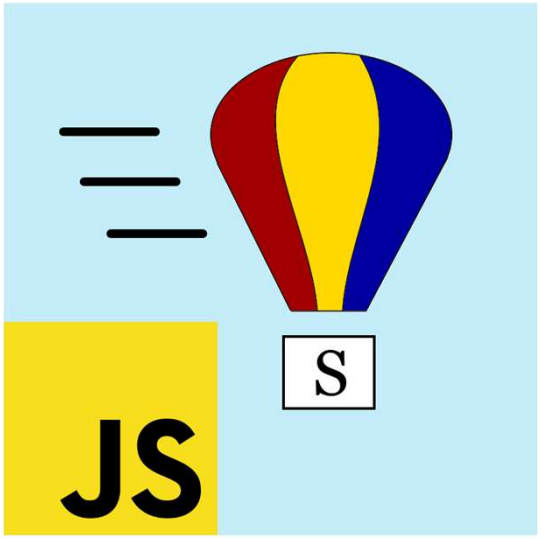
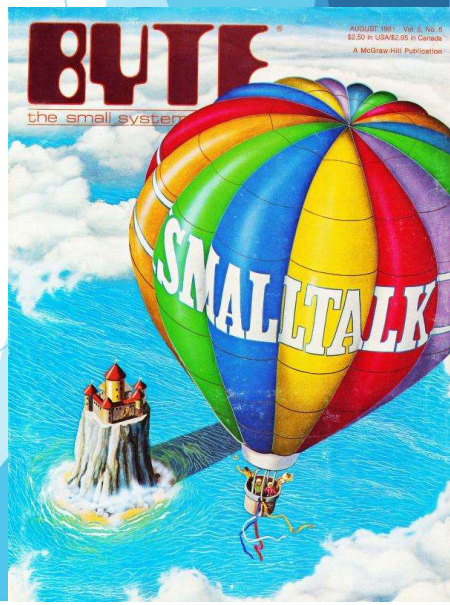
SmallJS

Back to elegance

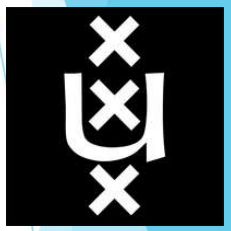
by:
Richard Ronteltap



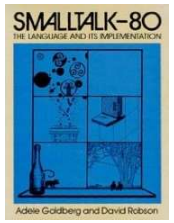


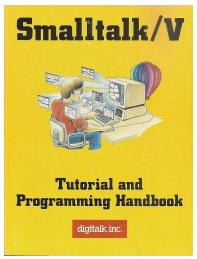
Website: small-js.org

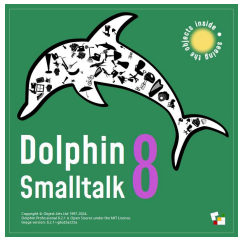
About the author



- My name is **Richard Ronteltap**
  (Yes, that *is* a bit of a strange last name :)
- Live in Amsterdam, The Netherlands
- Studied Computer Science at the University of Amsterdam
  where I met my wife (she insisted I say this :),
  where I work as an IT department head.
- My CS thesis in '93 was on OO databases,
  with a query optimizer written in Smalltalk-80.
- I also discovered: Smalltalk/V, Dolphin, Pharo, Amber...







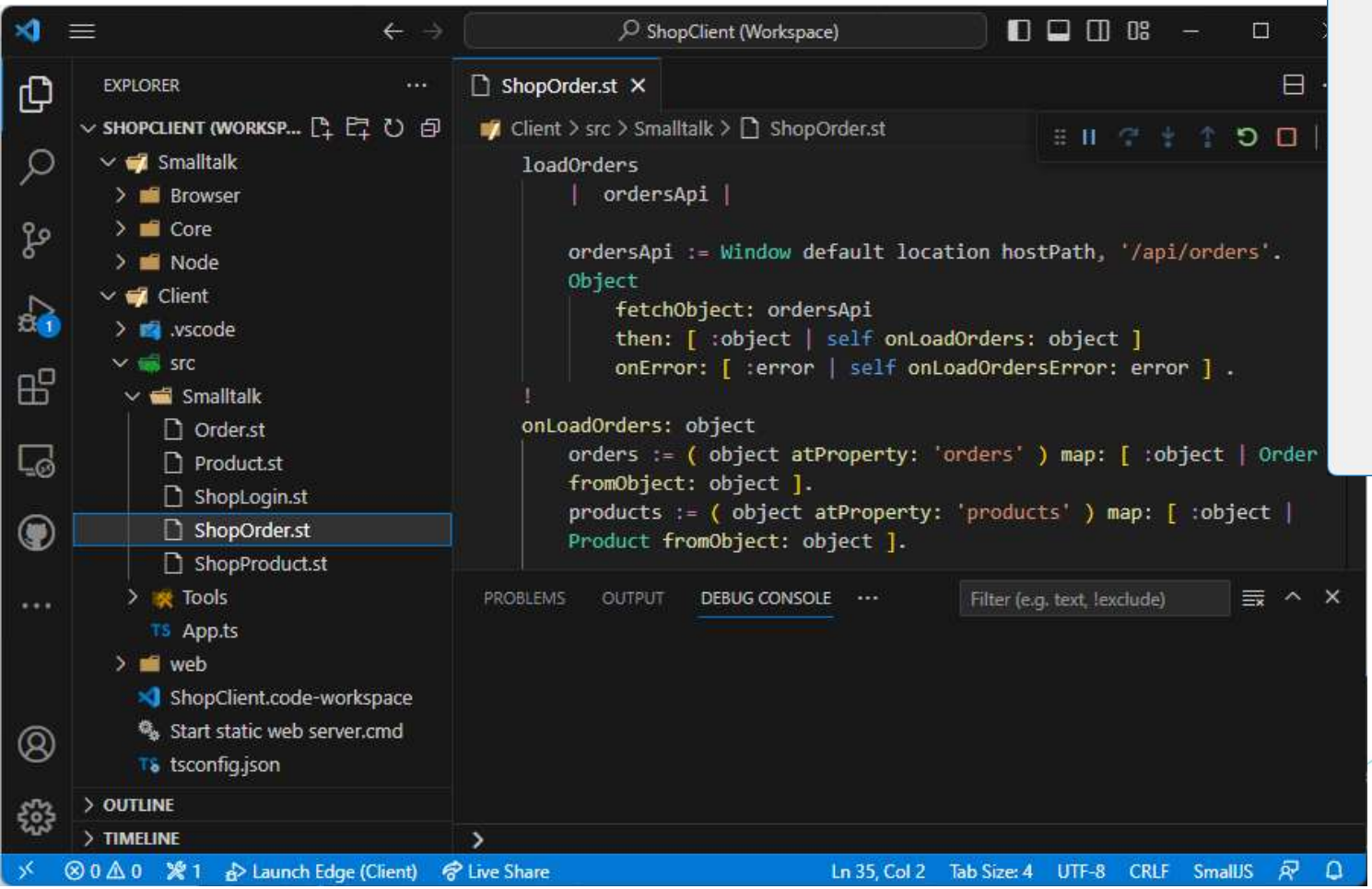
What is SmallJS?

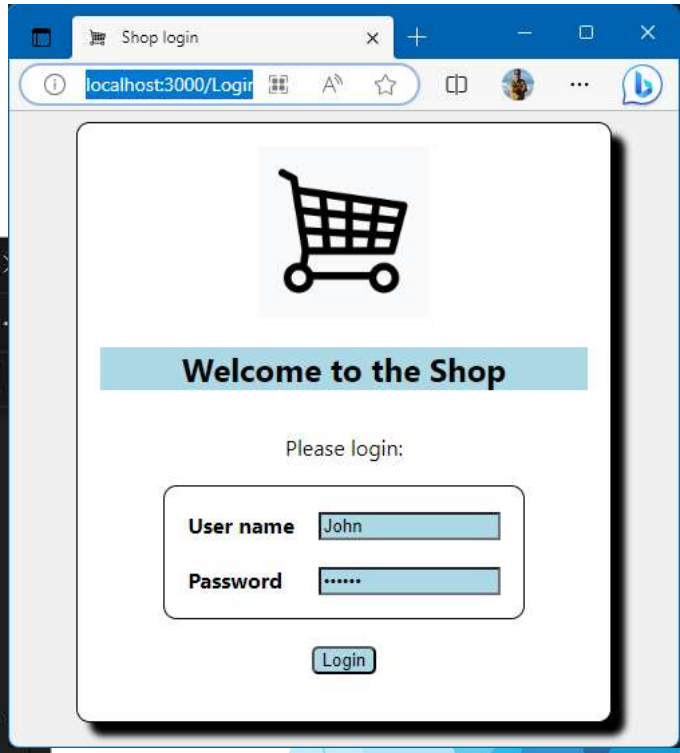
- Transpiler from Smalltalk to efficient, lightweight JavaScript.
- JS code runs in modern browsers ***and*** in Node.js.
- Smalltalk-80 language syntax support
  - Class and method names left like familiar JS.
- Source file based (not image based).
- Development in Visual Studio Code IDE
  - With syntax coloring and step debugging!
- Built-in unit-testing and GUI-testing (browser).
- Playground available (local or on small-js.org).
- Completely free and open source.

Why make SmallJS?

- Develop modern apps in ST, specifically web apps,
  using the same language for the front-end and the back-end.
- Promote the elegant Smalltalk language
  specifically to JS, TS, PHP, and Python devs,
  who don't know what they're missing... :)
- Looked at: Amber Smalltalk, PharoJS, Seaside
  But though it could be more JS native and integrated.
  With a few trade-offs.
- And a ***separate*** IDE and a modular image don't seem so bad...

How does it look?





Playground

(live demo possible)

Playground

Help

Enter any Smalltalk expression or statements below and then press [>Evaluate]. For more help on the syntax of SmallJS, look at Smalltalk.md

Some examples:

```
'Hello, ' , 'World' , $! toString
1 + 2 < 4 ifTrue: [ 'smaller' ]
#( 1 2 3 ) map: [ :n | n squared ]
| a |  a := 4.  a squared.
```

Expression

```
#( 1 2 3 ) map: [ :n | n squared ]
```

▷ Evaluate

Result

```
#( 1 4 9 )
```

Note:
It's not an IDE in your browser, because VSCode is much nicer and compiling is lightning quick :)

SmallJS library - Core

- Basic ST classes you'd expect.
- Full ST magnitude (number) hierarchy.
  - With also: BigInt, Fraction, Date, Point(3D), Rect.
- Events, streams, fetch.
- Async & await.
- Unit test framework
  - That auto-finds new test classes and methods.

SmallJS library - Browser

- ✓ HTML base classes like: Document, Window, Location.
- ✓ All common HTML elements.
- ✓ CSS styles and rules.
- ✓ Full Canvas 2D support for drawing.
- ✓ Lightweight HTML component system to easily create SPAs.
- ✓ Desktop app support using Electron or NodeGui !
- ✓ Example apps to get you started quickly.

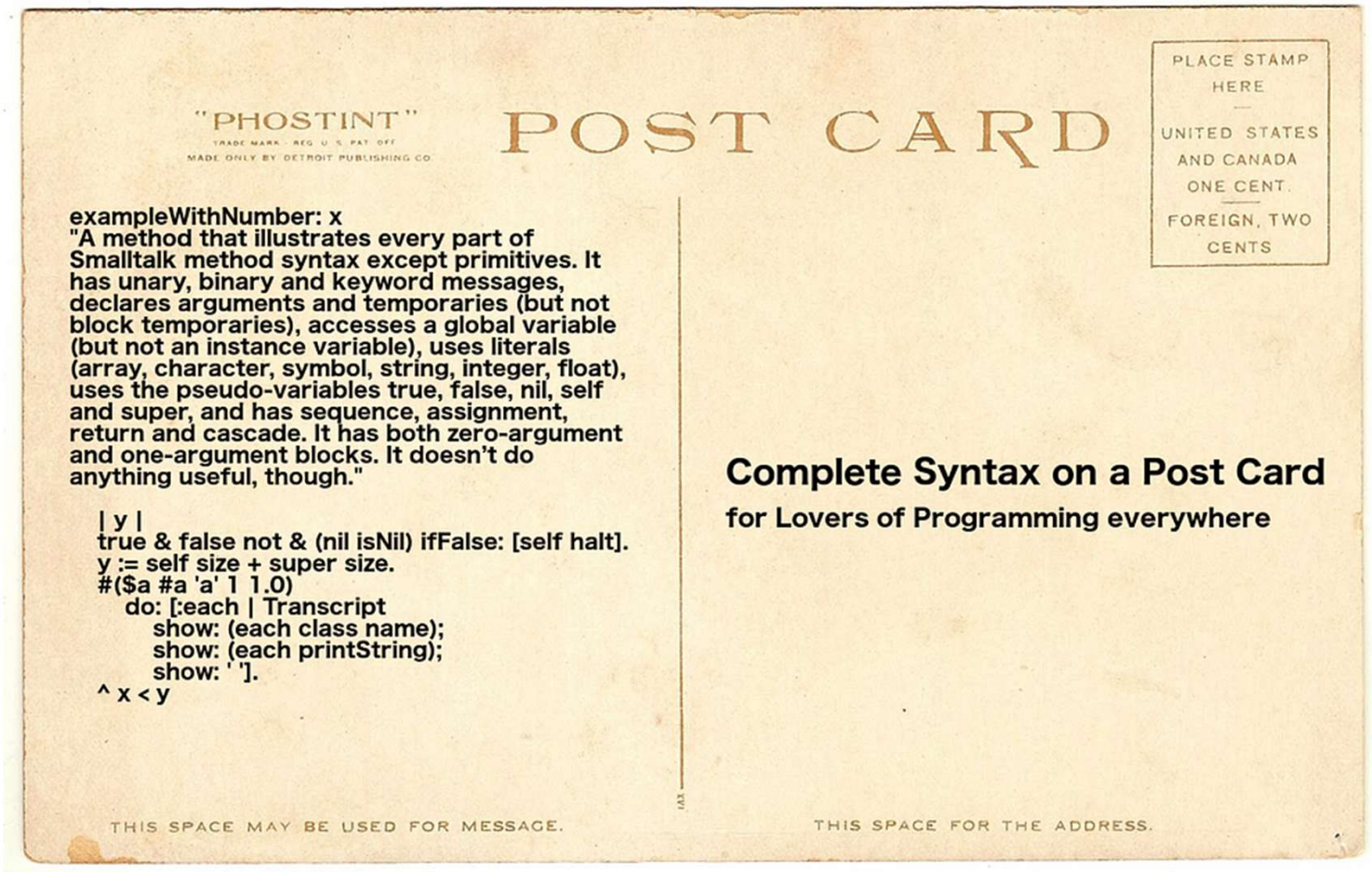
SmallJS library - Node.js

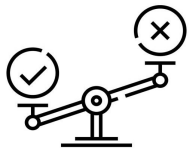
- HTTP server, ExpressJS.
- Worker threads, File.
- Databases: SQLite, Postgres, MariaDB, MySQL .
  - With an ORM for easy CRUD operations on objects.
- AI: Ollama, OpenAI, Deepseek, Google AI, Anthropic.
  - With shared classes for browser clients.
- Example apps to get you started quickly.

Why use SmallJS?

- The Smalltalk language syntax fits on a postcard
- Objects all the way down
  - Customizable on every level.
    Need to add a complex number type? Easy.
- Well defined behaviors, compared to JS.
  - Integers are really integers. Controlled type conversions.
- Uses familiar JS names and functionality
- Seamless integration of ST with JS/TS and HTML/CSS.

Smalltalk's syntax fits on a postcard





Code example ST vs JS

SmallJS

Code:

```
squared
  ^ self * self.
```

Call with > result:

```
10 squared          > 100
1.5 squared         > 2.25
( 1 / 3 ) squared   > ( 1 / 9 )
99999999 squared    > right answer, BigInt
‘s’ squared         > error, stops
```

> Number is a base class for Integer, Float, Fraction and BigInt, but not String.

JavaScript

Code:

```
NumUtil.squared( n )
  { return n * n; }
```

Call with > result:

```
NumUtil.squared( 10 )          > 100
NumUtil.squared( 1.5 )         > 2.25
NumUtil.squared( 1 / 3 )       > 0.1111111111111
NumUtil.squared( 99999999 )    > wrong answer, float
NumUtil.squared( ‘s’ )         > NaN, continues
```

> No (safe) integers, no fractions, BigInt not integrated, error prone type coercion.

But what about new JS/TS features?

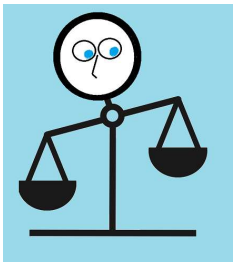
JS feature	ST solution
functional programming	Don't use state vars. Use array iterators for list processing.
interface	Abstract base class
record, tuple, immutable	Class with only getters
decorator	Pass anonymous function (block)
static	Class method
private	No getter method
variable argument list	Array
optional argument	Extra 1-line method
import / export	Automatic
async / await	Implemented, unfortunately.
type checking	Add type hints like Python? (todo...)

The philosophy is that retaining simplicity is worth some extra lines of encapsulated code.

Traditional Smalltalks vs SmallJS

(E.g.: Pharo, Dolphin, Cincom, Squeak)

- File-based (not image-based)
  - Easy source control in clear hierarchy. IDE safely separate from code.
  - Modular class loading iso unsafe image stripping.
  - Can use rich and familiar IDE (VSCode).
  - Focus on your ***project*** files, that are separated from the library (image).
- Run anywhere
  - One language for front-end and back-end apps in all browsers and Node.js. So also runs on mobile devices.
- Integrates smoothly with the rich JS ecosystem
  - Typically 1 line of interfacing code per encapsulated JS method.
  - ST can call JS and vice versa.
  - Newly available JS features and libraries can be integrated quickly.



SmallJS / ST trade-offs

- ST is dynamically typed
  - An IDE enhancement cloud help here.
  - And optional typing like TS is an idea...
- Debugging integrated with JS
  - Would making a VSCode Language Server be worth it?
  - Now you can easily see what's really going on..
- Tiny community, currently... :-)

SmallJS summary

- **Elegant and safe Smalltalk language!**
- Integrates tightly with JS in browser and Node.js.
- Familiar JS class and method names in both.
- Use it with your favorite IDE.
- Incremental use possible, mix and match with JS/TS.

Examples - basic

With live demo's & code inspection

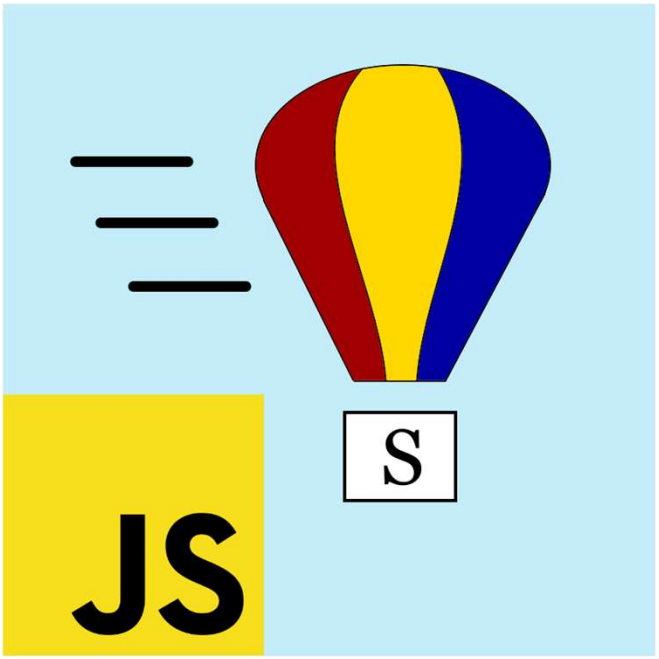
App	Notes
Counter	Standard minimal example web app.
Todo	Todo list web app with CRUD operations, sorting and multi-language support.
Balls	Colorful bouncing balls, using the HTML Canvas 2D API, which is fully supported.
Shop	Basic web shop front-ends, traditional and as SPA and back-end, with database support on SQL ORM mapper.

Examples - advanced

With live demo's & code inspection

App	Notes
Benchmark	Number crunching in SmallJS for primes, Fibonacci, Pi.
WebWorkers	True multithreading using the Web Workers API. (Node 'worker threads' are also supported)
Electron	Platform independent desktop apps, when you don't care about memory and complexity :)
NodeGui (QT)	Platform independent desktops apps, when you ***do*** care about memory usage and simplicity.
Pharo	SmallJS web client with Pharo web server using Zinc, so quite standard on both sides.

Any questions?



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