

Leveraging macros to reimplement language features

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March 5, 2019

Clojure Meetup Berlin

Agenda

- Comments
- Conditionals
- Lists
- Local bindings

Agenda

Shameless plug: agenda of my series of blog post on Scheme macros!

- Modules
- Generic functions
- Classes/Inheritance
- Keyword Arguments in functions
- Design by Contract
- Green Threads

Comments

```
(defmacro mcomment [& args] nil)
```

Listing 1: Implementing comments

```
(mcomment  
  (+ 40 3)  
  (undefined-function)  
  (println "nope"))
```

Listing 2: Using comments

Conditionals

```
(defn mtrue [x y] (x))  
(defn mfalse [x y] (y))
```

Listing 3: Booleans as functions


```
(defn mtrue [x y] (x))  
(defn mfalse [x y] (y))  
  
(defmacro mif [cnd then else] `(~cnd #(~then) #(~else)))
```

Listing 4: if as a macro

```
(mif mfalse  
  (println "nope")  
  (println "yup"))
```

Listing 5: Using if, the macro

```
(defmacro mcond [& args]
  (when args
    `(if ~(first args)
        ~(second args)
        ~(cons 'mcond (rest (rest args)))))))
```

Listing 6: cond as a macro

```
(mcond  
  (= 1 2) (println "no")  
  (= 2 3) (println "still no")  
  true (println "yup"))
```

Listing 7: Using cond, the macro

Lists

TODO

```
(defmacro mcons [h t] #(if % h t))  
(defn mcar [l] (l true))  
(defn mcdr [l] (l false))
```

Listing 8: cons, car, and cdr as macros

```
(println (mcar (mcd r (mcons 1 (mcons 2 3)))))
```

Listing 9: Using cons, car, and cdr, the macros

```
(defn mlist [& args]
  (loop [res nil, args args]
    (if (empty? args)
        res
        (recur (mcons (first args) res) (rest args)))))
```

Listing 10: Reimplementing list

Local bindings

```
(defmacro mlet [args body]
  (if (= (count args) 2)
    `((fn [~(first args)] ~body) ~(second args))
    `((fn [~(first args)]
        (mlet ~(rest (rest args)) ~body))
      ~(second args))))
```

Listing 11: Reimplementing let

```
(println (mlet [x 1 y 2] (+ x y)))
```

Listing 12: Using let

- “Reversing the technical interview” uses the lists for great effect:
<https://aphyr.com/posts/340-reversing-the-technical-interview>
- These slides: <https://github.com/hellerve/talks>
- A series of blog posts on Scheme macros:
<https://blog.veitheller.de/scheme-macros>

Thank you!

Questions?

Slides at <https://github.com/hellerve/talks>