http://clojure.org/

Clojure 第一眼

涧泉

2013-4-28

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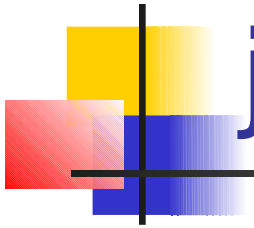
- 文中知识点仅凭个人记忆和理解，不保证正确性。



joke

- 你喜欢函数式编程？是啊。我也是，你喜欢 Erlang 、 Lua 、 Lisp 还是 Haskell ？ Lisp 。我也是，你喜欢 Common Lisp 、 Emacs Lisp 、 Scheme 还是 Clojure ？ Scheme 。我也是，你喜欢 MIT Scheme 、 MzScheme 、 DrScheme 还是 Guile ？MIT Scheme 。我也是，你喜欢 7.5 版还是 7.4 版？ 7.5 。滚！异端
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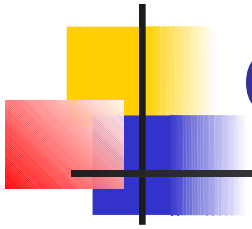


clojure

- LISP

  简单语法、 Symbol 、宏
- JVM

  字节码、解释执行、 Java 交互
- & More

  函数式、动态类型、并发支持

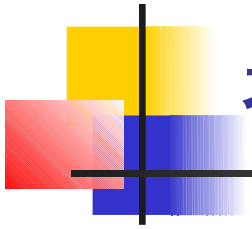
  通用编程语言

REPL（交互式控制台）

- Read Eval Print Loop

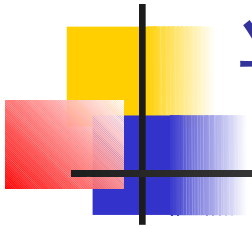
  读取表达式，求值，输出，循环
- 解释执行 REPL
- idea 、 eclipse 、 apt-get

```
hanyong@han:~$ clojure
Clojure 1.4.0
user=> (+ 2 3)
5
user=> (println "hello world")
hello world
nil
user=>
```



表达式

- 2 + 3 = ?
- (+ 2 3)
- (+ 2 3 4)
- (println “hello world”)
- nil
- (class “abc”)



语法 & 语义

- 语法

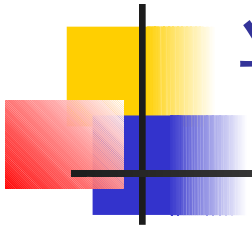
  原子、集合

  语法树？
- 语义

  special forms => (if)

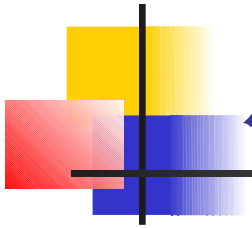
  宏 => (for)

  函数 => (println)



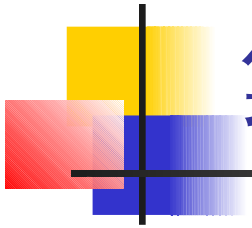
语法

- 原子
- 集合



原子

- user=> \a ; 字符
- \a
- user=> "string" ; 字符串
- "string"
- user=> 456 ; 整数
- 456
- user=> true false ; bool
- true
- false
- user=> :key ; keyword
- :key
- user=> nil
- nil



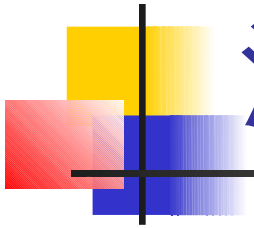
集合

- user=> [1 2 :is true "abc"]
- [1 2 :is true "abc"]

- user=> {:x 5, "pos" [3 2], [99 99] :good}
- {[99 99] :good, :x 5, "pos" [3 2]}

- user=> (list 44 :fast "joke")
- (44 :fast "joke")

- user=> #{"abc" false {:x 8} nil 42.5}
- #{nil 42.5 {:x 8} "abc" false}

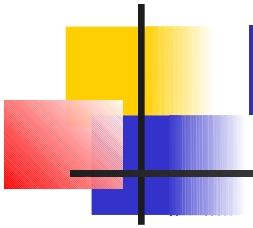


注释和可选分隔符

- user=> ; (print "hello") 这里只是注释

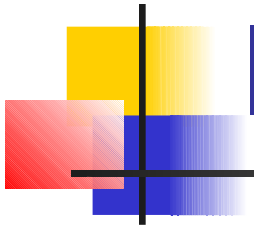
- user=> 1,456,,,,,,,,,72.3,,,,,,,,,,,,
- 1
- 456
- 72.3

- user=> {1, :x 5, :y 6, true} ； 分隔符被忽略
- {1 :x, 5 :y, 6 true}



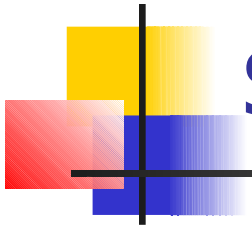
list 和 quote(1)

- clojure 对每个表达式求值
- 递归求值
- 求值 list 表达式发生函数 (语义) 调用
- quote 禁止求值
- 简写 (')
- 表达式自闭合性



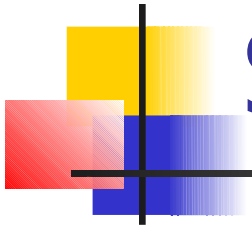
list 和 quote(2)

- user=> (println "hello")
- hello
- nil
- user=> (quote (println "hello"))
- (println "hello")
- user=> (= [(+ 2 3)] [5])
- true
- user=> (= '[(+ 2 3)] '[5])
- false



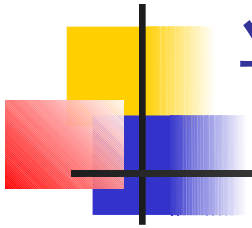
symbol

- user=> x
- CompilerException java.lang.RuntimeException: Unable to resolve symbol: x in this context, compiling: (NO_SOURCE_PATH:0)
- user=> (def x)
- #'user/x
- user=> x
- #<Unbound Unbound: #'user/x>
- user=> (def x 3)
- #'user/x
- user=> x
- 3
- user=> (print x)
- 3nil
- user=> (println x)
- 3
- nil
- user=> (println 'x "=" x)
- x = 3
- nil
- user=> (class x)
- java.lang.Long
- user=> (class 'x)
- clojure.lang.Symbol



Symbol 命名约定

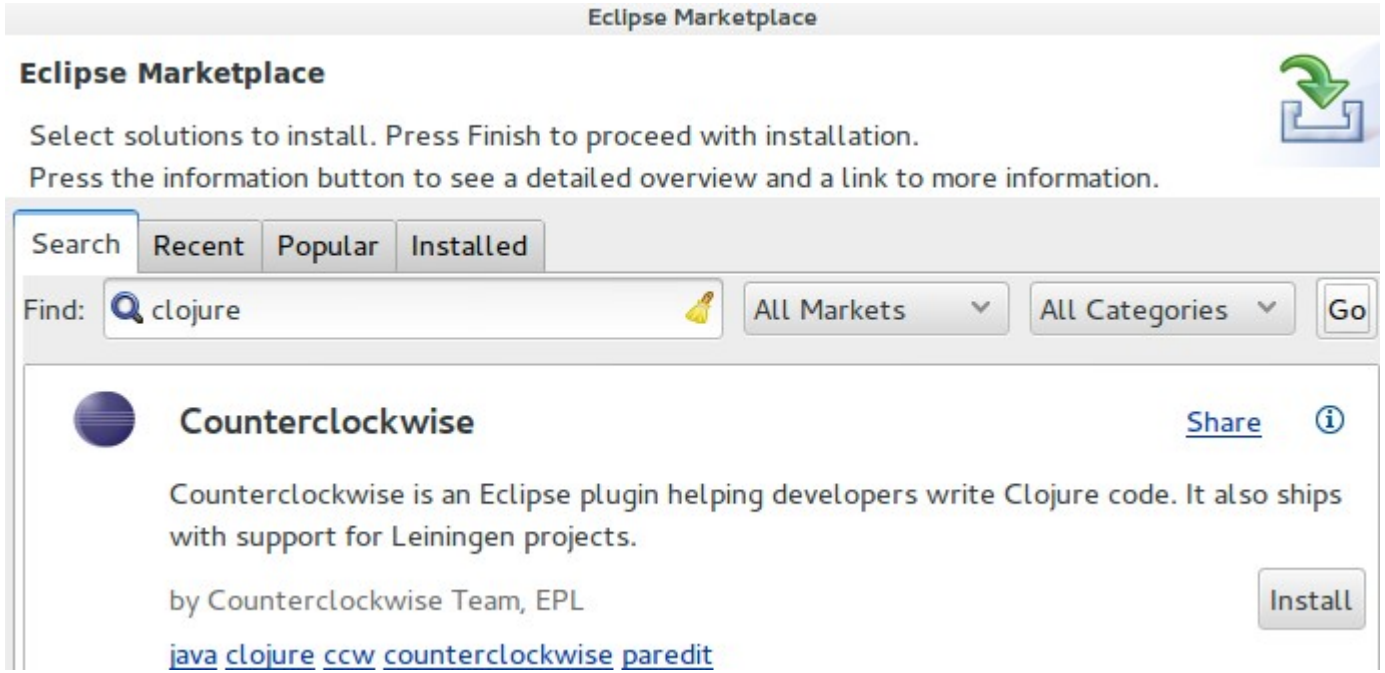
- user=> (empty? [])
- true
- user=> (vector? [])
- true
- user=> (every? integer? [1 2 3 4])
- true
- user=> (every? integer? [1 2 3 4 "ab"])
- false
- user=> (not-any? integer? [1 2 3 4 "ab"])
- false
- user=> (not-any? integer? ["ab"])
- true



语法小结

- 分词规则和数据结构？
- 语法树？
- json++ ？
- Q&A？

eclipse 安装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Counterclockwise is an Eclipse plugin helping developers write Clojure code. It also ships with support for Leiningen projects.
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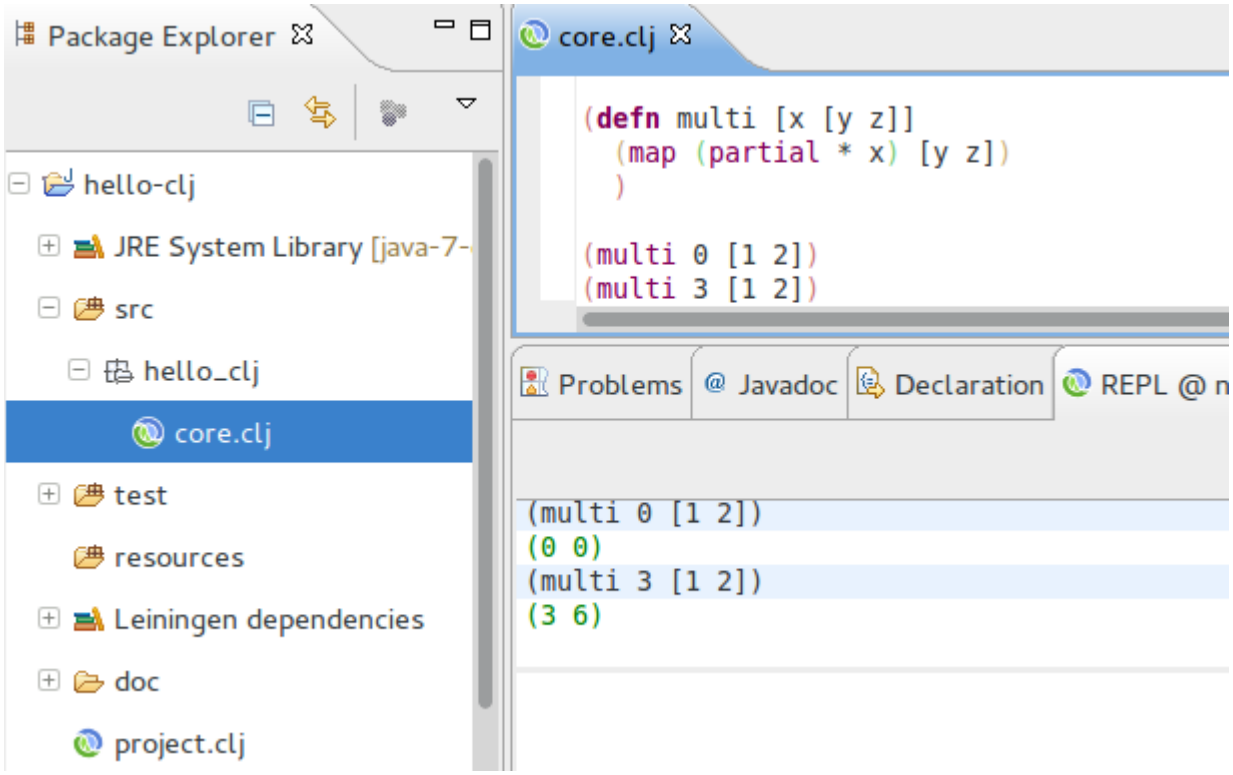
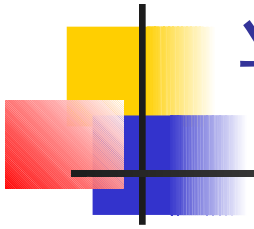
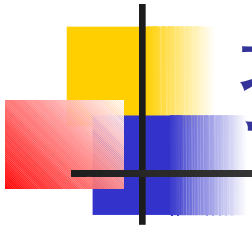
eclipse 开发


Package Explorer
hello-clj
JRE System Library [java-7-
src
hello_clj
core.clj
test
resources
Leiningen dependencies
doc
project.clj
core.clj
(defn multi [x [y z]]
(map (partial * x) [y z])
)
(multi 0 [1 2])
(multi 3 [1 2])
Problems
Javadoc
Declaration
REPL @ n
(multi 0 [1 2])
(0 0)
(multi 3 [1 2])
(3 6)



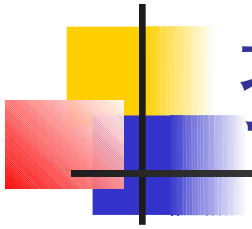
语义

- 所有语义都使用 list 表达式语法 (code is data ?)
- Special forms，宏，函数
- 控制结构，函数定义，函数
- 自定义语义，DSL?



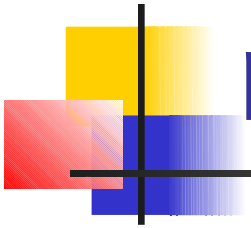
控制结构 (1)

- (def symbol init?) ； 符号定义，全局
- (do exprs*) ； 复合表达式
- (if test then else?) ； 分支
- (let [bindings*] exprs*) ； 局部推导
- (loop [bindings*] exprs* (.. recur ..)) ； 递归



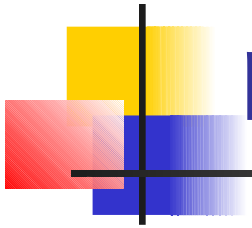
控制结构 (2)

- (for [e [elems*] :when test] expr) ；列表变换
- (doto obj (.method params*)*)；连续操作
- (-> expr (f params*)*)；连续首参数
- (->> expr (f params*)*)；连续末参数



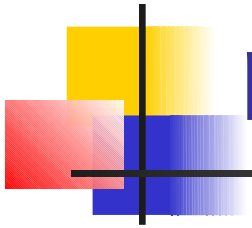
函数定义

- (fn [params*] exprs*)
- (defn name [params*] exprs*)
- #(action exprs*)
- 可变参数 [x & more]
- 参数结构 [x [y z]]
- 参数个数重载



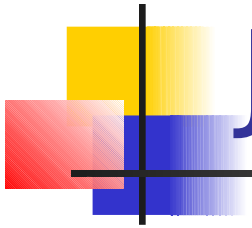
函数

- + - * quot rem /
- println class
- filter map partial
- apply concat lazy-cat
- http://clojuredocs.org/quickref/Clojure Core



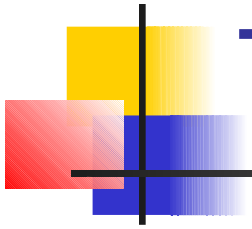
函数示例

```
(defn two
  ([] [])
  ([x & more]
    (lazy-cat [(* x 2)] (apply two more))
    ))

(two)
(two 1 2 3)

(defn multi [x [y z]]
  (map (partial * x) [y z])
  )

(multi 0 [1 2])
(multi 3 [1 2])
```



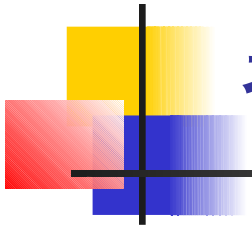
Java 交互

- (StringBuilder. "init-value")；构造函数
- (.append sb "str")；方法调用
- (import java.util.Random)
- (Math/PI) / (Math/abs -1)；静态成员



TODO

- 项目管理 (leiningen)
- 宏
- 多方法、 Java 接口
- 高阶函数、闭包
- 并行支持
- Q&A ?



参考

- 尔术 《clojure make fun》
- The Blackstag Blog http://blackstag.com/blog.posting?id=6
- 为什么 Lisp 语言如此先进 http://www.ruanyifeng.com/blog/2010/10/why_lisp_is_superior.html