FlowStorm

Conj 2025 workshop

Before we start, let's know each other a little bit:

- Me
  - I'm Juan (coming from Uruguay)
  - Been working as a programmer since the 90s
  - Professionally as a Clojure developer since 2011 on many domains
  - Have a passion for dev tooling and anything that makes writing software more fun
  - Wrote and currently maintain FlowStorm and other OSS
- What about you ?
  - Programming experience
  - Clojure experience
  - FlowStorm experience

Agenda

- A high level FlowStorm overview (what is it?)
- Installation
- Basics
  - Recording & exploring simple functions executions
  - Exploring values with Data windows
  - FlowStorm's REPL API (recordings from the repl)
- Understanding systems Part I
  - A web app
  - Minesweeper (on ClojureScript or Clojure)
- Q&A
- Understanding systems Part II
  - RadioSnake (a lot of traces)
  - ClojureScript compiler
- Flowbooks
- Final Q&A

What problem is FlowStorm trying to solve?

- Interactive programming allows us to grow a system iteratively and interactively.
- We can add/change/run functions, but their execution is opaque.
- There is no way of "looking" at execution, other than projecting it via logging/tapping.
- If we can't see, we have to guess a lot, specially in Clojure.

What is FlowStorm?

Editor/IDE independent dev tool, for recording and visualization of Clojure programs :

- execution
- data (like portal, morse, etc, with its own take)

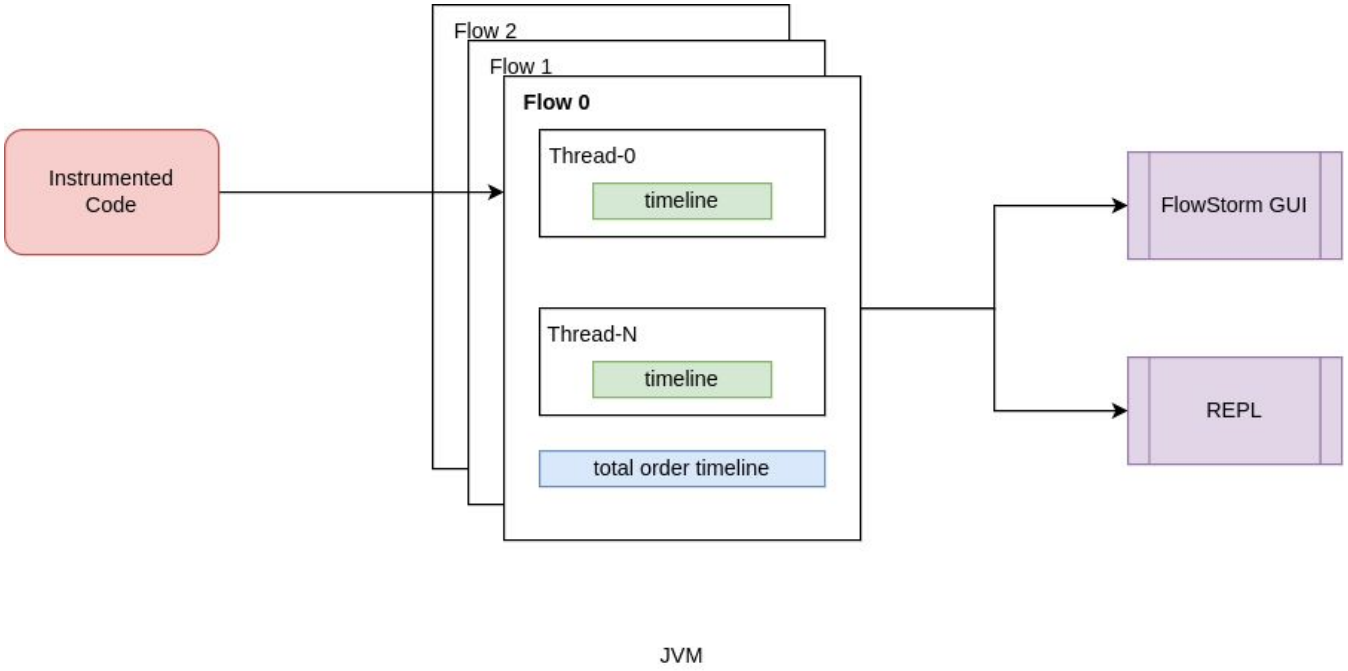
with interactive programming in mind (for dev, a repl companion)

How can it help?

More than a debugger

- Learning/Understanding, from simple functions to entire systems, from a runtime perspective
- With debugging
- With iterative/interactive development by value capture (like snitch, etc)
- Enhancing static code reading by providing more details like values shapes
- Visualizing complex and possibly real time changing data

The big picture (local / in-process)



What do we need for the workshop?

- A recent version of Clojure cli or Leiningen
- JDK >= 21 (for ClojureScript examples, FS requires >= 17)
- NPM (for ClojureScript demo)

```
$ git clone https://github.com/jpmonettas/conj-workshop-2025
```

What’s on the repo?

Global installation

- For clojure cli add conj-workshop-2025/config_samples/deps.edn aliases to
  - ~/.clojure/deps.edn (linux/macos)
  - %USERPROFILE%\.clojure\deps.edn (windows)
- For leiningen add conj-workshop-2025/config_samples/profiles.clj profiles to
  - ~/.lein/profiles.clj (linux/macos)
  - %USERPROFILE%\.lein\profiles.clj (windows)

As you can see there are aliases for FlowStorm itself (:1.12-storm), and aliases for plugins (:fs-*-plugin)

And that’s all we need!

- We can try by running :

```
$ clj -A:1.12-storm

user=> :dbg
```

- Help -> [Tutorial | User's guide]
- Let’s instrument user*, define a simple fn, and call it.

Note:

You are going to see some logging. FlowStorm uses JUL so it can be disabled if needed with a logging.properties file.

Basics

- Go to conj-workshop-2025/projects/basics
- Open basics/simple.clj
- Start a repl with :1.12-storm (alias or profile)
  - (there is already a .dir-locals.el for Emacs users)
- Load the entire file
- Eval :dbg to start the UI
- See there is nothing on basics/deps.edn related to FS
- Follow the comments in the file

Data Windows

The goals are to provide :

- a way to navigate nested structures in a lazy way
- lazy/infinite sequences navigation
- metadata navigation
- multiple visualizations for each value
- tools for the user to add custom visualizations
- clojure.datafy navigation out of the box
- a mechanism for changing/realtime data visualization
- great integration with the rest of FlowStorm

Data Windows

- Open basics/src/data_windows_demo.clj
- Follow the comments in the file

REPL API

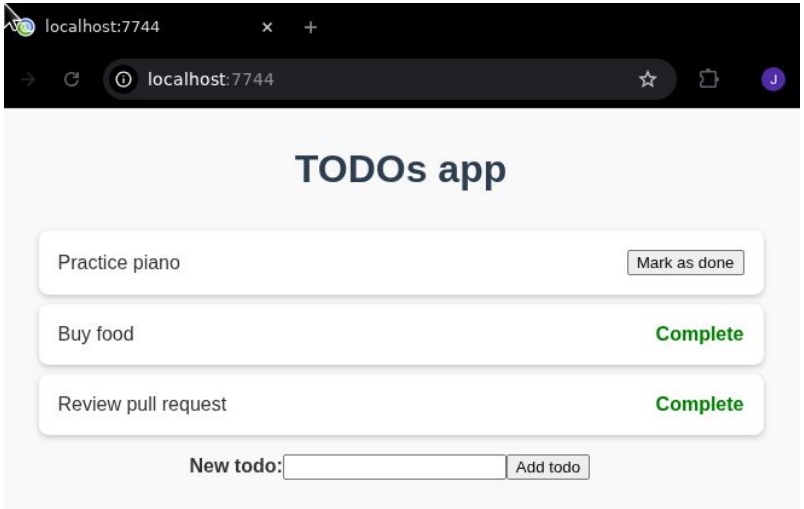
The REPL api allows us to work with recordings from the repl, skipping the UI.

This can be used in many ways, from finding patterns programmatically to custom visualizations (the plugin system).

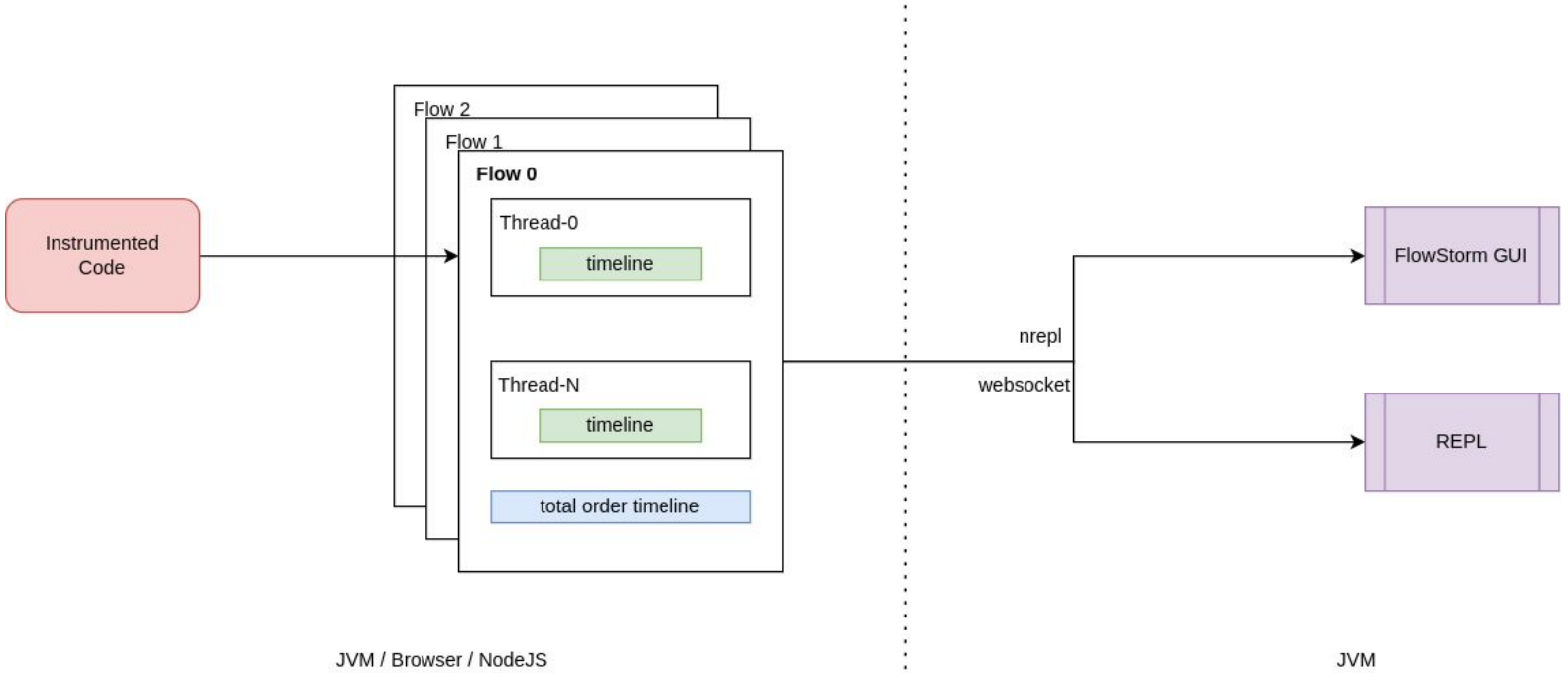
- Open src/basics/programmable.clj

Understanding systems (Web App)

- Go to conj-workshop-2025/projects/web-app
- Start a repl with :1.12-storm:fs-web-plugin (aliases or profiles)
- Open web-app/src/todos/web_app.clj
- Follow the comments at the bottom of the file

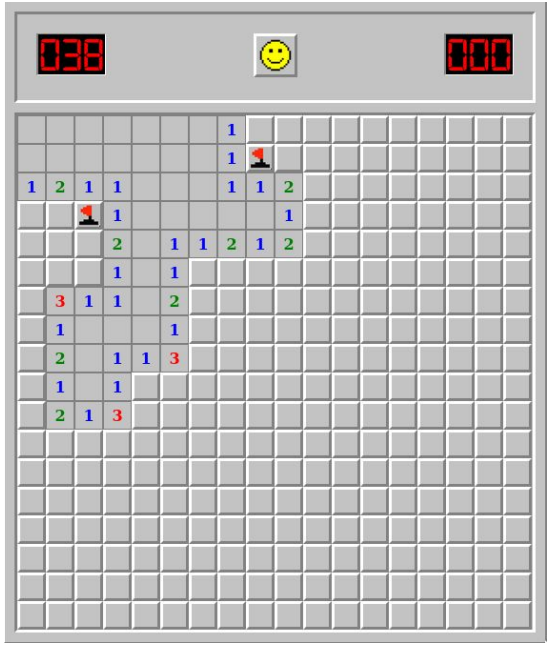


The big picture (remote)



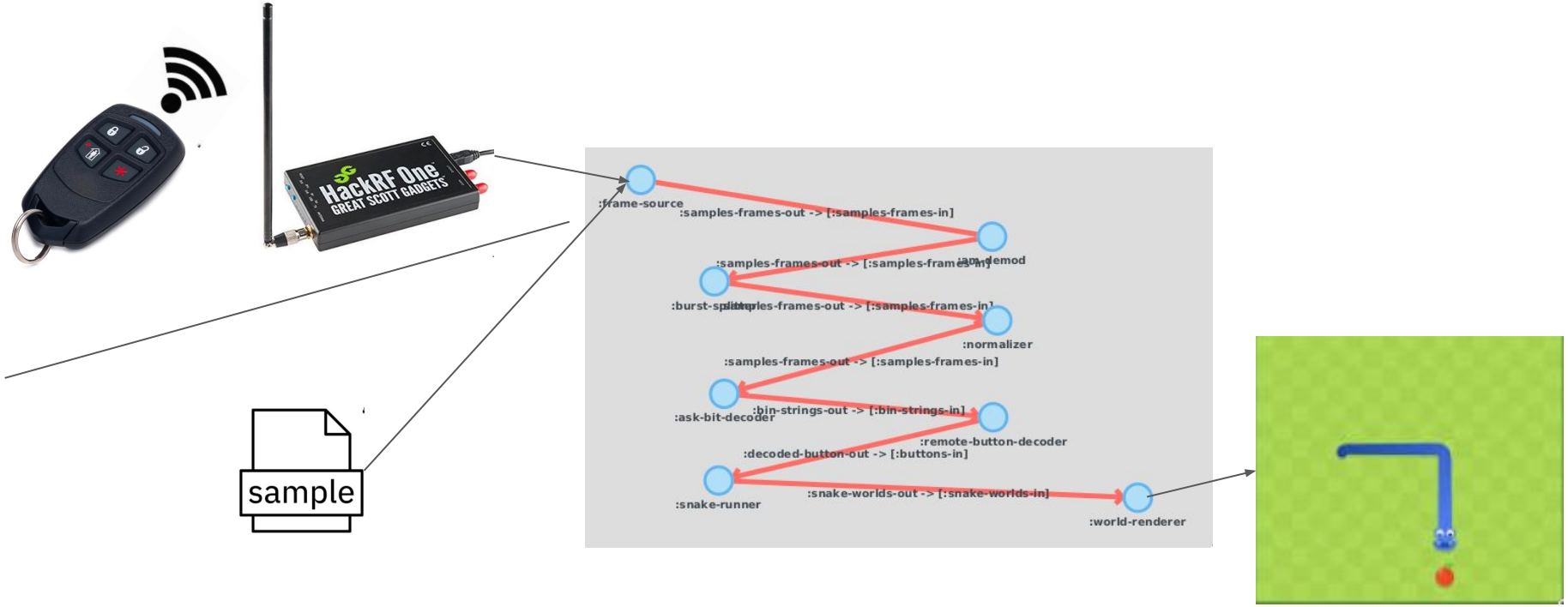
Understanding systems (Minesweeper)

- Go to conj-workshop-2025/projects/minesweeper
- Run :
  - $ npm install
  - $ npx shadow-cljs watch :dev
  - Open http://localhost:8021
  - Run the command in $ ./run-debugger
  - Refresh the page to connect it to FlowStorm
  - $ npx shadow-cljs cljs-repl :dev to start a cljs repl
- Look at shadow-cljs.edn and deps.edn
- Open minesweeper /src/mine_sweeper/core.cljs
- Follow the comments at the bottom of the file



Part I: Q&A

Understanding systems (RadioSnake)



Understanding systems (RadioSnake)

- Go to `conj-workshop-2025/projects/radio-snake`
- Open `radio-snake/dev/dev.clj`
- Take a look at `radio-snake/deps.edn`
- Start a repl with `:dev:1.12-storm:fs-async-flow-plugin`
- Load `dev.clj`
- Run `:dbg`
- Follow the comments at the bottom of dev.clj

Understanding systems (ClojureScript compiler)

- Goto `conj-workshop-2025/projects/cljs_compiler`
- Open `src/user.clj`
- Start a repl with `:1.12-storm:fs-cljs-compiler-plugin`
- On a terminal on the same folder run:
  - `$ lein repl :connect localhost:`cat .nrepl-port``
  - `user=> (cljs.main/-main "--repl")`
- Record the compilation of something like `(defn my-sum [a b] (+ a b))`
- Run the plugin

Flowbooks

The flowbook plugin allows you to store and replay your flows with an optional "flowbook", which is a notebook that supports links to your recordings you can use to explain a flow.

- Go to `conj-workshop-2025/projects/flowbooks`
- Run `clj -A:1.12-storm:fs-flowbook-plugin`
- Run the ui `(:dbg)`
- Go to Flowbooks, load `flowbooks/todos-web-app/todos-web-app.edn`
- After the flows are loaded, open the “flow book”
- Edit and modify `todos-web-app-flowbook.html` then refresh

Instrumentation (Vanilla vs ClojureStorm)

There are two ways of using *FlowStorm* for Clojure :

- With ClojureStorm (recommended) : Swap your Clojure compiler at dev time by ClojureStorm and get everything instrumented automatically.

- Vanilla FlowStorm : Instrument by tagging and re-evaluating forms (like cider debugger).

Resources

- http://www.flow-strom.org
- https://flow-storm.github.io/flow-storm-debugger/user_guide.html
- https://github.com/flow-storm/flow-storm-debugger

Thank you!

Final: Q&A