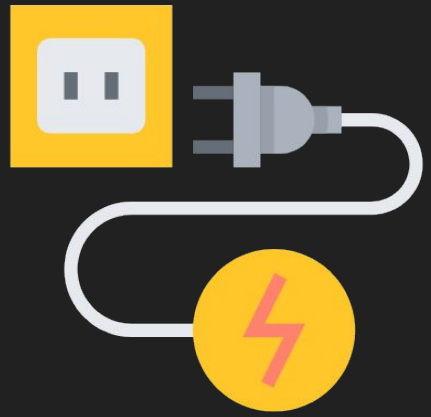
husseinnasser.com



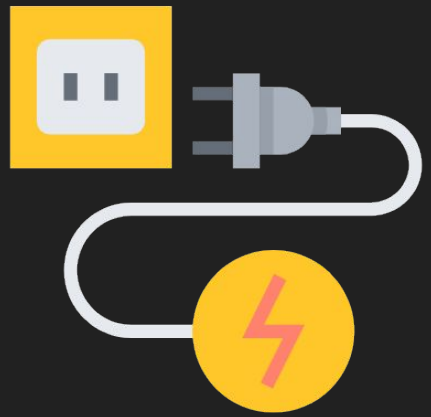
NGINX and WebSockets

Enabling WebSockets with NGINX (Layer 4/Layer 7)

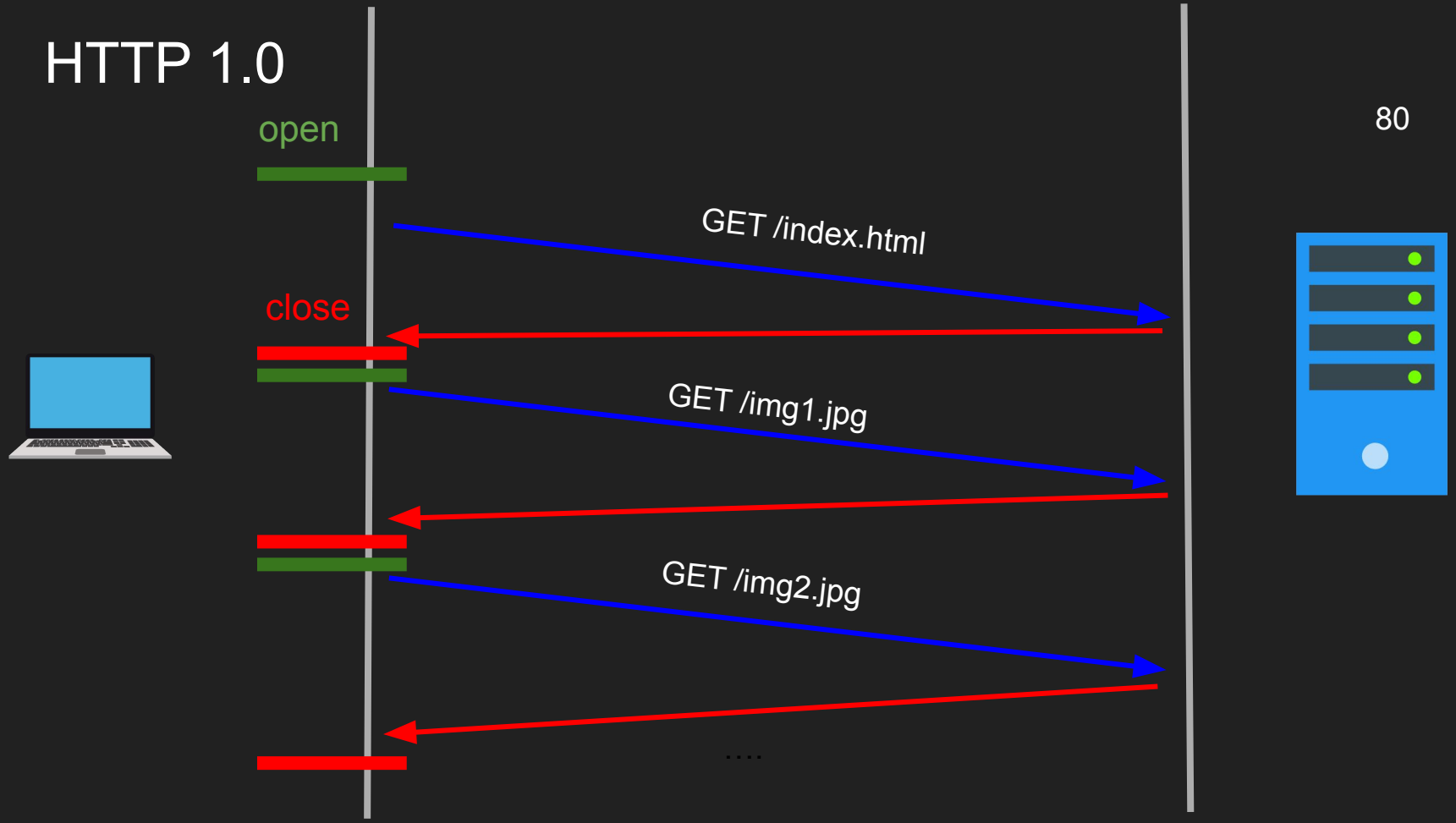
Agenda

- Quick Introduction to WebSockets
- Layer 4 vs Layer 7 WebSocket Proxying
- Spin up a WebSocket Server without NGINX
- Configure NGINX as a Layer 4 WebSocket Proxy/Load Balancer
- Configure NGINX as a Layer 7 WebSocket Proxy/Load Balancer
- Summary

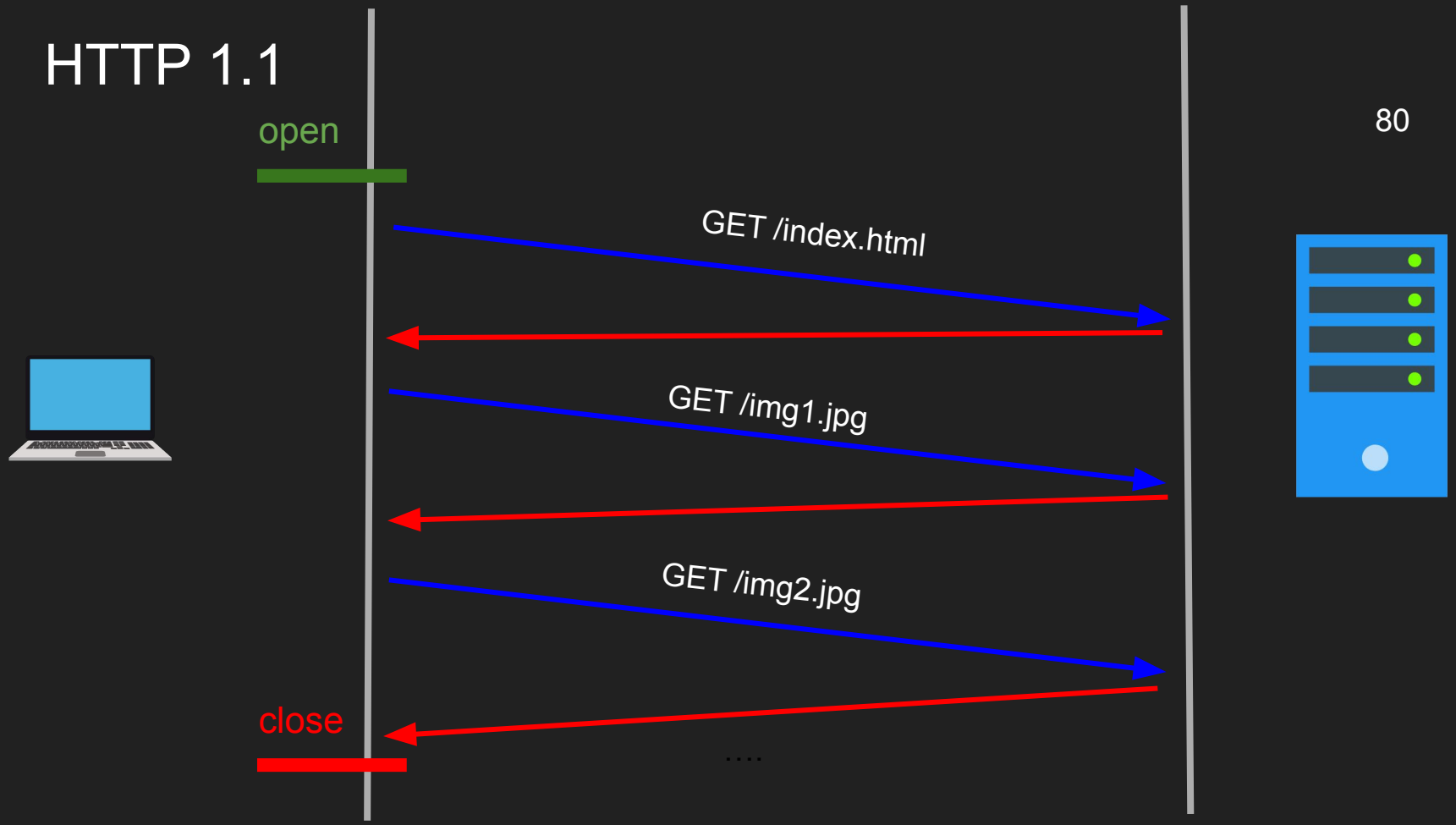
Introduction to WebSockets



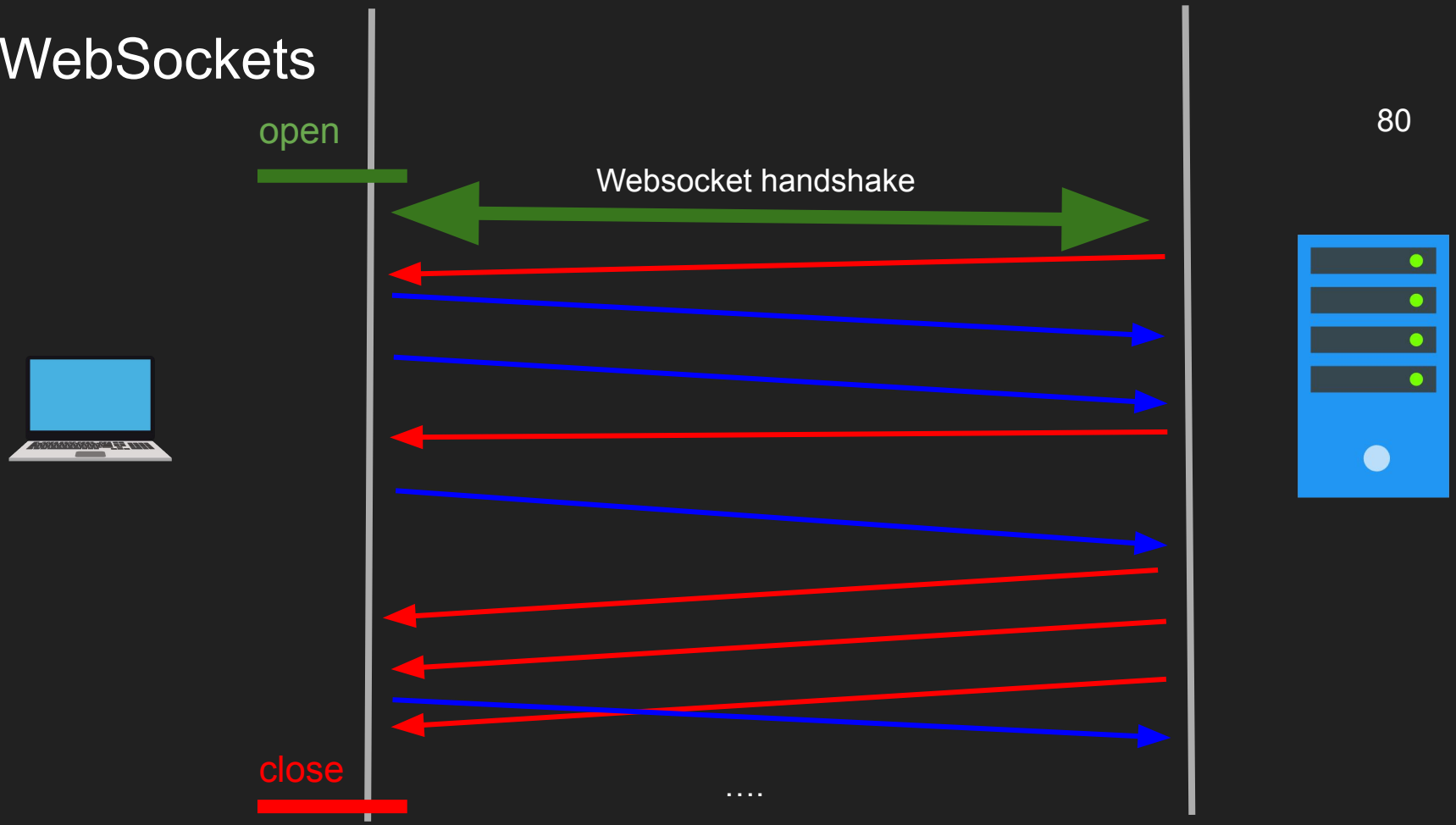
HTTP 1.0



HTTP 1.1



WebSockets



WebSockets Handshake ws:// or wss://

WebSocket Handshake

```
GET /chat HTTP/1.1
Host: server.example.com
Upgrade: websocket
Connection: Upgrade
Sec-WebSocket-Key: x3JJHMbDL1EzLkh9GBhXDw==
Sec-WebSocket-Protocol: chat, superchat
Sec-WebSocket-Version: 13
Origin: http://example.com
```

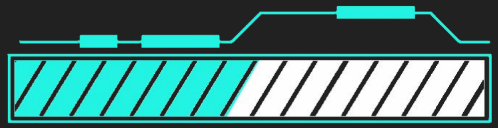
Client

```
HTTP/1.1 101 Switching Protocols
Upgrade: websocket
Connection: Upgrade
Sec-WebSocket-Accept: HSmrc0sMlYUkAGmm5OPpG2HaGWk=
Sec-WebSocket-Protocol: chat
```

Server

WebSockets use cases

- Chatting
- Live Feed
- Multiplayer gaming
- Showing client progress/logging



Layer 4 vs Layer 7 WebSockets Proxying

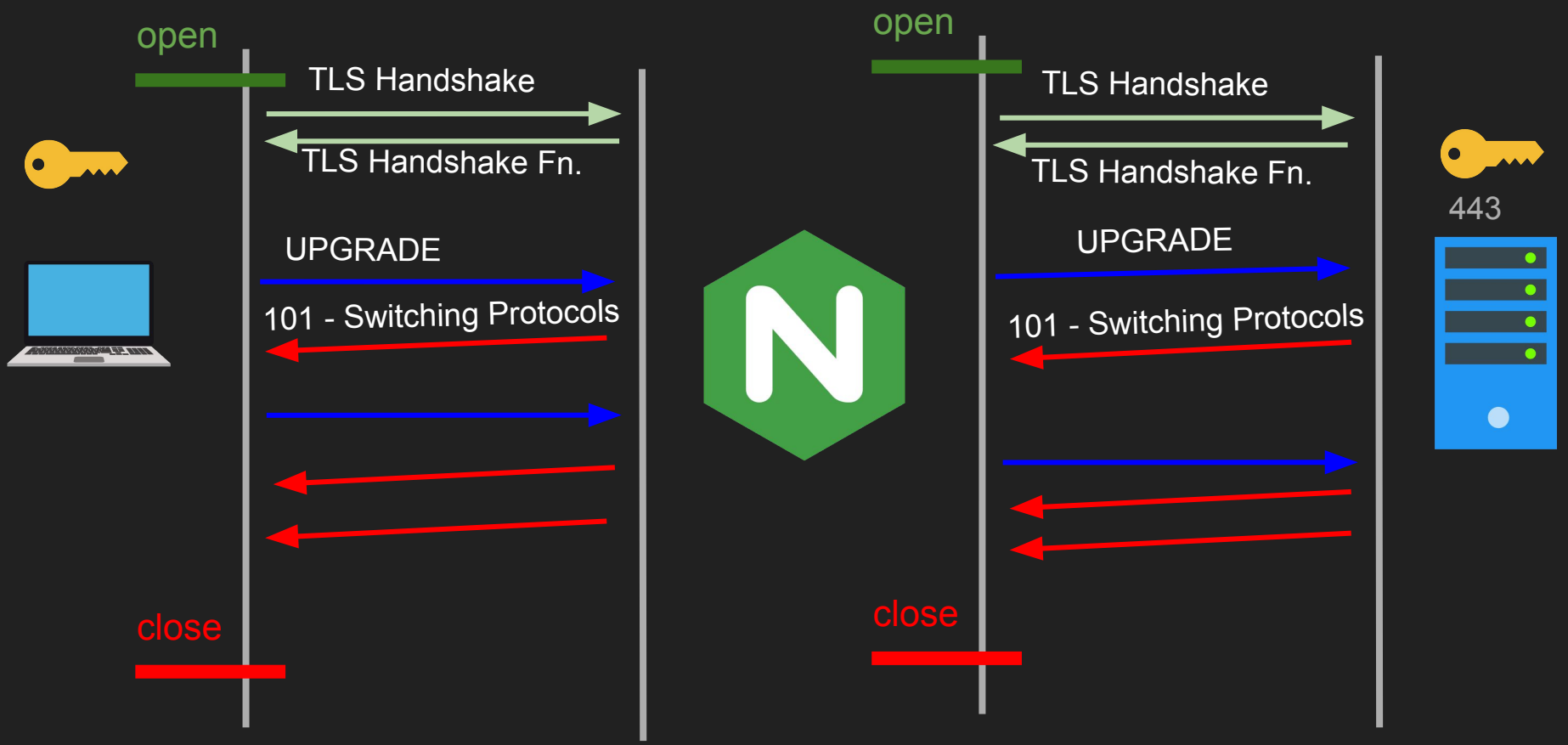
Layer 4 vs Layer 7 WebSocket Proxying

- In Layer 4 OSI model we see TCP/IP content
  - Connections, Ports, IP addresses.
  - Content remains encrypted (if unencrypted it is not inspected)
- In Layer 7 OSI Model we see all what's below
  - Layer 4 + Application layer content
  - Content is decrypted (TLS termination)
  - We can read headers, paths, urls etc.

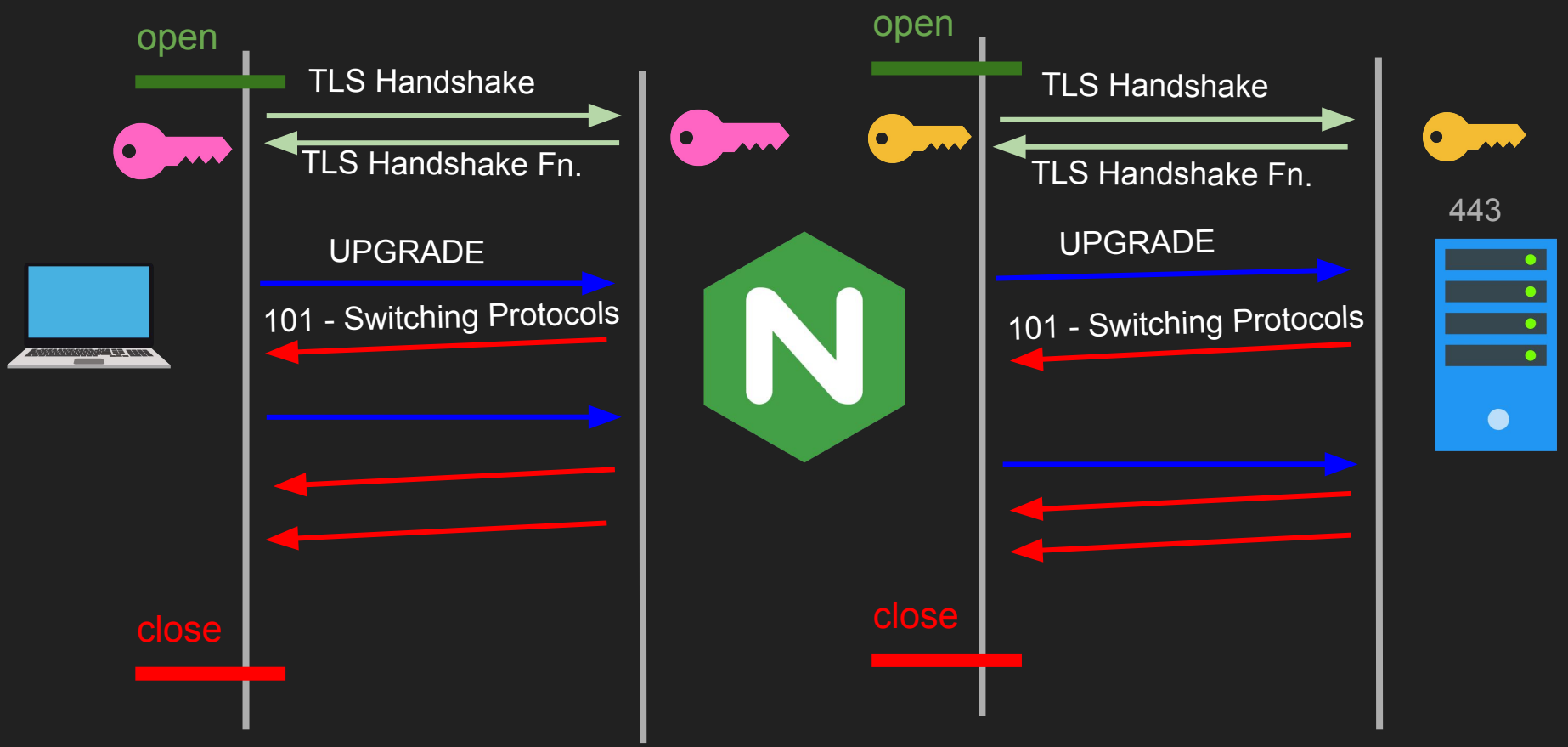
Layer 4 vs Layer 7 WebSocket Proxying

- Layer 4 Proxying on WebSockets is done as a tunnel
- NGINX intercepts the SYN for a connection and creates another connection on the backend
- Any data sent on the frontend connection is tunneled to the backend connection
- The backend connection remains private and dedicated to this client.

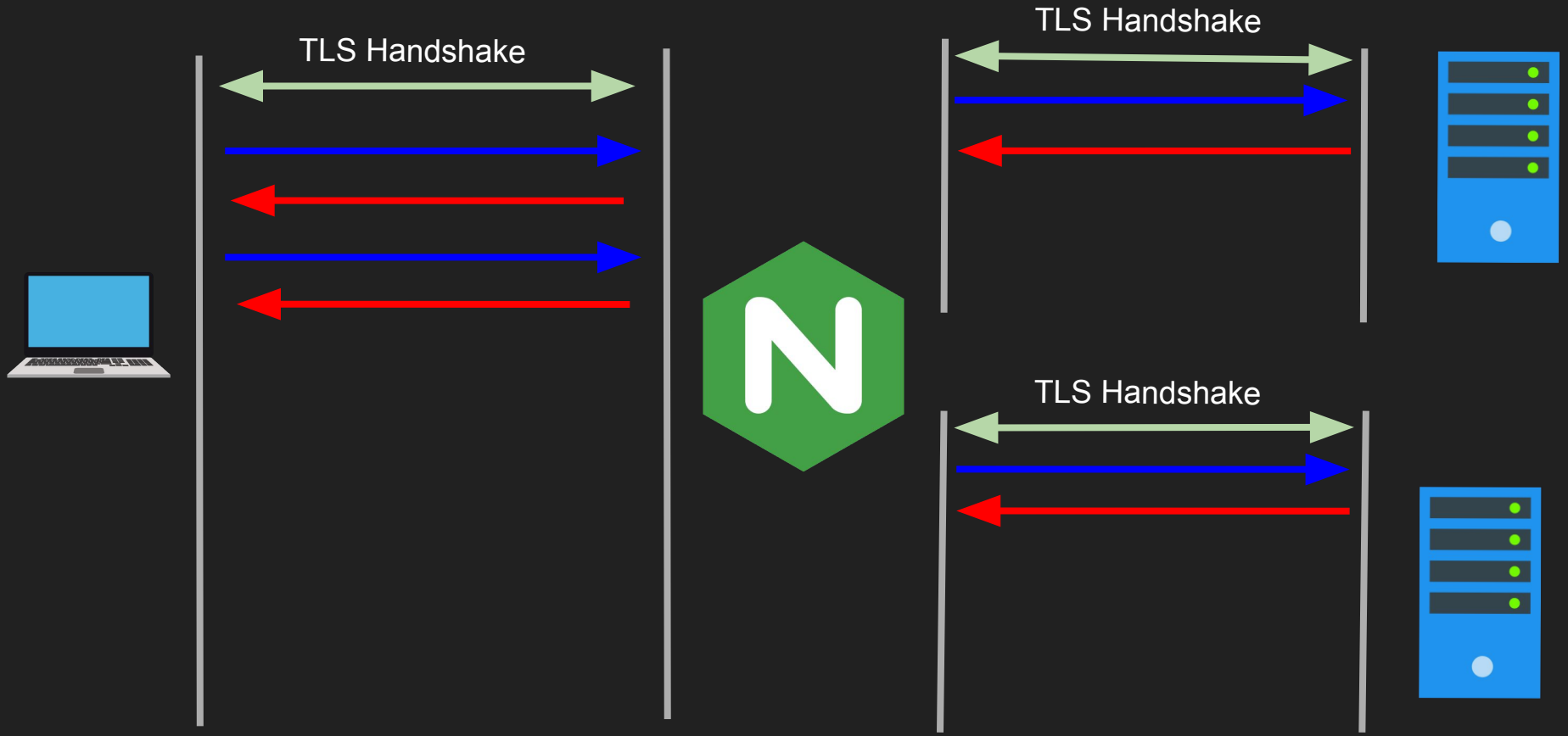
Layer 4 Proxying on WebSocket



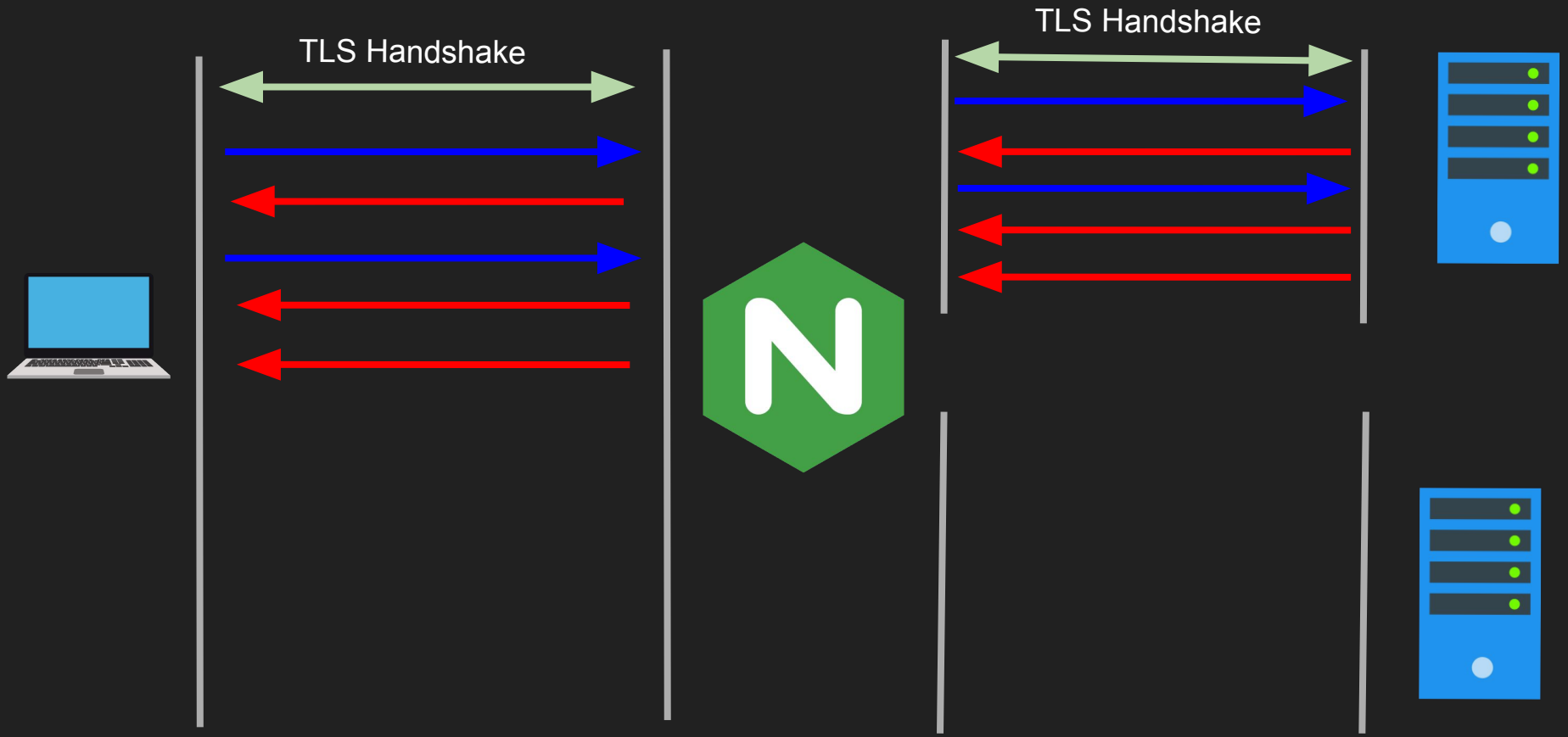
Layer 7 Proxying on WebSocket



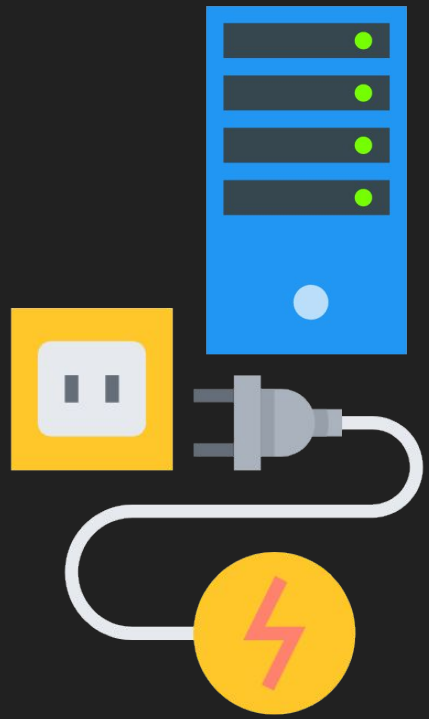
Layer 7 Load Balancing (Normal HTTP requests)



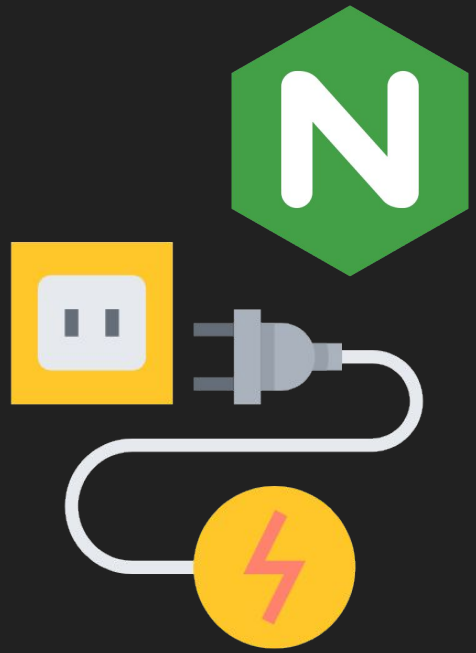
Layer 7 Load Balancing (WebSocket)



Spin up a WebSockets Server



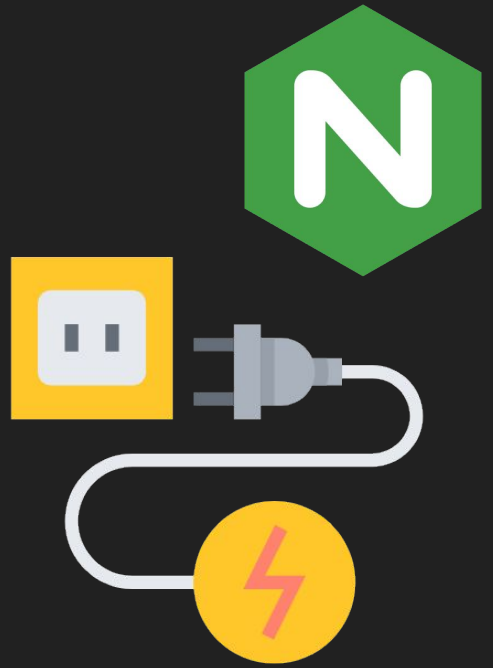
Configure NGINX as Layer 4 WebSocket Proxying



Layer 4 Proxying

- Listening on port 80
- Any TCP connection request is a tunnel and always goes to the websocket app
- Paths don’t matter (layer 7)
  - ws://localhost/ -> websocket app
  - ws://localhost/blahblah -> websocket app
- Layer 4 proxying blindly tunnels everything to the backend
- Any connection request to port 80 will be tunneled to the websocket app backend

Configure NGINX as Layer 7 WebSocket Proxying



Layer 7 Proxying

- Intercept the path and “route” appropriately
- http://localhost/ -> open main html page
- ws://localhost/wsapp -> websocket app
- ws://localhost/chat -> another websocket app for chatting
- Can’t do that in Layer 4 since port 80 is blindly tunnels

Summary

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