Intro to Web Security

Lecture 9 - ECS198F SQ26

Plan of the Day

Web Application Basics

- What goes on behind the scenes when you access a website?
- What are the parts of a web application and how do they interact?

Web Pentest Tools

- What kind of tools exist for testing web application security?
- What vulnerabilities might these tools exploit?

Basic Web Pentest

- Introduce the tools alongside some representative challenges

1. Web Application Basics

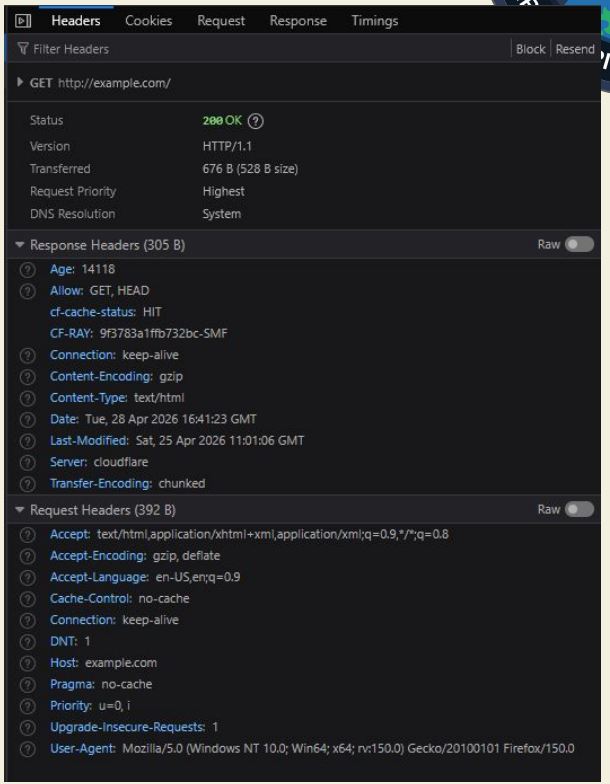
What Goes On Behind The Scenes?

Question: *What goes on when you connect to a website?*

Let's pull up [*http://example.com*](http://example.com)!

Relevant Findings?

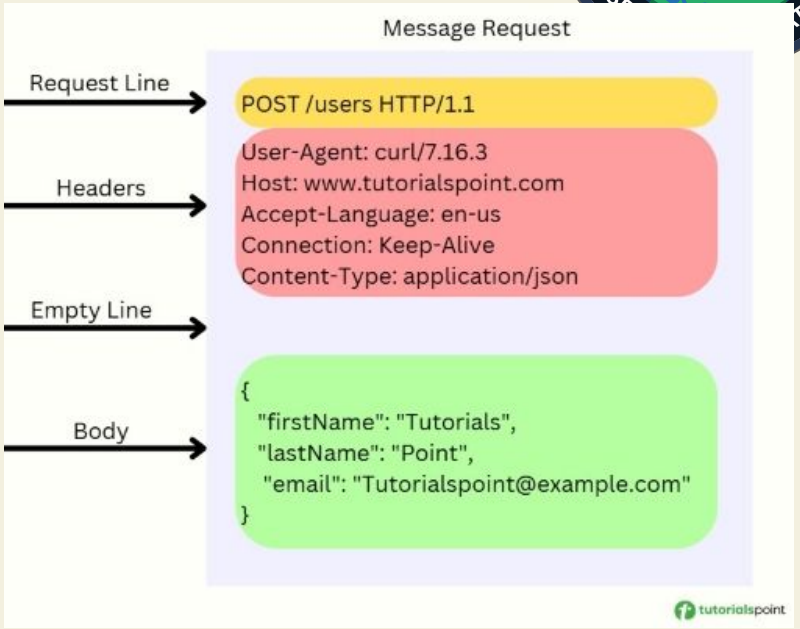
- HTTP used
  - What's sent OUT?
  - What's sent BACK?



Breaking Down HTTP

Basic system of requests/responses to interact with a server

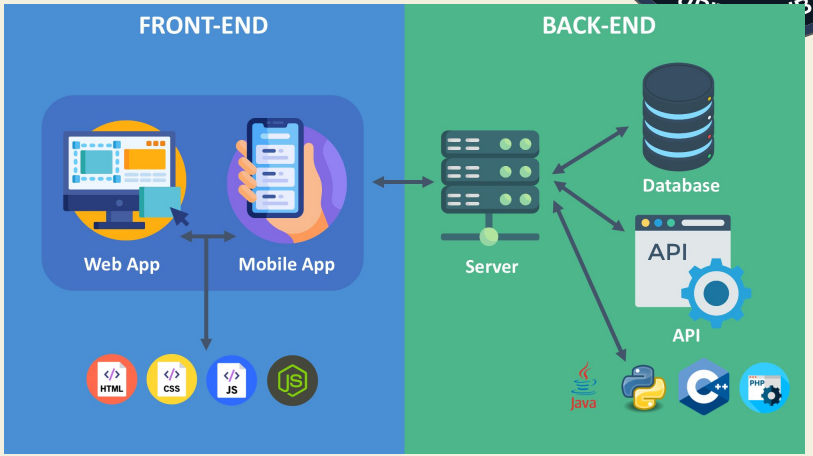
- Request:
  - Method + Resource + Protocol
  - https://developer.mozilla.org/en-US/docs/Web/HTTP/Reference/Methods
- Headers
  - Send extra data about the host
- Body
  - If you need to send stuff to application



https://www.tutorialspoint.com/http/images/http-message-request.jpg

Bringing in the Backend

- Just HTML and Javascript is fine if you're serving a mostly-static website…
  - But what if you need the server to process some data for you?
    - Can't do it in Javascript, not "part of the website"
  - You need a way to "pass data" to the server!



https://miro.medium.com/0*RfvInMt7Z1TSCa8N

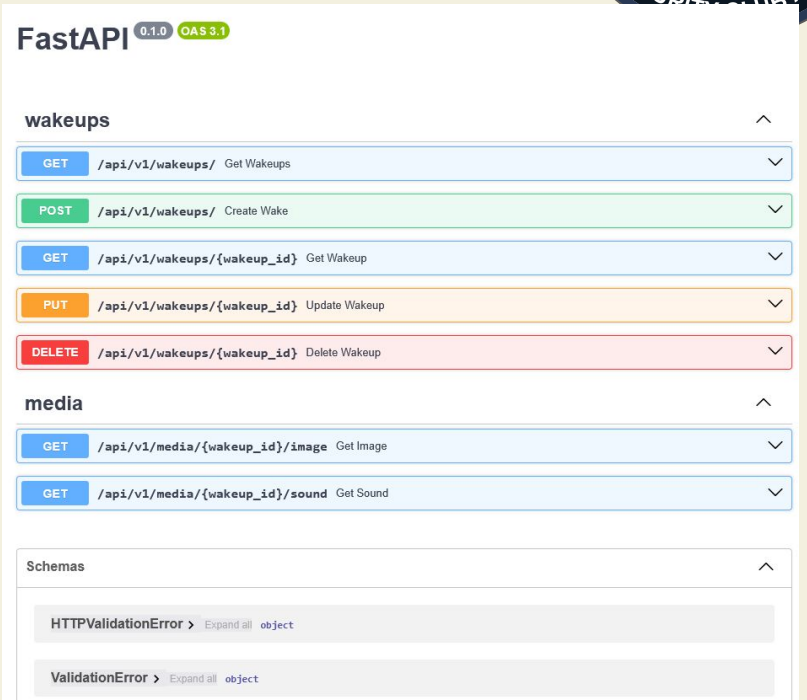
Application Programming Interface

Application Programming Interface (API)

- Rules/Protocol specification for how to interact with the application over HTTP!
- Same data can be passed in different “formats”

Example API Specification:

https://editor.swagger.io/



Storage

So you have something that can run programs…what if you want to store things?

- Remember that webapps have to “scale!”
  - Support millions of operations per second, handle race conditions, etc.
- So there’s usually a database “storing” things!
  - Most common is SQL-based

MariaDB Foundation

Amazon S3

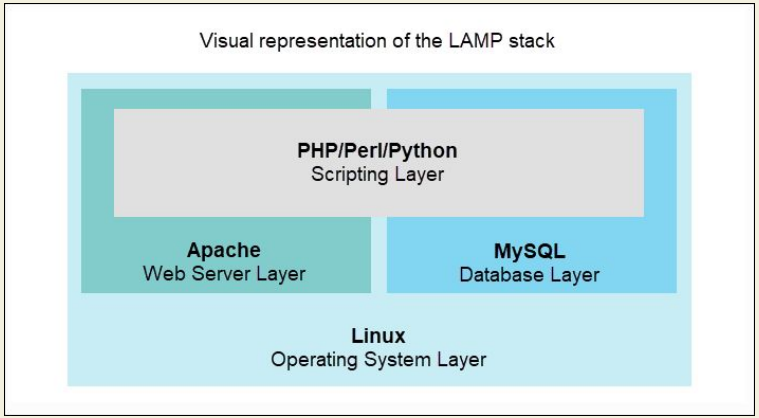
The “Full Stack”

“Full Stack Development” - Being able to handle all the technology needed to run a web application!

- “Frontend” (website)
- “Backend” (application + databases)

“Technology Stack” - The specific software you choose to implement your website features with

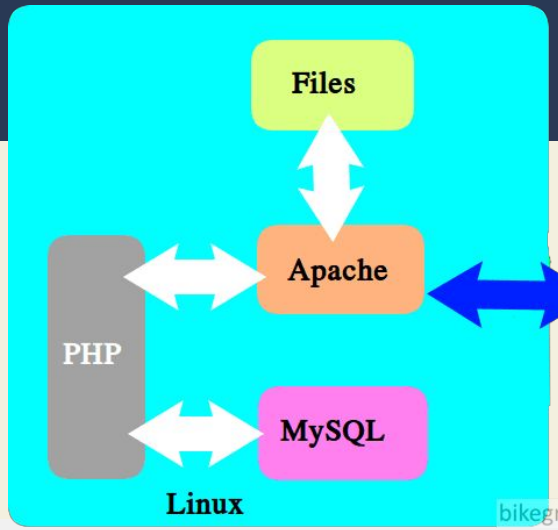
- EX: LAMP Stack

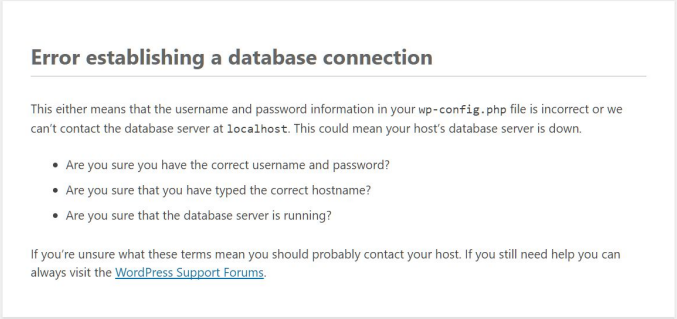


https://phoenixweb.com.au/wp-content/uploads/2016/11/LAMP-Stack-logo.png
https://phoenixnap.com/kb/wp-content/uploads/2022/01/visual-representation-of-the-lamp-stack-pnap.png

Why This Matters?

- Each of these components are a way you can compromise a web server!
  - Web server / application vulns, database vulns, insecure API, etc.
  - The ways these components interact with each other can be insecure!





2. Web Pentesting Tools

The Obvious Tool...

Browser!

- You already use it to interact with websites so much, it's a good first step for web pentesting!

https://play.picoctf.org/practice/challenge/66

https://play.picoctf.org/practice/challenge/46

Tips:

- Make sure to understand what the processes do!
- Check everything!!

Catch and Release

Burp Suite - Industry standard tool for web penetration testing!

- Captures incoming and outgoing web traffic
- Allows you to modify the request into a custom payload
- Send the modified traffic out as much as you need!

https://play.picoctf.org/practice/challenge/419

https://play.picoctf.org/practice/challenge/520

Leave No Stone Unturned

Sometimes, you just need to brute force a solution.

Problem: There may be “hidden” sites/folders/API endpoints on the website that might not be findable by clicking all the links.

Solution: Try a bunch of common directory names to find hidden folders.

Dirbuster, gobuster, ffuf, etc. *combined* with a wordlist!

https://tryhackme.com/room/mkingdom

WARNING: Bruteforcing is essentially one-step removed from a DDoS. Brute Force with Care!