



# Booting up with Polymer

# Why Web Components?

```
▼<div style="position: relative; min-height: 100%;">
  ▶<div class="vI8oZc cN">...</div>
  <div tabindex="0"></div>
  ▼<div class="nH" style="width: 1755px;">
    ▼<div class="nH" style="position: relative;">
      ▶<div class="nH w-asV aiw">...</div>
      ▼<div class="nH">
        ▼<div class="no">
          ▶<div class="nH oy8Mbf nn aeN" style="width: 202px; height: 352px;">...</div>
          ▼<div class="nH nn" style="width: 1553px;">
            ▼<div class="nH">
              ▼<div class="nH">
                ▼<div class="ar4 z">
                  ▶<div id=":5" class="aeH">...</div>
                  ▼<div class="A0">
                    ▼<div id=":4" class="Tm aeJ" style="height: 342px;">
                      <div id="dashboard-container"></div>
                      ▼<div id=":2" class="aeF" style="min-height: 152px;">
                        ▼<div class="nH">
                          ▶<div class="BlthKe nH oy8Mbf aE3" style="margin-right: 0px; display: none;">...</div>
                          ▶<div class="BlthKe nH oy8Mbf" style="margin-right: 0px; display: none;">_</div>
                          ▼<div class="nH" role="main">
                            ▼<div class="nH g id">
                              <div class="nH"></div>
                              ▼<table class="Bs nH iY" cellpadding="0" role="presentation">
                                ▼<tr>
                                  ▼<td class="Bu">
                                    <div class="Bt" style="width: 1333px;"></div>
                                    ▼<div class="nH if">
                                      ▶<div class="nH">...</div>
                                      ▼<div class="nH aHU">
                                        ▼<div class="nH hx" role="list">
                                          ▶<div class="nH">...</div>
                                          <div class="nH"></div>
                                          ▼<div class="nH">
                                            ▼<div class="h7 view102" tabindex="-1">
                                              ▼<div class="Bk">
                                                ▼<div class="G3 G2">
                                                  ▼<div>
                                                    ▼<div id=":n1">
                                                      ▼<div class="adn ads" style="display:" role="listitem">
                                                        ▶<div class="aju">...</div>
                                                        ▼<div class="gs">
                                                          ▶<div class="gE iv gt">_</div>
                                                          <div class="qQVYZb"></div>
                                                          <div class="utdU2e"></div>
                                                          <div class="tx78Ic"></div>
                                                          <div class="aHl"></div>
                                                          <div id=":nf" tabindex="-1"></div>
                                                        ▼<div id=":n3" class="ii gt m152d1c98331f06cb adP ad0">
                                                          ▼<div id=":n2" class="a3s" style="overflow: hidden;">
                                                            ▶<div dir="ltr">...</div>
                                                            ▶<span class="H0EnZb adL">...</span>
                                                          </div>
                                                        </div>
                                                        </div>
                                                        ▶<div id=":po" class="ii gt undefined" style="display:none">_</div>
                                                        ▶<div class="hq gt a10" id=":nu">...</div>

```

```
<!DOCTYPE html>
<html lang="en">
  ▶ <head>...</head>
  ▼ <body fullbleed class cz-shortcut-listen="true">
    ▼ <expenses-application>
      ▼ #shadow-root (open)
        ▶ <style scope="expenses-application">...</style>
        ▼ <neon-animated-pages entry-animation="fade-in-animation" exit-animation="fade-out-animation">
          ▶ #shadow-root (open)
          ▶ <login-page class="iron-selected">...</login-page>
          ▶ <expenses-page>...</expenses-page>
          </neon-animated-pages>
          <iron-localstorage name="token"></iron-localstorage>
        </expenses-application>
        ▶ <iron-a11y-announcer>...</iron-a11y-announcer>
      </body>
    ...</html>
```

Filter by merchant

Total  
\$2308.86

Date	Merchant	Total	Status	Comment
2016-02-13	Airline	\$22.97	New	Expense from NYC business trip.
2016-02-12	Office supplies	\$182.31	New	Expense from NYC business trip.
2016-02-11	Rental car	\$194.99	New	Expense from NYC business trip.
2016-02-06	Rental car	\$38.14	New	Expense from NYC business trip.
2016-02-04	Shuttle	\$20.83	New	Expense from NYC business trip.
2016-02-01	Hotel	\$62.28	New	Expense from NYC business trip.
2016-01-28	Parking	\$16.59	New	Expense from NYC business trip.
2016-01-27	Airline	\$39.61	New	Expense from NYC business trip.
2016-01-26	Electronics	\$24.05	New	Expense from NYC business trip.
2016-01-22	Office supplies	\$24.26	New	Expense from NYC business trip.
2016-01-21	Parking	\$68.21	New	Expense from NYC business trip.
2016-01-19	Hotel	\$76.65	New	Expense from NYC business trip.

History

2016 Feb: \$521.52  
Jan: \$648.07  
2015 Dec: \$1165.01  
Nov: \$837.36  
Oct: \$868.83  
Sep: \$1149.84  
Aug: \$1172.88  
Jul: \$1354.12  
Jun: \$802.51  
May: \$1090.94  
Apr: \$1000.82  
Mar: \$806.58  
Feb: \$359.72



```
<!DOCTYPE html>
<html lang="en">
  ▶ <head>...</head>
  ▼ <body fullbleed class cz-shortcut-listen="true">
    ▼ <expenses-application>
      ▼ #shadow-root (open)
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          </neon-animated-pages>
          <iron-localstorage name="token"></iron-localstorage>
        </expenses-application>
        ▶ <iron-a11y-announcer>...</iron-a11y-announcer>
      </body>
    ...</html>
```

# 4 standards

























- Custom elements
- HTML Imports
- Templates
- Shadow DOM



one 



**Do browsers support this?**

	CHROME	OPERA	FIREFOX	SAFARI	IE/EDGE
					
					
					
					

Source: [webcomponents.org](https://webcomponents.org)

# webcomponents.js

now also available as lite!

# What is Polymer then?

- Helper library for building Web Components – nothing more
- Comes with a collection of ready made Web Components
- Google project

# Building apps with Polymer

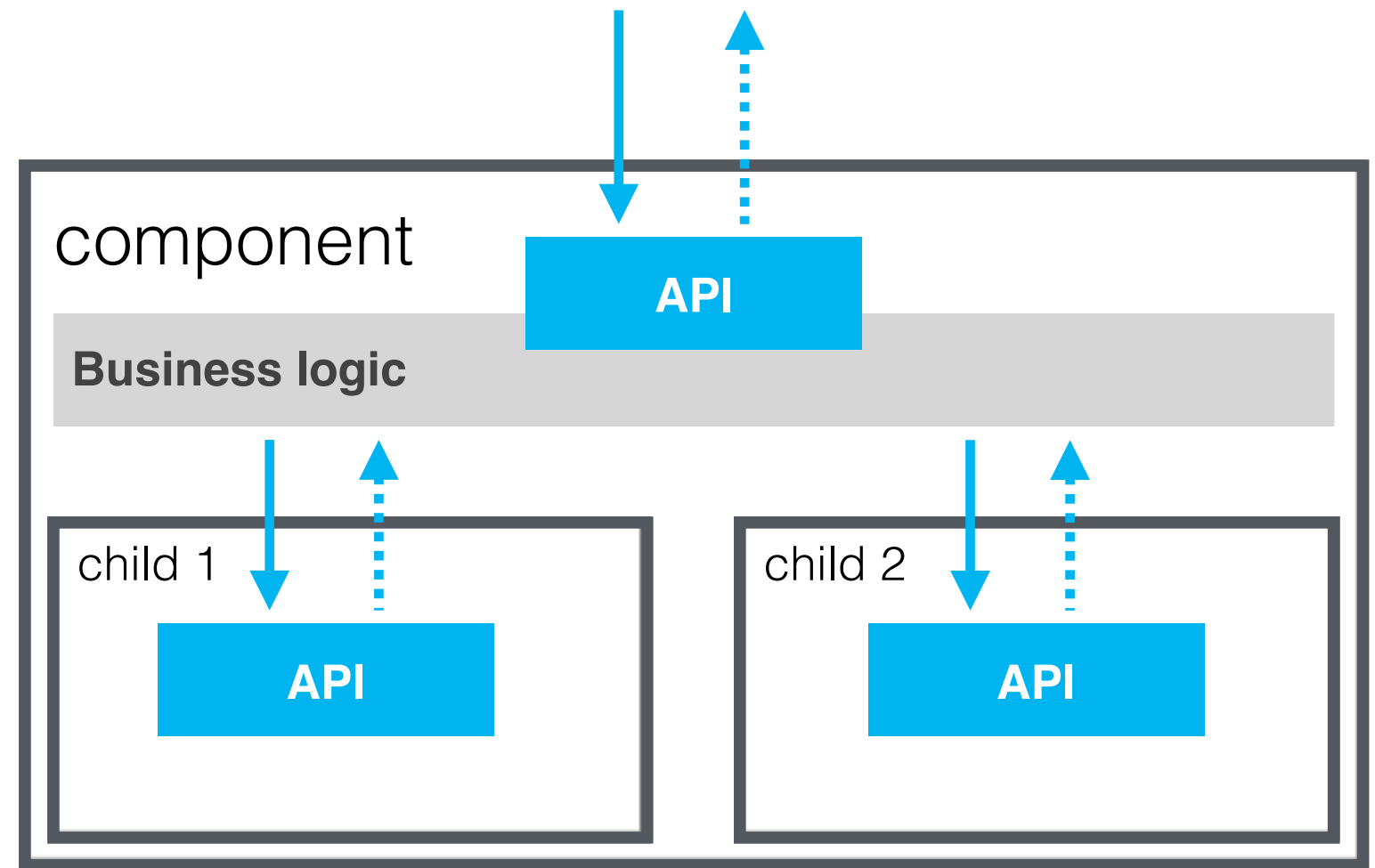
# Do we need a framework?

# ... the DOM is the framework

- Component model (= HTML elements)
- Data flow (= attributes, properties and events)
- Declarative format (= HTML)
- Now also extensible through Web Components

# Building apps out of components

- Composition
- Encapsulation
  - Mediator pattern





```
<text-repeater text="Hello"></text-repeater>
```

Hello

**You wrote:** Hello



# text-repeater.html

---

```
<link rel="import" href="bower_components/paper-input/paper-input.html">

<dom-module id="text-repeater">

  <template>

    <paper-input value="{{text}}"></paper-input>
    <b>You wrote: </b>
    <span>[[text]]</span>

  </template>

  <script>
    Polymer({
      is: 'text-repeater',
      properties: {
        text: String
      }
    });
  </script>

</dom-module>
```

**All code in one file?!**

```

<template>
  <paper-input value="{{text}}"></paper-input>
  <b>You wrote: </b>
  <span>[[text]]</span>
</template>

```

```

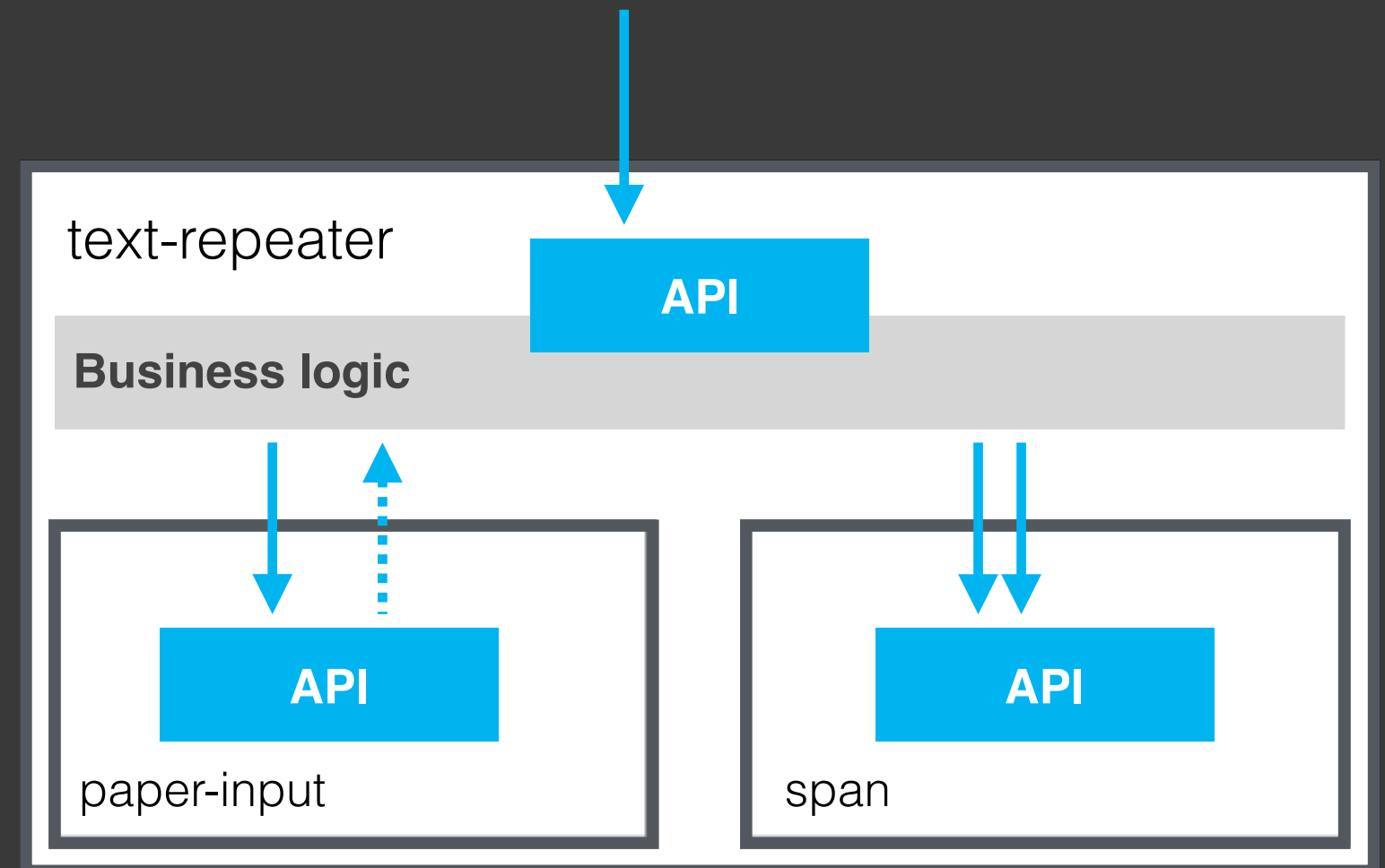
<script>
  Polymer({
    is: 'web-component',
    properties: {
      text: String
    }
  });
</script>

```

```

<text-repeater text="Hello"></text-repeater>

```



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May: \$1090.94  
Apr: \$1000.82  
Mar: \$806.58  
Feb: \$359.72



```
properties: {
  token: {
    type: String,
    notify: true,
    value: ''
  },
  selected: {
    type: Number,
    notify: true,
    computed: '_selectPage(token)'
  }
},

listeners: {
  'iron-form-response': '_handleLoginSuccess',
  'iron-form-error': '_handleLoginError'
},

observers: ['_fetchStuff(token, other)']
```

# Let's get started.



# Backend

# Spring Boot

*Takes an opinionated view of building production-ready Spring applications. Spring Boot favors convention over configuration and is designed to get you up and running as quickly as possible.*

- Create stand-alone Spring applications
- Embed Tomcat, Jetty or Undertow directly (no need to deploy WAR files)
- Provide opinionated 'starter' POMs to simplify your Maven configuration
- Automatically configure Spring whenever possible
- Provide production-ready features such as metrics, health checks and externalized configuration
- Absolutely no code generation and no requirement for XML configuration

# SPRING INITIALIZR

bootstrap your application now

Generate a Maven Project with Spring Boot 1.3.2

## Project Metadata

Artifact coordinates

Group

com.example

Artifact

demo

## Dependencies

Add Spring Boot Starters and dependencies to your application

Search for dependencies

Web, Security, JPA, Actuator, Devtools...

Selected Starters

Web ×

Security ×

JPA ×

H2 ×

Generate Project

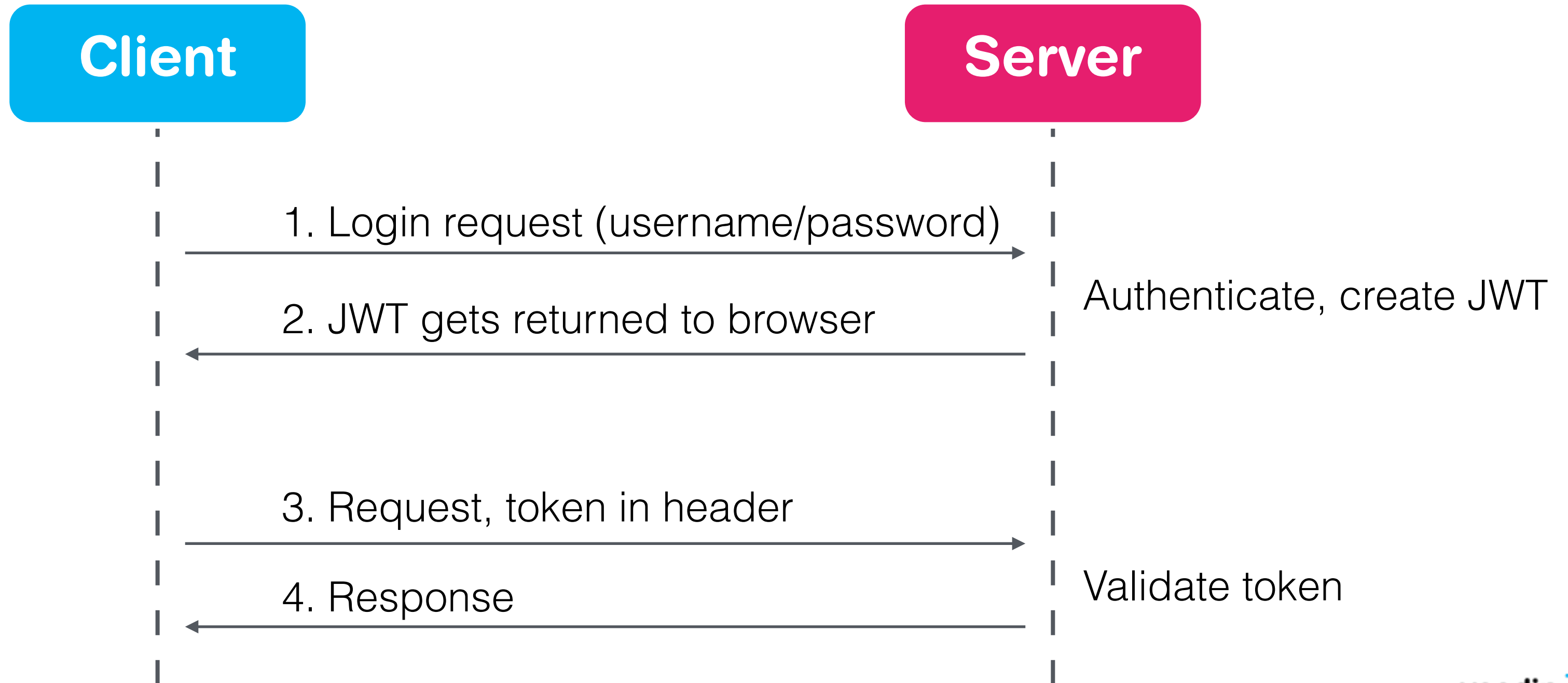
Don't know what to look for? Want more options? [Switch to the full version.](#)

[start.spring.io](http://start.spring.io)

# Token authentication

- JSON Web Token
- Compact
- Self-contained
- `header.payload.signature`

# JWT authentication



polymer-demo>src>main>java>org>vaadin>marcus>repository>ExpensesRepository

011001Run

ProjectPackages

polymer-demo (~dev/polymer-demo)

- .idea
- .mvn
- node\_modules (library home)
- src
  - main
    - java
      - org.vaadin.marcus
        - api
          - ExpensesController
          - auth
          - domain
          - repository
            - ExpensesRepository
            - UserRepository
            - PolymerDemoApplication
        - resources
      - target
        - .bowerrc
        - .gitignore
        - bower.json
        - gulpfile.js
        - mvnw
        - mvnw.cmd
        - package.json
        - polymer-demo.iml
        - pom.xml
        - readme.md
    - External Libraries

ExpensesRepository.java

```
1 package org.vaadin.marcus.repository;
2
3
4 import ...
5
9
10 public interface ExpensesRepository extends JpaRepository<Expense, Long> {
11
12     List<Expense> findByUserOrderByDateDesc(User user);
13 }
14
```

Ant Build

Maven Projects

Database

Bean Validation

# Polymer app



# Some additional tools we'll use

- npm – development time JS dependencies
- bower – Polymer dependencies
- gulp – JS based build tool used to run some optimization tasks
- Integrated into Maven build process

server

<expense-application>

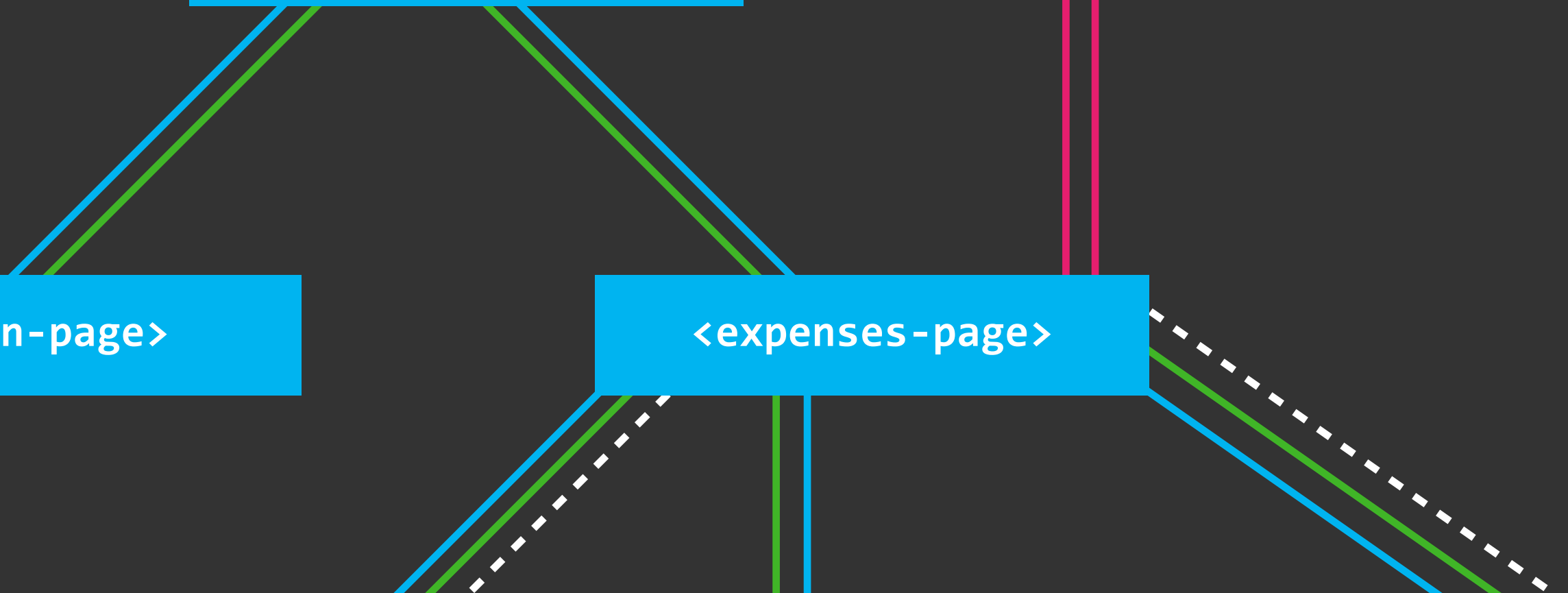
<login-page>

<expenses-page>

<expenses-list>

<summary-panel>

<expenses-editor>



polymer-demo

src

main

resources

static

index.html

Project

Packages

index.html

polymer-demo (~dev/polymer-demo)

.idea

.mvn

node\_modules (library home)

src

main

java

org.vaadin.marcus

api

auth

domain

repository

PolymerDemoApplication

resources

static

resources

bower\_components

scripts

styles

elements.html

expense-editor.html

expenses-application.html

expenses-list.html

expenses-page.html

login-page.html

stats-panel.html

token-ajax.html

index.html

templates

application.properties

target

.bowerrc

.gitignore

bower.json

gulpfile.js

mvnw

...

Run

Ant Build

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index.html - polymer-demo - [~/dev/polymer-demo]

html body expenses-application

1

<!DOCTYPE html>

2

<html lang="en">

3

<head>

4

<meta charset="UTF-8">

5

<meta name="viewport" content="width=device-width, initial-scale=1, user-scalable=no">

6

<title>Expense Manager</title>

7

<script src="resources/bower\_components/webcomponentsjs/webcomponents-lite.min.js"></script>

8

9

<link rel="stylesheet" href="resources/styles/styles.css">

10

11

<!--Put any includes needed on index.html in elements.html

12

as it will be vulcanized by the build process-->

13

<link rel="import" id="bundle" href="resources/elements.html">

14

15

</head>

16

<body unresolved fullbleed>

17

18

<expenses-application></expenses-application>

19

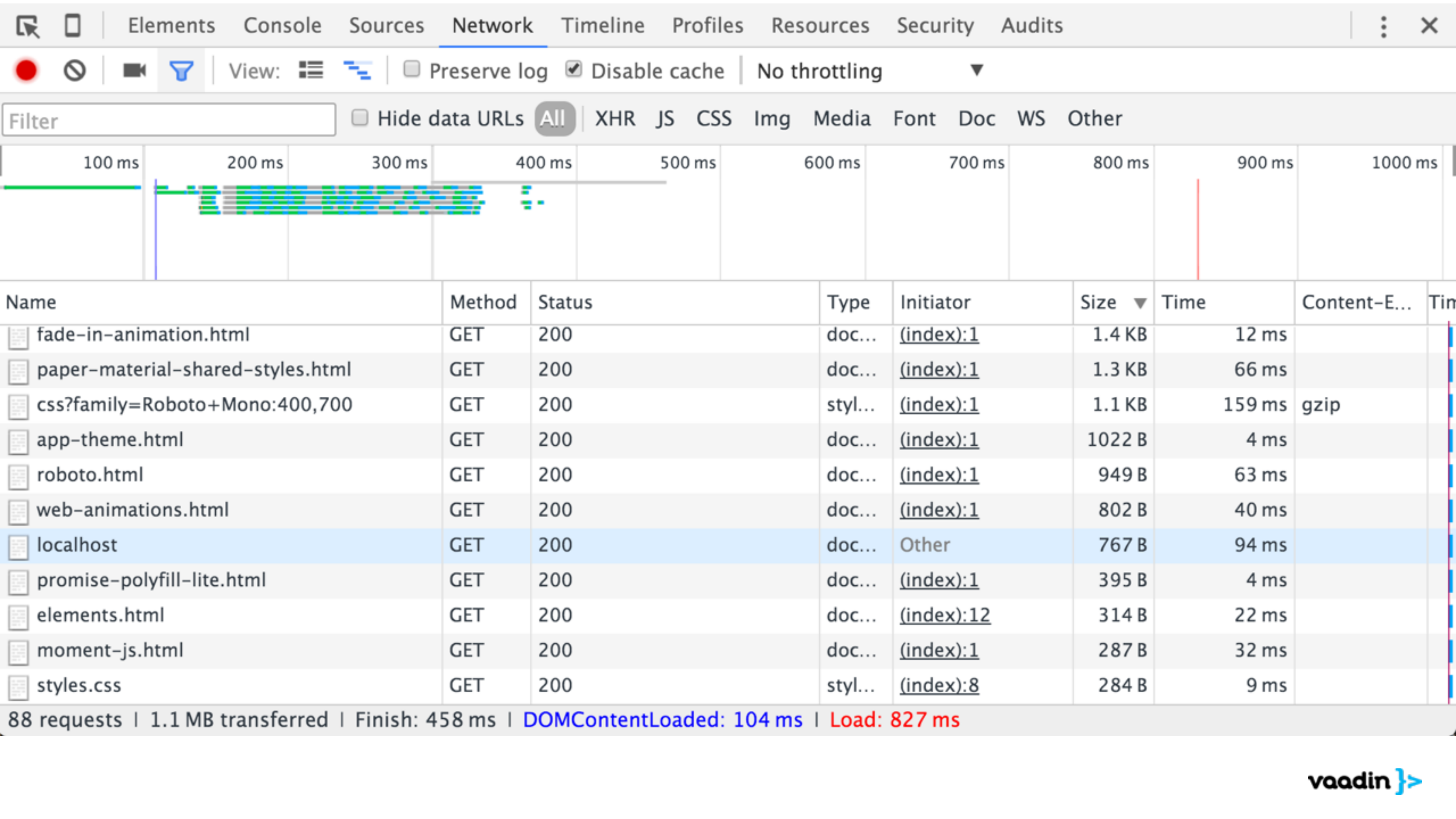
20

</body>

21

</html>

# What about performance?



# Optimizing

- vulcanize – combine all imports into one file
- crisper – pull out all JS into separate file for CSP compliance
- htmlmin & uglify – minimize assets
- turn on server gzip

```
gulp.task('build', function() {  
  return gulp  
    .src(SRC_DIR + '/elements.html')  
    .pipe($.vulcanize({  
      inlineScripts: true,  
      inlineCss: true  
    })))  
    .pipe($.crisper())  
    .pipe($.if('*.js', $.uglify({  
      preserveComments: 'some'  
    })))  
    .pipe($.if('*.html', $.htmlmin({  
      customAttrAssign: [/\$=/],  
      removeComments: true,  
      collapseWhitespace: true  
    })))  
    .pipe(gulp.dest(DEST_DIR));  
});
```

`mvn clean package -Pproduction`



# Optimizing some more

- Load imports asynchronously
- Style "app skeleton"
- Use native shadow DOM where available

polymer-demo

src

main

resources

static

index

Project

Packages

polymer-demo (~dev/polymer-demo)

.idea

.mvn

node\_modules (library home)

src

main

java

org.vaadin.marcus

api

ExpensesController

auth

domain

repository

ExpensesRepository

UserRepository

PolymerDemoApplication

resources

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resources

index.html

templates

application.properties

target

.bowerrc

.gitignore

bower.json

gulpfile.js

mvnw

mvnw.cmd

package.json

polymer-demo.iml

pom.xml

readme.md

External Libraries

index.html - polymer-demo - [~/dev/polymer-demo]

Run

Ant Build

Maven Projects

Database

Bean Validation

application.properties

index.html

html

body.loading

script

1

2

3

4

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<!DOCTYPE html>

<html lang="en">

<head>

<meta charset="UTF-8">

<meta name="viewport" content="width=device-width, initial-scale=1, user-scalable=no">

<title>Expense Manager</title>

<link rel="stylesheet" href="resources/styles/styles.css" async>

<!--Put any includes needed on index.html in elements.html as it will be vulcanized by the build process-->

<link rel="import" id="bundle" href="resources/elements.html" async>

<!--Use native Shadow DOM where available-->

<script>

window.Polymer = window.Polymer || {};

window.Polymer.dom = 'shadow';

</script>

<style>

body.loading {

height: 100vh;

width: 100vw;

background: #37474F;

}

body.loading > \* {

display: none;

}

</style>

</head>

<body class="loading" fullbleed>

<script>

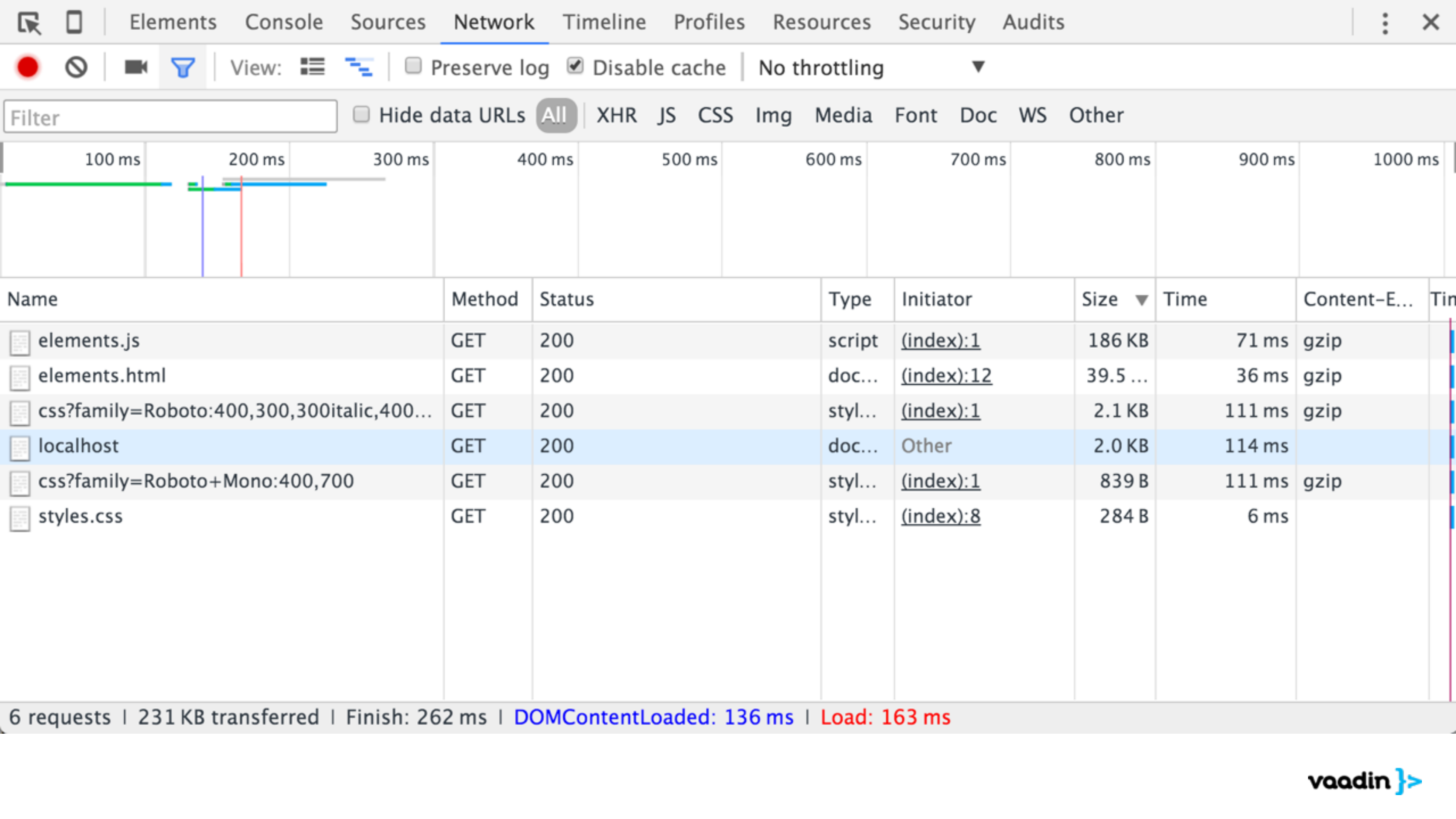
function onImportLoaded() {

document.body.classList.remove('loading');

document.body.classList.add('ready');

var appElement = document.createElement('expenses-application');

document.body.appendChild(appElement);



**80% smaller and faster startup**

# Ready for production?

# Getting started with



1.0.8

# Fe

Iron  
Elements

---

Polymer core elements

1.0.7

# Md

Paper  
Elements

---

Material design elements

1.0.1

# Go

Google Web  
Components

---

Components for Google's APIs  
and services

1.0.1

# Au

Gold  
Elements

---

Ecommerce Elements

1.0.0

# Ne

Neon  
Elements

---

Animation and Special Effects

2.0.0

# Pt

Platinum  
Elements

---

Offline, push, and more

1.0.0

# Mo

Molecules

---

Wrappers for third-party  
libraries

# Va

Vaadin  
Elements

# Go

Google Web  
Components

# Fe

Iron  
Elements

# Md

Paper  
Elements

## Vaadin Elements

Built with Polymer



Vaadin Elements is a set of custom HTML elements tailored for business applications. It extends the Google Polymer library with elements like data grid, charts and combo box so you can build the app your business needs. The elements are actively maintained and tested to ensure compatibility with the latest Polymer releases.



[github.com/vaadin-marcus/polymer-spring-boot](https://github.com/vaadin-marcus/polymer-spring-boot)

?!

thanks!

@marcushellberg (twitter)  
@marcus (polymer slack)