

# 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 clone (ClojureScript)
- [Flowbooks](#)
- [Understanding systems Part II](#)
  - RadioSnake (a lot of traces)
  - ClojureScript compiler
- 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**, especially 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)

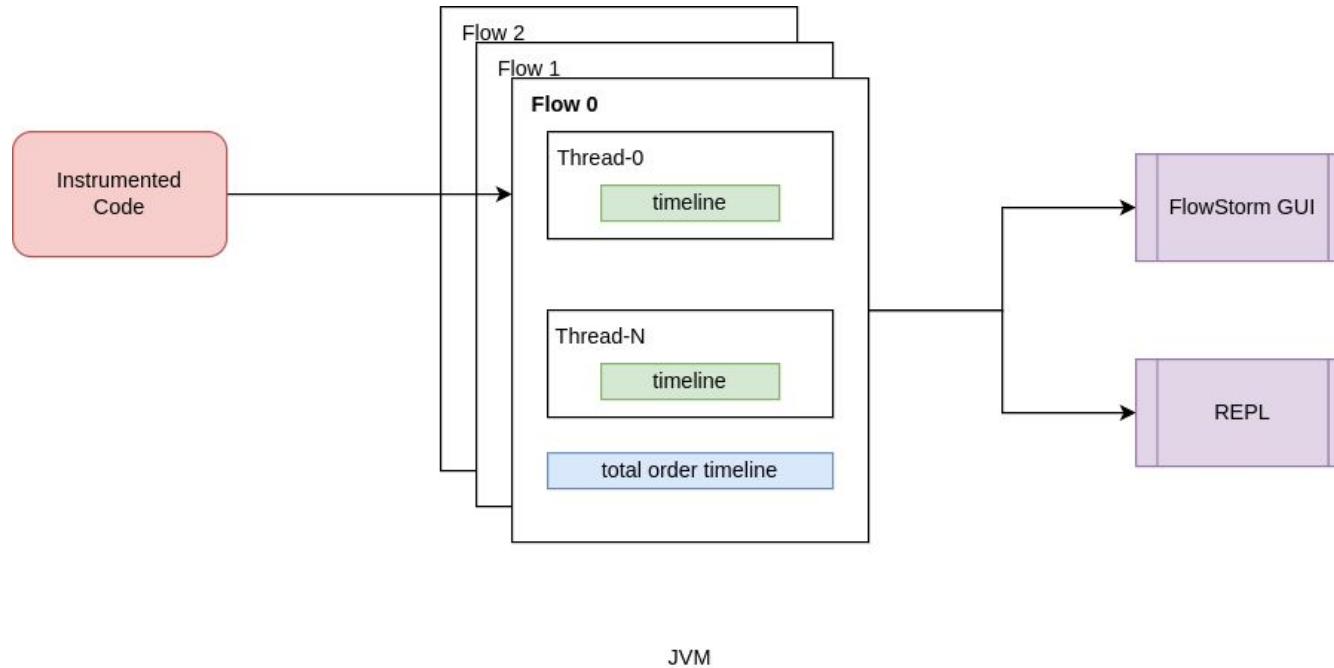
with interactive programming in mind (for dev, a repl companion)

# 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  $\geq 21$  (for ClojureScript examples, FS requires  $\geq 17$ )
- NPM (for ClojureScript demo)

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

# What's on the repo?

```
.  
├── config_samples  
│   ├── deps.edn  
│   └── profiles.clj  
├── projects  
│   ├── basics  
│   ├── cljs_compiler  
│   ├── flowbooks  
│   ├── minesweeper  
│   ├── radio-snake  
│   └── web-app  
└── slides  
    ├── FlowStorm_conj_2025_workshop.pdf  
    └── FlowStorm_internals.pdf
```

# 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 `lein` 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 it by running :

```
$ clj -A:1.12-storm
```

```
user=> :dbg
```

- Help -> [Tutorial | User's guide]

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 `src/basics/simple.clj`
- Start a repl with `:1.12-storm` (alias or profile)
  - (there is already a `.dir-locals.el` for Emacs users)
  - (there is a non-needed copy of the alias on `deps.edn` for VSCode users)
- Load the entire file
- Eval `:dbg` to start the UI
- When set globally there is no need for any FS stuff on your projects
- 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 Window id: :outputs

tap :a :name

:map clojure.lang.PersistentArrayMap def □

Meta: {:some-meta [1 2]}

Key	Val	Nav
:other	:hello	
:bla	"world"	

# Data Windows

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

# REPL API

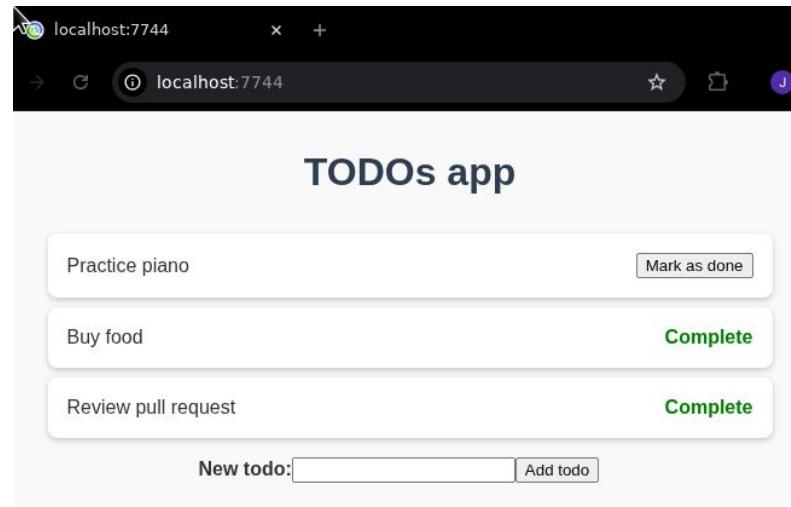
The [REPL api](#) allows us to work with recordings from the repl, skipping the UI.

This can be used in many ways, from finding patterns programmatically and custom visualizations (the plugin system) to being a interface for LLMs to use FlowStorm.

- Open `src/basics/programmable.clj`

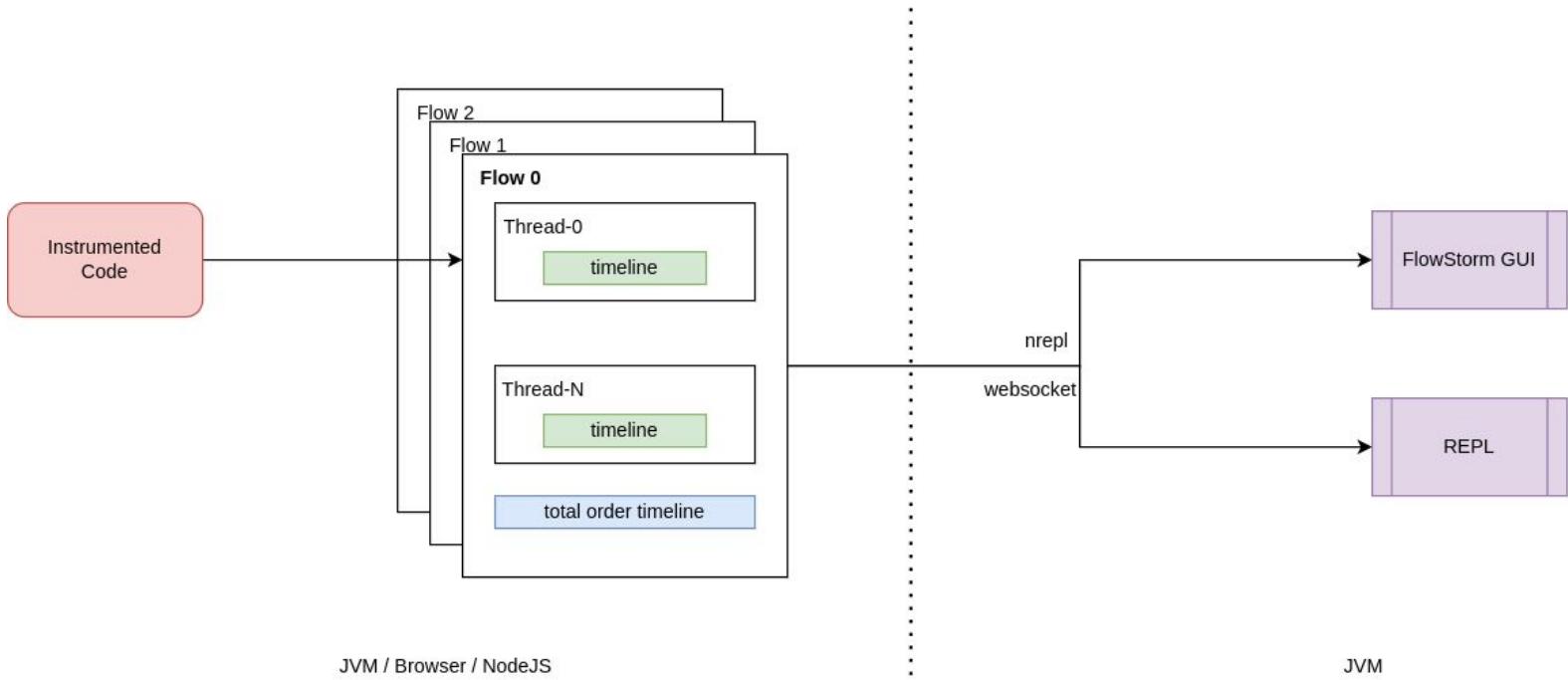
# Understanding systems (Web App)

- 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



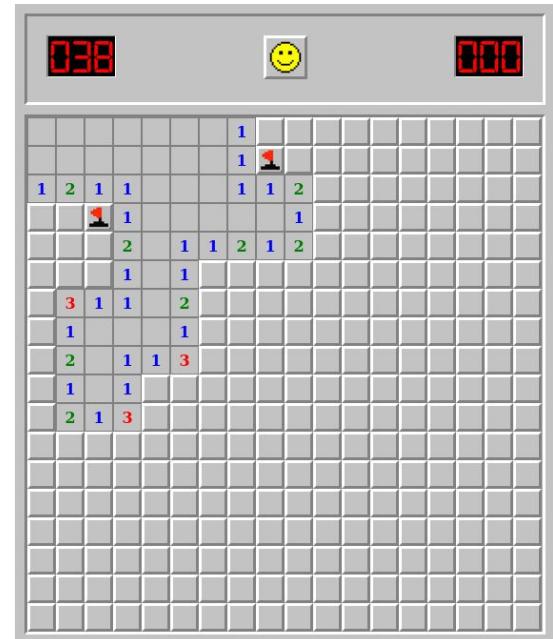
# Break

# The big picture (remote)



# Understanding systems (Buggy minesweeper)

- Go to [conj-workshop-2025/projects/minesweeper](https://conj-workshop-2025/projects/minesweeper)
- Look at [shadow-cljs.edn](#)
- Open minesweeper /src/mine\_sweeper/core.cljs
- Run :
  - \$ npm install
  - [term1] \$ npx shadow-cljs watch :dev (watch/compile)
  - [term2] \$ ./run-debugger[.bat] (FS GUI)
  - [term3] \$ npx shadow-cljs cljs-repl :dev (cljs repl)
  - Open <http://localhost:8021>
- Follow the comments at the bottom of the file

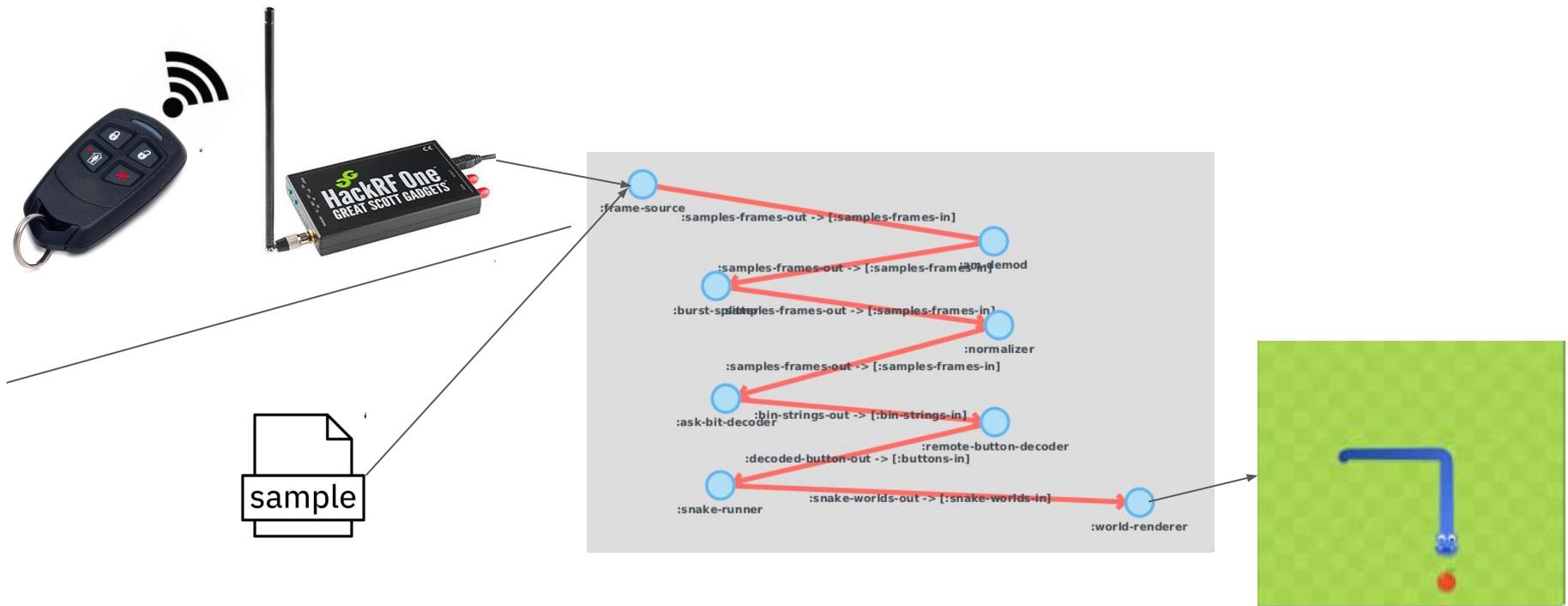


# Flowbooks

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

# Understanding systems (RadioSnake Demo)



# Understanding systems (RadioSnake Demo)

- Go to `conj-workshop-2025/projects/radio-snake`
- Open `radio-snake/dev/dev.clj`
- Take a look at `radio-snakedeps.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 Demo)

- 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

# Notes on 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://flow-storm.github.io/flow-storm-debugger/user_guide.html)
- <https://github.com/flow-storm/flow-storm-debugger>

Thank you!

Final: Q&A