Core Reference

libcore version *0.0.39*

Type Keywords and aliases

supertype	*T*
bool	`()`, `:nil` are false, otherwise true
condition	*keyword,* see ***Exception***
list	*cons* or `()`, `:nil`
frame	*cons*, see ***Frame***

`:null`	`()`, `:nil`	
`:asyncid`	*async*	async future id
`:char`	*char*	
`:cons`	*cons*	
`:fixnum`	*fixnum, fix*	56 bit signed integer
`:float`	*float, fl*	32 bit IEEE float
`:func`	*function, fn*	function
`:keyword`	*keyword, key*	*symbol*
`:stream`	*stream*	file or string type
`:struct`	*struct*	typed vector
`:symbol`	*symbol, sym*	LISP-1 symbol
`:vector`	*vector, string, str*	`:char :t :byte :fixnum :float`

Heap *p*

hp-info	*vector*	heap static information `#(:t type pages pagesize)`
hp-stat	*vector*	heap allocations `#(:t :type size total free ...)`
hp-size *T*	*fixnum*	heap occupancy in bytes

Frame *e*

frame binding: `(`*fn* `. #(:t …))`

frames	*list*	active *frame binding* list
fr-pop *fn*	*fn,*	pop *function's* top frame binding
fr-push *frame*	*cons*	push frame binding
fr-ref *fix fix*	*T*	frame id, offset

Struct *t*

struct *key list*	*struct*	of type *key* from list
st-type *struct*	*key*	struct type keyword
st-vec *struct*	*vector*	of struct members

Symbol *l*

boundp *sym*	*bool*	is *symbol* bound?
keyword *str*	*key*	*keyword* from *string*
symbol *str*	*symbol*	uninterned *symbol*
sy-ns *sym*	*key*	*symbol* namespace
sy-name *sym*	*string*	*symbol* name binding
sy-val *sym*	*T*	*symbol* value binding

Special Forms *s*

***:async** *fn . list*	*async*	create *future* context
:lambda *list . list'*	*function*	anonymous function
:quote *form*	*list*	quoted form
:if *form T T'*	*T*	conditional

Core *s*

apply *fn list*	*T*	apply *function* to *list*
eval *form*	*T*	evaluate *form*
eq *T T'*	*bool*	*are T* and *T'* identical?
type-of *T*	*keyword*	
***await** *async*	*T*	return value of async future
***abort** *async*	*T*	abort future
compile *form*	*T*	*mu* form compiler
view *form*	*vector*	vector of object
repr `type` *T*	*T*	tag representation

`type` `- :t :vector`

if `type` is `:vector`, return 8 byte byte vector of argument tag bits, otherwise convert argument byte vector to tag.

fix *fn form*	*T*	fixpoint of *function* on *form*
gc *bool*	*bool*	garbage collection, verbose

Fixnum *m*

fx-mul *fix fix'*	*fixnum*	product
fx-add *fix fix'*	*fixnum*	sum
fx-sub *fix fix'*	*fixnum*	difference
fx-lt *fix fix'*	*bool*	*fix < fix'?*
fx-div *fix fix'*	*fixnum*	quotient
ash *fix fix'*	*fixnum*	arithmetic shift
logand *fix fix'*	*fixnum*	bitwise and
logor *fix fix'*	*fixnum*	bitwise or
lognot *fix*	*fixnum*	bitwise complement

Float *t*

fl-mul *fl fl'*	*float*	product
fl-add *fl fl'*	*float*	sum
fl-sub *fl fl'*	*float*	difference
fl-lt *fl fl'*	*bool*	*fl < fl'?*
fl-div *fl fl'*	*float*	quotient

Conses/Lists *s*

append *list T*	*list*	append
car *list*	*list*	head of *list*
cdr *list*	*T*	tail of *list*
cons *T T'*	*cons*	(*form . form'*)
length *list*	*fixnum*	length of *list*
nth *fix list*	*T*	*n*th *car* of *list*
nthcdr *fix list*	*T*	*n*th *cdr* of *list*

Vector *s*

vector *key list*	*vector*	specialized vector from list
sv-len *vector*	*fixnum*	length of *vector*
sv-ref *vector fix*	*T*	*n*th element
sv-type *vector*	*key*	type of *vector*

System

sys-tm	*fixnum*	system time in *us*
proc-tm	*fixnum*	process time in *us*
getpid	*fixnum*	process id
getcwd	*string*	`getcwd(2)`
uname		*struct* `uname(2)`
spawn *str list*	*fixnum*	spawn command
sysinfo		*struct* `sysinfo(2)`
exit	*fixnum*	exit shell with fixnum

Exception

with-ex *fn fn' T* catch exception
fn - `(:lambda (obj cond src) . body)`
fn' - `(:lambda () . body)`

raise *T keyword* raise exception with condition

```
:arity  :eof    :open   :read :syscall
:write  :error  :syntax :type
:div0   :stream :range  :except
:ns     :over   :under  :unbound
```

Stream

std-in *symbol* standard input *stream*
std-out *symbol* standard output *stream*
err-out *symbol* standard error *stream*

open `type direction` *string*
stream open *stream*
`type - :file :string`
`direction - :input :output :bidir`

close *stream bool* close *stream*
openp *stream bool* is *stream* open?

flush *stream bool* flush output steam
get-str *stream string* from *string stream*

rd-byte *stream bool T*
byte read *byte* from *stream,* error on eof, *T:* eof value
rd-char *stream bool T*
char read *char* from *stream,* error on `eof`, *T:* `eof` value

un-char *char stream*
char push *char* onto *stream*

wr-byte *byte stream*
byte write *byte* to *stream*
wr-char *char stream*
char write *char* to *stream*

Namespace

make-ns *key key* make namespace
ns-map *list* list of mapped namespaces
untern *key string*
symbol intern unbound symbol
intern *key string value*
symbol intern bound symbol
ns-find *key string*
symbol map *string* to *symbol*
ns-syms `type` *key*
T namespace's *symbols*
`type - :list :vector`

Reader/Printer

read *stream bool T*
T read stream object
write *T bool stream*
T write escaped object

libmu API

```
[dependencies]
mu = { git =
"https://github.com/Software-Knife-and-Tool/mu.git",
branch=main }

use libcore::{Condition, Config, Exception, Mu, Result, Tag}

config string format: "npages:N,gcmode:GCMODE"
GCMODE - { none, auto, demand }

impl Mu {
  const Mu::VERSION: &str

  fn config(config: String) -> Option<Config>;
  fn new(config: &Config)-> Mu;

  fn apply(&self, func: Tag, args: Tag)-> Result;
  fn compile(&self, form: Tag) -> Result;
  fn eq(&self, func: Tag, args: Tag) -> bool;
  fn exception_string(&self, ex: Exception) -> String;
  fn eval(&self, expr: Tag) -> Result;
  fn eval_str(&self, expr: &str) -> Result;
  fn load(&self, file_path: &str) -> Result;
  fn load_image(&self, file_path: &str) -> Result;
  fn read(&self, stream: Tag, eofp: bool, eof: Tag) -> Result;
  fn read_str(&self, str: &str) -> Result;
  fn err_out(&self) -> Tag
  fn save_and_exit(&self, file_path: &str) → Result;
  fn std_in(&self) -> Tag
  fn std_out(&self) -> Tag
  fn write(&self, expr: Tag, esc: bool, stream: Tag) -> Result
  fn write_str(&self, str: &str, stream: Tag) -> Result;
  fn write_to_string(&self, stream: Tag) -> Result;
}
```

Reader Syntax

;	comment to end of line
`#|...|#`	block comment
‘*form*	quoted form
`*form*	backquoted form
`(…)	backquoted list (proper lists only)
,*form*	eval backquoted form
,@*form*	eval-splice backquoted form
(…)	constant *list*
()	empty *list*, prints as `:nil`
(… . .)	dotted *list*
“…”	*string, char vector*
\	single escape in strings
#x	hexadecimal *fixnum*
#\c	*char*
#(:type …)	*vector*
#s(:type …)	*struct*
#:symbol	uninterned *symbol*
“`,;	terminating macro char
#	non-terminating macro char
!$%&*+-. <>=?@[]| :^_{}~/ A..Za..z 0..9	symbol constituents

```
0x09 #\tab     whitespace
0x0a #\linefeed
0x0c #\page
0x0d #\return
0x20 #\space
```

Runtime

```
mu-sys: x.y.z: [-h?pvcelq] [file…]

?: usage message
h: usage message
c: [name:value,…]
e: eval [form] and print result
l: load [path]
p: pipe mode (no repl)
q: eval [form] quietly
v: print version and exit
```