If we are going to transpile JavaScript, why not use ClojureScript?

Shivek Khurana

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About me

- Apps since 2008, Clojure since 2017
- Consultant at Juxt Inc.
- Enterprise Apps
- Currently building a system for Vodafone

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Built an LMS from 2012 to 2016

Long projects == Living with your past mistakes

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Followed best practices

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JS ecosystem was maturing in 2012

Is it mature now?

rollup.js

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JS Community Conundrum

Enthusiatic
Community

Abandoned
Libs & Ideas

$$LI + EC = HVOD + C$$

Language
Imperfections

High Velocity
Open Source
Development

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Stablity

- Add new features after periods of inactivity

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Clojure/Script

LISP Functional Immutable Homoiconic

Thread Safe Dynamically typed Hosted

Joy to use

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Clojure/Script Crash Course

All the best games are easy to learn and difficult to master.

— Nolan Bushnell (Founder, Atari)

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;; Native Data Types

;; Character

```
\a
\b
\newline
\tab
```

;; String

```
“hello”
“line 1\nline2”
```

;; Keywords

```
:keyword
```

;; Regex

```
#”[a-z]+”
```

;; Bool

```
true, false
```

;; Nothing

```
nil
```

;; Number

```
255 ;; int
012 ;; octal
0xff ;; hex
2r1111 ;; radix
3.14 ;; standard float
1.35e-12 ;; scientific float
22/7 ;; fraction
```

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U:--- *scratch* All L1 [(Lisp Paredit)]

;; List

```
;; function calls are written as a list
(max 1 2) ;; => 2

;; to not call the first element
(list 1 3 5) ;; => (1 3 5)
'(1 3 5) ;; => (1 3 5)
(quote (1 3 5)) ;; => (1 3 5)
```

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U:— — — * scratch * All L1 [(Lisp Paredit)]

;; Vector, Sets & Maps

```
[1 2]
[1, 2]

(vector 1 2)
```

```
#{1 3}

(set 1 2)
```

```
{:name “Shivek”
 :age 24
 [:a :b] :c
 {:alpha “b”} :kappa}
```

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;; LISP – LISt Processing

```
'(1 2 3)

(+ 1 2 3)

(defn sum [a b]
  (+ a b))
```


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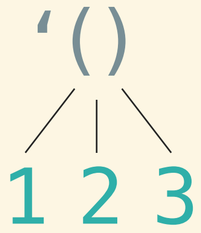
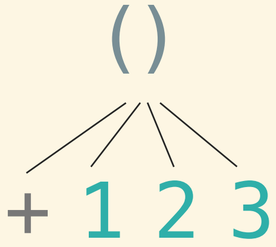
;; LISP

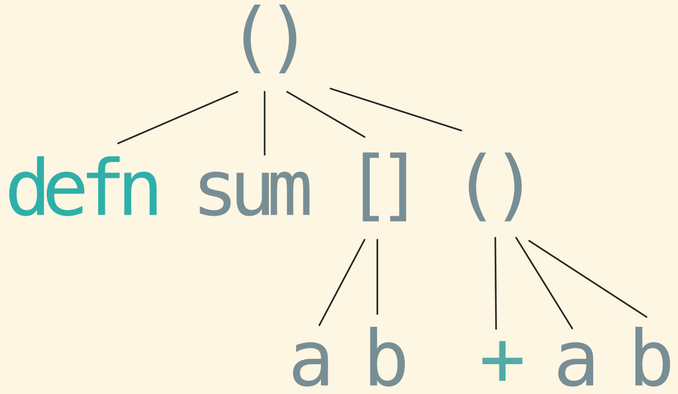
```
‘(1 2 3)

(+ 1 2 3)

(defn sum [a b]
  (+ a b))
```







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U:— — — * scratch * All L1 [(Lisp Paredit)]

;; Functional

```clojure
(defonce person
  {:name "Vienaa"
   :age 24})

(get person :name)
(get person :age)
```

```javascript
class Person {
  init(name, age) {…}
  getName() => {…}
  getAge() => {…}
}

const v = Person("Viena", 24)
v.getName()
v.getAge()
```

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U:— - - * scratch * All L1 [(Lisp Paredit)]

;; Immutable

```
(defonce count 0)
(inc count) ;; => 1
count ;; => 0
```

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U:— - - * scratch * All L1 [(Lisp Paredit)]

;; Atoms
;; thread safe/ mutable constructs

```
(defonce count (atom 0))
(swap! count inc) ;; => 1
count ;; => 1
(reset! count 4) ;; => 4
count ;; => 4
```

```
;; Homoiconic
;; Code is data

'(1 2 4)

[2 1]

(defn sum [a b] (+ a b))
```


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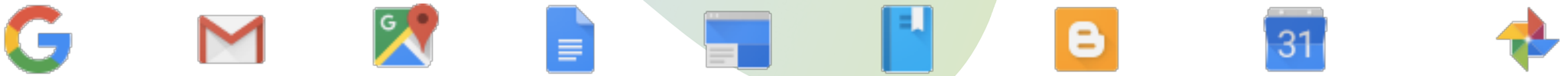
Compiles to JavaScript using Google Closure Compiler



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Google Closure Compiler

- In prod for 10+ years
- Compiles JS to better JS

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Google Closure Library

- Google’s Standard Lib for JS
- Cross Platform

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;; Interop with JS

```
(.getElementById js/document "root")

(new js/FormData)

(.-height js/window)

(clj->js {:hello :world})
```

```
document.getElementById(“root”)

new FormData()

window.height

#js {:hello “world”}
```

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;; Consuming NPM Packages

```
(:require ["react-dom/server" :refer [renderToString]])

(renderToString react-element)
```


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;; Write Node Libs

```
(ns demo.lib)
(defn hello []
  (prn "hello")
  "hello")
```

```
{...
 :builds {:library {:target     :node-library
                    :output-to "out/demo-library/lib.js"
                    :exports    {:hello demo.lib/hello}}}}
```

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U:— - - * scratch * All L1 [(Lisp Paredit)]

;; Write Node Libs

```
$ cd out/demo-library
$ node
> var x = require('./lib');
undefined
> x.hello()
hello
'hello'
```

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U:— - - * scratch * All L1 [(Lisp Paredit)]

;; Write NPM Packages

```
(defn ^:export my-function [] ...)
```

```
U:--- *scratch*   All  L1    [(Lisp Paredit)]
```

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;; HTML/React Components
;; using Hiccup

```
(defn Settings [username realname email]
  [:div {:class “pa2 ma3”}
    [:h3 username]
    [:div realname]
    [:div email]
    [:button {:onClick #()} “Edit”]])
```

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U:— - - * scratch * All L1 [(Lisp Paredit)]

;; JS Equivalent

```
function Settings(username, realname, email) {
  return (<div class="pa2 ma3">
    <h3>{username}</h3>
    <div>{realname}</div>
    <div>{email}</email>
    <button onClick={() => {…}}>Edit</button>
  </div>);
}
```

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REPL

Developing inside the Runtime

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Observation Driven Dev

Text Editor

Runtime (Browser)

Code

Transpile +
Hot Swap

Updated App

Perform Actions

Observe

Code

Updated App

Perform Actions

Observe

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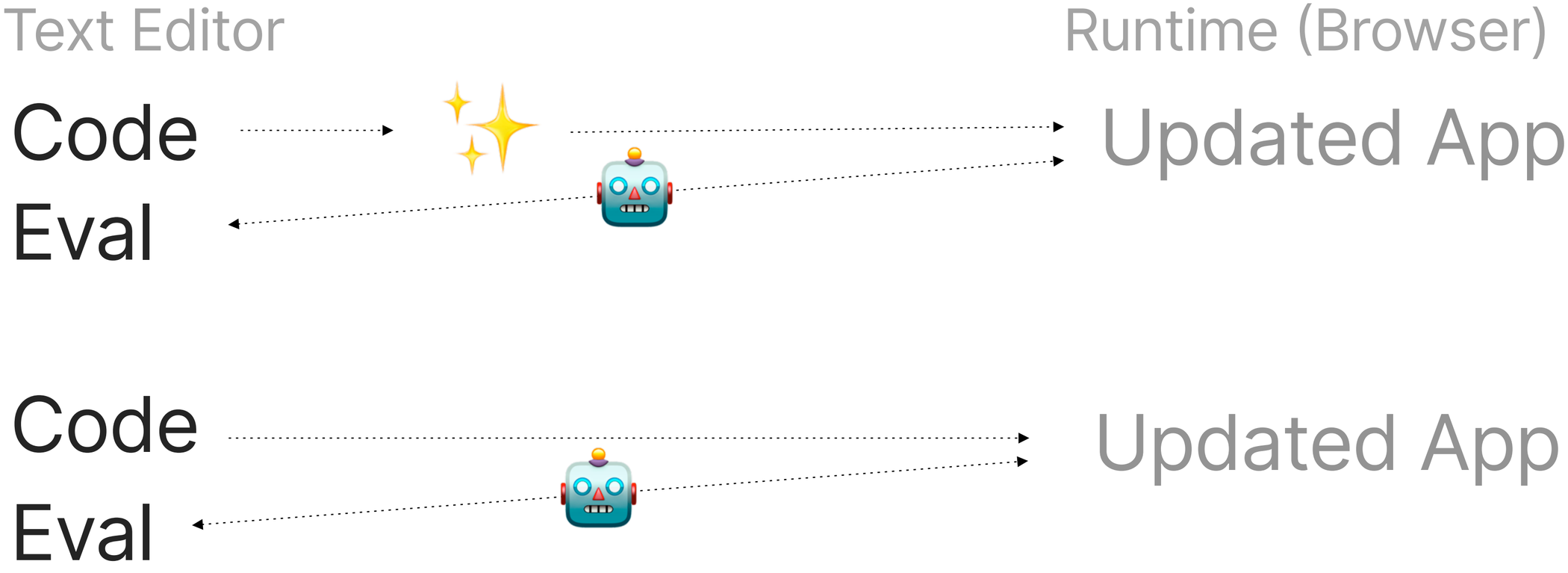
REPL Driven Dev



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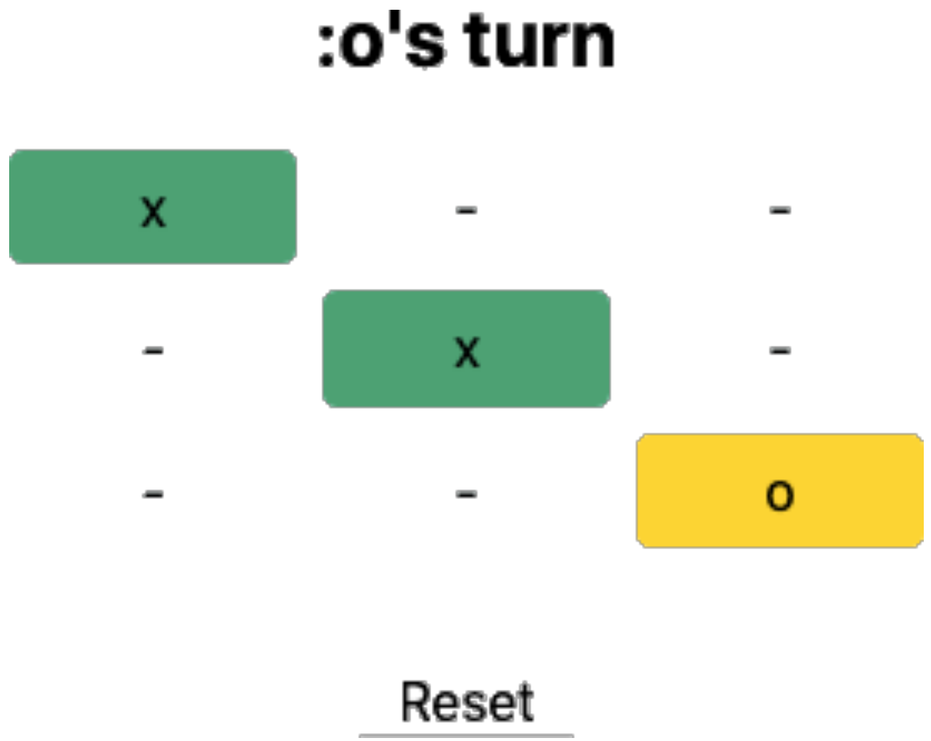
REPL Demo - Tic Tac Toe

State

```
Lattice
[[:x nil nil]
 [nil :x nil]
 [nil nil :o]]

Turn :o
```


React



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With REPL - Develop only a function

- Precisely load the relevent function
- Test with inline feedback
- Rich Comments in git history

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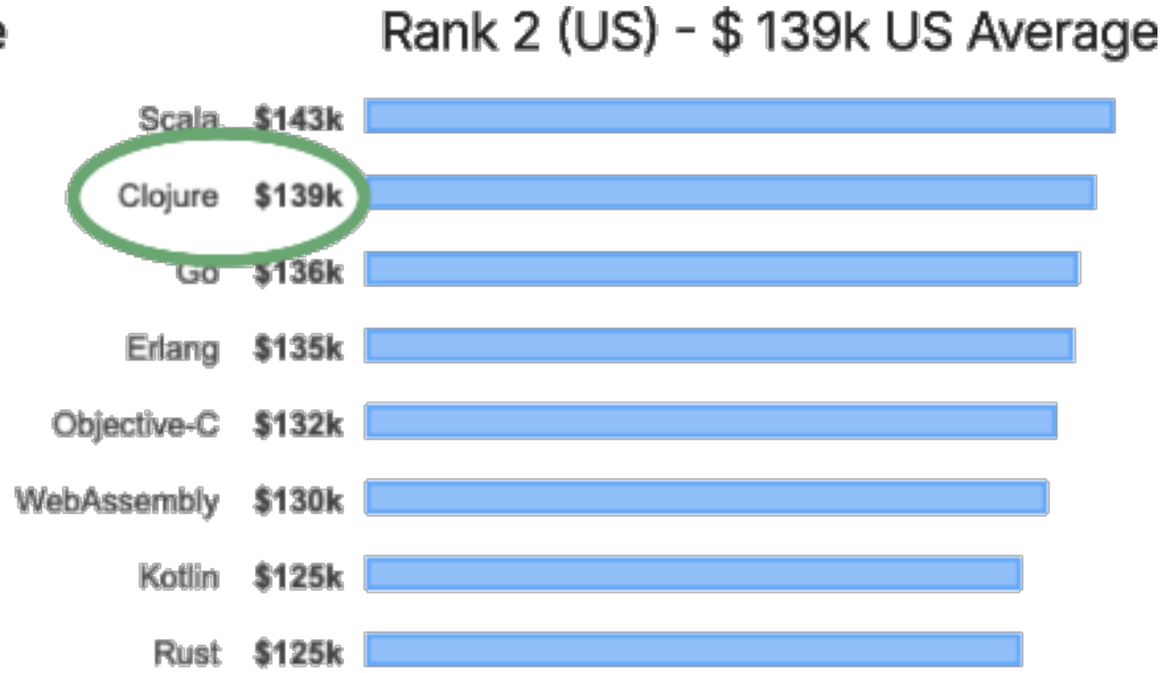
Clojure Devs are best paid



StackOverflow Developer Survey-2019

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clojure.spec

- Optional type library
- Define types as predicates
- Assert/ Validate/ Generate/ Conform

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;; valid?

```
(:require [clojure.spec.alpha :as s])

(s/valid? even? 100) ;; => true
(s/valid? odd? 2) ;; => false
(s/valid #(< 5 %) 10) ;; => true
(s/valid? #{:club :diamond :heart :spade} :club) ;; => true
```

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U:--- *scratch* All L1 [(Lisp Paredit)]

;; Registry

```
;; Global registory using ns keyword
(ns spec.defs)
(s/def ::suit #{:club :diamond :heart :spade})

;; Check
(ns my.app)
(s/valid? :spec.defs/suit :club)
```


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;; Composing predicates

```
(s/def ::name-or-id (s/or :name string?
                          :id   int?))
(s/valid? ::name-or-id "abc") ;; => true
(s/valid? ::name-or-id 100) ;; => true
(s/valid? ::name-or-id :foo) ;; => false
```

;; explain

```
(s/explain ::name-or-id :foo)
;; :foo - failed: string? at: [:name] spec: :user/name-or-id
;; :foo - failed: int? at: [:id] spec: :user/name-or-id
```


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;; Spec domain entities

```clojure
(def email-regex #"^[a-zA-Z0-9._%+-]+@[a-zA-Z0-9.-]+\.[a-zA-Z]{2,63}$")
(s/def ::email-type (s/and string? #(re-matches email-regex %)))

(s/def ::id int?)
(s/def ::first-name string?)
(s/def ::last-name string?)
(s/def ::email ::email-type)

(s/def ::person (s/keys :req [::id ::first-name ::email]
                        :opt [::last-name]))
```

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U:--- * scratch * All L1 [(Lisp Paredit)]

Spec Demo

Form (React)

State

```
first-name
last-name
email
```

Validation

```
(s/valid?  ::person %)
```

API (Stub)

```
POST /person
```

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Spec Benefits

- Optional opt in
- Generative testing
- Spec code (not just data)*

https://clojure.org/guides/spec

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Switching stacks

Weird Syntax
No classes
Small Community
Talent/ Training

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Switching stacks

Weird Syntax	Brackets become invisible
No classes	Functional ❤️
Small community	Brilliant community
Talent/ Training	Can be improved

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Build Systems

Lein + Figwheel

https://leiningen.org/

https://figwheel.org/

Shadow CLJS

https://shadow-cljs.org

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React Wrappers

Reagent

https://reagent-project.github.io/

Reagent is what React hopes to be one day

— Luke Whorton (https://medium.com/@lwhorton/)

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React Wrappers

Reagent

https://reagent-project.github.io/

hx

https://github.com/Lokeh/hx

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Editors

(cider[])

Cursive

Calva

Fireplace (?)

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People

Rich Hickey
Creator of Clojure

Stuart Halloway
Core Team Member

Alex Miller
Core Team Member

Stuart Sierra
Component; Reloaded

Malcolm Sparks
Yada/Bidi/Tick

James Reeves
Integrant/ Hiccup/ Medley

Bruce Hauman
Figwheel

Bozhidar Batsov
nrepl

David Nolen
ClojureScript

David Miller
ClojureCLR

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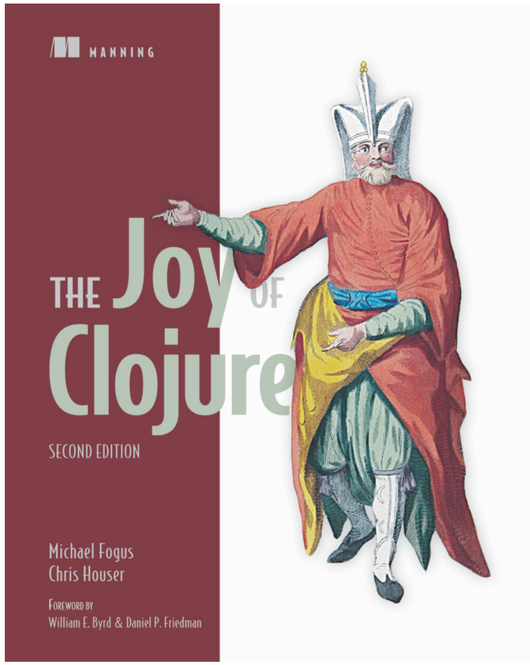
Blogs & Docs

braveclojure.com

PurelyFunctional.tv

purelyfunctional.tv



The Joy of Clojure;
By Fogus & Houser

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juxt.pro/blog

CLOJURE KOANS

clojurekoans.com
clojurescriptkoans.com

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Thank You

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