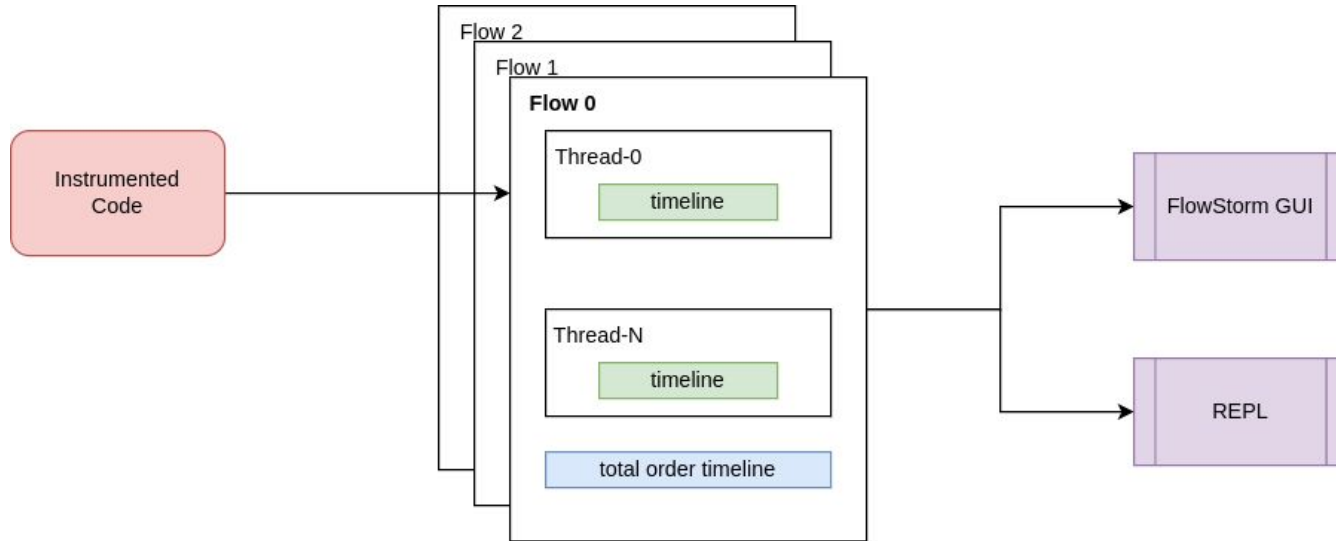


# FlowStorm

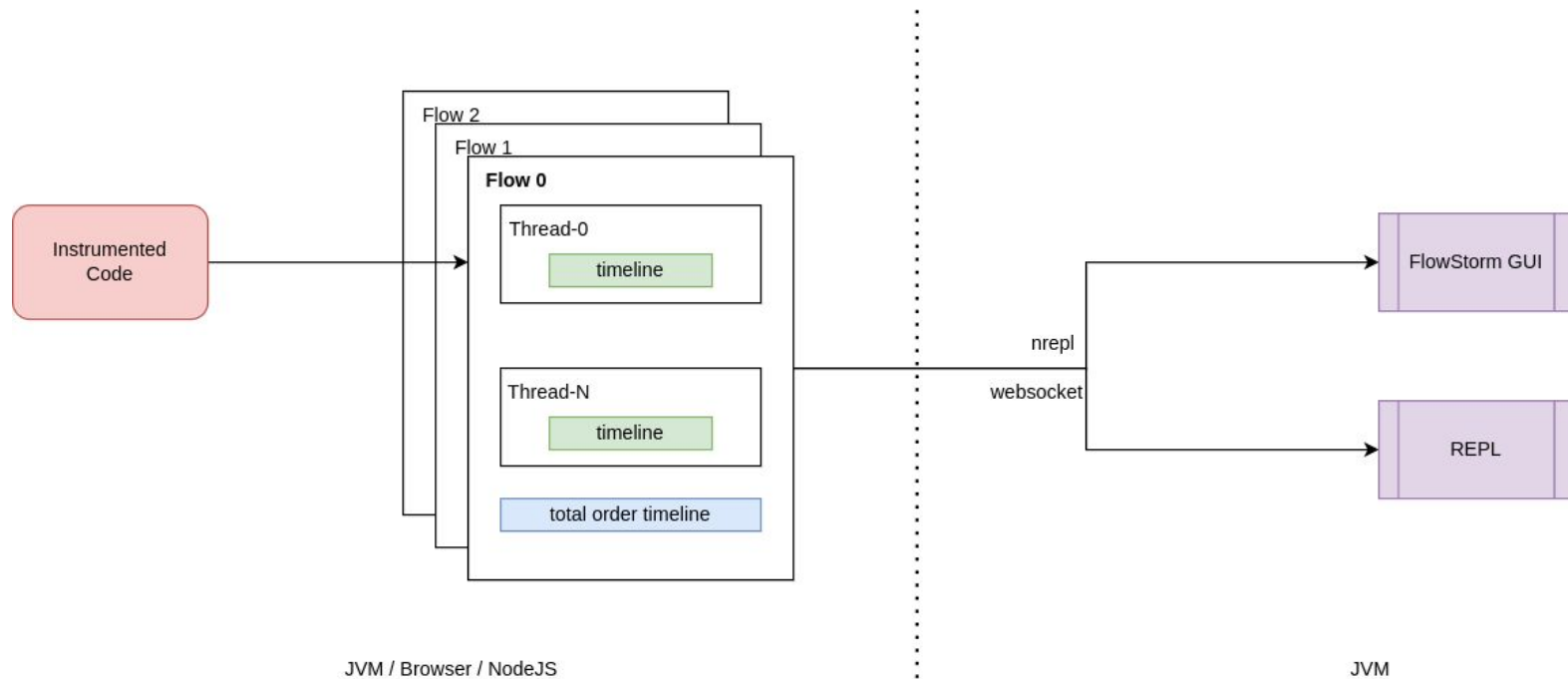
Internals

# The big picture (local / in-process)



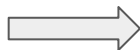
JVM

# The big picture (remote)



# How instrumentation works with ClojureStorm

```
(defn add-age [m years]
  (assoc m :age years))
```



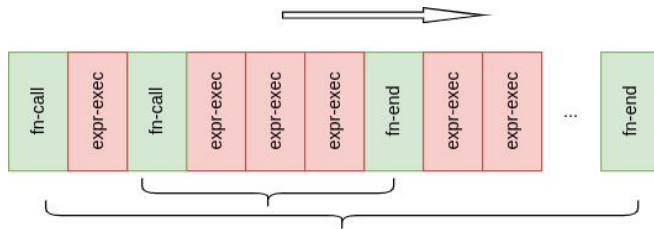
Copy pointers

hooks

Source coords

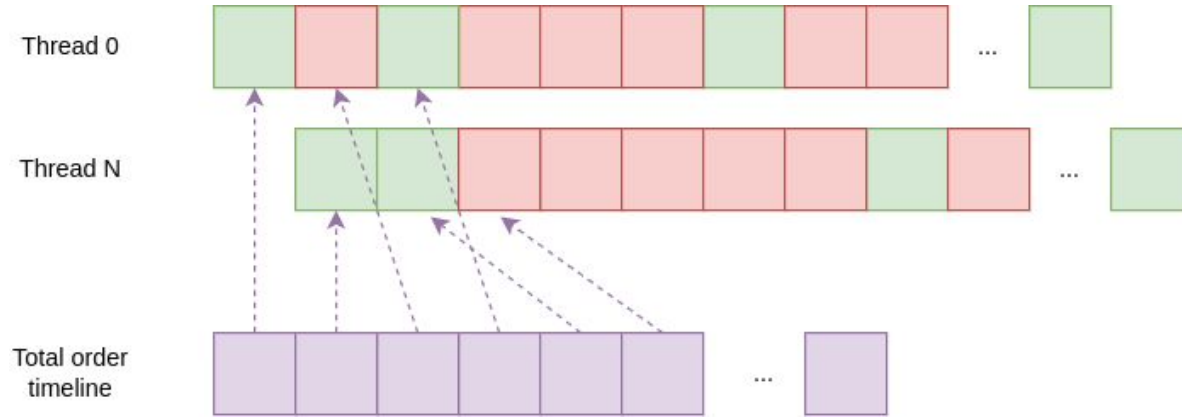
```
public static java.lang.Object invokeStatic(java.lang.Object m, java.lang.Object years);
  0: iconst_2
  1: anewarray      Ljava/lang/Object;
  4: dup
  5: iconst_0
  6: aload_0
  7: aastore
  8: dup
  9: iconst_1
 10: aload_1
 11: aastore
 12: ldc             "dev-tester"
 14: ldc             "add-age"
 16: ldc             -82329772
 18: invokestatic   clojure/storm/Tracer.traceFnCall
 21: aload_0
 22: ldc             ""
 24: ldc             "m"
 26: invokestatic   clojure/storm/Tracer.traceBind
 29: aload_1
 30: ldc             ""
 32: ldc             "years"
 34: invokestatic   clojure/storm/Tracer.traceBind
 37: getstatic      dev_tester$add_age.const_0:Lclojure/lang/Var;
 40: invokevirtual  clojure/lang/Var.getRawRoot:()Ljava/lang/Object;
 43: checkcast     Lclojure/lang/IFn;
 46: aload_0
 47: dup
 48: ldc             "3,1"
 49: ldc             -82329772
 52: invokestatic   clojure/storm/Tracer.traceExpr
 55: getstatic      dev_tester$add_age.const_1
 58: aload_1
 59: dup
 60: ldc             "3,3"
 62: ldc             -82329772
 64: invokestatic   clojure/storm/Tracer.traceExpr
 67: invokeinterface clojure/lang/IFn.invoke
 72: dup
 73: ldc             "3"
 75: ldc             -82329772
 77: invokestatic   clojure/storm/Tracer.traceExpr
 80: dup
 81: ldc             ""
 83: ldc             -82329772
 85: invokestatic   clojure/storm/Tracer.traceFnReturn
 88: goto          100
 91: dup
 92: ldc             ""
 94: ldc             -82329772
 96: invokestatic   clojure/storm/Tracer.traceFnUnwind
 99: athrow
100: areturn
```

# Thread timeline



- One [per thread](#)
- Represented by an [array of events](#) (fn-calls, expression-executions, fn-returns, fn-unwinds)
- <https://raw.githubusercontent.com/flow-storm/flow-storm-debugger/master/docs/timeline.svg>

# Total order timeline



- Record **thread interleaving**
- **Optional** to make everything faster

# Architecture

High Level

[https://raw.githubusercontent.com/flow-storm/flow-storm-debugger/master/docs/high\\_level\\_diagram.svg](https://raw.githubusercontent.com/flow-storm/flow-storm-debugger/master/docs/high_level_diagram.svg)

Run configurations

[https://raw.githubusercontent.com/flow-storm/flow-storm-debugger/master/docs/run\\_configs.svg](https://raw.githubusercontent.com/flow-storm/flow-storm-debugger/master/docs/run_configs.svg)