
JavaScript can feel messy!


We want maintainable code

JavaScript Code Encapsulation

Function Spaghetti Code

Ravioli Code
(JavaScript Patterns)

JavaScript Dynamic Types

- **JavaScript provides a dynamic type system**

- **The Good:**
  - Variables can hold any object
  - Types determined on the fly
  - Implicit type coercion (ex: string to number)

- **The Bad:**
  - Difficult to ensure proper types are passed without tests
  - Not all developers use ===
  - Enterprise-scale apps can have 1000s of lines of code to maintain

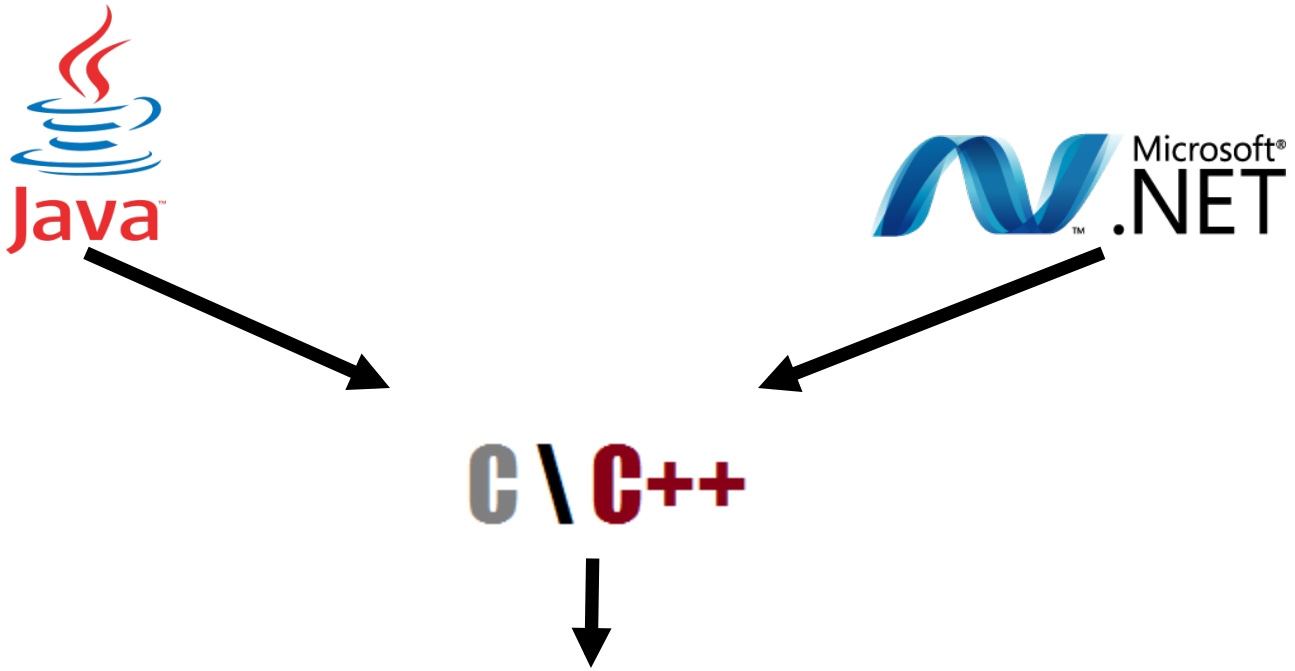
Migrating from Server-Side to Client-Side

- **Migrating from server-side apps to client-side apps can be challenging**

What are the Alternatives?

- **Several TypeScript alternatives exist:**
  - Write pure JavaScript
  - Apply JavaScript patterns
  - CoffeeScript – http://coffeescript.org
  - Dart – http://dartlang.org

Shouldn't we Simply Write Plain JavaScript?




```
START:  JUMP    LOOP        # jump past sensor and constant locations
RSV:    0000                # read right sensor value here
LSV:    0000                # read left sensor value here
RMP:    0000                # write right motor power level here
LMP:    0000                # write left motor power level here
OFF:    0000                # store motor-off constant here
ON:     0100                # store motor-on constant here
LOOP:   LOAD    1     RSV   # load right sensor value into register 1
        LOAD    2     LSV   # load left sensor value into register 2
        SUB     1  2  3     # subtract 1 from 2 and store result in 3
        LOAD    1     OFF   # load motor-off constant into register 1
        LOAD    2     ON    # load motor-on constant into register 2
        BRANCH  3     RGT   # if the left sensor is greater than the
LFT:    STORE   2     RMP   # right then turn the right motor on
        STORE   1     LMP   # and turn the left motor off
        JUMP    LOOP        # and then jump to beginning of the loop
```

What is TypeScript?

"TypeScript is a typed superset of JavaScript that compiles to plain JavaScript.“ ~ typescriptlang.org

Flexible Options

Any Browser

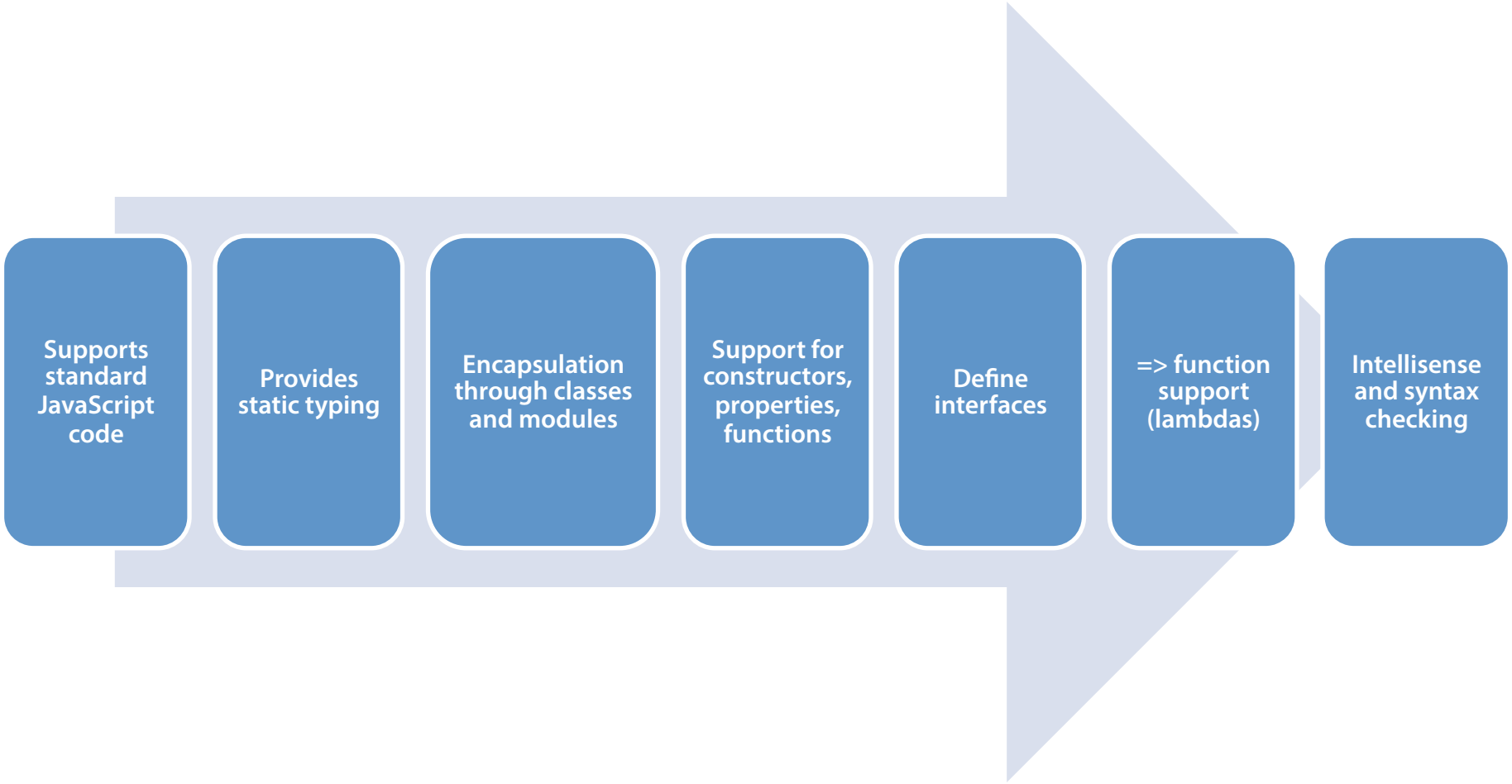
Any Host

Any OS

Open Source

Tool Support

Key TypeScript Features



TypeScript Compiler

tsc first.ts

TypeScript → JavaScript

TypeScript

JavaScript

Encapsulation

Static Typing

```
class Greeter {
    greeting: string;
    constructor (message: string) {
        this.greeting = message;
    }
    greet() {
        return "Hello, " + this.greeting;
    }
}
```

```
var Greeter = (function () {
    function Greeter(message) {
        this.greeting = message;
    }
    Greeter.prototype.greet = function () {
        return "Hello, " + this.greeting;
    };
    return Greeter;
})();
```

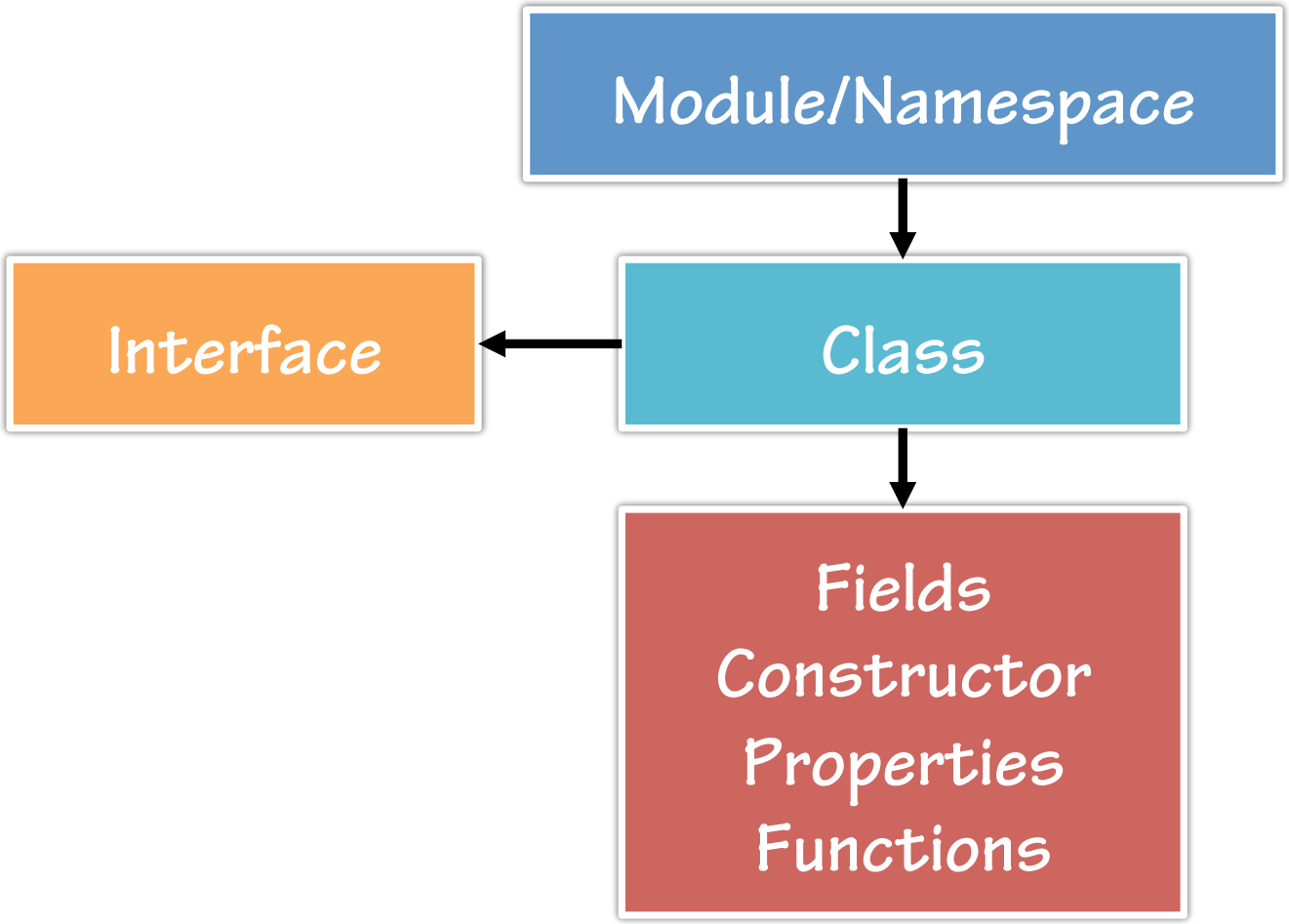
TypeScript Syntax Rules

- **TypeScript is a superset of JavaScript**
- **Follows the same syntax rules:**
  - { } brackets define code blocks
  - Semi-colons end code expressions
- **JavaScript keywords:**
  - for
  - if
  - More..

Important Keywords and Operators

Keyword	Description
class	Container for members such as properties and functions
constructor	Provides initialization functionality in a class
exports	Export a member from a module
extends	Extend a class or interface
implements	Implement an interface
imports	Import a module
interface	Defines code contract that can be implemented by types
module / namespace	Container for classes and other code
public/private	Member visibility modifiers
...	Rest parameter syntax
=>	Arrow syntax used with definitions and functions
<typeName>	< > characters use to cast/convert between types
:	Separator between variable/parameter names and types

Code Hierarchy



Tool/Framework Support

Node.js

Sublime

Emacs

Vi

Visual Studio

TypeScript Playground

TypeScript PREVIEW

learn | play | get it | run it | join in

TypeScript | Walkthrough: Classes

```typescript

class Greeter
{
    greeting: string;
    constructor (message: string)
    {
        this.greeting = message;
    }
    greet()
    {
        return "Hello, " + this.greeting;
    }
}

var greeter = new Greeter("world");

var button = document.createElement('button')
button.innerText = "Say Hello"
button.onclick = function() {
    alert(greeter.greet())
}
```

Run | JavaScript

```javascript
var Greeter = (function () {
    function Greeter(message) {
        this.greeting = message;
    }
    Greeter.prototype.greet = function () {
        return "Hello, " + this.greeting;
    };
    return Greeter;
})();
var greeter = new Greeter("world");
var button = document.createElement('button');
button.innerText = "Say Hello";
button.onclick = function () {
    alert(greeter.greet());
};
document.body.appendChild(button);

```

Summary

- **TypeScript is an open source language that compiles to JavaScript**

- **Key features:**
  - Code encapsulation
  - Type support

- **Supports multiple tools:**
  - Node.js
  - Sublime (and others)
  - Visual Studio