Mu Namespace

mu version *0.0.10*

Type keywords and aliases

supertype	*T, form*
bool	`()`, `:nil` is false, otherwise true
condition	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
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*
arity *fn*	*fixnum,* function arity
compile *form*	*T,* library form compiler
view *form*	*vector,* vector of object
repr *bool T*	*T,* tag representation conversion: if *bool* is (), return 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 condition 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 import*)
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-imp *ns*	*ns,* namespace's import
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
```