Mu Namespace

mu version *0.0.22*

Type keywords and aliases

supertype	*T, object*
bool	`()`, `:nil` is false, otherwise true
condition	*keyword,* see ***Exceptions***
type	*type-of* returns *keyword*
list	*cons* or `()`, `:nil`
frame	see ***Frames***
string	*char vector*
`:null`	`()`, `:nil`
`:asyncid`	async future id
`:char`	*char*
`:cons`	*cons*
`:fixnum`	*fix, fixnum,* 56 bit signed integer
`:float`	*float, fl,* 32 bit IEEE float
`:func`	*fn,* a function
`:keyword`	*keyword symbol*
`:map`	*map* object
`:stream`	*stream,* file or string type
`:struct`	*struct*
`:symbol`	*sym, symbol*
`:vector`	simple *vector, string* `(:char)` `:t :byte :fixnum :float`

Heap

hp-info	*vector,* heap allocations `#(:t` *`type total alloc in-use`*`)`
size-of *T*	*fixnum,* size in bytes of object

Frame

	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

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

Symbol

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

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

Core

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,* 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
exit *fix*	*exit process with return code*

Fixnum

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*

Float

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

%append *list T*	*list,* append
car *list*	*list,* head of *list*
cdr *list*	*T,* 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*

Vector

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*

Map

make-mp	*map,* make a new map
mp-add *map T T'*	*map,* add pair to map
mp-get *map T*	*T,* reference map
mp-has *map T*	*bool,* is key resident?
mp-size *map*	*fixnum,* size of map
mp-list *map*	*cons,* map contents

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
: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
```

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

rd-char *stream bool T*
char, read *char* from *stream,*
bool: 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*

System

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

Namespace

make-ns *keyword*
keyword, make namespace

untern *keyword string*
symbol, intern unbound symbol

intern *keyword string value*
symbol, intern bound symbol

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

ns-syms *keyword*
list, namespace's symbols

Reader/Printer

read *stream bool T*
T, read stream object

write *T bool stream*
T, write escaped object

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`
`(... . .)`	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` `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
```