Mu Namespace

mu version *0.0.14*

Type keywords and aliases

supertype	*T, form*
bool	`(),:nil` is false, otherwise true
condition	*keyword* (see ***Exceptions***)
type	*type-of* returns *keyword*
list	*cons* or `(),:nil`
frame	see ***Frames***
ns	see ***Namespaces***

`:null`	`(),:nil`
`:char`	*char*
`:cons`	*cons,*
`:fixnum`	*fix, fixnum, a* 61 bit signed integer
`:float`	*float, fl* a 32 bit IEEE float
`:func`	*fn,* a function
`:stream`	*stream,* file or string type
`:struct`	*struct*
`:symbol`	*sym, symbol, keyword*
`:vector`	simple *vector, string* `(:char)` `:t :byte :fixnum :float`

Heap

hp-info	*vector,* heap allocations `#(:t type total alloc in-use)`

frames

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

Reader/Printer

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

Structs

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

Symbols

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

Special Forms

:lambda *list . list'*	*function,* anonymous
:quote *form*	*list*, quoted form
:if *form fn' fn"*	*T,* conditional

Core

eval *form*	*T,* evaluate *form*
eq *form form'*	*bool***,** *are form* and *form'* identical?
type-of *form*	*keyword*
apply *fn list*	*T***,** apply *function* to *list*
async *fn list*	`:async`**,** create future context
await `:async`	*T***,** return value of async future
abort `:async`	*T***,** abort future
compile *form*	*T***,** library form compiler
view *form*	*vector,* vector of object
repr *bool T*	*T,* tag representation conversion: if *bool* is (), return 8 byte vector of argument tag bits, otherwise convert argument byte vector to tag
fix *fn form*	*T***,** fixpoint of *function* on *form*
***gc**	*bool,* garbage collection

System

real-tm *T*	*fixnum*, system clock secs
run-us *T*	*fixnum***,** process time *μs*

Fixnums

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
logand *fix fix'*	*fixnum***,** bitwise *and*
logor *fix fix'*	*fixnum***,** bitwise *or*

Floats

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 and Lists

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

Vectors

make-sv *keyword list*	*vector,* typed vector of list
sv-len *vector*	*fixnum,* length of *vector*
sv-ref *vector fix*	*T,* nth element
sv-type *vector*	*keyword,* type of *vector*

Exceptions

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
:write  :error  :syntax :type
:div0   :stream :range  :except
:ns     :unbound
```

Streams

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`

close *stream*	*bool,* close *stream*
openp *stream*	*bool,* is *stream* open?
eof *stream*	*bool,* is *stream* at end of file?
flush *stream*	*bool,* flush output steam
get-str *stream*	*string,* from *string stream*

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

rd-char *stream bool form*
: *char,* read *char* from *stream,*
bool: error on `eof`, *form:* `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*

Namespaces

ns: `#s(:ns` *`name`*`)`

make-ns *string ns*
: *ns,* make *namespace*

map-ns *string*	*ns,* map *string* to namespace

untern *ns string*
: *symbol,* intern unbound symbol

intern *ns string value*
: *symbol,* intern bound symbol

ns-find *ns string*
: *symbol,* map *string* to *symbol*

ns-name *ns*	*string,* namespace's name
ns-syms *ns*	*list,* namespace's symbols

library API

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

use mu::{Condition, Exception, Mu, Result, System, Tag}

const Mu::VERSION: &str

Mu::new(config: String)-> Mu
Mu::apply(&self, func: Tag, args: Tag)-> Result
Mu::eq(&self, func: Tag, args: Tag) -> Result
Mu::eval(&self, expr: Tag) -> Result
Mu::compile(&self, form: Tag) -> Result
Mu::read(&self, stream: Tag, eofp: bool, value: Tag) -> Result
Mu::write(&self, form: Tag, esc: bool, stream: Tag) -> Result
Mu::get_string(&self, stream: Tag) -> Result
Mu::write_string(&self, str: String, stream: Tag) -> Result
Mu::from_u64(&self, tag: u64) -> Tag
Mu::as_u64(&self, tag: Tag) -> u64
Mu::std_in(&self) -> Tag
Mu::std_out(&self) -> Tag
Mu::err_out(&self) -> Tag

System::new(config: String)-> System
System::mu(&self)-> &Mu
System::version(&self) -> String
System::eval(&self, expr: &String) -> Result
System::error(&self, ex: Exception) -> String
System::read(&self, string: String) -> Result
System::write(&self, expr: Tag, escape: bool) -> String
System::load(&self, file_path: &String) -> 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`
"…"	*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`
 `0x0a #\linefeed`
 `0x0c #\page`
 `0x0d #\return`
 `0x20 #\space`
	whitespace

Runtime

```
runtime: x.y.z: [-h?pvcedlq] [file…]

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