HTTP/2 with Node and Express

Implementing Future Web

Azat Mardan @azat_co

Node University

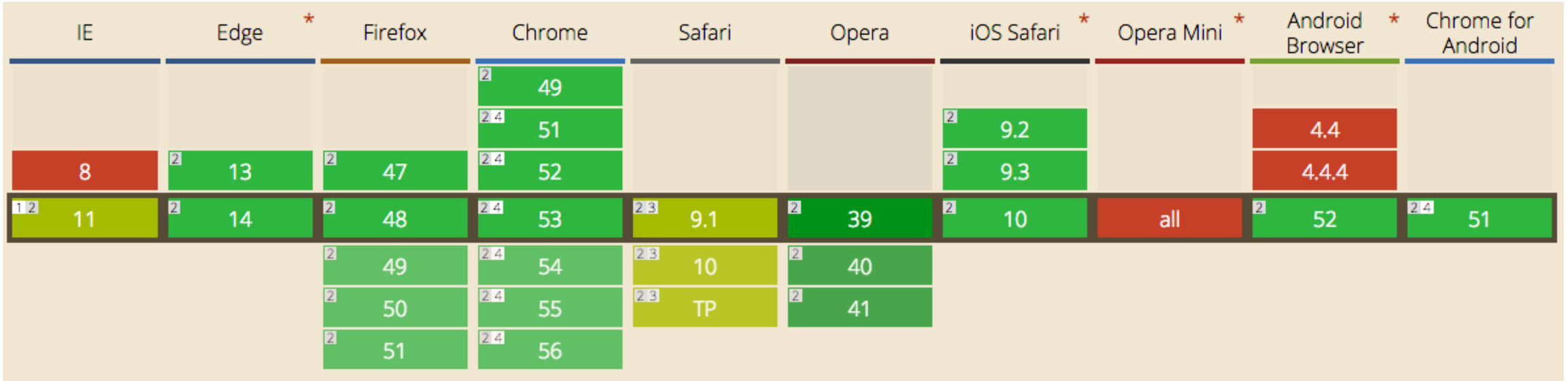
Slides   

PDF+Markdown: https://github.com/azat-co/h2-node

HTTP/2

It's here.

Really is here



http://caniuse.com/#feat=http2

History of H2

Started at SPDY at Google

Benefits of H2

Multiplexing

Multiple requests in a single TCP connection means browsers can request all assets in parallel.

Server push

Servers can push assets, such as CSS, JS, and images, before a browser knows it needs them

Faster load times by utilizing render time and reducing number of requests.

Without Server Push

1. Client requests HTML and server responds
2. Browser renders HTML
3. Browser requests additional assets: images, scripts, CSS
4. Server responds
5. Browser renders page with assets

Server Push Scenario

1. Client requests HTML and server responds
2. Server knows HTML will need certain assets, and pushes assets while browser is busy rendering HTML
3. Browser renders HTML and uses pushed assets instead of requesting them

Browser will only use pushed assets if it needs them.

Stream priority

Stream priority allows browsers to specify priority of assets. For example, browser can request HTML first to render it before any styles or JavaScript.

Header compression

All HTTP/1.1 requests have to have headers which are typically duplicate the same info.

H2 forces all HTTP headers to be sent in a compressed format.

Encryption*

* De facto mandatory encryption

Although the encryption is not required, most major browsers implement H2 only over TLS (HTTPS).

TL;DR: Old methods of HTTP/1 might not work and might even harm!

Examples: Domain sharding, file concatenation, sprites

HTTP/2 with Node and Express

H2 Express Server

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Let's Get Our Hands Dirty

SSL Key+Cert

```
$ mkdir http2-express
$ cd http2-express
$ openssl genrsa -des3 -passout pass:x -out server.pass.key 2048
...
$ openssl rsa -passin pass:x -in server.pass.key -out server.key
writing RSA key
$ rm server.pass.key
$ openssl req -new -key server.key -out server.csr
...
Country Name (2 letter code) [AU]:US
State or Province Name (full name) [Some-State]:California
...
A challenge password []:
...
$ openssl x509 -req -sha256 -days 365 -in server.csr -signkey server.key -out server.crt
```

H/2 and Node

- `spdy` - like
- `http2` - not like
- core `http2` (based on `nghttp2`) - coming! (GitHub issue)

spdy

```
npm init
npm i express spdy -S
```

```
const port = 3000
const spdy = require('spdy')
const express = require('express')
const path = require('path')
const fs = require('fs')

const app = express()
```

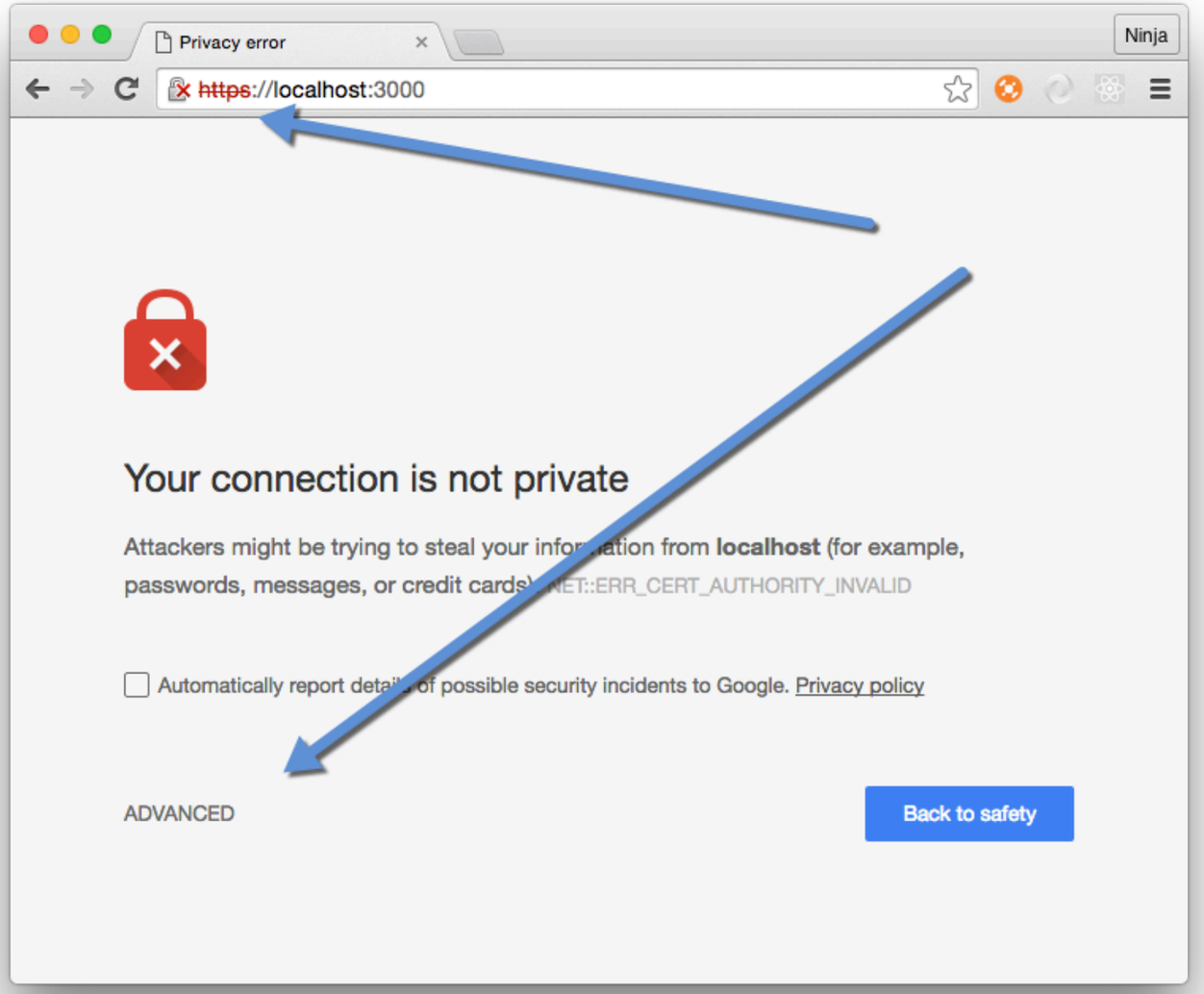
```
app.get('*', (req, res) => {
    res
      .status(200)
      .json({message: 'ok'})
})
```

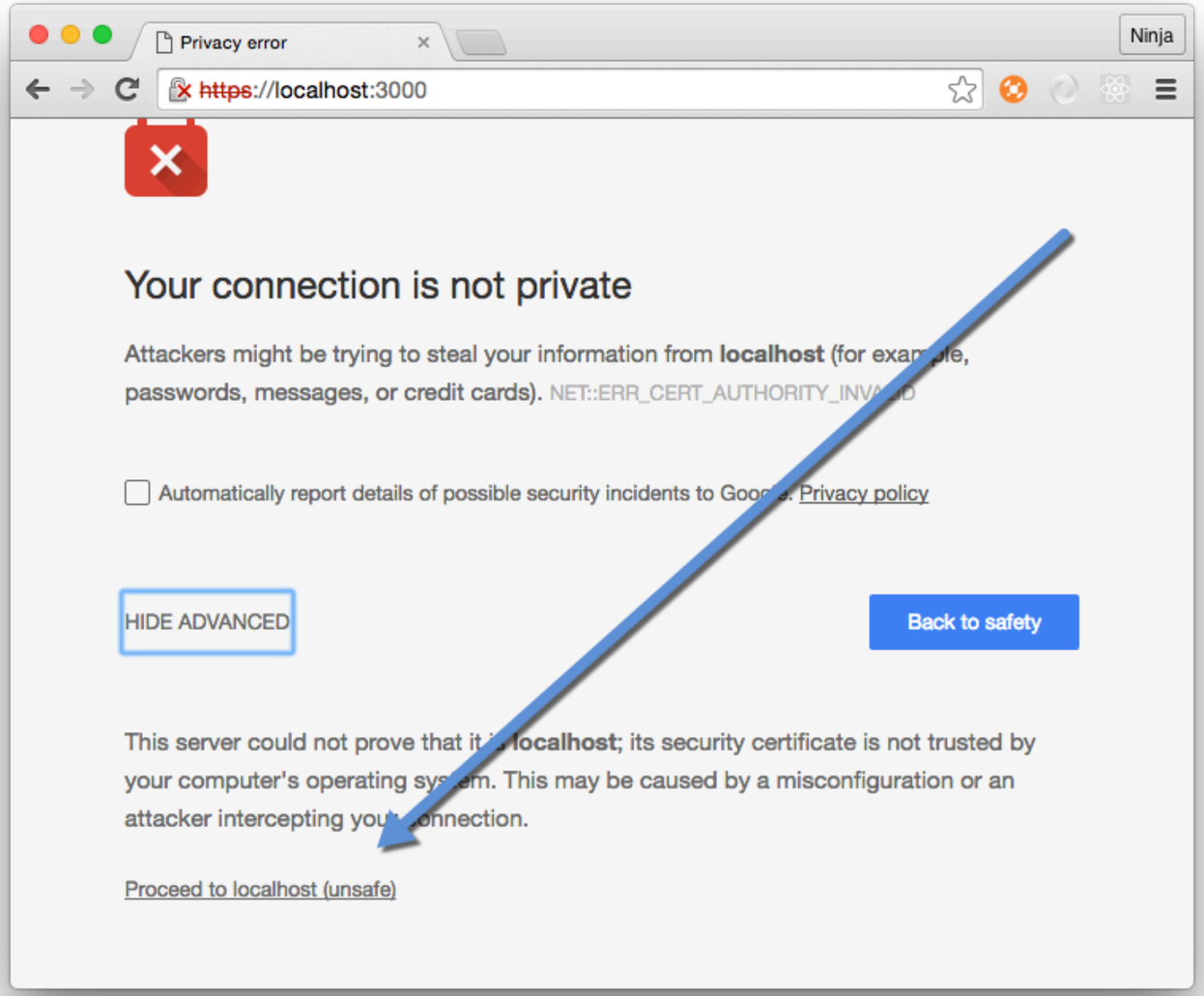
```
const options = {
    key: fs.readFileSync(__dirname + '/server.key'),
    cert:  fs.readFileSync(__dirname + '/server.crt')
}
```

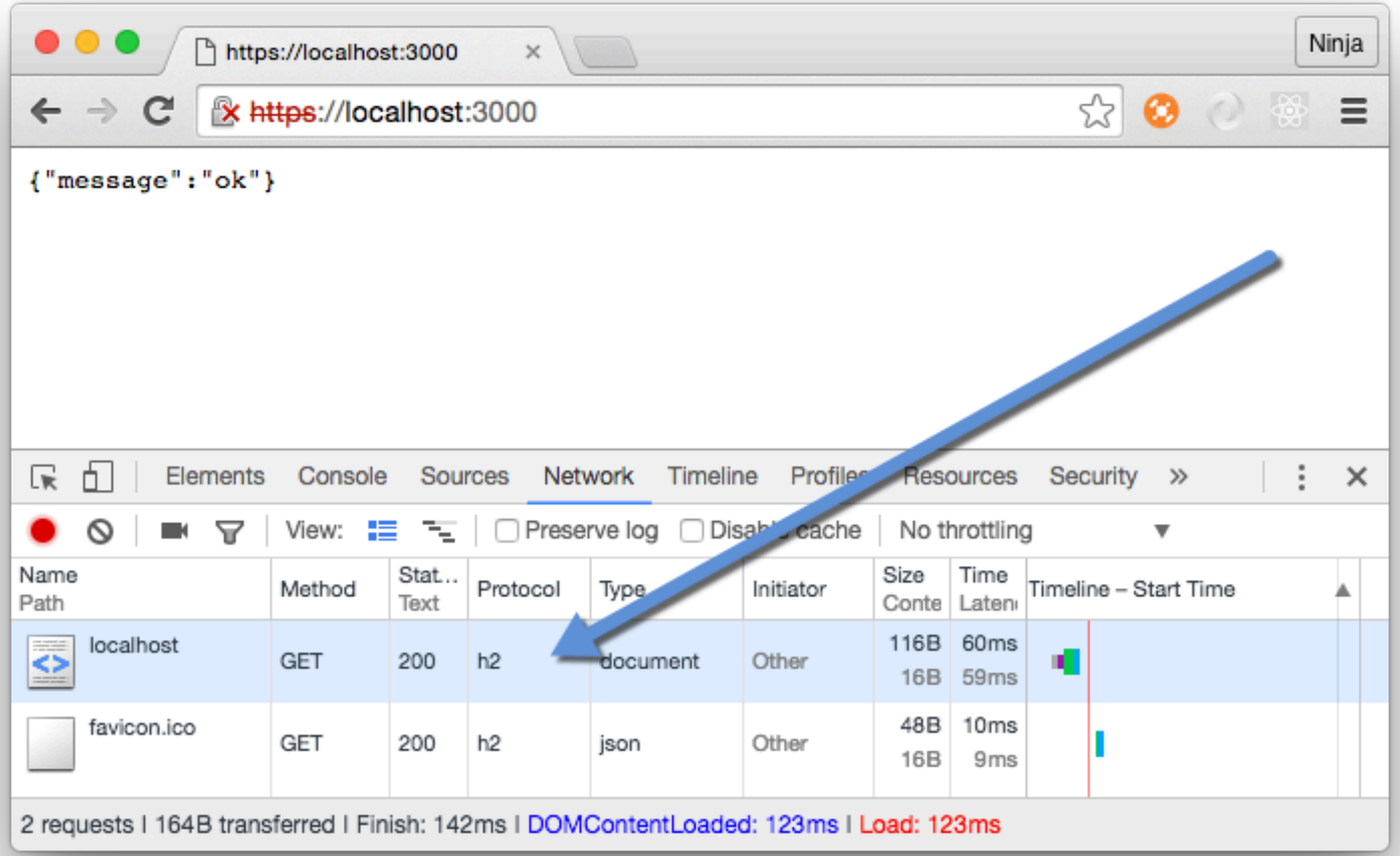
```
spdy
  .createServer(options, app)
  .listen(port, (error) => {
    if (error) {
      console.error(error)
      return process.exit(1)
    } else {
      console.log('Listening on port: ' + port + '.')
    }
  })
```

Start

```
node server
```



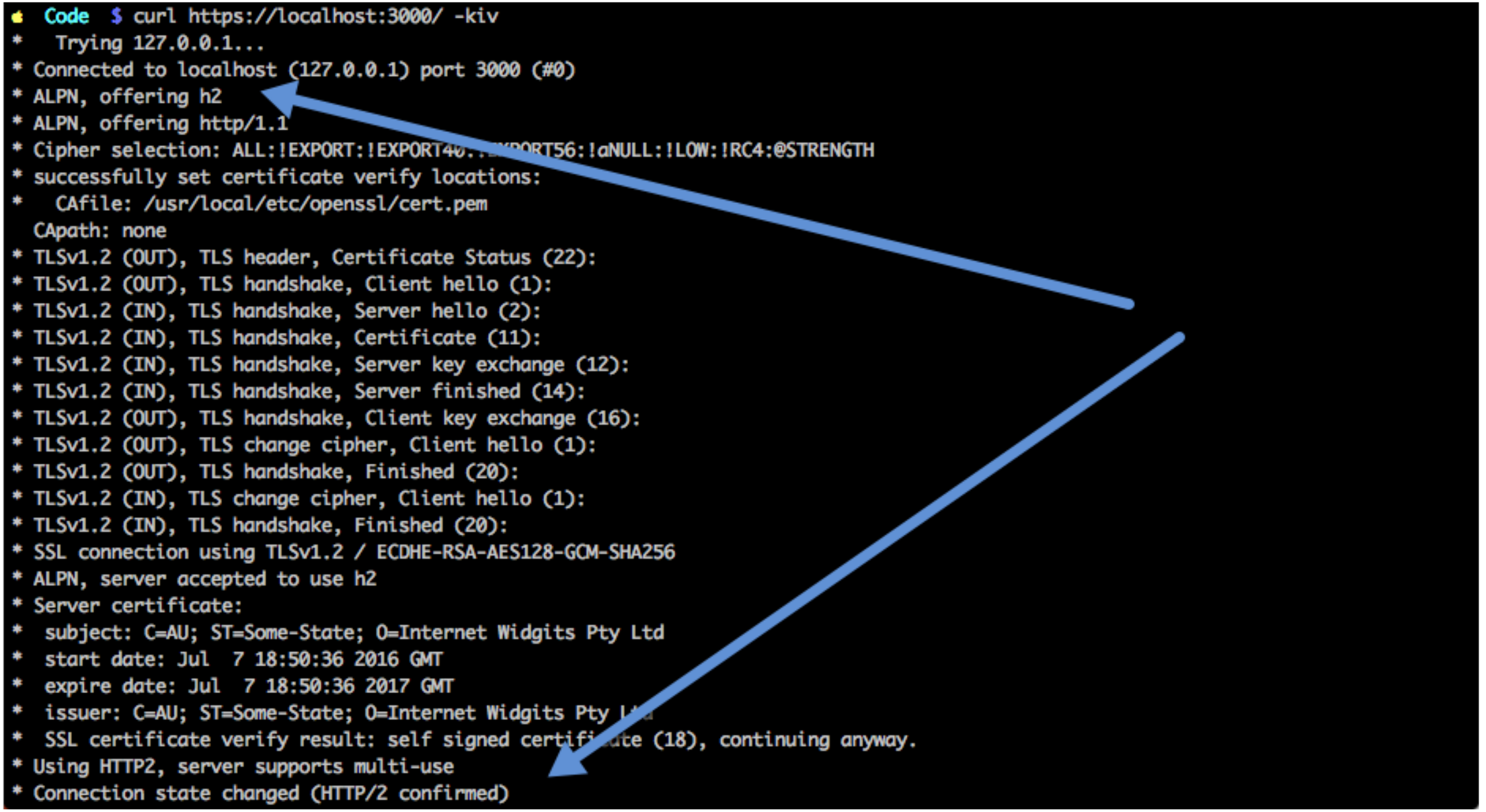




Using CURL

```
curl https://localhost:3000/ -k
```

Make sure you got the latest version 7.46 with nghttp2



HTTP/2 with Node and Express

Server Push

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Server Push—Yeah!

```
const http2 = require('spdy')
const logger = require('morgan')
const express = require('express')
const app = express()
const fs = require('fs')
```

```
app.use(logger('dev'))
```

```
app.get('/', (req, res) => {
  res.send(`hello, http2!
go to /pushy`)
})
```

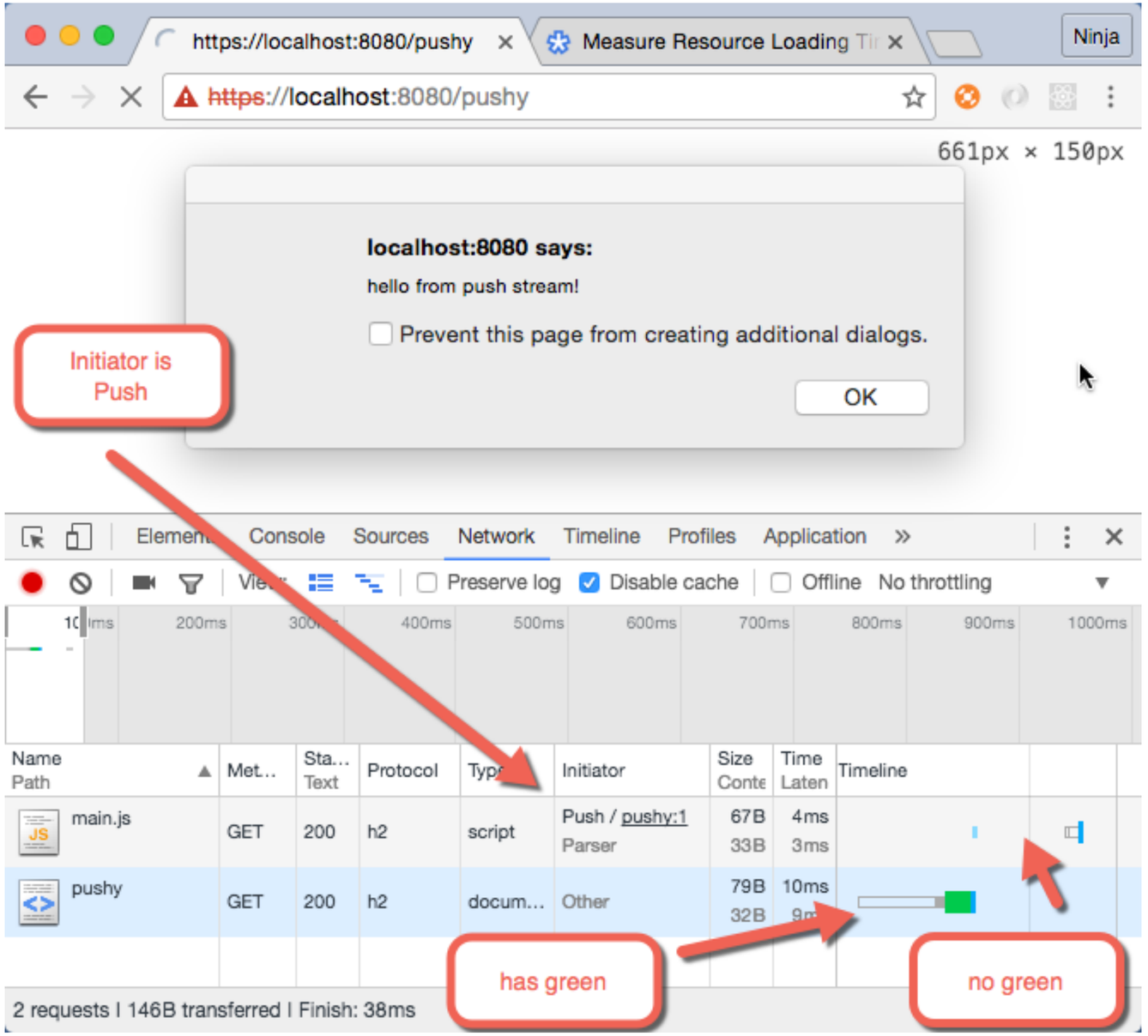
```
app.get('/pushy', (req, res) => {
  var stream = res.push('/main.js', {
    status: 200, // optional
    method: 'GET', // optional
    request: {
      accept: '*/*'
    },
    response: {
      'content-type': 'application/javascript'
    }
  })
  stream.on('error', () => {
  })
  stream.end('alert("hello from push stream!");')
  res.end('<script src="/main.js"></script>')
})
```

```
var options = {
  key: fs.readFileSync('./server.key'),
  cert: fs.readFileSync('./server.crt')
}

http2
  .createServer(options, app)
  .listen(8080, ()=>{
    console.log(`Server is listening on https://localhost:8080.
You can open the URL in the browser.`)
  }
)
```

Result

```
GET /pushy 200 4.918 ms - -
```



HTTP/2 with Node and Express

Server Push Express Middleware

Azat Mardan @azat_co

Demo

https://github.com/azat-co/http2-node-server-push/blob/master/index-advanced.js

30-Second Summary

1. `spdy` or http2 core (soon)
2. Express rocks
3. Server Push - yeah!
4. Server Push Express middleware 👍

Code

» https://github.com/azat-co/http2-express

» https://github.com/azat-co/http2-node-server-push

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