Workshop on
Web Security

Nov 29, 2023

Introduction

Hi, I am **Ataf**

- BUET CSE'17 Batch, Ex-BUETSEC
- Secure Software Dev. @ OpenRefactory
  - Find & Fix Bugs in Open Source Projects
- Contributor/Member @ RevoltZero
  - Share & Practice Knowledge

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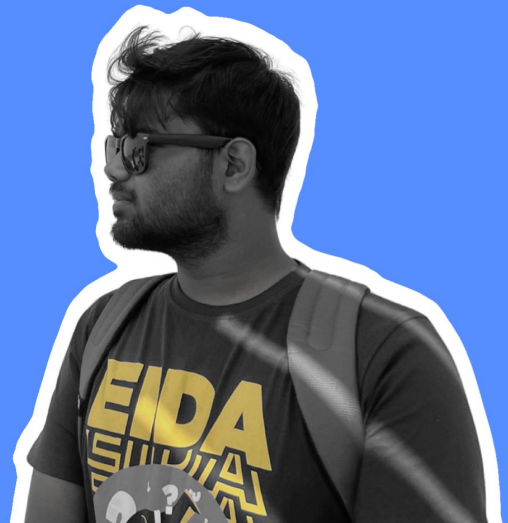
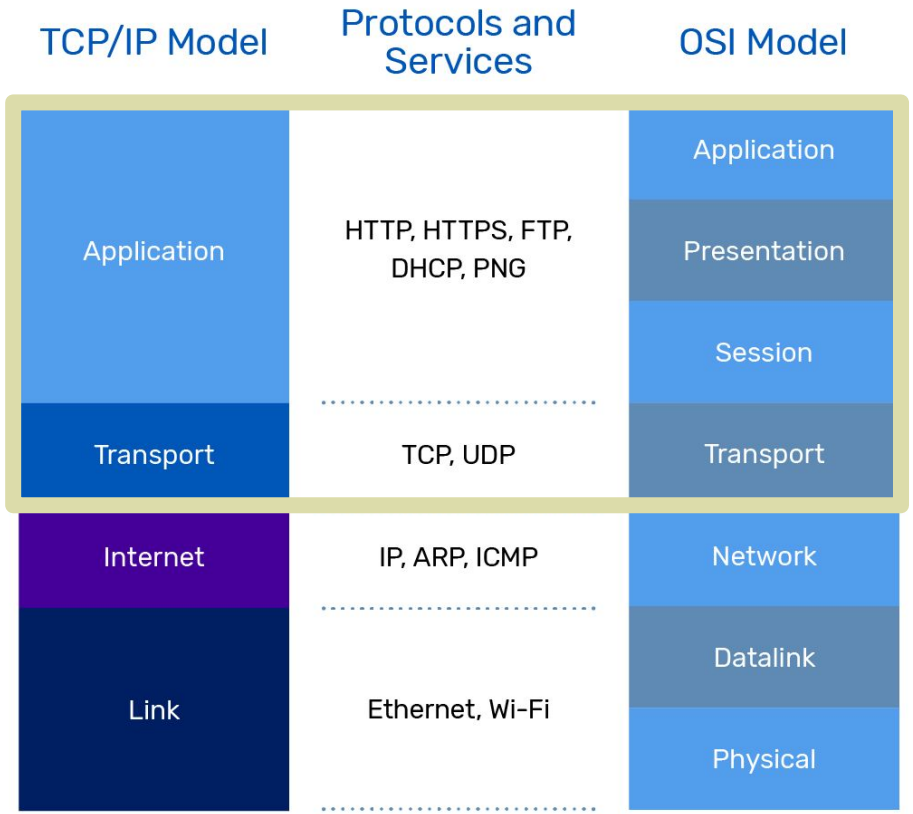


We’ll Be Doing Today

- Different Types of HTTP Requests
- The Browser Environment
- App #1: Cookie
- App #2: Flask Debug Mode
- App #3: Fuzzing
-

Network Model



For Web Security

- HTTP/HTTPS
- TCP, UDP
- FTP

# of Ports
65536

0-65535

Different Types of HTTP Requests

Mainly FOUR types of request (methods)

- GET
- POST
- PUT
- DELETE

Others

- PATCH
- HEAD
- OPTIONS and so on

Read more: https://developer.mozilla.org/en-US/docs/Web/HTTP/Methods

Different Types of HTTP Requests

Mainly FOUR types of request (methods)

- GET → to GET some data from server
- POST → to POST some data to server
- PUT
- DELETE

Others

- PATCH
- HEAD
- OPTIONS and so on

Read more: https://developer.mozilla.org/en-US/docs/Web/HTTP/Methods

Different Types of HTTP Requests

Mainly FOUR types of request (methods)

- GET → to GET some data from server
  - Parameters are in URL
  - No payload/body
  - Limited URL length

  - https://store.com/find_products?name=Tshirt&size=XL

- POST → to SEND some data to server
  - Parameters are in URL
  - Data in payload/body

  - https://store.com/add_product
    Data in payload

The Browser Environment

Let’s start with a sample code - Example #1

Let’s run the code

1) In terminal using NodeJS
2) In browser

```
1
2  const fetch = require("node-fetch");
3  const url = 'https://example.com';
4
5  fetch(url)
6  .then((res) => {
7      return res.text();
8  })
9  .then((data) => {
10     console.log(data);
11 })
12 .finally(() => {
13     console.log("fetch completed");
14 })
15
```

The Browser Environment

Let’s start with a sample code -

Example #1

Let’s run the code

1) In terminal using NodeJS

2) In browser

Same code but

why different output?

```
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2   const fetch = require("node-fetch");
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```
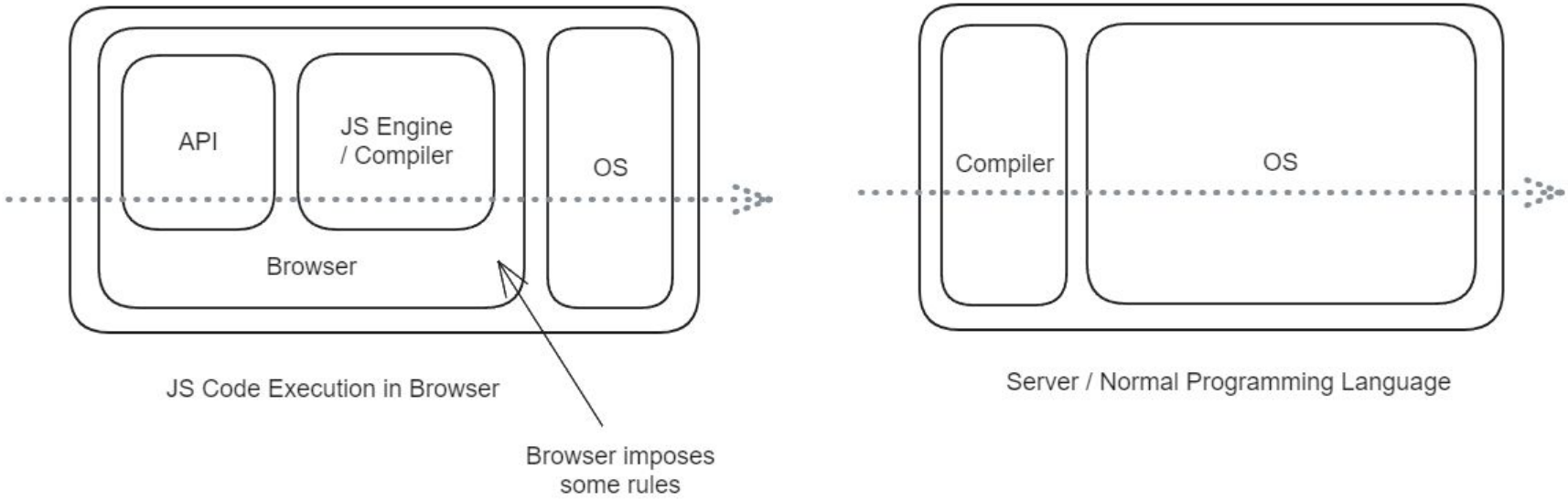

The Browser Environment

Depends on How JavaScript Actually Works -



The Browser Environment

1) So, Different Environment = Different Output

2) But what are those rules?

- No File System Access *
- No Socket Connection
- No Threading/Subprocess
- Follow CSP, Same Origin Policy, etc.

3) Browser Plugins

Read More: https://infosec.mozilla.org/guidelines/web_security

The Browser Environment

Let’s start with a sample code -

Example #2

Let’s run these codes

```python
import requests

url = "http://localhost:5000/"
res = requests.get(url)
print(res.text)

```

```python
from flask import Flask, request

app = Flask(__name__)

@app.route("/")
def index():
    print("****************")
    print(request.headers)
    print("****************")
    return "Hello World"

if __name__ == "__main__":
    app.run(debug=True)
```

The Browser Environment

Let’s start with a sample code -

Example #2

Let’s run these codes

Different outputs here too!

```python
import requests

url = "http://localhost:5000/"
res = requests.get(url)
print(res.text)

```

```python
from flask import Flask, request

app = Flask(__name__)

@app.route("/")
def index():
    print("****************")
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    print("****************")
    return "Hello World"

if __name__ == "__main__":
    app.run(debug=True)
```

Port Scanning Using `nmap`

1) Follow On Screen
    a) Server 1
    b) Server 2

2)

Example App #1: Cookie

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1) Challenge URL: http://23.251.153.217:6000/

2) Follow On Screen

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1) Challenge URL: http://23.251.153.217:6000/

2) Follow On Screen

3) JWT: JSON Web Tokens
   - Format: {scheme/algo}.{payload/data}.{signature}
   - If you find anything, try breaking it

Example App #1: Cookie

1) Challenge URL: http://23.251.153.217:6000/

2) Follow On Screen

3) JWT: JSON Web Tokens
   - Format: {scheme/algo}.{payload/data}.{signature}
   - If you find anything, try breaking it

4) Don’t trust JWTs blindly! Always verify the signature!

Read more: https://jwt.io/

Example App #2: Flask Debug Mode

Example App #2: Flask Debug Mode

1) Challenge URL: http://23.251.153.217:3000/

2) Follow On Screen

Example App #2: Flask Debug Mode

1) Challenge URL: http://23.251.153.217:3000/

2) Follow On Screen

3) Follow these resources, solve on your own

https://www.bengrewell.com/cracking-flask-werkzeug-console-pin/

https://www.youtube.com/watch?v=jwBRgaIRdgs

Example App #3: Fuzzing

1) Challenge URL: http://23.251.153.217:8000/
2) Follow On Screen

- Fuzzing Tools:
  - dirb
  - gobuster
  - nikto

Example App #3: Fuzzing

1) Challenge URL: http://23.251.153.217:8000/
2) Follow On Screen

- Fuzzing Tools:
  - $ dirb http://23.251.153.217:8000 /usr/share/dirb/wordlists/common.txt
  - $ gobuster
  - $ nikto
- Difference
  - `dirb` can search iteratively
  - `gobuster` is multithreaded

GitHub Codespaces

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1) Install GitHub CLI
2) Install VSCode (not Codium)
3) Login to your account
4) Follow On Screen

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Use it as a VPS!

- Run Scripts, Fuzzers
- Host your webapps

The Hacker's Approach

a) Perform automation, save time
   i) nmap, fuzzers, scripts, ZAP

b) Do it on a server than your PC
   i) Better bandwidth
   ii) Better performance

c) Perform recon
   i) Censys, Shodan for finding info
   ii) Get IP address !

The Developer’s Approach

a) Use SSL/TLS Certificates - *Free*
   i) ZeroSSL, Cloudflare, etc.

b) Use DDoS Protection
   i) Cloudflare - *Free*
   ii) Never expose your IP address
      - If HTTP exposed, can perform DDoS on IP
      - DDoS Protection saves only requests coming to domain

c) Don’t expose unnecessary ports. Follow HSTS.

d) Use Encryption, JWTs carefully

The Developer’s Approach

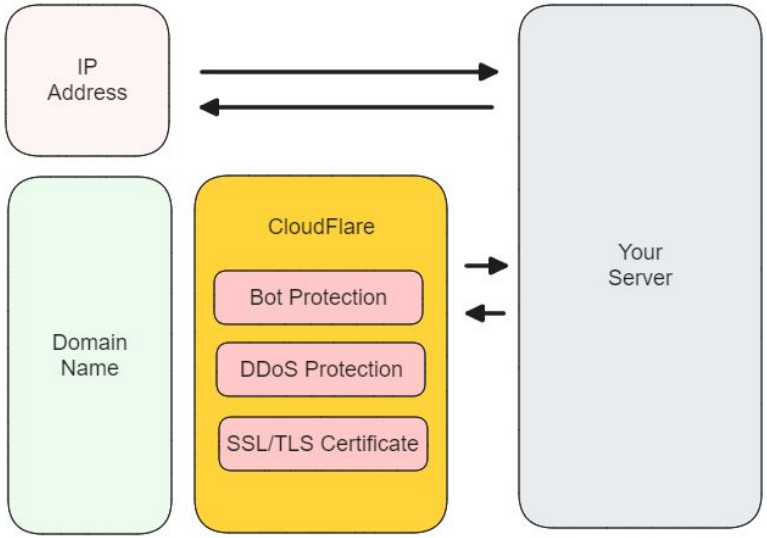
b) Use DDoS Protection

i) Cloudflare - *Free*

ii) Never expose your IP address

- If HTTP exposed, can perform DDoS on IP

- DDoS Protection saves only requests coming to domain



Questions?

- Knock Anytime on Discord
- BUET Cyber Drill Practice Zone @ Facebook

- Resources To Study
  - CS 253: Web Security by Stanford CS
  - PortSwigger Labs
  - MDN Docs

- Contents: https://github.com/buetsec/web-security-workshop-2023

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Thank You