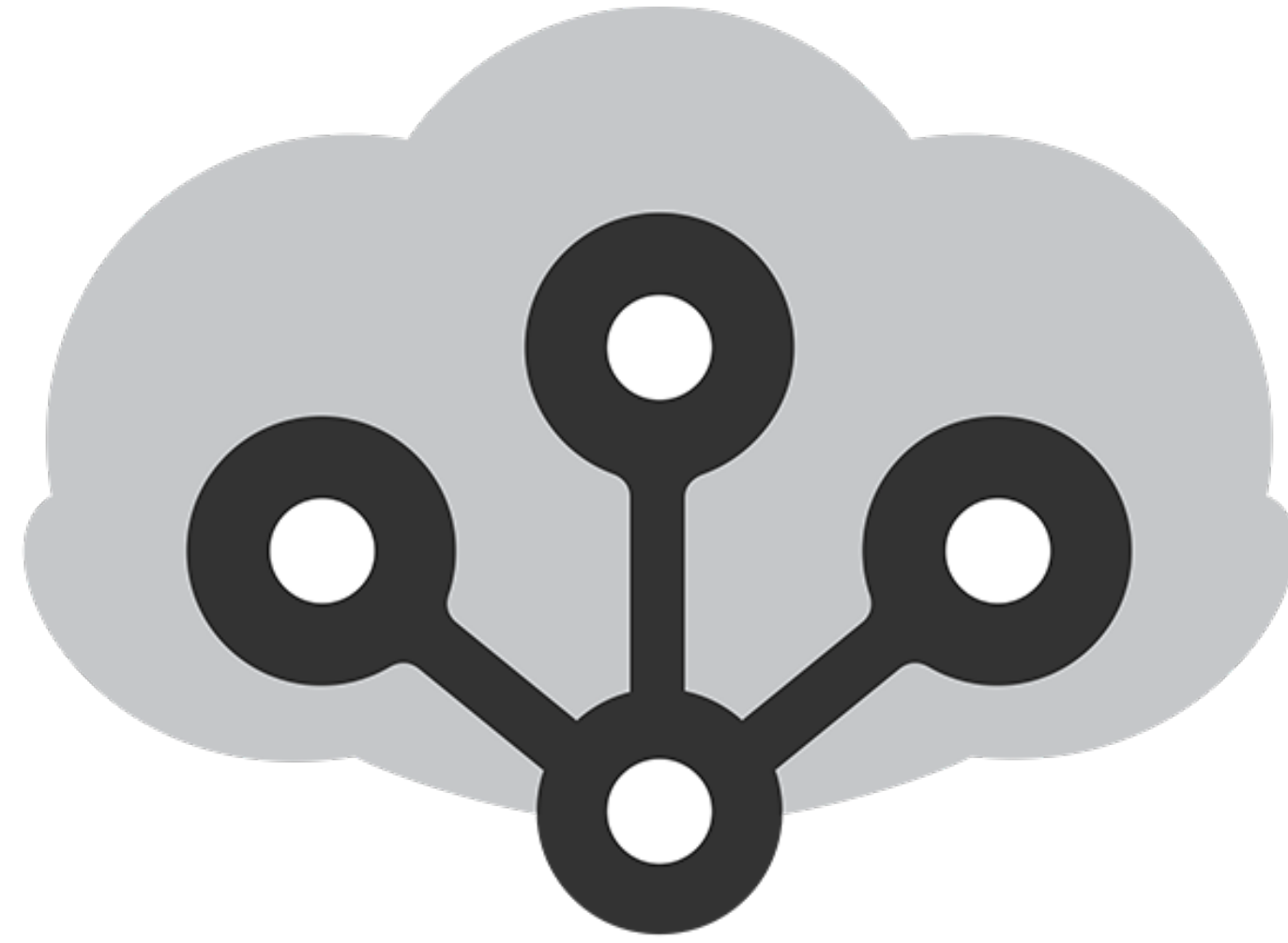
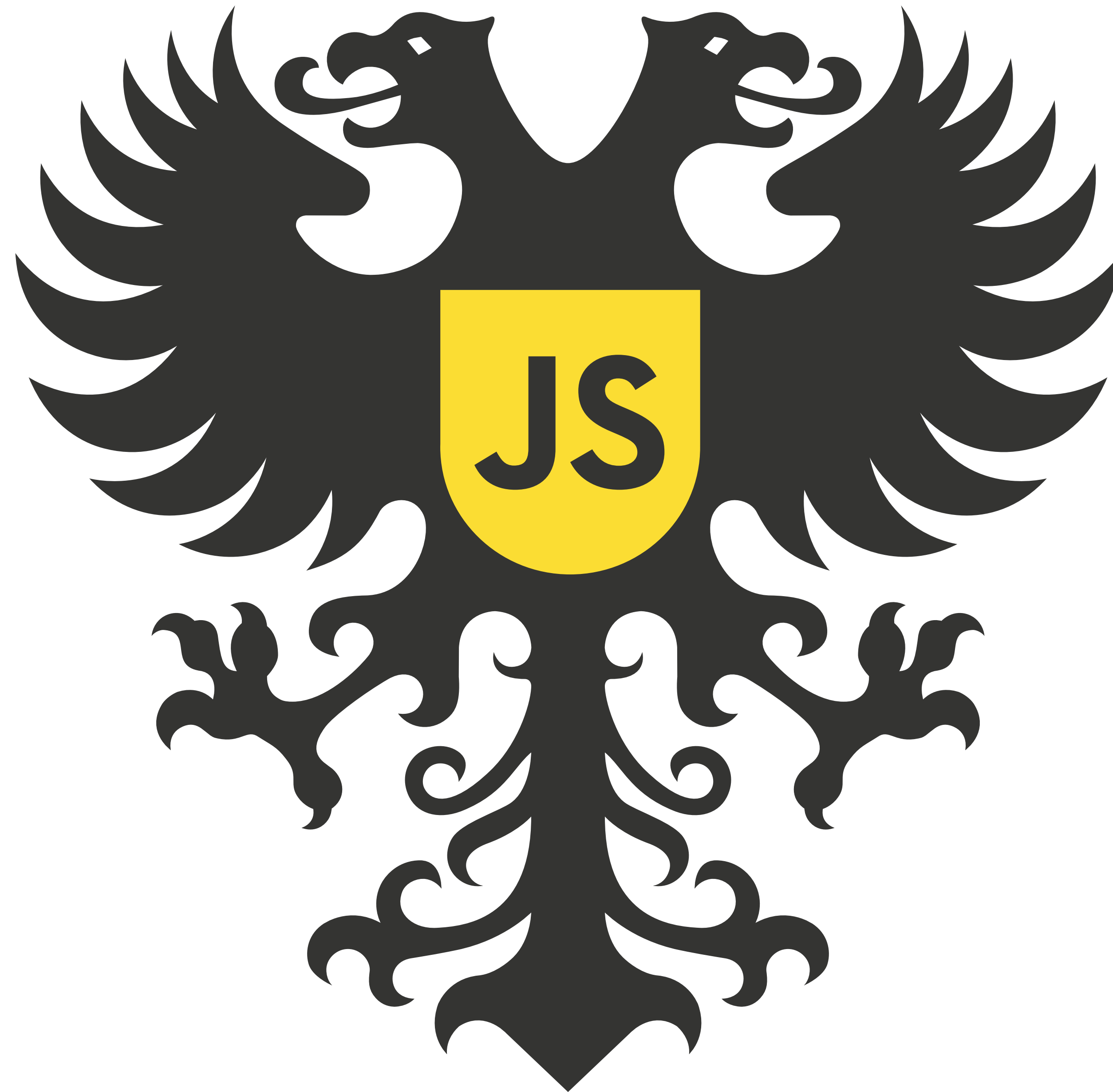


*pushing*  
*the real-time web*  
*forward*



nodejitsu

observe.it





*3rdeden*



*3rd-eden*

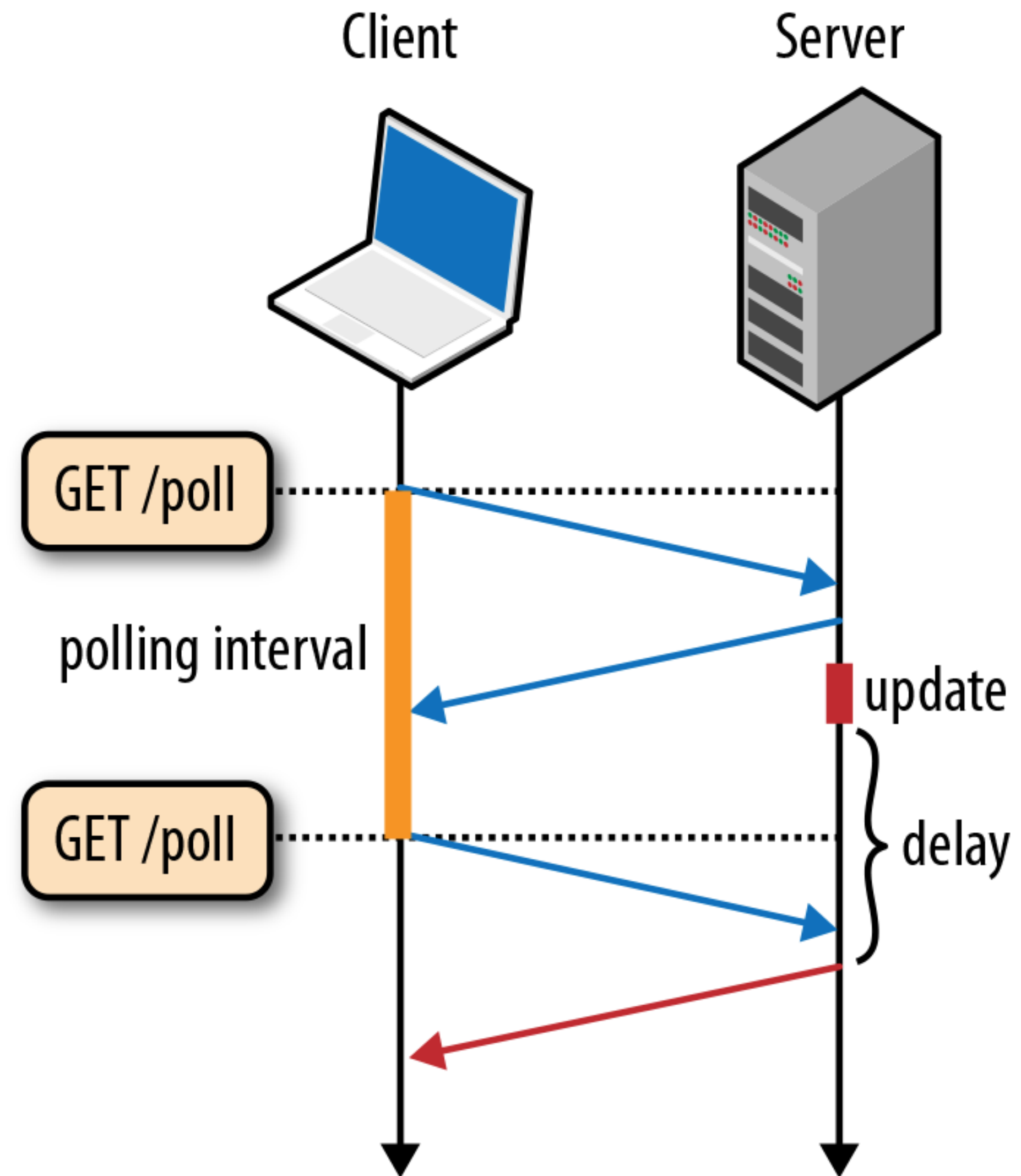
with a dash  
↑

*previously*

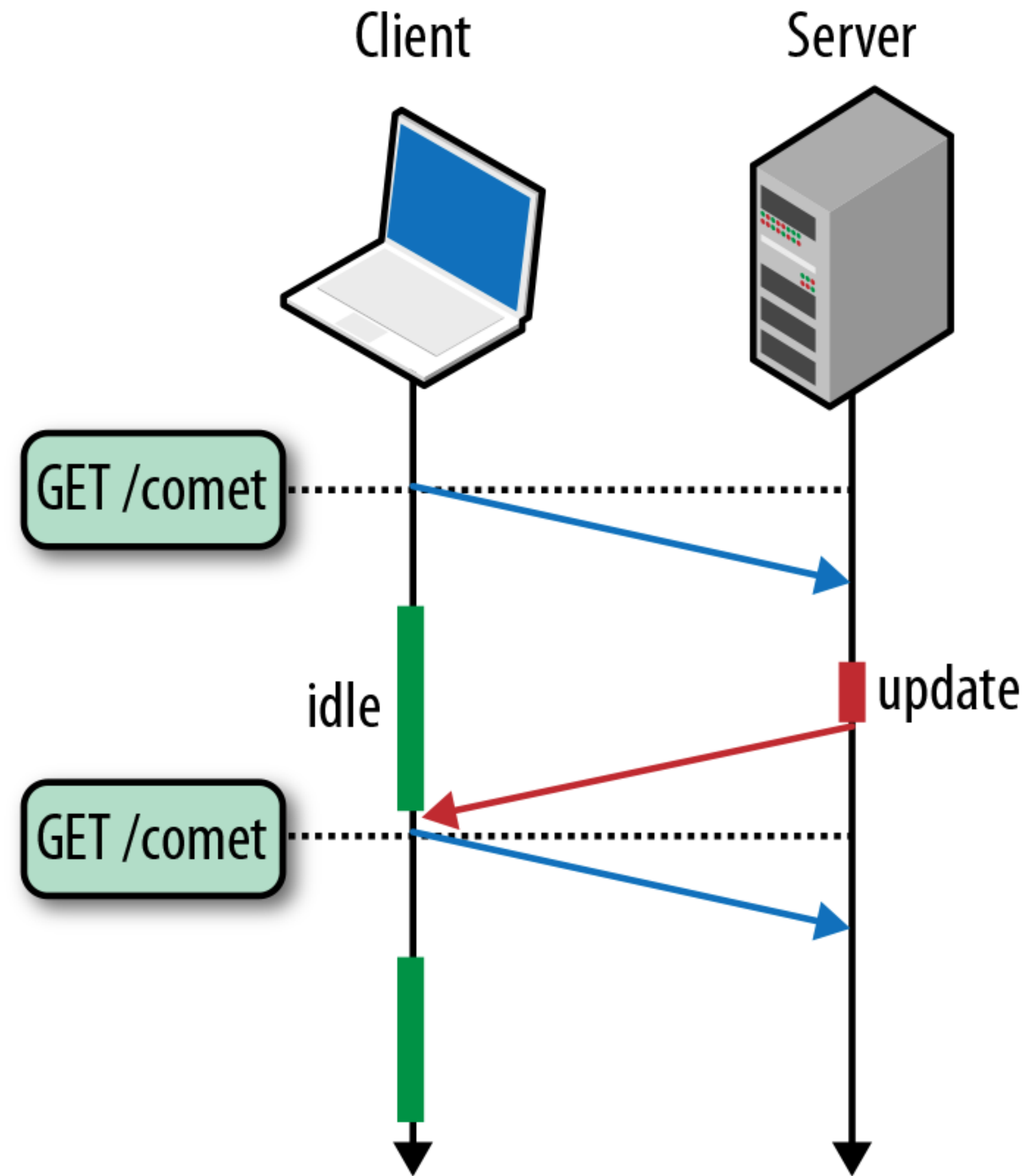
*Plugins*

*polling*

# SHORT POLLING



# LONG POLLING



# JSONP GET

```
var s = document.createElement("script");

s.src = "https://example.com/resource";
s.async = true;

var target = document.getElementsByTagName("script")[0];
target.parentNode.insertBefore(s, target);
```

# JSONP POST

```
var i = document.createElement("iframe");
i.name = "posttarget";
i.src = "javascript:0";

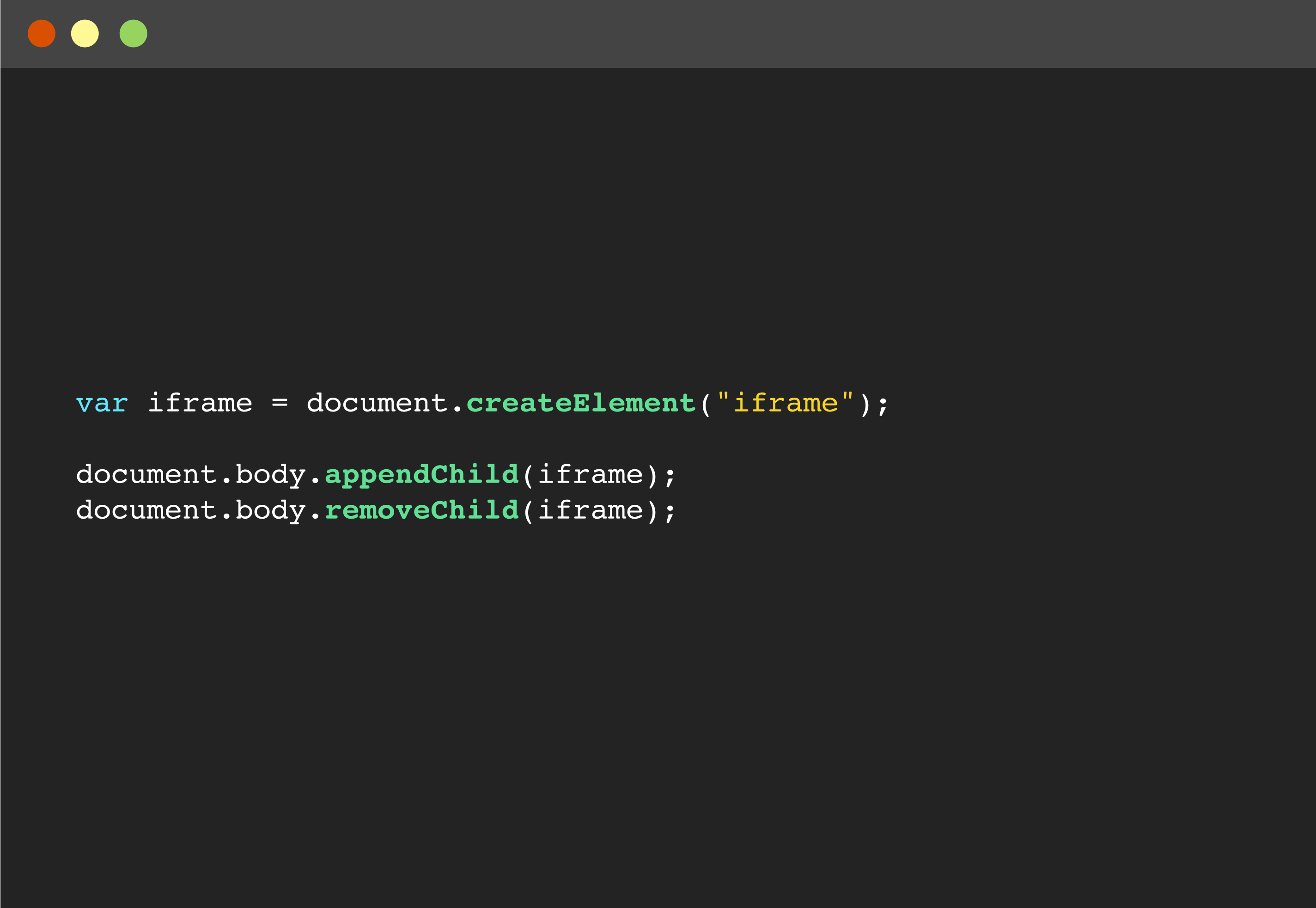
var f = document.createElement("form");
form.action = "https://example.org/resource";
form.target = i.name;

var t = document.createElement("textarea");
t.value = "body to post";
t.name = "data";

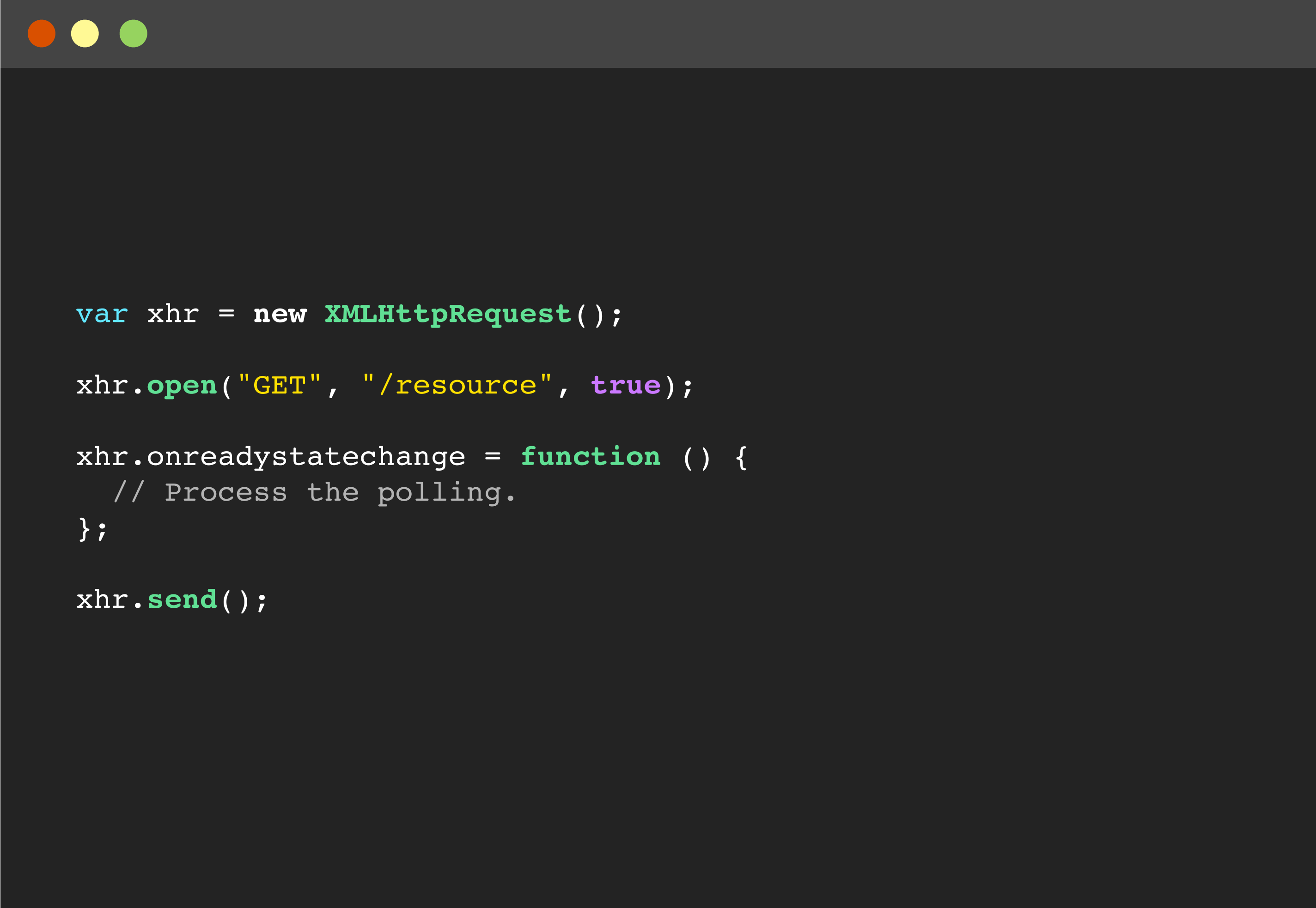
f.appendChild(i);
f.appendChild(t);
document.body.appendChild(f);

f.submit();
```

# LOADING INDICATOR

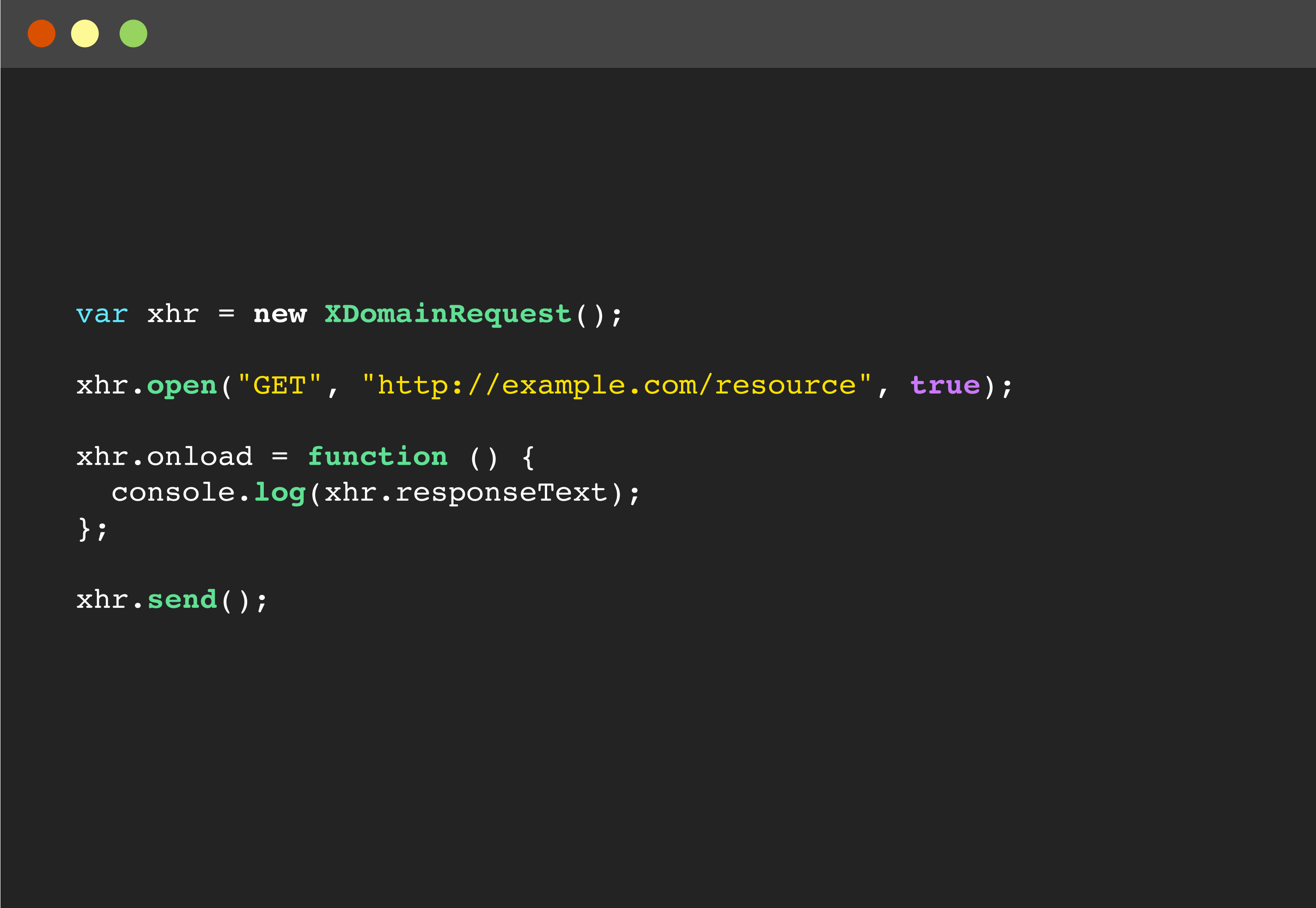


```
var iframe = document.createElement("iframe");  
  
document.body.appendChild(iframe);  
document.body.removeChild(iframe);
```



```
var xhr = new XMLHttpRequest();  
  
xhr.open("GET", "/resource", true);  
  
xhr.onreadystatechange = function () {  
    // Process the polling.  
};  
  
xhr.send();
```

# XDOMAINREQUEST



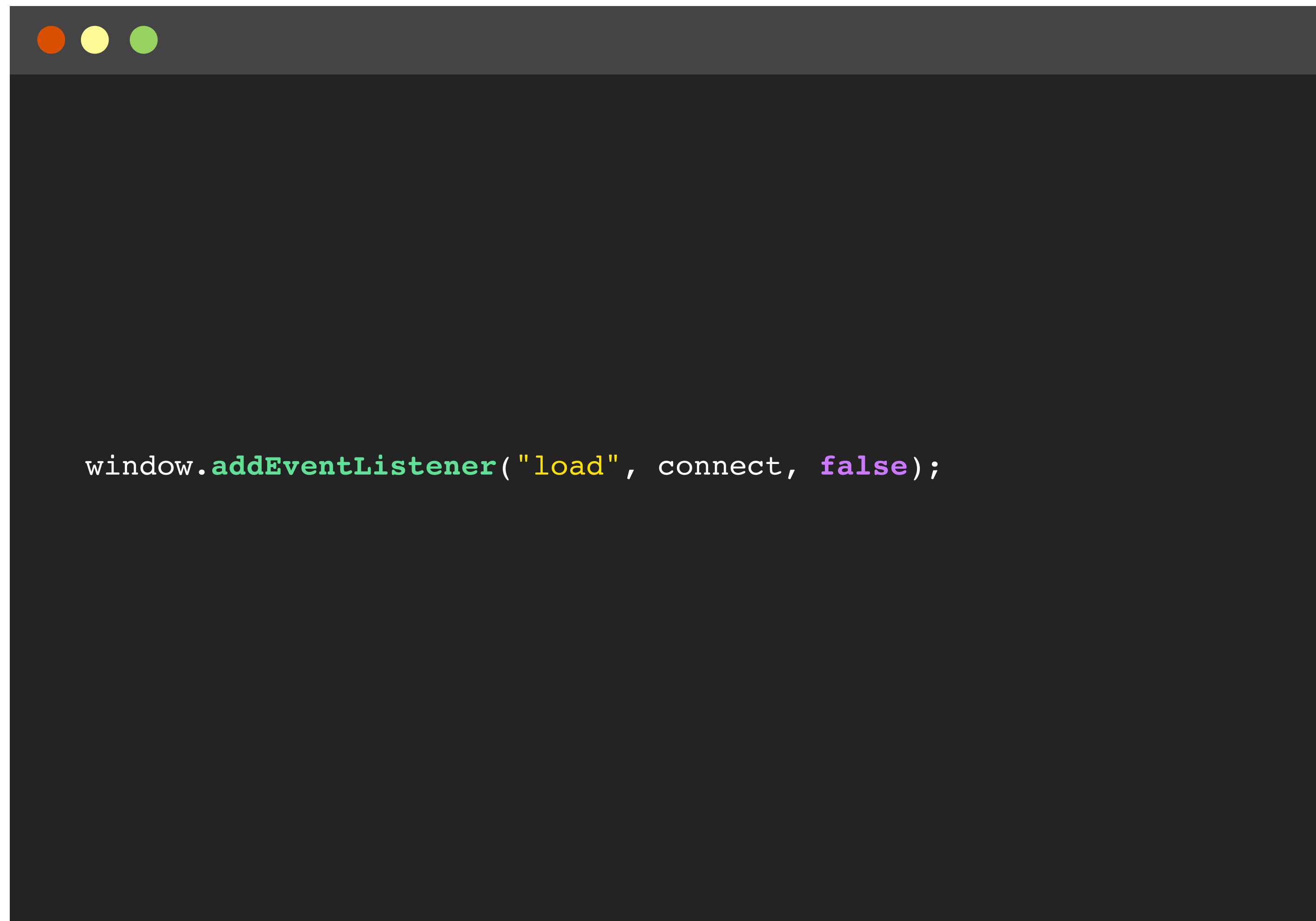
```
var xhr = new XMLHttpRequest();

xhr.open("GET", "http://example.com/resource", true);

xhr.onload = function () {
    console.log(xhr.responseText);
};

xhr.send();
```

# LOADING INDICATOR



# CACHING IS A MAJOR PROBLEM

ESPECIALLY BACK-FOWARD CACHE

# STAMP + UNIQUE

```
var i = 0;

//
// Generate unique URL for all GET/POST/PUT/* requests
//
var unique = +new Date() + ":" + i++;
url = url + (~url.indexOf("?") ? "&" : "?") + "t=" + unique;
```

*now*

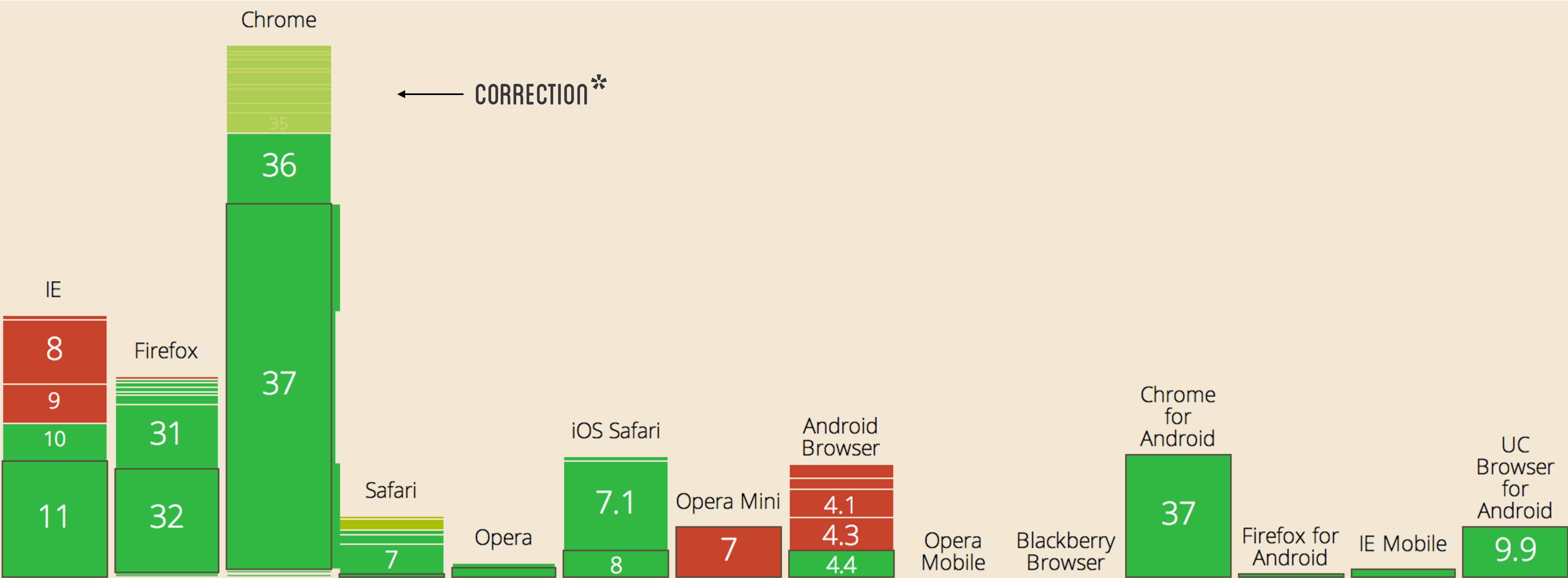
*websockets*

# GOOD ENOUGH BROWSER SUPPORT

| IE | Firefox | Chrome | Safari | Opera | iOS Safari | Opera Mini | Android Browser | Chrome for Android |
|----|---------|--------|--------|-------|------------|------------|-----------------|--------------------|
|    |         | 31     |        |       |            |            |                 |                    |
|    |         | 33     |        |       |            |            | 2.3             |                    |
| 8  |         | 34     | 5.1    |       |            |            | 4               |                    |
| 9  |         | 35     | 6.1    |       |            |            | 4.1             |                    |
| 10 | 31      | 36     | 7      |       | 7.1        |            | 4.3             |                    |
| 11 | 32      | 37     | 7.1    | 24    | 8          | 7          | 4.4             | 37                 |
|    | 33      | 38     | 8      | 25    |            |            | 4.4.3           |                    |
|    | 34      | 39     |        | 26    |            |            |                 |                    |
|    | 35      | 40     |        |       |            |            |                 |                    |

# CHROME SHOULD BE FLAGGED AS PARTIAL

JUST BECAUSE ITS POSTED ON THE INTERNET IT DOESN'T MEAN ITS TRUE



# COMPLEX BUT OPTIMIZED PROTOCOL

22,043 WORDS, 01:50:12 READING TIME



```
GET /chat HTTP/1.1
Host: server.example.com
Upgrade: websocket
Connection: Upgrade
Sec-WebSocket-Key: dGhlIHNhbXBsZSBub25jZQ==
Origin: http://example.com
Sec-WebSocket-Protocol: chat, superchat
Sec-WebSocket-Version: 13
```

The handshake from the server looks as follows:

```
HTTP/1.1 101 Switching Protocols
Upgrade: websocket
Connection: Upgrade
Sec-WebSocket-Accept: s3pPLMBiTxaQ9kYGzzhZRbK+xOo=
Sec-WebSocket-Protocol: chat
```

# SIMPLE AND UNDERSTANDABLE API

```
var ws;

try { ws = new WebSocket("wss://localhost:8080/"); }
catch (e) { return console.error("shit happend", e); }

ws.onmessage = function message(event) {
  console.log(event.data);
};

ws.onclose = function close() {
  console.log(event.data);
};

ws.send("Sup Fronteers");
```

```
var ws;

try { ws = new WebSocket("wss://localhost:8080/"); }
catch (e) { return console.error("shit happend", e); }

ws.binaryType = "arraybuffer";

var image = canvas.getContext("2d").getImageData(0, 0, 440, 300)
    , data = new Uint8Array(image.data.length);

for (var i = 0; i < image.data.length; i++) {
    data[i] = image.data[i];
}

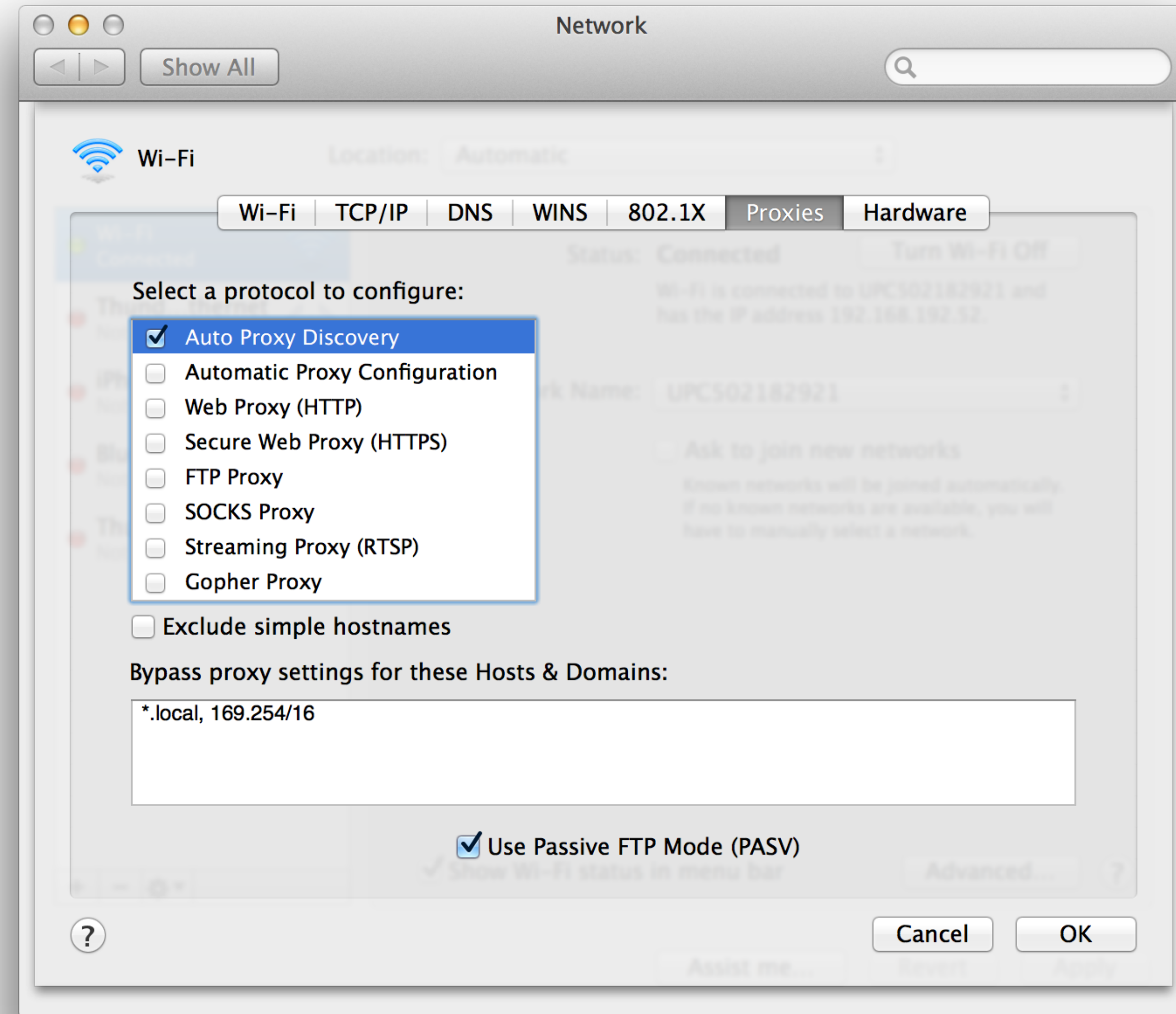
ws.send(data.buffer);
```

$u^*$

~~websockets~~

# HTTP PROXY SETTINGS IN YOUR NETWORK SETTINGS CAN CAUSE A FULL BROWSER CRASH

LUCKLY, ITS MAC ONLY



# BROWSER SNIFFING

```
if (
  // Target safari browsers
  $.browser.safari

  // Not chrome
  && !$.browser.chrome

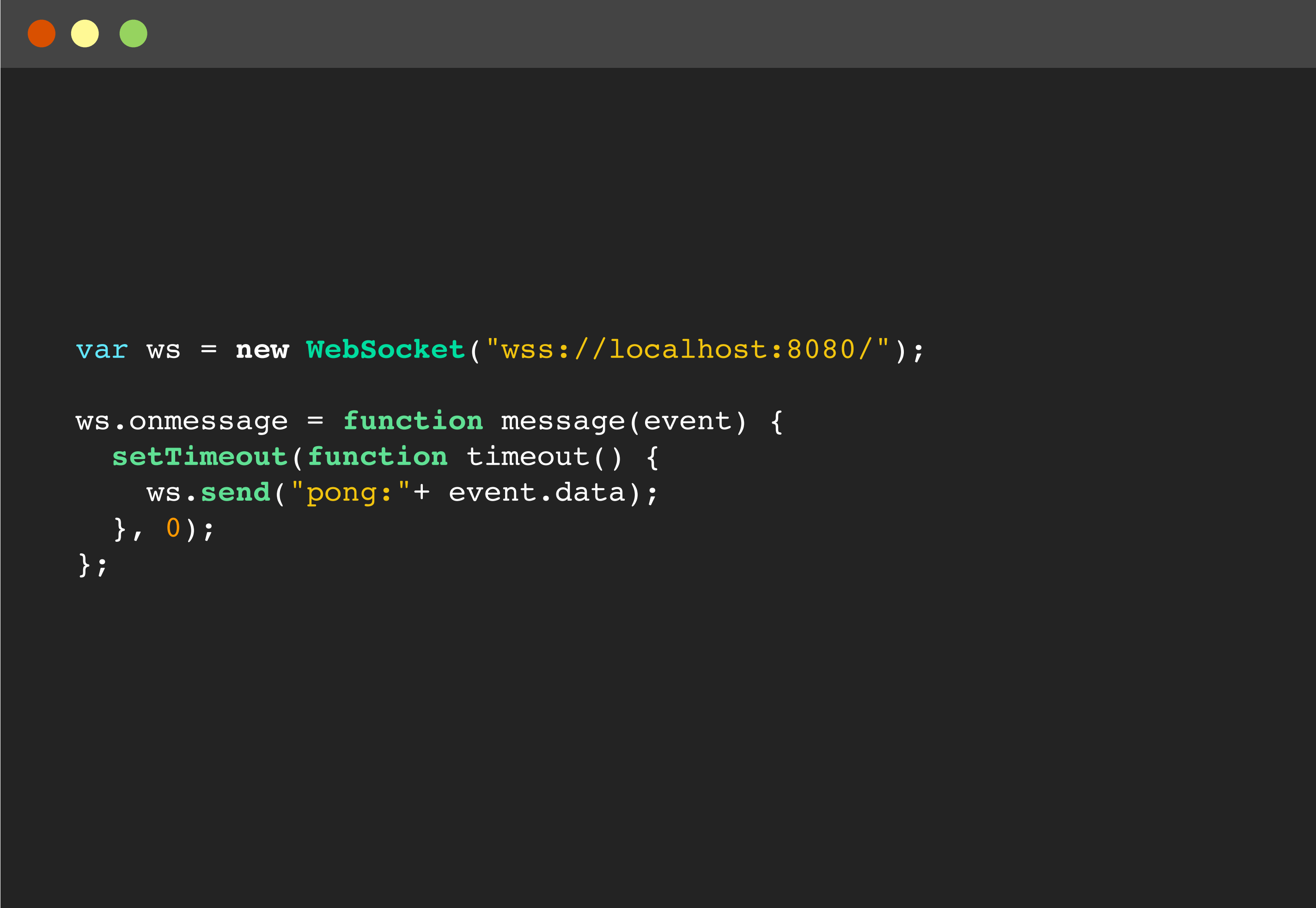
  // And correct WebKit version
  && parseFloat($.browser.version, 0) < 534.54
) {
  // Don't use WebSockets.
  return;
}
```

# WRITING TO A CLOSED WEBSOCKET CONNECTION CAN CRASH YOUR PHONE

AFFECTS MOBILE SAFARI WHEN RETURNING TO THE PAGE FROM A DIFFERENT TAB

OR RETRIEVING SAFARI FROM THE BACKGROUND

# ADD A SLIGHT DELAY



```
var ws = new WebSocket("wss://localhost:8080/");

ws.onmessage = function message(event) {
    setTimeout(function timeout() {
        ws.send("pong:" + event.data);
    }, 0);
};
```

# DONT INTRODUCE POINTLESS LATENCY

```
var ws = new WebSocket("wss://localhost:8080/");

ws.onmessage = function message(event) {
    //
    // Wrap sends in a setTimeout out to allow the
    // readyState to be correctly set to closed. But
    // Only have this delay on mobile devices.
    //
    if (mobile) return setTimeout(function timeout() {
        ws.send("pong:" + event.data);
    }, 0);

    ws.send("pong:" + event.data);
};
```

# PRESSING ESC IN FIREFOX CLOSES THE CONNECTION

FIXED IN FIREFOX 20

# INTERCEPT & PREVENT

```
$( "body" ).keydown(function (e) {  
  //  
  // make sure that you capture the `esc` key and  
  // prevent it's default action from happening.  
  //  
  if (e.which === 27) e.preventDefault();  
});
```

# FIREFOX CAN CREATE GHOST CONNECTIONS

WHEN YOU CONNECT DURING WS.CLOSE

**LOL, MOBILE - 4G, 3G, LTE**  
ALL HAIL THE GLORIOUS CACHE PROXIES

# DISABLE IF YOU HAVE FALLBACKS

```
var ua = navigator.userAgent.toLowerCase();

//
// Detect all possible mobile phones to filter out WebSockets
//
if (
    ~ua.indexOf("mobile")
    || ~ua.indexOf("android")
    || ~ua.indexOf("ios")
    // .. and more ..
) {
    // Don't use WebSockets.
}
```

# VIRUS SCANNERS BLOCK WEBSOCKETS

BUT ALSO EXTENSIONS.. AKA: USER ENVIRONMENTS ARE HOSTILE

[HTTP://BATTLELOG.BATTLEFIELD.COM/BF3/FORUM/THREADVIEW/2832654347699167126/1/](http://battlelog.battlefield.com/bf3/forum/threadview/2832654347699167126/1/)

[HTTPS://GITHUB.COM/AUTOMATTIC/SOCKET.IO/WIKI/SOCKET.IO-AND-FIREWALL-SOFTWARE](https://github.com/Automattic/socket.io/wiki/socket.io-and-firewall-software)

# USER, NETWORK SERVER FIREWALLS

SAME THING, ENOCONNECTIONPOSSIBLE

# OUT OF DATE LOAD BALANCERS

TIME TO YELL AT YOUR OPS /DEVOPS TEAM

# *server-sent events*

ALSO KNOWN AS EVENTSOURCE

*are...*

freaking  
awesome!

# DECENT ENOUGH BROWSER SUPPORT

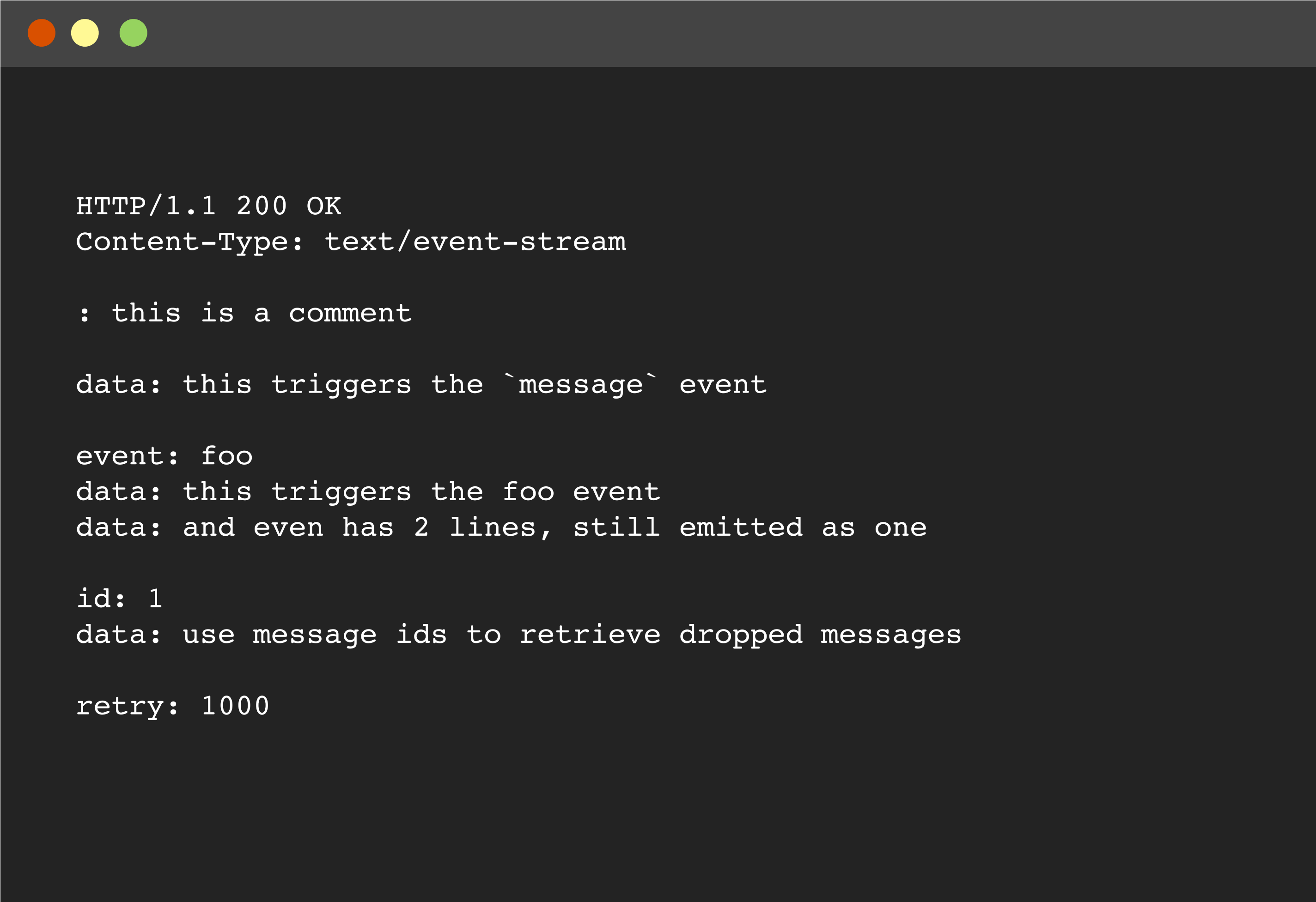
EVEN WORKS SINCE OPERA 8.5+

| IE | Firefox | Chrome | Safari | Opera | iOS Safari | Opera Mini | Android Browser | Chrome for Android |
|----|---------|--------|--------|-------|------------|------------|-----------------|--------------------|
|    |         | 31     |        |       |            |            |                 |                    |
|    |         | 33     |        |       |            |            | 2.3             |                    |
| 8  |         | 34     | 5.1    |       |            |            | 4               |                    |
| 9  |         | 35     | 6.1    |       |            |            | 4.1             |                    |
| 10 | 31      | 36     | 7      |       | 7.1        |            | 4.3             |                    |
| 11 | 32      | 37     | 7.1    | 24    | 8          | 7          | 4.4             | 37                 |
|    | 33      | 38     | 8      | 25    |            |            | 4.4.3           |                    |
|    | 34      | 39     |        | 26    |            |            |                 |                    |
|    | 35      | 40     |        |       |            |            |                 |                    |

[HTTP://CANIUSE.COM/#SEARCH=EVENTSOURCING](http://caniuse.com/#search=eventsourcing)

# HUMAN READABLE PROTOCOL

4,852 WORDS, 00:24:15 READING TIME



```
HTTP/1.1 200 OK
Content-Type: text/event-stream

: this is a comment

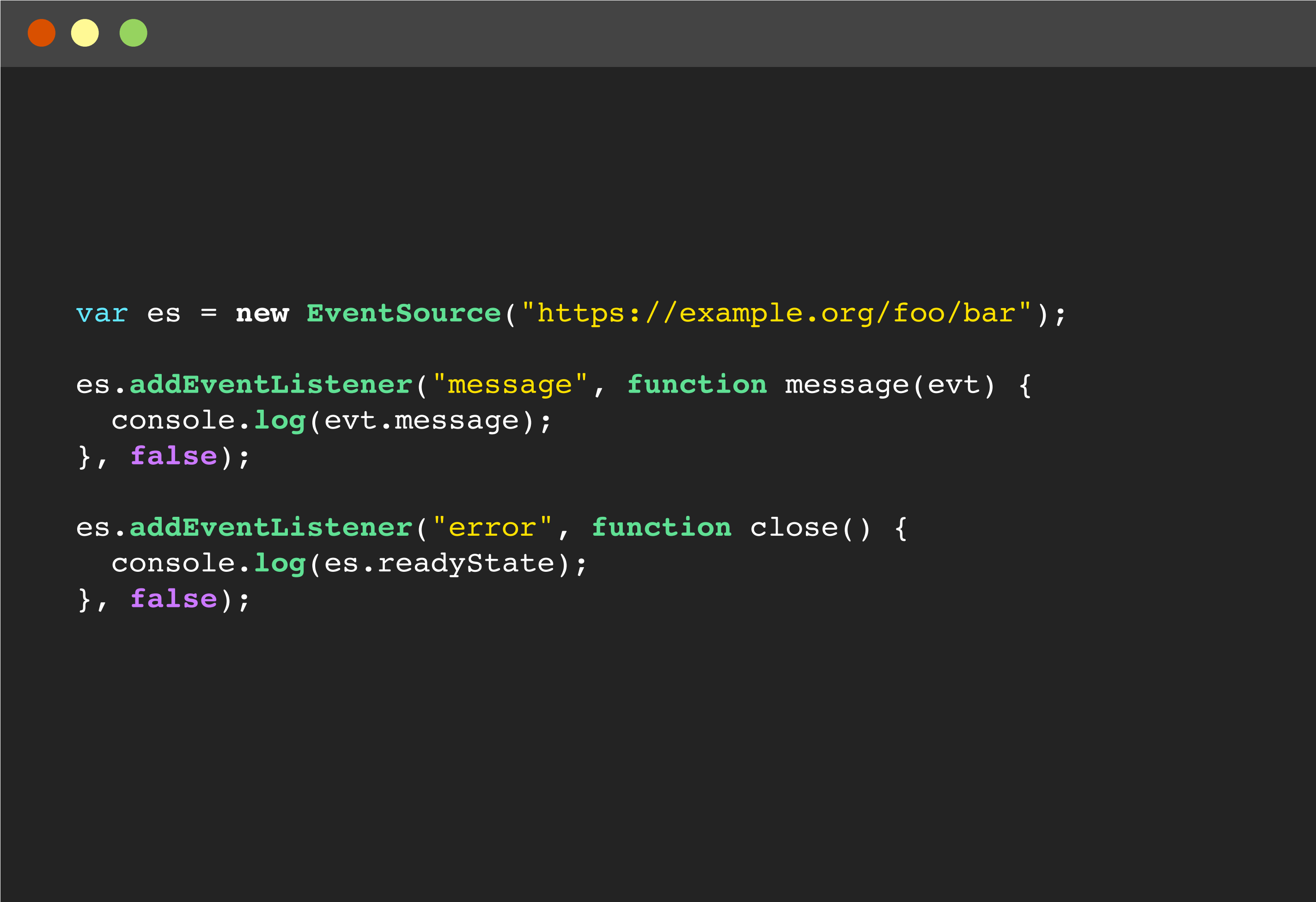
data: this triggers the `message` event

event: foo
data: this triggers the foo event
data: and even has 2 lines, still emitted as one

id: 1
data: use message ids to retrieve dropped messages

retry: 1000
```

# SIMPLE AND UNDERSTANDABLE API



```
var es = new EventSource("https://example.org/foo/bar");

es.addEventListener("message", function message(evt) {
  console.log(evt.message);
}, false);

es.addEventListener("error", function close() {
  console.log(es.readyState);
}, false);
```

*cross domain?*

# CORS SUPPORT

```
//  
// Check for CORS support.  
//  
"withCredentials" in EventSource.prototype;  
  
//  
// And use:  
//  
var es = new EventSource("https://example.org/foo/bar", {  
    withCredentials: true  
});
```

# IFRAME HACK



```
//  
// Sending using postMessage.  
//  
var i = document.createElement("iframe");  
i.src = "https://example.com/iframe";  
document.body.appendChild(i);  
  
//  
// Sending using postMessage.  
//  
i.contentWindow.postMessage("hello", origin);  
window.parent.postMessage("world", origin);  
  
//  
// Receiving messages.  
//  
window.addEventListener("message", listener, false);  
document.attachEvent("onmessage", listener);  
window.attachEvent("onmessage", listener);
```

# ANTI-VIRUS/FIREWALLS

BUFFERS UP THE REQUEST

# RECONNECT, MAYBE?

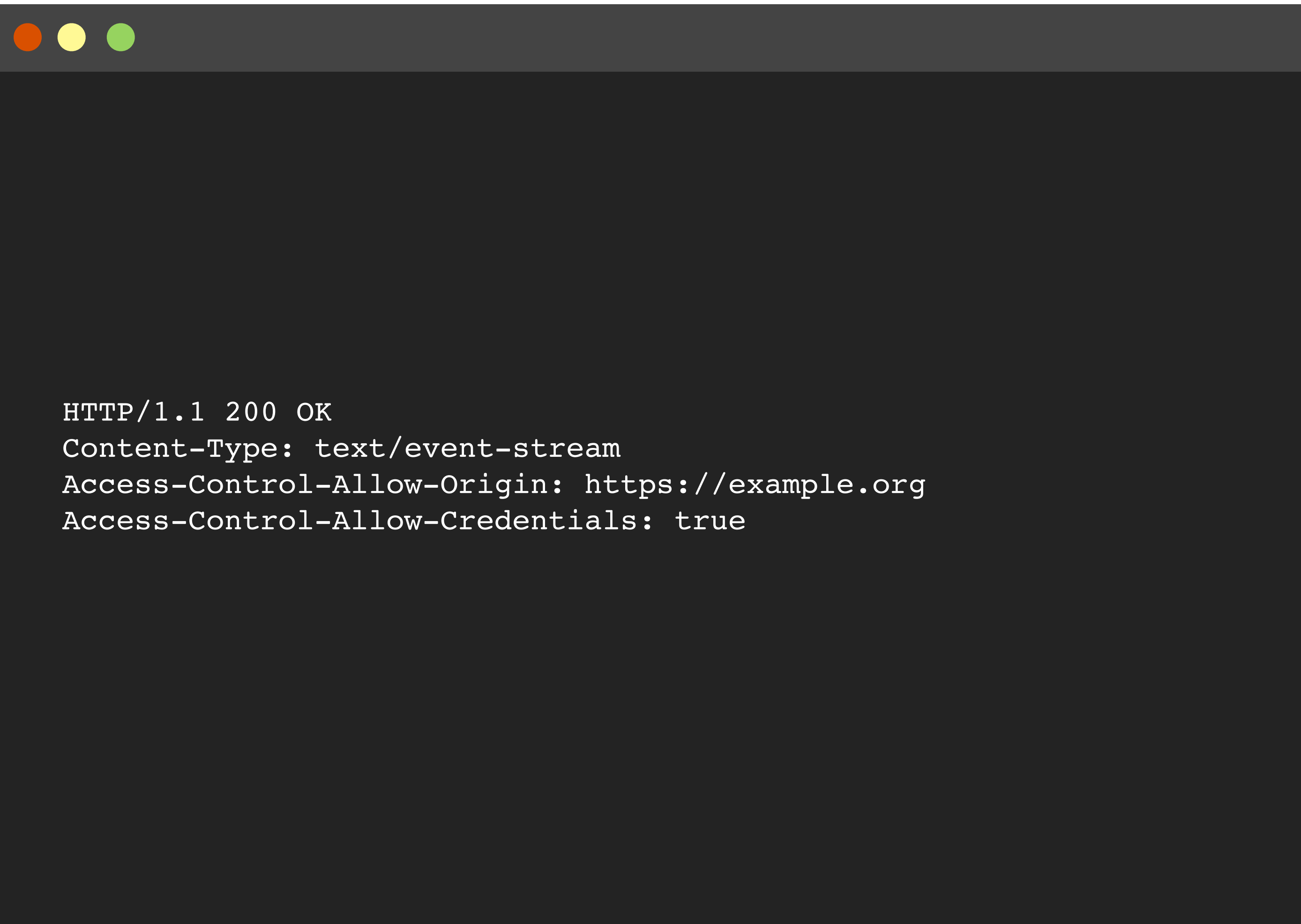
NOT SOMETHING YOU CAN TRUST

# INACTIVE CONNECTIONS

# access control

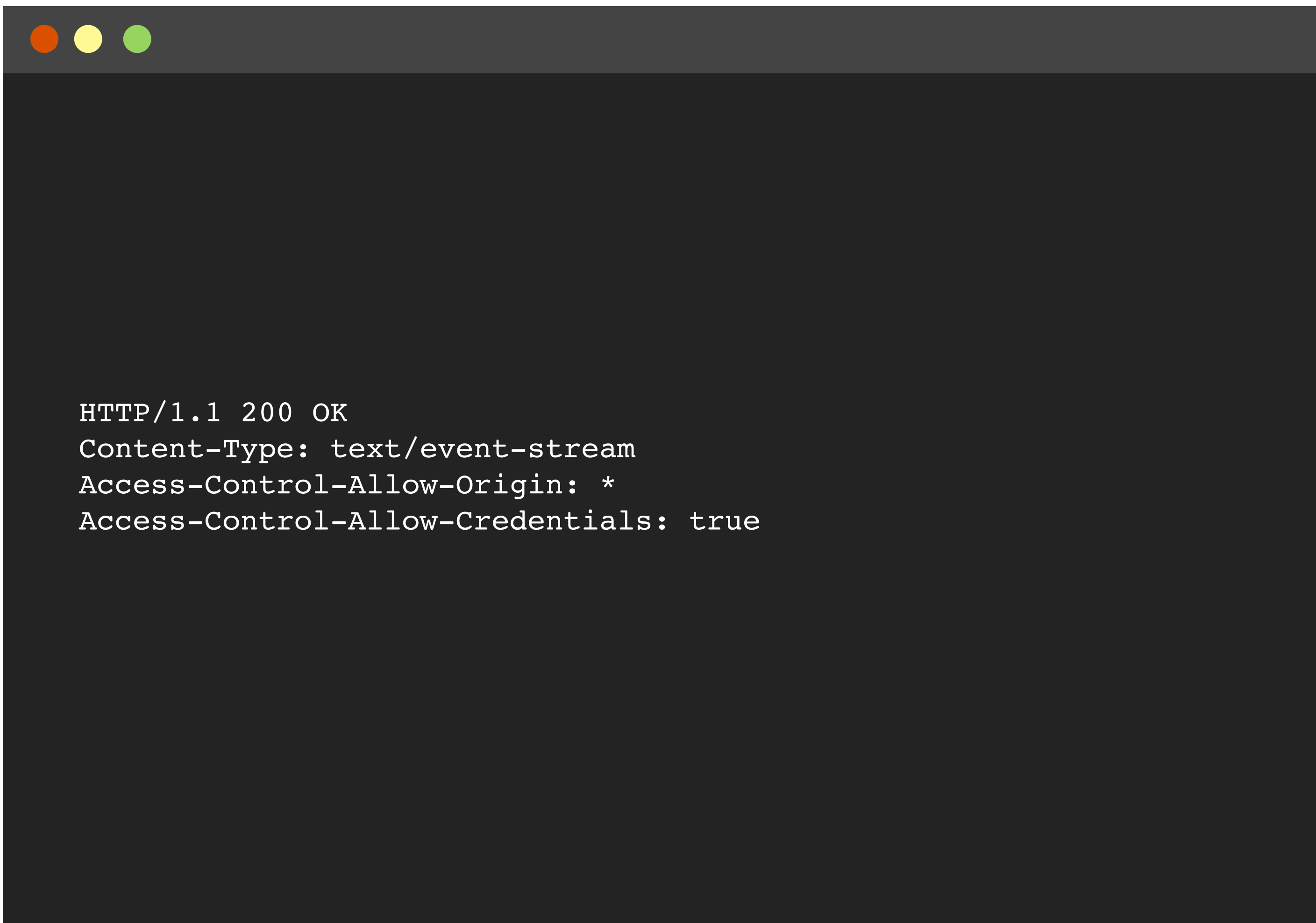
ALSO KNOWN AS CORS / CROSS ORIGIN

# WHEN DONE RIGHT, REALLY POWERFUL



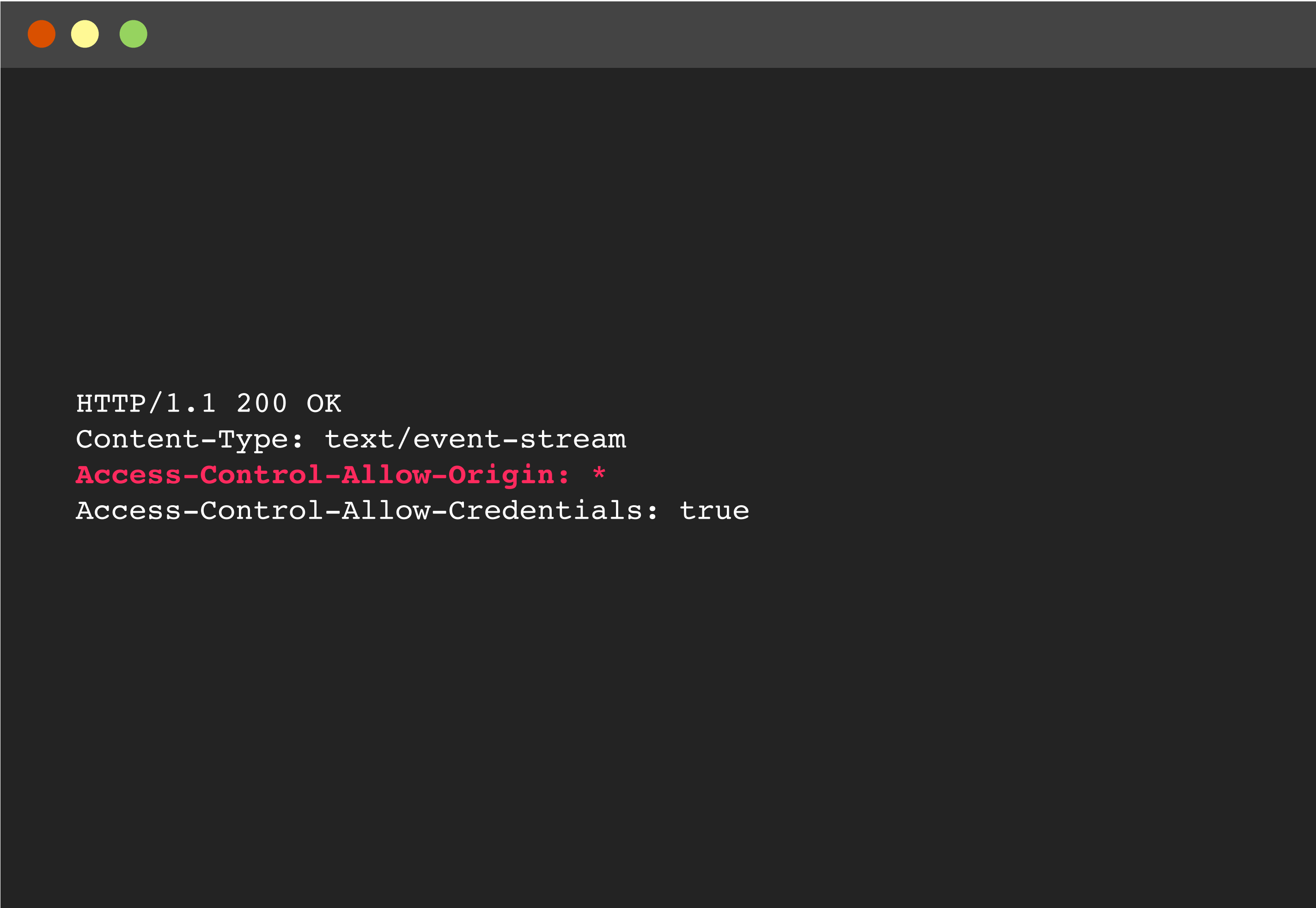
```
HTTP/1.1 200 OK
Content-Type: text/event-stream
Access-Control-Allow-Origin: https://example.org
Access-Control-Allow-Credentials: true
```

# NON OBVIOUS



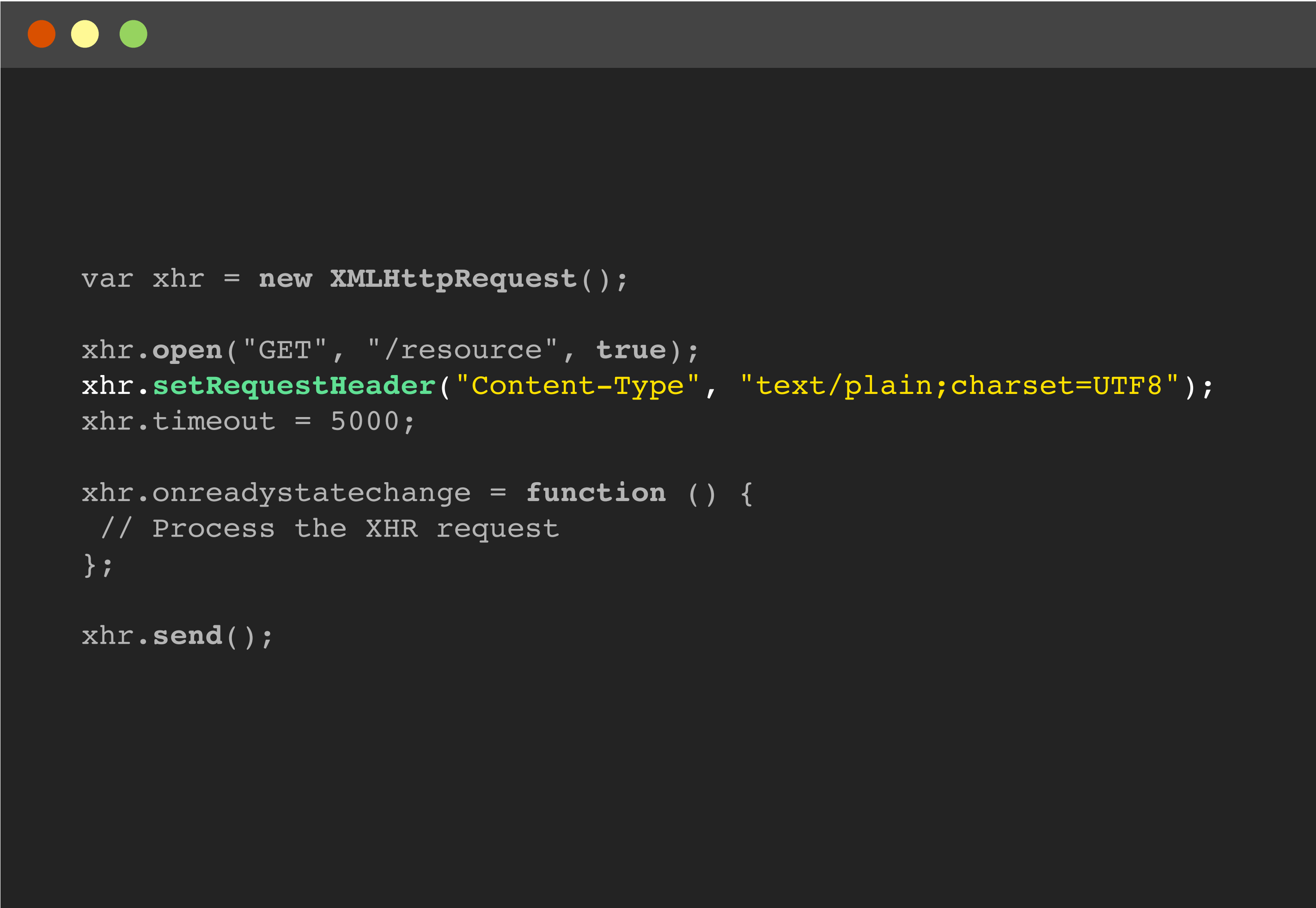
```
HTTP/1.1 200 OK
Content-Type: text/event-stream
Access-Control-Allow-Origin: *
Access-Control-Allow-Credentials: true
```

# ORIGIN MISS MATCH



```
HTTP/1.1 200 OK
Content-Type: text/event-stream
Access-Control-Allow-Origin: *
Access-Control-Allow-Credentials: true
```

# PREVENT CORS PREFLIGHT



```
var xhr = new XMLHttpRequest();

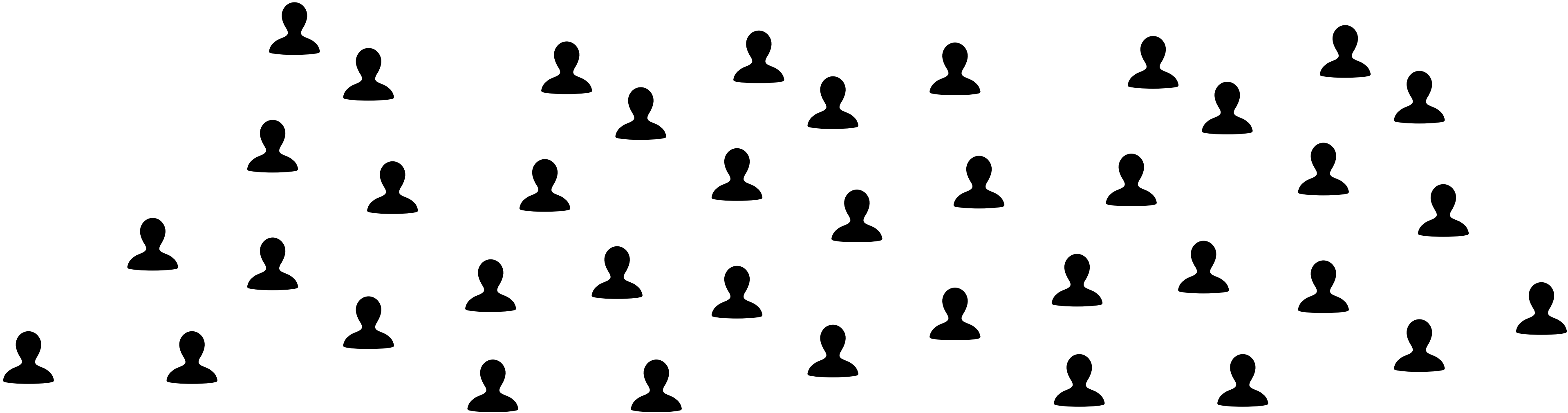
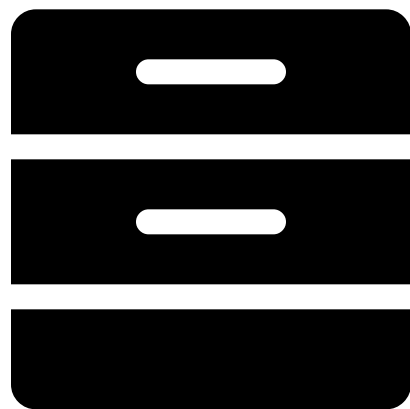
xhr.open("GET", "/resource", true);
xhr.setRequestHeader("Content-Type", "text/plain;charset=UTF8");
xhr.timeout = 5000;

xhr.onreadystatechange = function () {
    // Process the XHR request
};

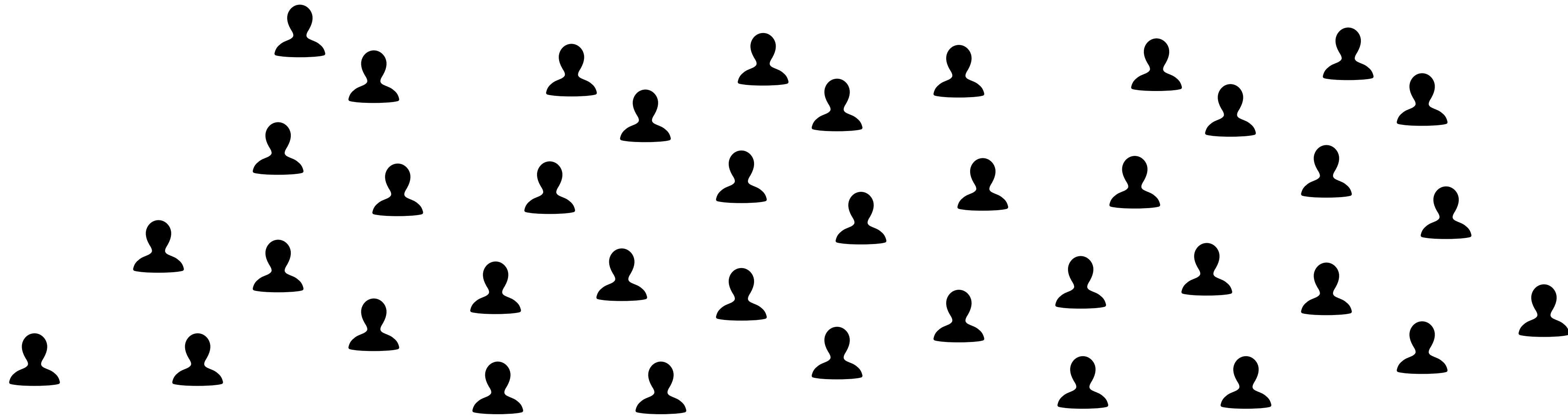
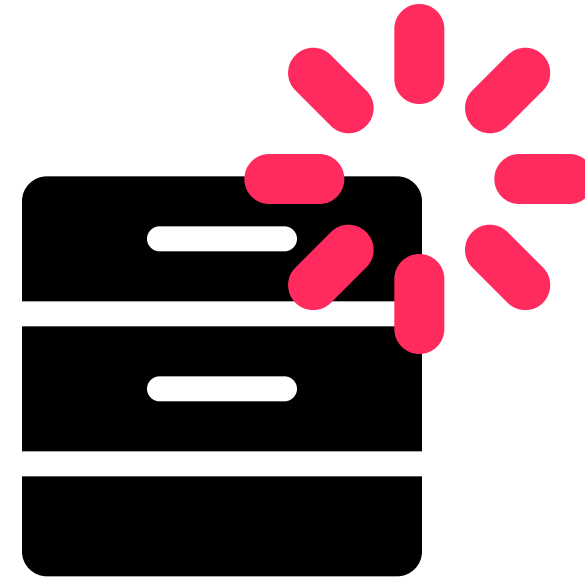
xhr.send();
```

*reconnect*

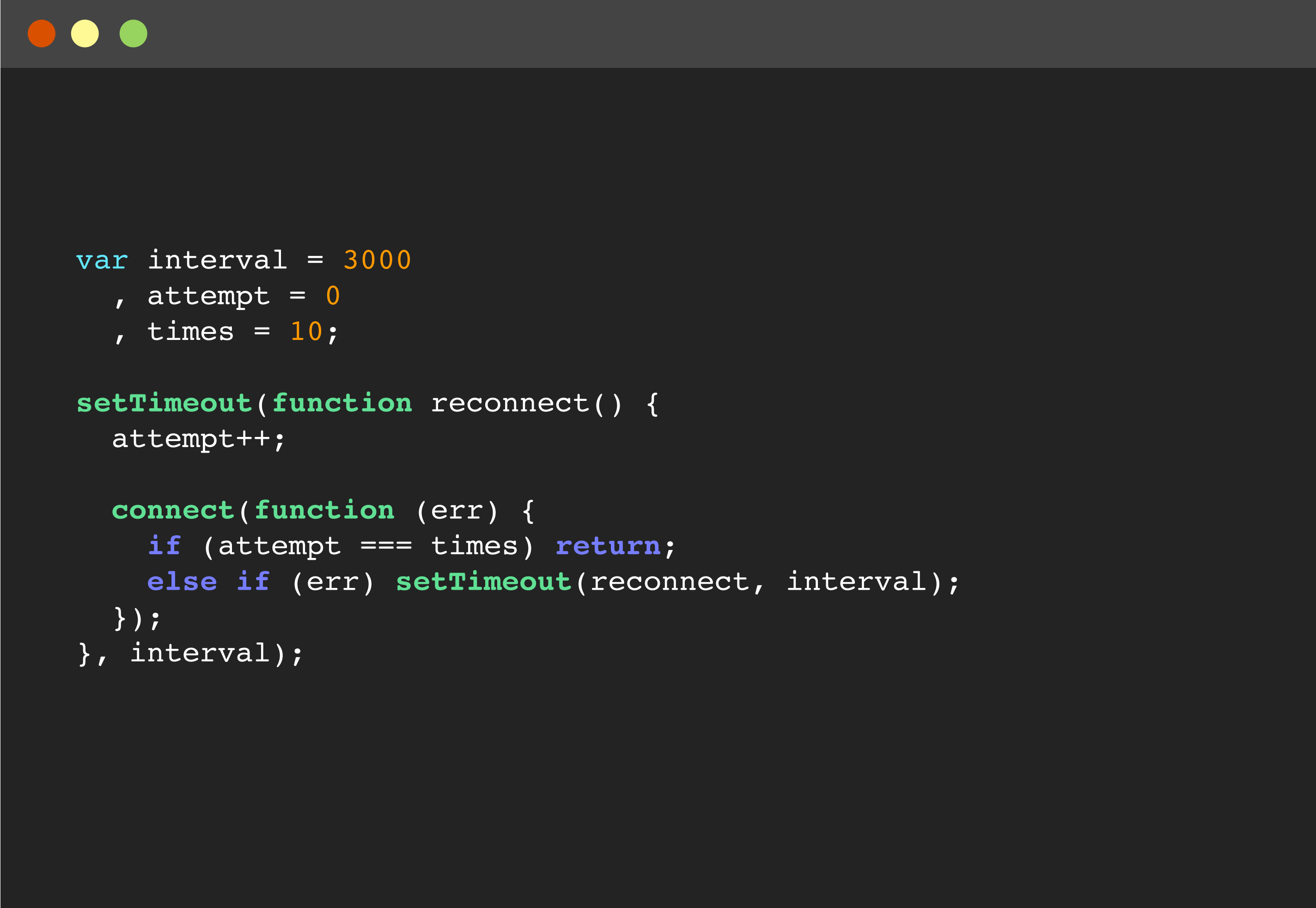
# HAPPY CONNECTED USERS



OH NOES!



# RECONNECT INTERVAL

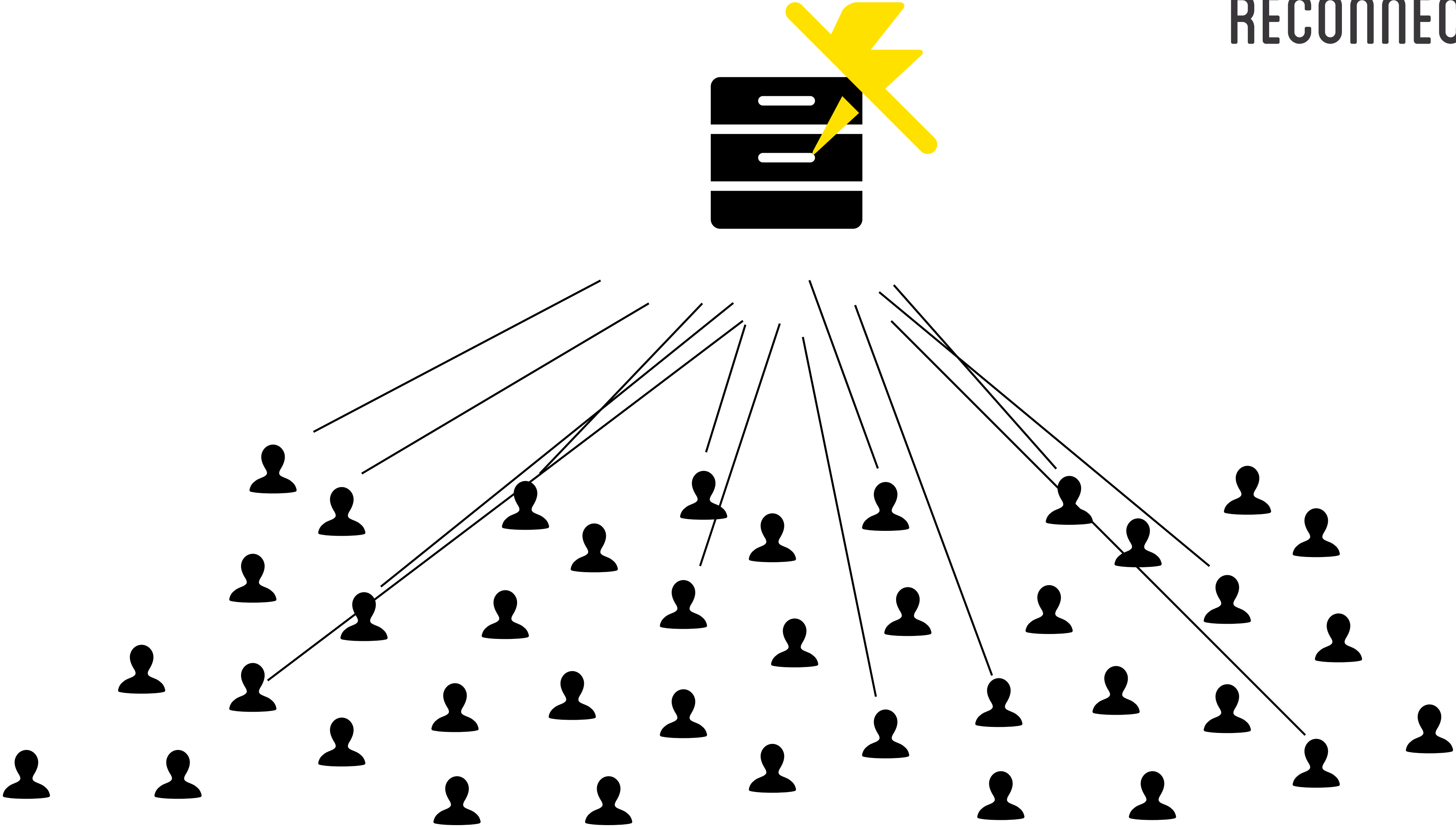


```
var interval = 3000
  , attempt = 0
  , times = 10;

setTimeout(function reconnect() {
  attempt++;

  connect(function (err) {
    if (attempt === times) return;
    else if (err) setTimeout(reconnect, interval);
  });
}, interval);
```

RECONNECT INTERVAL



# RANDOM BACK OFF

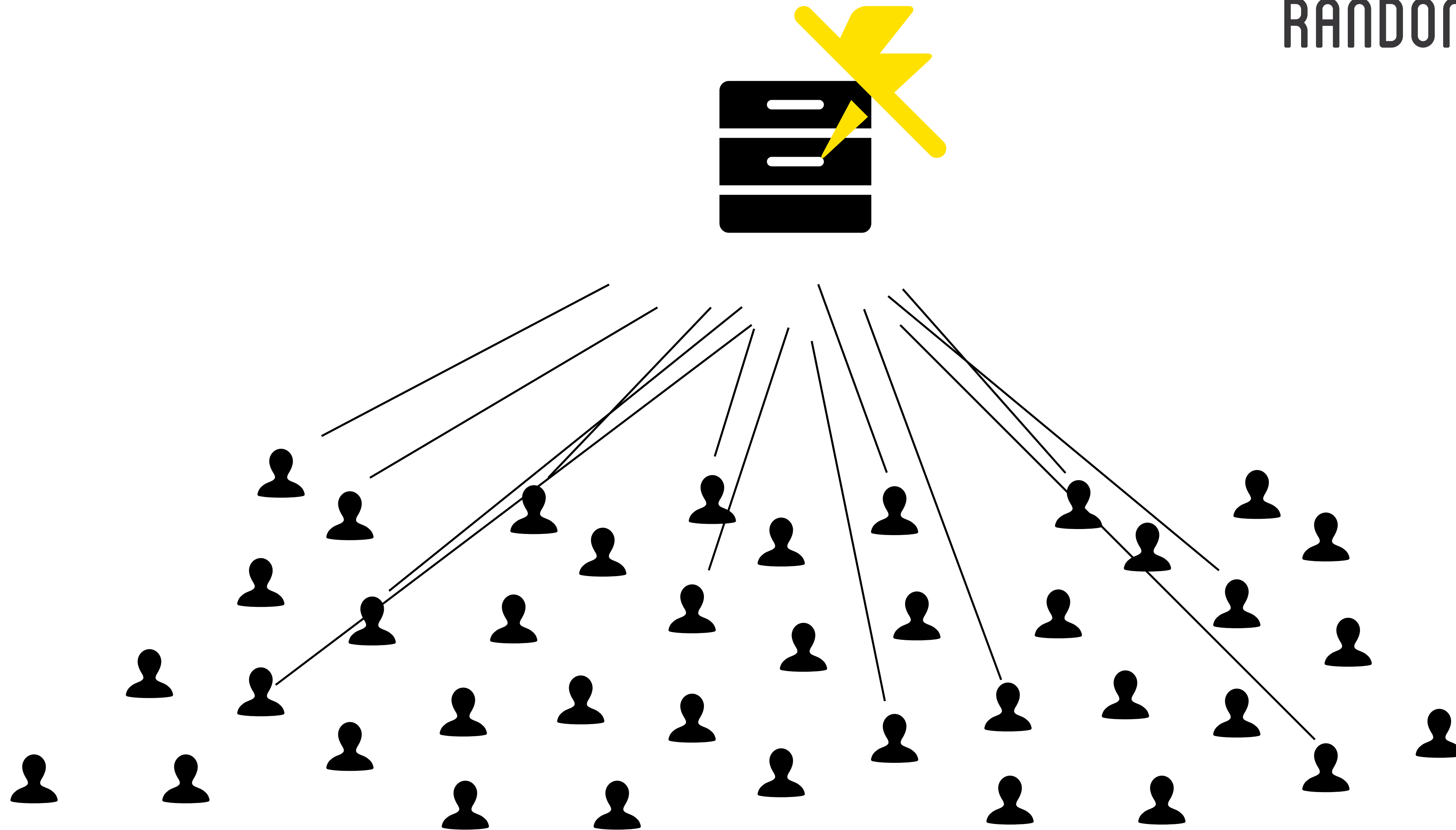
```
var maxDelay = Infinity
  , minDelay = 500
  , attempt = 0
  , times = 10
  , factor = 0;

function timeout() {
  return attempt !== 1
    ? Math.min(Math.round(
      (Math.random() + 1) * minDelay * Math.pow(factor, attempt)
    ), maxDelay)
    : minDelay;
}

setTimeout(function reconnect() {
  attempt++;

  connect(function (err) {
    if (attempt === times) return;
    else if (err) setTimeout(reconnect, timeout());
  });
}, timeout());
```

# RANDOM BACK OFF

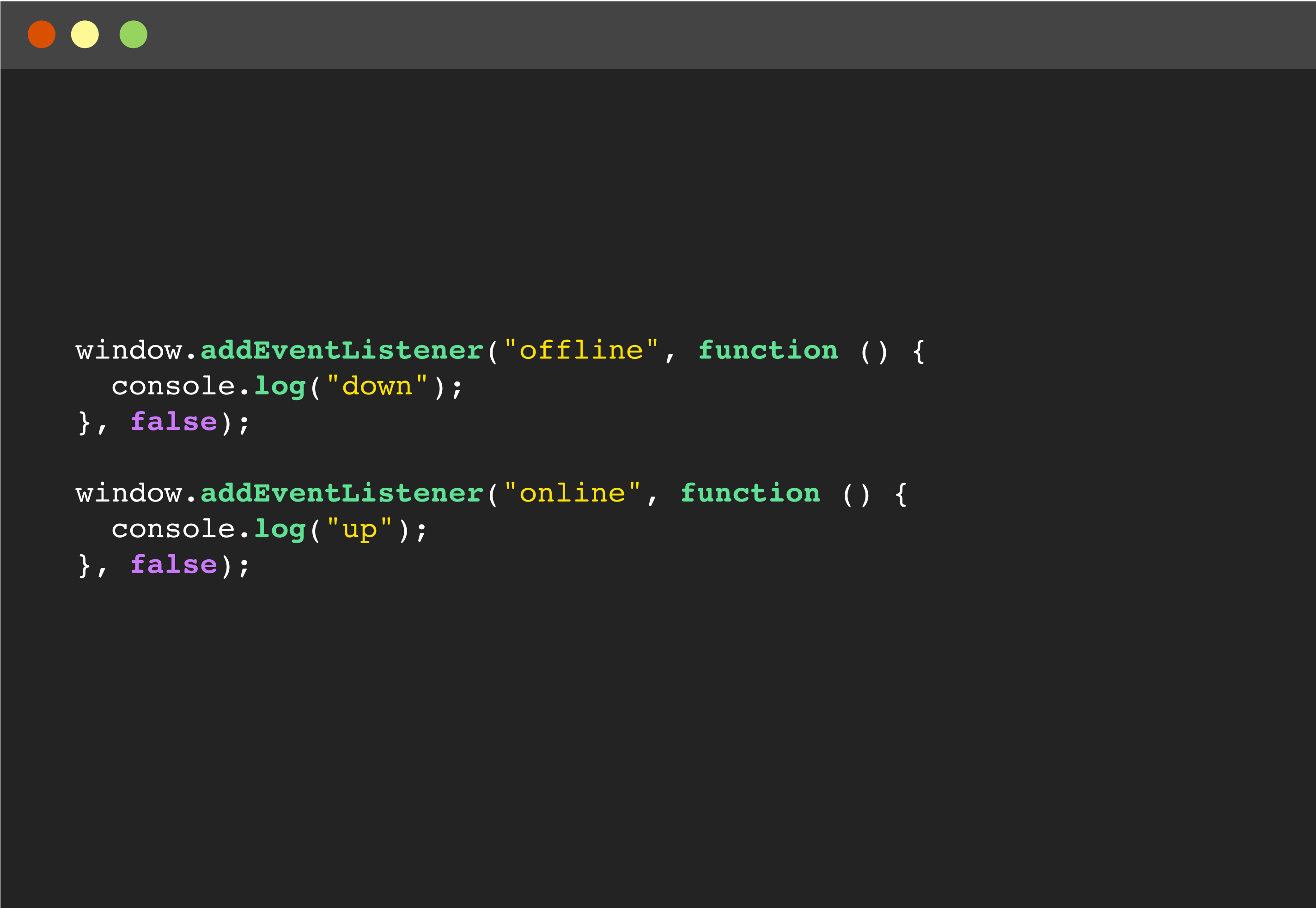


*heartbeat*

CLIENT → SERVER

*offline*

# BROWSER EVENTS



```
window.addEventListener("offline", function () {  
    console.log("down");  
}, false);  
  
window.addEventListener("online", function () {  
    console.log("up");  
}, false);
```

# IMAGE CHECK

```
var img = document.createElement("img");

img.onerror = function () { console.log("down"); };
img.onload = function () { console.log("up"); }
img.src = "/favicon.ico?t="+ Date.now();
```

# OR EVEN AN XHR

```
var xhr = new XMLHttpRequest();

xhr.open("HEAD", "/favicon.ico?t="+ Date.now(), true);
xhr.timeout = 5000;

xhr.onreadystatechange = function () {
    if (xhr.readyState == 0) console.log("down");
    else if (xhr.readyState == 4) {
        if (xhr.status && xhr.status < 12000) console.log("up");
        else console.log("down");
    }
};

xhr.send();
```

*per server  
connection limit*

MAJOR PAIN BUT CAN BE AVOIDED

## DIFFERENT PER BROWSER AND VERSION

|                                                                                                                                                                                                                                                                                                               |       |            |                          |                 |                  |                      |                 |                  |               |        |                        |               |                 |                          |               |            |                    |         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------------|--------------------------|-----------------|------------------|----------------------|-----------------|------------------|---------------|--------|------------------------|---------------|-----------------|--------------------------|---------------|------------|--------------------|---------|
| <div>SummarySecurityRich TextSelectors APINetworkAcid3JSKB</div>                                                                                                                                                                                                                                              |       |            |                          |                 |                  |                      |                 |                  |               |        |                        |               |                 |                          |               |            |                    |         |
| <div>Top Browsers</div>                                                                                                                                                                                                                                                                                       |       |            |                          |                 |                  |                      |                 |                  |               |        |                        |               |                 |                          |               |            |                    |         |
| name                                                                                                                                                                                                                                                                                                          | score | PerfTiming | Connections per Hostname | Max Connections | II Script Script | II Script Stylesheet | II Script Image | II Script Iframe | Async Scripts | II CSS | II CSS + Inline Script | Cache Expires | Cache Redirects | Cache Resource Redirects | Link Prefetch | data: URLs | Headers in trailer | # Tests |
| <input type="checkbox"/> Chrome 32 →                                                                                                                                                                                                                                                                          | 12/16 | yes        | 6                        | 10              | yes              | yes                  | yes             | no               | yes           | yes    | yes                    | yes           | yes             | yes                      | no            | yes        | no                 | 342     |
| <input type="checkbox"/> Firefox 26 →                                                                                                                                                                                                                                                                         | 11/16 | yes        | 6                        | 17              | yes              | yes                  | yes             | no               | yes           | no     | no                     | yes           | yes             | yes                      | yes           | yes        | no                 | 327     |
| <input type="checkbox"/> IE 9 →                                                                                                                                                                                                                                                                               | 12/16 | yes        | 6                        | 35              | yes              | yes                  | yes             | no               | no            | yes    | yes                    | yes           | yes             | yes                      | no            | yes        | no                 | 1152    |
| <input type="checkbox"/> IE 10 →                                                                                                                                                                                                                                                                              | 12/16 | yes        | 8                        | 16              | yes              | yes                  | yes             | no               | yes           | yes    | yes                    | yes           | yes             | yes                      | no            | yes        | no                 | 311     |
| <input type="checkbox"/> IE 11 →                                                                                                                                                                                                                                                                              | 12/16 | yes        | 13                       | 17              | yes              | yes                  | yes             | no               | yes           | yes    | yes                    | yes           | yes             | yes                      | no            | yes        | no                 | 449     |
| <input type="checkbox"/> Safari 7.0.1 →                                                                                                                                                                                                                                                                       | 11/16 | no         | 6                        | 17              | yes              | yes                  | yes             | no               | yes           | yes    | yes                    | yes           | yes             | yes                      | no            | yes        | no                 | 22      |
| <input type="checkbox"/> Chrome 34 →                                                                                                                                                                                                                                                                          | 12/16 | yes        | 6                        | 10              | yes              | yes                  | yes             | no               | yes           | yes    | yes                    | yes           | yes             | yes                      | no            | yes        | no                 | 381     |
| <input type="checkbox"/> Firefox 27 →                                                                                                                                                                                                                                                                         | 11/16 | yes        | 6                        | 17              | yes              | yes                  | yes             | no               | yes           | no     | no                     | yes           | yes             | yes                      | yes           | yes        | no                 | 282     |
| <input type="checkbox"/> Android 2.3 →                                                                                                                                                                                                                                                                        | 8/16  | no         | 8                        | 10              | yes              | yes                  | yes             | no               | no            | yes    | no                     | yes           | no              | yes                      | no            | yes        | no                 | 172     |
| <input type="checkbox"/> Android 4 →                                                                                                                                                                                                                                                                          | 13/16 | yes        | 6                        | 17              | yes              | yes                  | yes             | no               | yes           | yes    | yes                    | yes           | yes             | yes                      | yes           | yes        | no                 | 379     |
| <input type="checkbox"/> Blackberry 7 →                                                                                                                                                                                                                                                                       | 11/16 | no         | 7                        | 9               | yes              | yes                  | yes             | no               | yes           | yes    | yes                    | yes           | yes             | yes                      | no            | yes        | no                 | 7       |
| <input type="checkbox"/> Chrome Mobile 18 →                                                                                                                                                                                                                                                                   | 12/16 | yes        | 6                        | 16              | yes              | yes                  | yes             | no               | yes           | yes    | yes                    | yes           | yes             | yes                      | no            | yes        | no                 | 24      |
| <input type="checkbox"/> IEMobile 9 →                                                                                                                                                                                                                                                                         | 11/16 | yes        | 6                        | 60              | yes              | yes                  | yes             | no               | no            | yes    | yes                    | yes           | no              | yes                      | no            | yes        | no                 | 8       |
| <input type="checkbox"/> IEMobile 10 →                                                                                                                                                                                                                                                                        |       |            |                          |                 |                  |                      |                 |                  |               |        |                        |               |                 |                          |               |            |                    | 0       |
| <input type="checkbox"/> iPhone 7 →                                                                                                                                                                                                                                                                           |       |            |                          |                 |                  |                      |                 |                  |               |        |                        |               |                 |                          |               |            |                    | 0       |
| <div>Compare Browsers</div>                                                                                                                                                                                                                                                                                   |       |            |                          |                 |                  |                      |                 |                  |               |        |                        |               |                 |                          |               |            |                    |         |
| <div>● We think you're using <b>Chrome 37.0.2062</b> 3856 tests from 15 browsers Downloads: <a href="#">json</a> <a href="#">pickle</a> <a href="#">csv</a> <a href="#">Link to this page</a> <a href="http://www.browserscope.org/?category=network">HTTP://WWW.BROWSERSCOPE.ORG/?CATEGORY=NETWORK</a></div> |       |            |                          |                 |                  |                      |                 |                  |               |        |                        |               |                 |                          |               |            |                    |         |



DIFFERENT SUBDOMAIN PER CONNECTION

# INTER TAB COMMUNICATION

# SHAREDWORKER

```
var worker = new SharedWorker("/worker.js");

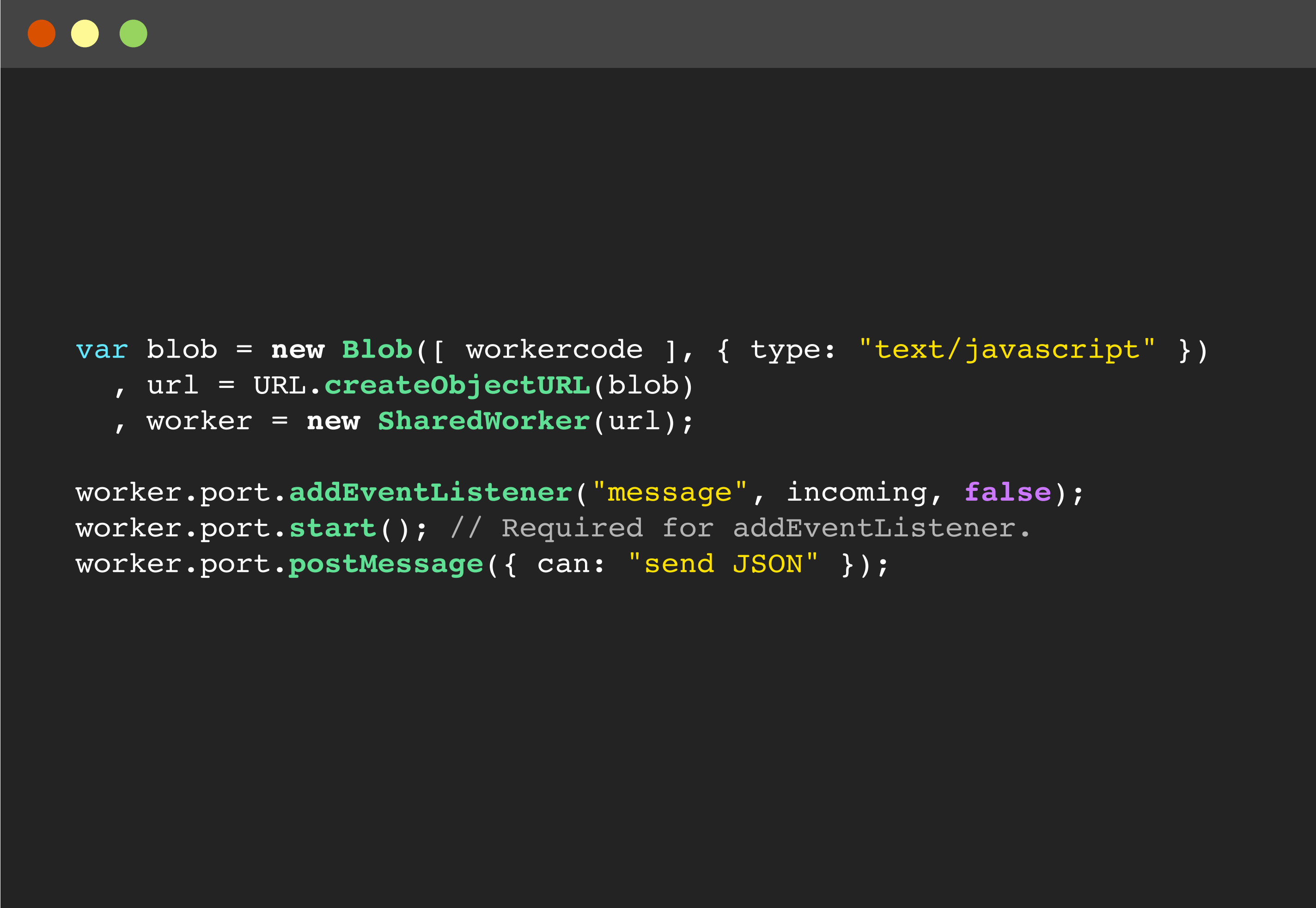
worker.port.addEventListener("message", incoming, false);
worker.port.start(); // Required for addEventListener.
worker.port.postMessage({ can: "send JSON" });

//
// worker.js:
//
var connections = [];
self.addEventListener("connect", function connect(e) {
    var port = e.ports[0];

    connections.push(port);
}, false);

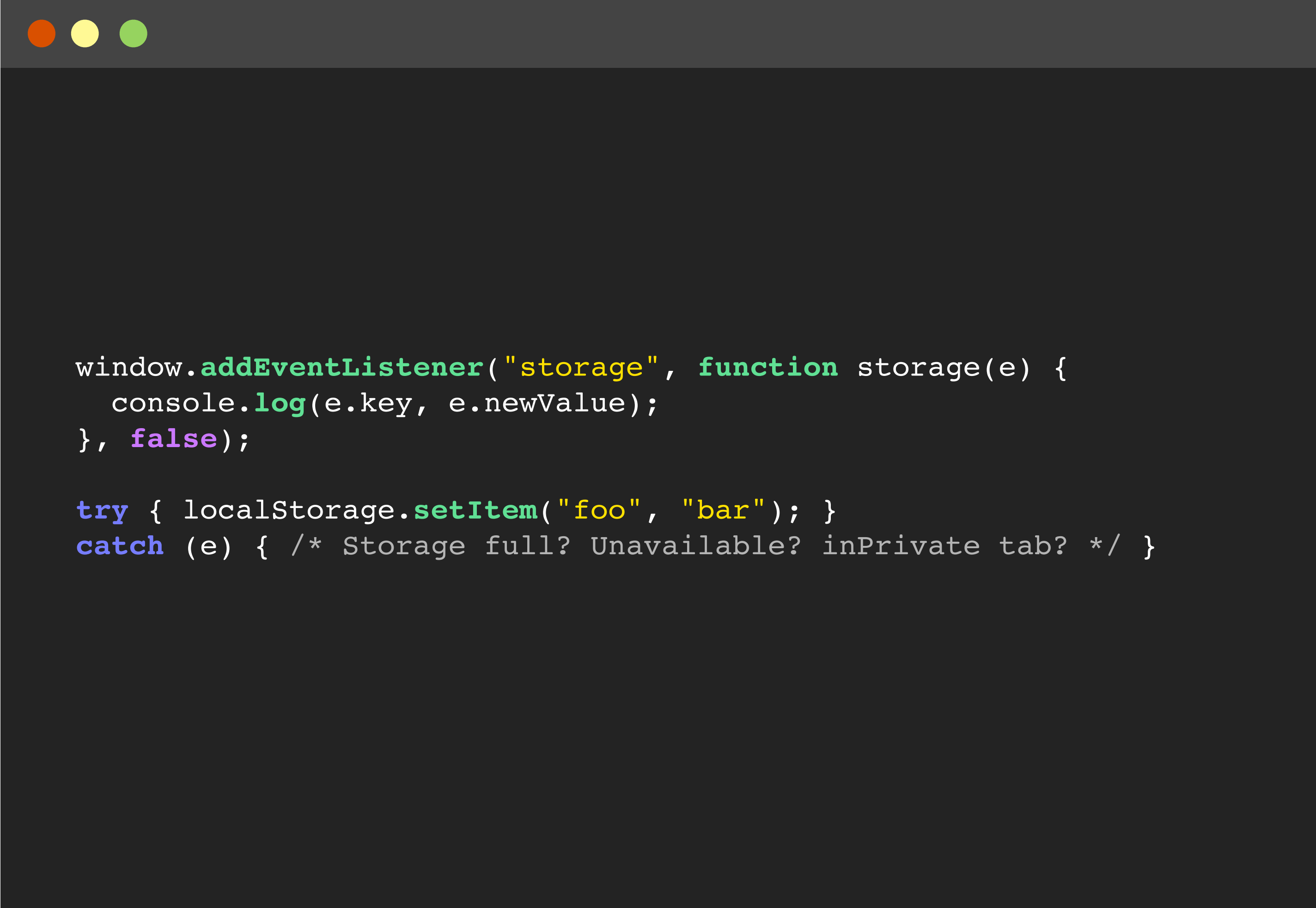
connections.forEach(function each(port) {
    port.postMessage({ can: "send JSON" });
});
```

# SHAREDWORKER , INLINED?



```
var blob = new Blob([ workercode ], { type: "text/javascript" })  
  , url = URL.createObjectURL(blob)  
  , worker = new SharedWorker(url);  
  
worker.port.addEventListener("message", incoming, false);  
worker.port.start(); // Required for addEventListener.  
worker.port.postMessage({ can: "send JSON" });
```

# LOCALSTORAGE



```
window.addEventListener("storage", function storage(e) {  
    console.log(e.key, e.newValue);  
}, false);  
  
try { localStorage.setItem("foo", "bar"); }  
catch (e) { /* Storage full? Unavailable? inPrivate tab? */ }
```

# POLLING

```
var interval = setInterval(function ticktock() {
    var id = readCookie("id")
    , value = readCookie(id);

    if (value) {
        // Process all the datas.
    }
}, 100);

//
// Behold!
//
var id = 0;

function write(msg) {
    setCookie("id", "foo"+ id);
    setCookie("foo"+ id, msg, "300ms");
}
```

*tls & ssl*

HTTPS:// & WSS:// IS YOUR **ONLY** OPTION

HTTPS ALL THE THINGS

*but frameworks*

YES, FRAMEWORK EXISTS, NO THEY DONT FIX ALL OF THESE ISSUES

*no buts!*

*next big thing*

THATS ALL I GOT!  
*thanks!*



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