AMIS | CONCLUSION

SIG WebSockets

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SIG WebSockets

Overview

17:30 – 18:00
Short introduction: **WebSockets 101**
Some background, history and the inner workings of WebSockets

18:00 – 18:45
Dinner Break
A fine selection of delicious pizzas from our very own Eduardo!

18:45 – 19:00
Short introduction: **Socket.io**
A library that makes it very easy to use WebSockets

19:00 – 21:00
Hands-On
Creating your own simple chat app using Socket.io

WebSockets 101

A short introduction

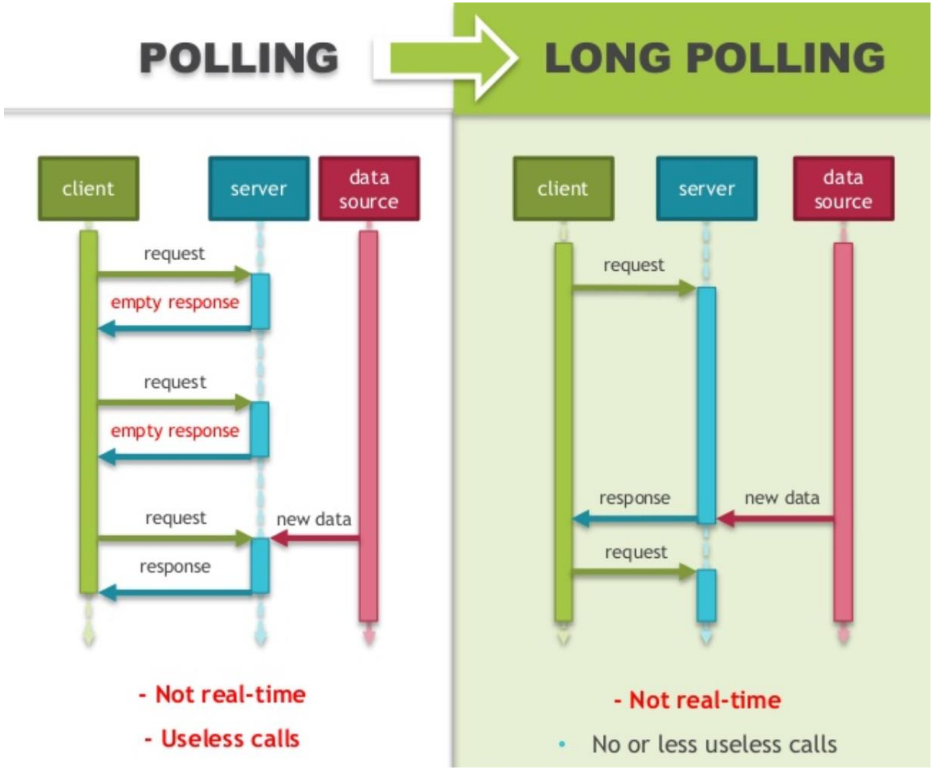
WebSockets 101

Why WebSockets?

- Session is ‘INITIATED’
- HTTP: request and response
- Polling – every three seconds
- Session is ‘CONNECTED’

WebSockets 101

Polling vs Long Polling



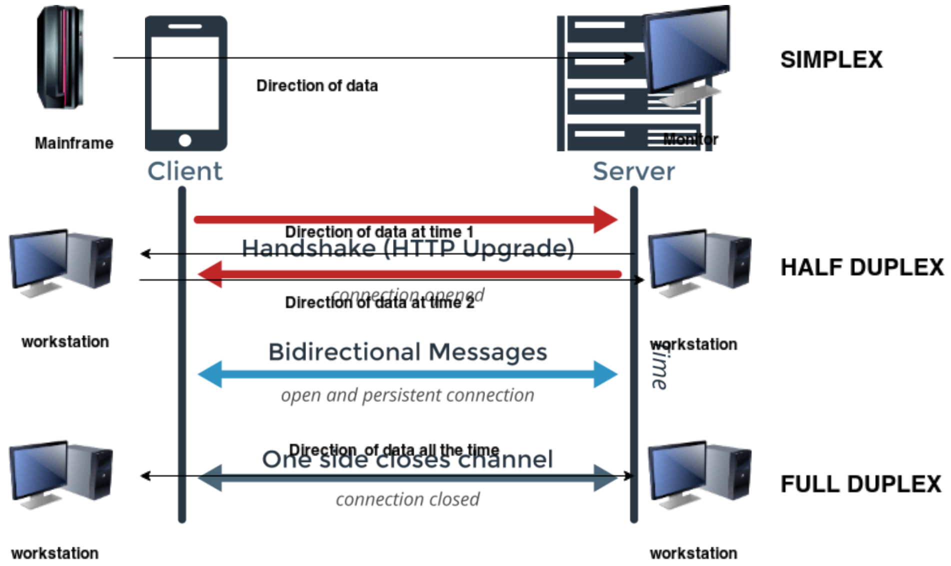
- Not real-time
- Useless calls

- Not real-time
- No or less useless calls

WebSockets 101

Enter: WebSockets

- Standardized in 2011
- WebSockets: *full-duplex*
- Realtime updates
- Using existing TCP connection

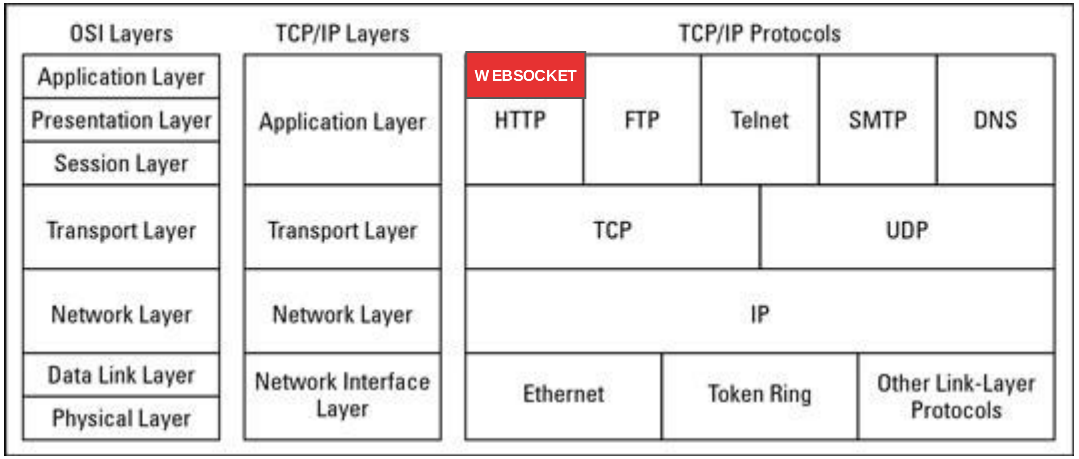


- Lifecycle: Handshake – Messages sent back and forth – Closing connection

WebSockets 101

Short technical background

- Protocol
- Internet Protocol
- Internet Protocol Suite (TCP/IP)
- Transmission Control (TCP)
- User Datagram (UDP)
- HyperText Transfer (HTTP)
- WebSocket



WebSockets 101

(not so secret) Handshake

- Client HTTP upgrade request
- Successful: 101 Switching Protocols
- Unsuccessful: 400 Bad Request
- Switches to ws:// or wss://
- Connected and able to send and receive
- Will remain open until explicitly closed

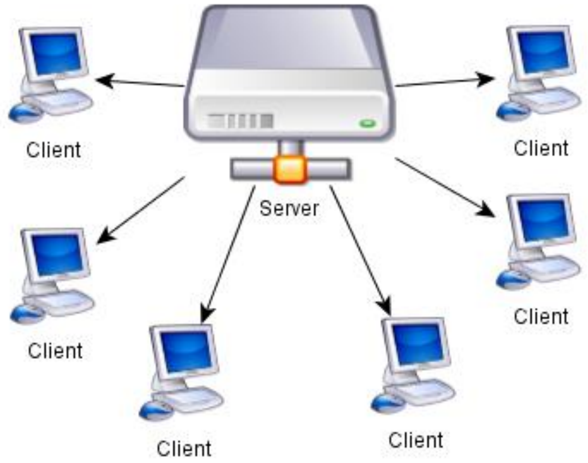
```
GET /chat HTTP/1.1
Host: server.example.com
Upgrade: websocket
Connection: Upgrade
Sec-WebSocket-Key: x3JJHMbDL1EzLkh9GBhXDw==
Sec-WebSocket-Protocol: chat, superchat
Sec-WebSocket-Version: 13
Origin: http://example.com
```

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

WebSockets 101

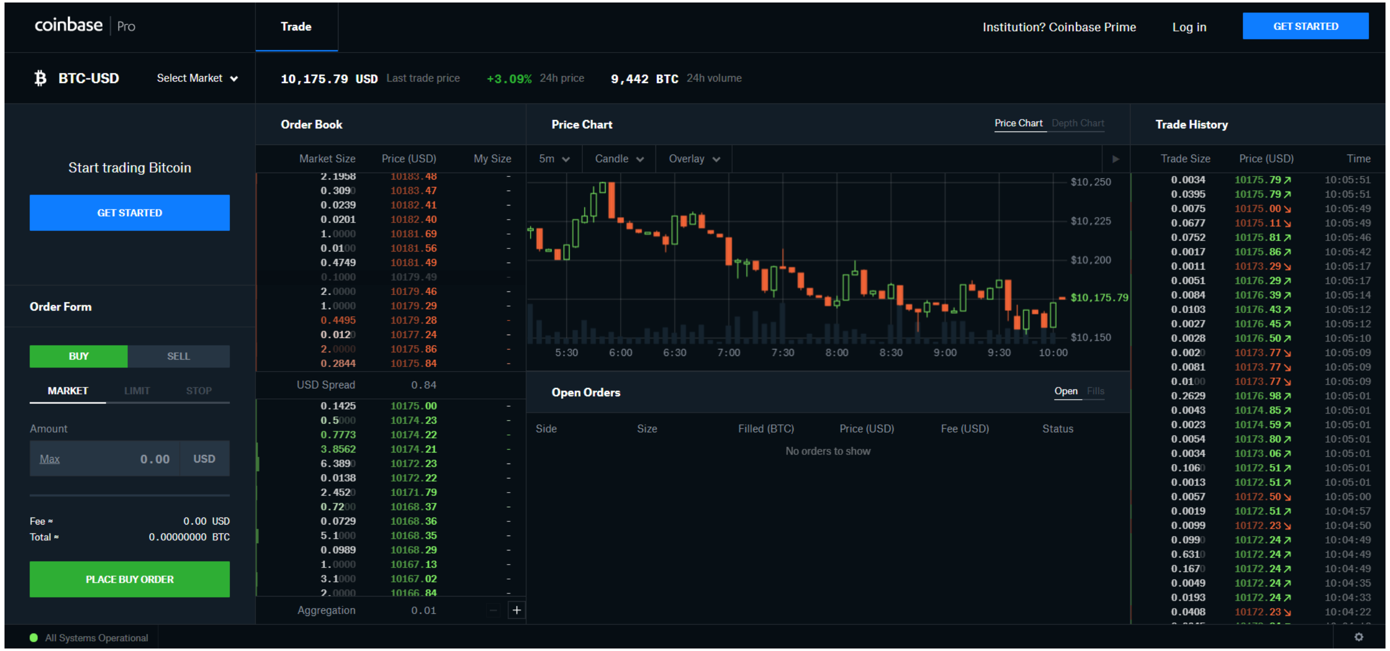
Examples

- Multiplayer browser games
- Collaborative code editing
- Live text for sports/news/finance websites
- Social media feed
- Real-time to-do apps with multiple users



WebSockets 101

WebSockets in action



coinbase | Pro · Trade · Institution? Coinbase Prime · Log in · GET STARTED

BTC-USD · Select Market · 10,175.79 USD Last trade price · +3.09% 24h price · 9,442 BTC 24h volume

Start trading Bitcoin

GET STARTED

Order Form

BUY · SELL

MARKET · LIMIT · STOP

Amount: Max 0.00 USD

Fee ≈ 0.00 USD
Total ≈ 0.00000000 BTC

PLACE BUY ORDER

Order Book

Market Size	Price (USD)	My Size
2.1958	10183.48	-
0.3090	10183.47	-
0.0239	10182.41	-
0.0201	10182.40	-
1.0000	10181.69	-
0.0100	10181.56	-
0.4749	10181.49	-
0.1000	10179.49	-
2.0000	10179.46	-
1.0000	10179.29	-
0.4495	10179.28	-
0.0120	10177.24	-
2.0000	10175.86	-
0.2844	10175.84	-
USD Spread	0.84	
0.1425	10175.00	-
0.5000	10174.23	-
0.7773	10174.22	-
3.8562	10174.21	-
6.3890	10172.23	-
0.0138	10172.22	-
2.4520	10171.79	-
0.7200	10168.37	-
0.0729	10168.36	-
5.1000	10168.35	-
0.0989	10168.29	-
1.0000	10167.13	-
3.1000	10167.02	-
2.0000	10166.84	-
Aggregation	0.01	

Price Chart · Price Chart · Depth Chart

5m · Candle · Overlay

Open Orders · Open · Fills

Side	Size	Filled (BTC)	Price (USD)	Fee (USD)	Status

No orders to show

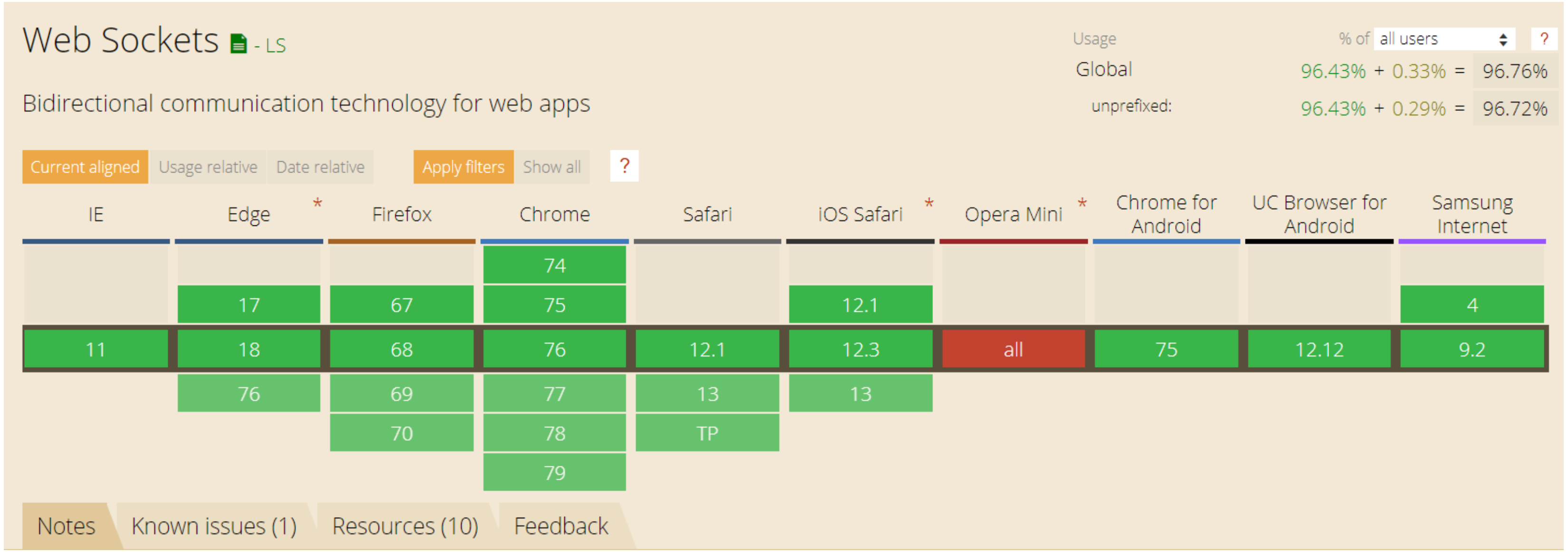
Trade History

Trade Size	Price (USD)	Time
0.0034	10175.79 ↗	10:05:51
0.0395	10175.79 ↗	10:05:51
0.0075	10175.00 ↘	10:05:49
0.0677	10175.11 ↘	10:05:49
0.0752	10175.81 ↗	10:05:46
0.0017	10175.86 ↗	10:05:42
0.0011	10173.29 ↘	10:05:17
0.0051	10176.29 ↗	10:05:17
0.0084	10176.39 ↗	10:05:14
0.0103	10176.43 ↗	10:05:12
0.0027	10176.45 ↗	10:05:12
0.0028	10176.50 ↗	10:05:10
0.0020	10173.77 ↘	10:05:09
0.0081	10173.77 ↘	10:05:09
0.0100	10173.77 ↘	10:05:09
0.2629	10176.98 ↗	10:05:01
0.0043	10174.85 ↗	10:05:01
0.0023	10174.59 ↗	10:05:01
0.0054	10173.80 ↗	10:05:01
0.0034	10173.06 ↗	10:05:01
0.1060	10172.51 ↗	10:05:01
0.0013	10172.51 ↗	10:05:01
0.0057	10172.50 ↘	10:05:00
0.0019	10172.51 ↗	10:04:57
0.0099	10172.23 ↘	10:04:50
0.0990	10172.24 ↗	10:04:49
0.6310	10172.24 ↗	10:04:49
0.1670	10172.24 ↗	10:04:49
0.0049	10172.24 ↗	10:04:35
0.0193	10172.24 ↗	10:04:33
0.0408	10172.23 ↘	10:04:22

● All Systems Operational

WebSockets 101

Browser Support



Web Sockets - LS

Bidirectional communication technology for web apps

Usage % of all users ?

Global	96.43%	+	0.33%	=	96.76%
unprefixed:	96.43%	+	0.29%	=	96.72%

Current aligned | Usage relative | Date relative | Apply filters | Show all | ?

IE	Edge *	Firefox	Chrome	Safari	iOS Safari *	Opera Mini *	Chrome for Android	UC Browser for Android	Samsung Internet
			74						
	17	67	75		12.1				4
11	18	68	76	12.1	12.3	all	75	12.12	9.2
	76	69	77	13	13				
		70	78	TP					
			79						

Notes | Known issues (1) | Resources (10) | Feedback

WebSockets 101

When not to use WebSockets

- If data only has to be collected once
- If realtime updates are not the main concern

THANK YOU FOR YOUR ATTENTION

Dinner Break

Any **Questions?**

We will start with the **hands-on** here at

18:45

Enjoy your meal!!

Socket.IO

101

- A library that enables real-time, bidirectional and event-based communication between browser and server

- Consists of 2 packages
  - NodeJS server https://socket.io/docs/server-api/
  - JS client https://socket.io/docs/client-api/

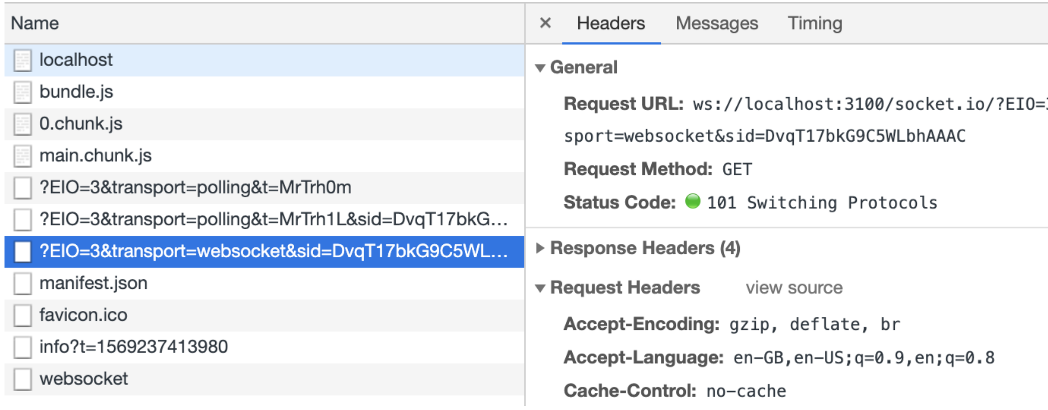
- Features:
  - Reliable connections
  - Auto-reconnection support
  - Disconnection detection
  - Room support

Socket.IO

Under the hood

- Implementation of Engine.IO
  1. Establish long-polling connection
  2. Tries to upgrade to transports like WebSocket

- WebSockets have trouble connecting in the presence of
  - Proxies
  - Load balancers
  - Personal firewalls
  - Antivirus software



Name
- localhost
- bundle.js
- 0.chunk.js
- main.chunk.js
- ?EIO=3&transport=polling&t=MrTrh0m
- ?EIO=3&transport=polling&t=MrTrh1L&sid=DvqT17bkG…
- ?EIO=3&transport=websocket&sid=DvqT17bkG9C5WL…
- manifest.json
- favicon.ico
- info?t=1569237413980
- websocket

▼ General

Request URL: `ws://localhost:3100/socket.io/?EIO=`
`sport=websocket&sid=DvqT17bkG9C5WLbhAAAC`
Request Method: `GET`
Status Code: ● `101 Switching Protocols`

▶ Response Headers (4)

▼ Request Headers view source

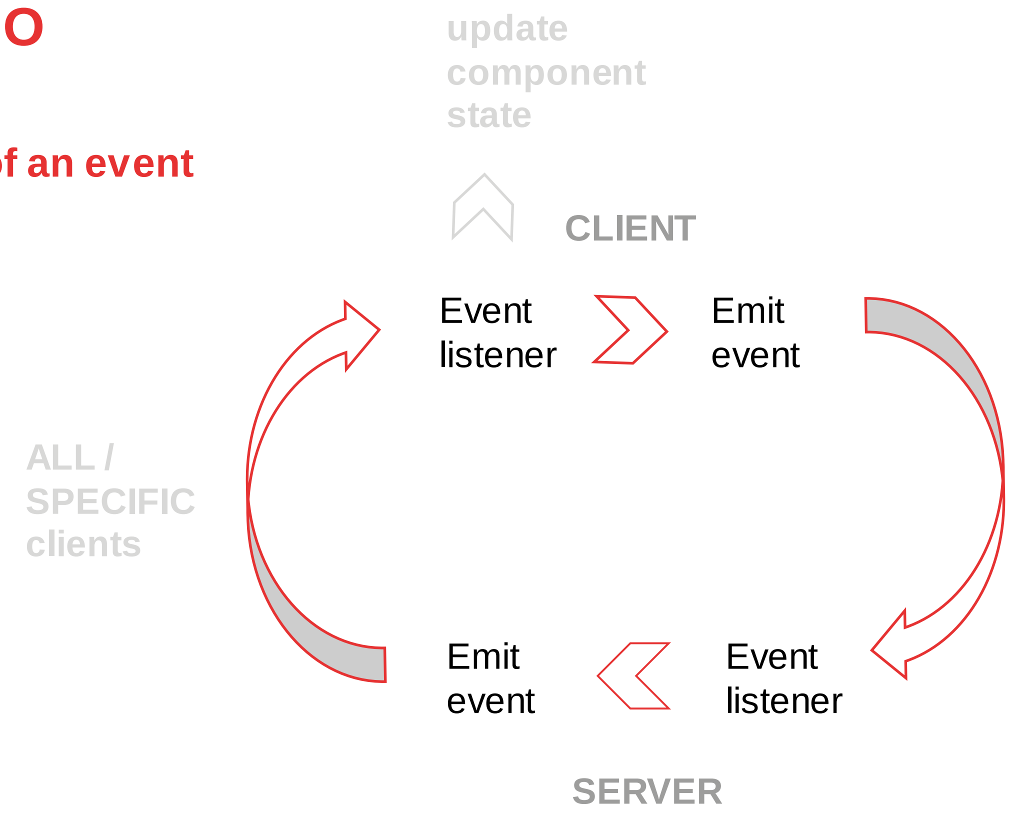
Accept-Encoding: `gzip, deflate, br`
Accept-Language: `en-GB,en-US;q=0.9,en;q=0.8`
Cache-Control: `no-cache`

Socket.IO

DEMO

Socket.IO

Lifecycle of an event



Socket.IO

Docs

- https://socket.io/docs/
- https://socket.io/docs/emit-cheatsheet/

- Event emitters `**.emit()**`
- Event listeners `**.on()**`
- Use listeners to
  - callback emits (mostly done server side):
  - callback (component) state updates

`client.on("message", **function(payload) {**
 io.emit("message", payload);
});`

Socket.IO

SocketHandler

- Demo

Socket.IO

Overview

- Exercises and skeleton project
  - https://github.com/AMIS-Services/sig-socket-io

- Examples
  - React
    - https://github.com/nathanbreuring/socket-chat
  - Angular (missing private chat functionality)
    - https://github.com/MarkMudde/sig-socket-angular