

Lisp Lisp

""""Lisp Lisp "

Lisp Lisp ""JavaC#JavaScriptPython, RubyHaskell..... Lisp

- Lisp Lisp
- Lisp PythonJavaScriptRuby
- Lisp macro system C "" Lisp
- Lisp garbage collection JavaC#

Lisp — Lisp "" Lisp Lisp Machine Unix

Lisp dynamic scoping dynamic scoping """"

f y x y

```
(setq f
  (let ((x 1))
    (lambda (y) (* x y))))
```

x (lambda (y) (* x y)) ""free variable

x 1 f (* 1 y) y dynamic scoping

emacs Emacs Lisp dynamic scoping

x 2

```
(let ((x 2))
  (funcall f 2))
```

x f x 2 4

x 3

```
(let ((x 3))
  (funcall f 2))
```

2 6

```
(funcall f 2)
```

2

```
Debugger entered--Lisp error: (void-variable x)
(* x y)
(lambda (y) (* x y))(2)
funcall((lambda (y) (* x y)) 2)
eval_r((funcall f 2) nil)
eval-last-sexp-1(nil)
eval-last-sexp(nil)
call-interactively(eval-last-sexp nil nil)
```

f " x" x f x Lisp Scheme, Common Lisp, Haskell, OCaml, Python, JavaScript..... dynamic scoping

dynamic scopingLisp Machine Lisp Machine Lisp dynamic scoping Lisp Machine Common Lisp
Scheme C++Java Python Lisp Machine Lisp Emacs Lisp

Lisp dynamic scoping """" emacs f

```
'(lambda (y) (* x y))
```

f S Scheme ""closureEmacs Lisp S '(lambda (y) (* x y)) ""Lisp

f (funcall f 2)y 2 x "" (funcall f 2) x

""(closure) SchemeCommon Lisp PythonC# x""(Closure '(lambda (y) (* x y)) '((x . 1)))

(Closure ...) "" C struct '((x . 1))""map x

dynamic scoping "lexical scoping" lexical scoping lexical scoping Lisp Algol 60"Algol"algorithm
Algol Lisp lexical scoping Scheme Algol 60 lexical scoping lexical scoping "Lisp "9 Lisp "" Common
Lisp lexical scoping

Lisp "Lisp "" S S TeX Lisp SchTeXScheme + TeXSchTeX

```
(documentclass article (11pt))
(document
  (abstract (...))
  (section (First Section)
    ... )
  (section (Second Section)
    ... )
)
```

Scheme TeX

Scheme S Scheme Lisp ""Scheme Emacs LispCommon Lisp Racket PLT Scheme Scheme PLT
Racket

"Lisp Lisp " "Lisp""Lisp " Lisp Machine Lisp Lisp"Lisp " SchemeCommon Lisp Lisp

Lisp Lisp