SORRY ABOUT YOUR WAF

Bypassing the Modern WAF

kasada

security redefined

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PREVIOUS PROFESSIONAL ROLES:

- Network Engineer
- Systems Engineer
- Information Security Engineer
- Information Security Consultant
- Penetration Tester
- Industrial Security Researcher

LINKS:

- https://twitter.com/j0hnnyxm4s
- https://www.linkedin.com/in/johnnyxmas/
- https://www.youtube.com/c/johnnyxmas
- https://github.com/johnnyxmas

WAF

WEB APPLICATION FIREWALLS

BASIC

- Very Basic Behavioral Analysis
- Just blacklists IPs (LOL)
- Trivial to Bypass

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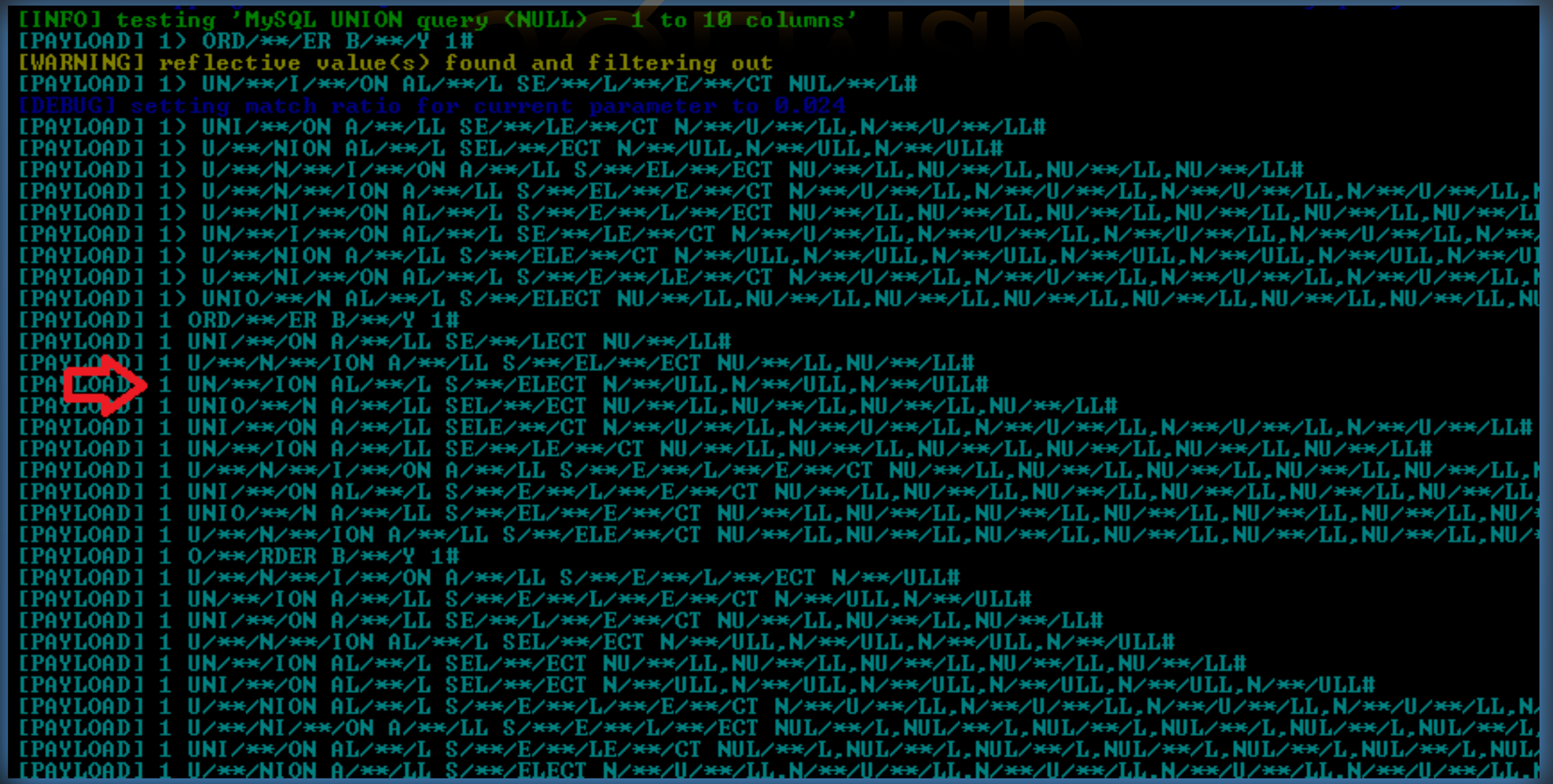
SQLMap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[WARNING] reflective value(s) found and filtering out
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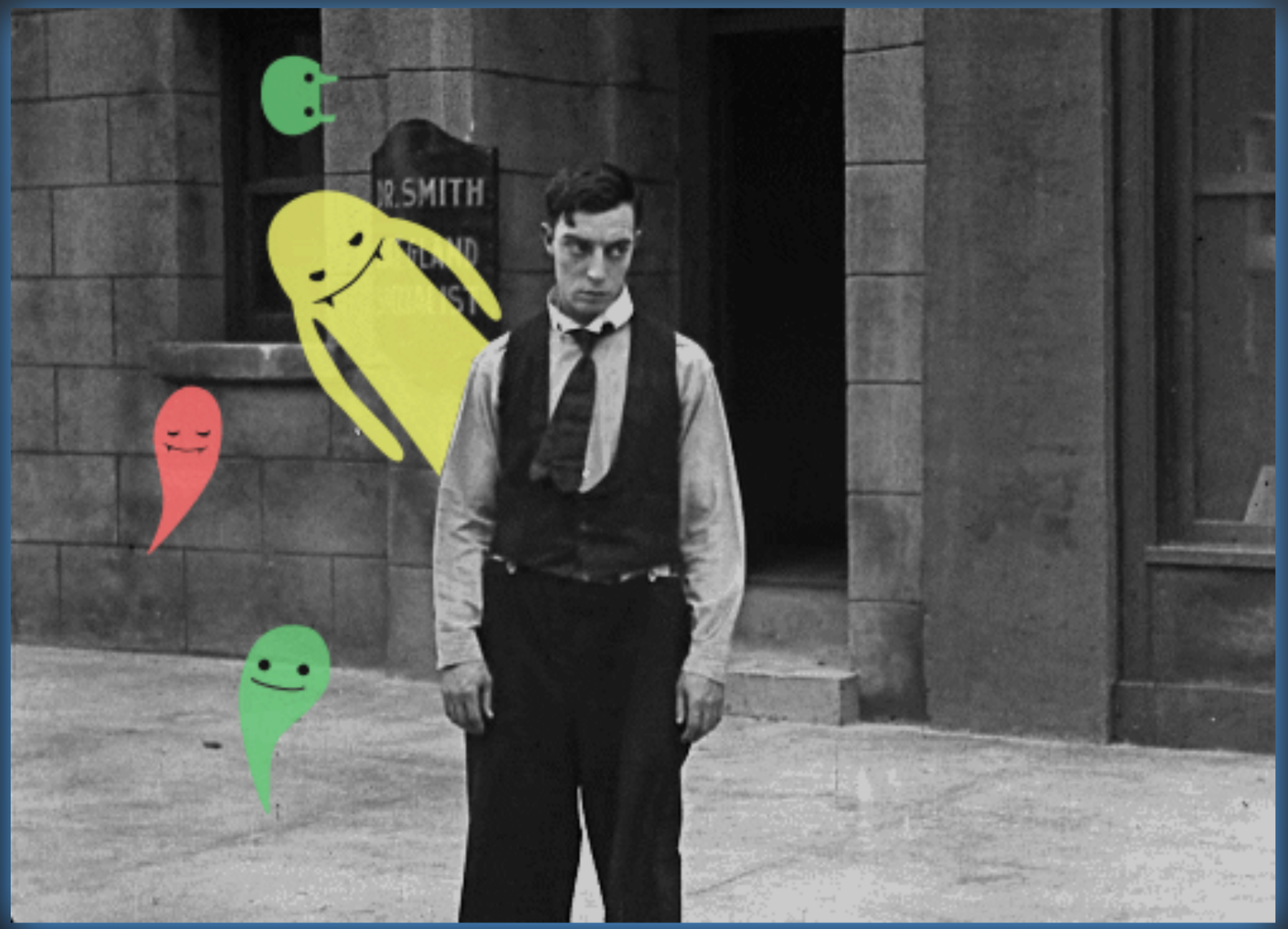
WAF

WEB APPLICATION FIREWALLS

SOPHISTIOCATED

- Often a Reverse Proxy
- Partially relies on js execution
- Fingerprints client environment

Also, they’re both pretty useless. . .



…so let’s get hacking!

BARE MINIMUMS

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Rotate Your IP

- Huge # of “Free Proxy” sites as exit nodes (for our bots!)

BARE MINIMUMS

Use Residential IPs

- Huge # of “Free Proxy” sites
- Hard to convince The Business to allow blocking residential IPs
- Residential IPs are easy to lease in bulk
- Residential IPs are not free
- Services like HolaVPN and MonkeySocks use users’ IPs

BARE MINIMUMS

Use The Usual HTTP Headers

- **BUT ALSO:**
  - **Accept : */***
  - **DNT : 1**
  - **X-Headers (Sometimes)**
  - **User-Agent (NO QUOTES)**
  - **Session Cookies (Sometimes)**

BARE MINIMUMS

Rotate User-Agents

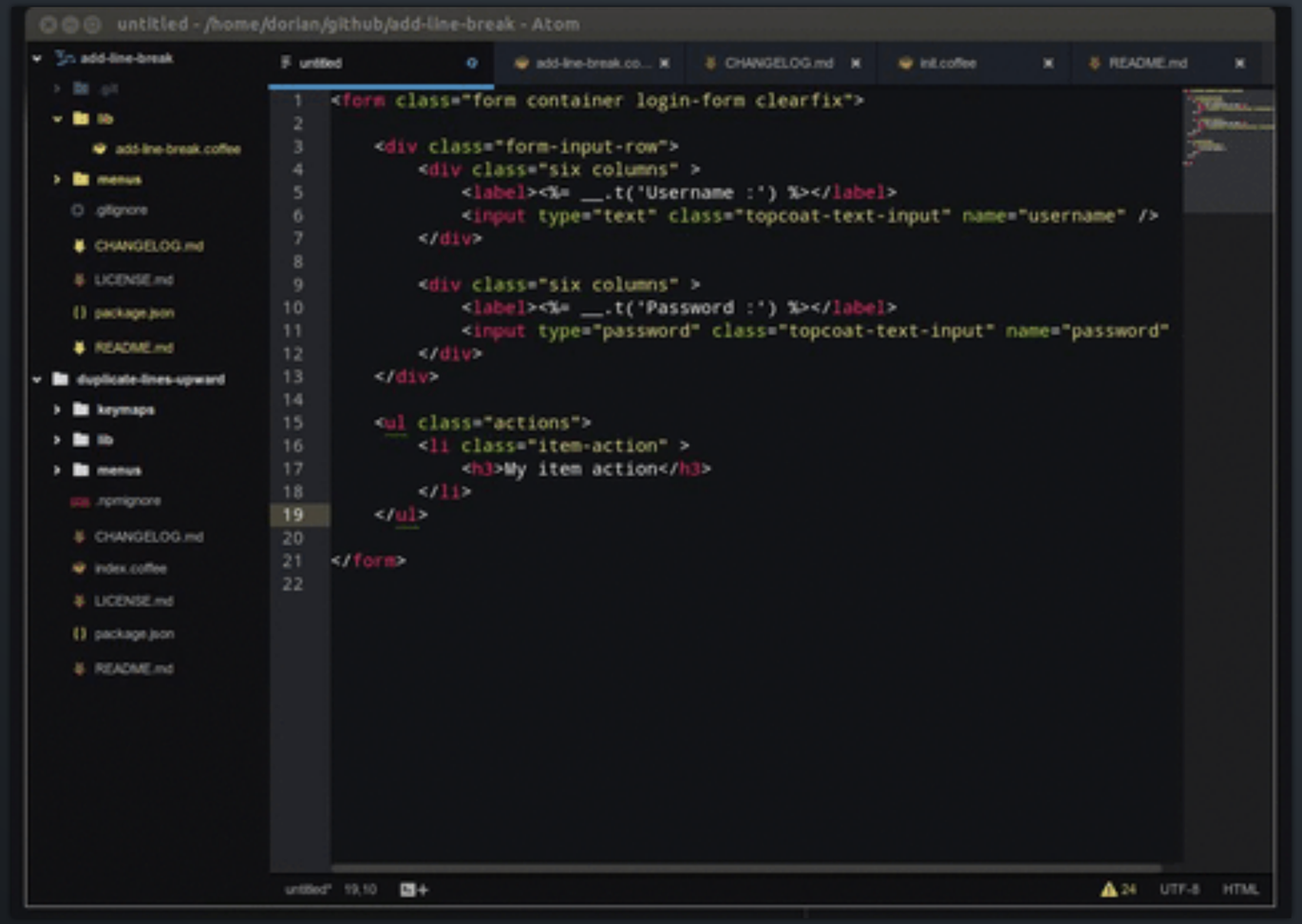
- Seriously, this gets past so many defenses
- Rotate with each HTTP request, if possible
- Also use this for whitelist fuzzing

Use Cookies

- Auth'd sessions often have more lenient throttling
- Some session cookies are *required*
- WATCH OUT FOR SNEAKY WAF COOKIES

~~SUPER BORING~~ CODE DEMO

PLEASE BEAR WITH US FOR LIKE 2 MINUTES



(IT’S COOL, WE PROMISE)

ADVANCED TACTICS
FOR CLOUD WAFS

BE THE LUCHADOR *AND* THE OSTRICHES

EDGE ENUMERATION

Check Every System

- Find ASN's owned by target (ARIN, etc)
- Find domains owned by target to uncover additional ASNs (WHOIS)
- Find which IPs are hosting web servers (ScanCannon)
- Enumerate paths to find forms, APIs, data, etc (wfuzz, etc)

Smash DNS

- Find ASN's owned by target (ARIN, etc)
- Find domains owned by target to uncover additional ASNs
- Reverse Lookup on IPs to DNS names (human-language indicators)
- DNS History lookups
- DNS Zone Transfers
- DNS name fuzzing

EDGE ENUMERATION

Round-Robin the Edge Nodes

- Discover all edge nodes
- Hit one until it blocks you, then hit the next
- This exploits the sync delay (often 15 minutes) and conserves IPs

Unprotected Paths

- Layer 7 WAFs & their associated CDNs have path rules
- One application may have multiple login portals \ paths
- Some of these may be accidental or intentionally unprotected

Smash the API

- APIs are almost never fully-protected; often not at all
- Great if all you need is to steal data
- Can also be used to “test” credentials

SOPHISTICATED WAFs

Find the Origins

- Use previous enumeration (look for “origin” in DNS)
- UUID or hash DNS names
- Hitting these bypasses the WAF completely
- Watch out for firewalls

Ditch the Script, Share the Cookies

- Identify and block WAF javascript snippets
- *RUN* WAF Javascript and replay the resulting fingerprint cookie

OR. . .

AUTOMATE A REAL BROWSER

AUTOMATE A REAL BROWSER

- Looks like human activity
- Practically undetectable
- Scriptable AF
- Executes Javascript
- Properly leverages Cookies
- Multiple instances per

- Headless Chrome
- Zombie.JS
- Phantom.JS
- **Puppeteer**
- Arachni

CHANGE THESE.

- User_agent
- Navigator_Platform
- Color_depth
- Pixel_ratio
- Cpu_Class
- Hardware_concurrency
- Resolution
- Available_resolutions
- Timezone_offset
- Session_storage

SUMMARY:

- Rotate IP Addresses
  - Use Residential IPs
- Use the Usual HTTP Headers
- Rotate your User-Agents
- Rotate session cookies
  Rotate between targets
- Hit the Origin directly
- USE PUPPETEER
  - Change the stock config!

THANKS FOR PLAYING!

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security redefined

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https://www.github.com/johnnyxmas/Talk_Decks