ClojureScript-in-ClojureSc

localhost:8080/index.html#/about-me

About Me

Principal Software Engineer at LonoCloud

Probably best known for creating noVNC and websockify

Connect:

- @bus_kanaka
- @noVNC (noVNC & HTML5 related)
- github.com/kanaka
- blog.n01se.net/kanaka
- cljs@martintribe.org

ClojureScript-in-ClojureSc ×

localhost:8080/index.html#/intro

Introducing ClojureScript-in-ClojureScript

A (hopefully temporary) fork of ClojureScript: https://github.com/kanaka/clojurescript

A Port of ClojureScript to ClojureScript

More specifically: A port of the Clojure parts of the ClojureScript compiler to ClojureScript.

ClojureScript-in-ClojureSc ×

localhost:8080/index.html#/why

Why?

The best reason I can give is to show examples of what is possible

Web Examples

Node.js Examples

ClojureScript-in-ClojureSc ×

localhost:8080/index.html#/why-web

Web Examples

- Online web REPL: ClojureScript.net

ClojureScript-in-ClojureSc × ClojureScript-in-ClojureSc ×

clojurescript.net

CLOJURESCRIPT.NET

ClojureScript Web REPL

ClojureScript-in-ClojureScript Web REPL

```
cljs.user=>
```

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ClojureScript at a glance - PDF | Searchable docs | Translations from JavaScript

Datatypes

MAP	{:key1 :val1, :key2 :val2}
VECTORS	[1 2 3 4 :a :b :c 1 2]
SETS	#{:a :b :c 1 2 3}
SCALARS	a-symbol, :a-keyword, "a string"

Useful Functions

MATH	+ - * / quot rem mod inc dec max min
COMPARISON	= == not= < > <= >=
PREDICATES	nil? identical? zero? pos? neg? even? odd? true? false?

ClojureScript-in-ClojureSc × ClojureScript-in-ClojureSc ×

clojurescript.net

CLOJURESCRIPT.NET

ClojureScript Web REPL

ClojureScript-in-ClojureScript Web REPL

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CLOJURESCRIPT.NET

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(1 2 3)
cljs.user=> (take 4 things)
(1 2 3)
cljs.user=> (take 4 things)
(1 2 3)
cljs.user=>
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  - NOTE: trailing nil is necessary

```
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(take 4 things)
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(take 4 things)
```
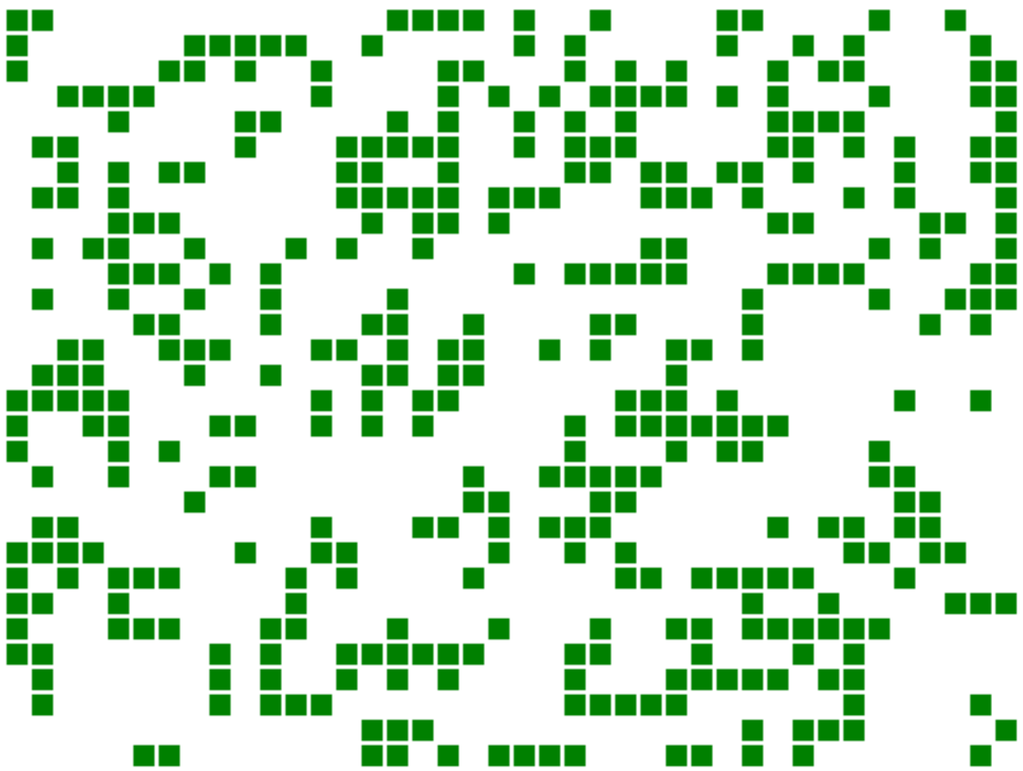

- Debug Web REPL for ClojureScript Projects: ClojureScript Game of Life

ClojureScript-in-ClojureSc × | ClojureScript-in-ClojureSc × | localhost:8080/game-of-li ×

localhost:8080/game-of-life.html



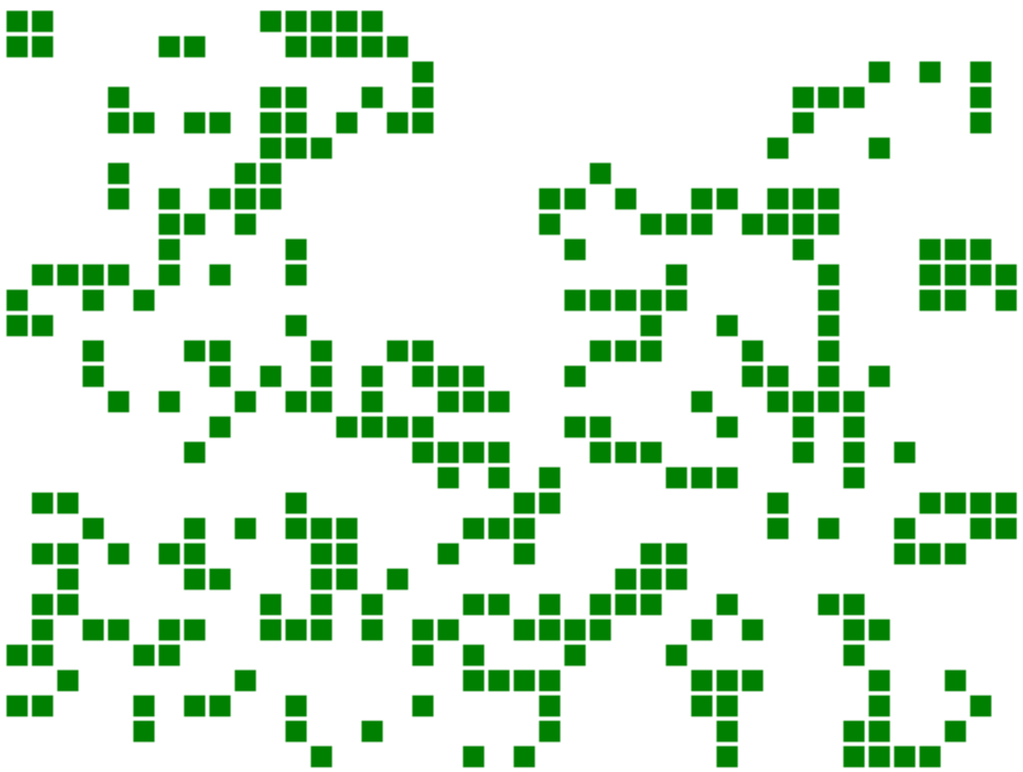
Copy/paste at REPL:

```
@ldnclj_dojo_team_5_game_
(count @ldnclj_dojo_team_5_
(reset! ldnclj_dojo_team_5_g
```

DEBUG REPL

ClojureScript-in-ClojureSc | ClojureScript-in-ClojureSc | localhost:8080/game-of-li

localhost:8080/game-of-life.html



ClojureScript-in-ClojureScript Web REPL
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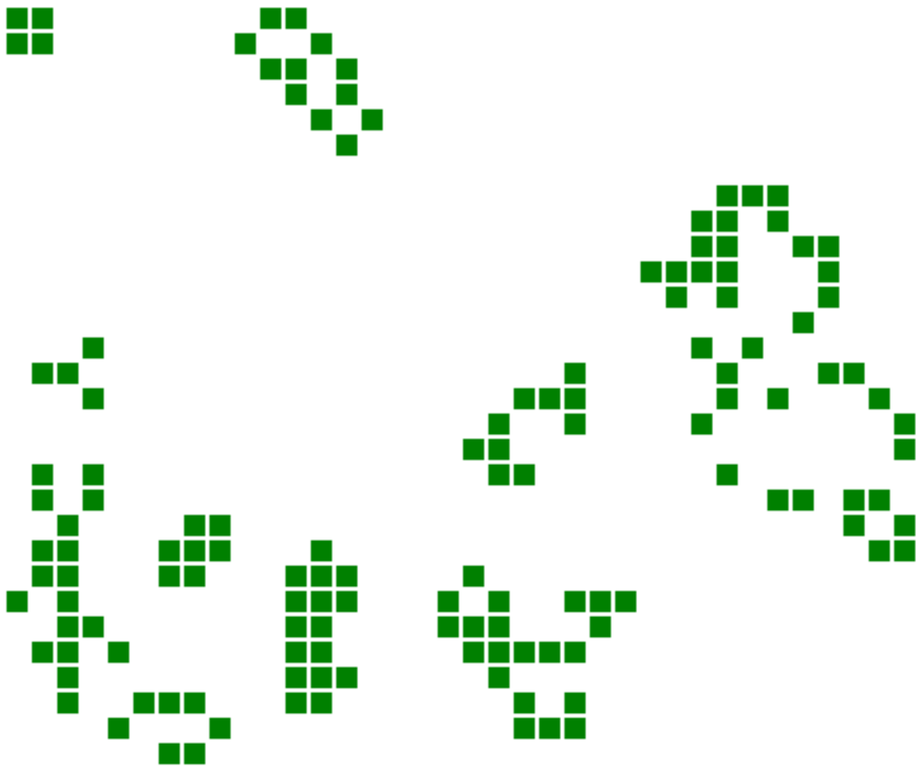

ClojureScript-in-ClojureScript Web REPL
cljs.user=> @ldnclj_dojo_team_5_game_of_life.model/*grid*

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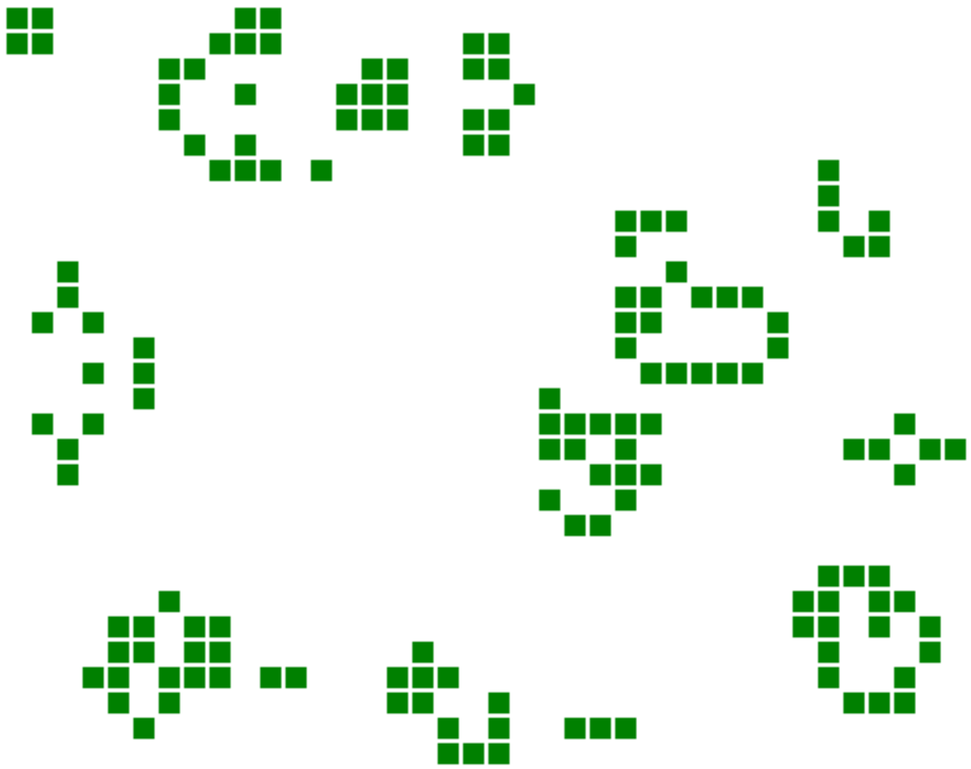

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```
nil nil :alive :alive :alive nil nil nil nil nil nil nil nil nil nil :alive
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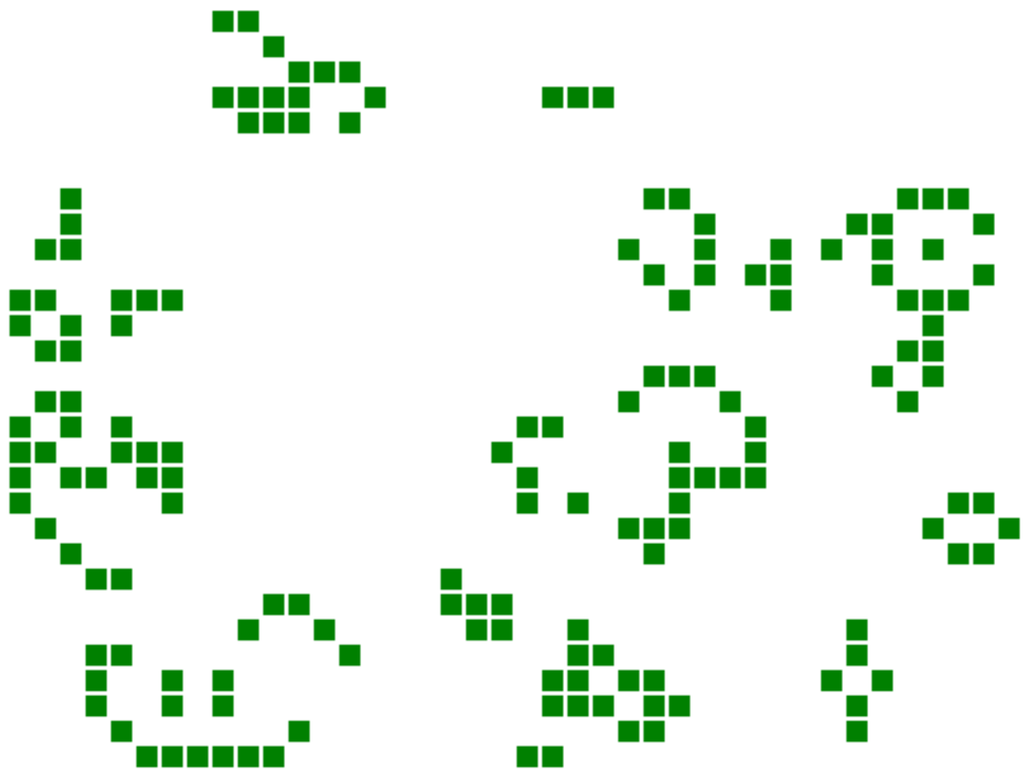

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nil nil :alive :alive :alive nil nil nil nil nil nil nil nil nil nil :alive
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cljs.user=> (count @ldnclj_dojo_team_5_game_of_life.model/*grid*)
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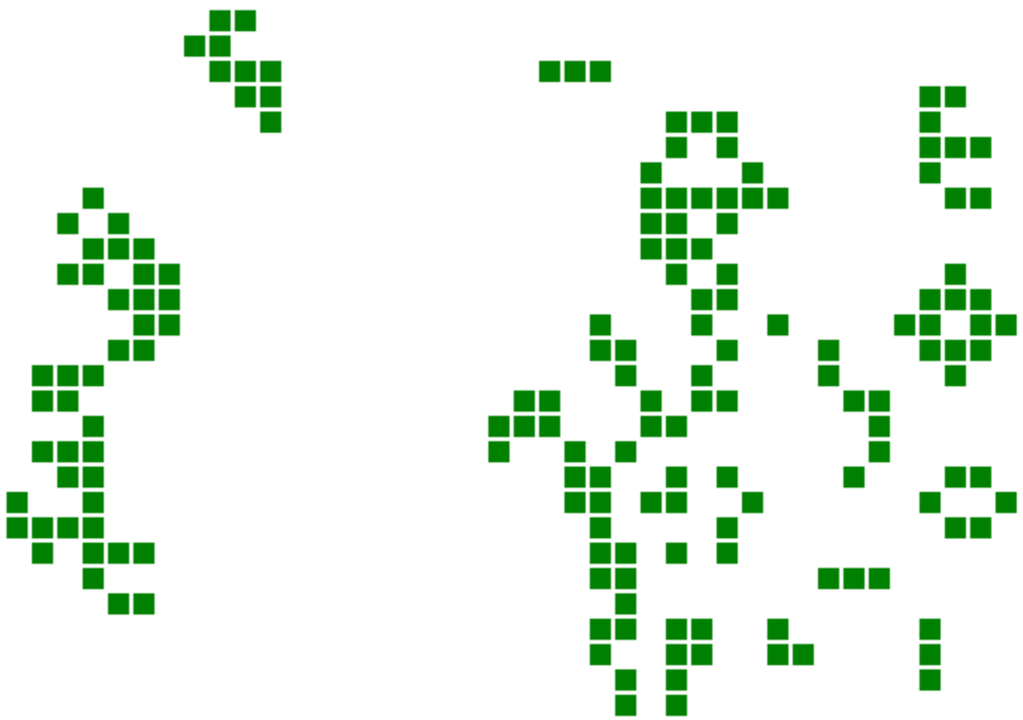

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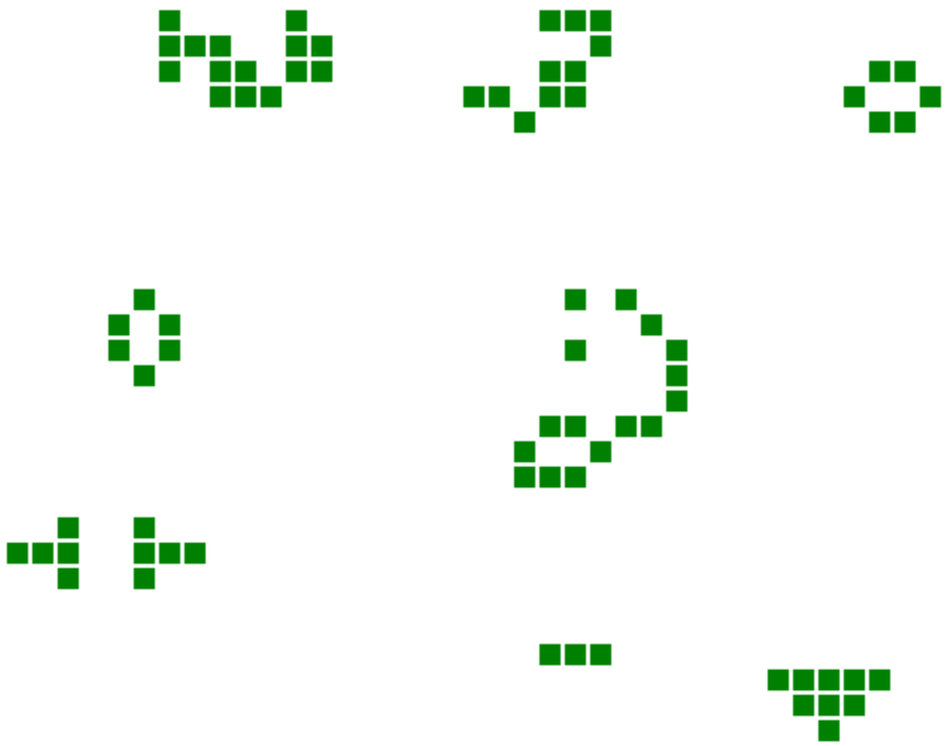
ClojureScript-in-ClojureSc × | ClojureScript-in-ClojureSc × | localhost:8080/game-of-li ×

localhost:8080/game-of-life.html



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cljs.user=> (count @ldnclj_dojo_team_5_game_of_life.model/*grid*)
1200
cljs.user=> (reset! ldnclj_dojo_team_5_game_of_life.model/*grid* (vec (repeatedly
1200 #(rand-nth [nil nil :alive]))))
```

Copy/paste at REPL:

@ldnclj_dojo_team_5_game_

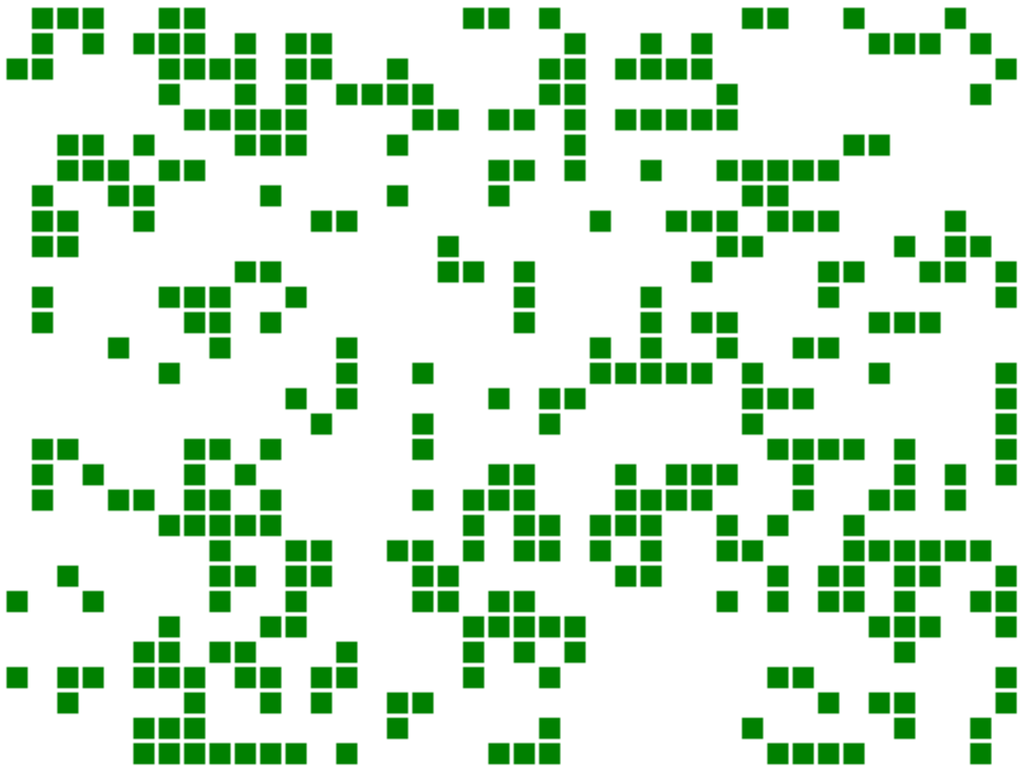
(count @ldnclj_dojo_team_5_

(reset! ldnclj_dojo_team_5_g

DEBUG REPL

ClojureScript-in-ClojureSc × | ClojureScript-in-ClojureSc × | localhost:8080/game-of-li ×

localhost:8080/game-of-life.html



Copy/paste at REPL:

```
@ldnclj_dojo_team_5_game_
(count @ldnclj_dojo_team_5_
(reset! ldnclj_dojo_team_5_g
```

```
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:alive :alive :alive nil nil nil nil nil nil]
cljs.user=>
```
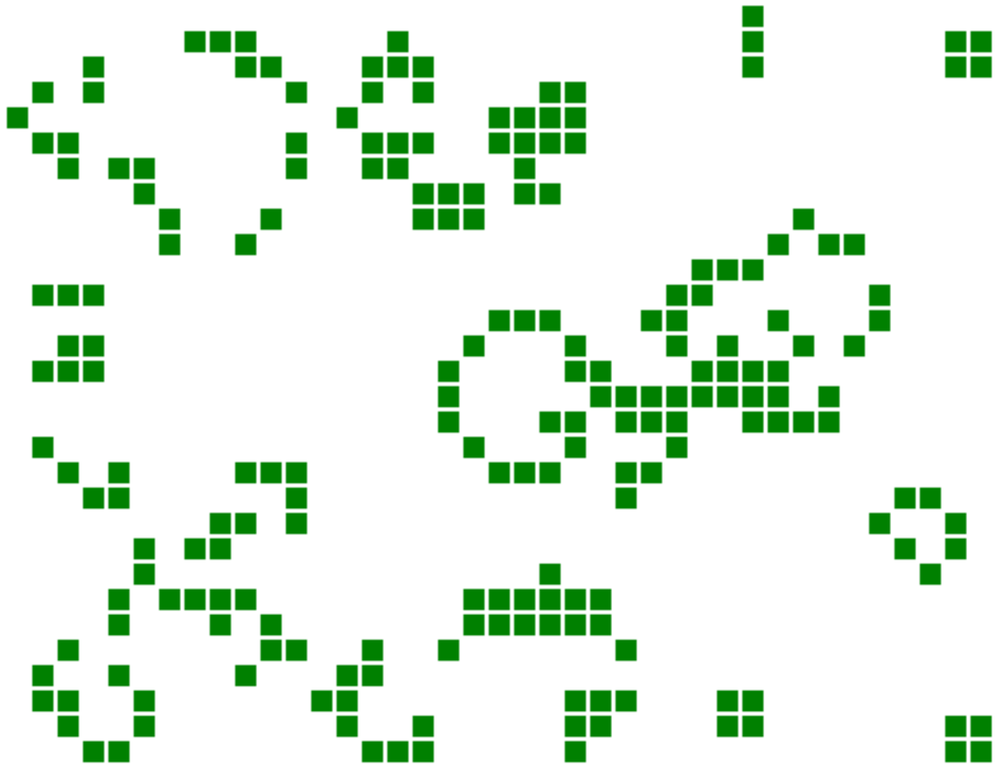

DEBUG REPL



Copy/paste at REPL:

```
@ldnclj_dojo_team_5_game_
(count @ldnclj_dojo_team_5_
(reset! ldnclj_dojo_team_5_g
```

```
nil nil nil nil nil nil nil :alive nil :alive nil nil :alive nil nil nil :alive
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cljs.user=> (reset! ldnclj_dojo_team_5_game_of_life.model/*grid* (vec (repeatedly
1200 #(rand-nth [nil nil :alive]))))
```
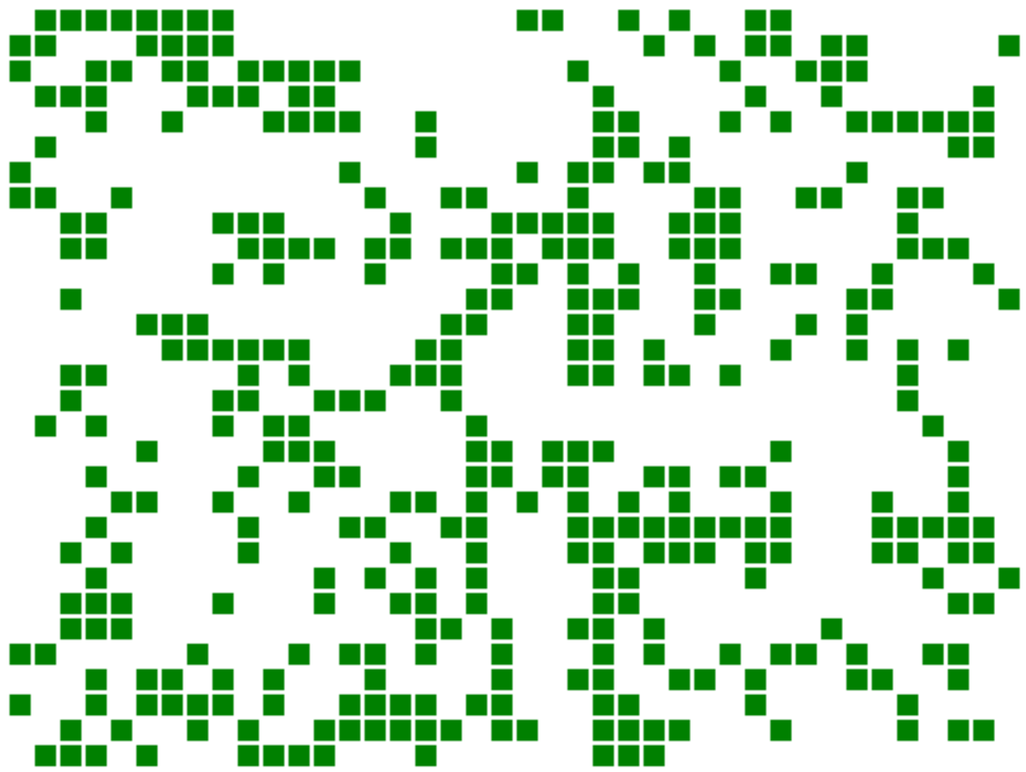

DEBUG REPL

ClojureScript-in-ClojureSc × | ClojureScript-in-ClojureSc × | localhost:8080/game-of-li ×

localhost:8080/game-of-life.html



Copy/paste at REPL:

@ldnclj_dojo_team_5_game_

(count @ldnclj_dojo_team_5_

(reset! ldnclj_dojo_team_5_g

```
nil nil nil nil nil nil :alive :alive :alive :alive :alive nil :alive nil :alive
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nil :alive nil nil :alive nil nil nil nil nil nil nil nil nil :alive nil nil
nil nil]
cljs.user=>
```

DEBUG REPL

ClojureScript-in-ClojureSc × ClojureScript-in-ClojureSc ×

localhost:8080/index.html#/why-web

Web Examples

- Online web REPL: ClojureScript.net

```
(+ 1 1)
(defn frob [x] (apply + 1 (vals (meta x))))
(frob (with-meta [1 2 3] {:a 10 :b 20 :c 30}))
(defmacro surprise-ending [s f]
    `(lazy-cat ~s (do ~f nil)))
(def things (surprise-ending [1 2 3]
    (println "SURPRISE!"))) nil
```

  - NOTE: trailing nil is necessary

```
(take 2 things)
(take 3 things)
(take 4 things)
(take 4 things)
```

- Debug Web REPL for ClojureScript Projects: ClojureScript Game of Life
- HTML Script tags with ClojureScript: Scriptany. Steps: 1, 2, 3, 4.

ClojureScript-in-ClojureSc | ClojureScript-in-ClojureSc | localhost:8080/scriptany-

localhost:8080/scriptany-cljs.html

Hello World!
Hint: view source

Elements | Resources | Network | Sources | Timeline | Profiles | Audits | Console

<top frame> | All | Errors | Warnings | Logs | Debug

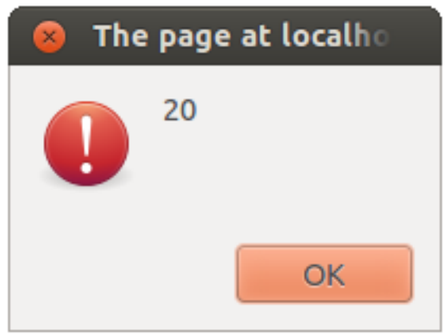
```
<!DOCTYPE html>
<html>
<head>
  <script type="text/javascript" src="scriptany.js"></script>
  <script src="repl-out/goog/base.js"></script>
  <script src="repl-out/repl.js"></script>
  <script>
      goog.require("cljs.repl");
  </script>
  <script>
      cljs.repl.init();
      scriptany.register("text/clojurescript", function (text)  {
          var ret = cljs.repl.read_eval_print(text);
          console.log("RTN:", ret);
      });
  </script>

</head>
<body>

    <div id="hello">Hello World!</div>

    <div>Hint: view source</div>

</body>
</html>
~
```

```
<!DOCTYPE html>
<html>
<head>
  <script type="text/javascript" src="scriptany.js"></script>
  <script src="repl-out/goog/base.js"></script>
  <script src="repl-out/repl.js"></script>
  <script>
      goog.require("cljs.repl");
  </script>
  <script>
      cljs.repl.init();
      scriptany.register("text/clojurescript", function (text)  {
          var ret = cljs.repl.read_eval_print(text);
          console.log("RTN:", ret);
      });
  </script>

  <script type="text/clojurescript">
      (defn foo [x] (* 2 x))
      (js/alert (foo 10))
  </script>

</head>
<body>

    <div id="hello">Hello World!</div>
```

ClojureScript-in-ClojureSc | ClojureScript-in-ClojureSc | localhost:8080/scriptany-

localhost:8080/scriptany-cljs.html

Hello World!
Hint: view source



Elements Resources Network Sources Timeline Profiles Audits Console

<top frame> All Errors Warnings Logs Debug

File Edit View Search Terminal Help

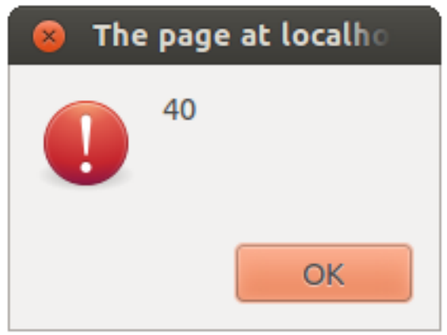
```
<script>
    cljs.repl.init();
    scriptany.register("text/clojurescript", function (text)  {
        var ret = cljs.repl.read_eval_print(text);
        console.log("RTN:", ret);
    });
</script>

<script type="text/clojurescript">
    (defn foo [x] (* 2 x))
</script>

<script type="text/javascript">
    scriptany.barrier();
    alert(cljs.user.foo(20));
</script>

</head>
<body>

    <div id="hello">Hello World!</div>

    <div>Hint: view source</div>

</body>
</html>
~
```

scriptany-cljs.html 24,27 Bot

"scriptany-cljs.html" 35L, 747C [w]

ClojureScript-in-ClojureSc × | ClojureScript-in-ClojureSc × | localhost:8080/scriptany- ×

localhost:8080/scriptany-cljs.html



Elements | Resources | Network | Sources | Timeline | Profiles | Audits | Console

```
RTN: function foo(x){
return cljs.core._STAR_.call(null,2,x);
}                                                    scriptany-cljs.html:14
```

<top frame> | All | Errors | Warnings | Logs | Debug

File Edit View Search Terminal Help

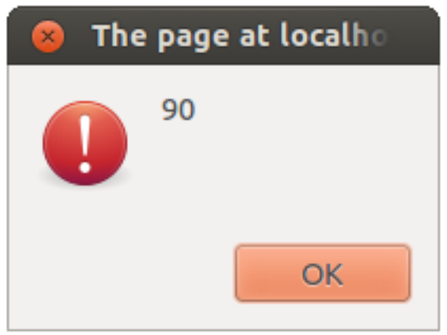
```
        cljs.repl.init();
        scriptany.register("text/clojurescript", function (text)  {
            var ret = cljs.repl.read_eval_print(text);
            console.log("RTN:", ret);
        });
    </script>

    <script type="text/clojurescript">
        (defn foo [x] (* 2 x))
    </script>

    <script type="text/clojurescript" src="bar.cljs">
    </script>

    <script type="text/javascript">
        scriptany.barrier();
        alert(cljs.user.bar(30));
    </script>

</head>
<body>

    <div id="hello">Hello World!</div>

    <div>Hint: view source</div>

</body>
```

scriptany-cljs.html 29,0-1 90%

"scriptany-cljs.html" 38L, 812C [w]

ClojureScript-in-ClojureSc × | ClojureScript-in-ClojureSc × | localhost:8080/scriptany- ×

localhost:8080/scriptany-cljs.html



Elements | Resources | Network | Sources | Timeline | Profiles | Audits | Console

Resource interpreted as Script but transferred with MIME type application/octet-stream: "http://localhost:8080/bar.cljs". scriptany-cljs.html:4

RTN: function foo(x){
return cljs.core._STAR_.call(null,2,x);
}
scriptany-cljs.html:14

▶XHR finished loading: "http://localhost:8080/bar.cljs". scriptany.js:27

print from bar.cljs ambtj.js:131

ambtj.js:131

RTN: null scriptany-cljs.html:14

<top frame> | All | Errors | Warnings | Logs | Debug | 1

Node.js Examples

- ClojureScript REPL (Node.js)

File Edit View Search Terminal Help

```
momote ~/c1 $ ./run.js repl-out/noderepl.js
;; ClojureScript-in-ClojureScript
;;   - http://github.com/kanaka/clojurescript
;;   - A port of the ClojureScript compiler to ClojureScript
cljs.user=>
```

File Edit View Search Terminal Help

```
momote ~/c1 $ ./run.js repl-out/noderepl.js
;; ClojureScript-in-ClojureScript
;;   - http://github.com/kanaka/clojurescript
;;   - A port of the ClojureScript compiler to ClojureScript
cljs.user=> (+ 1 1)
2
cljs.user=>
```

Node.js Examples

- ClojureScript REPL (Node.js)
  - `./run.js repl-out/noderepl.js`
- ClojureScript shebang scripts (Node.js)

File Edit View Search Terminal Help

```
momote ~/c1 $ cat shebang.cljs
#!./run.js repl-out/nodecljs.js

(ns shebang-test)

(def dbl (fn* [x] (* 2 x)))

(println "Hello World UNIX World.")
(println "(dbl 16) is:" (dbl 16))

8
momote ~/c1 $
```

File Edit View Search Terminal Help

```
momote ~/c1 $ cat shebang.cljs
#!./run.js repl-out/nodecljs.js

(ns shebang-test)

(def dbl (fn* [x] (* 2 x)))

(println "Hello World UNIX World.")
(println "(dbl 16) is:" (dbl 16))

8
momote ~/c1 $ ./shebang.cljs
Hello World UNIX World.
(dbl 16) is: 32
momote ~/c1 $
```

File Edit View Search Terminal Help

```
momote ~/c1 $ cat shebang.cljs
#!./run.js repl-out/nodecljs.js

(ns shebang-test)

(def dbl (fn* [x] (* 2 x)))

(println "Hello World UNIX World.")
(println "(dbl 16) is:" (dbl 16))

8
momote ~/c1 $ ./shebang.cljs
Hello World UNIX World.
(dbl 16) is: 32
momote ~/c1 $ ./shebang.clj
Hello World UNIX World.
(dbl 16) is: 32
momote ~/c1 $
```

```
File  Edit  View  Search  Terminal  Help
momote ~/c1 $ cat shebang.cljs
#!./run.js repl-out/nodecljs.js

(ns shebang-test)

(def dbl (fn* [x] (* 2 x)))

(println "Hello World UNIX World.")
(println "(dbl 16) is:" (dbl 16))

8
momote ~/c1 $ ./shebang.cljs
Hello World UNIX World.
(dbl 16) is: 32
momote ~/c1 $ ./shebang.clj
Hello World UNIX World.
(dbl 16) is: 32
momote ~/c1 $ time ./shebang.clj
Hello World UNIX World.
(dbl 16) is: 32

real    0m1.129s
user    0m1.588s
sys     0m0.060s
momote ~/c1 $
```

```
File  Edit  View  Search  Terminal  Help
(ns shebang-test)

(def dbl (fn* [x] (* 2 x)))

(println "Hello World UNIX World.")
(println "(dbl 16) is:" (dbl 16))

8
momote ~/c1 $ ./shebang.cljs
Hello World UNIX World.
(dbl 16) is: 32
momote ~/c1 $ ./shebang.clj
Hello World UNIX World.
(dbl 16) is: 32
momote ~/c1 $ time ./shebang.clj
Hello World UNIX World.
(dbl 16) is: 32

real    0m1.129s
user    0m1.588s
sys     0m0.060s
momote ~/c1 $ time ./shebang.cljs
Hello World UNIX World.
(dbl 16) is: 32

real    0m0.516s
user    0m0.464s
sys     0m0.056s
momote ~/c1 $
```

```
File  Edit  View  Search  Terminal  Help
(dbl 16) is: 32
momote ~/c1 $ time ./shebang.clj
Hello World UNIX World.
(dbl 16) is: 32

real    0m1.129s
user    0m1.588s
sys     0m0.060s
momote ~/c1 $ time ./shebang.cljs
Hello World UNIX World.
(dbl 16) is: 32

real    0m0.516s
user    0m0.464s
sys     0m0.056s
momote ~/c1 $
momote ~/c1 $
momote ~/c1 $ cat shebang.clj
#!/usr/bin/env clj

(ns shebang-test)

(def dbl (fn* [x] (* 2 x)))

(println "Hello World UNIX World.")
(println "(dbl 16) is:" (dbl 16))

8
momote ~/c1 $
```

Node.js Examples

- ClojureScript REPL (Node.js)
  - `./run.js repl-out/noderepl.js`
- ClojureScript shebang scripts (Node.js)
  - `time ./shebang.cljs`
  - `time ./shebang.clj`
- ClojureScript-in-ClojureScript compiler (Node.js)

File Edit View Search Terminal Help

momote ~/c2/node $

File Edit View Search Terminal Help

```
momote ~/c2/node $ mkdir -p out2/cljs
momote ~/c2/node $
```

File Edit View Search Terminal Help

```
momote ~/c2/node $ mkdir -p out2/cljs
momote ~/c2/node $ cp out/goog.js out2/
momote ~/c2/node $ cp out/cljs/core.js out2/cljs
momote ~/c2/node $
```

File Edit View Search Terminal Help

```
momote ~/c2/node $ mkdir -p out2/cljs
momote ~/c2/node $ cp out/goog.js out2/
momote ~/c2/node $ cp out/cljs/core.js out2/cljs
momote ~/c2/node $ ./run.js out/cljsc.js hello.cljs > hello.js
momote ~/c2/node $
```

File Edit View Search Terminal Help

```
momote ~/c2/node $ mkdir -p out2/cljs
momote ~/c2/node $ cp out/goog.js out2/
momote ~/c2/node $ cp out/cljs/core.js out2/cljs
momote ~/c2/node $ ./run.js out/cljsc.js hello.cljs > hello.js
momote ~/c2/node $ ./run2.js hello.js
hello world 256


momote ~/c2/node $
```

File Edit View Search Terminal Help

```
momote ~/c2/node $ mkdir -p out2/cljs
momote ~/c2/node $ cp out/goog.js out2/
momote ~/c2/node $ cp out/cljs/core.js out2/cljs
momote ~/c2/node $ ./run.js out/cljsc.js hello.cljs > hello.js
momote ~/c2/node $ ./run2.js hello.js
hello world 256


momote ~/c2/node $ cat hello.cljs
(ns hello)

(set! cljs.core/*print-fn* (.-log js/console))

(def sqr (fn* [x] (* x x)))

(println "hello world" (sqr 16))
momote ~/c2/node $
```

Node.js Examples

- ClojureScript REPL (Node.js)
  - `./run.js repl-out/noderepl.js`
- ClojureScript shebang scripts (Node.js)
  - `time ./shebang.cljs`
  - `time ./shebang.clj`
- ClojureScript-in-ClojureScript compiler (Node.js)
  - `mkdir -p out2/cljs`
  - `cp out/goog.js out2/`
  - `cp out/cljs/core.cljs # Hack alert`
  - `./run.js out/cljsc.js hello.cljs > hello.js`
  - `./run2.js hello.js`

Clojure-in-Clojure

- The dream of **Clojure-in-Clojure** is a Clojure implementation that is written entirely in Clojure except for a very small platform specific core.
- It would allow easy porting to new platforms (among other advantages).
- **ClojureScript** itself is a step towards this goal; more of the compiler is implemented in Clojure.
- **ClojureScript-in-ClojureScript** is another step towards that goal; more of the compiler is implemented in Clojure/ClojureScript.

ClojureScript -> ClojureScript-in-ClojureScript

ClojureScript-in-ClojureSc × ClojureScript-in-ClojureSc ×

localhost:8080/index.html#/cljs-overview

ClojureScript -> ClojureScript-in-ClojureScript

Standard ClojureScript

Input

Program: ClojureScript.clj

Runtime: JVM

ClojureScript-in-ClojureSc × ClojureScript-in-ClojureSc ×

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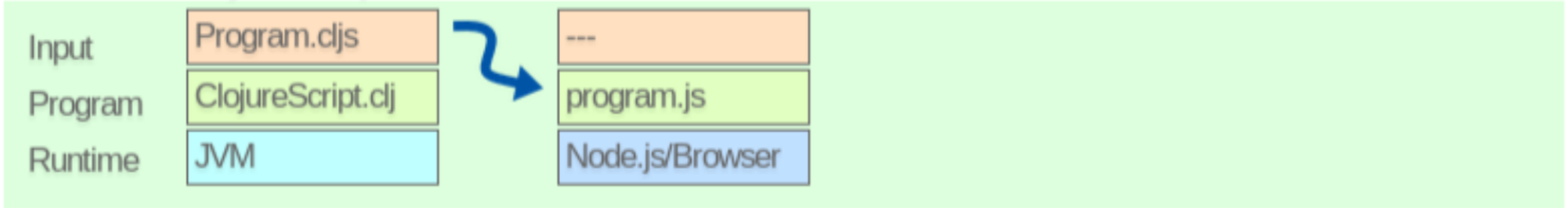

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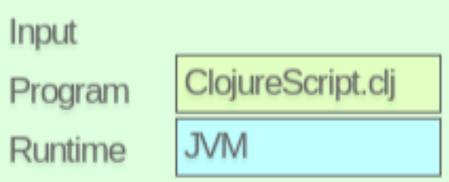

ClojureScript-in-ClojureSc × ClojureScript-in-ClojureSc ×

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Runtime	JVM	→	Node.js/Browser

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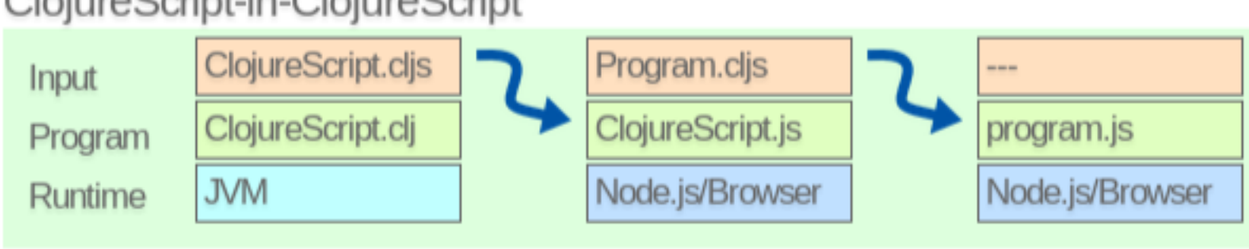

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Self-hosted ClojureScript-in-ClojureScript

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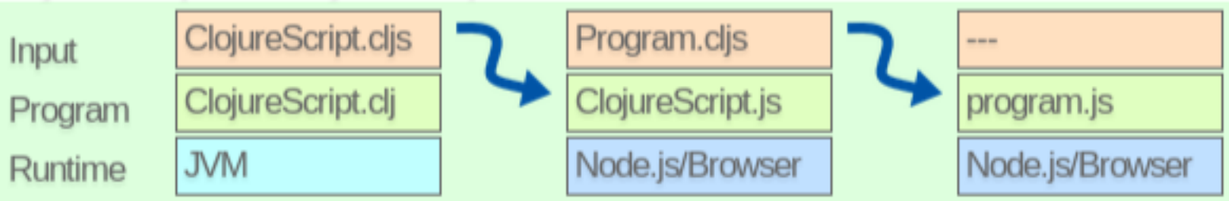

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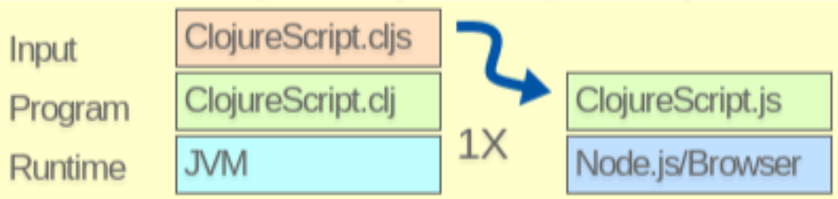

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Porting Steps

A chronological rather than functional overview of the process.

Review: ClojureScript Compilation Process

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- Read
  - symbols, comments, quote, metadata, syntax quote and unquote
  - literals: characters, maps, lists, vectors, keywords, strings
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- Eval
  - at JavaScript load time

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localhost:8080/index.html#/porting1

Step 1. Minimal web REPL

The beginning: a Clojure/conj hackathon with chouser.

- Copy src/clj/cljs/{compiler,analyzer}.clj to src/cljs/cljs/*.cljs
- Static snapshot of the analyzer namespaces atom.
- Move macros out and pull in using :use-macros
- Stub out a bunch of stuff
- Rewrite emit-constant multimethods as EmitConstant protocol (ClojureScript protocol oriented rather than type/class oriented).
- Bootstrap HTML/JavaScript file:
  - load the static namespaces snapshot
  - setup the analyzer environment
- **RESULT**:
  - very simple web REPL
  - invoke cljs.core functions
  - specials (fn*, if, def, let*)
  - no macros (defn, let, etc)

Step

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Step 2. Node.js REPL Support

- Add Node.js file loading to Google Closure (goog.js)
- node.js launch script (run.js):
  - load the static namespaces snapshot
  - provide a basic REPL using Node.js readline module.
- **RESULT**:
  - very simple Node.js REPL
  - equivalent to the simple web REPL

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Step 3. Dynamic namespaces data

- The namespaces atom: the analyzer's namespace and var data for def forms being compiled.
- Lookup vars during compilation (only macros are resolved to compiler's namespace vars).
- Normally discarded after compilation, but cljs-in-cljs needs it!
- Old and busted:
  - Write entire namespaces content to a file
  - Manually add "(set! cljs.analyzer.namespaces DATA)"
- **RESULT** (New hotness):
  - Emit namespaces data to end of each compiled file
  - Just for the namespace being compiled
  - Swapped into to build up the namespaces as each file is loaded.

Ste

- P
- P
- A
- R

Step 4. Complete the reader

- Port syntax quote/unqoute from Java code. Syntax quote/unquote is a key component of macros.
- Port the anonymous function and function argument reader
- Activate comment reader
- **RESULT**:
  - Full reader (modulo bugs)

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Step 5. defmacro

- defmacro is itself a macro. This leads to some challenges.
- In ClojureScript, macros are defined on the Clojure/JVM side. Only the expanded result is emitted as JS code.
- Port defmacro macro from into cljs-in-cljs core.cljs file.
- **RESULT**:
  - Runtime definition of new macros.
  - No ahead-of-time definition of macros due to the split between the Clojure vars namespace and the ClojureScript compiled namespaces.
  - Still no predefined core macros.

result

ars

Step 6. clj-defmacro and core macros

- Add clj-defmacro to core_macros.clj and pull it in using :use-macros so that it is a Clojure (JVM) side version of defmacro.
- Use clj-defmacro to port macros from Clojure core.clj and ClojureScript core.cljs into cljs-in-cljs core.cljs file.
- Port destructure function for use by let, loop, fn macros.
- **RESULT**:
  - Much of core Clojure is now available
  - Starting to feel like a real REPL.

Step 7. Types, protocols and first-class symbols

- Definition and extension of protocols uses metadata on symbols to pass around information.
- In ClojureScript, symbols are just prefixed strings.
- Problem: no custom attributes on strings in JS.
- Change symbols to real things that support metadata.
- Port reify, extend-type, deftype, defrecord, and defprotocol macros and supporting functions from ClojureScript core.clj. Port extend-protocol from Clojure core.clj.
- **RESULT**:
  - New types, protocols, records, etc can be defined at "runtime" (more specifically at cljs-in-cljs compile time).

Step 8. Namespaces as a value

- In Clojure, the *ns* symbol refers to the mutable Namespace object of the current namespace.
- The namespaces data in ClojureScript is a normal Clojure persistent datastructure in an atom.
- Problem: modifying a namespace in the namespaces data (via a def*) will not automatically update the copy of it in *ns*.
- Drop *ns* for cljs-in-cljs and replace with *ns-sym*: a dynamic "var" with the namespace symbol.
- Update *ns* uses to use *ns-sym* and deref namespaces atom as appropriate.
- Port some namespace related functions
- **RESULT**:
  - No stale *ns*.
  - Namespace creation and other functions.
  - More correct macro and symbol resolution.

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Step 9. File I/O Support

- Implement Java-like File object.
- Implement Java-like I/O readers/streams (maybe).
- Use node.js file read/write routines. Use XMLHttpRequest for web file read.
- **RESULT**:
  - load-file now works.
  - Testing via direct cljs file loading rather than pasted forms.

Step 10. Miscellaneous

- Port defmulti and defmethod macros.
- Output "streams" (*out*, *err*, *rtn*)
  - Rendering functions rather than file streams
  - *rtn* for rendering of return value
- Port closure.clj
- Line numbering pushbackreader
- Bug fixes: / symbol, keywords, regexes, unicode, etc, etc
- Tests
- REPL functionality/cleanup
- **RESULT**:
  - Useful enough to hack up cool examples for a Clojure conference.

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Step 11. Self-hosting

On going work

Most things compile except for some tricky macro/var/namespace interactions in core.clj/core.cljs

The hack: copy the already compiled core.js file and the rest will compile.

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ClojureScript-in-ClojureSc ×

localhost:8080/index.html#/finish

Finishing Up

Future Work

- Require/Use/CLASSPATH issues
- Enhance debug repl
  - Vision: like firebug but for (and in) ClojureScript
  - Make it a compile/lein option
- Self-hosting (get all of core.clj to compile)
- Merging upstream ClojureScript (branched in Nov 2012)
- Push to upstream ClojureScript
- Greater use of Node.js
  - npmjs.org is the fastest growing language module repository
  - Create and push Node.js package (npm)
  - Node.js library interop
- Performance work
  - V8 profiling
  - asm.js: asmjs.org (not cljs-in-cljs specific)
- Cool new applications
  - cljs-in-cljs + catnip + js-git
  - LightTable Light (no backend needed)
  - All the cool things I can't think of, that all of you will create.

Connect:

- @bus_kanaka
- @noVNC (noVNC & HTML5 related)
- github.com/kanaka
- blog.n01se.net/kanaka
- cljs@martintribe.org
- IRC discussion: #cljs-in-cljs (freenode)

Links:

- This presentation: kanaka.github.com/cljs-in-cljs-presentation
  - WARNING: very HTML5 heavy.
- Source for presentation: github.com/kanaka/cljs-in-cljs-presentation
- ClojureScript-in-ClojureScript Project: github.com/kanaka/clojurescript
- Upstream ClojureScript: github.com/kanaka/clojurescript
- ClojureScript-in-ClojureScript web REPL: ClojureScript.net
- Scriptany: github.com/kanaka/Scriptany
- Wisp - From-scratch Clojure implementation on JavaScript: github.com/Gozala/wisp

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localhost:8080/index.html#/thanks

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Questions?