Introduction to the OWASP ModSecurity Core Rule Set Project

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OWASP Dorset

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Talk Overview

- Why use a WAF? *(What is a WAF?)*
- WAF engines
- WAF rules: Enter the Core Rule Set (CRS)
- How CRS works
- Other bits we do as a project

Who am I and Why am I Here?

Andrew Howe

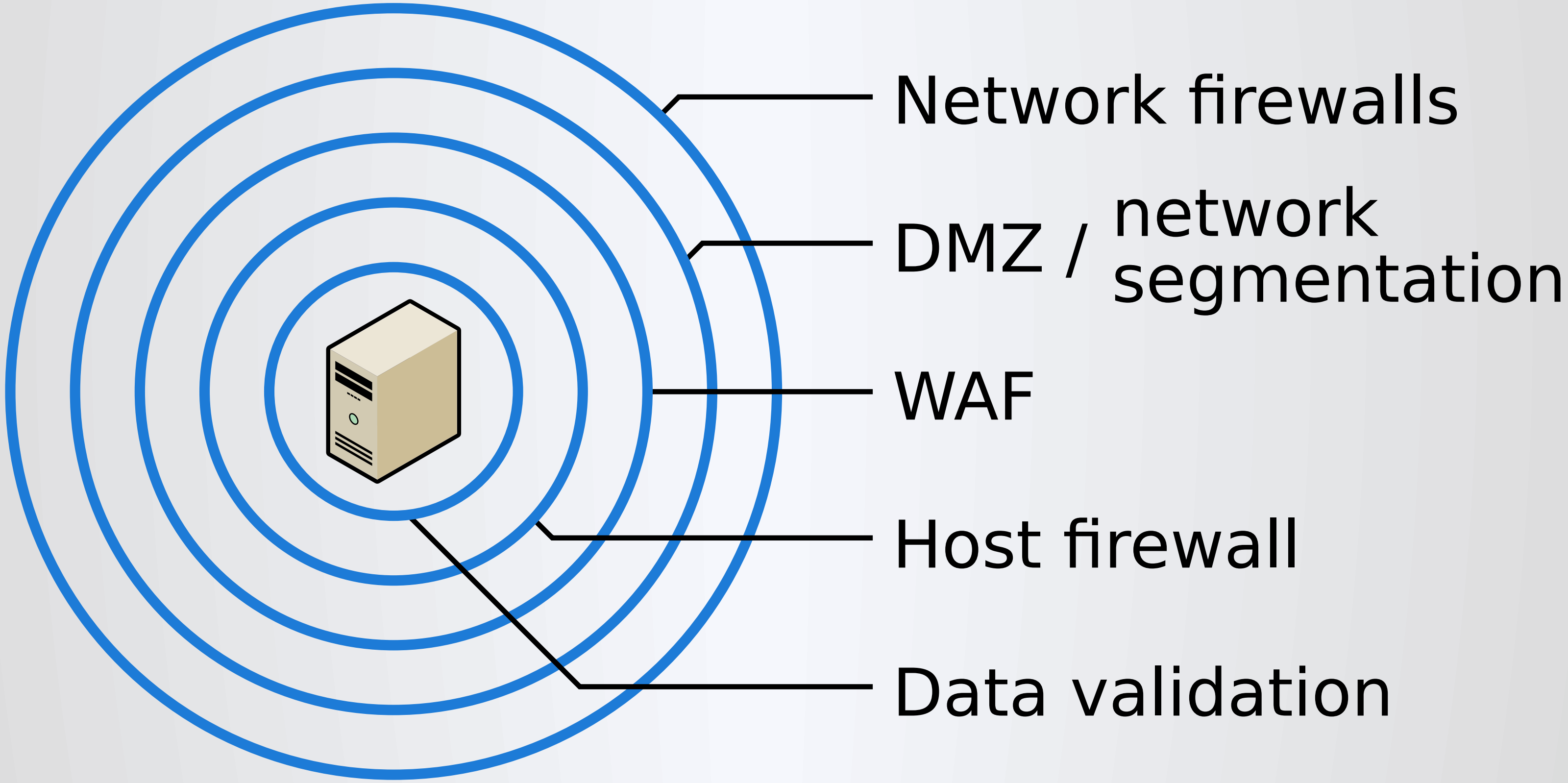
Technical Author/Architect

LOADBALANCER

Why Use a WAF?

Why Use a WAF?

Why Use a WAF?



Network firewalls

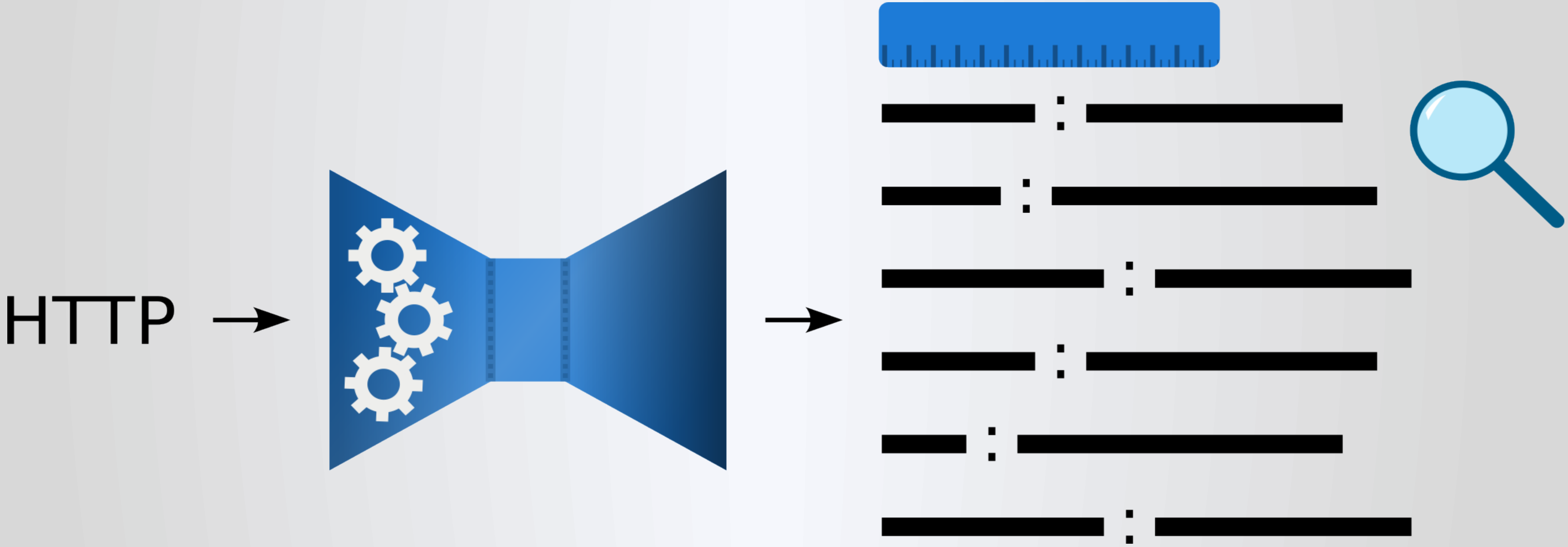
DMZ / network segmentation

WAF

Host firewall

Data validation

Engine



Engine

modsecurity

Open Source Web Application Firewall

Engine

“SecLang”

```
SecRule VARIABLES OPERATOR ACTIONS
```

Engine

“SecLang”

```
SecRule VARIABLES OPERATOR ACTIONS
```

```
SecRule REQUEST_HEADERS "@rx pear|apple" "id:1,deny"
```

Engine

coraza

WEB APPLICATION FIREWALL

Rules

OWASP

ModSecurity Core Rule Set

THE 1ST LINE OF DEFENSE

Rules

⋮

REQUEST-911-METHOD-ENFORCEMENT.conf

REQUEST-913-SCANNER-DETECTION.conf

REQUEST-920-PROTOCOL-ENFORCEMENT.conf

⋮

REQUEST-932-APPLICATION-ATTACK-RCE.conf

REQUEST-933-APPLICATION-ATTACK-PHP.conf

⋮

Rules

⋮

REQUEST-941-APPLICATION-ATTACK-XSS.conf

REQUEST-942-APPLICATION-ATTACK-SQLI.conf

⋮

REQUEST-944-APPLICATION-ATTACK-JAVA.conf

REQUEST-949-BLOCKING-EVALUATION.conf

⋮

Rules

⋮

RESPONSE-951-DATA-LEAKAGES-SQL.conf

⋮

RESPONSE-953-DATA-LEAKAGES-PHP.conf

RESPONSE-954-DATA-LEAKAGES-IIS.conf

⋮

RESPONSE-955-WEB-SHELLS.conf

⋮

Rules

```
Include modsecurity.conf-recommended
Include coreruleset-3.3.4/crs-setup.conf
Include coreruleset-3.3.4/rules/*.conf
```

Rules

```
SecRule REQUEST_HEADERS:Content-Length "!@rx ^\d+$" \
    "id:920160,\
    phase:1,\
    block,\
    msg:'Content-Length HTTP header is not numeric',\
    logdata:'%{MATCHED_VAR}',\
    tag:'paranoia-level/1',\
    ver:'OWASP_CRS/4.0.0-rc1',\
    severity:'CRITICAL',\
    setvar:'tx.inbound_anomaly_score_pl1=+%{tx.critical_anomaly_score}'"
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The Humans Behind the Rules!

Who Uses CRS?

OWASP

ModSecurity
Core Rule Set

THE 1ST LINE OF DEFENSE

Who Uses CRS?

OWASP
ModSecurity
Core Rule Set

THE 1ST LINE OF DEFENSE

Why is CRS So Widely Used?

OWASP

ModSecurity
Core Rule Set

THE 1ST LINE OF DEFENSE

How CRS Works

OWASP

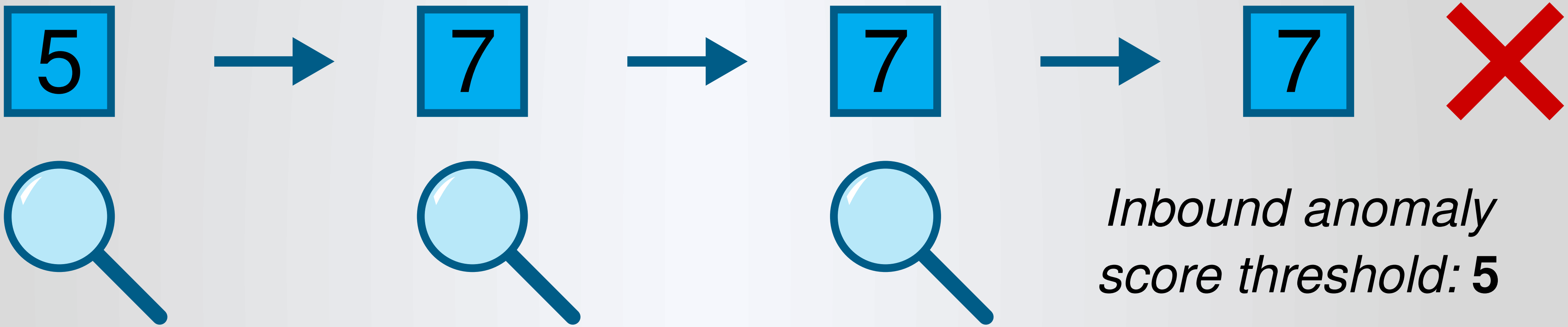
ModSecurity
Core Rule Set

THE 1ST LINE OF DEFENSE

Anomaly Scoring

Anomaly Scoring

Anomaly Scoring



Rule 1

CRITICAL

MATCH (Add 5)

Rule 2

NOTICE

MATCH (Add 2)

Rule 3

NOTICE

NO MATCH

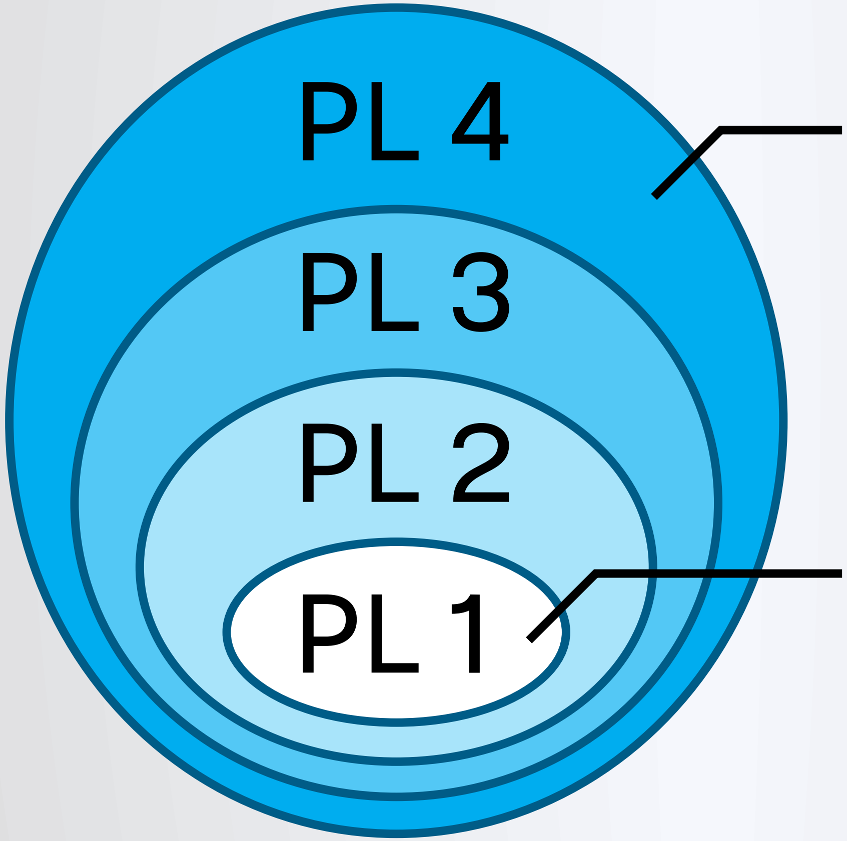
Inbound anomaly score threshold: **5**

Blocking evaluation

DENY

Rule Set Configuration

Paranoia Levels



Very aggressive rules
False positives likely

Less aggressive rules
False positives rare

False Positives and Tuning

False Positives and Tuning

01234567896 andy.smith@company.co.uk

False Positives and Tuning

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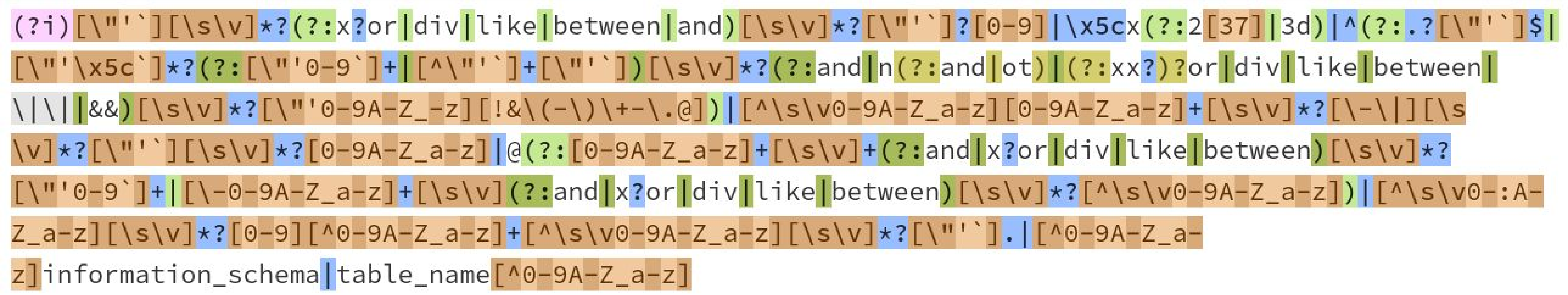
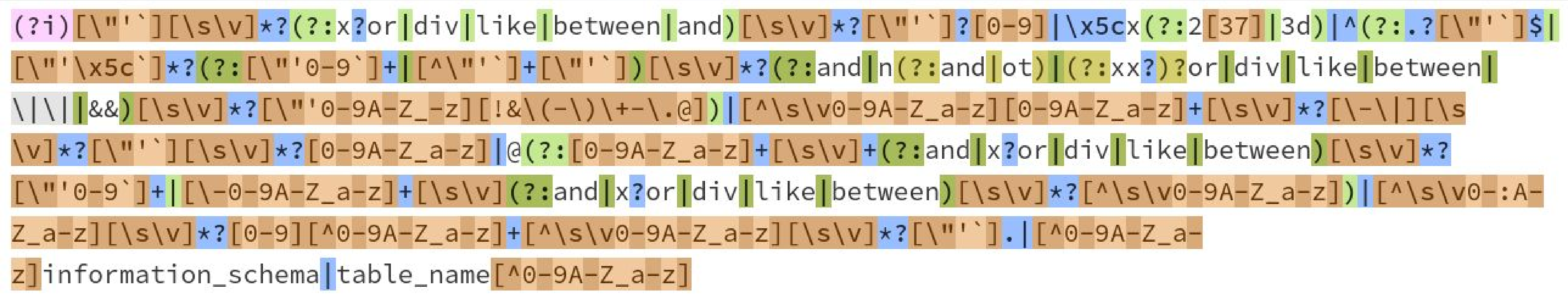


```
(?i)[\"'`][\s\v]*?(?:x?or|div|like|between|and)[\s\v]*?[\"'`]?[0-9]|\x5cx(?:2[37]|3d)|^(?:.?[\"'`]$|
[\"'\x5c`]*?(?:[\"'0-9`]+|[^\"'`]+[\"'`])[\s\v]*?(?:and|n(?:and|ot)|(?:xx?)?or|div|like|between|
\|\||&&)[\s\v]*?[\"'0-9A-Z_-z][!&\(-\)\+-\.@])|[^\s\v0-9A-Z_a-z][0-9A-Z_a-z]+[\s\v]*?[\-\|][\s
\v]*?[\"'`][\s\v]*?[0-9A-Z_a-z]|@(?:[0-9A-Z_a-z]+[\s\v]+(?:and|x?or|div|like|between)[\s\v]*?
[\"'0-9`]+|[\-0-9A-Z_a-z]+[\s\v](?:and|x?or|div|like|between)[\s\v]*?[^\s\v0-9A-Z_a-z])|[^\s\v0-:A-
Z_a-z][\s\v]*?[0-9][^0-9A-Z_a-z]+[^\s\v0-9A-Z_a-z][\s\v]*?[\"'`].|[^0-9A-Z_a-
z]information_schema|table_name[^0-9A-Z_a-z]
```

False Positives and Tuning

01234567896 andy.smith@company.co.uk



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\|\||&&)[\s\v]*?[\"'0-9A-Z_-z][!&\(-\)\+-\.@])|[^\s\v0-9A-Z_a-z][0-9A-Z_a-z]+[\s\v]*?[\-\|][\s
\v]*?[\"'`][\s\v]*?[0-9A-Z_a-z]|@(?:[0-9A-Z_a-z]+[\s\v]+(?:and|x?or|div|like|between)[\s\v]*?
[\"'0-9`]+|[\-0-9A-Z_a-z]+[\s\v](?:and|x?or|div|like|between)[\s\v]*?[^\s\v0-9A-Z_a-z])|[^\s\v0-:A-
Z_a-z][\s\v]*?[0-9][^0-9A-Z_a-z]+[^\s\v0-9A-Z_a-z][\s\v]*?[\"'`].|[^0-9A-Z_a-
z]information_schema|table_name[^0-9A-Z_a-z]
```

Rule Exclusion Packages

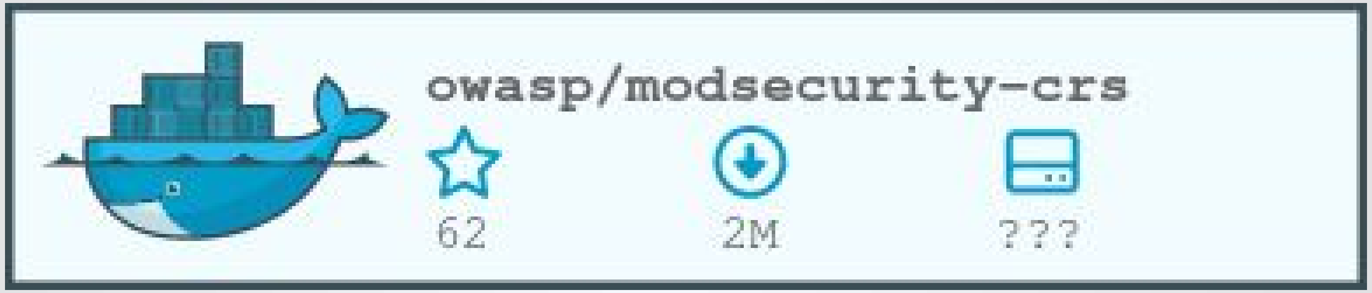
- Drupal
- WordPress
- Nextcloud
- DokuWiki
- cPanel
- XenForo
- phpBB
- phpMyAdmin

Plugins

- Automatic (opportunistic) character decoding
- Anti-User Agent bot spoofing (e.g. attackers pretending to be a Google bot)
- Legacy DoS protection

Docker Containers

- Apache
- Nginx



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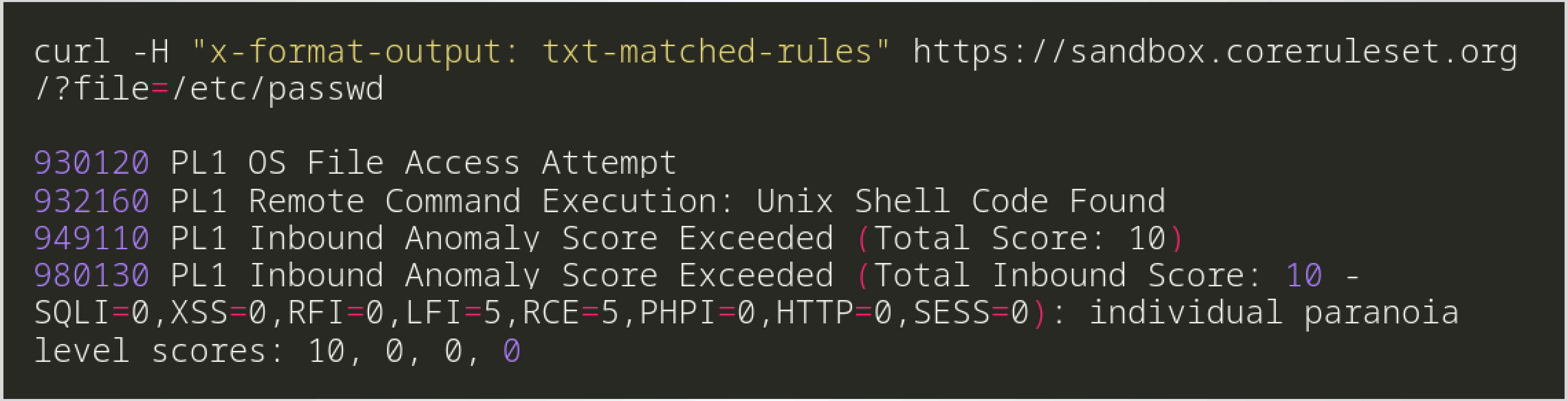
CRS Sandbox

- https://sandbox.coreruleset.org/



```
curl -H "x-format-output: txt-matched-rules" https://sandbox.coreruleset.org
/?file=/etc/passwd

930120 PL1 OS File Access Attempt
932160 PL1 Remote Command Execution: Unix Shell Code Found
949110 PL1 Inbound Anomaly Score Exceeded (Total Score: 10)
980130 PL1 Inbound Anomaly Score Exceeded (Total Inbound Score: 10 -
SQLI=0,XSS=0,RFI=0,LFI=5,RCE=5,PHPI=0,HTTP=0,SESS=0): individual paranoia
level scores: 10, 0, 0, 0
```

And More Cool Stuff We Do!

- Google Summer of Code
- Documentation and PR
- Tooling for crazy regular expressions
- Go-FTW
- CRS Status Page

The Future

- CRS 4
- CRS 3.3.5

Conclusion

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