometimes zero-days
- Such threats often evade signature-based detection (because they have tested their malware against the AV the targeted entity is running)
- Heuristic and behavior-based methods improve detection but have limits

Limitations of AV Software

(Ideally) they have to **detect** all malware and they have **not to detect** all benign software, this in a single product distributed to all customers!

- What is a malware?
- Does everyone have the same definition?



AV impose to their definition of what is a malware and what is not. While providing no context about their detections.

What is the main objective when doing incident response?

What Are We Trying to Achieve in Incident Response?

- The main objective: **gather context around an alert** to understand the incident
- Context includes:
 - What triggered the alert?
 - What happened before and after?
 - Which users, processes, and systems were involved?
- This contextual information is essential to:
 - Assess the impact and scope of the incident
 - Build and update the **incident timeline**
 - Guide response actions and recovery

Incident Response Mantra

💡 **Without context, alerts are just noise.**

- An alert alone tells you something happened — but not what, why, or how.
- Context transforms a raw signal into actionable intelligence:
 - Who did it?
 - What else happened around the same time?
 - Is it part of a larger pattern?
- Effective incident response is not just reacting to alerts — it's **investigating with context.**

Knowing that, how do you think
incident response goes with AV alerts
only?

Bad

- Limited visibility into what actually happened during an attack
- Difficulty in tracing attack vectors and lateral movements
- Delays in detection reduce chances for quick containment
- Lack of rich context makes investigations slow and inefficient



Security teams need transparent, flexible, and extensible tools to monitor endpoints → **endpoint visibility software**

What is an Endpoint Visibility Software?

A tool that monitors and collects information from endpoints (servers, workstations, network devices)

- Provides real-time insights into what is happening on a system:
 - Process executions
 - File accesses and modifications
 - User activities
 - Network connections
- Helps detect suspicious or malicious behaviors
- Essential to implement **customized** / **tailored** threat detection scenarios

Beyond Detection: Incident Response Value

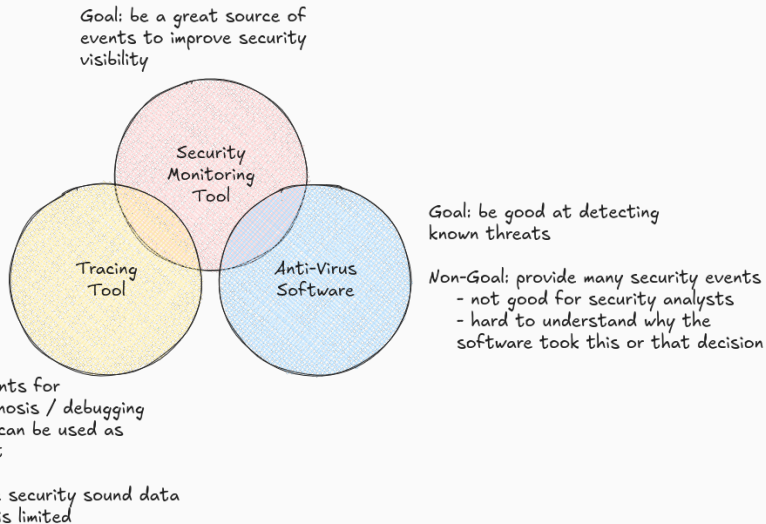
Endpoint visibility tools are not only useful for threat detection

- They provide **invaluable data** during incident response:
 - Timeline reconstruction of attacker activity
 - Identification of persistence mechanisms
 - Tracing lateral movement across systems
 - Understanding the scope and impact of the breach
- Without visibility, responders are often blind, forced to make assumptions while relying on time consuming analysis methods
 - Quick artifact acquisition (osquery, velociraptor)
 - Disk acquisition (need someone with a physical access to the device)
 - Artifact / disk acquisition take time and any time saved in incident response is good to take

Specific Terminology

- **Security event:** an event happening on a system which may indicate a potential security incident
Example: A log entry that indicates the execution of a given binary
- **Security monitoring tool:** a tool monitoring a system or an infrastructure and generating security events for analysis.
Example: Intrusion Detection Systems (IDS), Endpoint Detection and Response (EDR)
- **Security visibility:** the ability to monitor, detect and analyze security events
Example: A company using a security monitoring software increases its security visibility

Different Software for Different Purposes



Do you know any endpoint visibility software?

Current Landscape of Endpoint Visibility Software

- Real-time visibility is essential for detecting and responding to threats
- Few open-source tools provide comprehensive real-time event collection
- **Linux:**
 - `Auditd` – Kernel-level auditing, powerful but complex
 - `Kunai` – Real-time system event collection and threat hunting
 - `Falco` – Real-time detection focused on containers and syscall activity
- **Windows:**
 - `Sysmon` – Free tool from Microsoft for detailed event logging (not open-source)
 - `Wazuh` – Some real-time monitoring via event/log analysis

Key Steps for Effective Endpoint Visibility (1/2)

1. Monitor Endpoints

- Deploy lightweight agents or kernel features to collect real-time events

2. Define Logging Policies

- Determine what events are relevant (processes, file changes, network activity)
- Balance between data volume and usefulness

3. Forward and Aggregate Logs

- Securely send logs to central servers or SIEM platforms
- Ensure reliability and scalability

Key Steps for Effective Endpoint Visibility (2/2)

4. Analyze and Correlate

- Use rules, heuristics, and behavioral analytics to detect anomalies
- Enrich events with contextual data for better investigations

5. Respond and Hunt

- Trigger alerts, perform threat hunting, and conduct incident response
- Continuously refine detection and response strategies

With Great Power Comes Great Responsibilities (1/2)

- **1. Choosing the right data:**
 - Select logs that are useful for detection
 - Select logs that support incident response and forensics
- **2. Performance considerations:**
 - Minimize CPU, memory, and disk impact on monitored endpoints
 - Ensure tools do not degrade system reliability
- **3. Backend pressure:**
 - Limit log volume to avoid overloading storage and processing pipelines
 - Enable long-term retention with reasonable storage costs

With Great Power Comes Great Responsibilities (2/2)

- **4. Signal-to-noise ratio:**
 - Avoid collecting redundant or low-value events
 - Prioritize actionable and context-rich logs
- **5. Security and privacy:**
 - Protect collected data (it may contain sensitive information)
 - Comply with legal and organizational data retention policies



Analyst / detection engineers will want all the logs possible but you will have to do **trade-offs**

Theory vs. Practice in Endpoint Visibility

In theory, comprehensive endpoint monitoring covers all systems and activities

- In practice, blind spots remain due to:
 - Legacy systems running critical but unmodifiable applications
 - Network appliances and proprietary hardware with limited visibility
 - Constraints on deploying agents or updating software
- These gaps require tailored solutions and additional network-level monitoring



Endpoint visibility is necessary but not always sufficient for full coverage

Do you believe we should
throw antivirus away?

Of Course Not

- Antivirus can still serve as a first layer of defense
- Antivirus have very solid signature database detecting many commodity malware you don't want to bother with
- It might detect some threats or serve as a trigger for deeper investigations
- AV should be used **in conjunction with** a solid endpoint visibility strategy



Combining AV software with a good endpoint visibility strategy improves detection rates and shortens incident response time

Key Takeaways

- **Traditional antivirus** mainly detects known threats using signatures — often ineffective against advanced attacks.
- **AV alerts lack context**, making incident response difficult and slow.
- **Context is king**: effective incident response requires understanding what happened before, during, and after an alert.
- **Endpoint visibility tools** provide real-time, high-context data critical for detection and response.
- **With great power comes responsibility**: collecting the right logs, minimizing system impact, and balancing retention and privacy are essential.
- **AV is not obsolete** — it still plays a role as part of a layered security approach.

Linux Endpoint Visibility with Kunai

What is Kunai?

Kunai is a free and open-source Linux endpoint monitoring and hunting tool

- Designed to provide deep visibility into what happens on a Linux system
- Features:
 - Lightweight agent for collecting real-time system events
 - Extensible rule engine for detecting suspicious or malicious activity
 - Outputs structured JSON events for easy integration and analysis
 - Correlates with tools like **Suricata** and **Zeek** for enriched detection
- Aimed at individuals, companies, and public sector entities looking to improve visibility and response

But, why Kunai?



Kunai is **open-source** and is developed here in **Luxembourg**

Many concepts you will learn with Kunai will be transposable into other tools

Any question?

https://hdoc.csirt-tooling.org/5VEw-vd_ShmRs0T03071SQ#