

# All Aboard the Type Train

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Formidable



# Why this talk?



Why add types to JavaScript?

Should you use Flow or TypeScript?

... or something else entirely!



# All programming languages have a type system

The difference is *when* the type-  
checking is done



# Strong vs Weak

Languages are often colloquially referred to as *strongly typed* or *weakly typed*.

There is no universally accepted definition of what these terms mean.



# Static vs Dynamic

## Static (e.g. Go, C#, Haskell)

Types are checked before run-time

## Dynamic (Python, Lua, Objective C)

Types are checked at run-time, during execution

JavaScript is a Dynamically Typed language



# Static typing

(not JavaScript)

## Pros

More errors found earlier in development

Fewer errors at run-time and shipped code

No need to write tests for "type-correctness"

## Cons

Verbose type declarations

Complex error messages

Excessive boilerplate



# Dynamic typing

(e.g. JavaScript)

## Pros

Reduces clutter and repetition in code

Implicit polymorphism (the ability to write a single function that handles many data-types)

## Cons

More errors detected during run time and in shipped code

Need to write tests for type correctness





# DISCLAIMER!

Additional type-checking  
will not make code bug-free

It is **not** a replacement for testing your code

It **only** helps reduce **type errors**



# How to make JavaScript more type-safe?

1.

Static code analysis

2.

Statically typed language that  
compiles to JavaScript



# Flow - static type checker

Infers type information from existing code

```
const four = 4;  
const result = four.split('');
```

Cannot call four.split because property split is missing in Number.

You can choose to enforce types

```
function randomString(): string {  
  return 4;  
}
```

Cannot return 4 because number is incompatible with string.



2. Statically typed language that compiles to JavaScript

# TypeScript - a superset of JavaScript

Microsoft 2012

Infers type information from existing code

```
const four = 4;
const result = four.split('');
```

[ts] Property 'split' does not exist on type '4'. [2339]

any

You can choose to enforce types

```
function foo(): string {
  return 4;
}
```

[ts] Type '4' is not assignable to type 'string'. [2322]

(VSCode, with TypeScript plugin)



# Adding to an existing codebase

## Flow

"Opt in" by adding a flow declaration at the top of the file

```
// @flow
```

## TypeScript

TS is a superset of JS (so any valid JS file is also a valid TS file)

But you do have to change the file extension to .ts





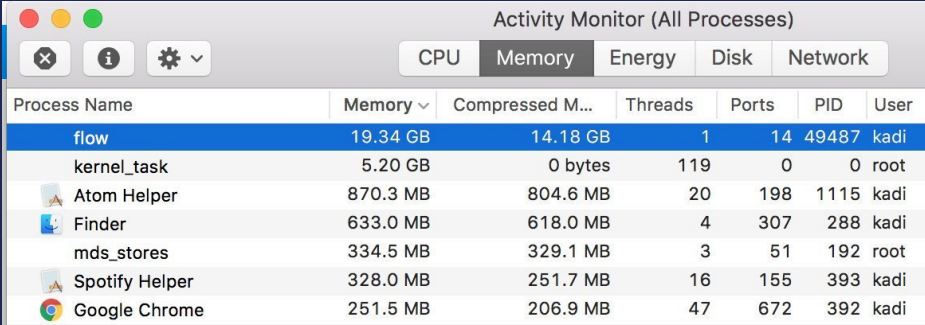
# Performance

## Flow

Usually fast, but notoriously unstable

## TypeScript

Slow to recompile on large projects



The screenshot shows the 'Activity Monitor (All Processes)' window with the 'Memory' tab selected. The table below lists the memory usage for several processes. The 'flow' process is highlighted in blue and is using 19.34 GB of memory.

| Process Name   | Memory   | Compressed M... | Threads | Ports | PID   | User |
|----------------|----------|-----------------|---------|-------|-------|------|
| flow           | 19.34 GB | 14.18 GB        | 1       | 14    | 49487 | kadi |
| kernel_task    | 5.20 GB  | 0 bytes         | 119     | 0     | 0     | root |
| Atom Helper    | 870.3 MB | 804.6 MB        | 20      | 198   | 1115  | kadi |
| Finder         | 633.0 MB | 618.0 MB        | 4       | 307   | 288   | kadi |
| mds_stores     | 334.5 MB | 329.1 MB        | 3       | 51    | 192   | root |
| Spotify Helper | 328.0 MB | 251.7 MB        | 16      | 155   | 393   | kadi |
| Google Chrome  | 251.5 MB | 206.9 MB        | 47      | 672   | 392   | kadi |



# Community

## Flow (by Facebook, 2014)

facebook / flow

Watch 435 Star 19,344 Fork 1,642

Code Issues 2,414 Pull requests 82 Projects 0 Wiki Insights

Adds static typing to JavaScript to improve developer productivity and code quality. <https://flow.org/>

8,550 commits 85 branches 132 releases 624 contributors MIT

Detailed description: This screenshot shows the GitHub repository for Facebook's Flow project. At the top, it identifies the repository as 'facebook / flow'. On the right, there are buttons for 'Watch' (435), 'Star' (19,344), and 'Fork' (1,642). Below these are navigation tabs for 'Code', 'Issues' (2,414), 'Pull requests' (82), 'Projects' (0), 'Wiki', and 'Insights'. The main description states: 'Adds static typing to JavaScript to improve developer productivity and code quality.' followed by the URL 'https://flow.org/'. At the bottom, a statistics bar shows: 8,550 commits, 85 branches, 132 releases, 624 contributors, and MIT license. A green progress bar is visible at the very bottom of the repository view.

## TypeScript (by Microsoft, 2012)

Microsoft / TypeScript

Watch 2,083 Star 47,943 Fork 6,662

Code Issues 3,604 Pull requests 166 Projects 5 Wiki Insights

TypeScript is a superset of JavaScript that compiles to clean JavaScript output. <https://www.typescriptlang.org>

typescript javascript language typechecker

27,297 commits 313 branches 97 releases 373 contributors Apache-2.0

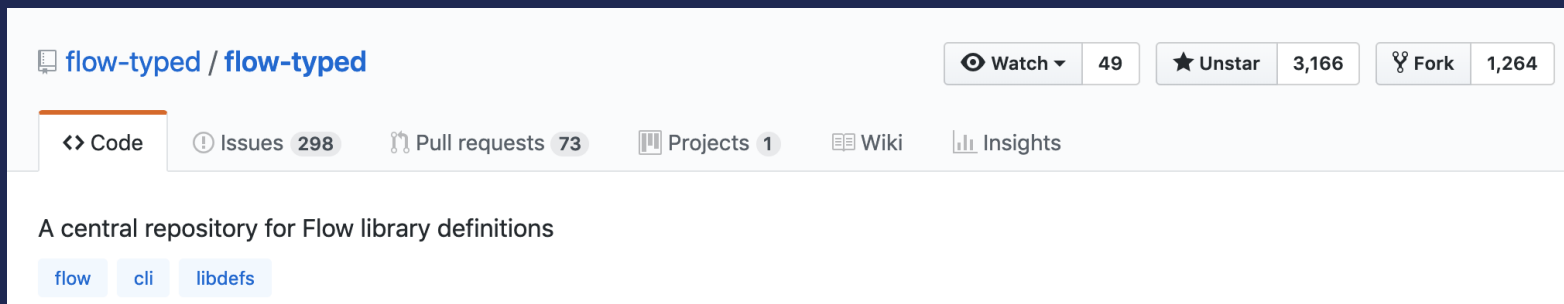
Detailed description: This screenshot shows the GitHub repository for Microsoft's TypeScript project. At the top, it identifies the repository as 'Microsoft / TypeScript'. On the right, there are buttons for 'Watch' (2,083), 'Star' (47,943), and 'Fork' (6,662). Below these are navigation tabs for 'Code', 'Issues' (3,604), 'Pull requests' (166), 'Projects' (5), 'Wiki', and 'Insights'. The main description states: 'TypeScript is a superset of JavaScript that compiles to clean JavaScript output.' followed by the URL 'https://www.typescriptlang.org'. Below the description are tags: 'typescript', 'javascript', 'language', and 'typechecker'. At the bottom, a statistics bar shows: 27,297 commits, 313 branches, 97 releases, 373 contributors, and Apache-2.0 license. A dark green progress bar is visible at the very bottom of the repository view.





# Typing Node Modules

## Flow



flow-typed / flow-typed

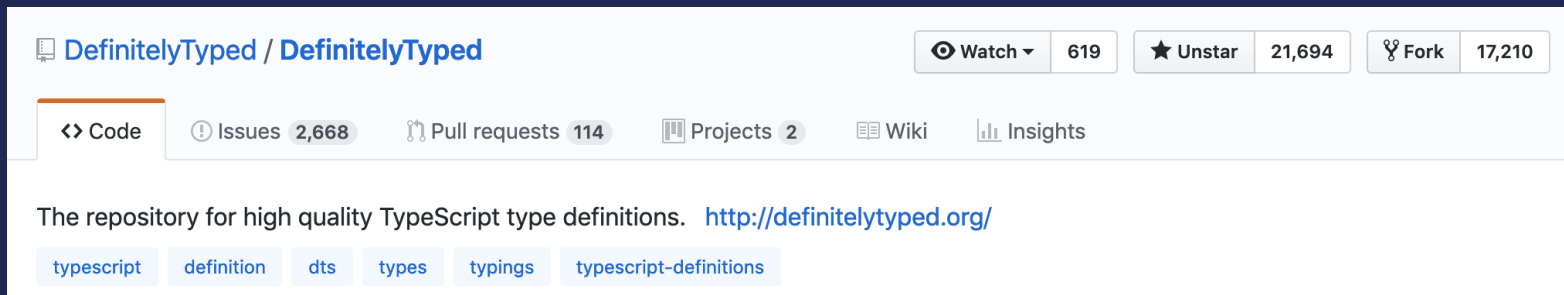
Watch 49 Unstar 3,166 Fork 1,264

Code Issues 298 Pull requests 73 Projects 1 Wiki Insights

A central repository for Flow library definitions

flow cli libdefs

## TypeScript



DefinitelyTyped / DefinitelyTyped

Watch 619 Unstar 21,694 Fork 17,210

Code Issues 2,668 Pull requests 114 Projects 2 Wiki Insights

The repository for high quality TypeScript type definitions. <http://definitelytyped.org/>

typescript definition dts types typings typescript-definitions



# So why are a lot of projects moving to TypeScript?

Larger community

Faster release cycle

More reliable

The features that made flow "better" have been implemented in TypeScript



# What you should know before jumping on the TypeScript "Type Train"

For best results, use **VSCode**

tslint (the TypeScript linter) will be deprecated in 2019

So use **typescript-eslint**

Be prepared for a lot of Object Oriented influence

TypeScript is a **compiled language**, not a static type-checker -  
if you have type errors in your code, **it will not compile**



# *"Why not just use a proper statically typed language?"*



**Elm** (2012 by Evan Czaplicki)

Compiled, statically typed, type declarations are optional, purely functional.



**ReasonML** (2016 by Jordan Walke at Facebook)

Transpiles to OCaml which compiles to JS, statically typed



Thank You 🙌

All Aboard the Type Train

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