Mu Library Reference

mu* namespace, version *0.2.0

type keywords and aliases

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

Features

```
[dependencies]
default = [ "cpu-time", "std", "nix", "ffi", "sysinfo" ]
```

env	heap-info *vector*	heap information
	`#(:t type pages pagesize)`	
	heap-stat *vector*	heap allocations
	`#(:t :type size total free ...)`	
	heap-size *T fixnum*	heap occupancy
	state *list*	env state
cpu-time	process-time, time-units-per-sec	
nix	uname	
std	command, exit	
sysinfo	sysinfo (disabled on macOS)	
ffi	Rust FFI	
prof	prof-control	
semispace_heap	use semispace heap	

Reader/Printer

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

Core

apply *fn list*	*T*	apply *fn* to *list*
eval *form*	*T*	evaluate *form*
eq *T T'*	*bool*	*T* and *T'* identical?
type-of *T*	*key*	type keyword
compile *form*	*T*	*mu* form compiler
view *form*	*vector*	vector of object
%if *T T' T"*	*key*	**:if** implementation
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 T*	*T*	fixpoint of *fn*
gc	*bool*	garbage collection

Frames

%frame-stack	*list*	active *frame*s
%frame-pop *fn*	*fn*	pop *function's* top frame binding

frame binding: `(`*fn* `. #(:t …))`

%frame-push *frame*	*cons*	push frame
%frame-ref *fn fix*	*T*	*function*, offset

Symbols

boundp *symbol*	*bool*	is *symbol* bound?
make-symbol *string*	*symbol*	uninterned *symbol*
symbol-namespace *symbol*	*key*	*namespace*
symbol-name *symbol*	*string*	name binding
symbol-value *symbol*	*T*	value binding

Special Forms

:lambda *list . List'*	*function*	anonymous *function*
:quote *form*	*list*	quoted form
:if *form T T'*	*T*	conditional

Futures

defer *fn list*	*struct*	future application
detach *fn list*	*struct*	future application
force *struct*	*T*	force completion
poll *struct*	*bool*	poll completion

Fixnum

mul *fix fix'*	*fixnum*	product
add *fix fix'*	*fixnum*	sum
sub *fix fix'*	*fixnum*	difference
less-than *fix fix'*	*bool*	*fix < fix'?*
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

fmul *fl fl'*	*float*	product
fadd *fl fl'*	*float*	sum
fsub *fl fl'*	*float*	difference
fless-than *fl fl'*	*bool*	*fl < fl'?*
fdiv *fl fl'*	*float*	quotient

Conses/Lists

append *list*	*list*	append lists
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*

Vectors

make-vector *key list*	*vector*	specialized vector from list
vector-length *vector*	*fixnum*	length of *vector*
vector-type *vector*	*key*	type of *vector*
svref *vector fix*	*T*	*n*th element

Streams

standard-input *stream* std input *stream*
standard-output *stream* std output *stream*
error-output *stream* std error *stream*

open `type dir` *string bool*
stream open *stream*
raise error if *bool*

type	`:file`	`:string`	
dir	`:input`	`:output`	`:bidir`

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

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

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

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

unread-char *char stream*
char push *char* onto *stream*

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

Namespace

make-namespace *str* *ns* make *namespace*
namespace-map *list* list of mapped *namespaces*
namespace-name *ns* *string* *namespace* name
intern *ns str value* *symbol* intern bound symbol
find-namespace *str* *ns* map *string* to *namespace*
find *ns string* *symbol* map *string* to *symbol*
namespace-symbols *ns list* *namespace symbols*

Exception

with-exception *fn fn'* *T* catch exception

fn - `(:lambda (obj cond src) . body)`
fn' - `(:lambda () . body)`

raise *T keyword* raise exception on *T* with condition:

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

Structs

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

mu library API

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

use mu::{
    Condition, Config, Env, Exception, Result, Tag
};

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

impl Env {
  const VERSION: &str
  fn signal_exception()  // enable ^C :sigint exception
  fn config(config: Option<String>) → Option<Config>
  fn new(config: &Config, Option<(Vec<u8>, Vec<u8>)> → Env
  fn apply(&self, func: Tag, args: Tag) → Result<Tag>
  fn compile(&self, form: Tag) → Result<Tag>
  fn eq(&self, func: Tag, args: Tag) → bool;
  fn exception_string(&self, ex: Exception) → String
  fn eval(&self, exp: Tag) → Result<Tag>
  fn eval_str(&self, exp: &str) → Result<Tag>
  fn load(&self, file_path: &str) → Result<bool>
  fn read(&self, st: Tag, eofp: bool, eof: Tag) → Result<Tag>
  fn read_str(&self, str: &str) → Result<Tag>
  fn image(&self) → Result<(Vec<u8>, Vec<u8>)>
  fn err_out(&self) → Tag
  fn std_in(&self) → Tag
  fn std_out(&self) → Tag
  fn write(&self, exp: Tag, esc: bool, st: Tag) → Result<()>
  fn write_str(&self, str: &str, st: Tag) → Result<()>
  fn write_to_string(&self, exp: Tag, esc: bool) → String
```

Reader Syntax

`;`	comment to end of line
`#|...|#`	block comment
`'form`	quoted form
`` `form ``	backquoted form
`` `(...) ``	backquoted list (proper lists)
`,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
`#*...`	bit vector
`#x...`	hexadecimal *fixnum*
`#.`	read-time eval
`#\.`	*char*
`#(:type ...)`	*vector*
`#s(:type ...)`	*struct*
`#:symbol`	uninterned *symbol*
`"`,;`	terminating macro char
`#`	non-terminating macro char
`!$%&*+-.`	symbol constituents
`<>=?@[]|`	
`:^_{}~/`	
`A..Za..z`	
`0..9`	
`0x09 #\tab`	whitespace
`0x0a #\linefeed`	
`0x0c #\page`	
`0x0d #\return`	
`0x20 #\space`	

mu-sys

```
mu-sys: 0.0.2: [celq] [file…]

c: [name:value,…]
e: eval [form] and print result
l: load [path]
q: eval [form] quietly
```