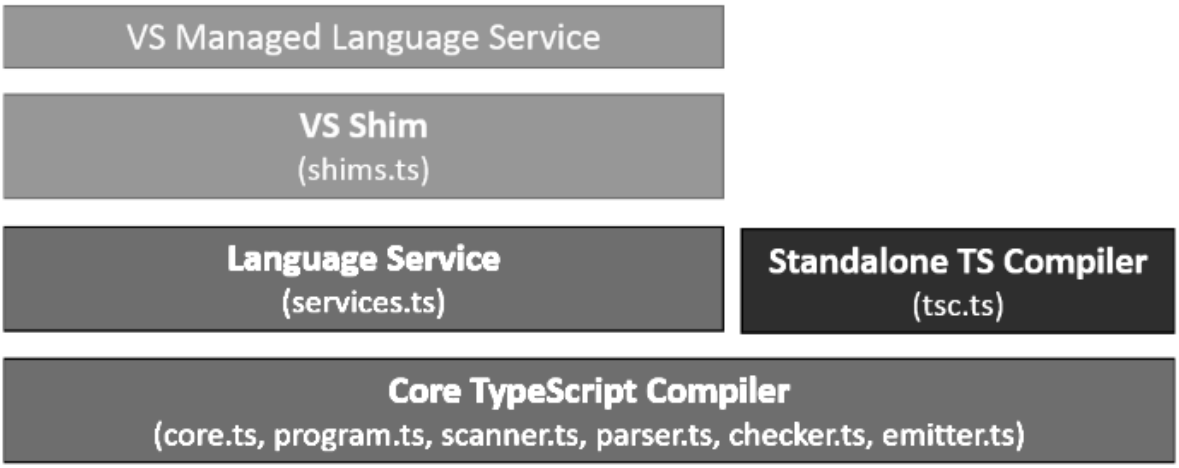
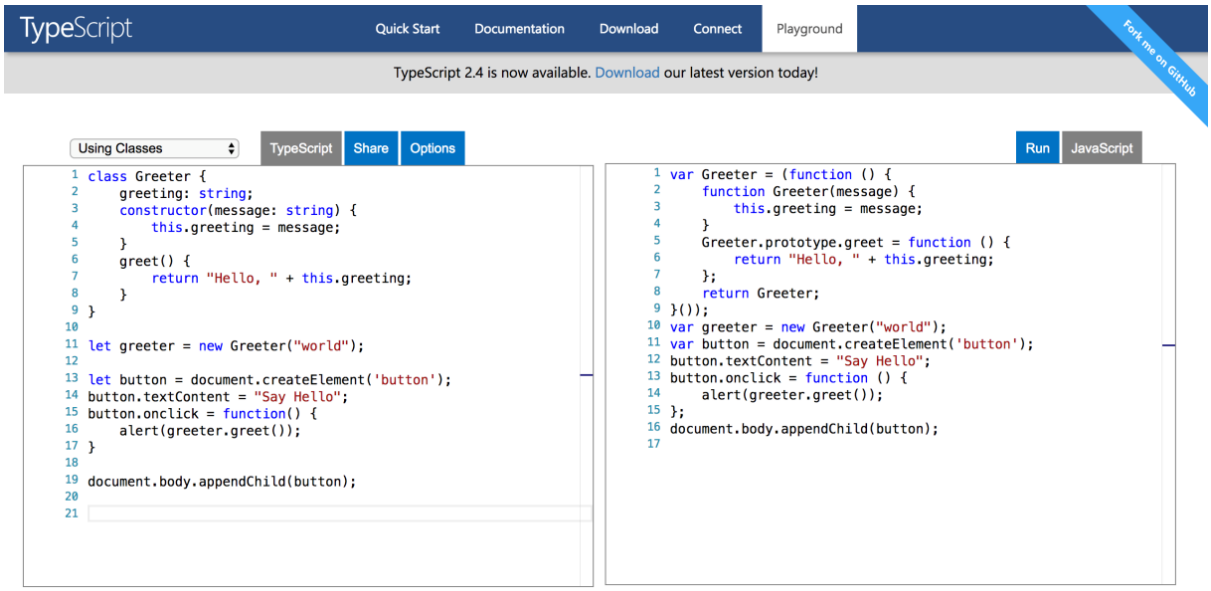
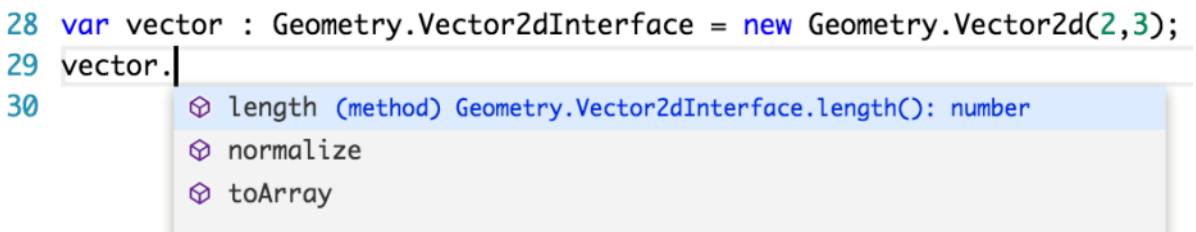
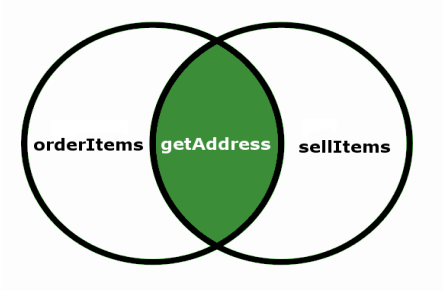
Chapter 1: Introducing TypeScript

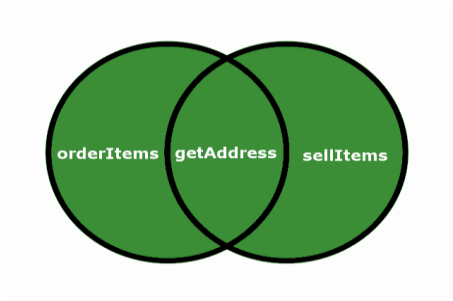


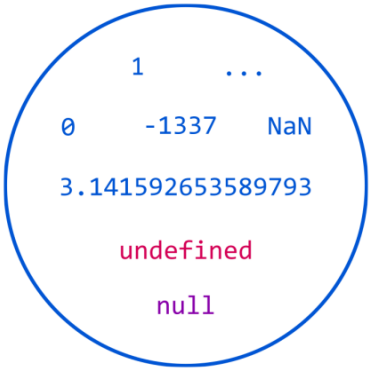


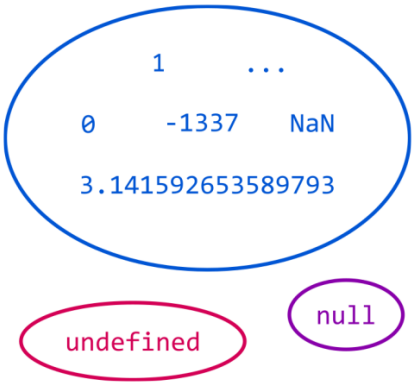


Chapter 2: Working with Types

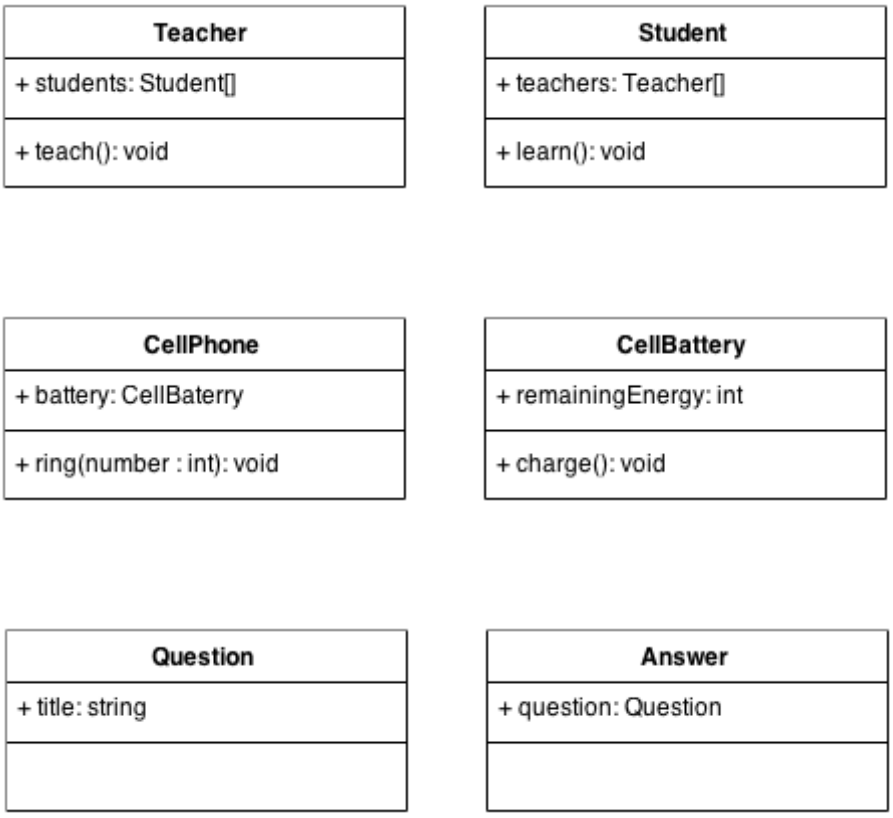


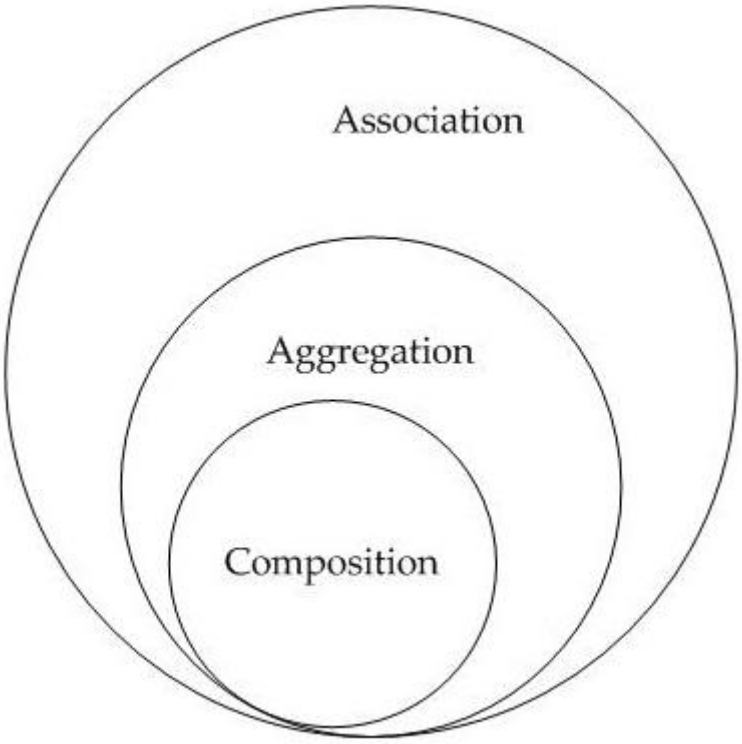


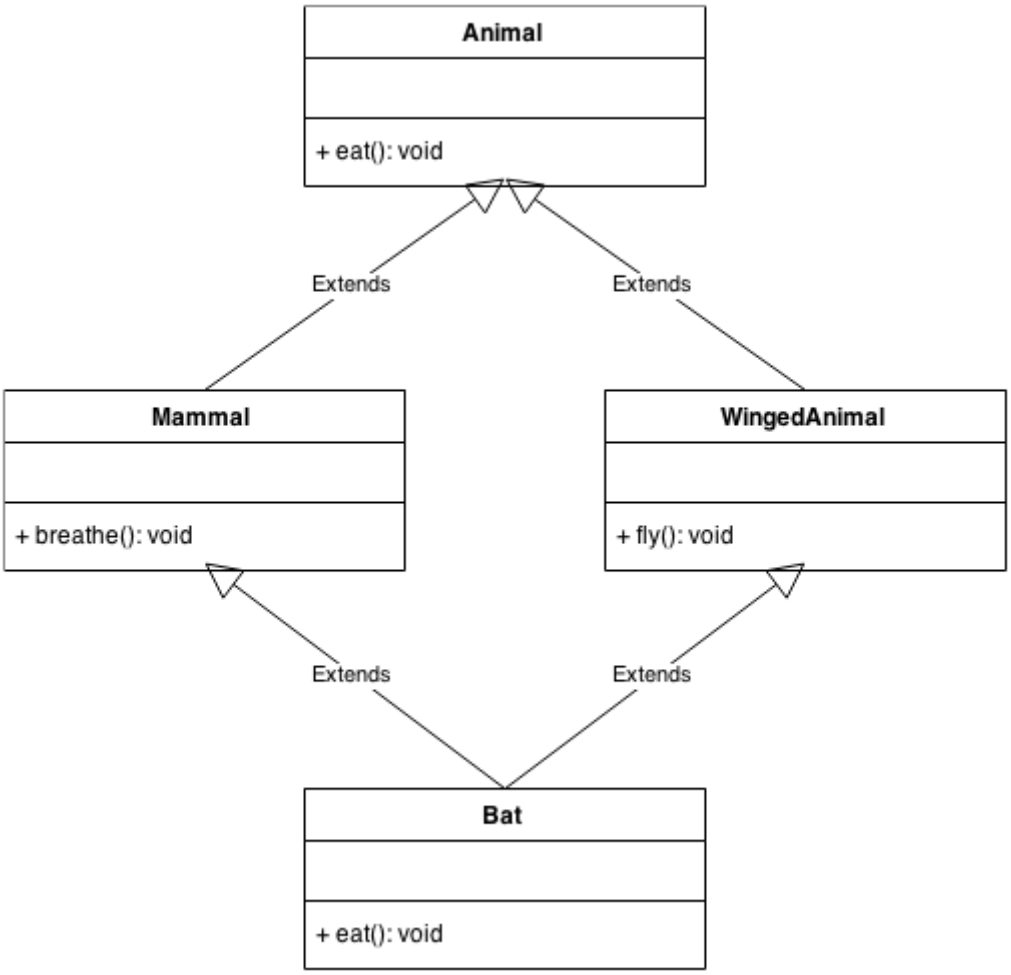



1 ...
0 -1337 NaN
3.141592653589793
undefined
null

Chapter 4: Object-Oriented Programming with TypeScript



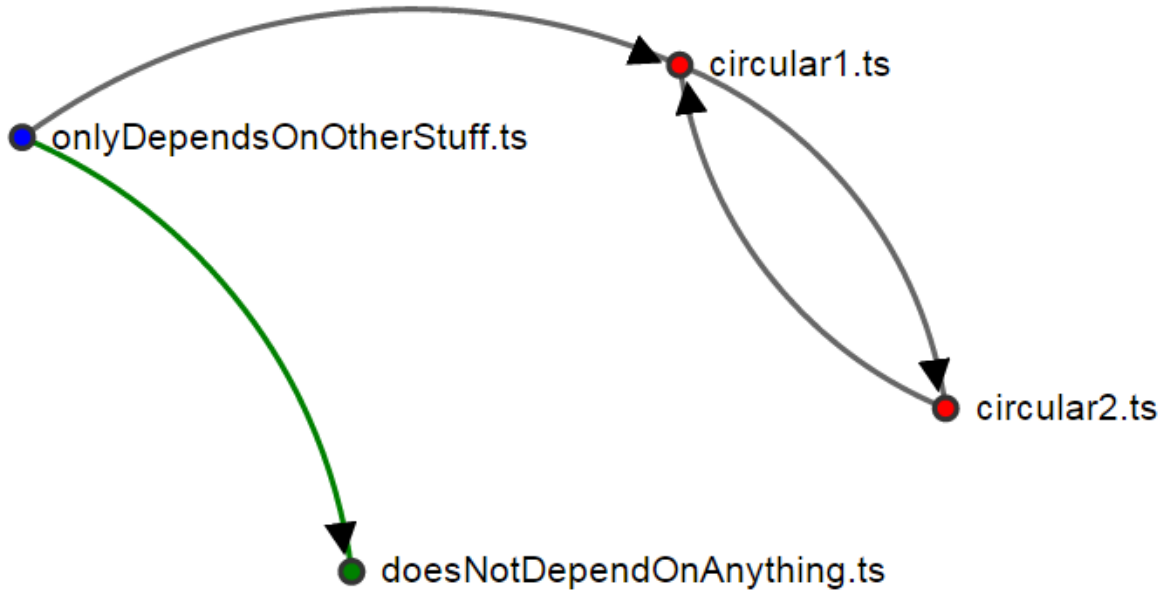

Association
Aggregation
Composition


Animal
+ eat(): void
Extends
Extends
Mammal
+ breathe(): void
WingedAnimal
+ fly(): void
Extends
Extends
Bat
+ eat(): void

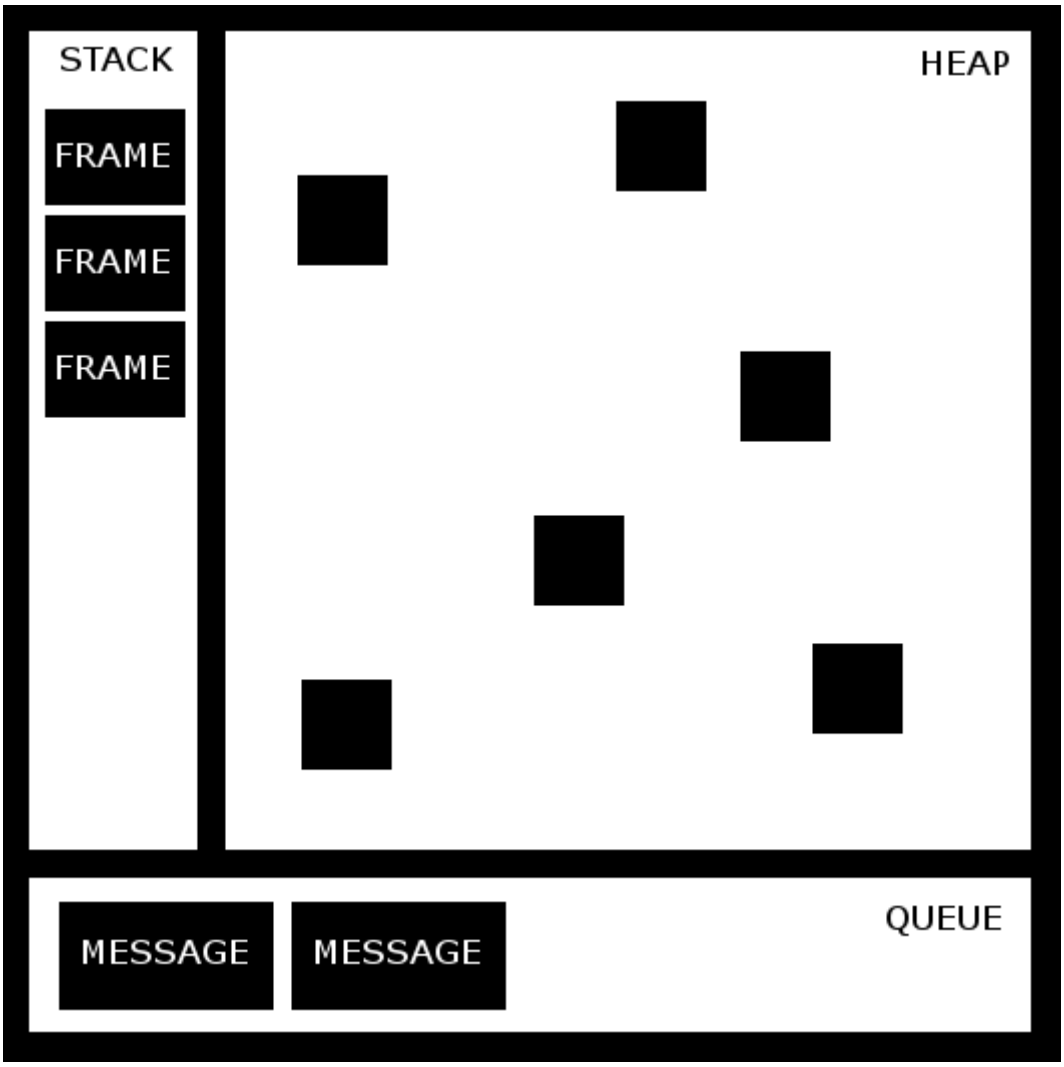
FavouritesController
persistanceService: PersistanceService
saveAsFavourite(articleId: number): number
1
«interface»
PersistanceService
CookiePersitanceService
saveAsFavourite(articleId: number): number

FavouritesController
persistanceService: PersistanceService
saveAsFavourite(articleId: number): number
1
CookiePersitanceService
saveAsFavourite(articleId: number): number

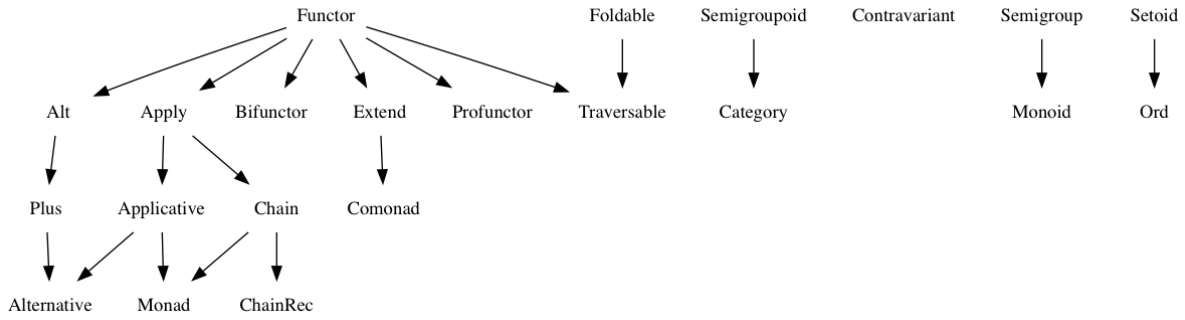
Chapter 5: Working with Dependencies



Chapter 6: Understanding the Runtime

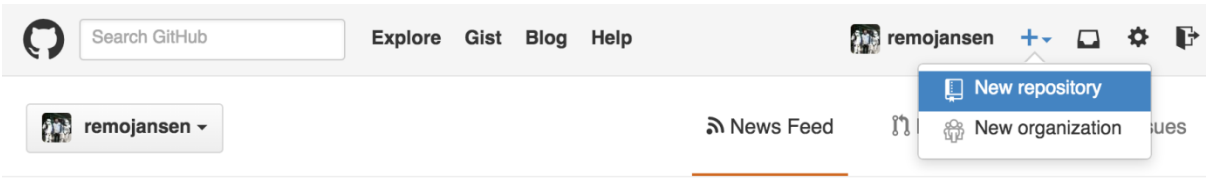


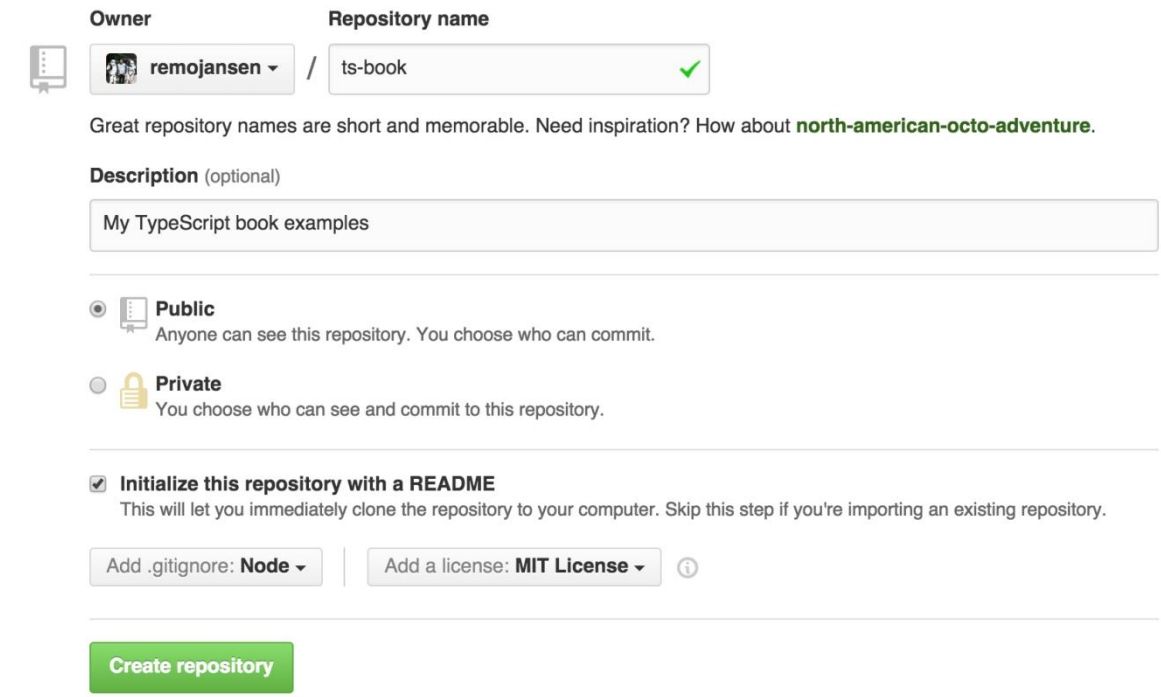
Chapter 7: Functional Programming with TypeScript

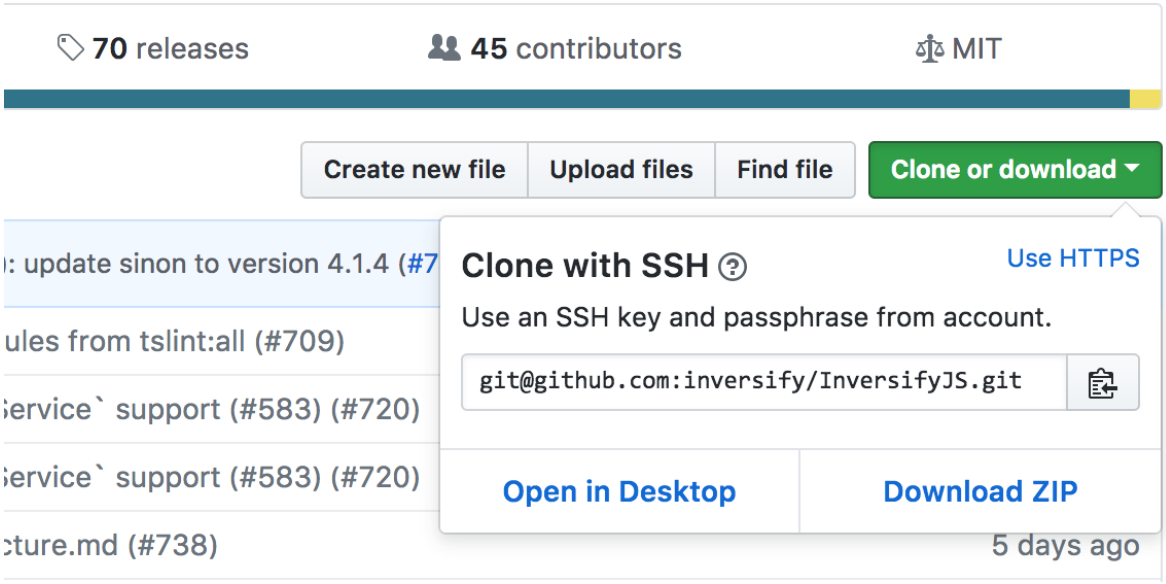


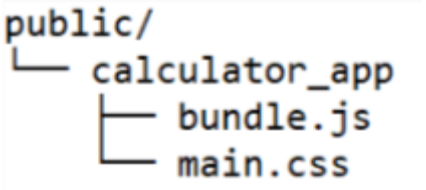
Chapter 9: Automating Your Development Workflow

```
├── gulpfile.js
├── index.html
├── package-lock.json
├── package.json
├── src
│   ├── calculator.ts
│   ├── main_server.ts
├── main_browser.ts
│   └── operations
│       ├── add.ts
│       ├── pow.ts
│       └── validation.ts
├── test
│   ├── add.test.ts
│   ├── calculator.test.ts
│   ├── pow.test.ts
│   └── validation.test.ts
├── tsconfig.json
├── tslint.json
└── webpack.config.js
```



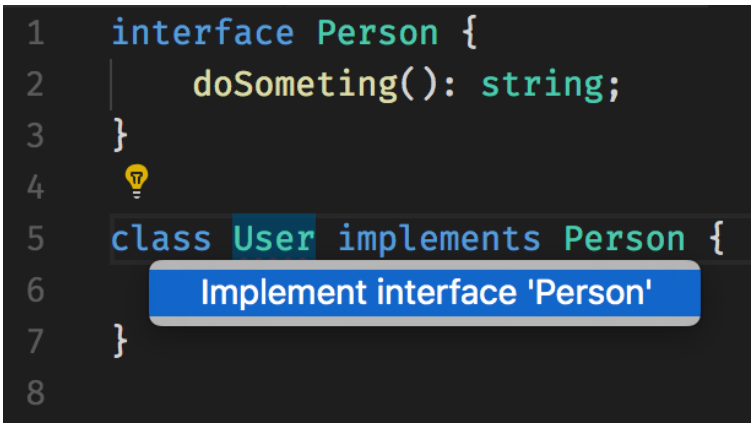

Owner
Repository name
remojansen
/
ts-book
Great repository names are short and memorable. Need inspiration? How about north-american-octo-adventure.
Description (optional)
My TypeScript book examples
Public
Anyone can see this repository. You choose who can commit.
Private
You choose who can see and commit to this repository.
Initialize this repository with a README
This will let you immediately clone the repository to your computer. Skip this step if you're importing an existing repository.
Add .gitignore: Node
Add a license: MIT License
Create repository

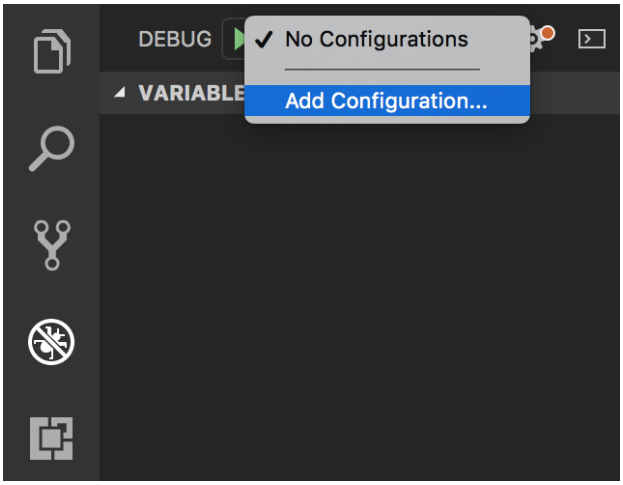

70 releases
45 contributors
MIT
Create new file
Upload files
Find file
Clone or download
: update sinon to version 4.1.4 (#7
ules from tslint:all (#709)
ervice` support (#583) (#720)
ervice` support (#583) (#720)
cture.md (#738)
5 days ago
Clone with SSH
Use HTTPS
Use an SSH key and passphrase from account.
git@github.com:inversify/InversifyJS.git
Open in Desktop
Download ZIP

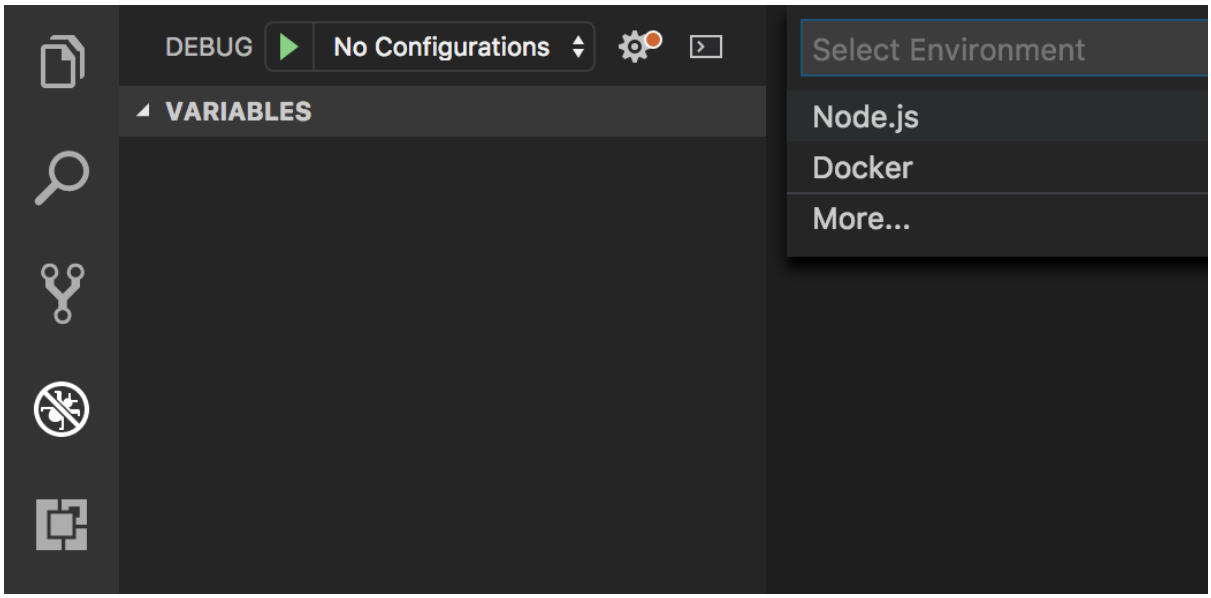

public/
calculator_app
bundle.js
main.css

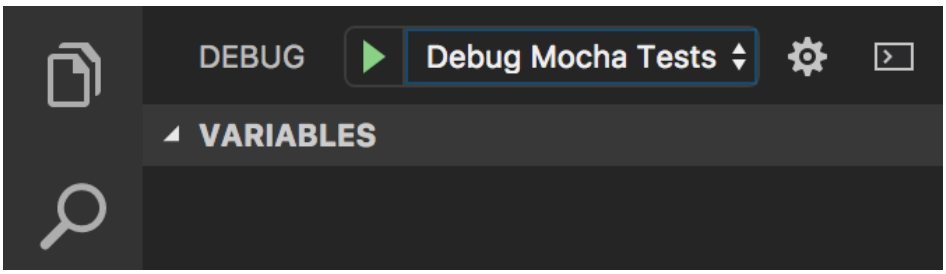
```
  Operation: add
    ✓ Should be able to calculate operation
    ✓ Should throw if an invalid argument is provided

  Calculator
    ✓ Should be able to calculate operations
    ✓ Should throw if an invalid operation is provided

  Operation: pow
    ✓ Should be able to calculate operation
    ✓ Should throw if an invalid argument is provided

  isNumber
    ✓ Should be able to add calculate operation
    ✓ Should throw if an invalid argument is provided


  8 passing (17ms)
```

File	% Stmts	% Branch	% Funcs	% Lines	Uncovered Lines
All files	91.76	100	100	91.03	
src	63.16	100	100	58.82	
calculator.ts	100	100	100	100	
main.ts	0	100	100	0	2,3,4,5,6,7,8
src/operations	100	100	100	100	
add.ts	100	100	100	100	
pow.ts	100	100	100	100	
validation.ts	100	100	100	100	
test	100	100	100	100	
add.test.ts	100	100	100	100	
calculator.test.ts	100	100	100	100	
pow.test.ts	100	100	100	100	
validation.test.ts	100	100	100	100	



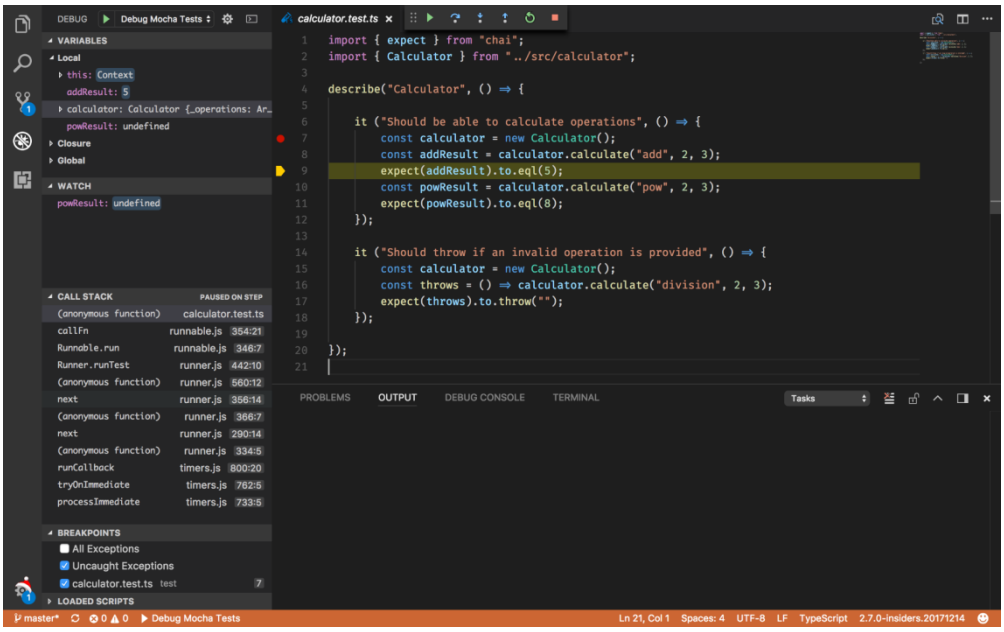

DEBUG
No Configurations
VARIABLE
Add Configuration...

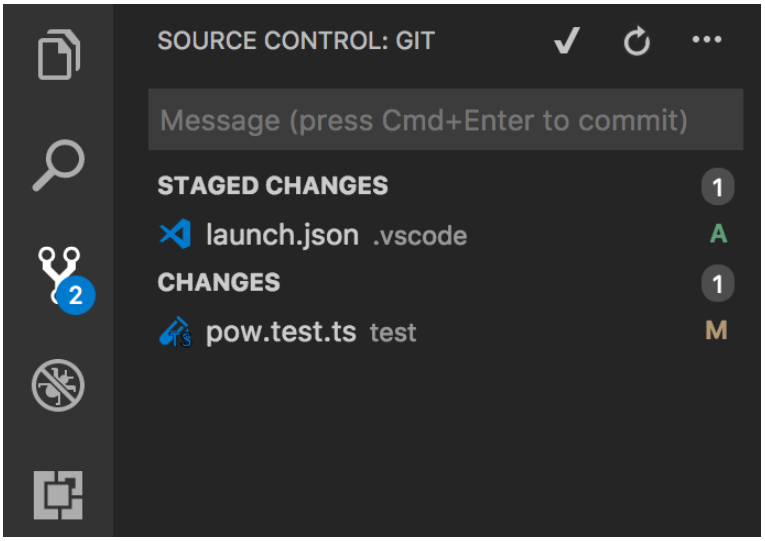

DEBUG
No Configurations
VARIABLES
Select Environment
Node.js
Docker
More...


DEBUG
Debug Mocha Tests
VARIABLES

calculator.test.ts

```
1   import { expect } from "chai";
2   import { Calculator } from "../src/calculator";
3
4   describe("Calculator", () => {
5
6       it ("Should be able to calculate operations", () => {
7           const calculator = new Calculator();
8           const addResult = calculator.calculate("add", 2, 3);
9           expect(addResult).to.eql(5);
10          const powResult = calculator.calculate("pow", 2, 3);
11          expect(powResult).to.eql(8);
12      });
```

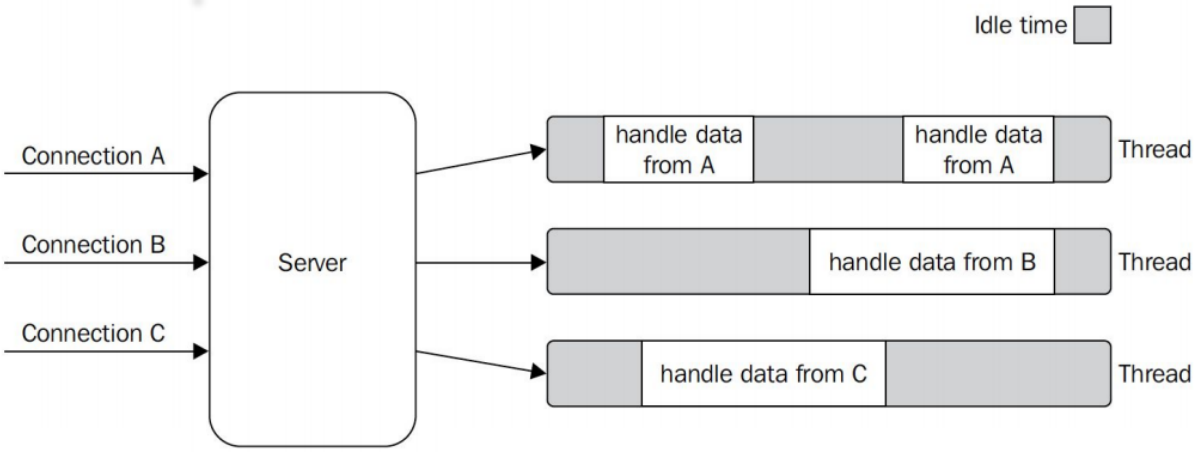


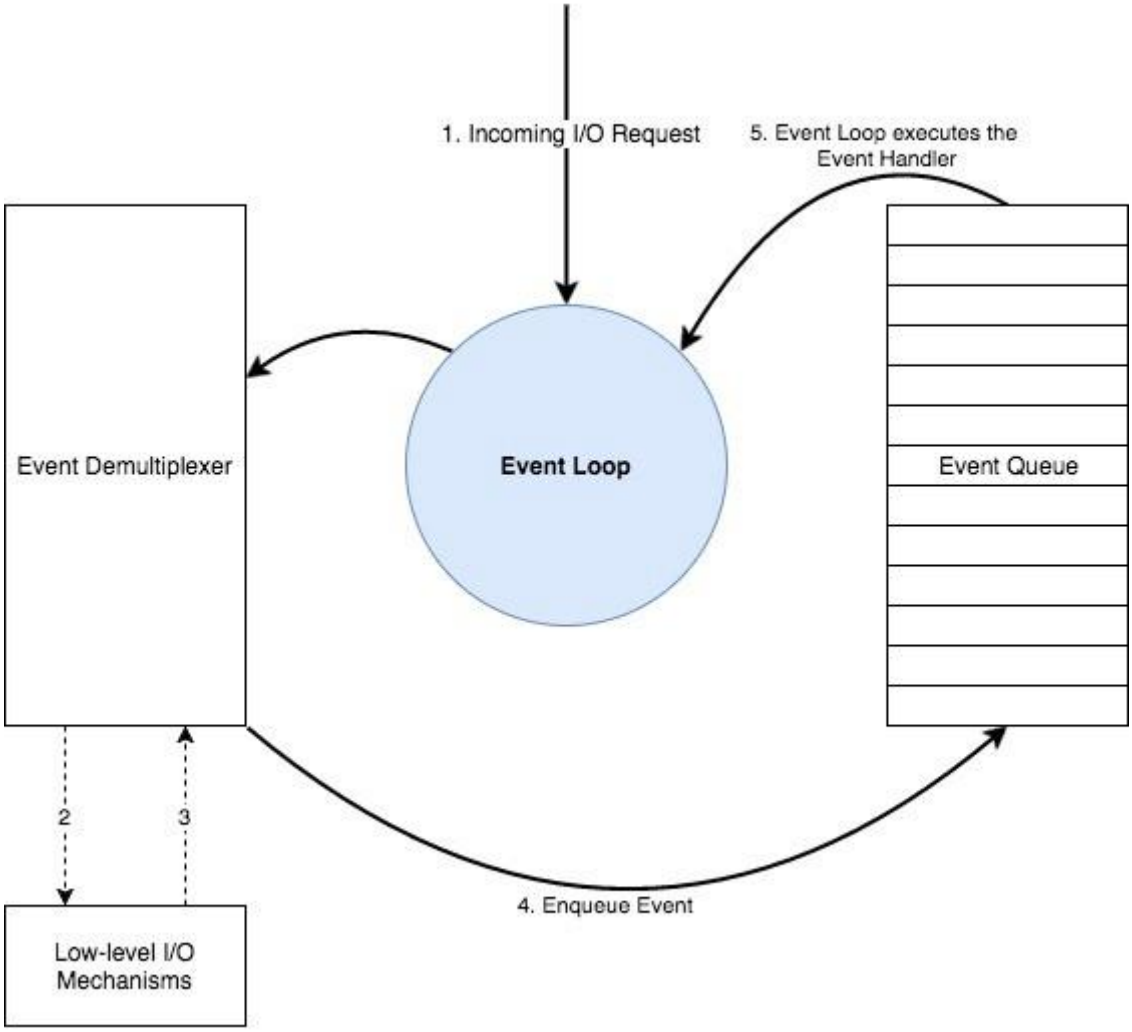


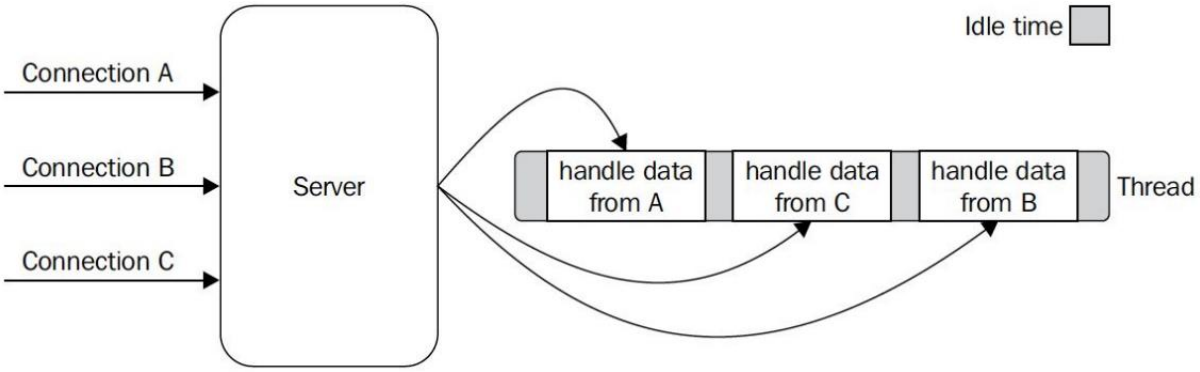
username/repository-name

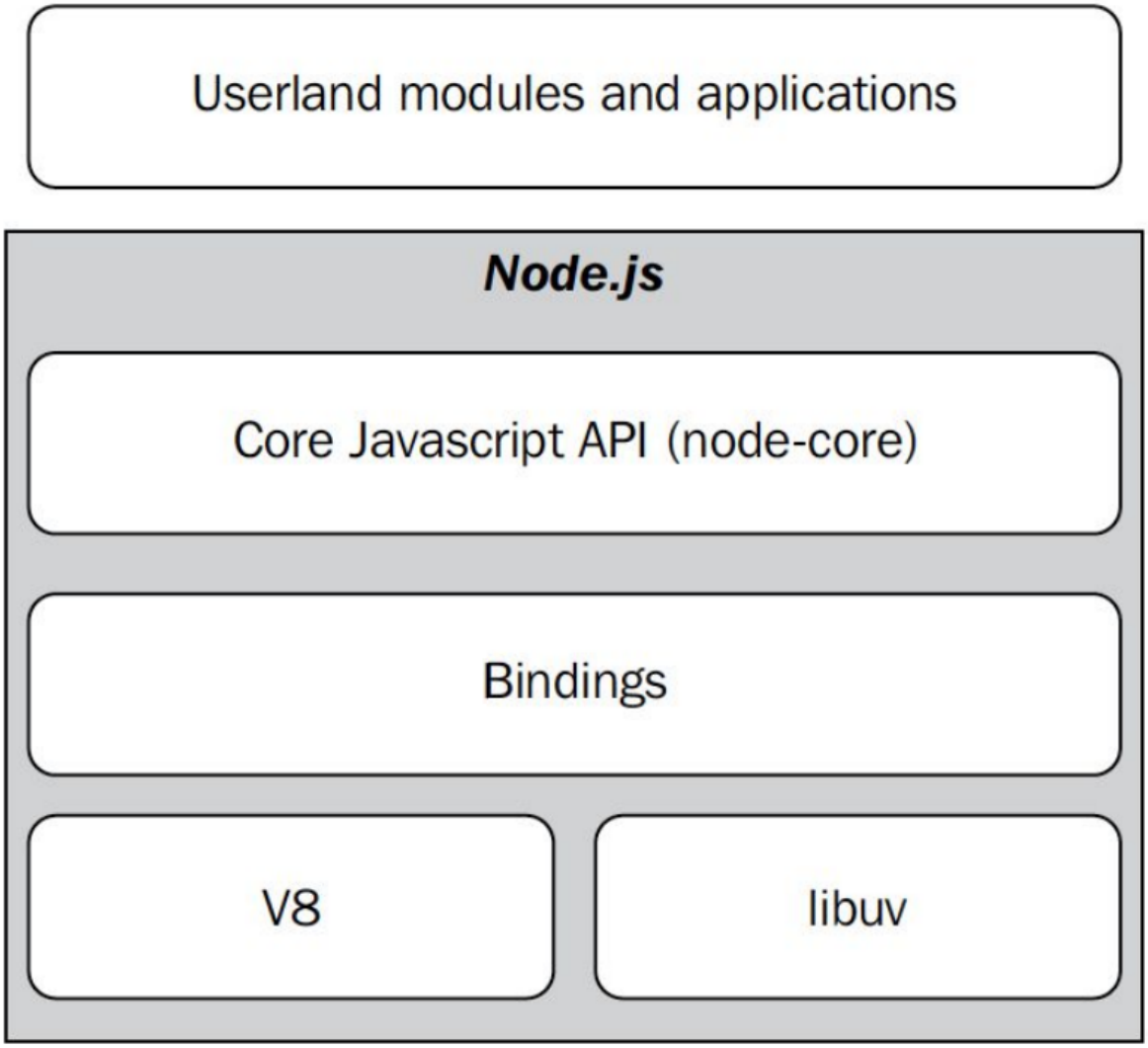
ON

Chapter 10: Node.js Development with TypeScript



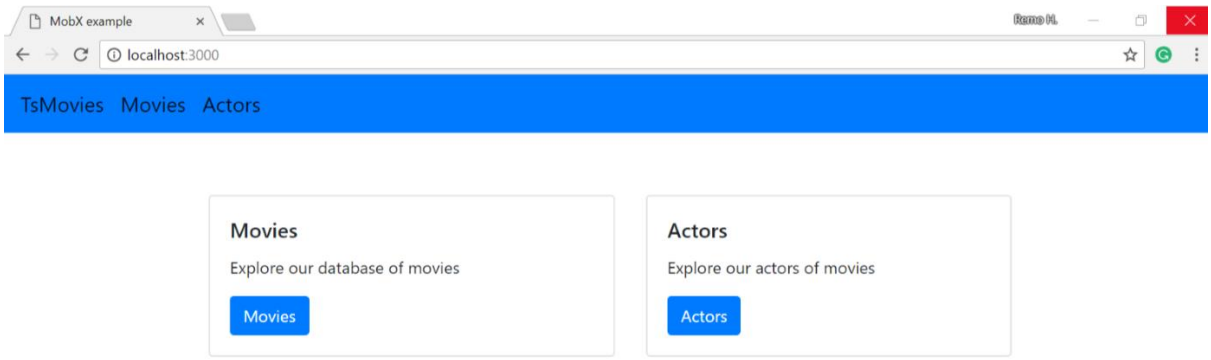


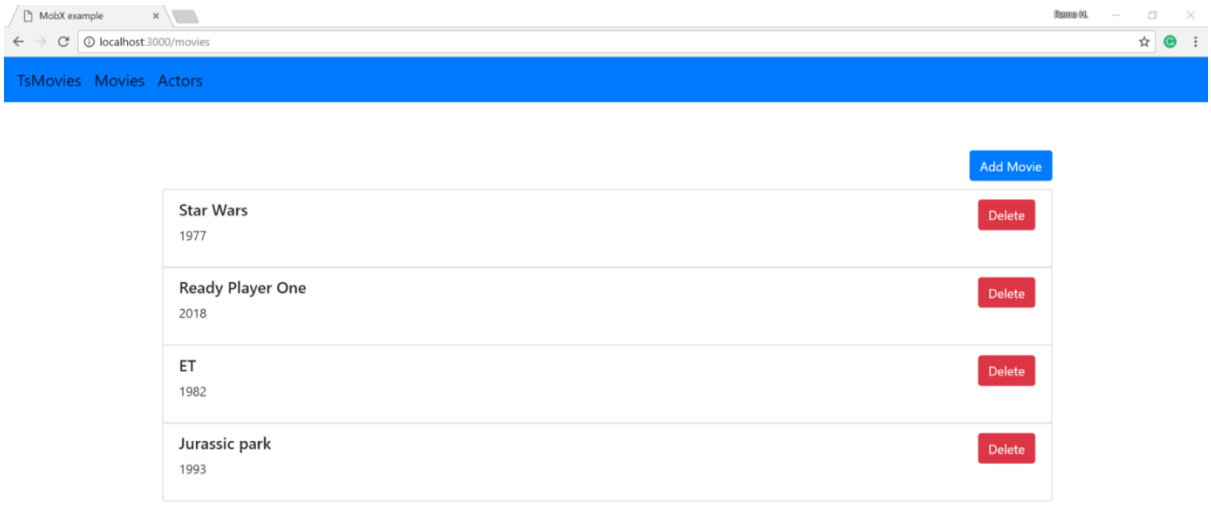


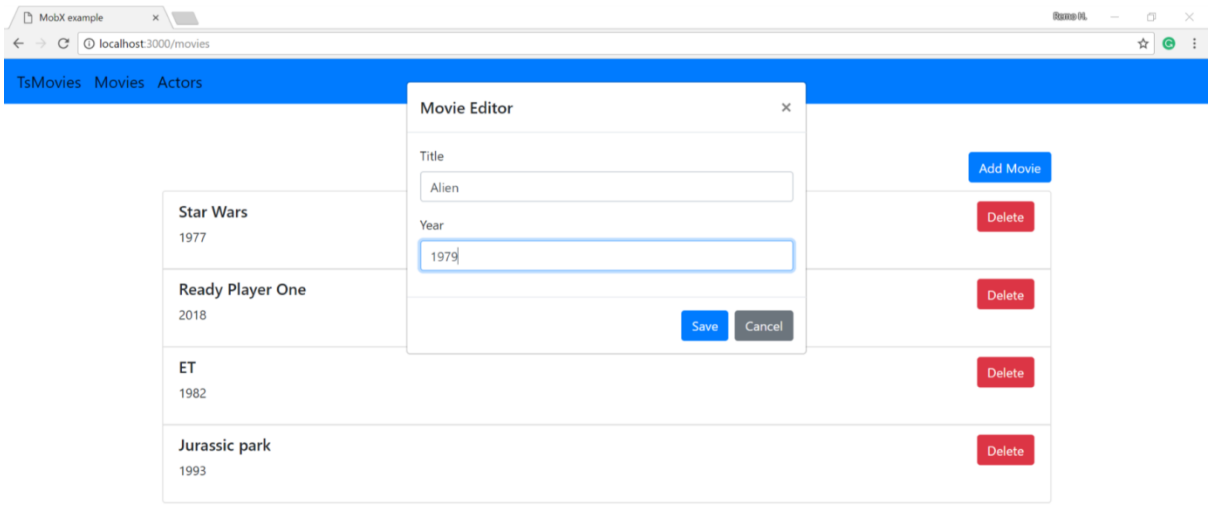


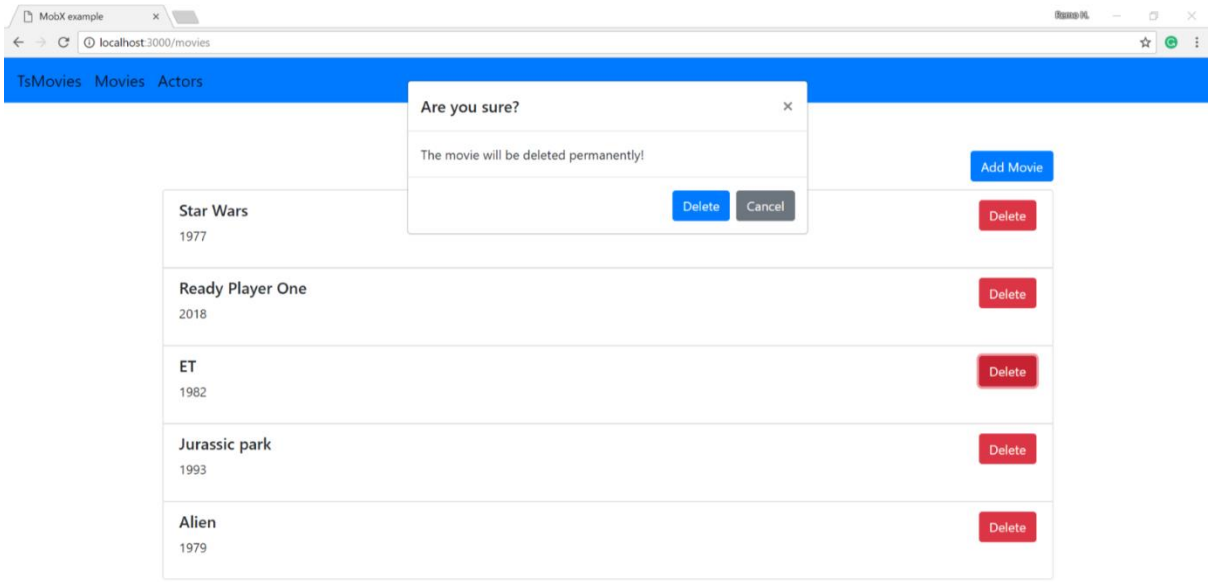

```
CONTAINER ID        IMAGE               COMMAND                  CREATED             STATUS              PORTS                    NAMES
3d2288e4acc1        postgres            "docker-entrypoint..."   42 minutes ago      Up 42 minutes       0.0.0.0:5432->5432/tcp   POSTGRES_USER
```

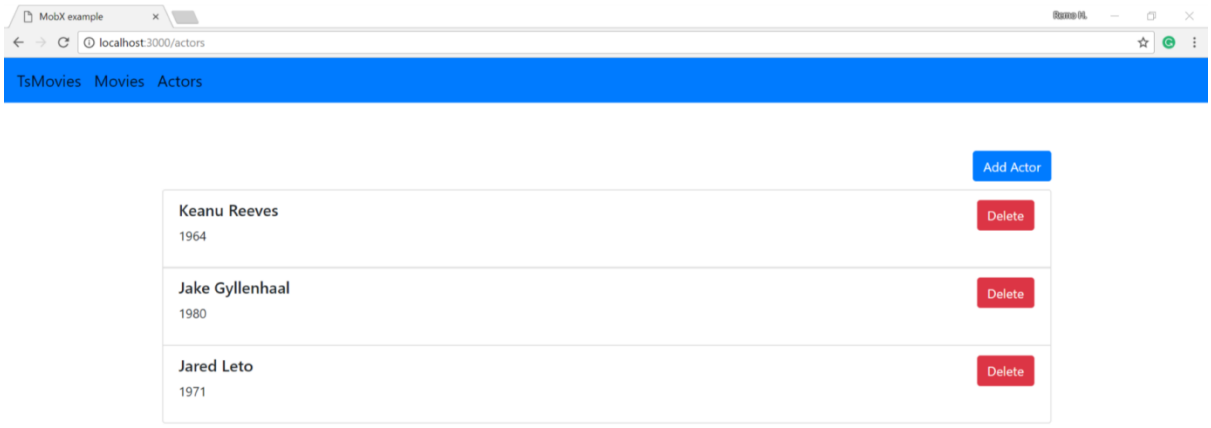
Chapter 11: Frontend Development with React and TypeScript

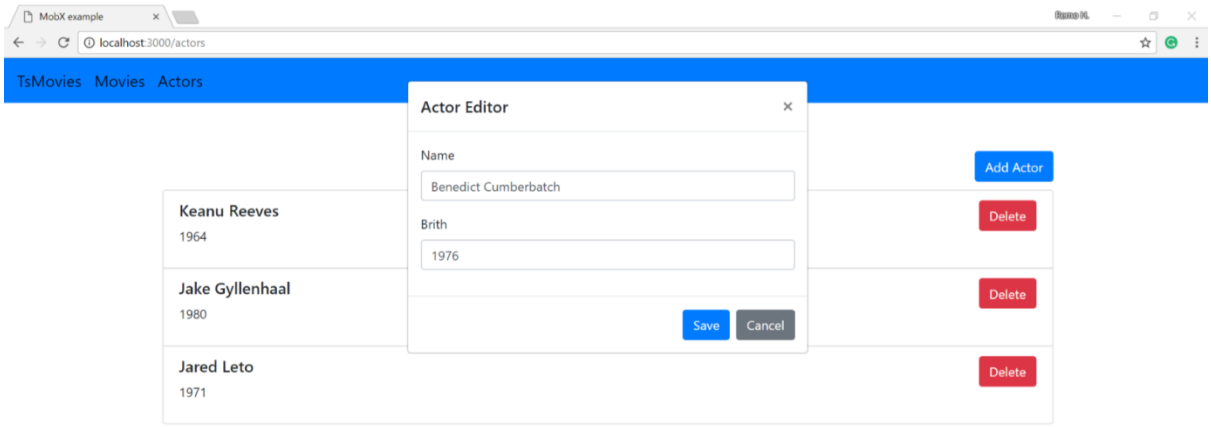


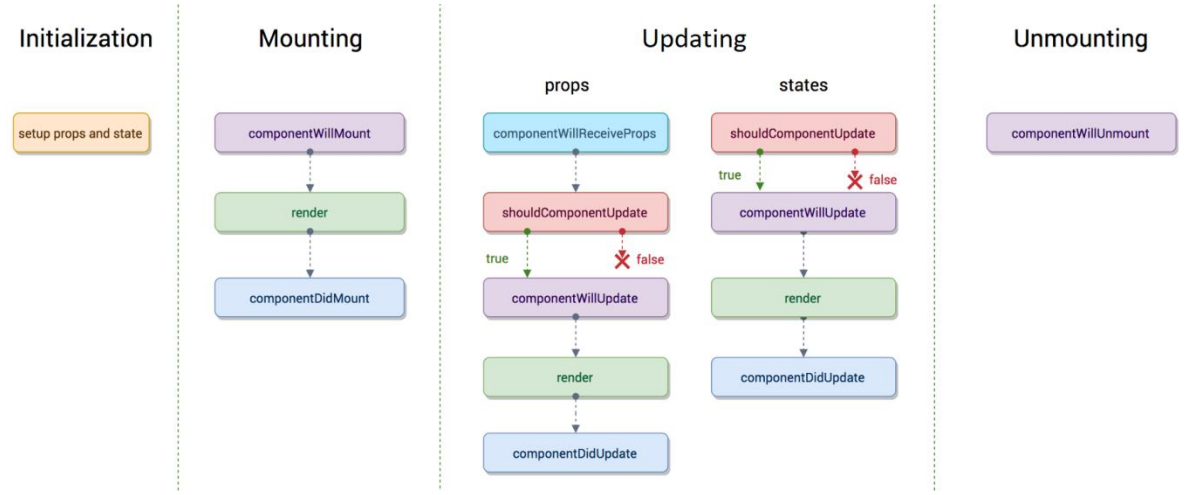





MobX example
localhost:3000/movies
TsMovies Movies Actors
Are you sure?
The movie will be deleted permanently!
Delete
Cancel
Add Movie
Star Wars
1977
Delete
Ready Player One
2018
Delete
ET
1982
Delete
Jurassic park
1993
Delete
Alien
1979
Delete

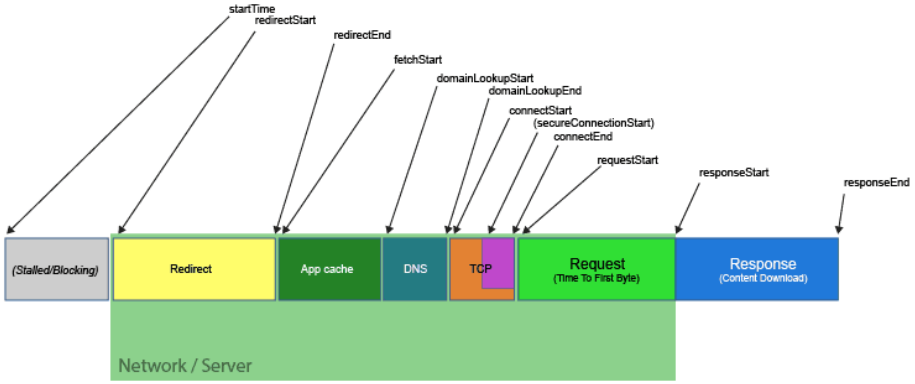

MobX example
localhost:3000/actors
TsMovies Movies Actors
Add Actor
Keanu Reeves
1964
Delete
Jake Gyllenhaal
1980
Delete
Jared Leto
1971
Delete

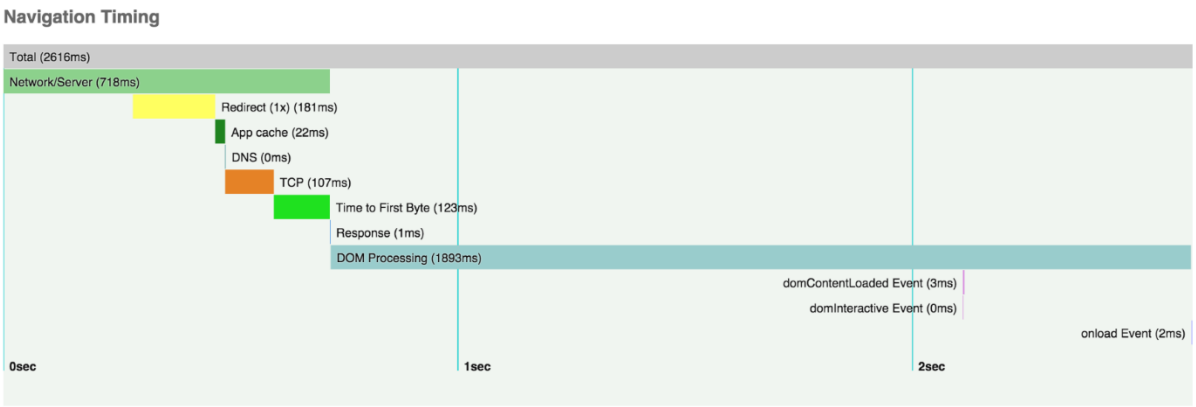

MobX example
localhost:3000/actors
TsMovies Movies Actors
Actor Editor
Name
Benedict Cumberbatch
Brith
1976
Save
Cancel
Add Actor
Keanu Reeves
1964
Delete
Jake Gyllenhaal
1980
Delete
Jared Leto
1971
Delete

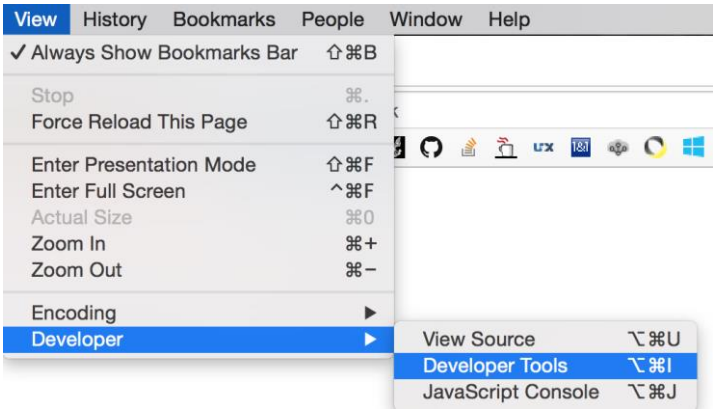

Initialization
setup props and state
Mounting
componentWillMount
render
componentDidMount
Updating
props
componentWillReceiveProps
shouldComponentUpdate
true
false
componentWillUpdate
render
componentDidUpdate
states
shouldComponentUpdate
true
false
componentWillUpdate
render
componentDidUpdate
Unmounting
componentWillUnmount

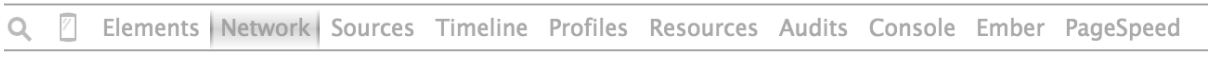
chrome-extension://pfgnfdagidkfgccljigdamigbcnndkod/window.html#window
Components
Changes
Performance
Search (string/rege
<App locale="en" cookies=Cookies{…} intl={locale: "en", messages: {…}, formats: {…}, …}
<FpLandingPage intl={locale: "en", messages: {…}, formats: {…}, …} advancedSearchStore
<ComponentWithJob intl={locale: "en", messages: {…}, formats: {…}, …} homeStore=HomeSt
<ComponentWithJob intl={locale: "en", messages: {…}, formats: {…}, …} homeStore=HomeSt
<ComponentWithJob intl={locale: "en", messages: {…}, formats: {…}, …} homeStore=HomeSt
<ComponentWithJob intl={locale: "en", messages: {…}, formats: {…}, …} homeStore=HomeSt
<Footer cookies=Cookies{…} intl={locale: "en", messages: {…}, formats: {…}, …} userSto
</App>
<ComponentWithJob/>
DEPENDENCIES (2)
context: {…}
getJobState: fn()
props: {…}
refs: {…}
render: d()
resolveWork: fn()
state: {…}

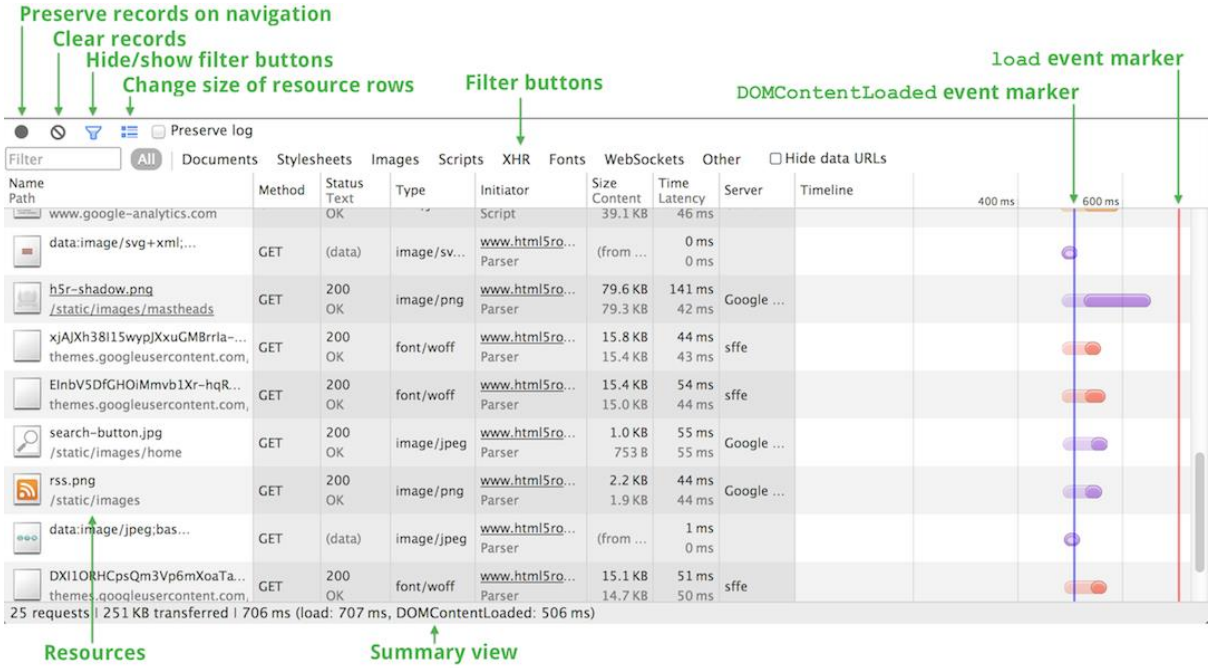
Chapter 13: Application Performance

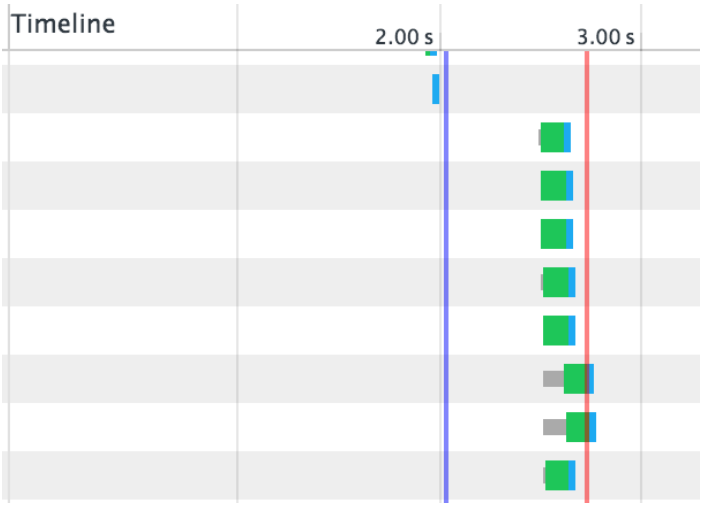


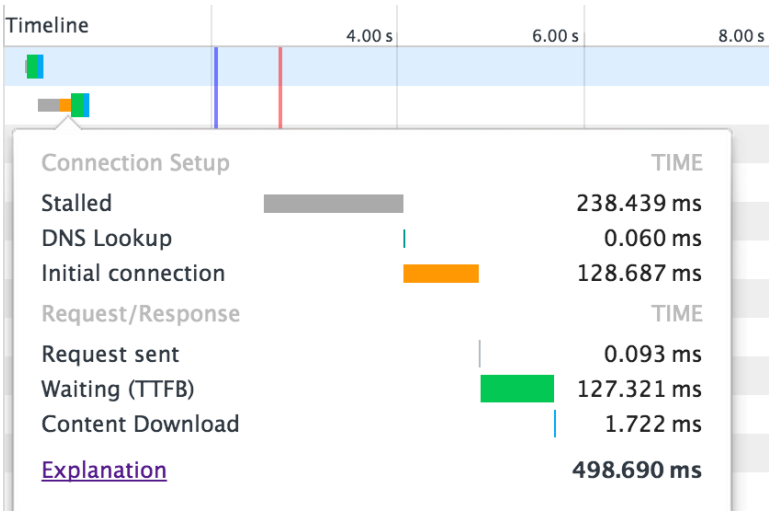


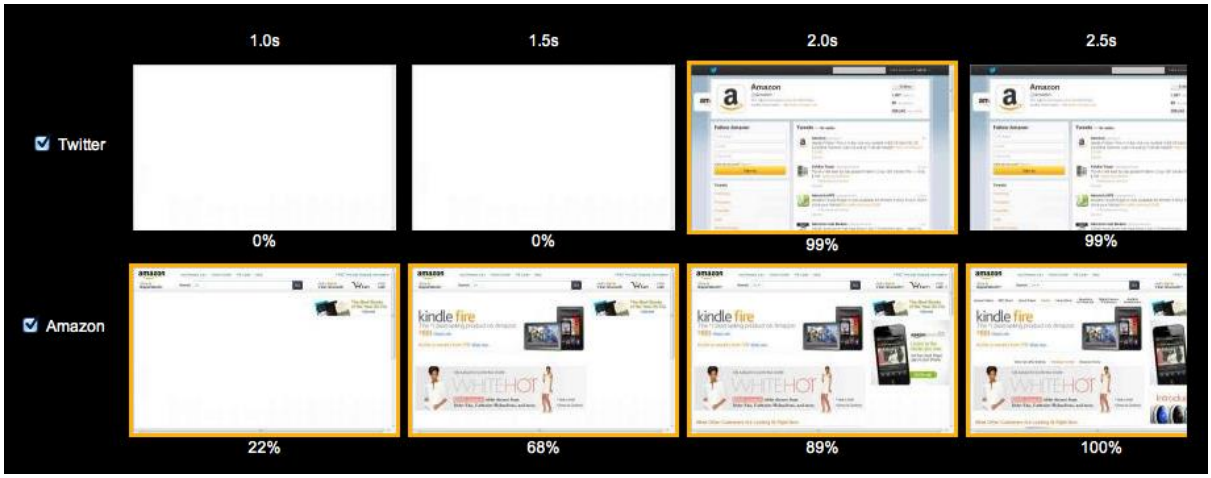





Preserve records on navigation
Clear records
Hide/show filter buttons
Change size of resource rows
Filter buttons
load event marker
DOMContentLoaded event marker
Preserve log
Filter
All
Documents
Stylesheets
Images
Scripts
XHR
Fonts
WebSockets
Other
Hide data URLs
Name
Path
Method
Status
Text
Type
Initiator
Size
Content
Time
Latency
Server
Timeline
400 ms
600 ms
www.google-analytics.com
OK
Script
39.1 KB
46 ms
data:image/svg+xml;...
GET
(data)
image/sv...
www.html5ro...
Parser
(from ...
0 ms
0 ms
h5r-shadow.png
/static/images/mastheads
GET
200
OK
image/png
www.html5ro...
Parser
79.6 KB
79.3 KB
141 ms
42 ms
Google ...
xjAJXh38I15wypJXxuGMBrrla-...
themes.googleusercontent.com,
GET
200
OK
font/woff
www.html5ro...
Parser
15.8 KB
15.4 KB
44 ms
43 ms
sffe
ElnbV5DfGHOiMmvb1Xr-hqR...
themes.googleusercontent.com,
GET
200
OK
font/woff
www.html5ro...
Parser
15.4 KB
15.0 KB
54 ms
44 ms
sffe
search-button.jpg
/static/images/home
GET
200
OK
image/jpeg
www.html5ro...
Parser
1.0 KB
753 B
55 ms
55 ms
Google ...
rss.png
/static/images
GET
200
OK
image/png
www.html5ro...
Parser
2.2 KB
1.9 KB
44 ms
44 ms
Google ...
data:image/jpeg;bas...
GET
(data)
image/jpeg
www.html5ro...
Parser
(from ...
1 ms
0 ms
DXI1ORHCpsQm3Vp6mXoaTa...
themes.googleusercontent.com,
GET
200
OK
font/woff
www.html5ro...
Parser
15.1 KB
14.7 KB
51 ms
50 ms
sffe
25 requests | 251 KB transferred | 706 ms (load: 707 ms, DOMContentLoaded: 506 ms)
Resources
Summary view


Timeline
2.00 s
3.00 s


Timeline
4.00 s
6.00 s
8.00 s
Connection Setup
TIME
Stalled
238.439 ms
DNS Lookup
0.060 ms
Initial connection
128.687 ms
Request/Response
TIME
Request sent
0.093 ms
Waiting (TTFB)
127.321 ms
Content Download
1.722 ms
Explanation
498.690 ms


1.0s
1.5s
2.0s
2.5s
Twitter
0%
0%
99%
99%
Amazon
22%
68%
89%
100%

Google Developers

Products > PageSpeed Insights

PageSpeed Insights +1

http://www.remojansen.com/ ANALYZE

Mobile | Desktop

31 / 100 Speed

! Should Fix:

Optimize images
- Show how to fix

Eliminate render-blocking JavaScript and CSS in above-the-fold content
- Show how to fix

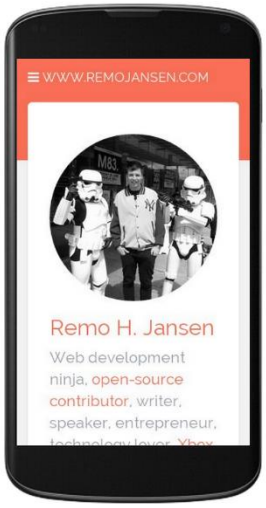
Leverage browser caching
- Show how to fix

! Consider Fixing:

Prioritize visible content
- Show how to fix

Minify JavaScript
- Show how to fix

Minify HTML
- Show how to fix



Grade B

Overall performance score 82 Ruleset applied: YSlow(V2) URL: http://www.remojansen.com/

ALL (23) FILTER BY: CONTENT (6) | COOKIE (2) | CSS (6) | IMAGES (2) | JAVASCRIPT (4) | SERVER (6)

C	Make fewer HTTP requests
F	Use a Content Delivery Network (CDN)
A	Avoid empty src or href
F	Add Expires headers
A	Compress components with gzip
A	Put CSS at top
A	Put JavaScript at bottom
A	Avoid CSS expressions
n/a	Make JavaScript and CSS external
A	Reduce DNS lookups
A	Minify JavaScript and CSS
A	Avoid URL redirects
A	Remove duplicate JavaScript and CSS

Grade C on Make fewer HTTP requests

This page has 4 external Javascript scripts. Try combining them into one.
This page has 8 external stylesheets. Try combining them into one.

Decreasing the number of components on a page reduces the number of HT
Some ways to reduce the number of components include: combine files, com
style sheet, and use CSS Sprites and image maps.

»Read More

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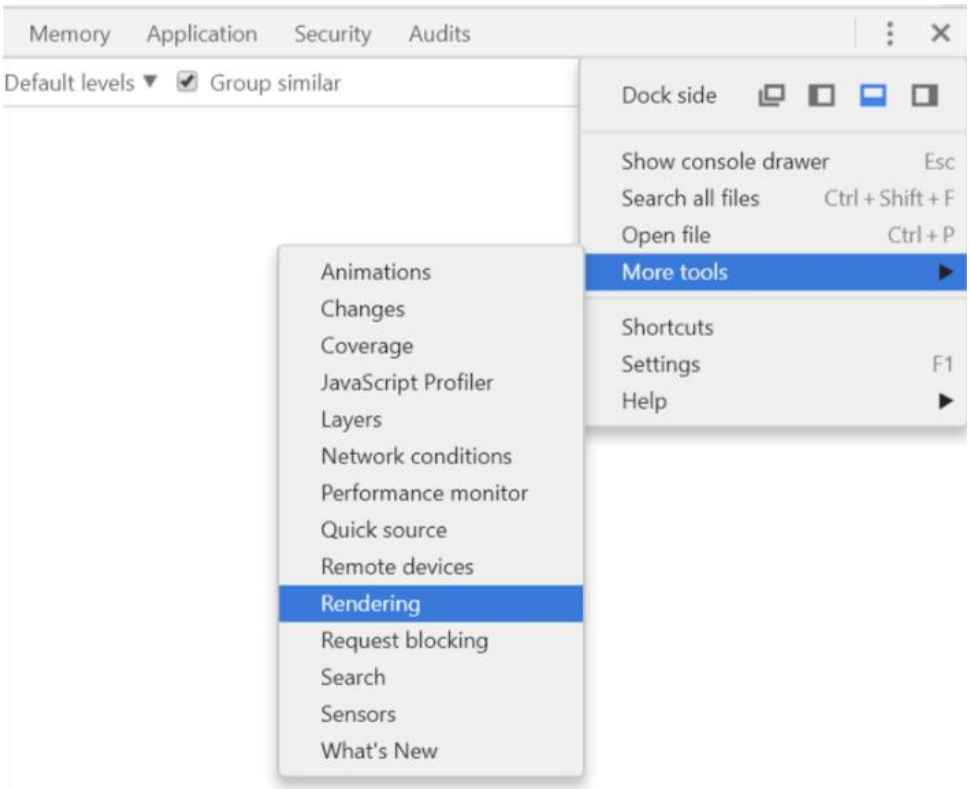
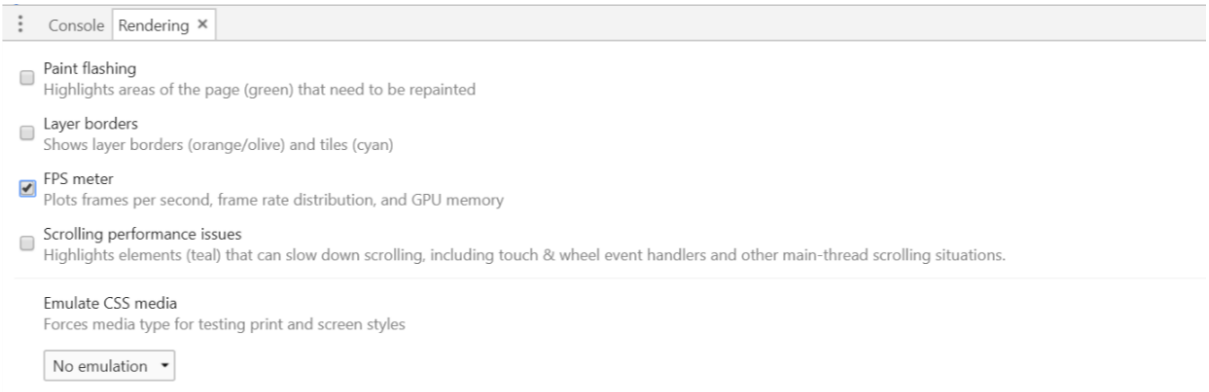
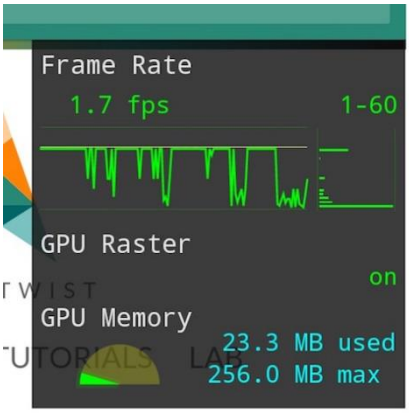
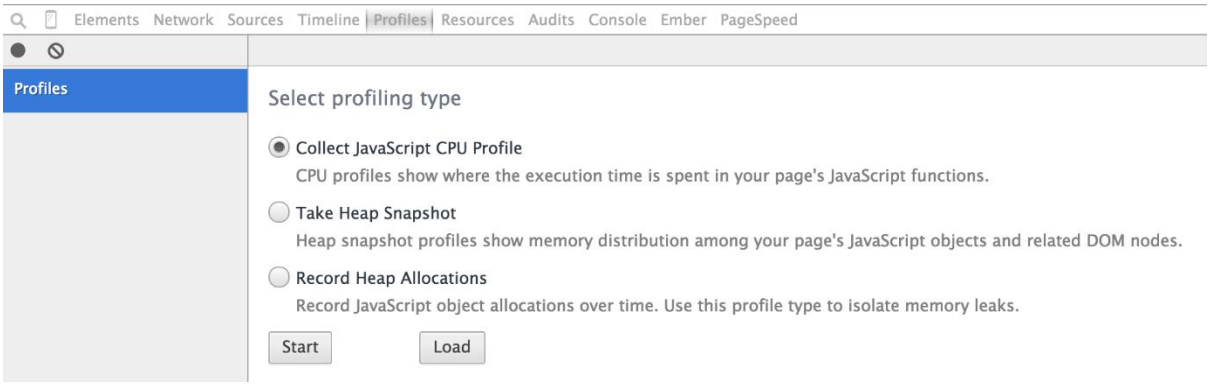

Memory
Application
Security
Audits
Default levels
Group similar
Dock side
Show console drawer Esc
Search all files Ctrl + Shift + F
Open file Ctrl + P
More tools
Shortcuts
Settings F1
Help
Animations
Changes
Coverage
JavaScript Profiler
Layers
Network conditions
Performance monitor
Quick source
Remote devices
Rendering
Request blocking
Search
Sensors
What's New

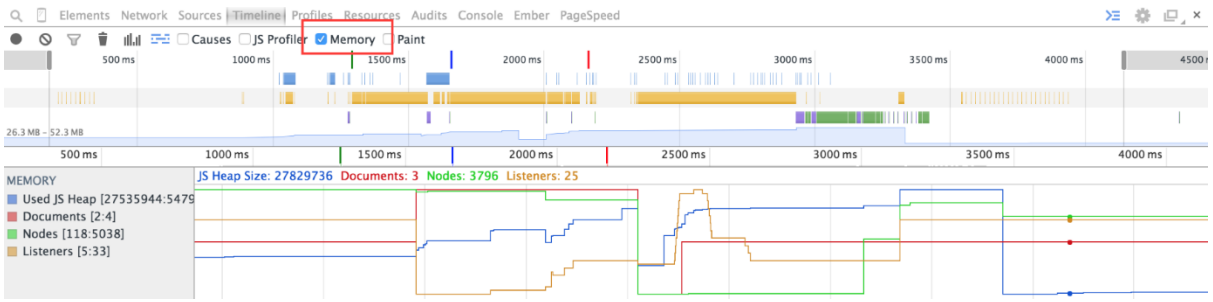

Console
Rendering
Paint flashing
Highlights areas of the page (green) that need to be repainted
Layer borders
Shows layer borders (orange/olive) and tiles (cyan)
FPS meter
Plots frames per second, frame rate distribution, and GPU memory
Scrolling performance issues
Highlights elements (teal) that can slow down scrolling, including touch & wheel event handlers and other main-thread scrolling situations.
Emulate CSS media
Forces media type for testing print and screen styles
No emulation

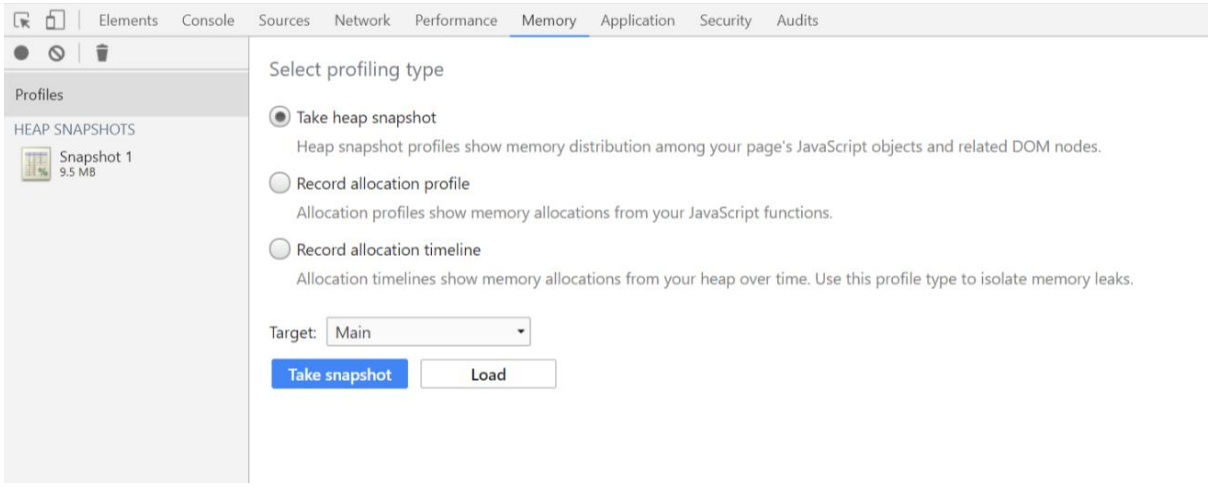

Frame Rate
1.7 fps
1-60
GPU Raster
on
GPU Memory
23.3 MB used
256.0 MB max

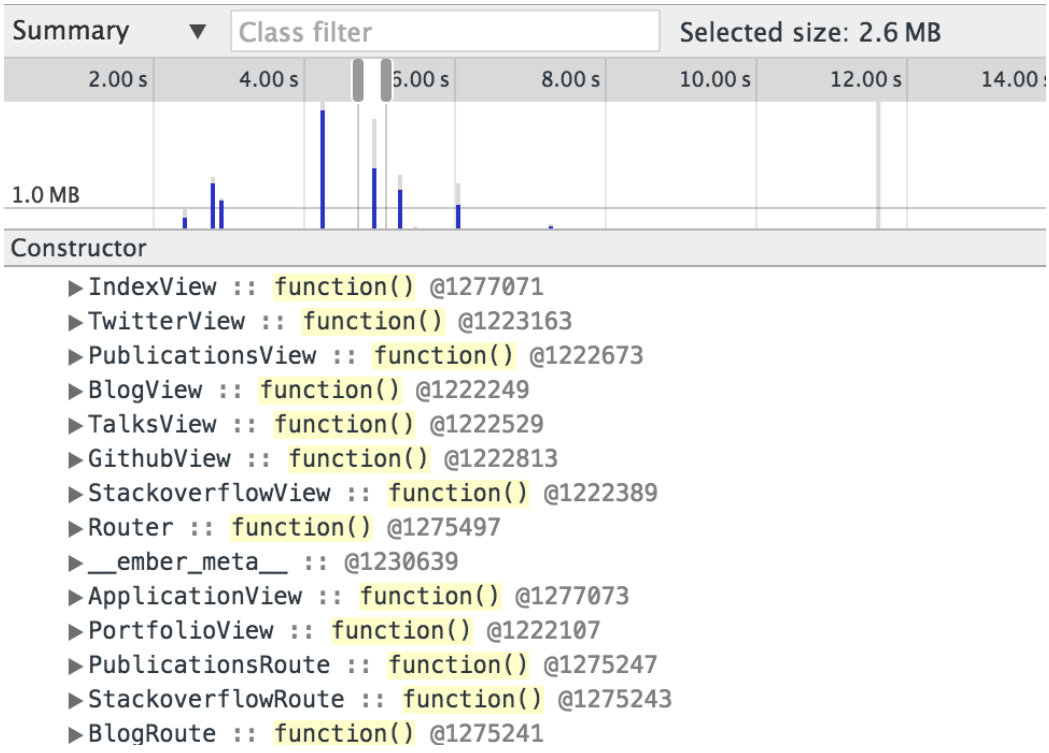

Elements Network Sources Timeline Profiles Resources Audits Console Ember PageSpeed
Profiles
Select profiling type
Collect JavaScript CPU Profile
CPU profiles show where the execution time is spent in your page's JavaScript functions.
Take Heap Snapshot
Heap snapshot profiles show memory distribution among your page's JavaScript objects and related DOM nodes.
Record Heap Allocations
Record JavaScript object allocations over time. Use this profile type to isolate memory leaks.
Start
Load

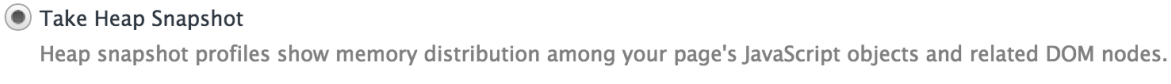
Elements Network Sources Timeline Profiles Resources Audits Console Ember PageSpeed
Chart
Profiles
CPU PROFILES
Profile
Save
Name (program)
Self time 27.2 ms
Total time 27.2 ms
URL
Aggregated self time 310.793 ms
Aggregated total time 310.793 ms

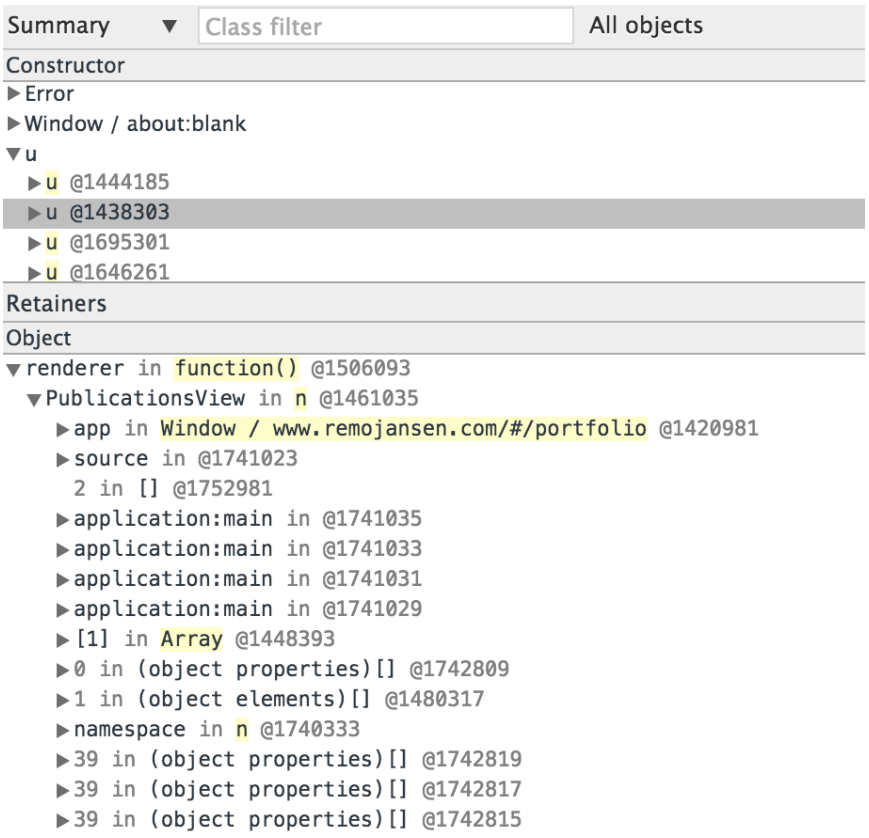
Chart
500 ms
1.00 s
1.50 s
2.00 s
0 ms
1900 ms
2000 ms
2100 ms
2200 ms
230
Name (anonymous function)
Self time 1.0 ms
Total time 1.0 ms
URL
Aggregated self time 1.003 ms
Aggregated total time 1.003 ms

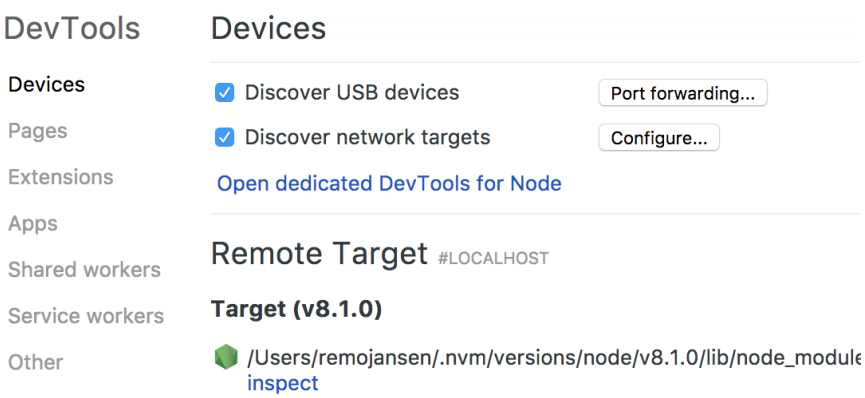

Elements Network Sources Timeline Profiles Resources Audits Console Ember PageSpeed
Causes JS Profiler Memory Paint
MEMORY
Used JS Heap [27535944:5479]
Documents [2:4]
Nodes [118:5038]
Listeners [5:33]
JS Heap Size: 27829736 Documents: 3 Nodes: 3796 Listeners: 25


Elements Console Sources Network Performance Memory Application Security Audits
Profiles
HEAP SNAPSHOTS
Snapshot 1
9.5 MB
Select profiling type
Take heap snapshot
Heap snapshot profiles show memory distribution among your page's JavaScript objects and related DOM nodes.
Record allocation profile
Allocation profiles show memory allocations from your JavaScript functions.
Record allocation timeline
Allocation timelines show memory allocations from your heap over time. Use this profile type to isolate memory leaks.
Target: Main
Take snapshot
Load

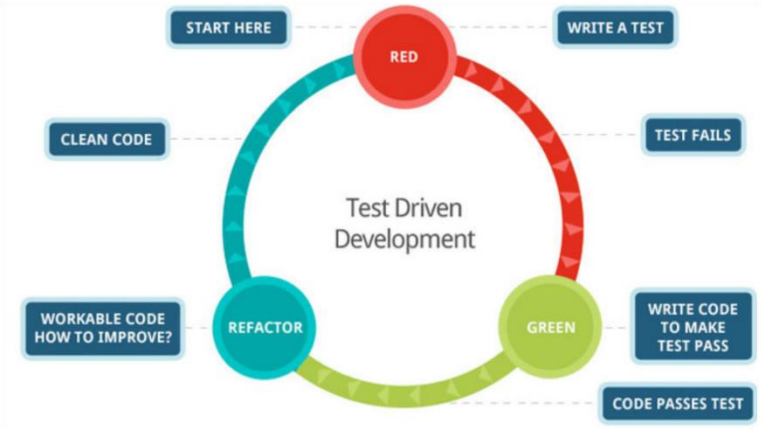

Summary
Class filter
Selected size: 2.6 MB
2.00 s
4.00 s
6.00 s
8.00 s
10.00 s
12.00 s
14.00 s
1.0 MB
Constructor
▶IndexView :: function() @1277071
▶TwitterView :: function() @1223163
▶PublicationsView :: function() @1222673
▶BlogView :: function() @1222249
▶TalksView :: function() @1222529
▶GithubView :: function() @1222813
▶StackoverflowView :: function() @1222389
▶Router :: function() @1275497
▶__ember_meta__ :: @1230639
▶ApplicationView :: function() @1277073
▶PortfolioView :: function() @1222107
▶PublicationsRoute :: function() @1275247
▶StackoverflowRoute :: function() @1275243
▶BlogRoute :: function() @1275241


Take Heap Snapshot
Heap snapshot profiles show memory distribution among your page's JavaScript objects and related DOM nodes.

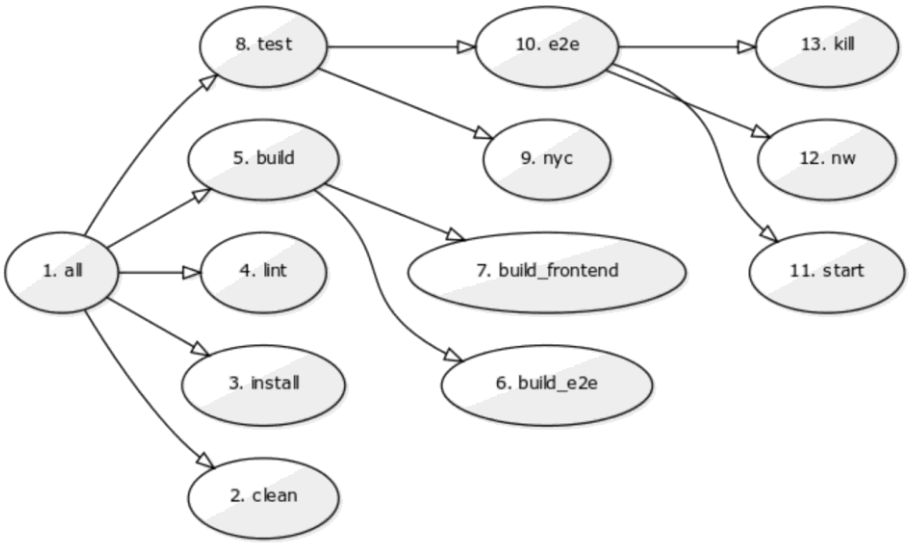

Summary
Class filter
All objects
Constructor
▶Error
▶Window / about:blank
▼u
▶u @1444185
▶u @1438303
▶u @1695301
▶u @1646261
Retainers
Object
▼renderer in function() @1506093
▼PublicationsView in n @1461035
▶app in Window / www.remojansen.com/#/portfolio @1420981
▶source in @1741023
2 in [] @1752981
▶application:main in @1741035
▶application:main in @1741033
▶application:main in @1741031
▶application:main in @1741029
▶[1] in Array @1448393
▶0 in (object properties)[] @1742809
▶1 in (object elements)[] @1480317
▶namespace in n @1740333
▶39 in (object properties)[] @1742819
▶39 in (object properties)[] @1742817
▶39 in (object properties)[] @1742815


DevTools
Devices
Pages
Extensions
Apps
Shared workers
Service workers
Other
Devices
Discover USB devices
Port forwarding...
Discover network targets
Configure...
Open dedicated DevTools for Node
Remote Target #LOCALHOST
Target (v8.1.0)
/Users/remojansen/.nvm/versions/node/v8.1.0/lib/node_module
inspect

Chapter 14: Application Testing



Base 2 Exponent 3 Result 8 Submit



```
  MathDemo
    ✓ Should return result of pow calculation

  MathDemo
before() invoked!
beforeEach() invoked!
    ✓ Should return the correct numeric value for PI
afterEach() invoked!
beforeEach() invoked!
    ✓ Should return the correct numeric value for pow
afterEach() invoked!
beforeEach() invoked!
    ✓ Should return the correct numeric value for pow (async)
afterEach() invoked!
beforeEach() invoked!
    ✓ Should return the correct numeric value for pow (async)
afterEach() invoked!
beforeEach() invoked!
    ✓ Should throw an exception when no parameters passed
afterEach() invoked!
after() invoked!

  Math Service
    ✓ Should be able to HTTP GET /api/math/pow/:base/:exponent

  Calculator Component
    ✓ Should invoke client and set #result value when #submit.click is triggered (90ms)


  8 passing (182ms)
```

File	% Stmts	% Branch	% Funcs	% Lines	Uncovered Lines
All files	82.86	50	73.17	84.25	
02_frontend_testing	90.91	100	66.67	90.91	
jsdom.js	90.91	100	66.67	90.91	8
02_frontend_testing/src/backend	60.34	50	47.37	63.46	
interfaces.ts	0	100	100	0	2
main.ts	0	100	100	0	2,3,4,5,6
math_demo.ts	56.76	50	43.75	59.38	... 62,64,65,75
server.ts	93.33	100	66.67	100	
02_frontend_testing/src/frontend	100	100	100	100	
math_client.ts	100	100	100	100	
02_frontend_testing/test	100	100	100	100	
match_client.test.ts	100	100	100	100	
math_demo.test.ts	100	100	100	100	
pow_service.test.ts	100	100	100	100	

All files

82.88% Statements 121/146 **50%** Branches 2/4 **73.17%** Functions 30/41 **84.09%** Lines 111/132

File		Statements		Branches		Functions		Lines	
02_frontend_testing		90.91%	10/11	100%	0/0	66.67%	2/3	90.91%	10/11
02_frontend_testing/src/backend		61.9%	39/63	50%	2/4	47.37%	9/19	64.91%	37/57
02_frontend_testing/src/frontend		100%	9/9	100%	0/0	100%	2/2	100%	6/6
02_frontend_testing/test		100%	63/63	100%	0/0	100%	17/17	100%	58/58

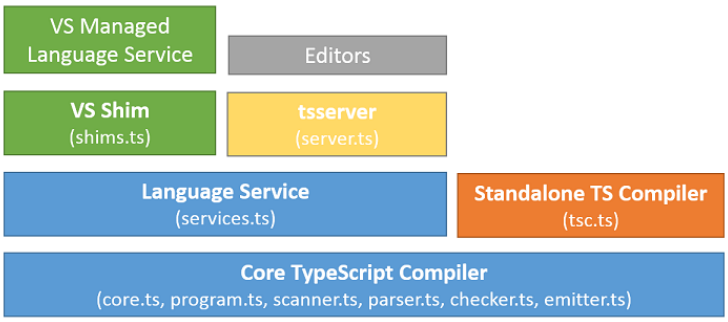
All files / 02_frontend_testing/src/frontend math_client.ts

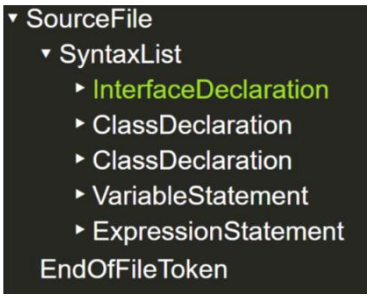
100% Statements 9/9 **100%** Branches 0/0 **100%** Functions 2/2 **100%** Lines 6/6

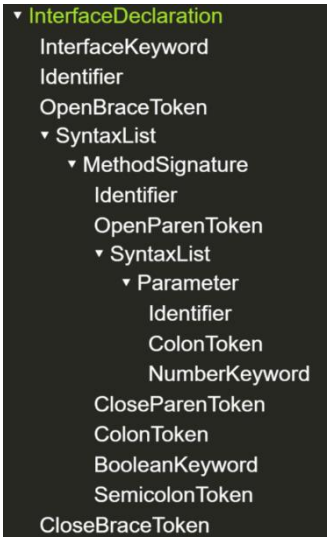
```
1  1x  export class MathClient {
2  1x      public async pow(base: number, exponent: number): Promise<string> {
3  1x          const res = await fetch(`/api/math/pow/${base}/${exponent}`);
4  1x          const json = await res.json();
5  1x          return json.result.toString();
6              }
7  1x  }
8
```

```
> nightwatch --config nightwatch.json


[Src / Backend / Interfaces] Test Suite
=======================================
/Users/remojansen/CODE/LearningTypeScript/chapters/chapter_11/02_frontend_testing
App listening at http://localhost:3000

[Src / Backend / Main] Test Suite
=================================

[Src / Backend / Math Demo] Test Suite
======================================

Running:  MathDemo
No assertions ran.

[Src / Backend / Server] Test Suite
===================================

Running:  getApp
/Users/remojansen/CODE/LearningTypeScript/chapters/chapter_11/02_frontend_testing
No assertions ran.

[Test / Pow E2e] Test Suite
===========================

Running:  Calculator pow e2e test example
 ✔ Element <body> was visible after 84 milliseconds.
 ✔ Testing if the page title equals "Calculator".
 ✔ Testing if element <#base> is visible.
 ✔ Testing if element <#exponent> is visible.
 ✔ Testing if element <#result> contains text: "8".

OK. 5 assertions passed. (2.54s)

OK. 5  total assertions passed. (4.552s)
```

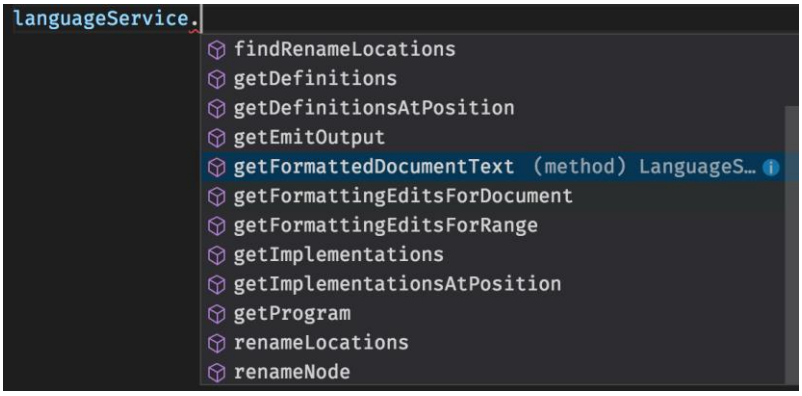
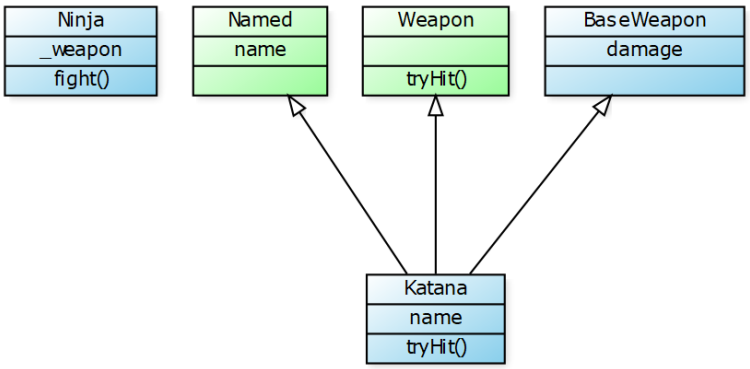
Chapter 15: Working with the TypeScript Compiler and the Language Services







TypeScript AST Viewer

```typescript
interface Weapon {
    tryHit(fromDistance: number): boolean;
}

class Katana implements Weapon {
    public tryHit(fromDistance: number) {
        return fromDistance <= 2;
    }
}

class Ninja {
    private _weapon: Weapon;
    public constructor(weapon: Weapon) {
        this._weapon = weapon;
    }
    public fight(fromDistance: number) {
        return this._weapon.tryHit(fromDistance);
    }
}

const ninja = new Ninja(new Katana());
ninja.fight("5");

```

- SourceFile
  - SyntaxList
    - InterfaceDeclaration
    - ClassDeclaration
    - ClassDeclaration
    - VariableStatement
    - ExpressionStatement
  - EndOfFileToken