Nico

Clojure for pleasure

Cool Clojure and how to get started quickly

Content

Chapter 1

Welcome to Clojure

This book is about sharing my love for Clojure, why I use it, and why I will keep using it for a fair bit of time. You don't need to be a great IT geek, you just have to start using Clojure. Here we go.

Clojure

http://learn-clojure.com/clojure_tutorials.html

I will not go too much into the first steps details, since this is not the aim of this book. There is a completely new online book written by John that should get all the attention it deserves.

Do not forget to do a few clojure koans to make sure the basic and the roots are ok.

Leiningen

https://github.com/technomancy/leiningen

To start using clojure, you actually do not install it. You start by installing Leiningen. Once you have it installed, you should be able to see the following:

```
[Niko@Modrzyks-MacBook-Pro][13:44][~/projects/] % lein
Leiningen is a tool for working with Clojure projects.

Several tasks are available:
```

```
classpath    Print the classpath of the current project.
clean        Remove compiled class files and jars from project.
compile      Compile Clojure source into .class files.
deploy       Build jar and deploy to remote repository.
deps         Download :dependencies and put them in :library-path.
help         Display a list of tasks or help for a given task.
install      Install current project or download specified project.
interactive  Enter an interactive task shell. Aliased to "int".
jar          Package up all the project's files into a jar file.
javac        Compile Java source files.
new          Create a new project skeleton.
plugin       Manage user-level plugins.
pom          Write a pom.xml file to disk for Maven interop.
repl         Start a repl session either with the current project or standalone.
retest       Run only the test namespaces which failed last time around.
run          Run the project's -main function.
search       Search remote maven repositories for matching jars.
test         Run the project's tests.
test!        Run a project's tests after cleaning and fetching dependencies.
trampoline   Run a task without nesting the project's JVM inside Leiningen's.
uberjar      Package up the project files and all dependencies into a jar file.
upgrade
version      Print version for Leiningen and the current JVM.

Run lein help $TASK for details.
See also: readme, tutorial, copying, sample, deploying and news.
```

Now if you just want to start using some live clojure, you just go with:

```
[Niko@Modrzyks-MacBook-Pro][13:50][~/] % lein repl
REPL started; server listening on localhost port 27991
user=>
```

And there you are. Was simple no ?

And here is your mother of them all hello world

```
user=> (println "hello clojure!")
hello clojure!
```

Now you have to realize that all the libs available to the Java World through Maven repositories, and all the libs hosted on Clojars can be integrated in the project in no time by using the command:

lein deps

The libraries will come to your local project folder. Let's hack in no time.

Search clojars

To search a library online, use the following syntax:

```
lein search <libraryname>
```

For example

```
lein search jsoup
```

will return

```
== Results from clojars - Showing page 1 / 1 total [org.clojars.clizzin/jsoup "1.5.1"] jsoup HTML parser
```

Upload to clojars

There is a plugin called lein-clojars

You install it somehow like this:

```
lein plugin install lein-clojars 0.9.1
```

Then in a clojure project, just go and upload it with

```
lein push
```

Nothing else.

Then a lein search will (should) show it.

Jark

http://icylisper.in/jark/started.html

Next you probably going to get tired of the Java VM so very slow startup time. Here comes nrepl and Jark

Create a new leiningen project, and follow the jark install steps:

```
; project.clj
(defproject book01 "1.0.0-SNAPSHOT"
```

```
  :description "FIXME: write description"
  :dependencies [
    [org.clojure/clojure "1.3.0"]
    [jark "0.4.2" :exclusions [org.clojure/clojure]]
  ])

; core.clj
(ns book01.core
    (:require [clojure.tools.nrepl :as nrepl]))

(nrepl/start-server 9000)
```

and then start the repl with the new code from core.clj

```
[Niko@Modrzyks-MacBook-Pro][14:11][~/projects/book01/] % lein repl
REPL started; server listening on localhost port 42326
user=> (load-file "src/book01/core.clj")
```

And now straight from the shell you can use and run remote clojure code

```
[Niko@Modrzyks-MacBook-Pro][14:16][~/Downloads/jark-0.4.2-Darwin-x86_64/] % jark -e "(+ 2 2)"
=> 4
```

Now that is some sweet fast starting time, so stop buzzing around.

Pomegrenate

https://github.com/cemerick/pomegranate

This is the best way to add libraries at runtime. You still need the library itself to be available to the repl, by adding this to your project.clj file:

```
[com.cemerick/pomegranate "0.0.13"]
```

Then, here is how to import incanter in a running REPL session:

[missing 'code/11_pomegranata.clj' file]

Chapter 2

Libraries

Now that we are ready for some hacking, here are sites, that refer interesting Clojure libraries:

- clojure-libraries on appspot.com/
- clojurewerkz
- Clojure on github
- http://programmers.stackexchange.com/questions/125107/what-are-the-essential-clojure-libraries-to-learn-beyond-the-basics-of-core

Noir

https://github.com/ibdknox/noir http://www.webnoir.org/

It's dark in here ! Noir is probably the simplest way to write a functional web application in clojure.

This is how it looks like in Clojure code

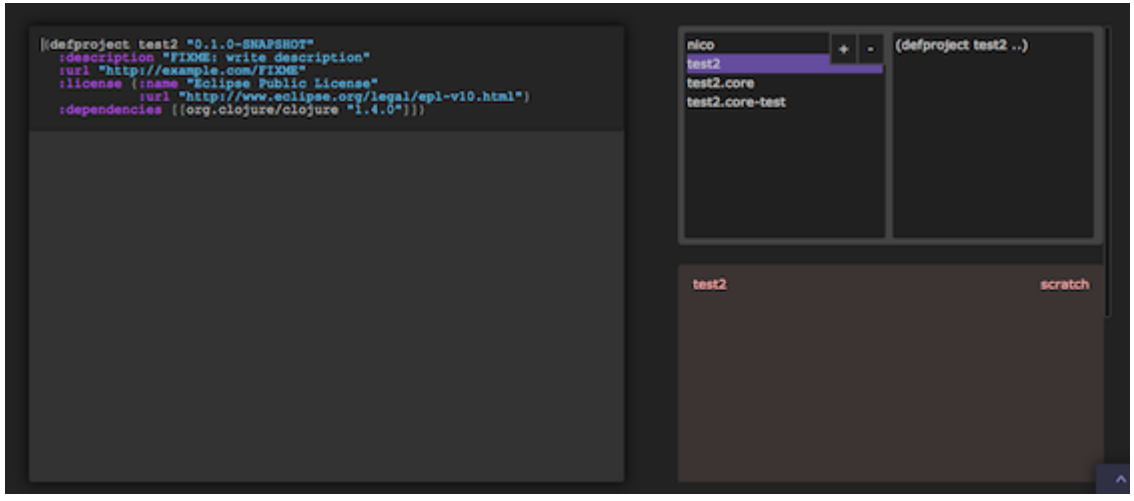
```
(ns my-app
  (:use noir.core)
  (:require [noir.server :as server]))

(defpage "/welcome" []
    "Welcome to Noir!")
```

```
(server/start 8080)
```

and/or this is how you would have it started in a few seconds with the leiningen command we installed earlier on

```
lein plugin install lein-noir 1.2.1
lein noir new my-website
cd my-website
lein run
```

Now the guy from Noir has also started a very cute project named Playground where you can do live execution of your code with a nice UI.



Incanter

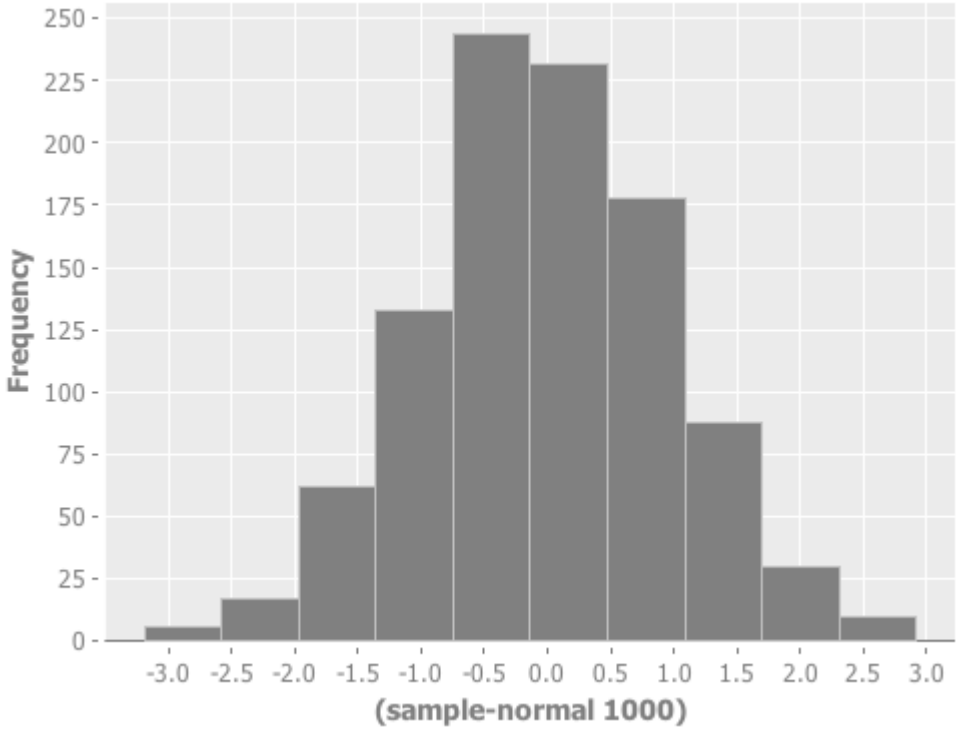
Download and Get started

From the Clojure REPL, load the Incanter libraries:

```
user=> (use '(incanter core stats charts))
```

Try an example: sample 1,000 values from a standard-normal distribution and view a histogram:

```
user=> (view (histogram (sample-normal 1000)))
```



Quil

https://github.com/quil/quil

Quil is to Processing what Clojure is to Java, some fresh air.

This is how your quil-ed processing sketch now looks like:

```
(ns quilme.core
  (:use quil.core))

(defn setup []
  ;(smooth)                          ;;Turn on anti-aliasing
  (frame-rate 5)                     ;;Set framerate to 1 FPS
  (background 0))                    ;;Set the background colour to
                                     ;;  a nice shade of grey.
(defn draw []
  (stroke (random 255))              ;;Set the stroke colour to a random grey
  (stroke-weight (random 10))        ;;Set the stroke thickness randomly
  (fill (random 255))                ;;Set the fill colour to a random grey

  (let [diam (random 100)            ;;Set the diameter to a value between 0 and 100
        x    (random (width))        ;;Set the x coord randomly within the sketch
        y    (random (height))]      ;;Set the y coord randomly within the sketch
    (ellipse x y diam diam)))        ;;Draw a circle at x y with the correct diameter

(defsketch example                   ;;Define a new sketch named example
  :title "Oh so many grey circles"   ;;Set the title of the sketch
  :setup setup                       ;;Specify the setup fn
  :draw draw                         ;;Specify the draw fn
  :render :opengl
  :decor false
  :size [800 600])                   ;;You struggle to beat the golden ratio
```

Note the decor set to false, that hides most of the uglyness of the Window borders.

And all the examples you have ever dreamed from the Generative Art book have been implemented in Clojure/Quil.

Overtone

https://github.com/overtone/overtone/wiki/Getting-Started

Because you really need to live audio programming to be a real VJ these days. This is how you install it:

```
(defproject tutorial "1.0"
  :dependencies [ [org.clojure/clojure "1.3.0"]
                  [overtone "0.7.1"] ])
```

Once the library is in your project, type

```
(use 'overtone.live)
```

And now you can define an instrument

```
(definst foo [] (saw 220))
```

And make some sound !

(foo) ; Call the function returned by our synth 4 ; returns a synth ID number (kill 4) ; kill the synth with ID 4 (kill foo) ; or kill all instances of synth foo

Marginalia

https://github.com/fogus/marginalia

Marginalia is your best literate programming tool for clojure.

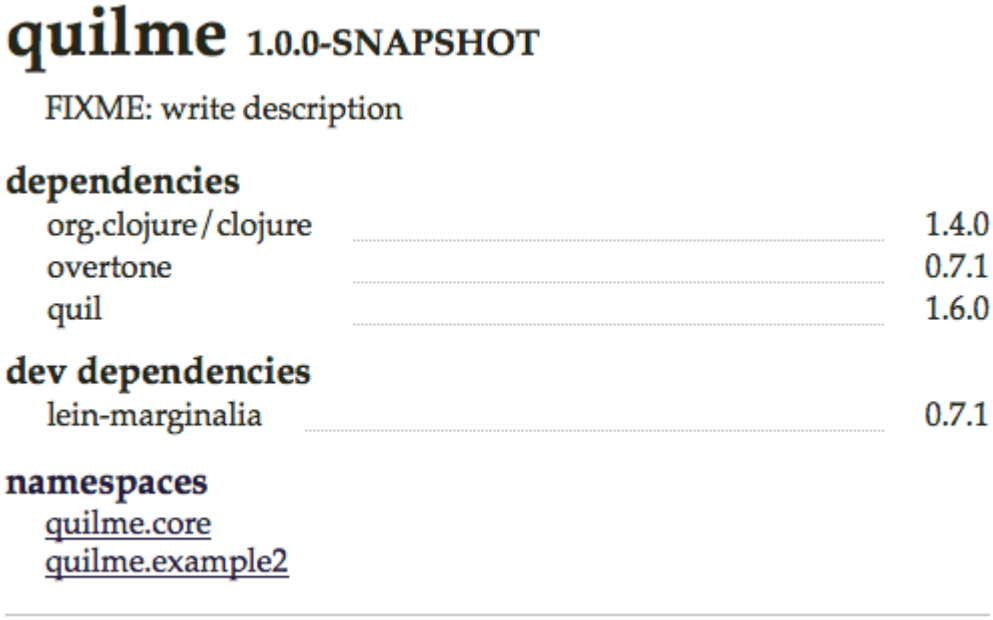
Install it as a dependency in your project.clj file:

```
:dev-dependencies [lein-marginalia "0.7.1"]
```

Then, just use it:

```
lein marg
```

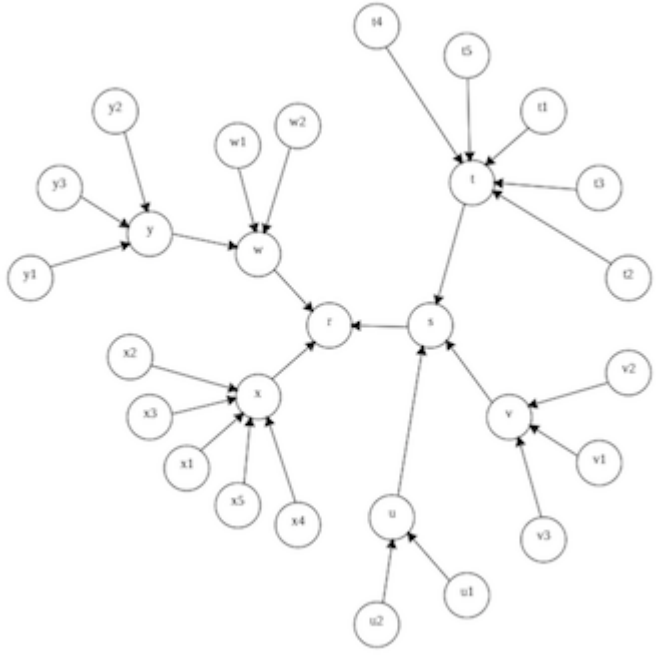
And dependending on the amount of comments you wrote in the code, you will get something similar to this:



Lacij

https://github.com/pallix/lacij

A library that can quickly create SVG diagram with automatic layout, like this one:




```
(use 'lacij.graph.svg.graph)
```

Then, a graph can be drawn like this:

```
(-> (create-graph :width 800 :height 400)
    (add-default-node-style :fill "lightgreen")
    (add-default-edge-style :stroke "royalblue")
    (add-node :hermes "Hermes" :x 10 :y 30 :style {:fill "lightblue"})
    (add-node :zeus "Zeus" :x 300 :y 150 :rx 15 :ry 15)
    (add-node :ares "Ares" :x 300 :y 250 :style {:fill "lavender" :stroke "red"})
    (add-edge :father1 :hermes :zeus "son of"
              :style {:stroke "darkcyan" :stroke-dasharray "9, 5"})
    (add-edge :father2 :ares :zeus)
    (add-default-node-attrs :rx 5 :ry 5)
    (add-node :epaphus "Epaphus" :x 450 :y 250)
    (add-edge :epaphus-zeus :epaphus :zeus)
    (add-node :perseus "Perseus" :x 600 :y 150)
    (add-edge :perseus-zeus :perseus :zeus)
    (add-label :father2 "son of" :style {:stroke "crimson"
                                         :font-size "20px"
                                         :font-style "italic"})
    (build)
    (export "/tmp/styles.svg"))
```

The advantage is that you can add and remove nodes dynamically, thus giving a dynamic view about live typologies.

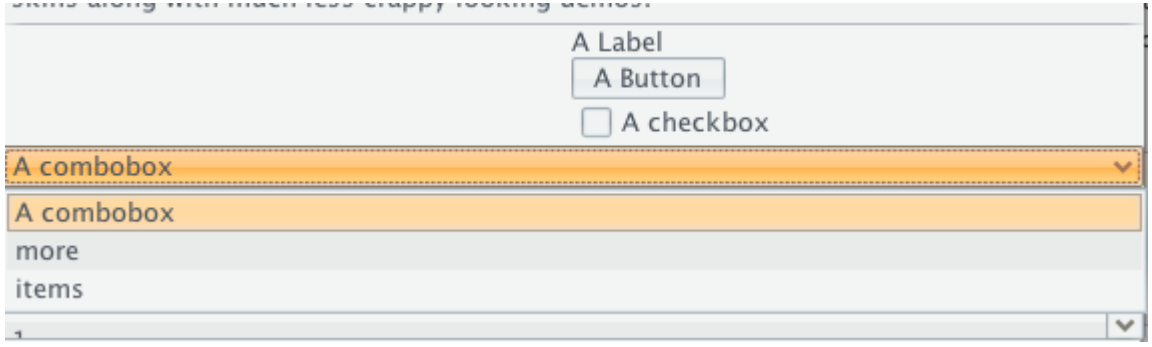
Seesaw

https://github.com/daveray/seesaw

Make cool UIs in no time.

The best tutorial I have found so far is here

And by trying the example, here is a style you can get after a few lines:



clj-xpath

https://github.com/kyleburton/clj-xpath

Now you been looking on how to process those xml files as fast as possible, here is a super way to do it, clj-xpath.

```
; import clj
(use 'clj-xpath.core)

; slurp the remote document
(def xdoc (slurp "http://google-web-toolkit.googlecode.com/svn/trunk/samples/expenses/pom.xml"))

; show the top element
($x:tag "/*" xdoc)
```

```
; show the developer name
($x:text* "/project/developers/developer/name" xdoc)

; describe all the dependencies
(doseq [node ($x "/project/dependencies/dependency" xdoc)]
  (prn (format "%s %s %s"
               ($x:text "./groupId"    node)
               ($x:text "./artifactId" node)
               ($x:text "./version"    node))))
```

clojure-soup

https://github.com/mfornos/clojure-soup

This is a wrapper to provide awesome parsing of html files, whether local or remote. Once you have added the library, check out the following example:

```
; start jsoup
(use 'jsoup.soup)

: Get all Emoji names concatenated by single bars from 'emoji-cheat-sheet.com':

($ (get! "http://www.emoji-cheat-sheet.com/")
   "li div:has(span.emoji)" (text)
   (map #(clojure.string/replace % ":" ""))
   (clojure.string/join "|"))
```

Enlive

https://github.com/cgrand/enlive

HTML parser, and Templating framework at the same time, Enlive does a super job of making HTML fun. (yes you read me.)

This is an example taken from a slick tutorial by David Nolen.

```
(html/deftemplate index "tutorial/template1.html"
  [ctxt]
  [:p#message] (maybe-content (:message ctxt) "Nothing to see here!"))
```

You declare templates in a regular html files, thus your designer can do his Dreamweaver work the way he/she usually does it. Then as a developper you just come and stick content at the location that has been decided. Slick uh ?

Vaadin

http://dev.vaadin.com/wiki/Articles/ClojureScripting

This is not so much a library than a way to develop slick web application using Vaadin, but without the java boiler plate code.

clj-opennlp

https://github.com/dakrone/clojure-opennlp Natural Language Processing in Clojure.

Tokenizer for text analysis.

clj-http

https://github.com/dakrone/clj-http

Cascalog

https://github.com/nathanmarz/cascalog/wiki

Aleph

https://github.com/ztellman/aleph

Lamina

https://github.com/ztellman/lamina Event workflow for clojure

Conduit

http://www.intensivesystems.net/tutorials/stream_proc.html Stream processing in Clojure

Chapter 3

OpenCV, Arduino

Physics with Clojure

- http://nakkaya.com/2010/07/21/physics-with-clojure/
- http://antoniogarrote.wordpress.com/2011/01/30/ocr-with-clojure-tesseract-and-opencv/

Cloduino

https://github.com/nakkaya/clodiuno

Once you have uploaded the Firmata protocol on your board `File -> Examples -> Firmata -> StandartFirmata`

You can send a Clojure SOS.

```
(ns sos
   (:use :reload-all clodiuno.core)
   (:use :reload-all clodiuno.firmata))

(def short-pulse 250)
(def long-pulse 500)
(def letter-delay 1000)

(def letter-s [0 0 0])
```

```
(def letter-o [1 1 1])

(defn blink [board time]
  (digital-write board 13 HIGH)
  (Thread/sleep time)
  (digital-write board 13 LOW)
  (Thread/sleep time))

(defn blink-letter [board letter]
  (doseq [i letter]
    (if (= i 0)
      (blink board short-pulse)
      (blink board long-pulse)))
  (Thread/sleep letter-delay))

(defn sos []
  (let [board (arduino :firmata "/dev/tty.usbserial-A900adPT")]
    ;;allow arduino to boot
    (Thread/sleep 5000)
    (pin-mode board 13 OUTPUT)

    (doseq [_ (range 3)]
      (blink-letter board letter-s)
      (blink-letter board letter-o)
      (blink-letter board letter-s))

    (close board)))
```

There are so many more great Samples that Nakkaya has been writing. Make sure you go through them.

- https://github.com/bagucode/clj-native

- https://groups.google.com/forum/?fromgroups=#!topic/clojure/WHKlys_SmcU
- http://im4java.sourceforge.net/
- https://github.com/bagucode/clj-native

Chapter 4

In the Clouds

Pallet

http://palletops.com/

Pallet is the mother of them all of cloud infrastructure tool. See the list of providers it supports! They are actually doing this through jclouds

Heroku

Debugging clojure on Heroku

VMFest

https://github.com/tbatchelli/vmfest

Easy VirtualBox wrapper for easy cloud management.

```
; you can define your machine this way:
(def my-machine
     (instance my-server "my-vmfest-vm"
       {:uuid "/Users/tbatchelli/imgs/vmfest-Debian-6.0.2.1-64bit-v0.3.vdi"}
```

```
            {:memory-size 512
             :cpu-count 1
             :network [{:attachment-type :host-only
                        :host-only-interface "vboxnet0"}
                       {:attachment-type :nat}]
             :storage [{:name "IDE Controller"
                        :bus :ide
                        :devices [nil nil {:device-type :dvd} nil]}]
             :boot-mount-point ["IDE Controller" 0]}))

    ; then this is the way to start/stop.. any of the virtual machines you have
    (start my-machine)
    (pause my-machine)
    (resume my-machine)
    (stop my-machine)
    (destroy my-machine)
```

Make sure you also look at the playground and have a look at the tutorial

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