Ruling the Rules

Quantifying the Evolution of Rulesets, Alerts and Incidents in Network Intrusion Detection

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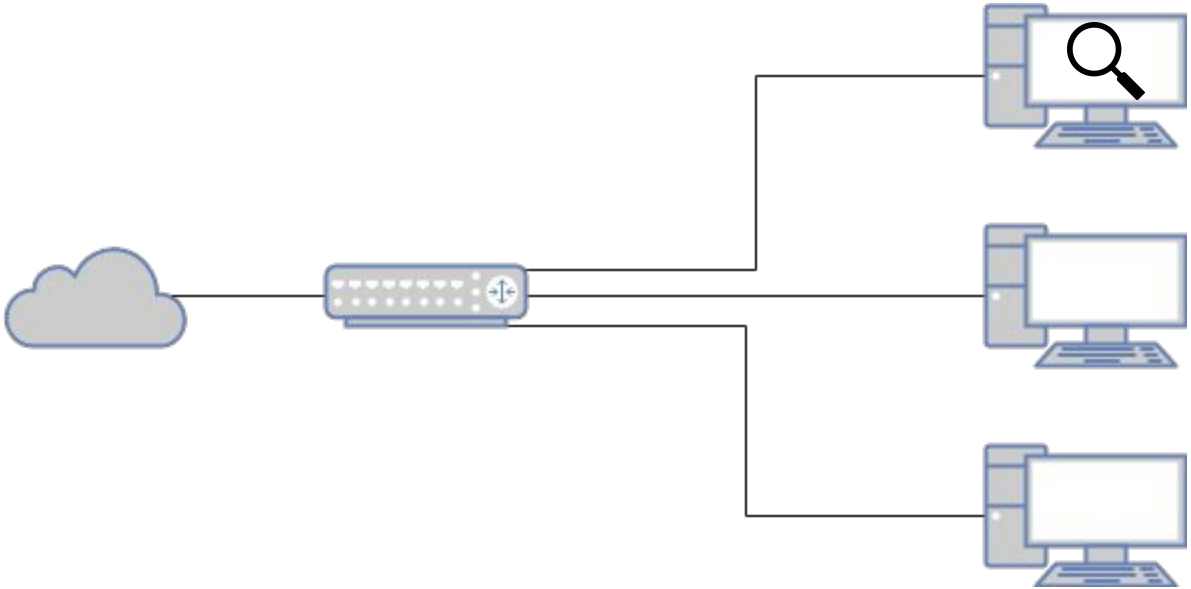
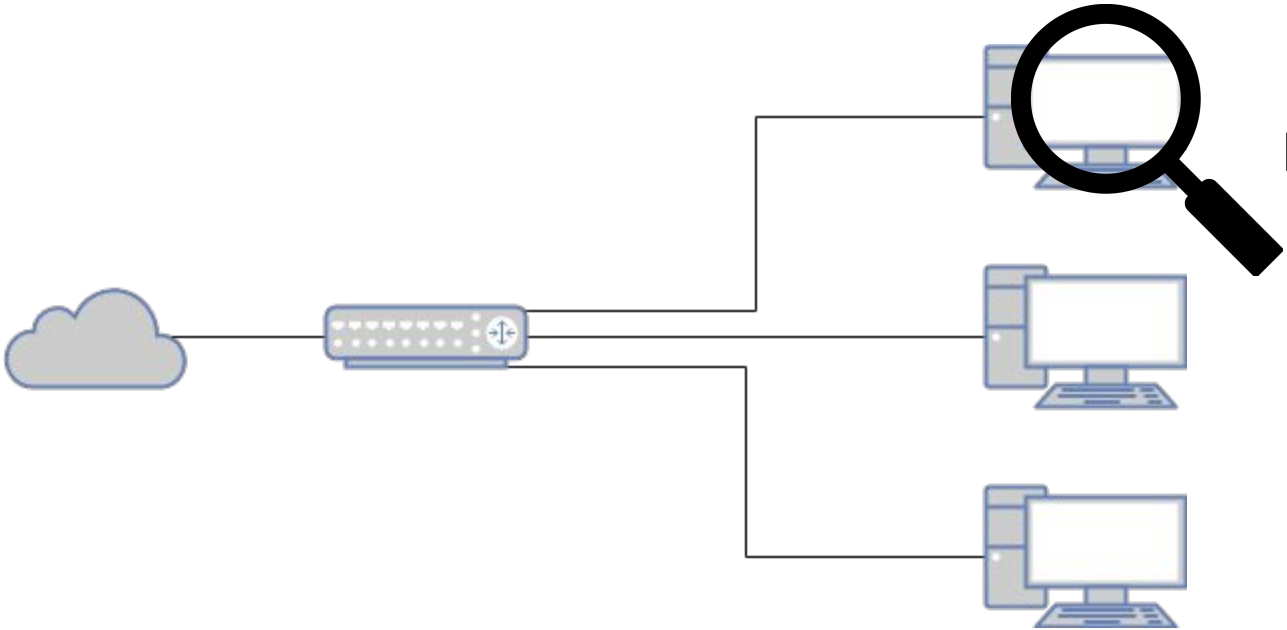
Intrusion detection systems (IDS)



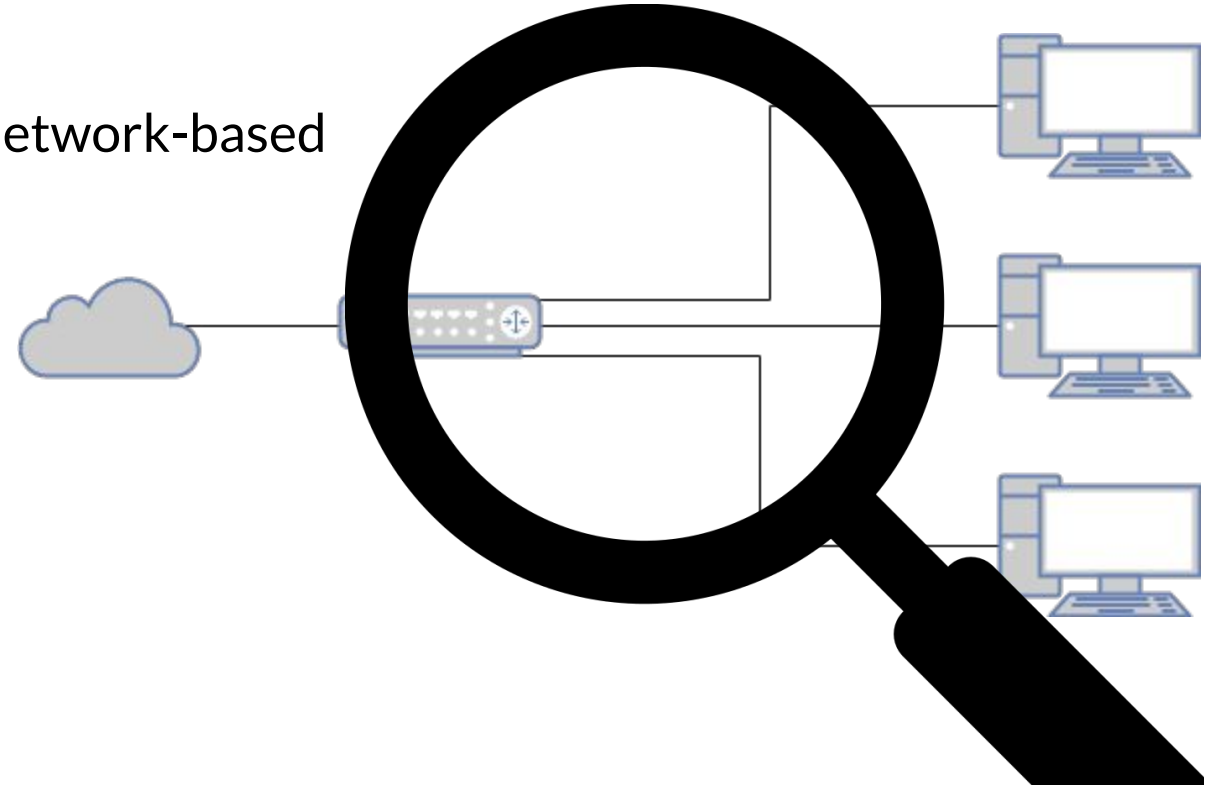
Application-based

Intrusion detection systems (IDS)

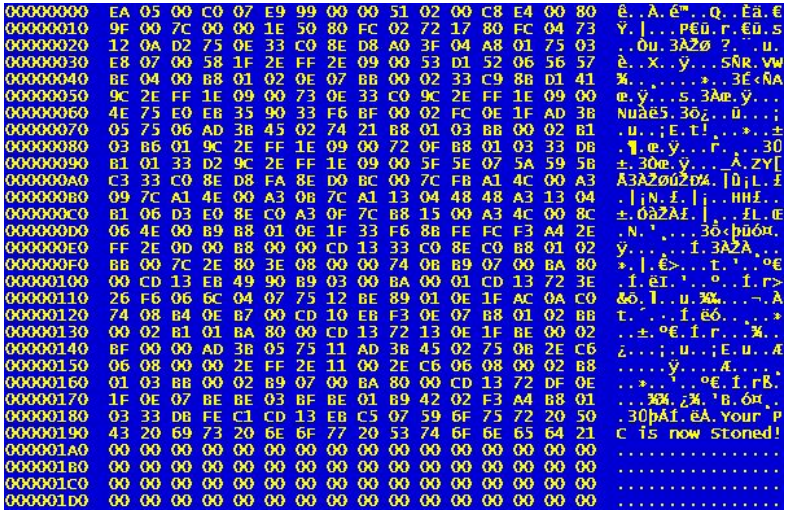


Intrusion detection systems (IDS)

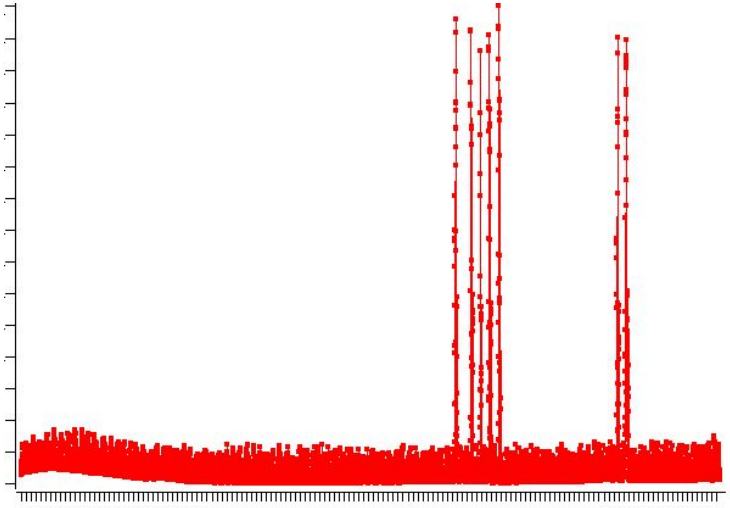
Network-based



Network intrusion detection systems (NIDS)



Signature-based



Anomaly-based


SECURITY
COMMUNITY
ANOMALY-BASED
NIDS
SIGNATURE-BASED
NIDS
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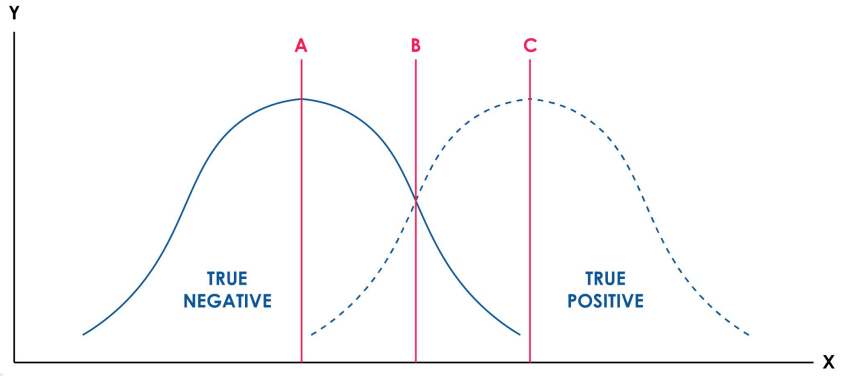
The NIDS black box

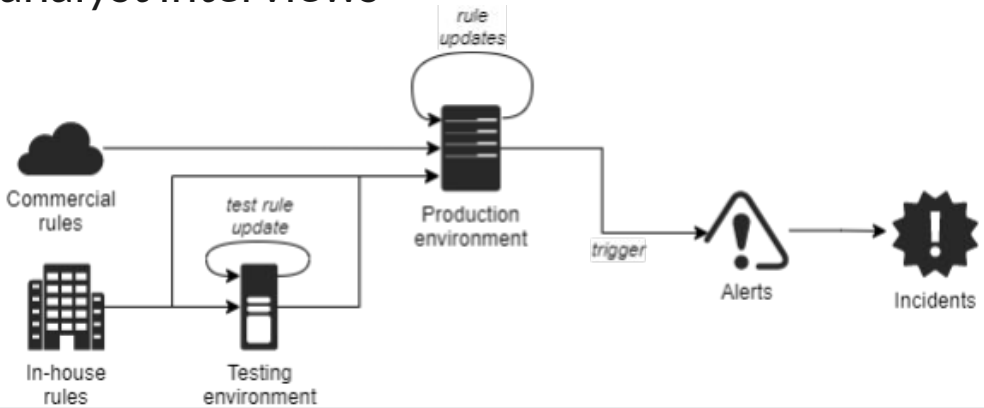
- Not as straightforward as it seems.
  - Why do they work?
  - What role do the rulesets play?
  - How do security professionals keep them working effectively?
- Critical tradeoff: Maximize intrusion detection vs minimize number of alerts.



https://www.publichealthnotes.com/sensitivity-vs-specificity-10-important-differences/

Methodology

- Partnered with managed security service provider (MSSP).
  - MSSP in-house NIDS ruleset
  - Three commercial NIDS rulesets (ET Pro Snort & Suricata, VRT)
  - Alerts & incidents over time
  - Security analyst interviews



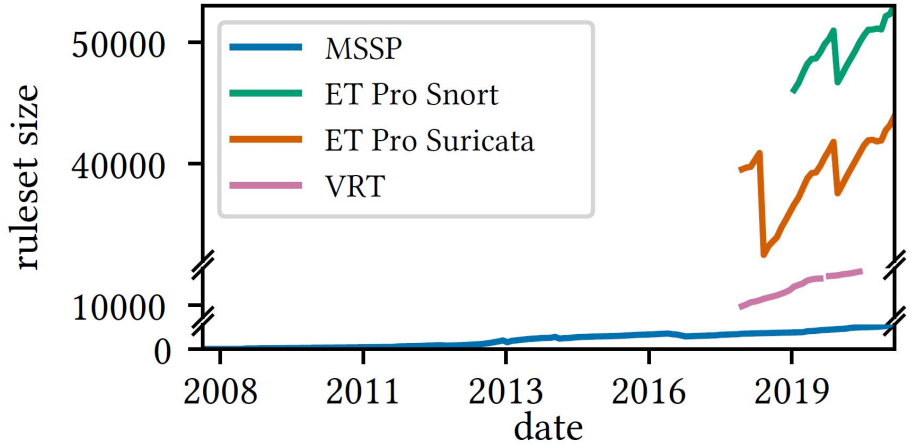
Methodology

- Create tool to track ruleset evolution in git repo.
  - Track new rules, updated rules & deleted rules.
- Calculate many different statistics that shed light upon ruleset management processes and organizational security.
- Interview security analysts to cross-validate the insights.

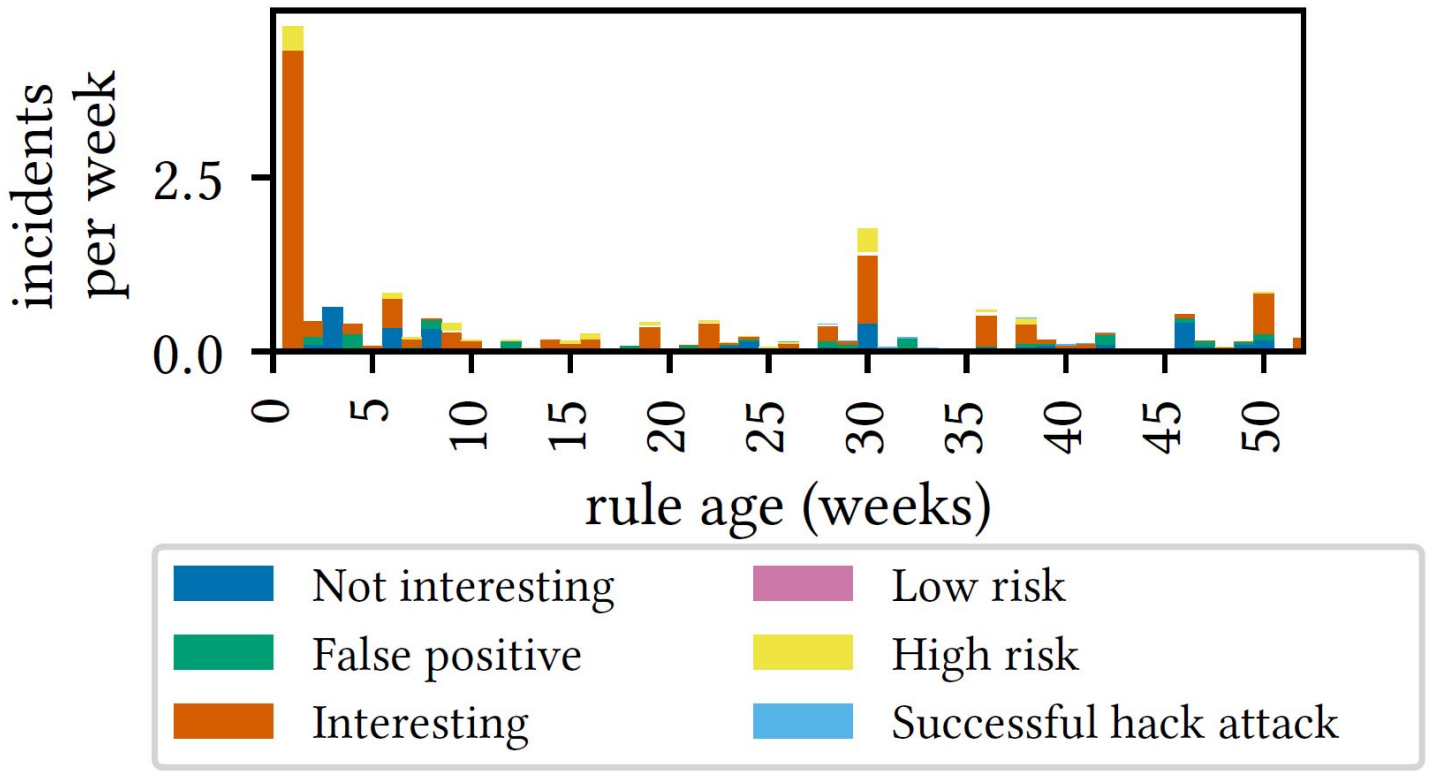
Results

Custom ruleset important for proper functioning of NIDS

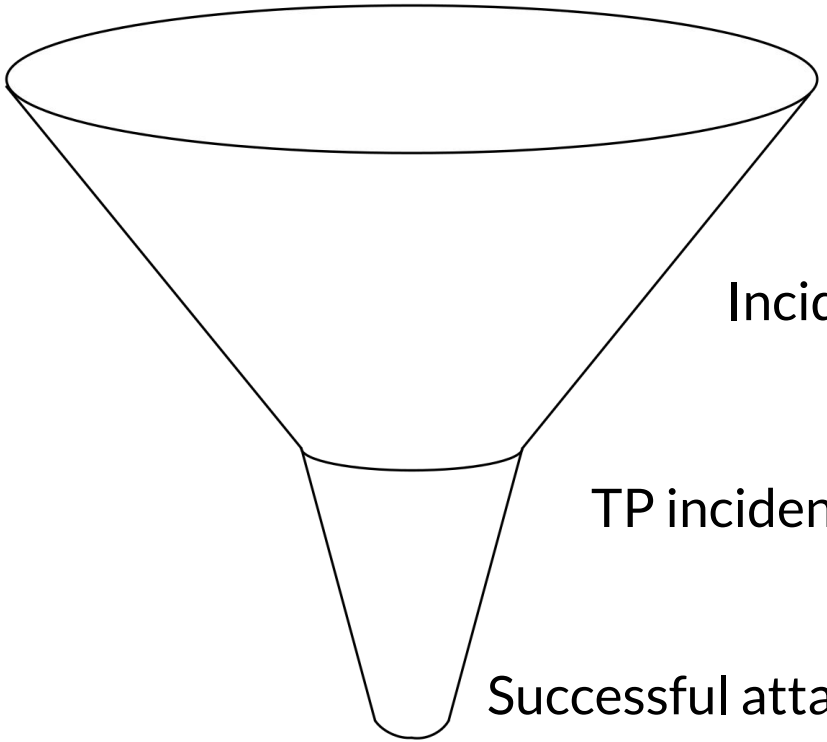
- Precision of MSSP ruleset higher than commercial rulesets.
- MSSP ruleset much smaller than commercial rulesets, but present in **27%** of all true positive incidents.
- Complementary to commercial rulesets, validated by interviews.



Newest rules produce most incidents



99.8% of TP incidents detected before becoming successful attack



Alerts: 62 million

Incidents: 150 thousand

TP incidents: 69 thousand

Successful attacks: 106

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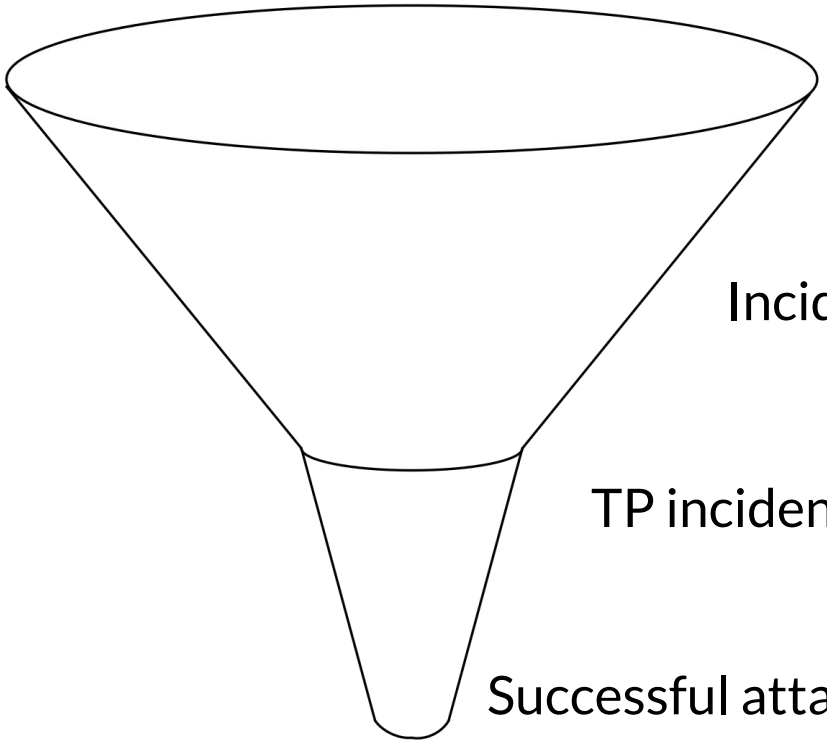

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Wrapping up

- Custom ruleset important for the proper functioning of an NIDS.
- Importance of keeping up to date with threat landscape: newest rules responsible for most incidents.
- Detects & prevents 99.8% of all TP incidents.

- Signature-based systems are still effective.
- Future work still needed to compare to different (N)IDS approaches.
- Archaic and obsolete or indispensable to security?