

Overview

Primitives	Literals	Number	String	Char	Boolean	Keyword	Symbol	Nil	Just		
Collections	List	Vector	Set	Map	LazySeq	Stack	Queue	DelayQueue	DAG	Array	ByteBuf
Custom Types	Types	Protocols									
Concepts	Recursion	Destructuring									
Core Functions	Functions	Macros	Special Forms		Transducers	Namespaces	Exceptions				
Concurrency	Atoms	Locks	Locking	Futures	Promises	Delay	Agents	Scheduler	Volatiles	Parallel	
Threads	ThreadLocal	Threads									
System & Java	System	System Vars	Java Interop	REPL	Sandbox	Load Paths					
Util	Math	Time	Regex	INET	CIDR						
I/O	I/O	File	Zip/GZip								
Documents	JSON	JSON Lines	PDF	PDF Tools	CSV	XML	Excel				
Modules	Kira Templates	Parsifal	Configuration	Component	ZipVault	XML	Grep	Fonts	Cryptography		
	AsciiTable	Matrix	Java	Hexdump	Shell	Geo IP	Ansi	Gradle Wrapper	Gradle	Maven	
	Docker	Cargo	Cargo/ArangoDB	Test	Tracing	Benchmark	Timing	App	QR Ref	Installer	
	Semver										
Others	Embedding in Java	Venice Doc	Markdown								

Primitives

Literals

Nil	nil
Boolean	true, false
Integer	150I, 1_000_000I, 0x1FFI
Long	1500, 1_000_000, 0x00A055FF
Double	3.569, 2.0E+10
BigDecimal	6.897M, 2.345E+10M
BigInteger	1000N, 1_000_000N
Char	#\A, #\π, #\u03C0 #\space, #\newline, #\return, #\tab, #\formfeed, #\backspace, #\lparen, #\rparen, #\quote
String	"abcd", "ab\"cd", "PI: \u03C0" """"{ "age": 42 }""""
String interpolation	"~{x}", """"~{x}""""

Collections

Collections

Generic	count	compare	empty-to-nil	empty	
	into	into!	cons	conj	conj!
	remove	repeat	repeatedly	cycle	
	replace	range	group-by		
	frequencies	get-in	seq	reverse	
	shuffle				
Tests	empty?	not-empty?	distinct?	coll?	
	list?	vector?	set?	sorted-set?	
	mutable-set?	map?	sequential?		
	hash-map?	ordered-map?	sorted-map?		
	mutable-map?	bytebuf?			
Process	map	map-indexed	filter	reduce	
	keep	docoll	mapv	run!	
Lists					
Create	()	list	list*	mutable-list	
Access					

~(inc x)", ""~(inc x)""

Numbers				
Arithmetic	+	-	*	/
Convert	int bigint	long	double	decimal
Compare	== compare	=	not=	< > <= >=
Test	zero? number? decimal?	pos? int?	neg? long?	even? double? odd?
NaN/Infinite	nan?	infinite?		
BigDecimal	dec/add dec/div	dec/sub dec/scale	dec/mul	

Strings				
Create	str			
Use	count first nlast reverse str/nfirst str/nrest str/butnlast str/pos str/reverse	compare last seq shuffle str/nlast str/butlast str/chars str/repeat str/lorem-ipsu	empty-to-nil nfirst rest str/subs str/nlast str/rest str/butlast	
Index	str/index-of str/index-of-char str/index-of-not-char str/last-index-of			
Split/Join	str/split str/split-at str/split-lines str/split-columns str/join			
Replace	str/replace-first str/replace-last str/replace-all			
Strip	str/strip-start str/strip-end str/strip-indent str/strip-margin			
Conversion	str/lower-case str/upper-case str/cr-lf			
Regex	match? not-match?			
Trim	str/trim str/trim-to-nil str/trim-left str/trim-right			
Format	str/format str/quote str/double-quote str/double-unquote str/align str/wrap str/expand str/truncate			
Hex	str/hex-to-bytebuf str/bytebuf-to-hex str/format-bytebuf			

	first last nlast	second peek sublist	third rest some	fourth butlast	nth nfirst nlast
Modify	cons into dedupe partition-by cartesian-product mapcat take drop-while split-with	conj into! partition interpose flatten take-while drop-last	conj! concat partition-all combinations sort take-last drop split-at	rest pop distinct partition-by interleave drop	
Test	list? not-every?	mutable-list? any?	every? not-any?		
Vectors					
Create	[] mapv	vector	vector*	mutable-vector	
Access	first peek subvec	second butlast some	third rest	nth nfirst	last nlast
Modify	cons into dedupe partition-by cartesian-product mapcat take drop-while update! update!	conj into! partition interpose combinations flatten take-while drop-last assoc	conj! concatv partition-by interleave combinations sort take-last update assoc!	rest pop distinct partition-by interleave drop update split-with	
Nested	get-in dissoc-in	assoc-in	update-in		
Test	vector? not-contains? any?	mutable-vector? every? not-any?	contains? not-every?		
Sets					
Create	#{}	set	sorted-set	mutable-set	
Modify	into conj!	into! disj	cons	cons!	conj
Algebra	difference subset?	union superset?	intersection		
Test	set? contains? not-every?	sorted-set? not-contains? any?	mutable-set? every? not-any?		
Maps					
Create	{}	hash-map	ordered-map	sorted-map mutable-map zipmap	
Access	find	get	keys	vals	
Modify	cons update into	conj update! into!	conj! dissoc concat	assoc dissoc!	assoc! dissoc!

Encode/Decode	str/encode-base64 str/decode-base64 str/encode-url str/decode-url str/escape-html str/escape-xml
Test	string? empty? not-empty? str/blank? str/not-blank? str/starts-with? str/ends-with? str/contains? str/equals-ignore-case? str/quoted? str/double-quoted?
Test char	str/char? str/digit? str/hexdigit? str/letter? str/whitespace? str/linefeed? str/lower-case? str/upper-case?
Validation	str/valid-email-addr?
Other	str/levenshtein

Chars

Use	char char? char-escaped char-literals
Conversion	str str/lower-case str/upper-case
Test char	str/char? str/digit? str/letter? str/whitespace? str/linefeed? str/lower-case? str/upper-case?

Booleans

Boolean	true false boolean not boolean? true? false?
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Keywords

Keyword	:a :blue keyword? keyword
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Symbols

Symbol	'a 'blue symbol? qualified-symbol? symbol
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Nil

Nil	nil nil? some?
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Just

Just	just just?
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Byte Buffer

Create

	filter-k filter-kv reduce-kv merge merge-with merge-deep map-invert map-keys map-vals select-keys
Entries	map-entry key val entries map-entry?
Nested	get-in assoc-in update-in dissoc-in
Test	map? sequential? hash-map? ordered-map? sorted-map? mutable-map? contains? not-contains?

Stack

Create	stack
Access	peek pop! push! into! conj! count
Test	empty? stack?

Queue

Create	queue
Access	peek into! conj! count
Sync	put! take!
Async	offer! poll!
Process	docoll transduce reduce
Test	empty? queue?

DelayQueue

Create	delay-queue
Access	peek count
Sync	put! take!
Async	poll!
Test	empty? delay-queue?

DAG (directed acyclic graph)

Create	dag/dag dag/add-edges dag/add-nodes
Access	dag/nodes dag/edges dag/roots count
Children	dag/children dag/direct-children
Parents	dag/parents dag/direct-parents
Sort	dag/topological-sort dag/compare-fn
Test	dag/dag? dag/node? dag/edge? dag/parent-of? dag/child-of? empty?

	bytebuf	bytebuf-allocate	
	bytebuf-allocate-random		
	bytebuf-from-string		
	bytebuf-byte-order!	bytebuf-byte-order	
Test	empty?	not-empty?	bytebuf?
Use	count	bytebuf-capacity	
	bytebuf-limit	bytebuf-to-string	
	bytebuf-to-list	bytebuf-sub	
	bytebuf-pos	bytebuf-pos!	
Read	bytebuf-get-byte	bytebuf-get-int	
	bytebuf-get-long	bytebuf-get-float	
	bytebuf-get-double		
Write	bytebuf-put-byte!	bytebuf-put-int!	
	bytebuf-put-long!	bytebuf-put-float!	
	bytebuf-put-double!	bytebuf-put-buf!	
Base64	str/encode-base64	str/decode-base64	
Hex	str/hex-to-bytebuf	str/bytebuf-to-hex	
	str/format-bytebuf		

Regex

General	regex/pattern	regex/matcher	
	regex/reset	regex/matches?	
	regex/matches-not?	regex/matches	
	regex/group	regex/groups	
	regex/count	regex/find?	regex/find
	regex/find-all	regex/find+	
	regex/find-all+		

Math

Arithmetic	inc	dec	min	max	mod	
	mod-floor		abs	sgn	negate	
	floor	ceil	sqrt	square	pow	
	exp	log	log2	log10		
Util	digits					
Random	rand-long		rand-double			
	rand-gaussian					
Trigonometry	math/to-radians			math/to-degrees		
	math/sin		math/cos		math/tan	
	math/asin		math/acos		math/atan	
Statistics	math/mean		math/median			
	math/quartiles		math/quantile			
	math/standard-deviation					
Algorithms	math/softmax					

Constants

E	math/E
PI	math/PI

Lazy Sequences

Create	lazy-seq
Realize	doall
Test	lazy-seq?

Arrays

Create	make-array	object-array	string-array	
	int-array	long-array	float-array	
	double-array			
Use	aget	aset	alength	asub
	amap	acopy		

Concurrency

Atoms	atom	atom?	deref	deref?
	reset!	swap!	swap-vals!	
	compare-and-set!	add-watch		
	remove-watch			
Locks	lock	lock?	acquire	
	try-acquire	release	locked?	
Locking	locking			
Futures	future	future-task	future?	
	futures-fork	futures-wait		
	futures-thread-pool-info	done?		
	cancel	cancelled?	deref	
	deref?	realized?		
Promises	promise	promise?	deliver	
	deliver-ex	realized?		
	then-accept	then-accept-both		
	then-apply	then-combine		
	then-compose	when-complete		
	accept-either	apply-to-either		
	all-of	any-of	or-timeout	
	complete-on-timeout	timeout-after		
	done?	cancel	cancelled?	
Delay	delay	delay?	deref	deref?
	force	realized?		
Agents	agent	send	send-off	
	restart-agent	set-error-handler!		
	agent-error	await	await-for	
	shutdown-agents	shutdown-agents?		
	await-termination-agents			
	await-termination-agents?			
	agent-send-thread-pool-info			
	agent-send-off-thread-pool-info			
Scheduler	schedule-delay			
	schedule-at-fixed-rate			
Volatiles	volatile	volatile?	deref	
	deref?	reset!	swap!	

Transducers

Use	transduce			
Functions	map	map-indexed	filter	drop
	drop-while	drop-last	take	
	take-while	take-last	keep	
	remove	dedupe	distinct	sorted
	reverse	flatten	halt-when	
Reductions	rf-first	rf-last	rf-every?	
	rf-any?			
Early	reduced	reduced?	deref	deref?

Functions

Create	fn	defn	defn-	identity
	comp	partial	memoize	juxt
	fn!l	trampoline	complement	
	constantly	every-pred		
	any-pred			
Call	apply	->	->>	
Test	fn?			
Misc	nil?	some?	name	
	qualified-name	namespace		
	fn-name	callstack	coalesce	
Load Source	load-module	load-file		
	load-classpath-file	read-string		
	eval			
Environment	set!	resolve	bound?	
	var-get	var-sym	var-name	
	var-ns	var-sym-meta		
	var-val-meta	var-thread-local?		
	var-local?	var-global?	name	
	namespace			
Tree Walker	prewalk	postwalk		
	prewalk-replace			
	postwalk-replace			
Meta	meta	with-meta	vary-meta	
Documentation	doc	finder	modules	
Definiton	fn-name	fn-about	fn-body	
	fn-pre-conditions			
Syntax	highlight			

Macros

Create	def-	defn	defn-	defmacro
	macroexpand		macroexpand-all	
	macro?			
Test	macro?	macroexpand-on-load?		
Quoting	quote	quasiquote		

ThreadLocal	thread-local	thread-local?
	thread-local-clear	
	thread-local-map	assoc
	get	binding
		def-dynamic
Threads	thread	thread-id
	thread-daemon?	thread-name
		thread-interrupted?
	thread-interrupted	
Parallel	pcalls	pmap
		preduce

System

Venice	version		
System	system-prop	system-env	
	system-exit-code	shutdown-hook	
	charset-default-encoding		
Java	java-version	java-version-info	
	java-major-version		
	java-source-location		
Java VM	pid	gc	total-memory
	used-memory		
OS	os-type	os-type?	os-arch
	os-name	os-version	
Jansi	jansi-version		
Time	current-time-millis	nano-time	
	format-nano-time	format-micro-time	
	format-milli-time		
Host	host-name	host-address	
	ip-private?	cpus	byte-order
User	user-name	io/user-home-dir	
Util	uuid	sleep	
Services	service	service?	
Shell	sh	with-sh-dir	with-sh-env
		with-sh-throw	
Shell Tools	sh/open	sh/pwd	

System Vars

System Vars	*version*	*newline*
	loaded-modules	*loaded-files*
	ns	*run-mode*
	ansi-term	
	ARGV	*out*
		err
		in

Time

Date	time/date	time/date?
Local Date	time/local-date	
	time/local-date?	
	time/local-date-parse	

Branch	and if-let	or when when-let	when-not letfn	if-not
Conditions	cond	condp	case	
Loop	while	dotimes	list-comp	doseq
Call	doto cond->	-> cond->>	->> -<> some->	as-> some->>
Load Code	load-module load-classpath-file loaded-modules	load-file load-string		
Assert	assert assert-ne assert-does-not-throw assert-throws-with-msg	assert-false assert-throws	assert-eq	
Util	comment with-out-str	gensym with-err-str	time	
Profiling	time	perf		

Special Forms

Forms	def do	defonce let binding	def-dynamic fn	if set!
Multi Methods	defmulti	defmethod		
Protocols	defprotocol	extend	extends?	
Recursion	loop	recur	tail-pos	
Exception	throw	try	try-with	
Profiling	dobench	dorun	prof	

Exceptions

Throw/Catch	try	try-with	throw
Create	ex		
Test	ex?	ex-venice?	
Util	ex-message	ex-cause	ex-value
Stacktrace	ex-venice-stacktrace ex-java-stacktrace		

Types

Util	type	supertype	supertypes
Test	instance-of?	deftype?	
Define	deftype	deftype-of	deftype-or
Create	..:		
Describe	deftype-describe		

Local Date Time	time/local-date-time time/local-date-time? time/local-date-time-parse
Zoned Date Time	time/zoned-date-time time/zoned-date-time? time/zoned-date-time-parse
Fields	time/year time/month time/day-of-week time/day-of-month time/day-of-year time/hour time/minute time/second time/milli
Fields etc	time/length-of-year time/length-of-month time/first-day-of-month time/last-day-of-month
Zone	time/zone time/zone-offset
Format	time/formatter time/format
Test	time/after? time/not-after? time/before? time/not-before? time/within? time/leap-year?
Miscellaneous	time/with-time time/plus time/minus time/period time/earliest time/latest
Util	time/zone-ids time/to-millis

I/O

to	print println newline	printf pr prn	flush
to-str	pr-str	with-out-str	
from	read-line	read-char	
classpath	io/load-classpath-resource io/classpath-resource?		
slurp	io/slurp io/slurp-stream io/read-line	io/slurp-lines io/slurp-reader io/read-char	
spit	io/spit io/spit-writer io/print-line	io/spit-stream io/print	
stream	io/copy-stream io/file-in-stream io/file-out-stream io/string-in-stream io/bytebuf-in-stream io/bytebuf-out-stream io/capturing-print-stream io/wrap-os-with-buffered-writer io/wrap-os-with-print-writer io/wrap-is-with-buffered-reader io/flush io/close		
reader/writer			

Protocols

Core	Object
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Namespace

Open	ns
Current	*ns*
Remove	ns-unmap ns-remove
Test	ns?
Util	ns-list namespace
Alias	ns-alias ns-aliases ns-unalias
Meta	ns-meta alter-ns-meta! reset-ns-meta!

Java Interoperability

Java	. import java-iterator-to-list java-enumeration-to-list java-unwrap-optional cast class
Proxify	proxify java/as-runnable java/as-callable java/as-predicate java/as-function java/as-consumer java/as-supplier java/as-bipredicate java/as-bifunction java/as-biconsumer java/as-unaryoperator java/as-binaryoperator
Test	java-obj? exists-class? enum?
Classes	class class-of class-name class-version
Types	formal-type remove-formal-type class supers bases
Support	imports stacktrace classloader classloader-of
JARs	jar-maven-manifest-version java-package-version
Modules	module-name

REPL

Info	repl? repl/info
Terminal	repl/term-rows repl/term-cols
Dirs	repl/home-dir repl/libs-dir
Config	repl/prompt! repl/handler! repl/color-theme repl/color-theme!

	io/buffered-reader io/buffered-writer io/string-reader io/string-writer io/flush io/close
http	io/download io/internet-avail?
other	with-out-str with-err-str io/mime-type io/default-charset
vars	*out* *err* *in*

File I/O

file	io/file io/file-parent io/file-name io/file-basename io/file-path io/file-path-slashify io/file-absolute io/file-canonical io/file-ext io/file-ext? io/file-size io/file-last-modified
dir	io/mkdir io/mkdirs
slurp/spit	io/slurp io/slurp-lines io/spit
list	io/list-files io/list-files-glob io/list-file-tree io/list-file-tree-lazy
delete	io/delete-file io/delete-files-glob io/delete-file-tree io/delete-file-on-exit
copy	io/copy-file io/copy-files-glob io/copy-file-tree
move	io/move-file io/move-files-glob
touch	io/touch-file
permissions	io/file-can-read? io/file-can-write? io/file-can-execute? io/file-set-readable io/file-set-writable io/file-set-executable io/file-can-read? io/file-can-write? io/file-can-execute?
links	io/symbolic-link? io/create-symbolic-link io/create-hard-link
test	io/file? io/file-absolute? io/exists-file? io/exists-dir? io/file-hidden? io/symbolic-link? io/file-within-dir?
glob	io/glob-path-matcher io/file-matches-glob? io/list-files-glob io/copy-files-glob io/move-files-glob io/delete-files-glob

Sandbox

Sandbox	<code>sandboxed?</code>	<code>sandbox/type</code> <code>sandbox/functions</code>
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Loadpaths

Load Paths	<code>loadpath/paths</code> <code>loadpath/unrestricted?</code> <code>loadpath/normalize</code>
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PDF

PDF	<code>pdf/render</code>	<code>pdf/text-to-pdf</code> <code>pdf/available?</code> <code>pdf/check-required-libs</code>
PDF Tools	<code>pdf/merge</code>	<code>pdf/copy</code> <code>pdf/pages</code> <code>pdf/watermark</code> <code>pdf/to-text</code>

Install the required PDF libraries:

```
(do
  (load-module :pdf-install)
  (pdf-install/install :dir (repl/libs-dir)
    :silent false))
```

Zip/GZip

zip	<code>io/zip</code> <code>io/zip-file</code> <code>io/zip-list</code> <code>io/zip-list-entry-names</code> <code>io/zip-append</code> <code>io/zip-remove</code> <code>io/zip?</code> <code>io/unzip</code> <code>io/unzip-first</code> <code>io/unzip-nth</code> <code>io/unzip-all</code> <code>io/unzip-to-dir</code>
gzip	<code>io/gzip</code> <code>io/gzip-to-stream</code> <code>io/gzip?</code> <code>io/ungzip</code> <code>io/ungzip-to-stream</code>

disk space	<code>io/filesystem-total-space</code> <code>io/filesystem-usable-space</code>
URL/URI	<code>io/->url</code> <code>io/->uri</code>
file watch	<code>io/await-for</code> <code>io/watch-dir</code> <code>io/close-watcher</code>
temporary	<code>io/temp-file</code> <code>io/temp-dir</code> <code>io/tmp-dir</code>
user dir	<code>io/user-dir</code> <code>io/user-home-dir</code>

JSON

read	<code>json/read-str</code> <code>json/slurp</code>
write	<code>json/write-str</code> <code>json/spit</code>
prettyfy	<code>json/pretty-print</code>

INET

Create	<code>inet/inet-addr</code>
Util	<code>inet/inet-addr-to-bytes</code> <code>inet/inet-addr-from-bytes</code>
Test	<code>inet/ip4?</code> <code>inet/ip6?</code> <code>inet/linklocal-addr?</code> <code>inet/sitelocal-addr?</code> <code>inet/multicast-addr?</code> <code>inet/reachable?</code>

CIDR (classless inter-domain routing)

CIDR	<code>cidr/parse</code> <code>cidr/in-range?</code> <code>cidr/start-inet-addr</code> <code>cidr/end-inet-addr</code>
CIDR Trie	<code>cidr/trie</code> <code>cidr/size</code> <code>cidr/insert</code> <code>cidr/lookup</code> <code>cidr/lookup-reverse</code>

CSV

read	<code>csv/read</code>
write	<code>csv/write</code> <code>csv/write-str</code>

Modules

Kira

Templating system

```
(load-module :kira)
```

Kira	kira/eval	kira/fn
Escape	kira/escape-xml	kira/escape-html

Cryptography

```
(load-module :crypt)
```

Ciphers	crypt/ciphers	crypt/max-key-size crypt/provider? crypt/add-bouncy-castle-provider
Hashes	crypt/md5-hash	crypt/sha1-hash crypt/sha512-hash crypt/pbkdf2-hash
Encrypt	crypt/encrypt	crypt/decrypt
File encrypt	crypt/encrypt-file	crypt/decrypt-file
File hash	crypt/hash-file	crypt/verify-file-hash

JSON Lines

```
(load-module :jsonl)
```

read	jsonl/read-str	jsonl/slurp jsonl/lazy-seq-slurper
write	jsonl/write-str	jsonl/spit jsonl/spitln

Zip Vault

AES 256 encrypted and password protected zip file

```
(load-module :zipvault)
```

Create	zipvault/zip	zipvault/entropy
Add	zipvault/add-files zipvault/add-folder zipvault/add-stream	
Remove	zipvault/remove-files	
Extract	zipvault/extract-file zipvault/extract-all zipvault/extract-file-data	
Util		

Hexdump

```
(load-module :hexdump)
```

Hexdump	hexdump/dump
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Semver

Semantic versioning

```
(load-module :semver)
```

Semver	semver/parse	semver/version
Validation	semver/valid?	semver/valid-format?
Test	semver/newer? semver/equal?	semver/older? semver/cmp

Geo IP

Geolocation mapping for IP addresses

```
(load-module :geoip)
```

Lookup	geoip/ip-to-country-resolver geoip/ip-to-country-loc-resolver geoip/ip-to-city-loc-resolver geoip/ip-to-city-loc-resolver-mem-optimized
Databases	geoip/download-google-country-db-to-csvfile geoip/download-maxmind-db-to-zipfile geoip/download-maxmind-db
DB Parser	geoip/parse-maxmind-country-ip-db geoip/parse-maxmind-city-ip-db geoip/parse-maxmind-country-db geoip/parse-maxmind-city-db
Util	geoip/build-maxmind-country-db-url geoip/build-maxmind-city-db-url geoip/map-location-to-numeric geoip/country-to-location-resolver geoip/addr-ranges->trie

Excel

Read/Write Excel files

```
(load-module :excel)
```

Writer	excel/writer	excel/add-sheet excel/add-column excel/add-merge-region excel/freeze-pane
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```
zipvault/encrypted?
zipvault/valid-zip-file?
```

XML

```
(load-module :xml)
```

XML	xml/parse-str	xml/parse	xml/path->
	xml/children	xml/text	

Java

```
(load-module :java)
```

Java	java/javadoc
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Parsifal

A parser combinator

Parsifal is a port of Nate Young's Parsatron Clojure [parser combinators](#) project.

```
(load-module :parsifal)
```

Run	parsifal/run
Define	parsifal/defparser
Parsers	parsifal/any parsifal/many parsifal/many1 parsifal/times parsifal/either parsifal/choice parsifal/between parsifal/>>
Special Parsers	parsifal/eof parsifal/never parsifal/always parsifal/lookahead parsifal/attempt
Binding	parsifal/let->>
Char Parsers	parsifal/char parsifal/not-char parsifal/any-char parsifal/digit parsifal/hexdigit parsifal/letter parsifal/letter-or-digit parsifal/any-char-of parsifal/none-char-of parsifal/string
Token Parsers	parsifal/token
Protocols	parsifal/SourcePosition
Line Info	parsifal/lineno parsifal/pos

Gradle Wrapper

```
(load-module :gradlew)
```

Gradle	gradlew/version	gradlew/run
	gradlew/run*	

Writer Data

```
excel/write-data
excel/write-items
excel/write-item
excel/write-value
```

Writer I/O

```
excel/write->file
excel/write->stream
excel/write->bytebuf
```

Writer Util

```
excel/sheet-count
excel/sheet-name
excel/sheet-index
excel/sheet-row-range
excel/sheet-col-range
excel/convert->reader
excel/col->string
excel/addr->string
```

Writer Formulas

```
excel/cell-formula
excel/sum-formula
excel/evaluate-formulas
```

Writer Styling

```
excel/add-font    excel/add-style
excel/add-merge-region
excel/row-height
excel/col-width
excel/cell-style
excel/bg-color
excel/auto-size-columns
excel/auto-size-column
excel/hide-columns
excel/freeze-pane
```

Writer Images

```
excel/add-image
```

Writer Charts

```
excel/add-line-chart
excel/add-bar-chart
excel/add-area-chart
excel/add-pie-chart
```

Writer Charts Util

```
excel/line-data-series
excel/bar-data-series
excel/area-data-series
excel/pie-data-series
excel/cell-address-range
```

Reader

```
excel/open    excel/sheet
excel/read-val
excel/read-string-val
excel/read-boolean-val
excel/read-long-val
excel/read-double-val
excel/read-date-val
excel/read-datetime-val
excel/read-error-code
```

Reader Util

```
excel/sheet-count
excel/sheet-name
excel/sheet-index
excel/sheet-row-range
excel/sheet-col-range
excel/evaluate-formulas
excel/cell-empty?
excel/cell-type
```

Gradle

(load-module :gradle)

Gradle	gradle/with-home	gradle/version
	gradle/task	

Maven

(load-module :maven)

Artifact	maven/parse-artifact	maven/artifact-filename	maven/artifact-uri
Download	maven/download	maven/get	
Commands	maven/home-dir	maven/mvn	maven/dependencies
	maven/version		
Install	maven/install	maven/uninstall	

Docker

(load-module :docker)

Docker	docker/version	docker/cmd	docker/debug											
Images	docker/images	docker/image-pull	docker/rmi	docker/image-rm	docker/image-prune									
Containers	docker/run	docker/ps	docker/start	docker/stop	docker/exec	docker/exec&	docker/rm	docker/prune	docker/cp	docker/diff	docker/pause	docker/unpause	docker/wait	docker/logs
Volumes	docker/volume-list	docker/volume-create	docker/volume-inspect	docker/volume-rm	docker/volume-prune	docker/volume-exists?								
Utils	docker/images-query-by-repo	docker/image-ready?	docker/container-find-by-name	docker/container-exists-with-name?	docker/container-running-with-name?	docker/container-start-by-name	docker/container-stop-by-name	docker/container-remove-by-name	docker/container-status-by-name	docker/container-exec-by-name	docker/container-exec-by-name&	docker/container-logs	docker/container-purge-by-name	docker/container-image-info-by-name

excel/cell-formula-result-type
excel/convert->writer

Install the required Apache POI 5.x libraries:

```
(do
  (load-module :excel-install)
  (excel-install/install :dir (repl/libs-dir)
    :silent false))
```

Fonts

True Type Fonts

(load-module :fonts)

Download	fonts/download-font-family	fonts/download-demo-fonts
----------	----------------------------	---------------------------

Test

(load-module :test)

Define	test/deftest						
Fixture	test/use-fixtures						
Run	test/run-tests	test/run-test-var	test/successful?				
Assert	assert	assert-false	assert-eq	assert-ne	assert-throws	assert-does-not-throw	assert-throws-with-msg

Configuration

Manages configurations with system property & env var support

(load-module :config)

Build	config/build	
File	config/file	config/resource
Env	config/env-var	config/env
Properties	config/property-var	config/properties

Component

Managing lifecycle and dependencies of components

(load-module :component)

Build	component/system-map	component/system-using	
Protocol	component/Component		
Util	component/deps	component/dep	component/id

Cargo

Docker Testcontainers

```
(load-module :cargo)
```

Cargo	<code>cargo/start</code>	<code>cargo/stop</code>
	<code>cargo/running?</code>	<code>cargo/purge</code>

Cargo ArangoDB

ArangoDB Testcontainers

```
(load-module :cargo-arangodb)
```

Lifecycle	<code>cargo-arangodb/start</code> <code>cargo-arangodb/stop</code> <code>cargo-arangodb/running?</code>
Backup	<code>cargo-arangodb/db-dump</code> <code>cargo-arangodb/db-restore</code> <code>cargo-arangodb/exists-db-dump?</code> <code>cargo-arangodb/remove-db-dump</code> <code>cargo-arangodb/list-db-dumps</code> <code>cargo-arangodb/upload-db-dump</code> <code>cargo-arangodb/download-db-dump</code>

Tracing

Tracing functions

```
(load-module :trace)
```

Tracing	<code>trace/trace</code>	<code>trace/trace-var</code> <code>trace/untrace-var</code>
Test	<code>trace/traced?</code>	<code>trace/traceable?</code>
Util	<code>trace/trace-str-limit</code>	
Tee	<code>trace/tee-></code>	<code>trace/tee->></code> <code>trace/tee</code>

Shell

Functions to deal with the operating system

```
(load-module :shell)
```

Open	<code>shell/open</code>	<code>shell/open-macos-app</code>
Process	<code>shell/kill</code>	<code>shell/kill-forcibly</code> <code>shell/wait-for-process-exit</code> <code>shell/alive?</code> <code>shell/pid</code> <code>shell/process-handle</code> <code>shell/process-handle?</code> <code>shell/process-info</code> <code>shell/processes</code> <code>shell/processes-info</code> <code>shell/descendant-processes</code> <code>shell/parent-process</code>
Util	<code>shell/diff</code>	

Ansi

App

Venice application archive

```
(load-module :app)
```

Build	<code>app/build</code>
Manifest	<code>app/manifest</code>

Benchmark

```
(load-module :benchmark)
```

Utils	<code>benchmark/benchmark</code>
-------	----------------------------------

Timing

Timing

```
(load-module :timing)
```

Timing	<code>timing/run</code>	<code>timing/elapsed</code>
--------	-------------------------	-----------------------------

Grep

Grep like search tool

```
(load-module :grep)
```

Grep	<code>grep/grep</code>	<code>grep/grep-zip</code>
------	------------------------	----------------------------

QR-Reference

Create, parse, and format QR references according to the Swiss payment standards.

```
(load-module :qrref)
```

QR Ref	<code>qrref/qr-ref</code>	<code>qrref/parse</code> <code>qrref/format</code>
--------	---------------------------	---

Ascii Table

Create and customize simple ASCII tables.

```
(load-module :ascii-table)
```

Render	<code>ascii-table/render</code>	<code>ascii-table/print</code>
--------	---------------------------------	--------------------------------

Matrix

Simple matrix functions. To process large matrices use the "Efficient Java Matrix Library" (EJML) <http://ejml.org/wiki/> instead.

```
(load-module :matrix)
```

Matrix	<code>matrix/validate</code>	<code>matrix/vector2d</code>
	<code>matrix/empty?</code>	<code>matrix/rows</code>
	<code>matrix/columns</code>	<code>matrix/row</code>
	<code>matrix/column</code>	

ANSI codes, styles, and colorization helper functions

(load-module :ansi)

Colors	<code>ansi/fg-color</code>	<code>ansi/bg-color</code>
Styles	<code>ansi/style</code>	<code>ansi/ansi</code> <code>ansi/with-ansi</code> <code>ansi/without-ansi</code>
Cursor	<code>ansi/without-cursor</code>	
Progress	<code>ansi/progress</code>	<code>ansi/progress-bar</code>

Installer

A simple artifact installer for Venice. This not a package manager!

(load-module :installer)

Install	<code>installer/install-module</code> <code>installer/install-libs</code>
Demo	<code>installer/install-demo</code> <code>installer/install-demo-fonts</code>

Format	<code>matrix/format</code>
Elements	<code>matrix/element</code> <code>matrix/assoc-element</code>
Add	<code>matrix/add-column-at-start</code> <code>matrix/add-column-at-end</code> <code>matrix/add-row-at-start</code> <code>matrix/add-row-at-end</code>
Remove	<code>matrix/remove-column</code> <code>matrix/remove-row</code>
LinAlg	<code>matrix/transpose</code>

Embedding in Java

Eval

```
import com.github.jlangch.venice.Venice;

public class Example {
    public static void main(String[] args) {
        final Venice venice = new Venice();

        final Long result = (Long)venice.eval("(+ 1 2)");
    }
}
```

Passing parameters

```
import com.github.jlangch.venice.Parameters;
import com.github.jlangch.venice.Venice;

public class Example {
    public static void main(String[] args) {
        Venice venice = new Venice();

        final Long result = (Long)venice.eval(
            "(+ x y 3)",
            Parameters.of("x", 6, "y", 3L));
    }
}
```

Dealing with Java objects

```
import java.awt.Point;
import com.github.jlangch.venice.Parameters;
import com.github.jlangch.venice.Venice;

public class Example {
    public static void main(String[] args) {
        Venice venice = new Venice();

        // returns a string: "Point=(x: 100.0, y: 200.0)"
        String ret = (String)venice.eval(
            "(let [x (:x point)                \n" +
            "      y (:y point)]                \n" +
            "  (str \"Point=(x: \" x \"\", y: \" y \"\")\"))",
            Parameters.of("point", new Point(100, 200)));

        // returns a java.awt.Point: [x=110,y=220]
        Point point = (Point)venice.eval(
            "(. :java.awt.Point :new (+ x 10) (+ y 20))",
            Parameters.of("x", 100, "y", 200));
    }
}
```

Precompiling

```
import com.github.jlangch.venice.IPreCompiled;
import com.github.jlangch.venice.Parameters;
import com.github.jlangch.venice.Venice;

public class Example {
```

```

public static void main(String[] args) {
    Venice venice = new Venice();

    IPreCompiled precompiled = venice.precompile("example", "(+ 1 x)");

    for(int ii=0; ii<100; ii++) {
        venice.eval(precompiled, Parameters.of("x", ii));
    }
}
}

```

Java Interop

```

import java.time.ZonedDateTime;
import com.github.jlangch.venice.Venice;

public class Example {
    public static void main(String[] args) {
        Venice venice = new Venice();

        Long val = (Long)venice.eval("( . :java.lang.Math :min 20 30)");

        ZonedDateTime ts = (ZonedDateTime)venice.eval(
            "(. (. :java.time.ZonedDateTime :now) :plusDays 5)");
    }
}

```

Sandbox

```

import com.github.jlangch.venice.SecurityException;
import com.github.jlangch.venice.Venice;
import com.github.jlangch.venice.javainterop.SandboxInterceptor;
import com.github.jlangch.venice.javainterop.SandboxRules;

public class SandboxExample {
    public static void main(final String[] args) {
        final SandboxInterceptor sandbox =
            new SandboxRules()
                // Venice functions: blacklist all unsafe functions
                .rejectAllUnsafeFunctions()

                // Venice functions: whitelist rules for print functions to offset
                // blacklist rules by individual functions
                .whitelistVeniceFunctions("*print*")

                .sandbox();

        final Venice venice = new Venice(sandbox);

        // => OK, 'println' is part of the unsafe functions, but enabled by the 2nd rule
        venice.eval("(println 100)");

        // => FAIL, 'read-line' is part of the unsafe functions
        try {
            venice.eval("(read-line)");
        }
        catch(SecurityException ex) {
            System.out.println("REJECTED: (read-line)");
        }
    }
}

```

Recursion

Recursion

Functional languages support **Tail Call Optimization (TCO)** to provide memory efficient recursion. Venice supports *automatic Tail Call Optimization* and *Self Recursion* through the `loop..recur` syntax. Self recursion is a way to mimic TCO.

In addition Venice provides the *trampoline* function for mutual recursion for more involved forms of recursion.

Self-Recursive Calls (loop - recur)

Venice self-recursive calls do not consume a new stack frame for every new recursion iteration and have a constant memory usage. It's the only non-stack-consuming looping construct in Venice. To make it work the `recur` expression must be in *tail position*. This way Venice can turn the recursive `loop..recur` construct behind the scene into a plain loop.

Definition: The tail position is a position which an expression would return a value from. There are no more forms evaluated after the form in the tail position is evaluated.

Remember: Venice offers various alternative solutions to recursion to solve loops like `(+ 1 2 3 4 5 6)` to sum up a list of numbers or the powerful `reduce` function: `(reduce + [1 2 3 4 5])`. Many Venice functions accept an arbitrary number of arguments to prevent you from writing loops.

Example 1: Recursively sum up the numbers 0..n:

```
;; Definition:
;; sum 0 -> 0
;; sum n -> n + sum (n - 1)
(do
  (defn sum [n]
    ;; the transformed recursion uses an accumulator for intermediate results
    (loop [cnt n, acc 0]
      (if (zero? cnt)
        acc
        (recur (dec cnt) (+ acc cnt)))))

  (sum 100000) ; => 5000050000
```

Example 2: Recursively compute the factorial of a number:

```
;; Definition:
;; factorial 1 -> 1
;; factorial n -> n * factorial (n - 1)
(do
  (defn factorial [x]
    ;; the transformed recursion uses an accumulator for intermediate results
    (loop [n x, acc 1N]
      (if (== n 1)
        acc
        (recur (dec n) (* acc n)))))

  (factorial 5) ; => 120N
  (factorial 10000) ; => 284625968091...00000N (35661 digits)
```


Example 3: Recursively compute the Fibonacci numbers (0 1 1 2 3 5 8 ...):

```
;; Definition:
;; fib 0 -> 0
;; fib 1 -> 1
;; fib n -> fib (n - 2) + fib (n - 1)
(do
  (defn fib [x]
    (loop [n x, a 0N, b 1N]
      (case n
        0 a
        1 b
        (recur (dec n) b (+ a b))))))

(fib 6) ; => 8N
(fib 100000) ; => 259740693472217...28746875N (20901 digits)
```

Recursion with lazy sequences

Example 1: Lazy Fibonacci number sequence computed by a recursive function:

```
(do
  (defn fib
    ([] (fib 0N 1N))
    ([a b] (cons a #(fib b (+ a b)))))

  (doall (take 7 (fib)))) ; => (0 1 1 2 3 5 8)
```

Example 2: Factorial numbers:

```
(do
  (defn factorial
    ([] (factorial 1 1N))
    ([x] (first (drop (dec x) (factorial))))
    ([n acc] (cons acc #(factorial (inc n) (* acc (inc n))))))

  (factorial 5) ; => 120N
  (factorial 10000) ; => 284625968091...00000N (35661 digits)
```

Mutually recursive calls (trampoline)

`trampoline` can be used to convert algorithms requiring mutual recursion without stack consumption. Calls `f`, if `f` returns a function, calls that function with no arguments, and continues to repeat, until the return value is not a function, then returns that non-function value.

The function `trampoline` is defined simplified as

```
(defn trampoline [f]
  (loop [f f]
    (let [ret (f)]
      (if (fn? ret) (recur ret) ret)))))
```

Examples:

```
(do
  (defn is-odd? [n]
    (if (zero? n) false #(is-even? (dec n))))

  (defn is-even? [n]
    (if (zero? n) true #(is-odd? (dec n))))

  (trampoline (is-odd? 10000)))
```

```
(do
  (defn factorial
    ([n] #(factorial n 1N))
    ([n acc] (if (< n 2)
                 acc
                 #(factorial (dec n) (* acc n)))))

  (trampoline (factorial 10000)))
```

Tail Call Optimization (TCO)

Venice has support for automatic *tail call optimization*. The recursive call must be in tail position.

```
(do
  (defn factorial
    ([n]      (factorial n 1N))
    ([n acc] (if (== n 1)
                 acc
                 (factorial (dec n) (* acc n)))))

  (factorial 5)      ; => 120N
  (factorial 10000) ; => 284625968091...00000N (35661 digits)
```

Recursion vs Folding

Tail call recursive functions, can always be written in terms of a reducing (folding) function. E.g.:

```
(do
  (defn factorial [n]
    ;; reducing factorial
    (reduce * 1N (range 1 (inc n))))

  (factorial 5)      ; => 120N
  (factorial 10000) ; => 284625968091...00000N (35661 digits)
```

But not all recursive functions can be transformed into a tail recursive function and translated into a loop. The [Ackermann's function](#) is such an example of a non [primitive recursive function](#) that can not be de-recursed into loops.

Recursion and Memoization

For some recursive algorithms *memoization* can speed up computation dramatically:

```
(do
  (def fibonacci
```

```

(memoize (fn [n]
           (if (< n 2)
               (max n 0)
               (+ (fibonacci (- n 1)) (fibonacci (- n 2)))))))

(fibonacci 30))

```

Please note that this naive memoization approach with recursive functions does **not** work as expected:

```

(do
  (defn fib-simple [n]
    (if (< n 2)
        (max n 0)
        (+ (fib-simple (- n 1)) (fib-simple (- n 2)))))

  (def fib-memoize (memoize fib-simple))

  (fib-memoize 30))

```

memoization is doing a good job in computing fibonacci numbers using simple recursion. It eliminates the recurring computation of the predecessors values.

Nevertheless there are recursive algorithms like the *Ackermann* function where memoization has to raise its arms.

Compare recursion efficiency

To see how efficient tail call optimization for recursion is we compare simple recursion with self recursion applied to computing Fibonacci numbers.

Note: all examples run with upfront macro expansion enabled.

```

(do
  (load-module :benchmark ['benchmark :as 'b])

  (defn fib-simple [n]
    (if (< n 2)
        n
        (+ (fib-simple (- n 1)) (fib-simple (- n 2)))))

  (defn fib-tco
    ([n]
     (fib-tco n 0N 1N))
    ([n a b]
     (case n
         0 a
         1 b
         (fib-tco (dec n) b (+ a b)))))

  (defn fib-loop-recur [x]
    (loop [n x, a 0N, b 1N]
      (case n
          0 a
          1 b
          (recur (dec n) b (+ a b)))))

  (def fib-memoize
    (memoize
     (fn [n]
       (if (< n 2)
           n
           (+ (fib-memoize (- n 1)) (fib-memoize (- n 2)))))))

```

```
;; (b/benchmark (fib-simple 30) 5 5)
;; (b/benchmark (fib-tco 30) 5000 1000)
;; (b/benchmark (fib-loop-recur 30) 5000 1000)
;; (time (fib-memoize 30)) ;; memoized functions can not be benchmarked
```

```
;; run on MacBook Air M2, with 'macroexpand' enabled
```

```
;; +-----+-----+
;; | (fib-simple 30)      | 1.171s |
;; | (fib-tco 30)        | 31.286μs |
;; | (fib-loop-recur 30) | 27.946μs |
;; | (fib-memoize 30)    | 2.540ms |
;; +-----+-----+
```

Destructuring

Destructuring

Sequential Destructuring

Sequential destructuring breaks up a sequential data structure as a Venice list or vector within a let binding

```
(do
  (let [[x y z] [1 2 3]]
    (println x y z))
  ;=> 1 2 3

  ;; for strings, the elements are destructured by character.
  (let [[x y z] "abc"]
    (println x y z))) ;; => a b c
```

or within function parameters

```
(do
  (defn position [[x y]]
    (println "x:" x "y:" y))

  (position [1 2])) ;; => x: 1 y: 2
```

The destructured collection must not be of same size as the number of binding names

```
(do
  (let [[a b c d e f] '(1 2 3)]
    (println a b c d e f)) ;=> 1 2 3 nil nil nil

  (let [[a b c] '(1 2 3 4 5 6 7 8 9)]
    (println a b c))) ;; => 1 2 3
```

Working with tail elements '&' and ignoring bindings '_'

```
(do
  (let [[a b c & z] '(1 2 3 4 5 6 7 8 9)]
    (println a b c z)) ;; => 1 2 3 (4 5 6 7 8 9)

  (let [[a _ b _ c & z] '(1 2 3 4 5 6 7 8 9)]
    (println a b c z))) ;; => 1 3 5 (6 7 8 9)
```

Binding the entire collection with ':as'

```
(do
  (let [[a b c & z :as all] '(1 2 3 4 5 6 7 8 9)]
    (println a b c z all))
  ;; => 1 2 3 (4 5 6 7 8 9) (1 2 3 4 5 6 7 8 9)
)
```

Nested bindings

```
(do
  (def line [[5 10] [10 20]])
  (let [[[x1 y1][x2 y2]] line]
    (printf "Line from (%d,%d) to (%d,%d)%n" x1 y1 x2 y2))
  ;; => "Line from (5,10) to (10,20)"
)
```

`:as` or `&` can be used at any level

```
(do
  (def line [[5 10] [10 20]])
  (let [[[a b :as group1] [c d :as group2]] line]
    (println a b group1)      ;; => 5 10 [5 10]
    (println c d group2)))   ;; => 10 20 [10 20]
```

Associative Destructuring

Associative destructuring breaks up an associative (key/value) data structure as a Venice map within a let binding.

```
(do
  (let [{a :a, b :b, c :c} {:a "A" :b "B" :d "D"}]
    (println a b c)))  ;; => A B nil
```

```
(do
  (def map_keyword {:a "A" :b "B" :c 3 :d 4})
  (def map_strings {"a" "A" "b" "B" "c" 3 "d" 4})

  (let [{:keys [a b c]} map_keyword]
    (println a b c))  ;; => A B 3

  (let [{:strs [a b c]} map_strings]
    (println a b c)))  ;; => A B 3
```

Binding the entire collection with `:as`

```
(do
  (def map_keyword {:a "A" :b "B" :c 3 :d 4})

  (let [{:keys [a b c] :as all} map_keyword]
    (println a b c all))
  ;; => A B 3 {:a A :b B :c 3 :d 4}
```

Binding with defaults `:or`

```
(do
  (defn configure [options]
    (let [{:keys [port debug verbose] :or {port 8000, debug false, verbose false}} options]
      (println "port =" port " debug =" debug " verbose =" verbose)))
    ;; => port 8000, debug false, verbose false

  (configure {:debug true}))
```

Nested destructuring

Associative destructuring can be nested and combined with sequential destructuring

```
(do
  (def users
    {:peter {:role "clerk"
              :branch "Zurich"
              :age 40}

     :magda {:role "head of HR"
              :branch "Bern"
              :age 45}

     :kurt  {:role "assistant"
              :branch "Lucerne"
              :age 32}})

  (let [{[:keys [role branch]] :peter} users]
    (println "Peter is a" role "located at" branch)))
;; => Peter is a clerk located at Zurich
```

VeniceDoc

VeniceDoc is a documentation generator for the *Venice* language for generating API documentation in HTML format from *Venice* source code. It is used internally for generating the PDF and HTML cheatsheets. The function `doc` makes use of it to display the documentation for functions.

Example

Define a function `add` with documentation:

```
(defn
  ^{ :arglists '(
      "(add)", "(add x)", "(add x y)", "(add x y & more)")
    :doc
      """
      Returns the sum of the numbers.
      `(add)` returns 0.
      """
    :examples '(
      "(add)",
      "(add 1)",
      "(add 1 2)",
      "(add 1 2 3 4)")
    :see-also '(
      "+", "-", "x", "/" ) }

add

([] 0)
([x] x)
([x y] (+ x y))
([x y & xs] (+ x y xs)))
```

Show its documentation from the REPL:

```
venice> (doc add)
```

REPL Output:

```
(add), (add x), (add x y), (add x y & more)

Returns the sum of the numbers. (add) returns 0.

EXAMPLES:
  (add)

  (add 1)

  (add 1 2)

  (add 1 2 3 4)
```


SEE ALSO:

[+](#), [-](#), [*](#), [/](#)

VeniceDoc Format

The documentation is defined as a Venice metadata `map` :

```
{ :arglists '("add)", "(add x)")
  :doc "Returns the sum of the numbers."
  :examples '("add 1)", "(add 1 2)")
  :see-also '("+", "-", "*", "/") }
```

key	description
:arglist	the optional arglist, a list of variadic arg specs
:doc	the documentation in Venice markdown format
:examples	optional examples, a list of Venice scripts. Use triple quotes for multi-line scripts
:see-also	an optional list of cross referenced functions

Markdown

Venice Markdown

Headings

To create a heading, add one to four `#` symbols before the heading text. The number of `#` will determine the size of the heading.

```
# The largest heading
## The second largest heading
### The third largest heading
#### The fourth largest heading
```

Paragraphs and Line Breaks

```
A paragraph is simply one or more consecutive lines of text, separated by
one or more blank lines (a line containing nothing but spaces or tabs).
```

```
Within a paragraph line breaks can be added by placing a `pilcrow`
```

```
Line 1¶Line 2¶
Line 3
```

A paragraph is simply one or more consecutive lines of text, separated by one or more blank lines (a line containing nothing but spaces or tabs).

Within a paragraph line breaks can be added by placing a `¶`

Line 1
Line 2
Line 3

Styling

Venice markdown supports *italic*, **bold**, and ***bold-italic*** styling

```
This is *italic*, **bold**, and ***bold-italic*** styled text.
```

This is *italic*, **bold**, and ***bold-italic*** styled text.

Lists

Unordered List

```
* item 1
* item 2
* item 3
```

- item 1
- item 2

- item 3

Ordered List

```
1. item 1
2. item 2
3. item 3
```

1. item 1
2. item 2
3. item 3

Multiline list items with explicit line breaks:

```
* item 1
* item 2
  next line
  next line
* item 3
```

- item 1
- item 2
next line
next line
- item 3

Multiline list items with auto line breaks:

```
* item 1
* Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod
  tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim
  veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex
  ea commodo consequat. Duis aute irure dolor in reprehenderit in
  voluptate velit esse cillum dolore eu fugiat nulla pariatur.
* item 3
```

- item 1
- Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur.
- item 3

Links

Links are created by wrapping link text in brackets `[]`, and then wrapping the URL in parentheses `()`.

```
[Venice](https://github.com/jlangch/venice)
```

[Venice](https://github.com/jlangch/venice)

Tables

A simple table

JAN	1
FEB	20
MAR	300

JAN	1
FEB	20
MAR	300

Column alignment

:---	:---:	---:
1	1	1
200	200	200
30000	30000	30000

1	1	1
200	200	200
30000	30000	30000

Width header

Col 1	Col 2	Col 3
:---	:---:	---:
1	1	1
200	200	200
30000	30000	30000

Col 1	Col 2	Col 3
1	1	1
200	200	200
30000	30000	30000

PDF rendered tables have always a width of 100%. In some use cases an additional left aligned column can trick the rendered table:

Col 1	Col 2	Col 3	
:---	:---:	---:	:---
1	1	1	
200	200	200	
30000	30000	30000	

Col 1	Col 2	Col 3
1	1	1
200	200	200
30000	30000	30000

Line breaks in cells

JAN	1 2 3
FEB	20
MAR	300

JAN	1
	2

	3
FEB	20
MAR	300

Column format using CSS styles

The Venice markdown supports a few CSS styles

Text alignment:

- `text-align: left`
- `text-align: center`
- `text-align: right`

Column width:

- `width: 15%`
- `width: 15pm`
- `width: 15em`
- `width: auto`

```
| Col 1 | Col 2 |
| [![text-align: left; width: 6em]] | [![text-align: left; width: 6em]] |
| 1      | 1      |
| 200    | 200    |
| 30000  | 30000  |
```

Col 1	Col 2
1	1
200	200
30000	30000

Code

Code can be called out within a text by enclosing it with single backticks.

```
To open a namespace use `(ns name)`.
```

To open a namespace use `(ns name)` .

Code block are enclosed with three backticks:

```
```
(defn hello []
 (println "Hello stranger"))

(hello)
```
```

producing

```
(defn hello []
  (println "Hello stranger"))

(hello)
```


Function Details

[top](#)

#{ }

Creates a set.

```
#{10 20 30}  
=> #{10 20 30}
```

[top](#)

()

Creates a list.

```
'(10 20 30)  
=> (10 20 30)
```

[top](#)

*

```
(*)  
(* x)  
(* x y)  
(* x y & more)
```

Returns the product of numbers. (*) returns 1

```
(*)  
=> 1
```

```
(* 4)  
=> 4
```

```
(* 4 3)  
=> 12
```

```
(* 4 3 2)  
=> 24
```

```
(* 4I 3I)  
=> 12I
```

```
(* 6.0 2)  
=> 12.0
```

```
( * 6 1.5M )
=> 9.0M
```

SEE ALSO

[+](#)

Returns the sum of the numbers. (+) returns 0.

[-](#)

If one number is supplied, returns the negation, else subtracts the numbers from x and returns the result.

[/](#)

If no denominators are supplied, returns 1/numerator, else returns numerator divided by all of the denominators.

[dec/add](#)

Adds two decimals and scales the result. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, or :UP

[dec/sub](#)

Subtract y from x and scales the result. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, or :UP

[dec/mul](#)

Multiplies two decimals and scales the result. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, ...

[dec/div](#)

Divides x by y and scales the result. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, or :UP

[dec/scale](#)

Scales a decimal. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, or :UP

[top](#)

ARGV

A list of the supplied command line arguments, or `nil` if the instantiator of the Venice instance decided not to make the command line arguments available.

`*ARGV*`

```
=> nil
```

[top](#)

ansi-term

`true` if Venice runs in an ANSI terminal, otherwise `false`

`*ansi-term*`

```
=> false
```

[top](#)

err

A `:java.io.PrintStream` object representing standard error for print operations.

Defaults to `System.err`, wrapped in an `PrintStream`.

`*err*` is a dynamic var. Any `:java.io.PrintStream` can be dynamically bound to it:

```
(binding [*err* print-stream]
 (println "text"))
```

SEE ALSO

[with-err-str](#)

Evaluates `exprs` in a context in which `*err*` is bound to a capturing output stream. Returns the string created by any nested printing ...

[*out*](#)

A `:java.io.PrintStream` object representing standard output for print operations.

[*in*](#)

A `:java.io.Reader` object representing standard input for read operations.

[top](#)

`*in*`

A `:java.io.Reader` object representing standard input for read operations.

Defaults to `System.in`, wrapped in an `InputStreamReader`.

`*in*` is a dynamic var. Any `:java.io.Reader` can be dynamically bound to it:

```
(binding [*in* reader]
 (read-line))
```

SEE ALSO

[read-line](#)

Without `arg` reads the next line from the stream that is the current value of `*in*`. With `arg` reads the next line from the passed stream ...

[read-char](#)

Without `arg` reads the next char from the stream that is the current value of `*in*`. With `arg` reads the next char from the passed stream ...

[*out*](#)

A `:java.io.PrintStream` object representing standard output for print operations.

[*err*](#)

A `:java.io.PrintStream` object representing standard error for print operations.

[top](#)

`*loaded-files*`

The loaded files

```
*loaded-files*
=> #{} 
```

[top](#)

`*loaded-modules*`

The loaded modules

```
*loaded-modules*
=> #[:crypt :csv :matrix :xchart :jsonl :docker :trace :ascii-table :java :fonts :xml :semver :json :cidr :
cargo :app :gradlew :geoip :hexdump :test :inet :io :maven :grep :timing :sandbox :ansi :benchmark :str :gradle
:excel :core :regex :component :pdf :cargo-arangodb :installer :parsifal :shell :zipvault :math :time :config :
kira :qrrref}
```

[top](#)

newline

The system newline

```
*newline*
=> "\n"
```

[top](#)

ns

The current namespace

```
*ns*
=> user

(do
  (ns test)
    *ns*)
=> test
```

[top](#)

out

A `:java.io.PrintStream` object representing standard output for print operations.

Defaults to `System.out`, wrapped in an `PrintStream`.

`*out*` is a dynamic var. Any `:java.io.PrintStream` can be dynamically bound to it:

```
(binding [*out* print-stream]
  (println "text"))
```

SEE ALSO

[with-out-str](#)

Evaluates `exprs` in a context in which `*out*` is bound to a capturing output stream. Returns the string created by any nested printing ...

[*err*](#)

A `:java.io.PrintStream` object representing standard error for print operations.

[*in*](#)

A `:java.io.Reader` object representing standard input for read operations.

[top](#)

run-mode

The current run-mode one of `:repl`, `:script`, `:app`

```
*run-mode*  
=> :script
```

[top](#)

version

The Venice version

```
*version*  
=> "0.0.0"
```

[top](#)

+

```
(+)  
(+ x)  
(+ x y)  
(+ x y & more)
```

Returns the sum of the numbers. (+) returns 0.

```
(+)  
=> 0
```

```
(+ 1)  
=> 1
```

```
(+ 1 2)  
=> 3
```

```
(+ 1 2 3 4)  
=> 10
```

```
(+ 1I 2I)  
=> 3I
```

```
(+ 1 2.5)  
=> 3.5
```

```
(+ 1 2.5M)  
=> 3.5M
```

SEE ALSO

—

If one number is supplied, returns the negation, else subtracts the numbers from x and returns the result.

[*](#)

Returns the product of numbers. (*) returns 1

[/](#)

If no denominators are supplied, returns 1/numerator, else returns numerator divided by all of the denominators.

[dec/add](#)

Adds two decimals and scales the result. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, or :UP

[dec/sub](#)

Subtract y from x and scales the result. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, or :UP

[dec/mul](#)

Multiplies two decimals and scales the result. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, ...

[dec/div](#)

Divides x by y and scales the result. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, or :UP

[dec/scale](#)

Scales a decimal. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, or :UP

[top](#)

[-](#)

```
(- x)
(- x y)
(- x y & more)
```

If one number is supplied, returns the negation, else subtracts the numbers from x and returns the result.

```
(- 4)
=> -4

(- 8 3 -2 -1)
=> 8

(- 5I 2I)
=> 3I

(- 8 2.5)
=> 5.5

(- 8 1.5M)
=> 6.5M
```

SEE ALSO

[+](#)

Returns the sum of the numbers. (+) returns 0.

[*](#)

Returns the product of numbers. (*) returns 1

[/](#)

If no denominators are supplied, returns 1/numerator, else returns numerator divided by all of the denominators.

[dec/add](#)

Adds two decimals and scales the result. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, or :UP

[dec/sub](#)

Subtract y from x and scales the result. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, or :UP

[dec/mul](#)

Multiplies two decimals and scales the result. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, ...

[dec/div](#)

Divides x by y and scales the result. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, or :UP

[dec/scale](#)

Scales a decimal. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, or :UP

[top](#)

[-<>](#)

(-<> x & forms)

Threads the x through the forms. Inserts x at position of the <> symbol of the first form, making a list of it if it is not a list already. If there are more forms, inserts the first form at position of the <> symbol in second form, etc.

```
(-<> 5
  (+ <> 3)
  (/ 2 <>)
  (- <> 1))
=> -1
```

SEE ALSO

[->](#)

Threads the x through the forms. Inserts x as the second item in the first form, making a list of it if it is not a list already.

[->>](#)

Threads the x through the forms. Inserts x as the last item in the first form, making a list of it if it is not a list already. If ...

[as->](#)

Binds name to expr, evaluates the first form in the lexical context of that binding, then binds name to that result, repeating for ...

[top](#)

[->](#)

(-> x & forms)

Threads the x through the forms. Inserts x as the second item in the first form, making a list of it if it is not a list already. If there are more forms, inserts the first form as the second item in second form, etc.

```
(-> 5 (+ 3) (/ 2) (- 1))
=> 3
```

```
(do
  (def person
```

```
{:name "Peter Meier"
 :address {:street "Lindenstrasse 45"
           :city "Bern"
           :zip 3000}}})

(-> person :address :street))
=> "Lindenstrasse 45"
```

SEE ALSO

[->>](#)

Threads the x through the forms. Inserts x as the last item in the first form, making a list of it if it is not a list already. If ...

[-<>](#)

Threads the x through the forms. Inserts x at position of the <> symbol of the first form, making a list of it if it is not a list already.

[as->](#)

Binds name to expr, evaluates the first form in the lexical context of that binding, then binds name to that result, repeating for ...

[top](#)

[->>](#)

`(->> x & forms)`

Threads the x through the forms. Inserts x as the last item in the first form, making a list of it if it is not a list already. If there are more forms, inserts the first form as the last item in second form, etc.

```
(->> 5 (+ 3) (/ 32) (- 1))
=> -3
```

```
(->> [ {:a 1 :b 2} {:a 3 :b 4} {:a 5 :b 6} {:a 7 :b 8} ]
    (map (fn [x] (get x :b)))
    (filter (fn [x] (> x 4)))
    (map inc)))
=> (7 9)
```

SEE ALSO

[->](#)

Threads the x through the forms. Inserts x as the second item in the first form, making a list of it if it is not a list already.

[-<>](#)

Threads the x through the forms. Inserts x at position of the <> symbol of the first form, making a list of it if it is not a list already.

[as->](#)

Binds name to expr, evaluates the first form in the lexical context of that binding, then binds name to that result, repeating for ...

[top](#)

•

```
(. classname :new args)
(. classname method-name args)
(. classname field-name)
(. classname :class)
(. object method-name args)
(. object field-name)
```

```
(. object :class)
```

Java interop. Calls a constructor or an class/object method or accesses a class/instance field. The function is sandboxed.

```
;; invoke constructor
(. :java.lang.Long :new 10)
=> 10

;; invoke static method
(. :java.time.ZonedDateTime :now)
=> 2024-03-10T17:11:31.974+01:00[Europe/Zurich]

;; invoke static method
(. :java.lang.Math :min 10 20)
=> 10

;; access static field
(. :java.lang.Math :PI)
=> 3.141592653589793

;; invoke method
(. (. :java.lang.Long :new 10) :toString)
=> "10"

;; get class name
(. :java.lang.Math :class)
=> class java.lang.Math

;; get class name
(. (. :java.io.File :new "/temp") :class)
=> class java.io.File
```

SEE ALSO

[import](#)

Imports one or multiple Java classes. Imports are bound to the current namespace.

[proxify](#)

Proxies a Java interface to be passed as a Callback object to Java functions. The interface's methods are implemented by Venice functions.

[java/as-runnable](#)

Wraps the function `f` in a `java.lang.Runnable` (<https://docs.oracle.com/javase/8/docs/api/java/lang/Runnable.html>)

[java/as-callable](#)

Wraps the function `f` in a `java.util.concurrent.Callable` (<https://docs.oracle.com/javase/8/docs/api/java/util/concurrent/Callable.html>)

top

```
::
```

```
(.: type-name args*)
```

Instantiates a custom type.

Note: Venice implicitly creates a builder function suffixed with a dot:

```
(deftype :complex [real :long, imaginary :long])
(complex. 200 300)
```

For readability prefer `(complex. 200 300)` over `(.: :complex 100 200)`.

```
(do
  (ns foo)
  (deftype :complex [real :long, imaginary :long])
  (def x (.: :complex 100 200))
  [(:real x) (:imaginary x)])
=> [100 200]
```

SEE ALSO

[deftype](#)

Defines a new custom record type for the name with the fields.

[deftype?](#)

Returns true if type is a custom type else false.

[deftype-of](#)

Defines a new custom wrapper type based on a base type.

[deftype-or](#)

Defines a new custom choice type.

[deftype-describe](#)

Describes a custom type.

[top](#)

/

```
(/ x)
(/ x y)
(/ x y & more)
```

If no denominators are supplied, returns 1/numerator, else returns numerator divided by all of the denominators.

```
(/ 2.0)
=> 0.5
```

```
(/ 12 2 3)
=> 2
```

```
(/ 12 3)
=> 4
```

```
(/ 12I 3I)
=> 4I
```

```
(/ 6.0 2)
=> 3.0
```

```
(/ 6 1.5M)
=> 4.0000000000000000M
```

SEE ALSO

[+](#)

Returns the sum of the numbers. (+) returns 0.

[-](#)

If one number is supplied, returns the negation, else subtracts the numbers from x and returns the result.

[*](#)

Returns the product of numbers. (*) returns 1

[dec/add](#)

Adds two decimals and scales the result. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, or :UP

[dec/sub](#)

Subtract y from x and scales the result. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, or :UP

[dec/mul](#)

Multiplies two decimals and scales the result. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, ...

[dec/div](#)

Divides x by y and scales the result. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, or :UP

[dec/scale](#)

Scales a decimal. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, or :UP

[top](#)

[<](#)

```
(< x y)
(< x y & more)
```

Returns true if the numbers are in monotonically increasing order, otherwise false.

```
(< 2 3)
=> true

(< 2 3.0)
=> true

(< 2 3.0M)
=> true

(< 2 3 4 5 6 7)
=> true

(let [x 10]
  (< 0 x 100))
=> true
```

SEE ALSO

[<=](#)

Returns true if the numbers are in monotonically non-decreasing order, otherwise false.

[>](#)

Returns true if the numbers are in monotonically decreasing order, otherwise false.

[>=](#)

Returns true if the numbers are in monotonically non-increasing order, otherwise false.

[top](#)

<=

```
(<= x y)
(<= x y & more)
```

Returns true if the numbers are in monotonically non-decreasing order, otherwise false.

```
(<= 2 3)
=> true

(<= 3 3)
=> true

(<= 2 3.0)
=> true

(<= 2 3.0M)
=> true

(<= 2 3 4 5 6 7)
=> true

(let [x 10]
  (<= 0 x 100))
=> true
```

SEE ALSO

[<](#)

Returns true if the numbers are in monotonically increasing order, otherwise false.

[>](#)

Returns true if the numbers are in monotonically decreasing order, otherwise false.

[>=](#)

Returns true if the numbers are in monotonically non-increasing order, otherwise false.

[top](#)

=

```
(= x)
(= x y)
(= x y & more)
```

Returns true if both operands have equivalent type and value

```
(= "abc" "abc")
=> true

(= 0 0)
=> true

(= 0 1)
=> false
```

```
(= 0 0.0)
=> false
```

```
(= 0 0.0M)
=> false
```

```
(= "0" 0)
=> false
```

```
(= 4)
=> true
```

```
(= 4 4 4)
=> true
```

SEE ALSO

[==](#)

Returns true if both operands have equivalent value.

[not=](#)

Same as (not (= x y))

[top](#)

[==](#)

```
(== x)
(== x y)
(== x y & more)
```

Returns true if both operands have equivalent value.

Numbers of different types can be checked for value equality.

```
(== "abc" "abc")
=> true
```

```
(== 0 0)
=> true
```

```
(== 0 1)
=> false
```

```
(== 0 0.0)
=> true
```

```
(== 0 0.0M)
=> true
```

```
(== "0" 0)
=> false
```

```
(== 4)
=> true
```

```
(= 4I 4 4.0 4.0M 4N)  
=> true
```

SEE ALSO

[=](#)

Returns true if both operands have equivalent type and value

[not=](#)

Same as (not (= x y))

[top](#)

[>](#)

```
(> x y)  
(> x y & more)
```

Returns true if the numbers are in monotonically decreasing order, otherwise false.

```
(> 3 2)  
=> true
```

```
(> 3 3)  
=> false
```

```
(> 3.0 2)  
=> true
```

```
(> 3.0M 2)  
=> true
```

```
(> 7 6 5 4 3 2)  
=> true
```

SEE ALSO

[<](#)

Returns true if the numbers are in monotonically increasing order, otherwise false.

[<=](#)

Returns true if the numbers are in monotonically non-decreasing order, otherwise false.

[>=](#)

Returns true if the numbers are in monotonically non-increasing order, otherwise false.

[top](#)

[>=](#)

```
(>= x y)  
(>= x y & more)
```

Returns true if the numbers are in monotonically non-increasing order, otherwise false.

```
(>= 3 2)
=> true

(>= 3 3)
=> true

(>= 3.0 2)
=> true

(>= 3.0M 2)
=> true

(>= 7 6 5 4 3 2)
=> true
```

SEE ALSO

[<](#)

Returns true if the numbers are in monotonically increasing order, otherwise false.

[<=](#)

Returns true if the numbers are in monotonically non-decreasing order, otherwise false.

[>](#)

Returns true if the numbers are in monotonically decreasing order, otherwise false.

[top](#)

Object

Defines a protocol to customize the `toString` and/or the `compareTo` function of custom datatypes.

Definition:

```
(defprotocol Object
  (toString [this] (to-str false this))
  (compareTo [this other] (compare this other)))
```

`compareTo` returns a negative integer, zero, or a positive integer as *this* value is less than, equal to, or greater than the *other* value.

```
(do
  (deftype :point [x :long, y :long]
    Object
    (toString [this] (str/format "[%s %s]" (:x this) (:y this)))
    (compareTo [self other] (. (:x self) :compareTo (:x other))))

  ; custom `toString`
  (println "toString:" (point. 1 2))

  ; custom `compareTo`: sort by 'x' ascending
  (println "compareTo:"
    (sort [(point. 2 100) (point. 3 101) (point. 1 102)])))

toString: [1 2]
compareTo: [[1 102] [2 100] [3 101]]
=> nil
```

SEE ALSO

[defprotocol](#)

Defines a new protocol with the supplied function specs.

[deftype](#)

Defines a new custom record type for the name with the fields.

top

`[]`

Creates a vector.

```
[10 20 30]  
=> [10 20 30]
```

top

abs

`(abs x)`

Returns the absolute value of the number

```
(abs 10)  
=> 10
```

```
(abs -10)  
=> 10
```

```
(abs -10I)  
=> 10I
```

```
(abs -10.1)  
=> 10.1
```

```
(abs -10.12M)  
=> 10.12M
```

SEE ALSO

[sgn](#)
sgn function for a number.

[negate](#)
Negates x

top

accept-either

`(accept-either p p-other f)`

Returns a new promise that, when either this or the other given promise completes normally, is executed with the corresponding result as argument to the supplied function f.

```
(-> (promise (fn [] (sleep 200) 200))  
    (accept-either (promise (fn [] (sleep 100) 100))
```

```
(fn [v] (println (+ v 1))))  
(deref))  
101  
=> nil
```

SEE ALSO

[promise](#)

Returns a promise object that can be read with `deref`, and set, once only, with `deliver`. Calls to `deref` prior to delivery will block, ...

[then-accept](#)

Returns a new promise that, when this promise completes normally, is executing the function `f` with this stage's result as the argument.

[then-accept-both](#)

Returns a new promise that, when either this or the other given promise completes normally, is executing the function `f` with the two ...

[then-apply](#)

Applies a function `f` on the result of the previous stage of the promise `p`.

[then-combine](#)

Applies a function `f` to the result of the previous stage of promise `p` and the result of another promise `p-other`

[then-compose](#)

Composes the result of two promises. `f` receives the result of the first promise `p` and returns a new promise that composes that value ...

[when-complete](#)

Returns the promise `p` with the same result or exception at this stage, that executes the action `f`. Passes the current stage's result ...

[apply-to-either](#)

Returns a new promise that, when either this or the other given promise completes normally, is executed with the corresponding result ...

[or-timeout](#)

Exceptionally completes the promise with a `TimeoutException` if not otherwise completed before the given timeout.

[complete-on-timeout](#)

Completes the promise with the given value if not otherwise completed before the given timeout.

top

acopy

```
(acopy src src-pos dest dest-pos dest-len)
```

Copies an array from the `src` array, beginning at the specified position, to the specified position of the `dest` array. Returns the modified destination array

```
(acopy (long-array '(1 2 3 4 5)) 2 (long-array 20) 10 3)  
=> [0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 3, 4, 5, 0, 0, 0, 0, 0, 0, 0]
```

top

acquire

```
(acquire lock)
```

Acquires a lock, blocking until the lock is available.

```
(let [l (lock)]  
  (acquire l)  
  ;; do something
```

```
(release l))
=> nil
```

SEE ALSO

[lock](#)

Creates a new lock object.

[try-acquire](#)

Acquires a lock within the given timeout time. Without a timeout returns immediately if the lock is not available.

[release](#)

Releases a lock.

[locked?](#)

Returns true if the lock is in use else false.

[top](#)

add-watch

```
(add-watch ref key fn)
```

Adds a watch function to an agent/atom reference. The watch fn must be a fn of 4 args: a key, the reference, its old-state, its new-state.

```
(do
  (def x (agent 10))
  (defn watcher [key ref old new]
    (println "watcher: " key))
  (add-watch x :test watcher))
=> nil
```

SEE ALSO

[agent](#)

Creates and returns an agent with an initial value of state and zero or more options.

[top](#)

agent

```
(agent state & options)
```

Creates and returns an agent with an initial value of state and zero or more options.

Options:

- `:error-handler handler-fn`
- `:error-mode mode-keyword`
- `:validator validate-fn`

The `handler-fn` is called if an action throws an exception. It's a function taking two args the agent and the exception. The mode-keyword may be either `:continue` (the default) or `:fail`. The `validate-fn` must be nil or a side-effect-free fn of one argument, which will be passed the intended new state on any state change. If the new state is unacceptable, the `validate-fn` should return false or throw an exception.

```
(do
  (def x (agent 100))
  (send x + 5)
  (sleep 100))
```



```
(deref x))  
=> 105
```

SEE ALSO

[send](#)

Dispatch an action to an agent. Returns the agent immediately.

[send-off](#)

Dispatch a potentially blocking action to an agent. Returns the agent immediately.

[await](#)

Blocks the current thread (indefinitely) until all actions dispatched thus far (from this thread or agent) to the agents have occurred.

[await-for](#)

Blocks the current thread until all actions dispatched thus far (from this thread or agent) to the agents have occurred, or the timeout ...

[deref](#)

Dereferences an atom, a future or a promise object. When applied to an atom, returns its current state. When applied to a future, will ...

[set-error-handler!](#)

Sets the error-handler of an agent to handler-fn. If an action being run by the agent throws an exception handler-fn will be called ...

[agent-error](#)

Returns the exception thrown during an asynchronous action of the agent if the agent is failed. Returns nil if the agent is not failed.

[top](#)

agent-error

```
(agent-error agent)
```

Returns the exception thrown during an asynchronous action of the agent if the agent is failed. Returns `nil` if the agent is not failed.

```
(do  
  (def x (agent 100 :error-mode :fail))  
  (send x (fn [n] (/ n 0)))  
  (sleep 500)  
  (agent-error x))  
=> com.github.jlangch.venice.VncException: / by zero
```

SEE ALSO

[agent](#)

Creates and returns an agent with an initial value of state and zero or more options.

[set-error-handler!](#)

Sets the error-handler of an agent to handler-fn. If an action being run by the agent throws an exception handler-fn will be called ...

[agent-error-mode](#)

Returns the agent's error mode

[top](#)

agent-send-off-thread-pool-info

```
(agent-send-off-thread-pool-info)
```

Returns the thread pool info of the ThreadPoolExecutor serving agent send-off.

<i>core-pool-size</i>	the number of threads to keep in the pool, even if they are idle
<i>maximum-pool-size</i>	the maximum allowed number of threads
<i>current-pool-size</i>	the current number of threads in the pool
<i>largest-pool-size</i>	the largest number of threads that have ever simultaneously been in the pool
<i>active-thread-count</i>	the approximate number of threads that are actively executing tasks
<i>scheduled-task-count</i>	the approximate total number of tasks that have ever been scheduled for execution
<i>completed-task-count</i>	the approximate total number of tasks that have completed execution

([agent-send-off-thread-pool-info](#))

```
=> {:core-pool-size 0 :maximum-pool-size 2147483647 :current-pool-size 2 :largest-pool-size 2 :active-thread-count 0 :scheduled-task-count 10 :completed-task-count 10}
```

SEE ALSO

[agent](#)

Creates and returns an agent with an initial value of state and zero or more options.

[send-off](#)

Dispatch a potentially blocking action to an agent. Returns the agent immediately.

[top](#)

agent-send-thread-pool-info

([agent-send-thread-pool-info](#))

Returns the thread pool info of the ThreadPoolExecutor serving agent send.

<i>core-pool-size</i>	the number of threads to keep in the pool, even if they are idle
<i>maximum-pool-size</i>	the maximum allowed number of threads
<i>current-pool-size</i>	the current number of threads in the pool
<i>largest-pool-size</i>	the largest number of threads that have ever simultaneously been in the pool
<i>active-thread-count</i>	the approximate number of threads that are actively executing tasks
<i>scheduled-task-count</i>	the approximate total number of tasks that have ever been scheduled for execution
<i>completed-task-count</i>	the approximate total number of tasks that have completed execution

([agent-send-thread-pool-info](#))

```
=> {:core-pool-size 10 :maximum-pool-size 10 :current-pool-size 9 :largest-pool-size 9 :active-thread-count 0 :scheduled-task-count 9 :completed-task-count 9}
```

SEE ALSO

[agent](#)

Creates and returns an agent with an initial value of state and zero or more options.

[send](#)

Dispatch an action to an agent. Returns the agent immediately.

[top](#)

aget

([aget](#) array idx)

Returns the value at the index of an array of Java Objects

```
(aget (long-array '(1 2 3 4 5)) 1)
=> 2
```

top

alength

```
(alength array)
```

Returns the length of an array

```
(alength (long-array '(1 2 3 4 5)))
=> 5
```

top

all-of

```
(all-of p & ps)
```

Returns a new promise that is completed when all of the given promises complete. If any of the given promises complete exceptionally, then the returned promise also does so. Otherwise, the results, if any, of the given promises are not reflected in the returned promise, but may be obtained by inspecting them individually.

```
(-> (all-of (promise (fn [] (sleep 100) 1))
           (promise (fn [] (sleep 100) 2))
           (promise (fn [] (sleep 500) 3)))
    (deref))
=> nil
```

SEE ALSO

[promise](#)

Returns a promise object that can be read with deref, and set, once only, with deliver. Calls to deref prior to delivery will block, ...

[any-of](#)

Returns a new promise that is completed when any of the given promises complete, with the same result. Otherwise, if it completed exceptionally, ...

top

alter-ns-meta!

```
(alter-ns-meta! n f & args)
```

Alters the metadata for a namespace. f must be free of side-effects.

```
(do
  (ns foo)
  (alter-ns-meta! foo assoc :a 1))
=> {:a 1}
```

```
(do
  (ns foo)
  (def n 'foo)
  (alter-ns-meta! (var-get n) assoc :a 1)
  (pr-str (ns-meta (var-get n))))
=> "{:a 1}"
```

SEE ALSO

[ns-meta](#)

Returns the meta data of the namespace n or nil if n is not an existing namespace

[reset-ns-meta!](#)

Resets the metadata for a namespace

[ns](#)

Opens a namespace.

[top](#)

amap

```
(amap f arr)
```

Applies f to each item in the array arr. Returns a new array with the mapped values.

```
(str (amap (fn [x] (+ 1 x)) (long-array 6 0)))
=> "[1, 1, 1, 1, 1, 1]"
```

[top](#)

and

```
(and x)
(and x & next)
```

Ands the predicate forms

```
(and true true)
=> true
```

```
(and true false)
=> false
```

```
(and)
=> true
```

SEE ALSO

[or](#)

Ors the predicate forms

[not](#)

Returns true if x is logical false, false otherwise.

ansi/ansi

(ansi style)

Output an ANSI escape code using a style key.

If `*use-ansi*` is bound to false, outputs an empty string instead of an ANSI code.

```
(println (str (ansi/ansi :blue) "foo"))
```

```
(println (str (ansi/ansi :underline) "foo"))
```

```
(println (str (ansi/ansi (ansi/fg-color 33)) "foo"))
```

ansi/bg-color

(bg-color code)

Defines an extended background color from the 256-color extended color set. The code ranges from 0 to 255.

```
(ansi/bg-color 197)
```

ansi/fg-color

(fg-color code)

Defines an extended foreground color from the 256-color extended color set. The code ranges from 0 to 255.

```
(ansi/fg-color 197)
```

ansi/progress

(progress & options)

Returns a progress handler that renders the progress as a percentage string.

The returned progress handler takes two args:

- progress, a value 0..100 in :percent mode otherwise any value
- status , one of {start :progress :end :failed}

E.g: Download: 54%

Progress options:

:caption txt A caption text. Defaults to empty.

:start-msg msg	A start message. Defaults to "{caption} started".
:end-msg msg	An end message. Defaults to "{caption} ok".
:end-col col	An end message ansi color code.
:failed-msg msg	A failed message. Defaults to "{caption} failed".
:failed-col col	A failed message ansi color code.
:mode m	A mode {;percent, :custom}. Defaults to :percent.

```
(let [pb (ansi/progress :caption "Test:")]
  (pb 0 :progress)
  (sleep 1 :seconds)
  (pb 50 :progress)
  (sleep 1 :seconds)
  (pb 100 :progress)
  (sleep 1 :seconds)
  (pb 100 :end))

(io/download "https://foo.org/image.png"
  :binary true
  :user-agent "Mozilla"
  :progress-fn (ansi/progress :caption "Download:"))
```

[top](#)

ansi/progress-bar

(progress-bar & options)

Returns a progress handler that renders a progress bar.

The returned progress handler takes two args:

- progress (0..100%)
- status {start :progress :end :failed}

E.g:

- Download: [#####]
- Download: [#####] 70%

Progress bar options:

:caption txt	A caption text. Defaults to empty.
:width val	The width of the bar in chars. Defaults to 25.
:start-msg msg	A start message. Defaults to "{caption} started".
:end-msg msg	An end message. Defaults to "{caption} ok".
:end-col col	An end message ansi color code.
:failed-msg msg	A failed message. Defaults to "{caption} failed".
:failed-col col	A failed message ansi color code.
:show-percent bool	If true shows the percentage. Defaults to 'false'.

```
(let [pb (ansi/progress-bar
  :caption "Test:"
  :width 25
  :show-percent true)]
  (pb 0 :progress)
  (sleep 1 :seconds)
  (pb 50 :progress)
  (sleep 1 :seconds))
```

```
(pb 100 :progress)
(sleep 1 :seconds)
(pb 100 :end))

(io/download "https://foo.org/image.png"
  :binary true
  :user-agent "Mozilla"
  :progress-fn (ansi/progress-bar
    :caption "Download:"
    :width 25
    :show-percent true))
```

[top](#)

ansi/style

```
(style text styles)
```

Applies ANSI color and style to a text string.

```
(println (ansi/style "foo" :green))

(println (ansi/style "foo" :green :underline))

(println (ansi/style "foo" :green :bg-yellow :underline))

(println (ansi/style "foo" (ansi/fg-color 21) (ansi/bg-color 221) :underline))

(println (ansi/style "foo" nil))
```

[top](#)

ansi/with-ansi

```
(with-ansi & forms)
```

Runs the given forms with the *use-ansi* variable temporarily bound to true, to enable the production of any ANSI color codes specified in the forms.

```
(ansi/with-ansi (println (ansi/style "foo" :green)))
```

[top](#)

ansi/without-ansi

```
(without-ansi & forms)
```

Runs the given forms with the *use-ansi* variable temporarily bound to false, to suppress the production of any ANSI color codes specified in the forms.

```
(ansi/without-ansi (println (ansi/style "foo" :green)))
```

ansi/without-cursor

```
(without-cursor & forms)
```

Runs the given forms with the cursor turned off.

any-of

```
(any-of p & ps)
```

Returns a new promise that is completed when any of the given promises complete, with the same result. Otherwise, if it completed exceptionally, the returned promise also does so.

```
(-> (any-of (promise (fn [] (sleep 300) 1))
            (promise (fn [] (sleep 100) 2))
            (promise (fn [] (sleep 500) 3)))
    (deref))
=> 2
```

SEE ALSO

[promise](#)

Returns a promise object that can be read with `deref`, and `set`, once only, with `deliver`. Calls to `deref` prior to delivery will block, ...

[all-of](#)

Returns a new promise that is completed when all of the given promises complete. If any of the given promises complete exceptionally, ...

any-pred

```
(any-pred p1 & p)
```

Takes a set of predicates and returns a function `f` that returns the first logical true value returned by one of its composing predicates against any of its arguments, else it returns logical false. Note that `f` is short-circuiting in that it will stop execution on the first argument that triggers a logical true result against the original predicates.

```
((any-pred number?) 1)
=> true
```

```
((any-pred number?) 1 "a")
=> true
```

```
((any-pred number? string?) 2 "a")
=> true
```


any?

```
(any? pred coll)
```

Returns true if the predicate is true for at least one collection item, false otherwise.

```
(any? number? nil)
=> false
```

```
(any? number? [])
=> false
```

```
(any? number? [1 :a :b])
=> true
```

```
(any? number? [1 2 3])
=> true
```

```
(any? #(== % 10) [10 20 30])
=> true
```

```
(any? #(>= % 10) [1 5 10])
=> true
```

SEE ALSO

[every?](#)

Returns true if the predicate is true for all collection items, false otherwise.

[not-any?](#)

Returns false if the predicate is true for at least one collection item, true otherwise

[not-every?](#)

Returns false if the predicate is true for all collection items, true otherwise

[top](#)

app/build

```
(app/build name main-file file-map dest-dir)
```

Creates a Venice application archive that can be distributed and executed as a single file.

The archive is stored as: {dest-dir}/{name}.zip

Returns a map with information on the created archive:

```
{ "file"   "{dest-dir}/{name}.zip",
  "name"   "{name}" }
```

Build example:

```
/staging
├─ billing.venice
├─ utils
│   └─ util.venice
└─ render.venice
```

```
└─ data
   └─ bill.template
   └─ logo.jpg
```

With these staged files the archive is built as:

```
(app/build
  "billing"
  "billing.venice"
  { "billing.venice"      "/staging/billing.venice"
    "utils/util.venice"   "/staging/utils/util.venice"
    "utils/render.venice" "/staging/utils/render.venice"
    "data/bill.template"  "/staging/data/bill.template"
    "data/logo.jpg"      "/staging/data/logo.jpg" }
  ".")
```

Loading Venice files works relative to the application. You can only load files that are in the app archive. If for instances "billing.venice" in the above example requires "utils/render.venice" just add `(load-file "utils/render.venice")` to "billing.venice".

The app can be run from the command line as:

```
> java -jar venice-1.12.4.jar -app billing.zip
```

Venice reads the archive and loads the archive's main file.

Or with additional Java libraries (all JARs in 'libs' dir):

```
> java -cp "libs/*" com.github.jlangch.venice.Launcher -app billing.zip
```

top

app/manifest

```
(app/manifest app)
```

Returns the manifest of a Venice application archive as a map.

top

apply

```
(apply f args* coll)
```

Applies f to all arguments composed of args and coll

```
(apply + [1 2 3])
=> 6
```

```
(apply + 1 2 [3 4 5])
=> 15
```

```
(apply str [1 2 3 4 5])
=> "12345"
```

```
(apply inc [1])
=> 2
```

top

apply-to-either

```
(apply-to-either p p-other f)
```

Returns a new promise that, when either this or the other given promise completes normally, is executed with the corresponding result as argument to the supplied function f.

```
(-> (promise (fn [] (sleep 200) 200))
    (apply-to-either (promise (fn [] (sleep 100) 100))
                     (fn [v] (+ v 1))))
(deref))
=> 101
```

SEE ALSO

[promise](#)

Returns a promise object that can be read with `deref`, and `set`, once only, with `deliver`. Calls to `deref` prior to delivery will block, ...

[then-accept](#)

Returns a new promise that, when this promise completes normally, is executing the function f with this stage's result as the argument.

[then-accept-both](#)

Returns a new promise that, when either this or the other given promise completes normally, is executing the function f with the two ...

[then-apply](#)

Applies a function f on the result of the previous stage of the promise p.

[then-combine](#)

Applies a function f to the result of the previous stage of promise p and the result of another promise p-other

[then-compose](#)

Composes the result of two promises. f receives the result of the first promise p and returns a new promise that composes that value ...

[when-complete](#)

Returns the promise p with the same result or exception at this stage, that executes the action f. Passes the current stage's result ...

[accept-either](#)

Returns a new promise that, when either this or the other given promise completes normally, is executed with the corresponding result ...

[or-timeout](#)

Exceptionally completes the promise with a `TimeoutException` if not otherwise completed before the given timeout.

[complete-on-timeout](#)

Completes the promise with the given value if not otherwise completed before the given timeout.

[top](#)

as->

```
(as-> expr name & forms)
```

Binds name to expr, evaluates the first form in the lexical context of that binding, then binds name to that result, repeating for each successive form, returning the result of the last form. This allows a value to thread into any argument position.

```
; allows to use arbitrary positioning of the argument
(as-> [ :foo :bar ] v
  (map name v)
  (first v)
  (str/subs v 1))
=> "oo"
```

```
; allows the use of if statements in the thread
(as-> {:a 1 :b 2} m
  (update m :a #(+ % 10))
  (if true
    (update m :b #(+ % 10))
    m))
=> {:a 11 :b 12}
```

SEE ALSO

[->](#)

Threads the x through the forms. Inserts x as the second item in the first form, making a list of it if it is not a list already.

[->>](#)

Threads the x through the forms. Inserts x as the last item in the first form, making a list of it if it is not a list already. If ...

[-<>](#)

Threads the x through the forms. Inserts x at position of the <> symbol of the first form, making a list of it if it is not a list already.

[top](#)

ascii-table/print

```
(ascii-table/print header data footer border padding)
(ascii-table/print columns data border padding)
```

Renders and prints an ascii table.

Actually does:

```
(println (ascii-table/render ...))
```

```
(do
  (load-module :ascii-table)
  (ascii-table/print ["head 1" "head 2"]
    [["1 1" "1 2"] ["2 1" "2 2"]]
    ["foot 1" "foot 2"]
    :standard
    1))
```

```
+-----+-----+
| head 1 | head 2 |
+-----+-----+
| 1 1    | 1 2    |
+-----+-----+
| 2 1    | 2 2    |
+-----+-----+
| foot 1 | foot 2 |
+-----+-----+
=> nil
```

SEE ALSO

[ascii-table/render](#)

Renders an ascii table.

[top](#)

ascii-table/render


```

      :overflow :newline}
    :body  {:align :left
      :overflow :newline}
    :width 8}
  {:header {:text "head 2"
    :align :right
    :overflow :newline}
  :footer  {:text "6"
    :align :right
    :overflow :newline}
  :body    {:align :right
    :overflow :newline}
  :width 8}]
[["1" "2"] ["3" "4"]]
:double
1)))

```

head 1	head 2
1	2
3	4
4	6

=> nil

SEE ALSO

[ascii-table/print](#)

Renders and prints an ascii table.

top

aset

```
(aset array idx val)
```

Sets the value at the index of an array

```
(aset (long-array '(1 2 3 4 5)) 1 20)
=> [1, 20, 3, 4, 5]
```

top

assert

```
(assert expr)
(assert expr message)
```

Evaluates expr and throws an `:AssertionException` exception if it does not evaluate to logical true.

```
(assert (= 3 (+ 1 2)))
=> true
```

```
(assert (= 4 (+ 1 2)))  
=> AssertionError: Assert failed.  
Expression:  
(= 4 (+ 1 2))
```

SEE ALSO

[assert-false](#)

Evaluates expr and throws an :AssertionException exception if it does not evaluate to logical false.

[assert-eq](#)

Assert that expected and actual are equal. Throws an :AssertionException exception if they are not equal.

[assert-ne](#)

Assert that unexpected and actual are not equal. Throws an :AssertionException exception if they are equal.

[assert-throws](#)

Evaluates expr and throws an :AssertionException exception if it does not throw the expected exception of type ex-type.

[assert-does-not-throw](#)

Evaluates expr and throws an :AssertionException exception if it does throw any kind of exception.

[test/deftest](#)

Defines a test function with no arguments.

[top](#)

assert-does-not-throw

```
(assert-does-not-throw expr)  
(assert-does-not-throw expr message)
```

Evaluates expr and throws an :AssertionException exception if it does throw any kind of exception.

```
(assert-does-not-throw (/ 2 1))  
=> true  
  
(assert-does-not-throw (/ 2 0))  
=> AssertionError: Assert failed.  
Unexpected exception: :com.github.jlangch.venice.VncException  
Expression:  
(/ 2 0)
```

SEE ALSO

[assert](#)

Evaluates expr and throws an :AssertionException exception if it does not evaluate to logical true.

[assert-false](#)

Evaluates expr and throws an :AssertionException exception if it does not evaluate to logical false.

[assert-eq](#)

Assert that expected and actual are equal. Throws an :AssertionException exception if they are not equal.

[assert-ne](#)

Assert that unexpected and actual are not equal. Throws an :AssertionException exception if they are equal.

[assert-throws](#)

Evaluates expr and throws an :AssertionException exception if it does not throw the expected exception of type ex-type.

[test/deftest](#)

Defines a test function with no arguments.

assert-eq

```
(assert-eq expected actual)
(assert-eq expected actual message)
```

Assert that expected and actual are equal. Throws an `:AssertionException` exception if they are not equal.

```
(assert-eq 3 (+ 1 2))
=> true

(assert-eq 4 (+ 1 2))
=> AssertionError: Assert failed.
Expected: 4
Actual:   3
Expression:
(+ 1 2)
```

SEE ALSO

[assert](#)

Evaluates `expr` and throws an `:AssertionException` exception if it does not evaluate to logical true.

[assert-false](#)

Evaluates `expr` and throws an `:AssertionException` exception if it does not evaluate to logical false.

[assert-ne](#)

Assert that unexpected and actual are not equal. Throws an `:AssertionException` exception if they are equal.

[assert-throws](#)

Evaluates `expr` and throws an `:AssertionException` exception if it does not throw the expected exception of type `ex-type`.

[assert-does-not-throw](#)

Evaluates `expr` and throws an `:AssertionException` exception if it does throw any kind of exception.

[test/deftest](#)

Defines a test function with no arguments.

assert-false

```
(assert-false expr)
(assert-false expr message)
```

Evaluates `expr` and throws an `:AssertionException` exception if it does not evaluate to logical false.

```
(assert-false (= 3 (+ 1 3)))
=> true

(assert-false (= 4 (+ 1 3)))
=> AssertionError: Assert failed.
Expression:
(= 4 (+ 1 3))
```


SEE ALSO

[assert](#)

Evaluates `expr` and throws an `:AssertionException` exception if it does not evaluate to logical true.

[assert-eq](#)

Assert that expected and actual are equal. Throws an `:AssertionException` exception if they are not equal.

[assert-ne](#)

Assert that unexpected and actual are not equal. Throws an `:AssertionException` exception if they are equal.

[assert-throws](#)

Evaluates `expr` and throws an `:AssertionException` exception if it does not throw the expected exception of type `ex-type`.

[assert-does-not-throw](#)

Evaluates `expr` and throws an `:AssertionException` exception if it does throw any kind of exception.

[test/deftest](#)

Defines a test function with no arguments.

[top](#)

assert-ne

```
(assert-ne unexpected actual)
(assert-ne unexpected actual message)
```

Assert that unexpected and actual are not equal. Throws an `:AssertionException` exception if they are equal.

```
(assert-ne :foo :bar)
=> true

(assert-ne :foo :foo)
=> AssertionError: Assert failed.
Unexpected: :foo
Actual:    :foo
Expression:
:foo
```

SEE ALSO

[assert](#)

Evaluates `expr` and throws an `:AssertionException` exception if it does not evaluate to logical true.

[assert-false](#)

Evaluates `expr` and throws an `:AssertionException` exception if it does not evaluate to logical false.

[assert-eq](#)

Assert that expected and actual are equal. Throws an `:AssertionException` exception if they are not equal.

[assert-throws](#)

Evaluates `expr` and throws an `:AssertionException` exception if it does not throw the expected exception of type `ex-type`.

[assert-does-not-throw](#)

Evaluates `expr` and throws an `:AssertionException` exception if it does throw any kind of exception.

[test/deftest](#)

Defines a test function with no arguments.

[top](#)

assert-throws

```
(assert-throws ex-type expr)
(assert-throws ex-type expr message)
```

Evaluates `expr` and throws an `:AssertionException` exception if it does not throw the expected exception of type `ex-type`.

```
(assert-throws :VncException (/ 2 0))
=> true
```

```
(assert-throws :VncException (/ 2 1))
=> AssertionException: Assert failed.
Expected: :VncException
But no exception has been thrown!
Expression:
(/ 2 1)
```

SEE ALSO

[assert](#)

Evaluates `expr` and throws an `:AssertionException` exception if it does not evaluate to logical true.

[assert-false](#)

Evaluates `expr` and throws an `:AssertionException` exception if it does not evaluate to logical false.

[assert-eq](#)

Assert that expected and actual are equal. Throws an `:AssertionException` exception if they are not equal.

[assert-ne](#)

Assert that unexpected and actual are not equal. Throws an `:AssertionException` exception if they are equal.

[assert-does-not-throw](#)

Evaluates `expr` and throws an `:AssertionException` exception if it does throw any kind of exception.

[test/deftest](#)

Defines a test function with no arguments.

[top](#)

assert-throws-with-msg

```
(assert-throws-with-msg ex-type ex-msg-regex expr)
(assert-throws-with-msg ex-type ex-msg-regex expr message)
```

Evaluates `expr` and throws an `:AssertionException` exception if it does not throw the expected exception of type `ex-type`.

```
(assert-throws-with-msg :VncException #"/ by zero" (/ 2 0))
=> true
```

SEE ALSO

[assert](#)

Evaluates `expr` and throws an `:AssertionException` exception if it does not evaluate to logical true.

[assert-false](#)

Evaluates `expr` and throws an `:AssertionException` exception if it does not evaluate to logical false.

[assert-eq](#)

Assert that expected and actual are equal. Throws an `:AssertionException` exception if they are not equal.

[assert-ne](#)

Assert that unexpected and actual are not equal. Throws an `:AssertionException` exception if they are equal.

[assert-does-not-throw](#)

Evaluates `expr` and throws an `:AssertionException` exception if it does throw any kind of exception.

[test/deftest](#)

Defines a test function with no arguments.

[top](#)

assoc

```
(assoc coll key val)
(assoc coll key val & kvs)
```

When applied to a map, returns a new map of the same type, that contains the mapping of key(s) to val(s). When applied to a vector, returns a new vector that contains val at index. Note - index must be \leq (count vector). When applied to a custom type, returns a new custom type with passed fields changed.

```
(assoc {} :a 1 :b 2)
=> {:a 1 :b 2}
```

```
(assoc nil :a 1 :b 2)
=> {:a 1 :b 2}
```

```
(assoc [1 2 3] 0 10)
=> [10 2 3]
```

```
(assoc [1 2 3] 3 10)
=> [1 2 3 10]
```

```
(assoc [1 2 3] 6 10)
=> [1 2 3 10]
```

```
(do
  (deftype :complex [real :long, imaginary :long])
  (def x (complex. 100 200))
  (def y (assoc x :real 110))
  (pr-str y))
=> "{:custom-type* :user/complex :real 110 :imaginary 200}"
```

SEE ALSO

[dissoc](#)

Returns a new coll of the same type, that does not contain a mapping for key(s)

[update](#)

Updates a value in an associative structure, where `k` is a key and `f` is a function that will take the old value and any supplied fargs ...

[top](#)

assoc!

```
(assoc! coll key val)
(assoc! coll key val & kvs)
```

Associates key/vals with a mutable map, returns the map

```
(assoc! nil :a 1 :b 2)
=> {:a 1 :b 2}

(assoc! (mutable-map) :a 1 :b 2)
=> {:a 1 :b 2}

(assoc! (mutable-vector 1 2 3) 0 10)
=> [10 2 3]

(assoc! (mutable-vector 1 2 3) 3 10)
=> [1 2 3 10]

(assoc! (mutable-vector 1 2 3) 6 10)
=> [1 2 3 10]
```

SEE ALSO

[dissoc!](#)

Dissociates keys from a mutable map, returns the map

[update!](#)

Updates a value in a mutable associative structure, where k is a key and f is a function that will take the old value and any supplied ...

[top](#)

assoc-in

```
(assoc-in m ks v)
```

Associates a value in a nested associative structure, where ks is a sequence of keys and v is the new value and returns a new nested structure. If any levels do not exist, hash-maps or vectors will be created.

```
(do
  (def users [ {:name "James" :age 26}
                {:name "John" :age 43}])
  (assoc-in users [1 :age] 44))
=> [{:name "James" :age 26} {:name "John" :age 44}]

(do
  (def users [ {:name "James" :age 26}
                {:name "John" :age 43}])
  (assoc-in users [2] {:name "Jack" :age 19}))
=> [{:name "James" :age 26} {:name "John" :age 43} {:name "Jack" :age 19}]

(assoc-in [[1 2] [3 4]] [0 0] 9)
=> [[9 2] [3 4]]
```

[top](#)

asub

```
(asub array start len)
```

Returns a sub array

```
(asub (long-array '(1 2 3 4 5)) 2 3)
=> [3, 4, 5]
```

[top](#)

atom

```
(atom x)
(atom x & options)
```

Creates an atom with the initial value x.

Options:

- :meta metadata-map
- :validator validate-fn

If metadata-map is supplied, it will become the metadata on the atom. validate-fn must be nil or a side-effect-free fn of one argument, which will be passed the intended new state on any state change. If the new state is unacceptable, the validate-fn should return false or throw an exception.

```
(do
  (def counter (atom 0))
  (swap! counter inc)
  (deref counter))
=> 1
```

```
(do
  (def counter (atom 0))
  (reset! counter 9)
  @counter)
=> 9
```

SEE ALSO

[deref](#)

Dereferences an atom, a future or a promise object. When applied to an atom, returns its current state. When applied to a future, will ...

[reset!](#)

Sets the value of an atom or a volatile to newval without regard for the current value. Returns newval.

[swap!](#)

Atomically swaps the value of an atom or a volatile to be: (apply f current-value-of-box args). Note that f may be called multiple ...

[compare-and-set!](#)

Atomically sets the value of atom to newval if and only if the current value of the atom is identical to oldval. Returns true if set ...

[add-watch](#)

Adds a watch function to an agent/atom reference. The watch fn must be a fn of 4 args: a key, the reference, its old-state, its new-state.

[remove-watch](#)

Removes a watch function from an agent/atom reference.

[top](#)

atom?

```
(atom? x)
```

Returns true if x is an atom, otherwise false

```
(do
  (def counter (atom 0))
  (atom? counter))
=> true
```

[top](#)

await

(await agents)

Blocks the current thread (indefinitely) until all actions dispatched thus far (from this thread or agent) to the agents have occurred.

```
(do
  (def x1 (agent 100))
  (def x2 (agent {}))
  (send-off x1 + 5)
  (send-off x2 (fn [state]
                 (sleep 100)
                 (assoc state :done true))))
;; blocks till the agent actions are finished
(await x1 x2))
=> true
```

SEE ALSO

[agent](#)

Creates and returns an agent with an initial value of state and zero or more options.

[await-for](#)

Blocks the current thread until all actions dispatched thus far (from this thread or agent) to the agents have occurred, or the timeout ...

[top](#)

await-for

(await-for timeout-ms agents)

Blocks the current thread until all actions dispatched thus far (from this thread or agent) to the agents have occurred, or the timeout (in milliseconds) has elapsed. Returns logical false if returning due to timeout, logical true otherwise.

```
(do
  (def x1 (agent 100))
  (def x2 (agent {}))
  (send-off x1 + 5)
  (send-off x2 (fn [state]
                 (sleep 100)
                 (assoc state :done true))))
;; blocks till the agent actions are finished
(await-for 500 x1 x2))
=> true
```

SEE ALSO

[agent](#)

Creates and returns an agent with an initial value of state and zero or more options.

[await](#)

Blocks the current thread (indefinitely) until all actions dispatched thus far (from this thread or agent) to the agents have occurred.

[top](#)

await-termination-agents

(shutdown-agents)

Blocks until all actions have completed execution after a shutdown request, or the timeout occurs, or the current thread is interrupted, whichever happens first.

```
(do
  (def x1 (agent 100))
  (def x2 (agent 100))
  (shutdown-agents)
  (await-termination-agents 1000))
```

SEE ALSO

[agent](#)

Creates and returns an agent with an initial value of state and zero or more options.

[top](#)

await-termination-agents?

(await-termination-agents?)

Returns true if all tasks have been completed following agent shut down

```
(do
  (def x1 (agent 100))
  (def x2 (agent 100))
  (shutdown-agents)
  (await-termination-agents 1000)
  (sleep 300)
  (await-termination-agents?))
```

SEE ALSO

[agent](#)

Creates and returns an agent with an initial value of state and zero or more options.

[top](#)

bases

(bases class)

Returns the immediate superclass and interfaces of class, if any.

```
(bases :java.util.ArrayList)
=> (:java.util.AbstractList :java.util.List :java.util.RandomAccess :java.lang.Cloneable :java.io.Serializable)
```

[top](#)

benchmark/benchmark

```
(benchmark expr warmup-iterations iterations & options)
```

Benchmarks the given expression.

Note: All macros in the expression are expanded before running the benchmark phases.

Runs the benchmark in 4 phases:

1. Run the expression in a warm-up phase to allow the JIT compiler to do optimizations
2. Run the garbage collector to isolate timings from GC state prior to testing
3. Runs the expression benchmark
4. Analyzes and prints the benchmark statistics

Options:

:chart b	If true generates a chart and saves it to 'benchmark.png'. Defaults to false.
:steps n	the number of steps for the quantization, defaults to 100
:median b	show the median value in the chart {true/false}, defaults to false
:outlier b	show the outlier range in the chart {true/false}, defaults to false
:gc n	the number of GC runs

```
(do
  (load-module :benchmark ['benchmark :as 'b])

  (b/benchmark (+ 1 2) 120000 10000)

  (b/benchmark (+ 1 2) 120000 10000 :chart true :median true)

  (b/benchmark (+ 1 2) 120000 10000 :chart true :outlier true)

  (b/benchmark (+ 1 2) 120000 10000 :chart true :steps 100))
```

[top](#)

bigint

```
(bigint x)
```

Converts to big integer.

```
(bigint 2000)
=> 2000N

(bigint 34897.65)
=> 34897N
```



```
(bigint "5676000000000")
=> 5676000000000N

(bigint nil)
=> 0N
```

[top](#)

binding

```
(binding [bindings*] exprs*)
```

Evaluates the expressions and binds the values to dynamic (thread-local) symbols

```
(do
  (binding [x 100]
    (println x)
    (binding [x 200]
      (println x))
    (println x)))
100
200
100
=> nil

;; binding-introduced bindings are thread-locally mutable:
(binding [x 1]
  (set! x 2)
  x)
=> 2

;; binding can use qualified names :
(binding [user/x 1]
  user/x)
=> 1
```

SEE ALSO

[def-dynamic](#)

Creates a dynamic variable that starts off as a global variable and can be bound with 'binding' to a new value on the local thread.

[let](#)

Evaluates the expressions and binds the values to symbols in the new local context.

[top](#)

boolean

```
(boolean x)
```

Converts to boolean. Everything except 'false' and 'nil' is true in boolean context.

```
(boolean false)
=> false
```

```
(boolean true)
=> true

(boolean nil)
=> false

(boolean 100)
=> true
```

[top](#)

boolean?

```
(boolean? n)
```

Returns true if n is a boolean

```
(boolean? true)
=> true

(boolean? false)
=> true

(boolean? nil)
=> false

(boolean? 0)
=> false
```

[top](#)

bound?

```
(bound? s)
```

Returns true if the symbol is bound to a value else false

```
(bound? 'test)
=> false

(let [test 100]
  (bound? 'test))
=> true

(do
  (def a 100)
  (bound? 'a))
=> true
```

SEE ALSO

[let](#)

Evaluates the expressions and binds the values to symbols in the new local context.

[def](#)

Creates a global variable.

[defonce](#)

Creates a global variable that can not be overwritten

[top](#)

butlast

```
(butlast coll)
```

Returns a collection with all but the last list element

```
(butlast nil)  
=> nil
```

```
(butlast [])  
=> []
```

```
(butlast [1])  
=> []
```

```
(butlast [1 2 3])  
=> [1 2]
```

```
(butlast '())  
=> ()
```

```
(butlast '(1))  
=> ()
```

```
(butlast '(1 2 3))  
=> (1 2)
```

```
(butlast "1234")  
=> (#\1 #\2 #\3)
```

SEE ALSO

[str/butlast](#)

Returns a possibly empty string of the characters without the last.

[top](#)

byte-order

```
(byte-order)
```

Returns the CPU's byte order.

```
(byte-order)  
=> :big-endian
```

[top](#)

bytebuf

```
(bytebuf x)
```

Converts x to bytebuf. x can be a bytebuf, a list/vector of longs, a string

```
(bytebuf [0 1 2])  
=> [0 1 2]
```

```
(bytebuf '(0 1 2))  
=> [0 1 2]
```

```
(bytebuf "abc")  
=> [97 98 99]
```

SEE ALSO

[io/bytebuf-out-stream](#)

Returns a new java.io.ByteArrayOutputStream.

[top](#)

bytebuf-allocate

```
(bytebuf-allocate length)  
(bytebuf-allocate length init-val)
```

Allocates a new bytebuf. The values will be all zero or preset with init-val if init-val is supplied.

```
(bytebuf-allocate 20)  
=> [0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0]
```

```
(bytebuf-allocate 20 0x55)  
=> [20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20 20]
```

[top](#)

bytebuf-allocate-random

```
(bytebuf-allocate-random length)
```

Allocates a new bytebuf. The values will be all preset with randombytes

```
(bytebuf-allocate-random 20)  
=> [93 11 12 198 202 68 246 217 126 252 88 9 169 5 154 241 212 95 112 111]
```

[top](#)

bytebuf-byte-order

```
(bytebuf-byte-order buf endian)
```

Returns the bytebuf's byte order.

```
(bytebuf-byte-order (bytebuf-allocate 10))  
=> :big-endian
```

SEE ALSO

[bytebuf-byte-order!](#)
Sets the bytebuf's byte order.

[top](#)

bytebuf-byte-order!

```
(bytebuf-byte-order! buf endian)
```

Sets the bytebuf's byte order.

```
(-> (bytebuf-allocate 10)  
    (bytebuf-byte-order! :big-endian)  
    (bytebuf-byte-order))  
=> :big-endian  
  
(-> (bytebuf-allocate 10)  
     (bytebuf-byte-order! :little-endian)  
     (bytebuf-byte-order))  
=> :little-endian
```

SEE ALSO

[bytebuf-byte-order](#)
Returns the bytebuf's byte order.

[top](#)

bytebuf-capacity

```
(bytebuf-capacity buf)
```

Returns the capacity of a bytebuf.

```
(bytebuf-capacity (bytebuf-allocate 100))  
=> 100
```

[top](#)

bytebuf-from-string

```
(bytebuf-from-string s)  
(bytebuf-from-string s encoding)
```

```
(bytebuf-from-string s encoding buf-length fillbyte)
```

Converts a string to a bytebuf using an optional encoding. The encoding defaults to :UTF-8

```
(bytebuf-from-string "abcdef")  
=> [97 98 99 100 101 102]  
  
(bytebuf-from-string "abcdef" :UTF-8)  
=> [97 98 99 100 101 102]  
  
(bytebuf-from-string "abcdef" :UTF-8 16 0x00)  
=> [97 98 99 100 101 102 0 0 0 0 0 0 0 0 0 0]
```

SEE ALSO

[bytebuf-to-string](#)

Converts a bytebuf to a string using an optional encoding. The encoding defaults to :UTF-8

[top](#)

bytebuf-get-byte

```
(bytebuf-get-byte buf)  
(bytebuf-get-byte buf pos)
```

Reads a byte from the buffer. Without a pos reads from the current position and increments the position by one. With a position reads the byte from that position.

```
(-> (bytebuf-allocate 4)  
    (bytebuf-put-byte! 1)  
    (bytebuf-put-byte! 2)  
    (bytebuf-get-byte 0))  
=> 11
```

[top](#)

bytebuf-get-double

```
(bytebuf-get-double buf)  
(bytebuf-get-double buf pos)
```

Reads a double from the buffer. Without a pos reads from the current position and increments the position by eight. With a position reads the double from that position.

```
(-> (bytebuf-allocate 16)  
    (bytebuf-put-double! 20.0)  
    (bytebuf-put-double! 40.0)  
    (bytebuf-get-double 0))  
=> 20.0
```

[top](#)

bytebuf-get-float

```
(bytebuf-get-float buf)
(bytebuf-get-float buf pos)
```

Reads a float from the buffer. Without a pos reads from the current position and increments the position by four. With a position reads the float from that position.

```
(-> (bytebuf-allocate 16)
    (bytebuf-put-float! 20.0)
    (bytebuf-put-float! 40.0)
    (bytebuf-get-float 0))
=> 20.0
```

[top](#)

bytebuf-get-int

```
(bytebuf-get-int buf)
(bytebuf-get-int buf pos)
```

Reads an integer from the buffer. Without a pos reads from the current position and increments the position by four. With a position reads the integer from that position.

```
(-> (bytebuf-allocate 8)
    (bytebuf-put-int! 1I)
    (bytebuf-put-int! 2I)
    (bytebuf-get-int 0))
=> 1I
```

[top](#)

bytebuf-get-long

```
(bytebuf-get-long buf)
(bytebuf-get-long buf pos)
```

Reads a long from the buffer. Without a pos reads from the current position and increments the position by eight. With a position reads the long from that position.

```
(-> (bytebuf-allocate 16)
    (bytebuf-put-long! 20)
    (bytebuf-put-long! 40)
    (bytebuf-get-long 0))
=> 20
```

[top](#)

bytebuf-limit

```
(bytebuf-limit buf)
```

Returns the limit of a bytebuf.

```
(bytebuf-limit (bytebuf-allocate 100))  
=> 100
```

[top](#)

bytebuf-pos

```
(bytebuf-pos buf)
```

Returns the buffer's current position.

```
(bytebuf-pos (bytebuf-allocate 10))  
=> 0
```

[top](#)

bytebuf-pos!

```
(bytebuf-pos! buf pos)
```

Sets the buffer's position.

```
(-> (bytebuf-allocate 10)  
    (bytebuf-pos! 4)  
    (bytebuf-put-byte! 1)  
    (bytebuf-pos! 8)  
    (bytebuf-put-byte! 2))  
=> [0 0 0 0 1 0 0 0 2 0]
```

[top](#)

bytebuf-put-buf!

```
(bytebuf-put-buf! dst src src-offset length)
```

This method transfers bytes from the src to the dst buffer at the current position, and then increments the position by length.

```
(-> (bytebuf-allocate 10)  
    (bytebuf-pos! 4)  
    (bytebuf-put-buf! (bytebuf [1 2 3]) 0 2))  
=> [0 0 0 0 1 2 0 0 0 0]
```

[top](#)

bytebuf-put-byte!

```
(bytebuf-put-byte! buf b)
```

Writes a byte to the buffer at the current position, and then increments the position by one.


```
(-> (bytebuf-allocate 4)
    (bytebuf-put-byte! 1)
    (bytebuf-put-byte! 2I))
=> [1 2 0 0]
```

[top](#)

bytebuf-put-double!

```
(bytebuf-put-double! buf d)
```

Writes a double (8 bytes) to buffer at the current position, and then increments the position by eight.

```
(-> (bytebuf-allocate 16)
    (bytebuf-put-double! 64.0)
    (bytebuf-put-double! 200.0))
=> [64 80 0 0 0 0 0 0 64 105 0 0 0 0 0 0]
```

[top](#)

bytebuf-put-float!

```
(bytebuf-put-float! buf d)
```

Writes a float (4 bytes) to buffer at the current position, and then increments the position by four.

```
(-> (bytebuf-allocate 8)
    (bytebuf-put-float! 64.0)
    (bytebuf-put-float! 200.0))
=> [66 128 0 0 67 72 0 0]
```

[top](#)

bytebuf-put-int!

```
(bytebuf-put-int! buf i)
```

Writes an integer (4 bytes) to buffer at the current position, and then increments the position by four.

```
(-> (bytebuf-allocate 8)
    (bytebuf-put-int! 4I)
    (bytebuf-put-int! 8I))
=> [0 0 0 4 0 0 0 8]
```

[top](#)

bytebuf-put-long!

```
(bytebuf-put-long! buf l)
```

Writes a long (8 bytes) to buffer at the current position, and then increments the position by eight.

```
(-> (bytebuf-allocate 16)
     (bytebuf-put-long! 4)
     (bytebuf-put-long! 8))
=> [0 0 0 0 0 0 0 4 0 0 0 0 0 0 0 8]
```

[top](#)

bytebuf-sub

(bytebuf-sub x start) (bytebuf-sub x start end)

Returns a byte buffer of the items in buffer from start (inclusive) to end (exclusive). If end is not supplied, defaults to (count bytebuffer)

```
(bytebuf-sub (bytebuf [1 2 3 4 5 6]) 2)
=> [3 4 5 6]
```

```
(bytebuf-sub (bytebuf [1 2 3 4 5 6]) 4)
=> [5 6]
```

[top](#)

bytebuf-to-list

(bytebuf-to-list buf)

Returns the bytebuf as lazy list of integers

```
(doall (bytebuf-to-list (bytebuf [97 98 99])))
=> (97I 98I 99I)
```

[top](#)

bytebuf-to-string

(bytebuf-to-string buf encoding)

Converts a bytebuf to a string using an optional encoding. The encoding defaults to :UTF-8

```
(bytebuf-to-string (bytebuf [97 98 99]) :UTF-8)
=> "abc"
```

SEE ALSO

[bytebuf-from-string](#)

Converts a string to a bytebuf using an optional encoding. The encoding defaults to :UTF-8

[top](#)

bytebuf?

(bytebuf? x)

Returns true if x is a bytebuf

```
(bytebuf? (bytebuf [1 2]))  
=> true
```

```
(bytebuf? [1 2])  
=> false
```

```
(bytebuf? nil)  
=> false
```

[top](#)

callstack

(callstack)

Returns the current callstack.

```
(do  
  (defn f1 [x] (f2 x))  
  (defn f2 [x] (f3 x))  
  (defn f3 [x] (f4 x))  
  (defn f4 [x] (callstack))  
  (f1 100))  
=> [{:fn-name "callstack" :file "example" :line 39 :col 18} {:fn-name "user/f4" :file "example" :line 38 :col 18}  
{:fn-name "user/f3" :file "example" :line 37 :col 18} {:fn-name "user/f2" :file "example" :line 36 :col 18}  
{:fn-name "user/f1" :file "example" :line 40 :col 5}]
```

[top](#)

cancel

(cancel f)

Cancels a future or a promise

```
(do  
  (def wait (fn [] (sleep 400) 100))  
  (let [f (future wait)]  
    (sleep 50)  
    (printf "After 50ms: cancelled=%b\n" (cancelled? f))  
    (cancel f)  
    (sleep 100)  
    (printf "After 150ms: cancelled=%b\n" (cancelled? f))))  
After 50ms: cancelled=false  
After 150ms: cancelled=true  
=> nil
```

SEE ALSO

[future](#)

Takes a function without arguments and yields a future object that will invoke the function in another thread, and will cache the result ...

[promise](#)

Returns a promise object that can be read with `deref`, and `set`, once only, with `deliver`. Calls to `deref` prior to delivery will block, ...

[done?](#)

Returns true if the future or promise is done otherwise false

[cancelled?](#)

Returns true if the future or promise is cancelled otherwise false

[top](#)

cancelled?

```
(cancelled? f)
```

Returns true if the future or promise is cancelled otherwise false

```
(cancelled? (future (fn [] 100)))  
=> false
```

SEE ALSO

[future](#)

Takes a function without arguments and yields a future object that will invoke the function in another thread, and will cache the result ...

[promise](#)

Returns a promise object that can be read with `deref`, and `set`, once only, with `deliver`. Calls to `deref` prior to delivery will block, ...

[done?](#)

Returns true if the future or promise is done otherwise false

[cancel](#)

Cancels a future or a promise

[top](#)

cargo-arangodb/db-dump

```
(cargo-arangodb/db-dump cname db-name db-user db-passwd dump-name log)
```

Dumps an ArangoDB database.

The DB dump is written to container's directory `"/var/lib/arangodb3/{dump-name}"`. If the directory does not exist it is created automatically.

Example:

```
(do  
  (load-module :cargo-arangodb ['cargo-arangodb :as 'ca])  
  
  ;; (cargo-arangodb/exists-db-dump? "db-test" "dump-001")  
  ;; (cargo-arangodb/remove-db-dump "db-test" "dump-001")  
  
  ;; Dump the 'people' database to 'dump-001'  
  (ca/db-dump "db-test" "people" "root" "xxx" "dump-001" nil))
```

Args:

cname	The container name
db-name	The name of the DB to dump
db-user	The DB user
db-passwd	The DB password
dump-name	The dump name. e.g "dump-001"
log	A log function, may be <i>nil</i> . E.g: <code>(fn [s] (println "ArangoDB:" s))</code>

Dumps an ArangoDB database using this commands on the container:

```
mkdir /var/lib/arangodb3/dump-001

arangodump
--output-directory /var/lib/arangodb3/dump-001
--overwrite true
--include-system-collections true
--server.database "people"
--server.endpoint tcp://127.0.0.1:8529
--server.username "root"
--server.password "xxx"
```

Open an interactive docker shell to check the dump:

```
docker exec -it {container-id} sh
```

ZIP a dump

```
docker exec -it {container-id}
zip -r
    /var/lib/arangodb3/dump-001.zip
    /var/lib/arangodb3/dump-001
```

```
(do
  (load-module :cargo-arangodb ['cargo-arangodb :as 'ca])

  (ca/db-dump "db-test" "people" "root" "xxx" "dump-001" nil))
```

SEE ALSO

[cargo-arangodb/db-restore](#)

Restores an ArangoDB database from a dump

[cargo-arangodb/exists-db-dump?](#)

Returns true if the dump with the given name exists otherwise false.

[cargo-arangodb/remove-db-dump](#)

Removes an existing DB dump.

[cargo-arangodb/download-db-dump](#)

Downloads an existing the DB dump 'dump-name' from the container to the local filesystem. The export directory in the local filesystem ...

[cargo-arangodb/upload-db-dump](#)

Uploads an existing DB dump with the name 'dump-name' from the local filesystem to the container. The import directory on local filesystem ...

[top](#)

cargo-arangodb/db-restore

```
(cargo-arangodb/db-restore cname db-name db-user db-passwd dump-name log)
```

Restores an ArangoDB database from a dump

The DB dump is read from container's directory `"/var/lib/arangodb3/{dump-name}"`.

Example:

```
(do
  (load-module :cargo-arangodb ['cargo-arangodb :as 'ca])

  ;; (cargo-arangodb/exists-db-dump? "db-test" "dump-001")
  ;; (cargo-arangodb/remove-db-dump "db-test" "dump-001")

  ;; Restore the 'people' database from 'dump-001'
  (ca/db-restore "db-test" "people" "root" "xxx" "dump-001" nil))
```

Args:

cname	The container name
db-name	The name of the DB to dump
db-user	The DB user
db-passwd	The DB password
dump-name	The dump name. e.g "dump-001"
log	A log function, may be <i>nil</i> . E.g: <code>(fn [s] (println "ArangoDB:" s))</code>

Restores an ArangoDB database using this command on the container:

```
arangorestore
--input-directory /var/lib/arangodb3/dump-001
--force-same-database
--create-database true
--include-system-collections true
--server.database "people"
--server.endpoint tcp://127.0.0.1:8529
--server.username "root"
--server.password "xxx"
```

Open an interactive docker shell to check the dump:

```
docker exec -it {container-id} sh
```

```
(do
  (load-module :cargo-arangodb ['cargo-arangodb :as 'ca])
  (ca/db-restore "db-test" "people" "root" "xxx" "dump-001" nil))
```

SEE ALSO

[cargo-arangodb/db-dump](#)

Dumps an ArangoDB database.

[cargo-arangodb/exists-db-dump?](#)

Returns true if the dump with the given name exists otherwise false.

[cargo-arangodb/remove-db-dump](#)

Removes an existing DB dump.

[cargo-arangodb/download-db-dump](#)

Downloads an existing the DB dump 'dump-name' from the container to the local filesystem. The export directory in the local filesystem ...

[cargo-arangodb/upload-db-dump](#)

Uploads an existing DB dump with the name 'dump-name' from the local filesystem to the container. The import directory on local filesystem ...

[top](#)

cargo-arangodb/download-db-dump

```
(cargo-arangodb/download-db-dump cname dump-name export-dir log)
```

Downloads an existing the DB dump 'dump-name' from the container to the local filesystem. The export directory in the local filesystem must be an existing directory.

Args:

cname	The container name
dump-name	The dump name
export-dir	The export dir. E.g.: <code>(io/file (io/user-home-dir) "dump")</code>
log	A log function, may be <i>nil</i> . E.g.: <code>(fn [s] (println "ArangoDB:" s))</code>

```
(do
  (load-module :cargo-arangodb ['cargo-arangodb :as 'ca])

  ;; create a DB dump
  (ca/db-dump "db-test" "people" "root" "xxx" "dump-001" nil)

  ;; downloads the DB dump to the local filesystem
  (let [dir (io/user-home-dir)]
    (ca/download-db-dump "db-test" "dump-001" dir nil)))
```

SEE ALSO

[cargo-arangodb/upload-db-dump](#)

Uploads an existing DB dump with the name 'dump-name' from the local filesystem to the container. The import directory on local filesystem ...

[cargo-arangodb/db-dump](#)

Dumps an ArangoDB database.

[cargo-arangodb/db-restore](#)

Restores an ArangoDB database from a dump

[cargo-arangodb/exists-db-dump?](#)

Returns true if the dump with the given name exists otherwise false.

top

cargo-arangodb/exists-db-dump?

```
(cargo-arangodb/exists-db-dump? cname dump-name)
```

Returns true if the dump with the given name exists otherwise false.

Args:

cname	The container name
dump-name	The dump name

```
(do
  (load-module :cargo-arangodb ['cargo-arangodb :as 'ca])
  (ca/exists-db-dump? "db-test" "dump-001"))
```

SEE ALSO

[cargo-arangodb/db-dump](#)

Dumps an ArangoDB database.

[cargo-arangodb/db-restore](#)

Restores an ArangoDB database from a dump

[cargo-arangodb/remove-db-dump](#)

Removes an existing DB dump.

top

cargo-arangodb/list-db-dumps

```
(cargo-arangodb/list-db-dumps cname)
```

List the created DB dumps.

Args:

cname The container name

```
(do
  (load-module :cargo-arangodb ['cargo-arangodb :as 'ca])
  (ca/list-db-dumps "db-test"))
```

SEE ALSO

[cargo-arangodb/db-dump](#)

Dumps an ArangoDB database.

[cargo-arangodb/db-restore](#)

Restores an ArangoDB database from a dump

[cargo-arangodb/exists-db-dump?](#)

Returns true if the dump with the given name exists otherwise false.

[top](#)

cargo-arangodb/remove-db-dump

```
(cargo-arangodb/remove-db-dump cname dump-name)
```

Removes an existing DB dump.

Args:

cname The container name

dump-name The dump name

```
(do
  (load-module :cargo-arangodb ['cargo-arangodb :as 'ca])
  (ca/remove-db-dump "db-test" "dump-001"))
```

SEE ALSO

[cargo-arangodb/db-dump](#)

Dumps an ArangoDB database.

[cargo-arangodb/db-restore](#)

Restores an ArangoDB database from a dump

[cargo-arangodb/exists-db-dump?](#)

Returns true if the dump with the given name exists otherwise false.

[top](#)

cargo-arangodb/running?


```
(cargo-arangodb/running? cname)
```

Returns true if a container with the specified name is running.

Args:

cname A unique container name

```
;; Test if ArangoDB container is running
(do
  (load-module :cargo-arangodb)
  (cargo-arangodb/running? "db-test"))
```

SEE ALSO

[cargo-arangodb/start](#)

Starts an ArangoDB container.

[cargo-arangodb/stop](#)

Stops an ArangoDB container

[top](#)

cargo-arangodb/start

```
(cargo-arangodb/start cname version mapped-port root-passwd memory cores log)
```

Starts an ArangoDB container.

Start rules:

- If a container with another version exists for the container name remove the container and the image
- Pull the image if not yet locally available
- If the container already runs - use it
- If the container is available but does not run - start it `(docker/start ...)`
- If the container is not available - run it `(docker/run ...)`
- Finally check for a successful startup. The container log must contain the string *".is ready for business. Have fun."* on the last line.

Args:

cname	A unique container name
version	The ArangoDB version to use. E.g.: 3.11.4
mapped-port	The published (mapped) ArangoDB port on the host
root-passwd	The ArangoDB root password
memory	The detected memory ArangoDB is to use. E.g.: 8GB, 8000MB
cores	The detected number of cores ArangoDB is to use
log	A log function, may be <i>nil</i> . E.g: <code>(fn [s] (println "ArangoDB:" s))</code>

```
(do
  (load-module :cargo-arangodb ['cargo-arangodb :as 'ca])

  ;; Run an ArangoDB container labeled as "db-test"
  (ca/start "db-test" "3.11.4" 8500 "test" "8GB" 1 nil))
```

SEE ALSO

[cargo-arangodb/stop](#)

Stops an ArangoDB container

[cargo-arangodb/running?](#)

Returns true if a container with the specified name is running.

[top](#)

cargo-arangodb/stop

```
(cargo-arangodb/stop cname log)
```

Stops an ArangoDB container

Args:

cname A unique container name

log A log function, may be *nil*. E.g: `(fn [s] (println "ArangoDB:" s))`

```
(do
  (load-module :cargo-arangodb ['cargo-arangodb :as 'ca])

  ;; Stop the ArangoDB container labeled as "db-test"
  (ca/stop "db-test" nil))
```

SEE ALSO

[cargo-arangodb/start](#)

Starts an ArangoDB container.

[cargo-arangodb/running?](#)

Returns true if a container with the specified name is running.

[top](#)

cargo-arangodb/upload-db-dump

```
(cargo-arangodb/upload-db-dump cname dump-name import-dir log)
```

Uploads an existing DB dump with the name 'dump-name' from the local filesystem to the container. The import directory on local filesystem must be an existing non empty directory.

Args:

cname The container name

dump-name The dump name

import-dir The import dir. E.g.: `(io/file (io/user-home-dir) "dump")`

log A log function, may be *nil*. E.g: `(fn [s] (println "ArangoDB:" s))`

```
(do
  (load-module :cargo-arangodb ['cargo-arangodb :as 'ca])

  ;; upload the dump to the container's filesystem
  (let [dir (io/file (io/user-home-dir) "dump-001")]
    (ca/upload-db-dump "db-test" "dump-001" dir nil))

  ;; restore the DB dump
  (ca/db-restore "db-test" "people" "root" "xxx" "dump-001" nil))
```

SEE ALSO

[cargo-arangodb/download-db-dump](#)

Downloads an existing the DB dump 'dump-name' from the container to the local filesystem. The export directory in the local filesystem ...

[cargo-arangodb/db-dump](#)

Dumps an ArangoDB database.

[cargo-arangodb/db-restore](#)

Restores an ArangoDB database from a dump

[cargo-arangodb/exists-db-dump?](#)

Returns true if the dump with the given name exists otherwise false.

[top](#)

cargo/purge

(cargo/purge cname)

Removes a container and its image. The container must not be running.

Args:

cname A unique container name

```
;; Purge an ArangoDB container
(cargo/purge "arangodb-test")
```

SEE ALSO

[cargo/start](#)

Starts a container.

[cargo/stop](#)

Stops a container

[cargo/running?](#)

Returns true if a container with the specified name is running.

[top](#)

cargo/running?

(cargo/running? cname)

Returns true if a container with the specified name is running.

Args:

cname A unique container name

```
;; Test if ArangoDB container is running
(cargo/running? "arangodb-test")
```

SEE ALSO

[cargo/start](#)

Starts a container.

[cargo/stop](#)

Stops a container

[cargo/purge](#)

Removes a container and its image. The container must not be running.

[top](#)

[cargo/start](#)

```
(cargo/start cname repo version publish envs args ready? log)
```

```
(cargo/start cname repo version publish envs args ready? log wait-after-start-secs ready-check-max-secs)
```

Starts a container.

Start rules:

- If a container with the passed name exists or is running in another version, stop that container and remove it together with the image
- Pull the image if it is not yet locally available
- If the container runs with the requested version already - use it
- If the container is available but does not run - start it using `(docker/start ...)`
- If the container is not available - run it using `(docker/run ...)`
- Finally check for a successful startup using the supplied `ready?` function. E.g.: `ready?` may scan the container logs for a successful startup message.

Args:

<code>cname</code>	A unique container name
<code>repo</code>	The image repository
<code>version</code>	The image version
<code>publish</code>	The port publish
<code>envs</code>	A vector of env variables
<code>vols</code>	A vector of volume mounts
<code>args</code>	A vector of arguments for the process run in the container
<code>ready?</code>	A function to decide if the container is ready (may be <i>nil</i>). The function takes the unique container name as its single argument. It returns true if the container is ready else false
<code>log</code>	A log function (may be <i>nil</i>). The function takes a single string argument
<code>wait-after-start-secs</code>	Wait n seconds after starting the container (may be <i>nil</i>)
<code>ready-check-max-secs</code>	Try max n seconds for ready check (defaults to 30s if <i>nil</i>)

```
;; Run an ArangoDB container
```

```
(cargo/start "arangodb-test"
  "arangodb/arangodb"
  "3.11.4"
  "8500:8529"
  ["ARANGO_ROOT_PASSWORD=test"
   "ARANGODB_OVERRIDE_DETECTED_TOTAL_MEMORY=8GB"
   "ARANGODB_OVERRIDE_DETECTED_NUMBER_OF_CORES=1"]
  []
  ["--server.endpoint tcp://0.0.0.0:8529"]
  (fn [cname]
    (-> (docker/container-logs cname :tail 1)
      (str/trim)
      (match? #".*is ready for business. Have fun.*"))))
  (fn [s] (println "ArangoDB:" s))
  3
  30)
```

SEE ALSO

[cargo/stop](#)

Stops a container

[cargo/running?](#)

Returns true if a container with the specified name is running.

[cargo/purge](#)

Removes a container and its image. The container must not be running.

[top](#)

cargo/stop

```
(cargo/stop cname log)
```

Stops a container

Args:

cname A unique container name

log A log function (may be *nil*). The function takes a single string argument

```
;; Stop an ArangoDB container
(cargo/stop "arangodb-test"
  (fn [s] (println "ArangoDB:" s)))
```

SEE ALSO

[cargo/start](#)

Starts a container.

[cargo/running?](#)

Returns true if a container with the specified name is running.

[cargo/purge](#)

Removes a container and its image. The container must not be running.

[top](#)

cartesian-product

```
(cartesian-product coll1 coll2 coll*)
```

Returns the cartesian product of two or more collections.

Removes all duplicates items in the collections before computing the cartesian product.

```
(cartesian-product [1 2 3] [1 2 3])
=> ((1 1) (1 2) (1 3) (2 1) (2 2) (2 3) (3 1) (3 2) (3 3))
```

```
(cartesian-product [0 1] [0 1] [0 1])
=> ((0 0 0) (0 0 1) (0 1 0) (0 1 1) (1 0 0) (1 0 1) (1 1 0) (1 1 1))
```

SEE ALSO

[combinations](#)

All the unique ways of taking n different elements from the items in the collection

top

case

(case expr & clauses)

Takes an expression and a set of clauses. Each clause takes the form of test-constant result-expr

```
(case (+ 1 9)
  10 :ten
  20 :twenty
  30 :thirty
  :dont-know)
=> :ten
```

SEE ALSO

[cond](#)

Takes a set of test/expr pairs. It evaluates each test one at a time. If a test returns logical true, cond evaluates and returns the ...

[condp](#)

Takes a binary predicate, an expression, and a set of clauses.

top

cast

(cast class object)

Casts a Java object to a specific type

Note: Casting a Java object will change the object's *formal type*. See the `formal-type` function for detailed information.

```
(do
  (import :java.awt.Point)
  (import :java.awt.geom.Point2D)

  ;; upcasting :java.awt.Point to :java.awt.geom.Point2D
  ;; Point2D does not define the translate method!
  (let [p1 (. :Point :new 1.0 1.0)
        p2 (cast :Point2D p1)]
    (println "p1 ->" p1)
    (println "p2 ->" p2)
    (println "Formal type p1 ->" (formal-type p1))
    (println "Formal type p2 ->" (formal-type p2))
    (println "p1' ->" (doto p1 (. :translate 2.0 2.0)))
    ;; the translate method is not defined by Point2D
    ;; and will fail with a JavaMethodInvocationException!
    ;; (doto p2 (. :translate 2.0 2.0))
  ))

p1 -> java.awt.Point[x=1,y=1]
p2 -> java.awt.Point[x=1,y=1]
Formal type p1 -> :java.awt.Point
```

```
Formal type p2 -> :java.awt.geom.Point2D
p1' -> java.awt.Point[x=3,y=3]
=> nil
```

SEE ALSO

[formal-type](#)

Returns the formal type of a Java object.

[remove-formal-type](#)

Removes the formal type from a Java object.

[class](#)

Returns the Java class for the given name. Throws an exception if the class is not found.

[top](#)

ceil

```
(ceil x)
```

Returns the largest integer that is greater than or equal to x

```
(ceil 1.4)
=> 2.0
```

```
(ceil -1.4)
=> -1.0
```

```
(ceil 1.23M)
=> 2.00M
```

```
(ceil -1.23M)
=> -1.00M
```

SEE ALSO

[floor](#)

Returns the largest integer that is less than or equal to x

[top](#)

char

```
(char c)
```

Converts a number or a single char string to a char.

```
(char 65)
=> #\A
```

```
(char "A")
=> #\A
```

```
(long (char "A"))
=> 65
```

```
(str/join (map char [65 66 67 68]))
=> "ABCD"
```

```
(map #(- (long %) (long (char "0")))) (str/chars "123456")
=> (1 2 3 4 5 6)
```

SEE ALSO

[char?](#)

Returns true if s is a char.

[top](#)

char-escaped

(char-escaped c)

Returns the ASCII escaped character for c.

- \' single quote
- \" double quote
- \\ backslash
- \n new line
- \r carriage return
- \t tab
- \b backspace
- \f form feed
- \0 null character
- in all other cases returns the character c

```
(char-escaped #\n)
=> #\newline
```

```
(char-escaped #\a)
=> #\a
```

SEE ALSO

[char](#)

Converts a number or s single char string to a char.

[char?](#)

Returns true if s is a char.

[top](#)

char-literals

(char-literals)

Returns all defined char literals.

Char Literal	Unicode	Char
#\space	\u0020	#\space
#\newline	\u000A	#\newline

<code>#\tab</code>	<code>\u0009</code>	<code>#\tab</code>
<code>#\formfeed</code>	<code>\u000C</code>	<code>#\formfeed</code>
<code>#\return</code>	<code>\u000D</code>	<code>#\return</code>
<code>#\backspace</code>	<code>\u0008</code>	<code>#\backspace</code>
<code>#\lparen</code>	<code>\u0028</code>	<code>#\l</code>
<code>#\rparen</code>	<code>\u0029</code>	<code>#\r</code>
<code>#\quote</code>	<code>\u0022</code>	<code>#\"</code>
<code>#\backslash</code>	<code>\u005C</code>	<code>#\backslash</code>
<code>#\pilcrow</code>	<code>\u00B6</code>	<code>#\¶</code>
<code>#\middle-dot</code>	<code>\u00B7</code>	<code>#\·</code>
<code>#\right-guillemet</code>	<code>\u00BB</code>	<code>#\»</code>
<code>#\left-guillemet</code>	<code>\u00AB</code>	<code>#\«</code>
<code>#\copyright</code>	<code>\u00A9</code>	<code>#\©</code>
<code>#\bullet</code>	<code>\u2022</code>	<code>#\•</code>
<code>#\horz-ellipsis</code>	<code>\u2026</code>	<code>#\…</code>
<code>#\per-mille-sign</code>	<code>\u2030</code>	<code>#\‰</code>
<code>#\diameter-sign</code>	<code>\u2300</code>	<code>#\∅</code>
<code>#\check-mark</code>	<code>\u2713</code>	<code>#\✓</code>
<code>#\cross-mark</code>	<code>\u2717</code>	<code>#\✗</code>
<code>#\pi</code>	<code>\u03C0</code>	<code>#\π</code>
<code>#\nbsp</code>	<code>\u00A0</code>	<code>#\ </code>
<code>#\en-space</code>	<code>\u2002</code>	<code>#\ </code>
<code>#\em-space</code>	<code>\u2003</code>	<code>#\ </code>
<code>#\three-per-em-space</code>	<code>\u2004</code>	<code>#\ </code>
<code>#\four-per-em-space</code>	<code>\u2005</code>	<code>#\ </code>
<code>#\six-per-em-space</code>	<code>\u2006</code>	<code>#\ </code>

([char-literals](#))

SEE ALSO

[char](#)
Converts a number or s single char string to a char.

[char?](#)
Returns true if s is a char.

[top](#)

[char?](#)

([char?](#) s)

Returns true if s is a char.

([char?](#) #\a)
=> true

SEE ALSO

[char](#)
Converts a number or s single char string to a char.

charset-default-encoding

```
(charset-default-encoding)
```

Returns the default charset of this Java virtual machine.

```
(charset-default-encoding)  
=> :UTF-8
```

cidr/end-inet-addr

```
(cidr/end-inet-addr cidr)
```

Returns the end inet address of a CIDR IP block.

```
(cidr/end-inet-addr "222.192.0.0/11")  
=> /222.223.255.255  
  
(cidr/end-inet-addr "2001:0db8:85a3:08d3:1319:8a2e:0370:7347/64")  
=> /2001:db8:85a3:8d3:ffff:ffff:ffff:ffff  
  
(cidr/end-inet-addr (cidr/parse "222.192.0.0/11"))  
=> /222.223.255.255
```

cidr/in-range?

```
(cidr/in-range? ip cidr)
```

Returns true if the ip adress is within the ip range of the cidr else false. ip may be a string or a :java.net.InetAddress, cidr may be a string or a CIDRJava object obtained from 'cidr/parse'.

```
(cidr/in-range? "222.220.0.0" "222.220.0.0/11")  
=> true  
  
(cidr/in-range? (inet/inet-addr "222.220.0.0") "222.220.0.0/11")  
=> true  
  
(cidr/in-range? "222.220.0.0" (cidr/parse "222.220.0.0/11"))  
=> true
```

cidr/insert

```
(cidr/insert trie cidr value)
```

Insert a new CIDR / value relation into trie. Works with IPv4 and IPv6. Please keep IPv4 and IPv6 CIDRs in different tries.

```
(do
  (let [trie (cidr/trie)]
    (cidr/insert trie
      (cidr/parse "192.16.10.0/24")
      "Germany")
    (cidr/lookup trie "192.16.10.15")))
=> "Germany"
```

[top](#)

cidr/lookup

```
(cidr/lookup trie ip)
```

Lookup the associated value of a CIDR in the trie. A cidr "192.16.10.0/24" or an inet address "192.16.10.15" can be passed as ip.

```
(do
  (let [trie (cidr/trie)]
    (cidr/insert trie
      (cidr/parse "192.16.10.0/24")
      "Germany")
    (cidr/lookup trie "192.16.10.15")))
=> "Germany"
```

[top](#)

cidr/lookup-reverse

```
(cidr/lookup-reverse trie ip)
```

Reverse lookup a CIDR in the trie given an IP address

```
(do
  (let [trie (cidr/trie)]
    (cidr/insert trie
      (cidr/parse "192.16.10.0/24")
      "Germany")
    (cidr/lookup-reverse trie "192.16.10.15")))
=> 192.16.10.0/24: [/192.16.10.0 .. /192.16.10.255]
```

[top](#)

cidr/parse

```
(cidr/parse cidr)
```

Parses CIDR IP blocks to an IP address range. Supports both IPv4 and IPv6.

```
(cidr/parse "222.192.0.0/11")
=> 222.192.0.0/11: [/222.192.0.0 .. /222.223.255.255]

(cidr/parse "2001:0db8:85a3:08d3:1319:8a2e:0370:7347/64")
=> 2001:0db8:85a3:08d3:1319:8a2e:0370:7347/64: [/2001:db8:85a3:8d3:0:0:0:0 .. /2001:db8:85a3:8d3:ffff:ffff:ffff:ffff]
```

[top](#)

cidr/size

```
(cidr/size trie)
```

Returns the size of the trie.

```
(do
  (let [trie (cidr/trie)]
    (cidr/insert trie
      (cidr/parse "192.16.10.0/24")
      "Germany")
    (cidr/size trie)))
=> 1
```

[top](#)

cidr/start-inet-addr

```
(cidr/start-inet-addr cidr)
```

Returns the start inet address of a CIDR IP block.

```
(cidr/start-inet-addr "222.192.0.0/11")
=> /222.192.0.0

(cidr/start-inet-addr "2001:0db8:85a3:08d3:1319:8a2e:0370:7347/64")
=> /2001:db8:85a3:8d3:0:0:0:0

(cidr/start-inet-addr (cidr/parse "222.192.0.0/11"))
=> /222.192.0.0
```

[top](#)

cidr/trie

```
(cidr/trie)
```

Create a new mutable concurrent CIDR trie.

```
(do
  (let [trie (cidr/trie)]
    (cidr/insert trie
      (cidr/parse "192.16.10.0/24")
```

```
      "Germany")
    (cidr/lookup trie "192.16.10.15"))))
=> "Germany"
```

top

class

(class name)

Returns the Java class for the given name. Throws an exception if the class is not found.

```
(class :java.util.ArrayList)
=> class java.util.ArrayList
```

SEE ALSO

[class-of](#)

Returns the Java class of a value.

[class-name](#)

Returns the Java class name of a class.

[class-version](#)

Returns the major version of a Java class.

[cast](#)

Casts a Java object to a specific type

[formal-type](#)

Returns the formal type of a Java object.

[remove-formal-type](#)

Removes the formal type from a Java object.

top

class-name

(class-name class)

Returns the Java class name of a class.

```
(class-name (class :java.util.ArrayList))
=> "java.util.ArrayList"
```

SEE ALSO

[class](#)

Returns the Java class for the given name. Throws an exception if the class is not found.

[class-of](#)

Returns the Java class of a value.

[class-version](#)

Returns the major version of a Java class.

top

class-of

```
(class-of x)
```

Returns the Java class of a value.

```
(class-of 100)
=> class com.github.jlangch.venice.impl.types.VncLong

(class-of (. :java.awt.Point :new 10 10))
=> class java.awt.Point
```

SEE ALSO

[class](#)

Returns the Java class for the given name. Throws an exception if the class is not found.

[class-name](#)

Returns the Java class name of a class.

[class-version](#)

Returns the major version of a Java class.

[top](#)

class-version

```
(class-version class)
```

Returns the major version of a Java class.

Java major versions:

- Java 8 uses major version 52
- Java 9 uses major version 53
- Java 10 uses major version 54
- Java 11 uses major version 55
- Java 12 uses major version 56
- Java 13 uses major version 57
- Java 14 uses major version 58
- Java 15 uses major version 59

```
(class-version :com.github.jlangch.venice.Venice)
=> 52
```

SEE ALSO

[class](#)

Returns the Java class for the given name. Throws an exception if the class is not found.

[class-of](#)

Returns the Java class of a value.

[class-name](#)

Returns the Java class name of a class.

[top](#)

classloader

```
(classloader)
(classloader type)
```

Returns the classloader.

```
;; Returns the current classloader
(classloader)
=> class sun.misc.Launcher$AppClassLoader

;; Returns the system classloader
(classloader :system)
=> sun.misc.Launcher$AppClassLoader@4e0e2f2a

;; Returns the classloader which loaded the Venice classes
(classloader :application)
=> sun.misc.Launcher$AppClassLoader@4e0e2f2a

;; Returns the thread-context classloader
(classloader :thread-context)
=> sun.misc.Launcher$AppClassLoader@4e0e2f2a
```

SEE ALSO

[class](#)

Returns the Java class for the given name. Throws an exception if the class is not found.

[classloader-of](#)

Returns the classloader of a value or a Java class.

[top](#)

classloader-of

```
(classloader-of x)
```

Returns the classloader of a value or a Java class.

Note:

Some Java VM implementations may use 'null' to represent the bootstrap class loader. This method will return 'nil' in such implementations if this class was loaded by the bootstrap class loader.

```
(classloader-of (class :java.awt.Point))
=> nil

(classloader-of (. :java.awt.Point :new 10 10))
=> nil

(classloader-of (class-of "abcdef"))
=> sun.misc.Launcher$AppClassLoader@4e0e2f2a

(classloader-of "abcdef")
=> sun.misc.Launcher$AppClassLoader@4e0e2f2a
```

SEE ALSO

class

Returns the Java class for the given name. Throws an exception if the class is not found.

classloader

Returns the classloader.

[top](#)

coalesce

(coalesce args*)

Returns nil if all of its arguments are nil, otherwise it returns the first non nil argument. The arguments are evaluated lazy.

```
(coalesce)  
=> nil
```

```
(coalesce 2)  
=> 2
```

```
(coalesce nil 1 2)  
=> 1
```

[top](#)

coll?

(coll? coll)

Returns true if coll is a collection

```
(coll? {:a 1})  
=> true
```

```
(coll? [1 2])  
=> true
```

[top](#)

combinations

(combinations coll n)

All the unique ways of taking n different elements from the items in the collection

```
(combinations [0 1 2 3] 1)  
=> ([0] [1] [2] [3])
```

```
(combinations [0 1 2 3] 2)  
=> ([0 1] [0 2] [0 3] [1 2] [1 3] [2 3])
```



```
(combinations [0 1 2 3] 3)
=> ([0 1 2] [0 1 3] [1 2 3])
```

```
(combinations [0 1 2 3] 4)
=> ([0 1 2 3])
```

SEE ALSO

[cartesian-product](#)

Returns the cartesian product of two or more collections.

top

comment

```
(comment & body)
```

Ignores body, yields nil

```
(comment
  (println 1)
  (println 5))
=> nil
```

top

comp

```
(comp f*)
```

Takes a set of functions and returns a fn that is the composition of those fns. The returned fn takes a variable number of args, applies the rightmost of fns to the args, the next fn (right-to-left) to the result, etc.

```
((comp str +) 8 8 8)
=> "24"
```

```
(map (comp - (partial + 3) (partial * 2)) [1 2 3 4])
=> (-5 -7 -9 -11)
```

```
((reduce comp [(partial + 1) (partial * 2) (partial + 3)]) 100)
=> 207
```

```
(filter (comp not zero?) [0 1 0 2 0 3 0 4])
=> (1 2 3 4)
```

```
(do
  (def fifth (comp first rest rest rest rest))
  (fifth [1 2 3 4 5]))
=> 5
```

top

compare

```
(compare x y)
```

Comparator. Returns -1, 0, or 1 when x is logically 'less than', 'equal to', or 'greater than' y. For list and vectors the longer sequence is always 'greater' regardless of its contents. For sets and maps only the size of the collection is compared.

```
(compare nil 0)
```

```
=> -1
```

```
(compare 0 nil)
```

```
=> 1
```

```
(compare 1 0)
```

```
=> 1
```

```
(compare 1 1)
```

```
=> 0
```

```
(compare 1M 2M)
```

```
=> -1
```

```
(compare 1 nil)
```

```
=> 1
```

```
(compare nil 1)
```

```
=> -1
```

```
(compare "aaa" "bbb")
```

```
=> -1
```

```
(compare [0 1 2] [0 1 2])
```

```
=> 0
```

```
(compare [0 1 2] [0 9 2])
```

```
=> -1
```

```
(compare [0 9 2] [0 1 2])
```

```
=> 1
```

```
(compare [1 2 3] [0 1 2 3])
```

```
=> -1
```

```
(compare [0 1 2] [3 4])
```

```
=> 1
```

[top](#)

compare-and-set!

```
(compare-and-set! atom oldval newval)
```

Atomically sets the value of atom to newval if and only if the current value of the atom is identical to oldval. Returns true if set happened, else false.

```
(do
  (def counter (atom 2))
  (compare-and-set! counter 2 4)
  @counter)
=> 4
```

SEE ALSO

[atom](#)

Creates an atom with the initial value x.

[top](#)

complement

```
(complement f)
```

Takes a fn f and returns a fn that takes the same arguments as f, has the same effects, if any, and returns the opposite truth value.

```
(complement even?)
=> anonymous-efde7c4c-cfa4-4c2e-a4cc-ec2b89ec681c

(filter (complement even?) '(1 2 3 4))
=> (1 3)
```

[top](#)

complete-on-timeout

```
(complete-on-timeout p value time time-unit)
```

Completes the promise with the given value if not otherwise completed before the given timeout.

```
(-> (promise (fn [] (sleep 100) "The quick brown fox")))
    (complete-on-timeout "The fox did not jump" 500 :milliseconds)
    (deref))
=> "The quick brown fox"

(-> (promise (fn [] (sleep 500) "The quick brown fox")))
    (complete-on-timeout "The fox did not jump" 100 :milliseconds)
    (deref))
=> "The fox did not jump"

(-> (promise (fn [] (sleep 500) "The quick brown fox")))
    (complete-on-timeout "The fox did not jump" 100 :milliseconds)
    (then-apply str/upper-case)
    (deref))
=> "THE FOX DID NOT JUMP"

(-> (promise (fn [] (sleep 50) 100))
    (complete-on-timeout 888 100 :milliseconds)
    (then-apply #(do (sleep 200) (* % 3))))
    (complete-on-timeout 999 220 :milliseconds)
    (deref))
=> 999
```

SEE ALSO

[promise](#)

Returns a promise object that can be read with `deref`, and `set`, once only, with `deliver`. Calls to `deref` prior to delivery will block, ...

[then-accept](#)

Returns a new promise that, when this promise completes normally, is executing the function `f` with this stage's result as the argument.

[then-accept-both](#)

Returns a new promise that, when either this or the other given promise completes normally, is executing the function `f` with the two ...

[then-apply](#)

Applies a function `f` on the result of the previous stage of the promise `p`.

[then-combine](#)

Applies a function `f` to the result of the previous stage of promise `p` and the result of another promise `p-other`

[then-compose](#)

Composes the result of two promises. `f` receives the result of the first promise `p` and returns a new promise that composes that value ...

[when-complete](#)

Returns the promise `p` with the same result or exception at this stage, that executes the action `f`. Passes the current stage's result ...

[accept-either](#)

Returns a new promise that, when either this or the other given promise completes normally, is executed with the corresponding result ...

[apply-to-either](#)

Returns a new promise that, when either this or the other given promise completes normally, is executed with the corresponding result ...

[or-timeout](#)

Exceptionally completes the promise with a `TimeoutException` if not otherwise completed before the given timeout.

[top](#)

component/Component

Defines a protocol for components.

Definition:

```
(defprotocol Component
  (start [component] component)
  (stop [component] component))
```

Function `start` :

Begins operation of this component. Synchronous, does not return until the component is started. Returns an updated version of this component.

Function `stop` :

Ceases operation of this component. Synchronous, does not return until the component is stopped. Returns an updated version of this component.

[top](#)

component/dep

```
(dep c k)
```

Returns a dependency given by its key `'k'` from the component `'c'` dependencies.

```
(do
  (load-module :component ['component :as 'c]))
```

```

(deftype :server []
  c/Component
  (start [this] (println "Store: " (c/dep this :store)) this)
  (stop [this] this))

(deftype :database []
  c/Component
  (start [this] this)
  (stop [this] this))

(defn create-system []
  (-> (c/system-map
      "test"
      :server (server. )
      :store (database. ))
    (c/system-using {:server [:store]})))

(-> (create-system)
  (c/start)
  (c/stop))

nil)
Store: {:custom-type* :user/database}
=> nil

```

SEE ALSO

[component/deps](#)

Returns the dependencies of the component 'c' or nil if there aren't any dependencies.

[component/id](#)

Returns id of the component 'c'.

[top](#)

component/deps

```
(deps c)
```

Returns the dependencies of the component 'c' or `nil` if there aren't any dependencies.

```

(do
  (load-module :component ['component :as 'c])

  (deftype :server []
    c/Component
    (start [this] (println "Dependencies: " (c/deps this)) this)
    (stop [this] this))

  (deftype :database []
    c/Component
    (start [this] this)
    (stop [this] this))

  (defn create-system []
    (-> (c/system-map
        "test"
        :server (server. )
        :store (database. ))
      (c/system-using {:server [:store]})))

```

```
(-> (create-system)
    (c/start)
    (c/stop))

nil)
Dependencies: {:store {:custom-type* :user/database} :component-info {:custom-type* :component/component-info :
id :server :system-name test :components {}}}
=> nil
```

SEE ALSO

[component/dep](#)

Returns a dependency given by its key 'k' from the component 'c' dependencies.

[component/id](#)

Returns id of the component 'c'.

[top](#)

component/id

```
(id c)
```

Returns id of the component 'c'.

```
(do
  (load-module :component ['component :as 'c])

  (deftype :server []
    c/Component
    (start [this] (println "ID: " (c/id this)) this)
    (stop [this] this))

  (defn create-system []
    (-> (c/system-map
        "test"
        :server (server. ))
        (c/system-using {:server []})))

  (-> (create-system)
      (c/start)
      (c/stop))

  nil)
ID: :server
=> nil
```

SEE ALSO

[component/dep](#)

Returns a dependency given by its key 'k' from the component 'c' dependencies.

[component/deps](#)

Returns the dependencies of the component 'c' or nil if there aren't any dependencies.

[top](#)

component/system-map

```
(system-map name keyval*)
```

Returns a system constructed of components given as key/value pairs. The 'key' is a `keyword` (the component's id) referencing the component given as 'value'.

The system has default implementations of the Lifecycle 'start' and 'stop' methods which recursively starts/stops all components in the system.

Note:

`system-map` just creates a raw system without any dependencies between the components. Use `system-using` after creating the system map to establish the dependencies.

```
(do
  (load-module :component ['component :as 'c])

  (deftype :server [port :long]
    c/Component
    (start [this] (println "server started")) this)
    (stop [this] (println "server stopped")) this))

  (deftype :database [user      :string
                     password  :string]
    c/Component
    (start [this] (println "database started")) this)
    (stop [this] (println "database stopped")) this))

  (c/system-map
   "test"
   :server (server. 4600)
   :store (database. "foo" "123"))

  nil)
```

SEE ALSO

[component/system-using](#)

Associates a component dependency graph with the 'system' that has been created through a call to `system-map`. 'dependency-map' is a ...

[top](#)

component/system-using

```
(system-using system dependency-map)
```

Associates a component dependency graph with the 'system' that has been created through a call to `system-map`. 'dependency-map' is a map of keys to maps or vectors specifying the the dependencies of the component at that key in the system.

Throws an exception if a component dependency circle is detected.

The system is started and stopped calling the lifecycle `start` or `stop` method on the system component.

Upon succesfully starting a component the flag `{:started true}` is added to the component's meta data. It's up to the components lifecycle `start` method to decide what to do with multiple start requests. The lifecycle `start` method can for instance simply return the unaltered component if it has already been started.

Upon succesfully stopping a component the flag `{:started false}` is added to the component's meta data. It's up to the components lifecycle `stop` method to decide what to do with multiple stop requests. The lifecycle `stop` method can for instance simply return the unaltered component if it has not been started or has already been stopped.

```
(do
  (load-module :component ['component :as 'c])
```

```

(deftype :server [port :long]
  c/Component
  (start [this]
    (let [store1 (-> (c/dep this :store1) :name)
          store2 (-> (c/dep this :store2) :name)]
      (println "server started. using the stores" store1 "," store2))
    this)
  (stop [this]
    (println "server stopped")
    this))

(deftype :database [name :string
                    user :string
                    password :string]
  c/Component
  (start [this]
    (println "database" (:name this) "started")
    this)
  (stop [this]
    (println "database" (:name this) "stopped")
    this))

(defn create-system []
  (-> (c/system-map
      "test"
      :server (server. 4600)
      :store1 (database. "store1" "foo" "123")
      :store2 (database. "store2" "foo" "123"))
    (c/system-using {:server [:store1 :store2]})))

(defn start []
  (-> (create-system)
    (c/start)))

(let [system (start)
      server (-> system :components :server)]
  ; access server component
  (println "Accessing the system...")
  (c/stop system))

nil)
database store1 started
database store2 started
server started. using the stores store1 , store2
Accessing the system...
server stopped
database store2 stopped
database store1 stopped
=> nil

```

SEE ALSO

[component/system-map](#)

Returns a system constructed of components given as key/value pairs. The 'key' is a keyword (the component's id) referencing the component ...

[top](#)

concat

```

(concat coll)
(concat coll & colls)

```


Returns a list of the concatenation of the elements in the supplied collections.

```
(concat [1 2])
=> (1 2)

(concat [1 2] [4 5 6])
=> (1 2 4 5 6)

(concat '(1 2))
=> (1 2)

(concat '(1 2) [4 5 6])
=> (1 2 4 5 6)

(concat {:a 1})
=> ([:a 1])

(concat {:a 1} {:b 2 :c 3})
=> ([:a 1] [:b 2] [:c 3])

(concat "abc")
=> (#\a #\b #\c)

(concat "abc" "def")
=> (#\a #\b #\c #\d #\e #\f)
```

SEE ALSO

[concatv](#)

Returns a vector of the concatenation of the elements in the supplied collections.

[into](#)

Returns a new coll consisting of to coll with all of the items of from coll conjoined.

[merge](#)

Returns a map that consists of the rest of the maps conj-ed onto the first. If a key occurs in more than one map, the mapping from ...

[top](#)

concatv

```
(concatv coll)
(concatv coll & colls)
```

Returns a vector of the concatenation of the elements in the supplied collections.

```
(concatv [1 2])
=> [1 2]

(concatv [1 2] [4 5 6])
=> [1 2 4 5 6]

(concatv '(1 2))
=> [1 2]

(concatv '(1 2) [4 5 6])
=> [1 2 4 5 6]
```

```
(concatv {:a 1})
=> [[:a 1]]

(concatv {:a 1} {:b 2 :c 3})
=> [[:a 1] [:b 2] [:c 3]]

(concatv "abc")
=> [#\a #\b #\c]

(concatv "abc" "def")
=> [#\a #\b #\c #\d #\e #\f]
```

SEE ALSO

[concat](#)

Returns a list of the concatenation of the elements in the supplied collections.

[into](#)

Returns a new coll consisting of to coll with all of the items of from coll conjoined.

[merge](#)

Returns a map that consists of the rest of the maps conj-ed onto the first. If a key occurs in more than one map, the mapping from ...

[top](#)

cond

```
(cond & clauses)
```

Takes a set of test/expr pairs. It evaluates each test one at a time. If a test returns logical true, cond evaluates and returns the value of the corresponding expr and doesn't evaluate any of the other tests or exprs. (cond) returns nil.

```
(let [n 5]
  (cond
    (< n 0) "negative"
    (> n 0) "positive"
    :else "zero"))
=> "positive"
```

SEE ALSO

[condp](#)

Takes a binary predicate, an expression, and a set of clauses.

[case](#)

Takes an expression and a set of clauses. Each clause takes the form of test-constant result-expr

[top](#)

cond->

```
(cond-> expr & clauses)
```

Takes an expression and a set of test/form pairs. Threads expr (via ->) through each form for which the corresponding test expression is true. Note that, unlike cond branching, cond-> threading does not short circuit after the first true test expression.

It is useful in situations where you want selectively assoc, update, or dissoc something from a map.

```
(cond-> m
  (some-pred? q) (assoc :key :value))
```

```
(cond-> 1 ; we start with 1
  true inc ; the condition is true so (inc 1) => 2
  false (* 42) ; the condition is false so the operation is skipped
  (= 2 2) (* 3)) ; (= 2 2) is true so (* 2 3) => 6
=> 6
```

SEE ALSO

[cond->>](#)

Takes an expression and a set of test/form pairs. Threads expr (via ->>) through each form for which the corresponding test expression ...

[top](#)

cond->>

```
(cond->> expr & clauses)
```

Takes an expression and a set of test/form pairs. Threads expr (via ->>) through each form for which the corresponding test expression is true. Note that, unlike cond branching, `cond->>` threading does not short circuit after the first true test expression.

```
(cond->> 1 ; we start with 1
  true inc ; the condition is true so (inc 1) => 2
  false (* 42) ; the condition is false so the operation is skipped
  (= 2 2) (* 3)) ; (= 2 2) is true so (* 3 2) => 6
=> 6
```

SEE ALSO

[cond->](#)

Takes an expression and a set of test/form pairs. Threads expr (via ->) through each form for which the corresponding test expression ...

[top](#)

condp

```
(condp pred expr & clauses)
```

Takes a binary predicate, an expression, and a set of clauses.

Each clause can take the form of either:

```
test-expr result-expr
test-expr :>> result-fn
```

Note `:>>` is an ordinary keyword.

For each clause, (pred test-expr expr) is evaluated. If it returns logical true, the clause is a match. If a binary clause matches, the result-expr is returned, if a ternary clause matches, its result-fn, which must be a unary function, is called with the result of the predicate as its argument, the result of that call being the return value of condp. A single default expression can follow the clauses, and its value will be returned if no clause matches. If no default expression is provided and no clause matches, a VncException is thrown.

```
(condp some [1 2 3 4]
  #{0 6 7} :>> inc
  #{4 5 9} :>> dec)
```

```
#{1 2 3} :>> #(* % 10))
=> 3
```

```
(condp some [-10 -20 0 10]
  pos? 1
  neg? -1
  (constantly true) 0)
=> 1
```

SEE ALSO

[cond](#)

Takes a set of test/expr pairs. It evaluates each test one at a time. If a test returns logical true, cond evaluates and returns the ...

[case](#)

Takes an expression and a set of clauses. Each clause takes the form of test-constant result-expr

[top](#)

config/build

(build & parts)

Merges given configuration parts and returns it as a map.

Configuration parts:

- JSON classpath resource file
- JSON file
- Environment variables
- System properties

Example:

```
(do
  (load-module :config)

  (def cfg (config/build
    (config/env "java")
    (config/env-var "SERVER_PORT" [:http :port] "8080")))

  (println "home:" (-> cfg :11 :zulu :home))
  ; => home: /Library/Java/JavaVirtualMachines/zulu-11.jdk/Contents/Home

  (println "port:" (-> cfg :http :port)))
; => port: 8080
```

```
;; -----
;; Example I) Configuration builder
(do
  (load-module :config ['config :as 'cfg])

  (cfg/build
    (cfg/resource "config-defaults.json" :key-fn keyword)
    (cfg/file "./config-local.json" :key-fn keyword)
    (cfg/env-var "SERVER_PORT" [:http :port])
    (cfg/env-var "SERVER_THREADS" [:http :threads])
    (cfg/property-var "MASTER_PWD" [:app :master-pwd])))
```

```
;; -----
;; Example II) Using configurations with the component module
(do
  (load-module :config ['config :as 'cfg])
  (load-module :component ['component :as 'cmp])

  ;; define the server component
  (deftype :server []
    cmp/Component
    (start [this]
      (let [config (cmp/dep this :config)
            port   (get-in config [:server :port])]
        (println (cmp/id this) "started at port" port)
        this))
    (stop [this]
      (println (cmp/id this) "stopped")
      this))

  ;; note that the configuration is a plain vanilla Venice map and
  ;; does not implement the protocol 'Component'
  (defn create-system []
    (-> (cmp/system-map
          "test"
          :config (cfg/build
                    (cfg/env-var "SERVER_PORT" [:server :port] "8800"))
          :server (server. ))
        (cmp/system-using
         {:server [:config]})))

  (-> (create-system)
      (cmp/start)
      (cmp/stop))

  nil)
```

SEE ALSO

[config/file](#)

Reads a JSON configuration part from given file f.

[config/resource](#)

Reads a JSON configuration part from given path in classpath.

[config/env-var](#)

Reads a configuration value from an environment variable and associates it to the given path in a map.

[config/property-var](#)

Reads a configuration value from a system property and associates it to the given path in a map.

[config/env](#)

Reads configuration part from environment variables, filtered by a prefix. nil may be passed as prefix to get env vars.

[config/properties](#)

Reads configuration part from system properties, filtered by a prefix. nil may be passed as prefix to get property vars.

[top](#)

config/env

(env prefix)

Reads configuration part from environment variables, filtered by a prefix. `nil` may passed as prefix to get env vars.

The reader splits the environment variable names on the underscores to build a map.

```
(base) $ env | grep JAVA_
JAVA_11_OPENJDK_HOME=/Library/Java/JavaVirtualMachines/adoptopenjdk-11.jdk/Contents/Home
JAVA_11_ZULU_HOME=/Library/Java/JavaVirtualMachines/zulu-11.jdk/Contents/Home
JAVA_11_HOME=/Library/Java/JavaVirtualMachines/adoptopenjdk-11.jdk/Contents/Home
JAVA_8_ZULU_HOME=/Library/Java/JavaVirtualMachines/zulu-8.jdk/Contents/Home
JAVA_8_OPENJDK_HOME=/Library/Java/JavaVirtualMachines/adoptopenjdk-8.jdk/Contents/Home
JAVA_8_HOME=/Library/Java/JavaVirtualMachines/adoptopenjdk-8.jdk/Contents/Home
JAVA_HOME=/Library/Java/JavaVirtualMachines/adoptopenjdk-8.jdk/Contents/Home

venice> (config/env "java")
=> {
  :11 {
    :zulu { :home "/Library/Java/JavaVirtualMachines/zulu-11.jdk/Contents/Home" }
    :openjdk { :home "/Library/Java/JavaVirtualMachines/adoptopenjdk-11.jdk/Contents/Home" }
    :home "/Library/Java/JavaVirtualMachines/adoptopenjdk-11.jdk/Contents/Home"
  }

  :8 {
    :zulu { :home "/Library/Java/JavaVirtualMachines/zulu-8.jdk/Contents/Home" }
    :openjdk { :home "/Library/Java/JavaVirtualMachines/adoptopenjdk-8.jdk/Contents/Home" }
    :home "/Library/Java/JavaVirtualMachines/adoptopenjdk-8.jdk/Contents/Home"
  }

  :home "/Library/Java/JavaVirtualMachines/adoptopenjdk-8.jdk/Contents/Home"
}
```

```
(config/env "DATABASE_")
```

SEE ALSO

[config/env-var](#)

Reads a configuration value from an environment variable and associates it to the given path in a map.

[config/properties](#)

Reads configuration part from system properties, filtered by a prefix. `nil` may passed as prefix to get property vars.

[config/build](#)

Merges given configuration parts and returns it as a map.

[top](#)

config/env-var

```
(env-var name path)
(env-var name path default-val)
```

Reads a configuration value from an environment variable and associates it to the given path in a map.

```
(config/env-var "JAVA_HOME" [:java-home])
=> {:java-home "/Library/Java/JavaVirtualMachines/zulu-8.jdk/Contents/Home"}

(config/env-var "SERVER_PORT" [:http :port])
=> nil

(config/env-var "SERVER_PORT" [:http :port] "8080")
=> {:http {:port "8080"}}
```

SEE ALSO

[config/property-var](#)

Reads a configuration value from an system property and associates it to the given path in a map.

[config/env](#)

Reads configuration part from environment variables, filtered by a prefix. nil may passed as prefix to get env vars.

[config/build](#)

Merges given configuration parts and returns it as a map.

[top](#)

config/file

```
(file f)
(file f reader-opts)
```

Reads a JSON configuration part from given file f.

f may be a:

- string file path, e.g: "/temp/foo.json"
- `java.io.File`, e.g: `(io/file "/temp/foo.json")`
- `java.io.InputStream`
- `java.io.Reader`
- `java.net.URL`
- `java.net.URI`

The optional 'reader-opts' are defined by `json/read-str`.

E.g.: `:key-fn keyword` will convert all config keys to keywords

```
(config/file "/foo/app/config-production.json" :key-fn keyword)
```

```
(do
  (def cfg-json ""
    { "db" : {
      "classname" : "com.mysql.jdbc.Driver",
      "subprotocol" : "mysql",
      "subname" : "//127.0.0.1:3306/test",
      "user" : "test",
      "password" : "123"
    }
  }
  ""))
(-> (io/buffered-reader cfg-json)
  (config/file :key-fn keyword)))
```

SEE ALSO

[config/resource](#)

Reads a JSON configuration part from given path in classpath.

[config/build](#)

Merges given configuration parts and returns it as a map.

[json/read-str](#)

Reads a JSON string and returns it as a Venice datatype.

[top](#)

config/properties

```
(properties prefix)
```

Reads configuration part from system properties, filtered by a prefix. `nil` may passed as prefix to get property vars.

The reader splits the property names on the underscores to build a map.

```
(config/properties "DATABASE_")
```

SEE ALSO

[config/property-var](#)

Reads a configuration value from an system property and associates it to the given path in a map.

[config/build](#)

Merges given configuration parts and returns it as a map.

[top](#)

config/property-var

```
(property-var name path)
(property-var name path default-val)
```

Reads a configuration value from an system property and associates it to the given path in a map.

```
(config/property-var "java.vendor" [:java :vendor])
=> {:java {:vendor "Azul Systems, Inc."}}
```

```
(config/property-var "java.version" [:java :version])
=> {:java {:version "1.8.0_392"}}
```

```
(config/property-var "SERVER_PORT" [:http :port])
=> nil
```

```
(config/property-var "SERVER_PORT" [:http :port] "8080")
=> {:http {:port "8080"}}
```

SEE ALSO

[config/env-var](#)

Reads a configuration value from an environment variable and associates it to the given path in a map.

[config/properties](#)

Reads configuration part from system properties, filtered by a prefix. `nil` may passed as prefix to get property vars.

[config/build](#)

Merges given configuration parts and returns it as a map.

[top](#)

config/resource


```
(resource path)
(resource path reader-opts)
```

Reads a JSON configuration part from given path in classpath.

The optional 'reader-opts' are defined by `json/read-str`.

E.g.: `:key-fn keyword` will convert all config keys to keywords

```
(config/resource "com/github/jlangch/venice/examples/database-config.json"
                 :key-fn keyword)
=> {:db {:classname "com.mysql.jdbc.Driver" :subname "//127.0.0.1:3306/test" :user "test" :subprotocol "mysql" :
password "123"}}
```

SEE ALSO

[config/file](#)

Reads a JSON configuration part from given file f.

[config/build](#)

Merges given configuration parts and returns it as a map.

[json/read-str](#)

Reads a JSON string and returns it as a Venice datatype.

[top](#)

conj

```
(conj)
(conj x)
(conj coll x)
(conj coll x & xs)
```

Returns a new collection with the x, xs 'added'. `(conj nil item)` returns `(item)` and `(conj item)` returns `item`.

For ordered collections like list, vectors and ordered sets/maps the value is added at the end. For all other collections the position is undefined.

```
(conj [1 2 3] 4)
=> [1 2 3 4]

(conj [1 2 3] 4 5)
=> [1 2 3 4 5]

(conj [1 2 3] [4 5])
=> [1 2 3 [4 5]]

(conj '(1 2 3) 4)
=> (1 2 3 4)

(conj '(1 2 3) 4 5)
=> (1 2 3 4 5)

(conj '(1 2 3) '(4 5))
=> (1 2 3 (4 5))

(conj (set 1 2 3) 4)
=> #{1 2 3 4}
```

```
(conj {:a 1 :b 2} [:c 3])
=> {:a 1 :b 2 :c 3}

(conj {:a 1 :b 2} {:c 3})
=> {:a 1 :b 2 :c 3}

(conj {:a 1 :b 2} (map-entry :c 3))
=> {:a 1 :b 2 :c 3}

(conj)
=> []

(conj 4)
=> 4
```

SEE ALSO

[cons](#)

Returns a new collection where x is the first element and coll is the rest.

[into](#)

Returns a new coll consisting of to coll with all of the items of from coll conjoined.

[concat](#)

Returns a list of the concatenation of the elements in the supplied collections.

[list*](#)

Creates a new list containing the items prepended to the rest, the last of which will be treated as a collection.

[vector*](#)

Creates a new vector containing the items prepended to the rest, the last of which will be treated as a collection.

[top](#)

conj!

```
(conj!)
(conj! x)
(conj! coll x)
(conj! coll x & xs)
```

Returns a new mutable collection with the x, xs 'added'. (conj! nil item) returns (item) and (conj! item) returns item.

For mutable ordered collections like lists the value is added at the end. For all other mutable collections the position is undefined.

```
(conj! (mutable-list 1 2 3) 4)
=> (1 2 3 4)

(conj! (mutable-list 1 2 3) 4 5)
=> (1 2 3 4 5)

(conj! (mutable-list 1 2 3) '(4 5))
=> (1 2 3 (4 5))

(conj! (mutable-set 1 2 3) 4)
=> #{1 2 3 4}
```

```

(conj! (mutable-map :a 1 :b 2) [:c 3])
=> {:a 1 :b 2 :c 3}

(conj! (mutable-map :a 1 :b 2) {:c 3})
=> {:a 1 :b 2 :c 3}

(conj! (mutable-map :a 1 :b 2) (map-entry :c 3))
=> {:a 1 :b 2 :c 3}

(conj! (stack) 1 2 3)
=> (3 2 1)

(conj! (queue) 1 2 3)
=> (1 2 3)

(conj!)
=> ()

(conj! 4)
=> 4

```

[top](#)

cons

```
(cons x coll)
```

Returns a new collection where x is the first element and coll is the rest.

For ordered collections like list, vectors and ordered sets/maps the value is added at the beginning. For all other collections the position is undefined.

```

(cons 1 '(2 3 4 5 6))
=> (1 2 3 4 5 6)

(cons 1 nil)
=> (1)

(cons [1 2] [4 5 6])
=> [[1 2] 4 5 6]

(cons 3 (set 1 2))
=> #{1 2 3}

(cons {:c 3} {:a 1 :b 2})
=> {:a 1 :b 2 :c 3}

(cons (map-entry :c 3) {:a 1 :b 2})
=> {:a 1 :b 2 :c 3}

; cons a value to a lazy sequence
(->> (cons -1 (lazy-seq 0 #(+ % 1)))
      (take 5)
      (doall))
=> (-1 0 1 2 3)

```

```
; recursive lazy sequence (fibonacci example)
(do
  (defn fib
    ([ ] (fib 1 1))
    ([a b] (cons a (fn [] (fib b (+ a b))))))

  (doall (take 6 (fib))))
=> (1 1 2 3 5 8)
```

SEE ALSO

[conj](#)

Returns a new collection with the x, xs 'added'. (conj nil item) returns (item) and (conj item) returns item.

[list*](#)

Creates a new list containing the items prepended to the rest, the last of which will be treated as a collection.

[vector*](#)

Creates a new vector containing the items prepended to the rest, the last of which will be treated as a collection.

[top](#)

cons!

```
(cons! x coll)
```

Adds x to the mutable collection coll.

For mutable ordered collections like lists the value is added at the beginning. For all other mutable collections the position is undefined.

```
(cons! 1 (mutable-list 2 3))
=> (1 2 3)
```

```
(cons! 3 (mutable-set 1 2))
=> #{1 2 3}
```

```
(cons! {:c 3} (mutable-map :a 1 :b 2))
=> {:a 1 :b 2 :c 3}
```

```
(cons! (map-entry :c 3) (mutable-map :a 1 :b 2))
=> {:a 1 :b 2 :c 3}
```

```
(cons! 1 (stack))
=> (1)
```

```
(cons! 1 (queue))
=> (1)
```

[top](#)

constantly

```
(constantly x)
```

Returns a function that takes any number of arguments and returns always the value x.

```
(do
  (def fix (constantly 10))
  (fix 1 2 3)
  (fix 1)
  (fix ))
=> 10
```

SEE ALSO

[repeat](#)

Returns a lazy sequence of x values or a collection with the value x repeated n times.

[repeatedly](#)

Takes a function of no args, presumably with side effects, and returns a collection of n calls to it

[dotimes](#)

Repeatedly executes body with name bound to integers from 0 through n-1.

[top](#)

contains?

```
(contains? coll key)
```

Returns true if key is present in the given collection, otherwise returns false.

Note: To test if a value is in a vector or list use `any?`

```
(contains? #{:a :b} :a)
=> true
```

```
(contains? {:a 1 :b 2} :a)
=> true
```

```
(contains? [10 11 12] 1)
=> true
```

```
(contains? [10 11 12] 5)
=> false
```

```
(contains? "abc" 1)
=> true
```

```
(contains? "abc" 5)
=> false
```

SEE ALSO

[not-contains?](#)

Returns true if key is not present in the given collection, otherwise returns false.

[any?](#)

Returns true if the predicate is true for at least one collection item, false otherwise.

[top](#)

count

```
(count coll)
```

Returns the number of items in the collection. `(count nil)` returns 0. Also works on strings, and Java Collections

```
(count {:a 1 :b 2})  
=> 2
```

```
(count [1 2])  
=> 2
```

```
(count "abc")  
=> 3
```

[top](#)

cpus

```
(cpus)
```

Returns the number of available processors or number of hyperthreads if the CPU supports hyperthreads.

```
(cpus)  
=> 8
```

[top](#)

crypt/add-bouncy-castle-provider

```
(crypt/add-bouncy-castle-provider
```

Adds the BouncyCastle provider to the Java security.

```
(do  
  (load-module :crypt)  
  (crypt/add-bouncy-castle-provider))
```

SEE ALSO

[crypt/provider?](#)

Returns true if the Java security provider with name exists, else false.

[top](#)

crypt/ciphers

```
(crypt/ciphers)  
(crypt/ciphers opt)
```

Returns a list of the ciphers the Java VM supports

Argument opt

returns the names of the cipher suites which are enabled by default.

:default

:available returns the names of the cipher suites which could be enabled for use on an SSL connection created by this

`SSLServerSocketFactory` .

```
(do
  (load-module :crypt)
  (crypt/ciphers :default))

(do
  (load-module :crypt)
  (crypt/ciphers :available))

(do
  (load-module :crypt)
  (docoll println (crypt/ciphers :available)))
```

[top](#)

crypt/decrypt

(crypt/decrypt algorithm passphrase & options)

Returns a new thread safe function to decrypt a string or a bytebuf given the algorithm and passphrase. If a string is passed it is base64 decoded, decrypted, and returned as string. If a bytebuf is passed the decrypted bytebuf is returned.

Supported algorithms: DES, 3DES, AES256

Options:

:url-safe The boolean option directs the base64 decoder to decode standard or URL safe base64 encoded strings. If enabled (true) the base64 decoder will convert '-' and '_' characters back to '+' and '/' before decoding.
Defaults to false.

:salt An optional salt. A bytebuf or a string.
DES and 3DES require exactly 8 bytes, AES256 1 or more bytes

```
(do
  (load-module :crypt)
  (def encrypt (crypt/encrypt "AES256" "secret" :url-safe true))
  (def decrypt (crypt/decrypt "AES256" "secret" :url-safe true))
  (encrypt "hello") ; => "e4m1qe6Fyx3Rr7NTIZe97g=="
  (decrypt "e4m1qe6Fyx3Rr7NTIZe97g==") ; => "hello"
  (encrypt (bytebuf [128 216 205]))) ; => [43 195 99 118 231 225 142 76 132 194 129 237 158 12 12 203]
=> [43 195 99 118 231 225 142 76 132 194 129 237 158 12 12 203]
```

```
(do
  (load-module :crypt)
  (def encrypt (crypt/encrypt "AES256" "secret" :salt "salty"))
  (def decrypt (crypt/decrypt "AES256" "secret" :salt "salty"))
  (-> "hello"
    (encrypt)
    (decrypt)))
=> "hello"
```

SEE ALSO

[crypt/encrypt](#)

Returns a new thread safe function to encrypt a string or a bytebuf given the algorithm and passphrase. If a string is passed it is ...

crypt/decrypt-file

```
(crypt/decrypt-file algorithm passphrase in)
(crypt/decrypt-file algorithm passphrase in out)
```

Decrypts an encrypted file that has been created by `crypt/encrypt-file`.

Returns a byte buffer with the decrypted data if the 'out' argument is missing. Otherwise returns nil and writes the decrypted file data to the destination given by 'out'.

The arg 'algorithm' is one of: "AES256-GCM", "AES256-CBC", "ChaCha20"

The arg 'in' may be a:

- string file path, e.g: "/temp/foo.json"
- bytebuf
- `java.io.File`, e.g: `(io/file "/temp/foo.json")`
- `java.io.InputStream`

The arg 'out' may be a:

- string file path, e.g: "/temp/foo.json"
- `java.io.File`, e.g: `(io/file "/temp/foo.json")`
- `java.io.OutputStream`

```
(do
  (load-module :crypt)
  (let [file-in      (io/temp-file "test-", ".data")
        file-out     (io/temp-file "test-", ".data.enc")
        passphrase "42"]
    (io/delete-file-on-exit file-in file-out)
    (io/spit file-in "1234567890")
    (crypt/encrypt-file "AES256-GCM" passphrase file-in file-out)
    (-> (crypt/decrypt-file "AES256-GCM" passphrase file-out)
        (bytebuf-to-string :UTF-8))))
=> "1234567890"
```

SEE ALSO

[crypt/encrypt-file](#)

Encrypts a file.

crypt/encrypt

```
(crypt/encrypt algorithm passphrase & options)
```

Returns a new thread safe function to encrypt a string or a bytebuf given the algorithm and passphrase. If a string is passed it is encrypted and returned as a base64 encoded string. If a bytebuf is passed the encrypted bytebuf is returned.

Supported algorithms: "DES", "3DES", "AES256"

Options:

:url-safe The boolean option directs the base64 encoder to emit standard or URL safe base64 encoded strings. If `true` the base64 encoder will emit '-' and '_' instead of the usual '+' and '/' characters.

Defaults to false.
Note: no padding is added when encoding using the URL-safe alphabet.

:salt An optional salt. A bytebuf or a string.
DES and 3DES require exactly 8 bytes, AES256 1 or more bytes

```
(do
  (load-module :crypt)
  (def encrypt (crypt/encrypt "3DES" "secret" :url-safe true))
  (encrypt "hello") ; => "ndmW1NLsDHA="
  (encrypt "world") ; => "KPYjndkZ8vM="
  (encrypt (bytebuf [1 2 3 4]))) ; => [128 216 205 163 62 43 52 82]
=> [128 216 205 163 62 43 52 82]

(do
  (load-module :crypt)
  (def encrypt (crypt/encrypt "3DES" "secret" :url-safe true :salt "salty"))
  (encrypt "hello") ; => "3MrQGcgbv00="
  (encrypt "world") ; => "a6UyBZUnK4I="
  (encrypt (bytebuf [1 2 3 4]))) ; => [86 66 56 135 239 120 10 150]
=> [86 66 56 135 239 120 10 150]
```

SEE ALSO

[crypt/decrypt](#)

Returns a new thread safe function to decrypt a string or a bytebuf given the algorithm and passphrase. If a string is passed it is ...

[top](#)

crypt/encrypt-file

```
(crypt/encrypt-file algorithm passphrase in)
(crypt/encrypt-file algorithm passphrase in out)
```

Encrypts a file.

Returns a byte buffer with the encrypted data if the 'out' argument is missing. Otherwise returns nil and writes the encrypted file data to the destination given by 'out'.

Supported algorithms:

- AES256-GCM ¹
- AES256-CBC ²
- ChaCha20 ³
- ChaCha20-BC ⁴

¹ Recommended by NIST

² AES256-CBC is regarded as a broken or risky cryptographic algorithm (CWE-327, CWE-328). Use AES256-GCM in production!

³ 256 bit key, only available with Java 11+

⁴ 256 bit key, only available with BouncyCastle libraries but works with Java 8+
Warning: files encrypted with ChaCha20 cannot be decrypted by ChaCha20-BC (and vice versa) due to different initial counter handling and the IV size (96bit vs 64bit)

The ChaCha family of ciphers are an order of magnitude more efficient on servers that do not provide hardware acceleration. Apple Silicon does not seem to have AES hardware acceleration probably due to its RISC nature.

The arg 'in' may be a:

- string file path, e.g: "/temp/foo.json"
- bytebuf

- `java.io.File`, e.g: `(io/file "/temp/foo.json")`
- `java.io.InputStream`

The arg 'out' may be a:

- string file path, e.g: `"/temp/foo.json"`
- `java.io.File`, e.g: `(io/file "/temp/foo.json")`
- `java.io.OutputStream`

The 256 bit encryption key is derived from the passphrase using a *PBKDF2WithHmacSHA256* secret key factory with a 16 byte random salt and 65536 iterations. Carefully choose a long enough passphrase.

Salt, *IV*, *Nonce* and/or *Counter* are random and unique for every call of `crypt/encrypt-file`.

While encrypting a file the random *Salt* (when a passphrase is used), *IV*, *Nonce* and/or *Counter* are written to the start of the encrypted file and read before decrypting the file:

AES256-GCM	AES256-CBC	ChaCha20
AES/GCM/NoPadding	AES/CBC/PKCS5Padding	
+-----+	+-----+	+-----+
salt (16)	salt (16)	salt (16)
+-----+	+-----+	+-----+
iv (12)	iv (12)	nonce (12)
+-----+	+-----+	+-----+
data (n)	data (n)	counter (4)
+-----+	+-----+	+-----+
		data (n)
		+-----+

```
(do
  (load-module :crypt)
  (load-module :hexdump)
  (let [file-in      (io/temp-file "test-", ".data")
        file-out     (io/temp-file "test-", ".data.enc")]
    (io/delete-file-on-exit file-in file-out)
    (io/spit file-in "1234567890")
    (crypt/encrypt-file "AES256-GCM" "42" file-in file-out)
    (-> (io/slurp file-out :binary false)
        (bytebuf)
        (hexdump/dump))))
00000000: efbf bdef bfbf 0b21 efbf bd6d efbf bdef  ....!...m...
00000010: bfbf efbf bd7c efbf bdef bfbf 4aef bfbf  ....|.....J...
00000020: efbf bdef bfbf efbf bd78 efbf bdcf 8e19  ....x.....
00000030: efbf bd25 18ef bfbf efbf bdef bfbf 68ef  ...%.....h.
00000040: bfbf 741d efbf bd79 017d efbf bd7c 5272  ..t...y.}...|Rr
00000050: efbf bd73 6406 efbf bdef bfbf 1753 efbf  ...sd.....S..
00000060: bd02 efbf bdef bfbf efbf bd          .....
=> nil
```

SEE ALSO

[crypt/decrypt-file](#)

Decrypts an encrypted file that has been created by `crypt/encrypt-file`.

[top](#)

crypt/hash-file

```
(crypt/hash-file algorithm salt file)
```

Computes a hash for a file. The hash is used together with the function `crypt/verify-file-hash` to detect file modifications.

Returns the hash Base64 encoded.

The functions uses the fast MD5 hash algorithm.

The arg 'file' may be a:

- string file path, e.g: `"/temp/foo.json"`
- `bytebuf`
- `java.io.File`, e.g: `(io/file "/temp/foo.json")`
- `java.io.InputStream`

Supported hash algorithms:

- MD5 (default)
- SHA-1
- SHA-512

MD5 is the fastest hash algorithm and precise enough to detect file changes.

```
(do
  (load-module :crypt)
  (let [file (io/temp-file "test-", ".data")
        data (bytebuf-allocate-random 1000)]
    (io/delete-file-on-exit file)
    (io/spit file data)
    (crypt/hash-file "SHA-256" "-salt-" file)))
=> "1FJuNNICUSDwIWZbHpeIY+lVgiuyLtaEQ9sb5S7h2m0="
```

SEE ALSO

[crypt/verify-file-hash](#)

Verifies a file against a hash (Base64 encoded). Returns true if the file's actual hash is equal to the given hash otherwise false.

[top](#)

crypt/max-key-size

(crypt/max-key-size algorithm)

Returns the max allowed key size

```
(do
  (load-module :crypt)
  (crypt/max-key-size "AES"))
=> 2147483647I
```

[top](#)

crypt/md5-hash

(crypt/md5-hash data)

(crypt/md5-hash data salt)

Hashes a string or a bytebuf using MD5 with an optional salt.

Note: MD5 is not safe any more use PBKDF2 to hash passwords!

```
(-> (crypt/md5-hash "hello world")
    (str/bytebuf-to-hex :upper))
=> "5EB63BBE01EEED093CB22BB8F5ACDC3"
```

```
(-> (crypt/md5-hash "hello world" "-salt-")
    (str/bytebuf-to-hex :upper))
=> "C40C4EAC3C1B87B6877E21FEBA087D0A"
```

SEE ALSO

[crypt/sha1-hash](#)

Hashes a string or a bytebuf using SHA1 with an optional salt.

[crypt/sha512-hash](#)

Hashes a string or a bytebuf using SHA512 with an optional salt.

[crypt/pbkdf2-hash](#)

Hashes a string using PBKDF2. iterations defaults to 1000, key-length defaults to 256.

[top](#)

crypt/pbkdf2-hash

```
(crypt/pbkdf2-hash data salt)
(crypt/pbkdf2-hash data salt iterations key-length)
```

Hashes a string using PBKDF2. iterations defaults to 1000, key-length defaults to 256.

```
(-> (crypt/pbkdf2-hash "hello world" "-salt-")
    (str/bytebuf-to-hex :upper))
=> "54F2B4411E8817C2A0743B2A7DD7EAE5AA3F748D1DDDC00766380914AFFE995"
```

```
(-> (crypt/pbkdf2-hash "hello world" "-salt-" 1000 256)
    (str/bytebuf-to-hex :upper))
=> "54F2B4411E8817C2A0743B2A7DD7EAE5AA3F748D1DDDC00766380914AFFE995"
```

SEE ALSO

[crypt/md5-hash](#)

Hashes a string or a bytebuf using MD5 with an optional salt.

[crypt/sha1-hash](#)

Hashes a string or a bytebuf using SHA1 with an optional salt.

[crypt/sha512-hash](#)

Hashes a string or a bytebuf using SHA512 with an optional salt.

[top](#)

crypt/provider?

```
(crypt/provider? name)
```

Returns true if the Java security provider with name exists, else false.

```
(do
  (load-module :crypt))
```

```
(crypt/provider? "BC"))
=> false
```

SEE ALSO

[crypt/add-bouncy-castle-provider](#)

Adds the BouncyCastle provider to the Java security.

[top](#)

crypt/sha1-hash

```
(crypt/sha1-hash data)
(crypt/sha1-hash data salt)
```

Hashes a string or a bytebuf using SHA1 with an optional salt.

```
(> (crypt/sha1-hash "hello world")
  (str/bytebuf-to-hex :upper))
=> "2AAE6C35C94FCFB415DBE95F408B9CE91EE846ED"
```

```
(> (crypt/sha1-hash "hello world" "-salt-")
  (str/bytebuf-to-hex :upper))
=> "90AECEDB9423CC9BC5BB7CBAFB88380BE5745B3D"
```

SEE ALSO

[crypt/md5-hash](#)

Hashes a string or a bytebuf using MD5 with an optional salt.

[crypt/sha512-hash](#)

Hashes a string or a bytebuf using SHA512 with an optional salt.

[crypt/pbkdf2-hash](#)

Hashes a string using PBKDF2. iterations defaults to 1000, key-length defaults to 256.

[top](#)

crypt/sha512-hash

```
(crypt/sha512-hash data)
(crypt/sha512-hash data salt)
```

Hashes a string or a bytebuf using SHA512 with an optional salt.

```
(let [s (> (crypt/sha512-hash "hello world")
  (str/bytebuf-to-hex :upper))]
  (str (str/nfirst s 32) "... " (str/nlast s 32)))
=> "309ECC489C12D6EB4CC40F50C902F2B4...D830E81F605DCF7DC5542E93AE9CD76F"
```

```
(let [s (> (crypt/sha512-hash "hello world" "-salt-")
  (str/bytebuf-to-hex :upper))]
  (str (str/nfirst s 32) "... " (str/nlast s 32)))
=> "316EBB70239D9480E91089D5D5BC6428...03095F186B19FC33C93D60282F3314A2"
```

SEE ALSO

[crypt/md5-hash](#)

Hashes a string or a bytearray using MD5 with an optional salt.

[crypt/sha1-hash](#)

Hashes a string or a bytearray using SHA1 with an optional salt.

[crypt/pbkdf2-hash](#)

Hashes a string using PBKDF2. iterations defaults to 1000, key-length defaults to 256.

[top](#)

crypt/verify-file-hash

(crypt/verify-file-hash algorithm salt file hash)

Verifies a file against a hash (Base64 encoded). Returns true if the file's actual hash is equal to the given hash otherwise false.

The arg 'file' may be a:

- string file path, e.g: `"/temp/foo.json"`
- bytearray
- `java.io.File`, e.g: `(io/file "/temp/foo.json")`
- `java.io.InputStream`

Supported hash algorithms:

- MD5
- SHA-1
- SHA-512

Warning: The MD5 hash function's security is considered to be severely compromised. Collisions can be found within seconds, and they can be used for malicious purposes.

```
(do
  (load-module :crypt)
  (let [file (io/temp-file "test-", ".data")
        data (bytebuf-allocate-random 1000)
        salt "salt"]
    (io/delete-file-on-exit file)
    (io/spit file data)
    (let [hash (crypt/hash-file "SHA-256" "-salt-" file)]
      (crypt/verify-file-hash "SHA-256" "-salt-" file hash))))
=> true
```

SEE ALSO

[crypt/hash-file](#)

Computes a hash for a file. The hash is used together with the function `crypt/verify-file-hash` to detect file modifications.

[top](#)

csv/read

(csv/read source & options)

Reads CSV-data from a source.

The source may be a:

- `string`
- `bytebuf`
- `java.io.File`, e.g: `(io/file "/temp/foo.json")`
- `java.nio.Path`, `
- `java.io.InputStream`
- `java.io.Reader`

Options:

:encoding enc used when reading from a binary data source e.g :encoding :utf-8, defaults to :utf-8
 :separator val e.g. ",", defaults to a comma
 :quote val e.g. "", defaults to a double quote

```
(csv/read ""1,"ab",false"")
=> (("1" "ab" "false"))

(csv/read "1|||'ab'|false" :separator "|" :quote "")
=> (("1" nil nil "ab" "false"))
```

[top](#)

csv/write

(csv/write sink records & options)

Spits data to a sink in CSV format.

The sink may be a:

- `java.io.File`, e.g: `(io/file "/temp/foo.json")`
- `java.nio.Path`
- `java.io.OutputStream`
- `java.io.Writer`

Options:

:separator val e.g. ",", defaults to a comma
 :quote val e.g. "", defaults to a double quote
 :newline val :lf (default) or :cr+lf
 :encoding enc used when writing to a binary data sink. e.g :encoding :utf-8, defaults to :utf-8

```
(csv/write (io/file "test.csv") [[1 "AC" false] [2 "WS" true]])
```

[top](#)

csv/write-str

(csv/write-str records & options)

Writes data to a string in CSV format.

All fields containing a quote char, a separator char or a newline are quoted.

Options:

:separator val e.g. ",", defaults to a comma
:quote val e.g. "\"", defaults to a double quote
:newline val :lf (default) or :cr+lf

```
(csv/write-str [[1 "AC" false] [2 "WS" true]])  
=> "1,AC,false\n2,WS,true"  
  
(csv/write-str [[1 "AC" false] [2 "WS, '-1'" true]]  
  :quote "\""  
  :separator ","  
  :newline :cr+lf)  
=> "1,AC,false\r\n2,'WS, '-1'',true"
```

[top](#)

current-time-millis

(current-time-millis)

Returns the current time in milliseconds.

```
(current-time-millis)  
=> 1710087124616
```

SEE ALSO

[nano-time](#)

Returns the current value of the running Java Virtual Machine's high-resolution time source, in nanoseconds.

[top](#)

cycle

(cycle coll)

Returns a lazy (infinite!) sequence of repetitions of the items in coll.

```
(doall (take 5 (cycle [1 2])))  
=> (1 2 1 2 1)
```

SEE ALSO

[repeat](#)

Returns a lazy sequence of x values or a collection with the value x repeated n times.

[repeatedly](#)

Takes a function of no args, presumably with side effects, and returns a collection of n calls to it

[dotimes](#)

Repeatedly executes body with name bound to integers from 0 through n-1.

[constantly](#)

Returns a function that takes any number of arguments and returns always the value x.

[top](#)

dag/add-edges

```
(add-edges edges*)
```

Add edges to a DAG. Returns a new DAG with added edges.

An edge is a vector of two nodes forming a parent/child relationship. Any *Venice* value can be used for a node.

Note: The graph is reconstructed after adding edges. To have best performance pass the edges with a single `add-edges` call to the DAG.

```
(dag/add-edges (dag/dag) ["A" "B"] ["B" "C"])  
=> (["A" "B"] ["B" "C"])
```

SEE ALSO

[dag/dag](#)

Creates a new DAG (directed acyclic graph) built from edges

[dag/topological-sort](#)

Topological sort of a DAG using Kahn's algorithm (https://en.wikipedia.org/wiki/Topological_sorting)

[top](#)

dag/add-nodes

```
(add-nodes nodes*)
```

Add nodes to a DAG. Returns a new DAG with added nodes.

Any *Venice* value can be used for a node.

Note: The graph is reconstructed after adding nodes. To have best performance pass the nodes with a single `add-nodes` call to the DAG.

```
(dag/add-nodes (dag/dag) "A")  
=> ("A")
```

```
(-> (dag/dag)  
    (dag/add-nodes "A")  
    (dag/add-edges ["A" "B"])))  
=> (["A" "B"])
```

```
(-> (dag/dag)  
    (dag/add-nodes "A")  
    (dag/add-edges ["B" "C"])))  
=> ("A" ["B" "C"])
```

SEE ALSO

[dag/dag](#)

Creates a new DAG (directed acyclic graph) built from edges

[dag/topological-sort](#)

Topological sort of a DAG using Kahn's algorithm (https://en.wikipedia.org/wiki/Topological_sorting)

[top](#)

dag/child-of?

(child-of? dag c v)

Returns `true` if c is a transitive child of v

```
(-> (dag/dag ["A", "B"] ; A E
        ["B", "C"] ; | |
        ["C", "D"] ; B F
        ["E", "F"] ; | / \
        ["F", "C"] ; C G
        ["F", "G"] ; \ /
        ["G", "D"] ; D
    (dag/child-of? "G" "E"))
=> true
```

SEE ALSO

[dag/dag](#)

Creates a new DAG (directed acyclic graph) built from edges

[dag/children](#)

Returns the transitive child nodes

[dag/parent-of?](#)

Returns true if p is a transitive parent of v

[top](#)

dag/children

(children dag node)

Returns the transitive child nodes

```
(dag/children (dag/dag ["A" "B"] ["B" "C"]) "A")
=> ("B" "C")
```

```
(-> (dag/dag ["A", "B"] ; A E
        ["B", "C"] ; | |
        ["C", "D"] ; B F
        ["E", "F"] ; | / \
        ["F", "C"] ; C G
        ["F", "G"] ; \ /
        ["G", "D"] ; D
    (dag/children "F"))
=> ("C" "G" "D")
```

SEE ALSO

[dag/dag](#)

Creates a new DAG (directed acyclic graph) built from edges

[dag/direct-children](#)

Returns the direct child nodes

[dag/parents](#)

Returns the transitive parent nodes

[dag/direct-parents](#)

Returns the direct parent nodes

[dag/roots](#)

Returns the root nodes of a DAG

[top](#)

[dag/compare-fn](#)

(compare-fn dag)

Returns a comparator fn which produces a topological sort based on the dependencies in the graph. Nodes not present in the graph will sort after nodes in the graph.

```
(let [g (dag/dag ["A", "B"] ; A E
                 ["B", "C"] ; | |
                 ["C", "D"] ; B F
                 ["E", "F"] ; | / \
                 ["F", "C"] ; C G
                 ["F", "G"] ; \ /
                 ["G", "D"] ; D
      (sort (dag/compare-fn g) ["D" "F" "A" "Z"])]
=> ["F" "A" "D" "Z"])
```

SEE ALSO

[dag/dag](#)

Creates a new DAG (directed acyclic graph) built from edges

[dag/topological-sort](#)

Topological sort of a DAG using Kahn's algorithm (https://en.wikipedia.org/wiki/Topological_sorting)

[top](#)

[dag/dag](#)

(dag)

(dag edges*)

Creates a new DAG (directed acyclic graph) built from edges

An edge is a vector of two nodes forming a parent/child relationship.

(dag/dag)

=> ()

(dag/dag ["A" "B"] ["B" "C"])

=> (["A" "B"] ["B" "C"])

```
(dag/dag ["A", "B"] ; A E
         ["B", "C"] ; | |
         ["C", "D"] ; B F
         ["E", "F"] ; | / \
         ["F", "C"] ; C G)
```

```
["F", "G"] ; \ /
["G", "D"]) ; D
=> (["A" "B"] ["B" "C"] ["C" "D"] ["E" "F"] ["F" "C"] ["F" "G"] ["G" "D"])
```

SEE ALSO

[dag/dag?](#)

Returns true if coll is a DAG

[dag/add-edges](#)

Add edges to a DAG. Returns a new DAG with added edges.

[dag/add-nodes](#)

Add nodes to a DAG. Returns a new DAG with added nodes.

[dag/topological-sort](#)

Topological sort of a DAG using Kahn's algorithm (https://en.wikipedia.org/wiki/Topological_sorting)

[dag/edges](#)

Returns the edges of a DAG

[dag/edge?](#)

Returns true if the edge given by its parent and child node is part of the DAG

[dag/nodes](#)

Returns the nodes of a DAG

[dag/node?](#)

Returns true if v is a node in the DAG

[dag/roots](#)

Returns the root nodes of a DAG

[dag/children](#)

Returns the transitive child nodes

[dag/direct-children](#)

Returns the direct child nodes

[dag/child-of?](#)

Returns true if c is a transitive child of v

[dag/parents](#)

Returns the transitive parent nodes

[dag/direct-parents](#)

Returns the direct parent nodes

[dag/parent-of?](#)

Returns true if p is a transitive parent of v

[empty?](#)

Returns true if x is empty. Accepts strings, collections and bytebufs.

[count](#)

Returns the number of items in the collection. (count nil) returns 0. Also works on strings, and Java Collections

[top](#)

dag/dag?

```
(dag? coll)
```

Returns true if coll is a DAG

```
(dag/dag? (dag/dag))  
=> true
```

top

[dag/direct-children](#)

(direct-children dag node)

Returns the direct child nodes

```
(-> (dag/dag ["A", "B"] ; A E  
          ["B", "C"] ; | |  
          ["C", "D"] ; B F  
          ["E", "F"] ; | / \  
          ["F", "C"] ; C G  
          ["F", "G"] ; \ /  
          ["G", "D"] ; D  
      (dag/direct-children "F"))  
=> ("C" "G")
```

SEE ALSO

[dag/dag](#)

Creates a new DAG (directed acyclic graph) built from edges

[dag/children](#)

Returns the transitive child nodes

[dag/parents](#)

Returns the transitive parent nodes

[dag/direct-parents](#)

Returns the direct parent nodes

[dag/roots](#)

Returns the root nodes of a DAG

top

[dag/direct-parents](#)

(direct-parents dag node)

Returns the direct parent nodes

```
(dag/parents (dag/dag ["A" "B"] ["B" "C"]) "C")  
=> ("B" "A")
```

```
(-> (dag/dag ["A", "B"] ; A E  
          ["B", "C"] ; | |  
          ["C", "D"] ; B F  
          ["E", "F"] ; | / \  
          ["F", "C"] ; C G  
          ["F", "G"] ; \ /  
          ["G", "D"] ; D  
      (dag/direct-parents "C"))  
=> ("B" "F")
```

SEE ALSO

[dag/dag](#)

Creates a new DAG (directed acyclic graph) built from edges

[dag/parents](#)

Returns the transitive parent nodes

[dag/children](#)

Returns the transitive child nodes

[dag/direct-children](#)

Returns the direct child nodes

[dag/roots](#)

Returns the root nodes of a DAG

[top](#)

[dag/edge?](#)

(edge? dag parent child)

Returns `true` if the edge given by its parent and child node is part of the DAG

```
(-> (dag/dag ["A", "B"] ; A E
      ["B", "C"] ; | |
      ["C", "D"] ; B F
      ["E", "F"] ; | / \
      ["F", "C"] ; C G
      ["F", "G"] ; \ /
      ["G", "D"] ; D
    (dag/edge? "C", "D"))
=> true
```

SEE ALSO

[dag/dag](#)

Creates a new DAG (directed acyclic graph) built from edges

[dag/edges](#)

Returns the edges of a DAG

[top](#)

[dag/edges](#)

(edges dag)

Returns the edges of a DAG

```
(dag/edges (dag/dag ["A" "B"] ["B" "C"]))
=> (["A" "B"] ["B" "C"])
```

SEE ALSO

[dag/dag](#)

Creates a new DAG (directed acyclic graph) built from edges

[dag/add-edges](#)

Add edges to a DAG. Returns a new DAG with added edges.

[dag/nodes](#)

Returns the nodes of a DAG

[top](#)

[dag/node?](#)

(node? dag v)

Returns `true` if v is a node in the DAG

```
(-> (dag/dag ["A", "B"] ; A E
          ["B", "C"] ; | |
          ["C", "D"] ; B F
          ["E", "F"] ; | / \
          ["F", "C"] ; C G
          ["F", "G"] ; \ /
          ["G", "D"] ; D
      (dag/node? "G"))
=> true
```

SEE ALSO

[dag/dag](#)

Creates a new DAG (directed acyclic graph) built from edges

[dag/nodes](#)

Returns the nodes of a DAG

[top](#)

[dag/nodes](#)

(nodes dag)

Returns the nodes of a DAG

```
(dag/nodes (dag/dag ["A" "B"] ["B" "C"]))
=> ("A" "B" "C")
```

SEE ALSO

[dag/dag](#)

Creates a new DAG (directed acyclic graph) built from edges

[dag/node?](#)

Returns true if v is a node in the DAG

[dag/add-edges](#)

Add edges to a DAG. Returns a new DAG with added edges.

[dag/edges](#)

Returns the edges of a DAG

dag/parent-of?

(parent-of? dag p v)

Returns `true` if p is a transitive parent of v

```
(-> (dag/dag ["A", "B"] ; A E
      ["B", "C"] ; | |
      ["C", "D"] ; B F
      ["E", "F"] ; | / \
      ["F", "C"] ; C G
      ["F", "G"] ; \ /
      ["G", "D"] ; D
    (dag/parent-of? "E" "G"))
=> true
```

SEE ALSO

[dag/dag](#)

Creates a new DAG (directed acyclic graph) built from edges

[dag/parents](#)

Returns the transitive parent nodes

[dag/child-of?](#)

Returns true if c is a transitive child of v

dag/parents

(parents dag node)

Returns the transitive parent nodes

```
(dag/parents (dag/dag ["A" "B"] ["B" "C"]) "C")
=> ("B" "A")
```

```
(-> (dag/dag ["A", "B"] ; A E
      ["B", "C"] ; | |
      ["C", "D"] ; B F
      ["E", "F"] ; | / \
      ["F", "C"] ; C G
      ["F", "G"] ; \ /
      ["G", "D"] ; D
    (dag/parents "C"))
=> ("B" "F" "A" "E")
```

SEE ALSO

[dag/dag](#)

Creates a new DAG (directed acyclic graph) built from edges

[dag/direct-parents](#)

Returns the direct parent nodes

[dag/children](#)

Returns the transitive child nodes

[dag/direct-children](#)

Returns the direct child nodes

[dag/roots](#)

Returns the root nodes of a DAG

[top](#)

[dag/roots](#)

```
(roots dag)
```

Returns the root nodes of a DAG

```
(dag/roots (dag/dag ["A" "B"] ["B" "C"]))  
=> ("A")
```

```
(-> (dag/dag ["A", "B"] ; A E  
        ["B", "C"] ; | |  
        ["C", "D"] ; B F  
        ["E", "F"] ; | / \  
        ["F", "C"] ; C G  
        ["F", "G"] ; \ /  
        ["G", "D"] ; D  
    (dag/roots))  
=> ("A" "E")
```

SEE ALSO

[dag/dag](#)

Creates a new DAG (directed acyclic graph) built from edges

[dag/parents](#)

Returns the transitive parent nodes

[dag/children](#)

Returns the transitive child nodes

[top](#)

[dag/topological-sort](#)

```
(topological-sort dag)
```

Topological sort of a DAG using [Kahn's algorithm](#)

```
(dag/topological-sort (dag/dag ["A" "B"] ["B" "C"]))  
=> ["A" "B" "C"]
```

```
(-> (dag/dag ["A", "B"] ; A E  
        ["B", "C"] ; | |  
        ["C", "D"] ; B F  
        ["E", "F"] ; | / \  
        ["F", "C"] ; C G
```

```
      ["F", "G"] ;      \ /
      ["G", "D"]) ;      D
    (dag/topological-sort))
=> ["E" "F" "G" "A" "B" "C" "D"]
```

SEE ALSO

[dag/dag](#)

Creates a new DAG (directed acyclic graph) built from edges

[dag/compare-fn](#)

Returns a comparator fn which produces a topological sort based on the dependencies in the graph. Nodes not present in the graph will ...

[dag/add-edges](#)

Add edges to a DAG. Returns a new DAG with added edges.

[top](#)

dec

```
(dec x)
```

Decrements the number x

```
(dec 10)
=> 9
```

```
(dec 10I)
=> 9I
```

```
(dec 10.1)
=> 9.1
```

```
(dec 10.12M)
=> 9.12M
```

SEE ALSO

[inc](#)

Increments the number x

[top](#)

dec/add

```
(dec/add x y scale rounding-mode)
```

Adds two decimals and scales the result. rounding-mode is one of `:CEILING`, `:DOWN`, `:FLOOR`, `:HALF_DOWN`, `:HALF_EVEN`, `:HALF_UP`, `:UNNECESSARY`, or `:UP`

```
(dec/add 2.44697M 1.79882M 3 :HALF_UP)
=> 4.246M
```

SEE ALSO

[dec/sub](#)

Subtract y from x and scales the result. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, or :UP

[dec/mul](#)

Multiplies two decimals and scales the result. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, ...

[dec/div](#)

Divides x by y and scales the result. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, or :UP

[dec/scale](#)

Scales a decimal. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, or :UP

[top](#)

dec/div

(dec/div x y scale rounding-mode)

Divides x by y and scales the result. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, or :UP

```
(dec/div 2.44697M 1.79882M 5 :HALF_UP)
=> 1.36032M
```

SEE ALSO

[dec/add](#)

Adds two decimals and scales the result. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, or :UP

[dec/sub](#)

Subtract y from x and scales the result. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, or :UP

[dec/mul](#)

Multiplies two decimals and scales the result. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, ...

[dec/scale](#)

Scales a decimal. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, or :UP

[top](#)

dec/mul

(dec/mul x y scale rounding-mode)

Multiplies two decimals and scales the result. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, or :UP

```
(dec/mul 2.44697M 1.79882M 5 :HALF_UP)
=> 4.40166M
```

SEE ALSO

[dec/add](#)

Adds two decimals and scales the result. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, or :UP

[dec/sub](#)

Subtract y from x and scales the result. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, or :UP

[dec/div](#)

Divides x by y and scales the result. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, or :UP

[dec/scale](#)

Scales a decimal. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, or :UP

[top](#)

dec/scale

(dec/scale x scale rounding-mode)

Scales a decimal. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, or :UP

```
(dec/scale 2.44697M 0 :HALF_UP)
=> 2M
```

```
(dec/scale 2.44697M 1 :HALF_UP)
=> 2.4M
```

```
(dec/scale 2.44697M 2 :HALF_UP)
=> 2.45M
```

```
(dec/scale 2.44697M 3 :HALF_UP)
=> 2.447M
```

```
(dec/scale 2.44697M 10 :HALF_UP)
=> 2.44697000000M
```

SEE ALSO

[dec/add](#)

Adds two decimals and scales the result. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, or :UP

[dec/sub](#)

Subtract y from x and scales the result. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, or :UP

[dec/mul](#)

Multiplies two decimals and scales the result. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, ...

[dec/div](#)

Divides x by y and scales the result. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, or :UP

[top](#)

dec/sub

(dec/sub x y scale rounding-mode)

Subtract y from x and scales the result. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, or :UP

```
(dec/sub 2.44697M 1.79882M 3 :HALF_UP)
=> 0.648M
```

SEE ALSO

[dec/add](#)

Adds two decimals and scales the result. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, or :UP

[dec/mul](#)

Multiplies two decimals and scales the result. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, ...

[dec/div](#)

Divides x by y and scales the result. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, or :UP

[dec/scale](#)

Scales a decimal. rounding-mode is one of :CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, or :UP

[top](#)

decimal

(decimal x) (decimal x scale rounding-mode)

Converts to decimal. rounding-mode is one of (:CEILING, :DOWN, :FLOOR, :HALF_DOWN, :HALF_EVEN, :HALF_UP, :UNNECESSARY, :UP)

```
(decimal 2)
=> 2M
```

```
(decimal 2 3 :HALF_UP)
=> 2.000M
```

```
(decimal 2.5787 3 :HALF_UP)
=> 2.579M
```

```
(decimal 2.5787M 3 :HALF_UP)
=> 2.579M
```

```
(decimal "2.5787" 3 :HALF_UP)
=> 2.579M
```

```
(decimal nil)
=> 0M
```

[top](#)

decimal?

```
(decimal? n)
```

Returns true if n is a decimal

```
(decimal? 4.0M)  
=> true
```

```
(decimal? 4.0)  
=> false
```

```
(decimal? 3)  
=> false
```

```
(decimal? 3I)  
=> false
```

[top](#)

dedupe

```
(dedupe coll)
```

Returns a collection with all consecutive duplicates removed.
Returns a stateful transducer when no collection is provided.

```
(dedupe [1 2 2 2 3 4 4 2 3])  
=> [1 2 3 4 2 3]
```

```
(dedupe '(1 2 2 2 3 4 4 2 3))  
=> (1 2 3 4 2 3)
```

SEE ALSO

[distinct](#)

Returns a collection with all duplicates removed.

[top](#)

def

```
(def name expr)
```

Creates a global variable.

```
(def x 5)  
=> user/x
```

```
(def sum (fn [x y] (+ x y)))  
=> user/sum
```

```
(def ^{:private true} x 100)  
=> user/x
```

SEE ALSO

[def](#)

Creates a global variable.

[def-](#)

Same as [def](#), yielding non-public [def](#)

[defonce](#)

Creates a global variable that can not be overwritten

[def-dynamic](#)

Creates a dynamic variable that starts off as a global variable and can be bound with 'binding' to a new value on the local thread.

[set!](#)

Sets a global or thread-local variable to the value of the expression.

[top](#)

def-

```
(def- name expr)
```

Same as [def](#), yielding non-public [def](#)

```
(def- x 100)
```

```
(do
  (ns foo)
  (def- x 100)
  (ns bar)
  foo/x) ; Illegal access of private symbol
```

SEE ALSO

[def](#)

Creates a global variable.

[top](#)

def-dynamic

```
(def-dynamic name expr)
```

Creates a dynamic variable that starts off as a global variable and can be bound with 'binding' to a new value on the local thread.

```
(do
  (def-dynamic x 100)
  (println x)
  (binding [x 200]
    (println x))
  (println x))
```

```
100
200
100
=> nil
```

```
(def-dynamic ^{:private true} x 100)
=> user/x
```

SEE ALSO

[binding](#)

Evaluates the expressions and binds the values to dynamic (thread-local) symbols

[def](#)

Creates a global variable.

[defonce](#)

Creates a global variable that can not be overwritten

[set!](#)

Sets a global or thread-local variable to the value of the expression.

[top](#)

defmacro

```
(defmacro name [params*] body)
```

Macro definition

```
(defmacro unless [pred a b]
  `(if (not ~pred) ~a ~b))
=> user/unless
```

SEE ALSO

[macroexpand](#)

If form represents a macro form, returns its expansion, else returns form.

[macroexpand-all](#)

Recursively expands all macros in the form.

[top](#)

defmethod

```
(defmethod multifn-name dispatch-val & fn-tail)
```

Creates a new method for a multimethod associated with a dispatch-value.

```
(do
  ;;defmulti with dispatch function
  (defmulti salary (fn [amount] (amount :t)))

  ;;defmethod provides a function implementation for a particular value
  (defmethod salary "com" [amount] (+ (:b amount) (/ (:b amount) 2)))
  (defmethod salary "bon" [amount] (+ (:b amount) 99))
  (defmethod salary :default [amount] (:b amount))

  [(salary {:t "com" :b 1000})
   (salary {:t "bon" :b 1000})])
```



```
(salary {:t "xxx" :b 1000})  
=> [1500 1099 1000]
```

SEE ALSO

[defmulti](#)

Creates a new multimethod with the associated dispatch function.

top

defmulti

```
(defmulti name dispatch-fn)
```

Creates a new multimethod with the associated dispatch function.

```
(do  
  ;;defmulti with dispatch function  
  (defmulti salary (fn [amount] (amount :t)))  
  
  ;;defmethod provides a function implementation for a particular value  
  (defmethod salary "com" [amount] (+ (:b amount) (/ (:b amount) 2)))  
  (defmethod salary "bon" [amount] (+ (:b amount) 99))  
  (defmethod salary :default [amount] (:b amount))  
  
  [(salary {:t "com" :b 1000})  
   (salary {:t "bon" :b 1000})  
   (salary {:t "xxx" :b 1000})]  
)  
=> [1500 1099 1000]
```

```
(do  
  ;;dispatch on type  
  (defmulti test (fn [x] (type x)))  
  
  (defmethod test :core/number [x] [x :number])  
  (defmethod test :core/string [x] [x :string])  
  (defmethod test :core/boolean [x] [x :boolean])  
  (defmethod test :default [x] [x :default])  
  
  [(test 1)  
   (test 1.0)  
   (test 1.0M)  
   (test "abc")  
   (test [1])]  
)  
=> [[1 :number] [1.0 :number] [1.0M :number] ["abc" :string] [[1] :default]]
```

SEE ALSO

[defmethod](#)

Creates a new method for a multimethod associated with a dispatch-value.

top

defn

```
(defn name [args*] condition-map? expr*)
(defn name ([args*] condition-map? expr*)+)
```

Same as `(def name (fn name [args*] condition-map? expr*))` or `(def name (fn name ([args*] condition-map? expr*)+))`

```
(defn sum [x y] (+ x y))
=> user/sum
```

```
(defn sum [x y] { :pre [(> x 0)] } (+ x y))
=> user/sum
```

```
(defn sum
  ([] 0)
  ([x] x)
  ([x y] (+ x y)))
=> user/sum
```

SEE ALSO

[defn-](#)

Same as `defn`, yielding non-public `def`

[fn](#)

Defines an anonymous function.

[def](#)

Creates a global variable.

[top](#)

defn-

```
(defn- name [args*] condition-map? expr*)
(defn- name ([args*] condition-map? expr*)+)
```

Same as `defn`, yielding non-public `def`

```
(defn- sum [x y] (+ x y))
=> user/sum
```

SEE ALSO

[defn](#)

Same as `(def name (fn name [args*] condition-map? expr*))` or `(def name (fn name ([args*] condition-map? expr*)+))`

[fn](#)

Defines an anonymous function.

[def](#)

Creates a global variable.

[top](#)

defonce

```
(defonce name expr)
```

Creates a global variable that can not be overwritten

```
(defonce x 5)
=> user/x
```

```
(defonce ^{:private true} x 5)
=> user/x
```

SEE ALSO

[def](#)

Creates a global variable.

[def-dynamic](#)

Creates a dynamic variable that starts off as a global variable and can be bound with 'binding' to a new value on the local thread.

top

defprotocol

```
(defprotocol protocol fn-spec*)
```

Defines a new protocol with the supplied function specs.

Formats:

- `(defprotocol P (foo [x]))`
- `(defprotocol P (foo [x] [x y]))`
- `(defprotocol P (foo [x] [x y] nil))`
- `(defprotocol P (foo [x] [x y] 100))`
- `(defprotocol P (foo [x]) (bar [x] [x y]))`

```
(do
  (ns foo)
  (deftype :complex [re :long, im :long])
  (defprotocol XMath (+ [x y]
                      (- [x y]))
    (extend :foo/complex XMath
      (+ [x y] (complex. (core/+ (:re x) (:re y))
                          (core/+ (:im x) (:im y)))))
      (- [x y] (complex. (core/- (:re x) (:re y))
                          (core/- (:im x) (:im y)))))

  (extend :core/long XMath
    (+ [x y] (core/+ x y))
    (- [x y] (core/- x y)))
  (foo/+ (complex. 1 1) (complex. 4 5)))
=> {:custom-type* :foo/complex :re 5 :im 6}
```

```
(do
  (ns foo)
  (defprotocol Lifecycle (start [c]) (stop [c]))
  (deftype :component [name :string]
    Lifecycle (start [c] (println "'~(:name c)' started"))
              (stop [c] (println "'~(:name c)' stopped")))
  (let [c (component. "test")]
    lifecycle? (extends? (type c) Lifecycle)]
    (println "'~(:name c)' extends Lifecycle protocol: ~{lifecycle?}")
    (start c)
    (stop c)))
```

```
'test' extends Lifecycle protocol: true
'test' started
'test' stopped
=> nil
```

SEE ALSO

[extend](#)

Extends protocol for type with the supplied functions.

[extends?](#)

Returns true if the type extends the protocol.

[defmulti](#)

Creates a new multimethod with the associated dispatch function.

[top](#)

deftype

```
(deftype name fields)
(deftype name fields validator)
```

Defines a new custom *record* type for the name with the fields.

The optional validator is a single arg function receiving the value as the argument and throwing an an exception if the value is not valid.

Venice implicitly creates a builder and a type check function suffixed with a dot and a question mark:

```
(deftype :point [x :long, y :long])

(point. 200 300)           ; builder
(point? (point. 200 300)) ; type check
```

The builder accepts values of any subtype of the field's type.

Validation example:

```
(deftype :point
  [x :long, y :long]
  (fn [t]
    (assert (pos? (:x t)) "x must be positive!")))
```

```
(do
  (ns foo)
  (deftype :point [x :long, y :long])
  ; explicitly creating a custom type value
  (def x (. :point 100 200))
  ; Venice implicitly creates a builder function
  ; suffixed with a '.'
  (def y (point. 200 300))
  ; ... and a type check function
  (point? y)
  y)
=> {:custom-type* :foo/point :x 200 :y 300}
```

```
(do
  (ns foo)
  (deftype :point [x :long, y :long])
  (def x (point. 100 200))
  (type x))
=> :foo/point
```

```

(do
  (ns foo)
  (deftype :point [x :long, y :long]
    (fn [p]
      (assert (pos? (:x p)) "x must be positive")
      (assert (pos? (:y p)) "y must be positive")))
  (def p (point. 100 200))
  [(:x p) (:y p)])
=> [100 200]

(do
  (ns foo)
  (deftype :named [name :string, value :any])
  (def x (named. "count" 200))
  (def y (named. "seq" [1 2]))
  [x y])
=> [{:custom-type* :foo/named :name "count" :value 200} {:custom-type* :foo/named :name "seq" :value [1 2]}]

;; modifying a custom type field
(do
  (deftype :point [x :long, y :long])
  (def p (point. 0 0))
  (def q (assoc p :x 1 :y 2)) ; q is a 'point'
  (pr-str q))
=> "{:custom-type* :user/point :x 1 :y 2}"

;; removing a custom type field
(do
  (deftype :point [x :long, y :long])
  (def p (point. 100 200))
  (def q (dissoc p :x)) ; q is just a map now
  (pr-str q))
=> "{:y 200}"

```

SEE ALSO

[deftype?](#)

Returns true if type is a custom type else false.

[deftype-of](#)

Defines a new custom wrapper type based on a base type.

[deftype-or](#)

Defines a new custom choice type.

[..](#)

Instantiates a custom type.

[deftype-describe](#)

Describes a custom type.

[Object](#)

Defines a protocol to customize the toString and/or the compareTo function of custom datatypes.

[assoc](#)

When applied to a map, returns a new map of the same type, that contains the mapping of key(s) to val(s). When applied to a vector, ...

[dissoc](#)

Returns a new coll of the same type, that does not contain a mapping for key(s)

[top](#)

deftype-describe

```
(deftype-describe type)
```

Describes a custom type.

```
(do
  (ns foo)
  (deftype :complex [real :long, imaginary :long])
  (deftype-describe :complex))

=> {:type :foo/complex :custom-type :record :field-defs ({:name :real :type :core/long :index 0I :nillable
false} {:name :imaginary :type :core/long :index 1I :nillable false}) :validation-fn nil}

(do
  (ns foo)
  (deftype-of :port :long)
  (deftype-describe :port))

=> {:custom-type :wrapping :base-type :core/long :type :foo/port :validation-fn nil}

(do
  (ns foo)
  (deftype-or :digit 0 1 2 3 4 5 6 7 8 9)
  (deftype-describe :digit))
=> {:type :foo/digit :custom-type :choice :values #{0 1 2 3 4 5 6 7 8 9}}
```

SEE ALSO

[deftype](#)

Defines a new custom record type for the name with the fields.

[deftype?](#)

Returns true if type is a custom type else false.

[deftype-or](#)

Defines a new custom choice type.

[deftype-of](#)

Defines a new custom wrapper type based on a base type.

[..](#)

Instantiates a custom type.

[top](#)

deftype-of

```
(deftype-of name base-type)
(deftype-of name base-type validator)
```

Defines a new custom *wrapper* type based on a base type.

Venice implicitly creates a builder and a type check function suffixed with a dot and a question mark:

```
(deftype-of :port :long)

(port. 8080)           ; builder
(port? (port. 8080))  ; type check
```

```
(do
  (ns foo)
```

```

(deftype-of :email-address :string)
; explicitly creating a wrapper type value
(def x (.: :email-address "foo@foo.org"))
; Venice implicitly creates a builder function
; suffixed with a '.'
(def y (email-address. "foo@foo.org"))
; ... and a type check function
(email-address? y)
y)
=> "foo@foo.org"

(do
  (ns foo)
  (deftype-of :email-address :string)
  (str "Email: " (email-address. "foo@foo.org")))
=> "Email: foo@foo.org"

(do
  (ns foo)
  (deftype-of :email-address :string)
  (def x (email-address. "foo@foo.org"))
  [(type x) (supertype x)])
=> [:foo/email-address :core/string]

(do
  (ns foo)
  (deftype-of :email-address
    :string
    str/valid-email-addr?)
  (email-address. "foo@foo.org"))
=> "foo@foo.org"

(do
  (ns foo)
  (deftype-of :contract-id :long)
  (contract-id. 100000))
=> 100000

(do
  (ns foo)
  (deftype-of :my-long :long)
  (+ 10 (my-long. 100000)))
=> 100010

```

SEE ALSO

[deftype](#)

Defines a new custom record type for the name with the fields.

[deftype?](#)

Returns true if type is a custom type else false.

[deftype-or](#)

Defines a new custom choice type.

..:

Instantiates a custom type.

[deftype-describe](#)

Describes a custom type.

deftype-or

```
(deftype-or name val*)
```

Defines a new custom *choice* type.

Venice implicitly creates a builder and a type check function suffixed with a dot and a question mark:

```
(deftype-or :color :red :green :blue)

(color. :blue)          ; builder
(color? (color. :blue)) ; type check
```

```
(do
  (ns foo)
  (deftype-or :color :red :green :blue)
  ; explicitly creating a wrapper type value
  (def x (. :color :red))
  ; Venice implicitly creates a builder function
  ; suffixed with a '.'
  (def y (color. :blue))
  ; ... and a type check function
  (color? y)
  y)
=> "blue"
```

```
(do
  (ns foo)
  (deftype-or :digit 0 1 2 3 4 5 6 7 8 9)
  (digit. 1))
=> 1
```

```
(do
  (ns foo)
  (deftype-or :long-or-double :long :double)
  (long-or-double. 1000))
=> 1000
```

SEE ALSO

[deftype](#)

Defines a new custom record type for the name with the fields.

[deftype?](#)

Returns true if type is a custom type else false.

[deftype-of](#)

Defines a new custom wrapper type based on a base type.

[..](#)

Instantiates a custom type.

[deftype-describe](#)

Describes a custom type.

[top](#)

deftype?

```
(deftype? type)
```


Returns true if `type` is a custom type else false.

```
(do
  (ns foo)
  (deftype :complex [real :long, imaginary :long])
  (deftype? :complex))
=> true

(do
  (ns foo)
  (deftype-of :email-address :string)
  (deftype? :email-address))
=> true

(do
  (ns foo)
  (deftype :complex [real :long, imaginary :long])
  (def x (complex. 100 200))
  (deftype? (type x)))
=> true
```

SEE ALSO

[deftype](#)

Defines a new custom record type for the name with the fields.

[deftype-of](#)

Defines a new custom wrapper type based on a base type.

[deftype-or](#)

Defines a new custom choice type.

[..](#)

Instantiates a custom type.

[deftype-describe](#)

Describes a custom type.

[top](#)

delay

```
(delay & body)
```

Takes a body of expressions and yields a Delay object that will invoke the body only the first time it is forced (with `force` or `deref` / `@`), and will cache the result and return it on all subsequent force calls.

```
(do
  (def x (delay (println "working...") 100))
  (deref x))
working...
=> 100
```

SEE ALSO

[deref](#)

Dereferences an atom, a future or a promise object. When applied to an atom, returns its current state. When applied to a future, will ...

[force](#)

If x is a delay, returns its value, else returns x

[realized?](#)

Returns true if a value has been produced for a promise, delay, or future.

[delay?](#)

Returns true if x is a Delay created with delay

[memoize](#)

Returns a memoized version of a referentially transparent function.

[top](#)

delay-queue

(delay-queue)

Creates a new delay queue.

A delay-queue is an unbounded blocking queue of delayed elements, in which an element can only be taken when its delay has expired. The head of the queue is that delayed element whose delay expired furthest in the past. If no delay has expired there is no head and `poll!` will return nil. Unexpired elements cannot be removed using `take!` or `poll!`, they are otherwise treated as normal elements. For example, the `count` method returns the count of both expired and unexpired elements. This queue does not permit `nil` elements.

Example rate limiter:

```
(do
  (defprotocol RateLimiter (init [x]) (acquire [x]))

  (deftype :rate-limiter [queue                :core/delay-queue
                        limit-for-period      :long
                        limit-refresh-period :long]

    RateLimiter
    (init [this] (let [q (:queue this)
                      n (:limit-for-period this)]
                  (empty q)
                  (repeatedly n #(put! q :token 0))
                  this))
    (acquire [this] (let [q (:queue this)
                        p (:limit-refresh-period this)]
                     (take! q)
                     (put! q :token p)))))

  ;; create a limiter with a limit of 5 actions within a 2s period
  (def limiter (init (rate-limiter. (delay-queue) 5 2000)))

  ;; test the limiter
  (doseq [x (range 1 26)]
    (acquire limiter)
    (printf "%s: run %2d%n" (time/local-date-time) x)))
```

```
(let [q (delay-queue)]
  (put! q 1 100)
  (put! q 1 200)
  (take! q))
=> 1
```

SEE ALSO

[peek](#)

For a list, same as first, for a vector, same as last, for a stack the top element (or nil if the stack is empty), for a queue the ...

[put!](#)

Puts an item to a queue. The operation is synchronous, it waits indefinitely until the value can be placed on the queue. Returns always nil.

[take!](#)

Retrieves and removes the head value of the queue, waiting if necessary until a value becomes available.

[poll!](#)

Polls an item from a queue with an optional timeout in milliseconds. For an indefinite timeout pass the timeout value :indefinite.

[empty](#)

Returns an empty collection of the same category as coll, or nil if coll is nil. If the collection is mutable clears the collection ...

[empty?](#)

Returns true if x is empty. Accepts strings, collections and bytebufs.

[count](#)

Returns the number of items in the collection. (count nil) returns 0. Also works on strings, and Java Collections

[delay-queue?](#)

Returns true if coll is a delay-queue

[top](#)

delay-queue?

```
(delay-queue? coll)
```

Returns true if coll is a delay-queue

```
(delay-queue? (delay-queue))  
=> true
```

[top](#)

delay?

```
(delay? x)
```

Returns true if x is a Delay created with delay

```
(do  
  (def x (delay (println "working...") 100))  
  (delay? x))  
=> true
```

SEE ALSO

[delay](#)

Takes a body of expressions and yields a Delay object that will invoke the body only the first time it is forced (with force or deref ...

[deref](#)

Dereferences an atom, a future or a promise object. When applied to an atom, returns its current state. When applied to a future, will ...

[realized?](#)

Returns true if a value has been produced for a promise, delay, or future.

[top](#)

deliver

```
(deliver ref value)
```

Delivers the supplied value to the promise, releasing any pending derefs. A subsequent call to deliver on a promise will have no effect.

```
(do
  (def p (promise))
  (deliver p 10)
  (deliver p 20) ; no effect
  @p)
=> 10
```

SEE ALSO

[deliver-ex](#)

Delivers the supplied exception to the promise, releasing any pending derefs. A subsequent call to deliver on a promise will have no effect.

[promise](#)

Returns a promise object that can be read with deref, and set, once only, with deliver. Calls to deref prior to delivery will block, ...

[realized?](#)

Returns true if a value has been produced for a promise, delay, or future.

[top](#)

deliver-ex

```
(deliver-ex ref ex)
```

Delivers the supplied exception to the promise, releasing any pending derefs. A subsequent call to deliver on a promise will have no effect.

```
(do
  (def p (promise))
  (deliver-ex p (ex :VncException "error"))
  (deliver p 20) ; no effect
  (try
    @p
    (catch :VncException e (ex-message e))))
=> "error"
```

SEE ALSO

[deliver](#)

Delivers the supplied value to the promise, releasing any pending derefs. A subsequent call to deliver on a promise will have no effect.

[promise](#)

Returns a promise object that can be read with deref, and set, once only, with deliver. Calls to deref prior to delivery will block, ...

[realized?](#)

Returns true if a value has been produced for a promise, delay, or future.

[top](#)

deref

```
(deref x)
(deref x timeout-ms timeout-val)
```

Dereferences an atom, a future or a promise object. When applied to an atom, returns its current state. When applied to a future, will block if computation is not complete. The variant taking a timeout can be used for futures and will return `timeout-val` if the timeout (in milliseconds) is reached before a value is available. If a future is deref'd and the waiting thread is interrupted the futures are cancelled.

```
(do
  (def counter (atom 10))
  (deref counter))
=> 10

(do
  (def counter (atom 10))
  @counter)
=> 10

(do
  (defn task [] 100)
  (let [f (future task)]
    (deref f)))
=> 100

(do
  (defn task [] 100)
  (let [f (future task)]
    @f))
=> 100

(do
  (defn task [] 100)
  (let [f (future task)]
    (deref f 300 :timeout)))
=> 100

(do
  (def x (delay (println "working...") 100))
  @x)
working...
=> 100

(do
  (def p (promise))
  (deliver p 10)
  @p)
=> 10

(do
  (def x (agent 100))
  @x)
=> 100

(do
  (def counter (volatile 10))
  @counter)
=> 10
```

deref?

```
(deref? x)
```

Returns true if x is dereferencable.

```
(deref? (atom 10))  
=> true
```

```
(deref? (delay 100))  
=> true
```

```
(deref? (promise))  
=> true
```

```
(deref? (future (fn [] 10)))  
=> true
```

```
(deref? (volatile 100))  
=> true
```

```
(deref? (agent 100))  
=> true
```

```
(deref? (just 100))  
=> true
```

[top](#)

difference

```
(difference s1)  
(difference s1 s2)  
(difference s1 s2 & sets)
```

Return a set that is the first set without elements of the remaining sets

```
(difference (set 1 2 3))  
=> #{1 2 3}
```

```
(difference (set 1 2) (set 2 3))  
=> #{1}
```

```
(difference (set 1 2) (set 1) (set 1 4) (set 3))  
=> #{2}
```

SEE ALSO

[union](#)

Return a set that is the union of the input sets

[intersection](#)

Return a set that is the intersection of the input sets

[cons](#)

Returns a new collection where x is the first element and coll is the rest.

`conj`

Returns a new collection with the x, xs 'added'. (conj nil item) returns (item) and (conj item) returns item.

`disj`

Returns a new set with the x, xs removed.

[top](#)

digits

`(digits x)`

Returns the number of digits of x. The number x must be of type integer, long, or bigint

```
(digits 124)
=> 3
```

```
(digits -10)
=> 2
```

```
(digits 1111111111111111111111111111111N)
=> 32
```

[top](#)

disj

`(disj set x)`
`(disj set x & xs)`

Returns a new set with the x, xs removed.

```
(disj (set 1 2 3) 3)
=> #{1 2}
```

[top](#)

dissoc

`(dissoc coll key)`
`(dissoc coll key & ks)`

Returns a new coll of the same type, that does not contain a mapping for key(s)

```
(dissoc {:a 1 :b 2 :c 3} :b)
=> {:a 1 :c 3}
```

```
(dissoc {:a 1 :b 2 :c 3} :c :b)
=> {:a 1}
```

```
(dissoc [1 2 3] 0)
=> [2 3]
```

```
(do
  (deftype :complex [real :long, imaginary :long])
  (def x (complex. 100 200))
  (def y (dissoc x :real))
  (pr-str y))
=> "{:imaginary 200}"
```

SEE ALSO

[assoc](#)

When applied to a map, returns a new map of the same type, that contains the mapping of key(s) to val(s). When applied to a vector, ...

[update](#)

Updates a value in an associative structure, where k is a key and f is a function that will take the old value and any supplied fargs ...

[top](#)

dissoc!

```
(dissoc! coll key)
(dissoc! coll key & ks)
```

Dissociates keys from a mutable map, returns the map

```
(dissoc! (mutable-map :a 1 :b 2 :c 3) :b)
=> {:a 1 :c 3}
```

```
(dissoc! (mutable-map :a 1 :b 2 :c 3) :c :b)
=> {:a 1}
```

```
(dissoc! (mutable-vector 1 2 3) 0)
=> [2 3]
```

SEE ALSO

[assoc!](#)

Associates key/vals with a mutable map, returns the map

[update!](#)

Updates a value in a mutable associative structure, where k is a key and f is a function that will take the old value and any supplied ...

[top](#)

dissoc-in

```
(dissoc-in m ks)
```

Dissociates an entry in a nested associative structure, where ks is a sequence of keys and returns a new nested structure.

```
(do
  (def users [ {:name "James" :age 26}
```



```
      {:name "John" :age 43} ]))
(dissoc-in users [1]))
=> [{:name "James" :age 26}]

(do
  (def users [ {:name "James" :age 26}
                {:name "John" :age 43} ])
  (dissoc-in users [1 :age]))
=> [{:name "James" :age 26} {:name "John"}]
```

[top](#)

distinct

```
(distinct coll)
```

Returns a collection with all duplicates removed.
Returns a stateful transducer when no collection is provided.

```
(distinct [1 2 3 4 2 3 4])
=> [1 2 3 4]
```

```
(distinct '(1 2 3 4 2 3 4))
=> (1 2 3 4)
```

SEE ALSO

[dedupe](#)

Returns a collection with all consecutive duplicates removed.

[distinct?](#)

Returns true if no two of the arguments are equal

[top](#)

distinct?

```
(distinct? x) (distinct? x y) (distinct? x y & more)
```

Returns true if no two of the arguments are equal

```
(distinct? 1 2 3)
=> true
```

```
(distinct? 1 2 3 3)
=> false
```

```
(distinct? 1 2 3 1)
=> false
```

SEE ALSO

[distinct](#)

Returns a collection with all duplicates removed.

do

```
(do exprs)
```

Evaluates the expressions in order and returns the value of the last.

```
(do (println "Test...") (+ 1 1))
Test...
=> 2
```

doall

```
(doall coll)
(doall n coll)
```

When lazy sequences are produced `doall` can be used to force any effects and realize the lazy sequence. Returns the realized items in a list!

```
(>> (lazy-seq #(rand-long 100))
      (take 4)
      (doall))
=> (39 20 58 65)
```

```
(>> (lazy-seq #(rand-long 100))
      (doall 4))
=> (28 3 94 81)
```

SEE ALSO

[lazy-seq](#)

Creates a new lazy sequence.

[cycle](#)

Returns a lazy (infinite!) sequence of repetitions of the items in coll.

[repeat](#)

Returns a lazy sequence of x values or a collection with the value x repeated n times.

[cons](#)

Returns a new collection where x is the first element and coll is the rest.

dobench

```
(dobench iterations expr)
(dobench warm-up-iterations gc-runs iterations expr)
```

Runs the expr iterations times in the most effective way and returns a list of elapsed nanoseconds for each invocation. It's main purpose is supporting benchmark tests.

Note: For best performance enable `macroexpand-on-load` !

[illegible]

top

doc

(doc x)

Prints documentation for a var or special form given `x` as its name. Prints the definition of custom types.

Displays the source of a module if `x` is a module: `(doc :ansi)`

If the var could not be found, searches for a similar var with the **Levenshtein distance** 1.

E.g:

```
> (doc dac)
Symbol 'dac' not found!
```

Did you mean?
dag/dag
dec

(doc +)

```
(doc def)
```

```
(do
  (deftype :complex [real :long, imaginary :long])
  (doc :complex))
```

SEE ALSO

ns-list

Without `arg` lists the loaded namespaces, else lists all the symbols in the specified namespace `ns`.

modules

Lists the available Venice modules

finder

Finds symbols that match one more glob patterns or regular expressions.

top

docker/cmd

(docker/cmd & args)

Runs any Docker command.

```
(println (docker/cmd "ps" "--all"))
```

```
;; a single string argument works as well
(println (docker/cmd "ps --all"))

;; run a command with JSON output and parse the JSON output into
;; Venice data
;; use `apply` to apply a vector of arguments
(-<> (apply docker/cmd ["ps" "--all" "--format" "json"])
  (:out <>)
  (str/split-lines <>)
  (str/join "," <>)
  (str "[" <> "]")
  (json/read-str <>))
```

[top](#)

docker/container-exec-by-name

(docker/container-exec-by-name name command)

Execute a command in the running container with the specified name (always in non detached mode).

Returns the captured stdout text if the command succeeds.

Throws `ShellException` if the command fails. The exception carries the exit code and the captured stderr text.

```
(docker/container-exec-by-name "myapp" "touch /tmp/execWorks")
```

SEE ALSO

[docker/container-exec-by-name&](#)

Execute a command in the running container with the specified name (always in detached mode).

[docker/run](#)

Create and run a new container from an image.

[docker/container-running-with-name?](#)

Checks if there is container with the specified name in 'running' state.

[docker/container-exec-by-name](#)

Execute a command in the running container with the specified name (always in non detached mode).

[docker/container-logs](#)

Returns the container logs.

[top](#)

docker/container-exec-by-name&

(docker/container-exec-by-name& name command)

Execute a command in the running container with the specified name (always in detached mode).

Returns always an empty string because the command is run in detached mode. To get the commands captured stdout text use `docker/container-exec-by-name` instead.

Throws a `ShellException` if the command fails. The `ShellException` carries the exit code, stdout, and stderr text.

```
(docker/container-exec-by-name& "myapp" "touch /tmp/execWorks")
```

SEE ALSO

[docker/container-exec-by-name](#)

Execute a command in the running container with the specified name (always in non detached mode).

[docker/run](#)

Create and run a new container from an image.

[docker/container-running-with-name?](#)

Checks if there is container with the specified name in 'running' state.

[docker/container-exec-by-name](#)

Execute a command in the running container with the specified name (always in non detached mode).

[docker/container-logs](#)

Returns the container logs.

[top](#)

docker/container-exists-with-name?

```
(docker/container-exists-with-name? name)
```

Returns true if there is container with the specified name else false.

```
(docker/container-exists-with-name? "myapp")
```

SEE ALSO

[docker/run](#)

Create and run a new container from an image.

[docker/container-find-by-name](#)

Find all containers with a specified name

[top](#)

docker/container-find-by-name

```
(docker/container-find-by-name name)
```

Find all containers with a specified name

```
(docker/container-find-by-name "myapp")
```

SEE ALSO

[docker/run](#)

Create and run a new container from an image.

[docker/container-exists-with-name?](#)

Returns true if there is container with the specified name else false.

[top](#)

docker/container-image-info-by-name

([docker/container-image-info-by-name](#) name)

Returns the image info for a container given by its name.

Returns a map (e.g.): { :image "arangodb/arangodb:3.10.10" :repo "arangodb/arangodb" :tag "3.10.10" }

([docker/container-image-info-by-name](#) "myapp")

SEE ALSO

[docker/run](#)

Create and run a new container from an image.

[docker/container-find-by-name](#)

Find all containers with a specified name

[docker/container-exists-with-name?](#)

Returns true if there is container with the specified name else false.

[docker/container-status-by-name](#)

Returns the status of container with the specified name.

[top](#)

docker/container-logs

([docker/container-logs](#) name & options)

Returns the container logs.

Options:

:tail n	Number of lines to show from the end of the logs
:since ts	Show logs since timestamp or relative (e.g. "42m" for 42 minutes)
:until ts	Show logs until timestamp or relative (e.g. "42m" for 42 minutes)
:follow {true, false}	Follow log output
:details {true, false}	Show extra details provided to logs

([docker/container-logs](#) "myapp")

([docker/container-logs](#) "myapp" :since "2m")

SEE ALSO

[docker/run](#)

Create and run a new container from an image.

[docker/logs](#)

Get the logs of a container

[docker/container-running-with-name?](#)

Checks if there is container with the specified name in 'running' state.

[top](#)

docker/container-purge-by-name

([docker/container-purge-by-name](#) name)

Removes a container and its image.

([docker/container-purge-by-name](#) "myapp")

SEE ALSO

[docker/run](#)

Create and run a new container from an image.

[docker/container-find-by-name](#)

Find all containers with a specified name

[docker/container-exists-with-name?](#)

Returns true if there is container with the specified name else false.

[docker/container-status-by-name](#)

Returns the status of container with the specified name.

[top](#)

docker/container-remove-by-name

([docker/container-remove-by-name](#) name)

Removes a container with the specified name.

([docker/container-remove-by-name](#) "myapp")

SEE ALSO

[docker/run](#)

Create and run a new container from an image.

[docker/container-find-by-name](#)

Find all containers with a specified name

[docker/container-exists-with-name?](#)

Returns true if there is container with the specified name else false.

[docker/container-status-by-name](#)

Returns the status of container with the specified name.

[top](#)

docker/container-running-with-name?

([docker/container-running-with-name?](#) name)

Checks if there is container with the specified name in 'running' state.

Returns true if running else false.

([docker/container-running-with-name?](#) "myapp")

SEE ALSO

[docker/run](#)

Create and run a new container from an image.

[docker/container-start-by-name](#)

Starts a container with the specified name.

[docker/container-stop-by-name](#)

Stops a container with the specified name.

[top](#)

docker/container-start-by-name

```
(docker/container-start-by-name name)
```

Starts a container with the specified name.

```
(docker/container-start-by-name "myapp")
```

SEE ALSO

[docker/run](#)

Create and run a new container from an image.

[docker/container-running-with-name?](#)

Checks if there is container with the specified name in 'running' state.

[docker/container-stop-by-name](#)

Stops a container with the specified name.

[docker/container-remove-by-name](#)

Removes a container with the specified name.

[docker/container-status-by-name](#)

Returns the status of container with the specified name.

[docker/container-logs](#)

Returns the container logs.

[top](#)

docker/container-status-by-name

```
(docker/container-status-by-name name)
```

Returns the status of container with the specified name.

```
(docker/container-status-by-name "myapp")
```

SEE ALSO

[docker/run](#)

Create and run a new container from an image.

[docker/container-find-by-name](#)

Find all containers with a specified name

[docker/container-exists-with-name?](#)

Returns true if there is container with the specified name else false.

[docker/container-remove-by-name](#)

Removes a container with the specified name.

[top](#)

docker/container-stop-by-name

```
(docker/container-stop-by-name name)
(docker/container-stop-by-name name time)
```

Stops a container with the specified name.

```
(docker/container-stop-by-name "myapp")
```

SEE ALSO

[docker/run](#)

Create and run a new container from an image.

[docker/container-running-with-name?](#)

Checks if there is container with the specified name in 'running' state.

[docker/container-stop-by-name](#)

Stops a container with the specified name.

[docker/container-remove-by-name](#)

Removes a container with the specified name.

[docker/container-status-by-name](#)

Returns the status of container with the specified name.

[docker/container-logs](#)

Returns the container logs.

[top](#)

docker/cp

```
(docker/cp src-path dst-path & options)
```

Copy files/folders between a container and the local filesystem

Options:

:archive {true, false}	Archive mode (copy all uid/gid information)
:follow-link {true, false}	Always follow symbol link in SRC_PATH
:quiet {true, false}	Suppress progress output during copy. Progress output is automatically suppressed if no terminal is attached

```
;; Copy file from host to docker container
(docker/cp "data.txt" "74789744g489:/data.txt")
```

```
;; Copy file from docker container to host
(docker/cp "74789744g489:/data.txt" "data.txt")
```

```
;; Copy a folder from host to docker container
(docker/cp "Desktop/images" "74789744g489:/root/img_files/car_photos/images")
```

```
;; Copy a folder from docker container to host
(docker/cp "74789744g489:/root/img_files/car_photos/images Desktop/images")
```

SEE ALSO

[docker/diff](#)

Inspect changes to files or directories on a container's filesystem.

[docker/ps](#)

List containers.

[docker/run](#)

Create and run a new container from an image.

[top](#)

docker/debug

```
(docker/debug mode)
```

Sets the debugging mode.

Without argument returns the current debug mode.

Mode:

:off	No debug output
:on	Prints the raw docker command line to the current stdout channel ahead of running the command
:on-no-exec	Prints the raw docker command line to the current stdout channel without running the command

```
(docker/debug :on)
```

```
(docker/debug :on-no-exec)
```

```
(docker/debug :off)
```

[top](#)

docker/diff

```
(docker/diff container & options)
```

Inspect changes to files or directories on a container's filesystem.

Options:

:format {;string, ;json} Returns the output either as a string or as JSON data

```
(println (docker/diff "74789744g489"))
```

```
(docker/diff "74789744g4892" :format :json)
```

SEE ALSO

[docker/cp](#)

Copy files/folders between a container and the local filesystem

[docker/ps](#)

List containers.

[docker/run](#)

Create and run a new container from an image.

[top](#)

docker/exec

(`docker/exec` container command args)

Execute a command in a running container (always in non detached mode).

Returns the captured stdout text if the command succeeds.

Throws `ShellException` if the command fails. The exception carries the exit code and the captured stderr text.

```
(docker/exec "74789744g489" "touch" "/tmp/execWorks")
```

```
(println (docker/exec "74789744g489" "ls" "-la" "/var"))
```

SEE ALSO

[docker/exec&](#)

Execute a command in a running container (always in detached mode).

[docker/ps](#)

List containers.

[docker/run](#)

Create and run a new container from an image.

[top](#)

docker/exec&

(`docker/exec&` container command args)

Execute a command in a running container (always in detached mode).

Returns always an empty string because the command is run in detached mode. To get the commands captured stdout text use `docker/exec` instead.

Throws `ShellException` if the command fails. The `ShellException` carries the exit code, stdout, and stderr text.

```
(docker/exec& "74789744g489" "touch" "/tmp/execWorks")
```

```
(docker/exec& "74789744g489" "ls" "/var")
```

SEE ALSO

[docker/exec](#)

Execute a command in a running container (always in non detached mode).

[docker/ps](#)

List containers.

[docker/run](#)

Create and run a new container from an image.

[top](#)

docker/image-prune

(docker/image-prune & options)

Remove unused images.

If `:all true` is specified, will also remove all images not referenced by any container. This is what you usually expect

Returns the stdout text from the command.

Options:

`:all {true, false}` Remove all unused images, not just dangling ones

```
(println (docker/image-prune))
```

```
(println (docker/image-prune :all true))
```

SEE ALSO

[docker/images](#)

List images.

[docker/image-pull](#)

Download an image from a registry.

[docker/rmi](#)

Remove an image.

[docker/image-rm](#)

Remove an image.

[top](#)

docker/image-pull

(docker/image-pull name & options)

Download an image from a registry.

Images can be pulled by name, name and tag, or digest

Returns the stdout text from the command.

Options:

`:quiet {true, false}` Suppress verbose output

```
(println (docker/image-pull "arangodb/arangodb:3.10.10"))
```

```
(println (docker/image-pull "arangodb/arangodb"))
```

SEE ALSO

[docker/images](#)

List images.

[docker/rmi](#)

Remove an image.

[docker/image-rm](#)

Remove an image.

[docker/image-prune](#)

Remove unused images.

[top](#)

[docker/image-ready?](#)

```
(docker/image-ready? repo tag)
```

Returns true if the image exists locally (is pulled) else false.

```
(docker/image-ready? "arangodb/arangodb" "3.10.10")
```

SEE ALSO

[docker/images](#)

List images.

[docker/images-query-by-repo](#)

Returns all pulled local images for a given repo.

[top](#)

[docker/image-rm](#)

```
(docker/image-rm image)
```

Remove an image.

```
(println (docker/image-rm "184e47dd1c58"))
```

SEE ALSO

[docker/images](#)

List images.

[docker/image-pull](#)

Download an image from a registry.

[docker/rmi](#)

Remove an image.

[docker/image-prune](#)

Remove unused images.

[top](#)

[docker/images](#)

```
(docker/images & options)
```

List images.

Options:

<code>:all {true, false}</code>	Show all images (default hides intermediate images)
<code>:digests {true, false}</code>	Show digests
<code>:quiet {true, false}</code>	If true only display image IDs
<code>:no-trunc {true, false}</code>	Don't truncate output
<code>:format {table, json}</code>	Returns the output either as a table string or as JSON data

```
(println (docker/images :format :table))
```

```
(docker/images :quiet true :no-trunc true :format :json)
```

```
(println (docker/images :format :json))
```

SEE ALSO

[docker/image-pull](#)

Download an image from a registry.

[docker/rmi](#)

Remove an image.

[docker/image-rm](#)

Remove an image.

[docker/image-prune](#)

Remove unused images.

[docker/run](#)

Create and run a new container from an image.

[docker/images-query-by-repo](#)

Returns all pulled local images for a given repo.

[docker/image-ready?](#)

Returns true if the image exists locally (is pulled) else false.

[top](#)

docker/images-query-by-repo

```
(docker/images-query-by-repo repo)
```

Returns all pulled local images for a given repo.

```
(docker/images-query-by-repo "arangodb/arangodb")
```

```
;; return a list of ids for "arangodb/arangodb" images
(->> (docker/images-query-by-repo "arangodb/arangodb")
      (map #(get % "ID")))
```

SEE ALSO

[docker/images](#)

List images.

[docker/image-ready?](#)

Returns true if the image exists locally (is pulled) else false.

[top](#)

[docker/logs](#)

([docker/logs](#) container & options)

Get the logs of a container

Options:

:tail n	Number of lines to show from the end of the logs
:since ts	Show logs since timestamp or relative (e.g. "42m" for 42 minutes)
:until ts	Show logs until timestamp or relative (e.g. "42m" for 42 minutes)
:follow {true, false}	Follow log output
:details {true, false}	Show extra details provided to logs

([docker/logs](#) "74789744g489")

([docker/logs](#) "74789744g489" [:tail 100](#))

([docker/logs](#) "74789744g489" [:since "60m"](#) [:until "30m"](#))

SEE ALSO

[docker/pause](#)

Pause all processes within a container

[docker/ps](#)

List containers.

[docker/run](#)

Create and run a new container from an image.

[top](#)

[docker/pause](#)

([docker/pause](#) container)

Pause all processes within a container

([docker/pause](#) "74789744g489")

SEE ALSO

[docker/unpause](#)

Unpause all processes within a container

[docker/ps](#)

List containers.

[docker/run](#)

Create and run a new container from an image.

docker/prune

(docker/prune)

Remove all stopped containers.

([docker/prune](#))

SEE ALSO

[docker/rm](#)

Remove a container.

[docker/ps](#)

List containers.

[docker/run](#)

Create and run a new container from an image.

docker/ps

(docker/ps & options)

List containers.

Options:

<code>:all {true, false}</code>	Show all containers (default shows just running)
<code>:last n</code>	Show n last created containers
<code>:quiet {true, false}</code>	If true only display container IDs
<code>:no-trunc {true, false}</code>	Don't truncate output
<code>:format {table, json}</code>	Returns the output either as a table string or as JSON data

```
(println (docker/ps :all true :format :table))
```

```
(docker/ps :all true :format :json)
```

```
(docker/ps :all true :no-trunc true :format :json)
```

```
(docker/ps :all true :no-trunc true :last 3 :format :json)
```

```
(println (docker/ps :all true :format :json))
```

SEE ALSO

[docker/start](#)

Start a stopped container.

[docker/stop](#)

Stop a container.

[docker/rm](#)

Remove a container.

[docker/run](#)

Create and run a new container from an image.

[top](#)

docker/rm

([docker/rm](#) container & options)

Remove a container.

Options:

:force {true, false}	Force the removal of a running container (uses SIGKILL)
:link link	Remove the specified link
:volumes {true, false}	Remove anonymous volumes associated with the container

```
(docker/rm "74789744g489")
```

SEE ALSO

[docker/prune](#)

Remove all stopped containers.

[docker/ps](#)

List containers.

[docker/run](#)

Create and run a new container from an image.

[top](#)

docker/rmi

([docker/rmi](#) image & options)

Remove an image.

Images can be removed by name, name and tag, or image id

Options:

:force {true, false}	Force removal of the image
:no-prune {true, false}	Do not delete untagged parents

```
(println (docker/rmi "arangodb/arangodb:3.10.10" :force true))
```

SEE ALSO

[docker/images](#)

List images.

[docker/image-pull](#)

Download an image from a registry.

[docker/image-rm](#)

Remove an image.

[docker/image-prune](#)

docker/run

([docker/run](#) image & options)

Create and run a new container from an image.

Images can be run by name, name and tag, or image id

Options:

:detach {true, false}	Run container in background and return container ID
:attach {stdin, stdout, stderr}	Attach to STDIN, STDOUT or STDERR
:publish port	Publish a container's port to the host. To expose port 8080 inside the container to port 3000 outside the container, pass "3000:8080"
:envs vars	Set environment variable (a sequence of env var defs)
:memory limit	Memory limit
:name name	Assign a name to the container
:quiet {true, false}	Suppress the pull output
:volumes vol	Bind mount a volume (a sequence of volume defs)
:workdir dir	Working directory inside the container
:args args	Arguments passed to container process (a sequence of args or a string)

See also [cargo/start](#) / [cargo/stop](#) for a smarter way to start/stop a container.

```
;; Run an ArangoDB container (use bind mounts, very slow on macOSX)
(docker/run "arangodb/arangodb:3.10.10"
  :name "myapp"
  :publish "8529:8529"
  :detach true
  :envs ["ARANGO_ROOT_PASSWORD=xxxxxx"
        "ARANGODB_OVERRIDE_DETECTED_TOTAL_MEMORY=8G"
        "ARANGODB_OVERRIDE_DETECTED_NUMBER_OF_CORES=1"]
  :volumes ["/Users/foo/arangodb/db:/var/lib/arangodb3"
            "/Users/foo/arangodb/apps:/var/lib/arangodb3-apps"])
```

```
;; Run an ArangoDB container (use docker volume, faster than bind mount)
(do
  (docker/volume-create "arangodb-db")
  (docker/volume-create "arangodb-apps")
  (docker/run "arangodb/arangodb:3.10.10"
    :name "myapp"
    :publish "8529:8529"
    :detach true
    :envs ["ARANGO_ROOT_PASSWORD=xxxxxx"
          "ARANGODB_OVERRIDE_DETECTED_TOTAL_MEMORY=8G"
          "ARANGODB_OVERRIDE_DETECTED_NUMBER_OF_CORES=1"]
    :volumes ["arangodb-db:/var/lib/arangodb3"
              "arangodb-apps:/var/lib/arangodb3-apps"]
    :args ["--database.auto-upgrade"])))
```

SEE ALSO

[cargo/start](#)

Starts a container.

[docker/images](#)

List images.

[docker/ps](#)

List containers.

[docker/start](#)

Start a stopped container.

[docker/stop](#)

Stop a container.

[docker/rm](#)

Remove a container.

[docker/prune](#)

Remove all stopped containers.

[docker/exec](#)

Execute a command in a running container (always in non detached mode).

[docker/cp](#)

Copy files/folders between a container and the local filesystem

[docker/diff](#)

Inspect changes to files or directories on a container's filesystem.

[docker/pause](#)

Pause all processes within a container

[docker/unpause](#)

Unpause all processes within a container

[docker/cp](#)

Copy files/folders between a container and the local filesystem

[docker/logs](#)

Get the logs of a container

[docker/container-find-by-name](#)

Find all containers with a specified name

[docker/container-exists-with-name?](#)

Returns true if there is container with the specified name else false.

[docker/container-running-with-name?](#)

Checks if there is container with the specified name in 'running' state.

[docker/container-start-by-name](#)

Starts a container with the specified name.

[docker/container-stop-by-name](#)

Stops a container with the specified name.

[docker/container-remove-by-name](#)

Removes a container with the specified name.

[docker/container-status-by-name](#)

Returns the status of container with the specified name.

[docker/container-exec-by-name](#)

Execute a command in the running container with the specified name (always in non detached mode).

[docker/container-logs](#)

Returns the container logs.

[docker/container-purge-by-name](#)

Removes a container and its image.

[docker/container-image-info-by-name](#)

Returns the image info for a container given by its name.

docker/start

(docker/start container & options)

Start a stopped container.

Options:

:attach {true, false} Attach STDOUT/STDERR and forward signals

See also [cargo/start](#) / [cargo/stop](#) for a smarter way to start/stop a container.

([docker/start](#) "74789744g489")

SEE ALSO

[cargo/start](#)

Starts a container.

[docker/container-start-by-name](#)

Starts a container with the specified name.

[docker/stop](#)

Stop a container.

[docker/ps](#)

List containers.

[docker/run](#)

Create and run a new container from an image.

docker/stop

(docker/stop container & options)

Stop a container.

Options:

:signal name Signal to send to the container

:time n Seconds to wait before killing the container

See also [cargo/start](#) / [cargo/stop](#) for a smarter way to start/stop a container.

([docker/stop](#) "74789744g489" :time 30)

SEE ALSO

[cargo/stop](#)

Stops a container

[docker/container-stop-by-name](#)

Stops a container with the specified name.

[docker/start](#)

Start a stopped container.

[docker/ps](#)

List containers.

[docker/run](#)

Create and run a new container from an image.

[top](#)

docker/unpause

(`docker/unpause container`)

Unpause all processes within a container

(`docker/unpause "74789744g489"`)

SEE ALSO

[docker/pause](#)

Pause all processes within a container

[docker/ps](#)

List containers.

[docker/run](#)

Create and run a new container from an image.

[top](#)

docker/version

(`docker/version & options`)

Returns the Docker version.

Options:

`:format` {:`string`, `json`} Returns the output either as a string or as JSON data

`:version` {:`full`, `server`, `client`} Returns full (default), server, or client version

(`docker/version`)

(`docker/version :version :client`)

(`docker/version :version :server`)

(`docker/version :format :json`)

(`println (docker/version :format :string)`)

SEE ALSO

[docker/images](#)

List images.

[docker/run](#)

Create and run a new container from an image.

docker/volume-create

(docker/volume-create vname & options)

Create a volume.

(docker/volume-create "hello")

SEE ALSO

[docker/volume-list](#)

List all the volumes known to Docker.

[docker/volume-inspect](#)

Inspects a volume.

[docker/volume-rm](#)

Remove a volume.

[docker/volume-prune](#)

Remove all unused local volumes. Unused local volumes are those which are not referenced by any containers. Removes both named and ...

[docker/volume-exists?](#)

Returns true if the volume with the specified name exists.

docker/volume-exists?

(docker/volume-exists? name)

Returns true if the volume with the specified name exists.

(docker/volume-exists? "hello")

SEE ALSO

[docker/volume-list](#)

List all the volumes known to Docker.

docker/volume-inspect

(docker/volume-inspect vname & options)

Inspects a volume.

Options:

:format {;string ;json} Returns the output either as a ascii or as JSON data

([docker/volume-inspect](#) "hello")

SEE ALSO

[docker/volume-list](#)

List all the volumes known to Docker.

[docker/volume-create](#)

Create a volume.

[docker/volume-inspect](#)

Inspects a volume.

[docker/volume-prune](#)

Remove all unused local volumes. Unused local volumes are those which are not referenced by any containers. Removes both named and ...

[docker/volume-exists?](#)

Returns true if the volume with the specified name exists.

[top](#)

docker/volume-list

([docker/volume-list](#) & options)

List all the volumes known to Docker.

Options:

:quiet {true, false}	Only display volume names
:format {table, json}	Returns the output either as a ascii table or as JSON data

([docker/volume-list](#))

SEE ALSO

[docker/volume-create](#)

Create a volume.

[docker/volume-inspect](#)

Inspects a volume.

[docker/volume-rm](#)

Remove a volume.

[docker/volume-prune](#)

Remove all unused local volumes. Unused local volumes are those which are not referenced by any containers. Removes both named and ...

[docker/volume-exists?](#)

Returns true if the volume with the specified name exists.

[docker/images](#)

List images.

[docker/run](#)

Create and run a new container from an image.

[top](#)

docker/volume-prune

([docker/volume-prune](#))

Remove all unused local volumes. Unused local volumes are those which are not referenced by any containers. Removes both named and anonymous volumes!

([docker/volume-prune](#))

SEE ALSO

[docker/volume-list](#)

List all the volumes known to Docker.

[docker/volume-create](#)

Create a volume.

[docker/volume-inspect](#)

Inspects a volume.

[docker/volume-rm](#)

Remove a volume.

[docker/volume-exists?](#)

Returns true if the volume with the specified name exists.

[top](#)

docker/volume-rm

([docker/volume-rm](#) name)

Remove a volume.

([docker/volume-remove](#) "hello")

SEE ALSO

[docker/volume-list](#)

List all the volumes known to Docker.

[docker/volume-create](#)

Create a volume.

[docker/volume-inspect](#)

Inspects a volume.

[docker/volume-prune](#)

Remove all unused local volumes. Unused local volumes are those which are not referenced by any containers. Removes both named and ...

[docker/volume-exists?](#)

Returns true if the volume with the specified name exists.

[top](#)

docker/wait

([docker/wait](#) & containers)

Block until one or more containers stop, then return their exit codes


```
(docker/wait "74789744g4892" "2341428e53535")
```

SEE ALSO

[docker/ps](#)

List containers.

[docker/rm](#)

Remove a container.

[docker/run](#)

Create and run a new container from an image.

[top](#)

docoll

```
(docoll f coll)
```

Applies `f` to the items of the collection presumably for side effects. Returns `nil`.

If `coll` is a lazy sequence, `docoll` iterates over the lazy sequence and realizes value by value while calling function `f` on the realized values.

```
(docoll #(println %) [1 2 3 4])
1
2
3
4
=> nil
```

```
(docoll (fn [[k v]] (println (pr-str k v)))
  {:a 1 :b 2 :c 3 :d 4})
:a 1
:b 2
:c 3
:d 4
=> nil
```

```
;; docoll all elements of a queue. calls (take! queue) to get the
;; elements of the queue.
;; note: use nil to mark the end of the queue otherwise docoll will
;; block forever!
(let [q (conj! (queue) 1 2 3 nil)]
  (docoll println q))
1
2
3
=> nil
```

```
;; lazy sequence
(let [q (conj! (queue) 1 2 3 nil)]
  (defn f []
    (let [v (poll! q)]
      (println "Producing " v)
      v))
    (docoll #(println "Collecting" %)
      (lazy-seq f)))
  Producing 1
  Collecting 1
  Producing 2
```

```
Collecting 2
Producing 3
Collecting 3
Producing nil
=> nil
```

SEE ALSO

[mapv](#)

Returns a vector consisting of the result of applying f to the set of first items of each coll, followed by applying f to the set of ...

[top](#)

done?

```
(done? f)
```

Returns true if the future or promise is done otherwise false

```
(do
  (def wait (fn [] (sleep 200) 100))
  (let [f (future wait)]
    (sleep 50)
    (printf "After 50ms: done=%b\n" (done? f))
    (sleep 300)
    (printf "After 300ms: done=%b\n" (done? f)))))
```

After 50ms: done=false

After 300ms: done=true

=> nil

SEE ALSO

[future](#)

Takes a function without arguments and yields a future object that will invoke the function in another thread, and will cache the result ...

[promise](#)

Returns a promise object that can be read with deref, and set, once only, with deliver. Calls to deref prior to delivery will block, ...

[realized?](#)

Returns true if a value has been produced for a promise, delay, or future.

[cancel](#)

Cancels a future or a promise

[cancelled?](#)

Returns true if the future or promise is cancelled otherwise false

[top](#)

dorun

```
(dorun count expr)
```

Runs the expr count times in the most effective way. It's main purpose is supporting benchmark tests. Returns the expression result of the last invocation.

Note:

For best performance enable `macroexpand-on-load` ! The expression is evaluated for every run. Alternatively a zero or one arg function referenced by a symbol can be passed:

```
(let [f (fn [] (+ 1 1))]  
      (dorun 10 f))
```

When passing a one arg function `dorun` passes the incrementing counter value (0..N) to the function:

```
(let [f (fn [x] (+ x 1))]  
      (dorun 10 f))
```

```
(dorun 10 (+ 1 1))  
=> 2
```

[top](#)

doseq

```
(doseq seq-exprs & body)
```

Repeatedly executes body (presumably for side-effects) with bindings and filtering as provided by `list-comp`. Does not retain the head of the sequence. Returns `nil`.

Supported modifiers are: `:when` predicate

```
(doseq [x (range 10)] (print x))  
0123456789  
=> nil
```

```
(doseq [x (range 10)] (print x) (print "-"))  
0-1-2-3-4-5-6-7-8-9-  
=> nil
```

```
(doseq [x (range 5)] (print (* x 2)))  
02468  
=> nil
```

```
(doseq [x (range 10) :when (odd? x)] (print x))  
13579  
=> nil
```

```
(doseq [x (range 10) :when (odd? x)] (print (* x 2)))  
26101418  
=> nil
```

```
(doseq [x [1 2 3] y [1 2 3]] (println [x y]))  
[1 1]  
[1 2]  
[1 3]  
[2 1]  
[2 2]  
[2 3]  
[3 1]  
[3 2]  
[3 3]  
=> nil
```

```
(doseq [[x y] [[0 1] [1 2]]] (println [x y]))  
[0 1]  
[1 2]  
=> nil
```

```
(doseq [[c vals] (group-by count ["a" "as" "asd" "aa" "asdf" "qwer"])]
  (println c vals))
1 [a]
2 [as aa]
3 [asd]
4 [asdf qwer]
=> nil
```

SEE ALSO

[list-comp](#)

List comprehension. Takes a vector of one or more binding-form or collection-expr pairs, each followed by zero or more modifiers, and ...

[dotimes](#)

Repeatedly executes body with name bound to integers from 0 through n-1.

top

dotimes

```
(dotimes bindings & body)
```

Repeatedly executes body with name bound to integers from 0 through n-1.

```
(dotimes [n 3] (println (str "n is " n)))
n is 0
n is 1
n is 2
=> nil
```

SEE ALSO

[repeat](#)

Returns a lazy sequence of x values or a collection with the value x repeated n times.

[repeatedly](#)

Takes a function of no args, presumably with side effects, and returns a collection of n calls to it

[doseq](#)

Repeatedly executes body (presumably for side-effects) with bindings and filtering as provided by list-comp. Does not retain the head ...

[list-comp](#)

List comprehension. Takes a vector of one or more binding-form or collection-expr pairs, each followed by zero or more modifiers, and ...

top

doto

```
(doto x & forms)
```

Evaluates x then calls all of the methods and functions with the value of x supplied at the front of the given arguments. The forms are evaluated in order. Returns x.

```
(doto (. :java.util.HashMap :new)
  (. :put :a 1)
  (. :put :b 2))
=> {"a" 1 "b" 2}
```

double

```
(double x)
```

Converts to double

```
(double 1)  
=> 1.0
```

```
(double nil)  
=> 0.0
```

```
(double false)  
=> 0.0
```

```
(double true)  
=> 1.0
```

```
(double 1.2)  
=> 1.2
```

```
(double 1.2M)  
=> 1.2
```

```
(double "1.2")  
=> 1.2
```

double-array

```
(double-array coll)  
(double-array len)  
(double-array len init-val)
```

Returns an array of Java primitive doubles containing the contents of coll or returns an array with the given length and optional init value

```
(double-array '(1.0 2.0 3.0))  
=> [1.0, 2.0, 3.0]
```

```
(double-array '(1 2 3.2 3.56M))  
=> [1.0, 2.0, 3.2, 3.56]
```

```
(double-array 10)  
=> [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0]
```

```
(double-array 10 42.0)  
=> [42.0, 42.0, 42.0, 42.0, 42.0, 42.0, 42.0, 42.0, 42.0, 42.0]
```

double?

(double? n)

Returns true if n is a double

```
(double? 4.0)  
=> true
```

```
(double? 3)  
=> false
```

```
(double? 3I)  
=> false
```

```
(double? 3.0M)  
=> false
```

```
(double? true)  
=> false
```

```
(double? nil)  
=> false
```

```
(double? {})  
=> false
```

[top](#)

drop

(drop n coll)

Returns a collection of all but the first n items in coll.
Returns a stateful transducer when no collection is provided.

```
(drop 3 [1 2 3 4 5])  
=> [4 5]
```

```
(drop 10 [1 2 3 4 5])  
=> []
```

[top](#)

drop-last

(drop-last n coll)

Return a sequence of all but the last n items in coll.
Returns a stateful transducer when no collection is provided.

```
(drop-last 3 [1 2 3 4 5])  
=> [1 2]
```

```
(drop-last 10 [1 2 3 4 5])  
=> []
```

[top](#)

drop-while

```
(drop-while predicate coll)
```

Returns a list of the items in coll starting from the first item for which `(predicate item)` returns logical false.
Returns a stateful transducer when no collection is provided.

```
(drop-while neg? [-2 -1 0 1 2 3])  
=> [0 1 2 3]
```

[top](#)

empty

```
(empty coll)
```

Returns an empty collection of the same category as coll, or nil if coll is nil. If the collection is mutable clears the collection and returns the the emptied collection.

```
(empty {:a 1})  
=> {}
```

```
(empty [1 2])  
=> []
```

```
(empty '(1 2))  
=> ()
```

[top](#)

empty-to-nil

```
(empty-to-nil x)
```

Returns nil if x is empty

```
(empty-to-nil "")  
=> nil
```

```
(empty-to-nil [])  
=> nil
```

```
(empty-to-nil '())  
=> nil
```

```
(empty-to-nil {})  
=> nil
```

[top](#)

empty?

```
(empty? x)
```

Returns true if x is empty. Accepts strings, collections and bytebufs.

```
(empty? {})  
=> true
```

```
(empty? [])  
=> true
```

```
(empty? '())  
=> true
```

```
(empty? nil)  
=> true
```

```
(empty? "")  
=> true
```

SEE ALSO

[not-empty?](#)

Returns true if x is not empty. Accepts strings, collections and bytebufs.

[top](#)

entries

```
(entries m)
```

Returns a collection of the map's entries.

```
(entries {:a 1 :b 2 :c 3})  
=> ([:a 1] [:b 2] [:c 3])
```

```
(let [e (entries {:a 1 :b 2 :c 3})]  
  (println (map key e))  
  (println (map val e)))  
(:a :b :c)  
(1 2 3)  
=> nil
```



```
;; compare to 'into'
(let [e (into [] {:a 1 :b 2 :c 3})]
  (println (map first e))
  (println (map second e)))
(:a :b :c)
(1 2 3)
=> nil
```

SEE ALSO

[map](#)

Applies *f* to the set of first items of each coll, followed by applying *f* to the set of second items in each coll, until any one of the ...

[key](#)

Returns the key of the map entry.

[val](#)

Returns the val of the map entry.

[keys](#)

Returns a collection of the map's keys.

[vals](#)

Returns a collection of the map's values.

[map-entry](#)

Creates a new map entry

[top](#)

enum?

```
(enum? class)
```

Returns true if class is a Java *enum*.

Get all values of a Java *enum*:

```
(. :java.time.Month :values)
```

Get a Java *enum* value:

```
(let [jan (. :java.time.Month :JANUARY)]
  (. :java.time.LocalDate :of 1994 jan 21))
```

This can be simplified to:

```
(. :java.time.LocalDate :of 1994 :JANUARY 21)
```

```
(enum? :java.time.Month)
=> true
```

[top](#)

eval

```
(eval form)
```

Evaluates the form data structure (not text!) and returns the result.

```
(eval '(let [a 10] (+ 3 4 a)))  
=> 17
```

```
(eval (list + 1 2 3))  
=> 6
```

```
(let [s "(+ 2 x)" x 10]  
  (eval (read-string s)))  
=> 12
```

SEE ALSO

[read-string](#)

Reads Venice source from a string and transforms its content into a Venice data structure, following the rules of the Venice syntax.

[top](#)

even?

```
(even? n)
```

Returns true if n is even, throws an exception if n is not an integer

```
(even? 4)  
=> true
```

```
(even? 3)  
=> false
```

```
(even? (int 3))  
=> false
```

SEE ALSO

[odd?](#)

Returns true if n is odd, throws an exception if n is not an integer

[top](#)

every-pred

```
(every-pred p1 & p)
```

Takes a set of predicates and returns a function f that returns true if all of its composing predicates return a logical true value against all of its arguments, else it returns false. Note that f is short-circuiting in that it will stop execution on the first argument that triggers a logical false result against the original predicates.

```
((every-pred number?) 1)  
=> true
```

```
((every-pred number?) 1 2)  
=> true
```

```
((every-pred number? even?) 2 4 6)  
=> true
```

every?

```
(every? pred coll)
```

Returns true if the predicate is true for all collection items, false otherwise.

```
(every? number? nil)
=> false
```

```
(every? number? [])
=> false
```

```
(every? number? [1 2 3 4])
=> true
```

```
(every? number? [1 2 3 :a])
=> false
```

```
(every? #(>= % 10) [10 11 12])
=> true
```

SEE ALSO

[any?](#)

Returns true if the predicate is true for at least one collection item, false otherwise.

[not-any?](#)

Returns false if the predicate is true for at least one collection item, true otherwise

[not-every?](#)

Returns false if the predicate is true for all collection items, true otherwise

ex

```
(ex class)
(ex class args*)
```

Creates an exception of type *class* with optional *args*. The *class* must be a subclass of `java.lang.Exception`

The exception types:

- `:java.lang.Exception`
- `:java.lang.RuntimeException`
- `:com.github.jlangch.venice.VncException`
- `:com.github.jlangch.venice.ValueException`

are imported implicitly so its alias `:Exception`, `:RuntimeException`, `:VncException`, and `:ValueException` can be used.

Checked vs unchecked exceptions

All exceptions in Venice are *unchecked*.

If *checked* exceptions are thrown in Venice they are immediately wrapped in a `:RuntimeException` before being thrown!
If Venice catches a *checked* exception from a Java Interop call it wraps it in a `:RuntimeException` before handling it by the catch block selectors.

```
(try
  (throw (ex :VncException)))
(catch :VncException e "caught :VncException"))
=> "caught :VncException"

(try
  (throw (ex :RuntimeException "#test")))
(catch :Exception e
  "msg: ~(ex-message e)")
=> "msg: #test"

(try
  (throw (ex :ValueException 100)))
(catch :ValueException e
  "value: ~(ex-value e)")
=> "value: 100"

(do
  (defn throw-ex-with-cause []
    (try
      (throw (ex :java.io.IOException "I/O failure"))
      (catch :Exception e
        (throw (ex :VncException "failure" (ex-cause e))))))
    (try
      (throw-ex-with-cause)
      (catch :Exception e
        "msg: ~(ex-message e), cause: ~(ex-message (ex-cause e))")))
=> "msg: failure, cause: I/O failure"
```

SEE ALSO

[throw](#)

Throws an exception.

[try](#)

Exception handling: try - catch - finally

[try-with](#)

try-with-resources allows the declaration of resources to be used in a try block with the assurance that the resources will be closed ...

[ex?](#)

Returns true if x is a an instance of `:java.lang.Throwable`

[ex-venice?](#)

Returns true if x is a an instance of `:VncException`

[top](#)

ex-cause

```
(ex-cause x)
```

Returns the exception cause or nil

```
(ex-cause (ex :VncException "a message" (ex :RuntimeException "..cause..")))
=> java.lang.RuntimeException: ..cause..
```

```
(ex-cause (ex :VncException "a message"))  
=> nil
```

SEE ALSO

[ex](#)

Creates an exception of type class with optional args. The class must be a subclass of :java.lang.Exception

[ex-message](#)

Returns the message of the exception

[ex-value](#)

Returns the value associated with a :ValueException or nil if the exception is not a :ValueException

[top](#)

ex-java-stacktrace

```
(ex-java-stacktrace x)  
(ex-java-stacktrace x format)
```

Returns the Java stacktrace for an exception.

The optional format (:string or :list) controls the format of the returned stacktrace. The default format is :string.

```
(println (ex-java-stacktrace (ex :RuntimeException "message")))  
  
(println (ex-java-stacktrace (ex :VncException "message") :list))
```

SEE ALSO

[ex](#)

Creates an exception of type class with optional args. The class must be a subclass of :java.lang.Exception

[ex-venice-stacktrace](#)

Returns the Venice stacktrace for an exception or nil if the exception is not a venice exception.

[top](#)

ex-message

```
(ex-message x)
```

Returns the message of the exception

```
(ex-message (ex :VncException "a message"))  
=> "a message"  
  
(ex-message (ex :RuntimeException))  
=> nil
```

SEE ALSO

[ex](#)

Creates an exception of type class with optional args. The class must be a subclass of :java.lang.Exception

[ex-cause](#)

Returns the exception cause or nil

[ex-value](#)

Returns the value associated with a :ValueException or nil if the exception is not a :ValueException

[top](#)

ex-value

```
(ex-value x)
```

Returns the value associated with a :ValueException or nil if the exception is not a :ValueException

```
(ex-value (ex :ValueException [10 20]))  
=> (10 20)
```

```
(ex-value (ex :RuntimeException))  
=> nil
```

SEE ALSO

[ex](#)

Creates an exception of type class with optional args. The class must be a subclass of :java.lang.Exception

[ex-message](#)

Returns the message of the exception

[ex-cause](#)

Returns the exception cause or nil

[top](#)

ex-venice-stacktrace

```
(ex-venice-stacktrace x)  
(ex-venice-stacktrace x format)
```

Returns the Venice stacktrace for an exception or nil if the exception is not a venice exception.

The optional format (:string or :list) controls the format of the returned stacktrace. The default format is :string.

```
(println (ex-venice-stacktrace (ex :ValueException [10 20])))  
Exception in thread "main" ValueException:
```

```
[Callstack]  
  at: ex (example: line 35, col 43)  
=> nil
```

```
(println (ex-venice-stacktrace (ex :RuntimeException "message")))  
nil  
=> nil
```

```
(println (ex-venice-stacktrace (ex :ValueException [10 20]) :list))  
({:fn ex :file example :line 35 :col 43})  
=> nil
```

SEE ALSO

[ex](#)

Creates an exception of type class with optional args. The class must be a subclass of :java.lang.Exception

[ex-java-stacktrace](#)

Returns the Java stacktrace for an exception.

[top](#)

ex-venice?

(ex-venice? x)

Returns true if x is a an instance of :VncException

```
(ex-venice? (ex :VncException))
=> true

(ex-venice? (ex :RuntimeException))
=> false
```

SEE ALSO

[ex](#)

Creates an exception of type class with optional args. The class must be a subclass of :java.lang.Exception

[ex?](#)

Returns true if x is a an instance of :java.lang.Throwable

[top](#)

ex?

(ex? x)

Returns true if x is a an instance of :java.lang.Throwable

```
(ex? (ex :RuntimeException))
=> true
```

SEE ALSO

[ex](#)

Creates an exception of type class with optional args. The class must be a subclass of :java.lang.Exception

[ex-venice?](#)

Returns true if x is a an instance of :VncException

[top](#)

excel/add-area-chart

```
(add-area-chart sheet chart-title
                  chart-addr-range
                  legend-position)
```

```
category-axis-title
category-axis-position
value-axis-title
value-axis-position
three-dimensional?
categories-addr-range
series)
```

Adds an area chart.

Arguments:

chart-title	The chart title
chart-addr-range	The chart position in the Excel
legend-position	The legend position: <code>:TOP</code> , <code>:TOP_RIGHT</code> , <code>:RIGHT</code> , <code>:BOTTOM</code> , <code>:LEFT</code>
category-axis-title	The category axis title
category-axis-position	The category axis position: <code>:TOP</code> , <code>:TOP_RIGHT</code> , <code>:RIGHT</code> , <code>:BOTTOM</code> , <code>:LEFT</code>
value-axis-title	The value axis title
value-axis-position	The value axis position: <code>:TOP</code> , <code>:TOP_RIGHT</code> , <code>:RIGHT</code> , <code>:BOTTOM</code> , <code>:LEFT</code>
three-dimensional?	Render in 3D: <code>true</code> or <code>false</code>
categories-addr-range	The category names in the Excel
series	The value series data. 1 to N series

```
(do
  (load-module :excel)
  (let [wbook (excel/writer :xlsx)
        sheet (excel/add-sheet wbook "Sheet 1")
        data [ ["Year" "Bears" "Dolphins" "Whales"]
                ["2017" 8 150 80 ]
                ["2018" 54 77 54 ]
                ["2019" 93 32 100 ]
                ["2020" 116 11 76 ]
                ["2021" 137 6 93 ]
                ["2022" 184 1 72 ]]]
    (excel/write-data sheet data)

    (excel/add-area-chart sheet
      "Bears Population"
      (excel/cell-address-range 10 25 1 7)
      :RIGHT
      "Year"
      :BOTTOM
      "Population"
      :LEFT
      false
      (excel/cell-address-range 2 7 1 1)
      [ (excel/area-data-series
        "Bears"
        (excel/cell-address-range 2 7 2 2)) ]])

    (excel/write->file wbook "sample.xlsx")))
```

SEE ALSO

[excel/add-line-chart](#)

Adds a line chart.

[excel/add-bar-chart](#)

Adds a bar chart.

[excel/add-pie-chart](#)

Adds a pie chart.

[excel/area-data-series](#)

Build an area chart data series

[excel/cell-address-range](#)

Build a cell address range

[top](#)

excel/add-bar-chart

```
(add-bar-chart sheet chart-title
               chart-addr-range
               legend-position
               category-axis-title
               category-axis-position
               value-axis-title
               value-axis-position
               three-dimensional?
               direction-bar?
               grouping
               vary-colors?
               categories-addr-range
               series)
```

Adds a bar chart.

Arguments:

chart-title	The chart title
chart-addr-range	The chart position in the Excel
legend-position	The legend position: <code>:TOP</code> , <code>:TOP_RIGHT</code> , <code>:RIGHT</code> , <code>:BOTTOM</code> , <code>:LEFT</code>
category-axis-title	The category axis title
category-axis-position	The category axis position: <code>:TOP</code> , <code>:TOP_RIGHT</code> , <code>:RIGHT</code> , <code>:BOTTOM</code> , <code>:LEFT</code>
value-axis-title	The value axis title
value-axis-position	The value axis position: <code>:TOP</code> , <code>:TOP_RIGHT</code> , <code>:RIGHT</code> , <code>:BOTTOM</code> , <code>:LEFT</code>
three-dimensional?	Render in 3D: <code>true</code> or <code>false</code>
direction-bar?	Render as horizontal bars or vertical columns: <code>true</code> or <code>false</code>
grouping	Bar grouping: <code>:STANDARD</code> , <code>:CLUSTERED</code> , <code>:STACKED</code> , <code>:PERCENT_STACKED</code>
vary-colors?	Vary the colors: <code>true</code> or <code>false</code>
categories-addr-range	The category names in the Excel
series	The value series data. 1 to N series

```
(do
  (load-module :excel)
  (let [wbook (excel/writer :xlsx)
        sheet (excel/add-sheet wbook "Sheet 1")
        data [["Year" "Bears" "Dolphins" "Whales"]
              ["2017" 8 150 80 ]
              ["2018" 54 77 54 ]
              ["2019" 93 32 100 ]
              ["2020" 116 11 76 ]
              ["2021" 137 6 93 ]
              ["2022" 184 1 72 ]]])
  (excel/write-data sheet data)

  (excel/add-bar-chart sheet
    "Bears Population"
    (excel/cell-address-range 10 25 1 7))
```

```

:RIGHT
"Year"
:BOTTOM
"Population"
:LEFT
false
false
:STANDARD
false
(excel/cell-address-range 2 7 1 1)
[ (excel/bar-data-series
  "Bears"
  (excel/cell-address-range 2 7 2 2))
  (excel/bar-data-series
  "Dolphins"
  (excel/cell-address-range 2 7 3 3))
  (excel/bar-data-series
  "Whales"
  (excel/cell-address-range 2 7 4 4)) ]

(excel/write->file wbook "sample.xlsx"))

```

SEE ALSO

[excel/add-line-chart](#)

Adds a line chart.

[excel/add-area-chart](#)

Adds an area chart.

[excel/add-pie-chart](#)

Adds a pie chart.

[excel/bar-data-series](#)

Build a bar chart data series

[excel/cell-address-range](#)

Build a cell address range

[top](#)

excel/add-column

```

(add-column sheet title)
(add-column sheet title options)

```

Defines a column with optional attributes on the sheet.

Note: The column cell value is just read from the passed tabular dataset. If there is any mapping or conversion needed it has to be applied to the dataset before writing it to the sheet!

Options:

:id id	a column id
:field f	a field, e.g. :first-name
:width n	width in points, e.g. 100
:skip s	skip column, e.g. true, false
:header-style r	style name for header row, e.g. :header
:body-style r	style name for body rows, e.g. :body
:footer-style r	style name for footer row, e.g. :footer
:footer-value v	explicit text or numeric value for the column's footer cell, e.g. "done", 10000.00M, nil
:footer-aggregate e	aggregation mode for the column's footer cell value, e.g. {:min, :max, :avg, :sum, :none}

```

(do
  (load-module :excel)
  (let [data [ {:first "John" :last "Doe" :weight 70.5 }
                {:first "Sue" :last "Ford" :weight 54.2 } ]
        wbook (excel/writer :xlsx)]
    (excel/add-font wbook :header { :bold true })
    (excel/add-style wbook :header { :font :header
                                     :bg-color :GREY_25_PERCENT
                                     :h-align :center })
    (excel/add-style wbook :weight { :format, "#,##0.0"
                                     :h-align :right })

    (let [sheet (excel/add-sheet wbook "Sheet 1"
                                { :no-header-row false
                                  :default-header-style :header })]
      (excel/add-column sheet "First Name" { :field :first })
      (excel/add-column sheet "Last Name" { :field :last })
      (excel/add-column sheet "Weight" { :field :weight
                                          :body-style :weight })

      (excel/write-items sheet data)
      (excel/auto-size-columns sheet)
      (excel/write->file wbook "sample.xlsx"))))

```

SEE ALSO

[excel/add-sheet](#)

Adds a sheet with optional attributes to an Excel.

[excel/add-font](#)

Add font with optional attributes to an Excel.

[excel/add-style](#)

Add a style with optional attributes to an Excel.

[top](#)

excel/add-font

```

(add-font wbook font-id)
(add-font wbook font-id options)

```

Add font with optional attributes to an Excel.

Options:

:name s	font name, e.g. 'Arial'
:height n	height in points, e.g. 12
:bold b	bold, e.g. true, false
:italic b	italic, e.g. true, false
:color c	color, either an Excel indexed color or a HTML color, e.g. :BLUE, "#00FF00" note: only XLSX supports 24 bit colors

```

(do
  (load-module :excel)
  (let [data [ {:first "John" :last "Doe" :age 28 }
                {:first "Sue" :last "Ford" :age 26 } ]
        wbook (excel/writer :xlsx)]
    (excel/add-font wbook :header { :height 12
                                    :bold true
                                    :italic false

```

```

                                :color :BLUE })
(excel/add-style wbook :header { :font :header })

(let [sheet (excel/add-sheet wbook "Sheet 1"
                             { :no-header-row false
                               :default-header-style :header })]
  (excel/add-column sheet "First Name" { :field :first })
  (excel/add-column sheet "Last Name" { :field :last })
  (excel/add-column sheet "Age" { :field :age })
  (excel/write-items sheet data)
  (excel/auto-size-columns sheet)
  (excel/write->file wbook "sample.xlsx"))))

```

SEE ALSO

[excel/add-style](#)

Add a style with optional attributes to an Excel.

[excel/add-sheet](#)

Adds a sheet with optional attributes to an Excel.

top

excel/add-image

```

(add-image sheet row col data type)
(add-image sheet row col data type scale-X scale-Y)

```

Adds an image given by its binary data (a `bytebuf`) to a specific anchor cell given by its row and col. Optionally the image can be scaled by an X and Y axis factor. The image types `:PNG` and `:JPEG` are supported.

```

(do
  (load-module :excel)
  (let [wbook (excel/writer :xlsx)
        sheet (excel/add-sheet wbook "Sheet 1")
        image "com/github/jlangch/venice/images/venice.png"
        data (io/load-classpath-resource image)]
    (excel/add-image sheet 2 2 data :PNG)
    (excel/write->file wbook "sample.xlsx")))

(do
  (load-module :excel)
  (let [wbook (excel/writer :xlsx)
        sheet (excel/add-sheet wbook "Sheet 1")
        image "com/github/jlangch/venice/images/venice.png"
        data (io/load-classpath-resource image)]
    (excel/add-image sheet 2 2 data :PNG 0.5 0.5)
    (excel/write->file wbook "sample.xlsx")))

```

SEE ALSO

[excel/write-items](#)

Writes the passed data items, a sequence of maps of name/value pairs, to the sheet.

[excel/write-item](#)

Render a single data item to the sheet

[excel/cell-formula](#)

Set a formula for a specific cell given by its row and col.

[excel/auto-size-columns](#)

Auto size the width of all columns in the sheet.

[excel/auto-size-column](#)

Auto size the width of column col (1..n) in the sheet.

[excel/row-height](#)

Set the height of a row (1..n) in the sheet.

[top](#)

excel/add-line-chart

```
(add-line-chart sheet chart-title
                chart-addr-range
                legend-position
                category-axis-title
                category-axis-position
                value-axis-title
                value-axis-position
                three-dimensional?
                vary-colors?
                categories-addr-range
                series)
```

Adds a line chart.

Arguments:

chart-title	The chart title
chart-addr-range	The chart position in the Excel
legend-position	The legend position: <code>:TOP</code> , <code>:TOP_RIGHT</code> , <code>:RIGHT</code> , <code>:BOTTOM</code> , <code>:LEFT</code>
category-axis-title	The category axis title
category-axis-position	The category axis position: <code>:TOP</code> , <code>:TOP_RIGHT</code> , <code>:RIGHT</code> , <code>:BOTTOM</code> , <code>:LEFT</code>
value-axis-title	The value axis title
value-axis-position	The value axis position: <code>:TOP</code> , <code>:TOP_RIGHT</code> , <code>:RIGHT</code> , <code>:BOTTOM</code> , <code>:LEFT</code>
three-dimensional?	Render in 3D: <code>true</code> or <code>false</code>
vary-colors?	Vary the colors: <code>true</code> or <code>false</code>
categories-addr-range	The category names in the Excel
series	The value series data. 1 to N series

```
(do
  (load-module :excel)
  (let [wbook (excel/writer :xlsx)
        sheet (excel/add-sheet wbook "Sheet 1")
        data [ ["Year" "Bears" "Dolphins" "Whales"]
                ["2017" 8 150 80 ]
                ["2018" 54 77 54 ]
                ["2019" 93 32 100 ]
                ["2020" 116 11 76 ]
                ["2021" 137 6 93 ]
                ["2022" 184 1 72 ]]]
    (excel/write-data sheet data)

    (excel/add-line-chart sheet
                          "Wildlife Population"
                          (excel/cell-address-range 10 25 1 10)
                          :RIGHT
                          "Year"
                          :BOTTOM)
```

```

      "Population"
      :LEFT
      false
      true
      (excel/cell-address-range 2 7 1 1)
      [ (excel/line-data-series
        "Bears"
        true
        :CIRCLE
        (excel/cell-address-range 2 7 2 2))
        (excel/line-data-series
        "Dolphins"
        true
        :CIRCLE
        (excel/cell-address-range 2 7 3 3))
        (excel/line-data-series
        "Whales"
        true
        :CIRCLE
        (excel/cell-address-range 2 7 4 4)) ] )

      (excel/write->file wbook "sample.xlsx"))))

```

SEE ALSO

[excel/add-bar-chart](#)

Adds a bar chart.

[excel/add-area-chart](#)

Adds an area chart.

[excel/add-pie-chart](#)

Adds a pie chart.

[excel/line-data-series](#)

Build a line chart data series

[excel/cell-address-range](#)

Build a cell address range

[top](#)

excel/add-merge-region

```
(add-merge-region sheet row-from row-to col-from col-to)
```

Add a merge region to the sheet.

```

(do
  (load-module :excel)
  (let [wbook (excel/writer :xlsx)
        sheet (excel/add-sheet wbook "Population")]
    (excel/column-width sheet 2 70)
    (excel/column-width sheet 3 70)
    (excel/add-merge-region sheet 2 2 2 3)
    (excel/write-value sheet 2 2 "Contry Population")
    (excel/write-value sheet 3 2 "Country")
    (excel/write-value sheet 3 3 "Population")
    (excel/write-value sheet 4 2 "Germany")
    (excel/write-value sheet 4 3 83_783_942)
    (excel/write-value sheet 5 2 "Italy")
    (excel/write-value sheet 5 3 60_461_826)

```

```
(excel/write-value sheet 6 2 "Austria")
(excel/write-value sheet 6 3 9_006_398)
(excel/write->file wbook "sample.xlsx")))
```

SEE ALSO

[excel/add-sheet](#)

Adds a sheet with optional attributes to an Excel.

[top](#)

excel/add-pie-chart

```
(add-pie-chart sheet chart-title
                chart-addr-range
                legend-position
                three-dimensional?
                vary-colors?
                categories-addr-range
                series)
```

Adds a pie chart.

Arguments:

chart-title	The chart title
chart-addr-range	The chart position in the Excel
legend-position	The legend position: <code>:TOP</code> , <code>:TOP_RIGHT</code> , <code>:RIGHT</code> , <code>:BOTTOM</code> , <code>:LEFT</code>
three-dimensional?	Render in 3D: <code>true</code> or <code>false</code>
vary-colors?	Vary the colors: <code>true</code> or <code>false</code>
categories-addr-range	The category names in the Excel
series	The value series data. 1 series required

```
(do
  (load-module :excel)
  (let [wbook (excel/writer :xlsx)
        sheet (excel/add-sheet wbook "Sheet 1")
        data [ ["Year" "Bears" "Dolphins" "Whales"]
                ["2017" 8 150 80 ]
                ["2018" 54 77 54 ]
                ["2019" 93 32 100 ]
                ["2020" 116 11 76 ]
                ["2021" 137 6 93 ]
                ["2022" 184 1 72 ]]])
    (excel/write-data sheet data)

    (excel/add-pie-chart sheet
      "Wildlife Population 2017"
      (excel/cell-address-range 10 25 1 7)
      :RIGHT
      false
      true
      (excel/cell-address-range 1 1 2 4)
      [ (excel/pie-data-series
        (excel/cell-address-range 2 2 2 4)) ]])

    (excel/write->file wbook "sample.xlsx")))
```

SEE ALSO

[excel/add-line-chart](#)

Adds a line chart.

[excel/add-bar-chart](#)

Adds a bar chart.

[excel/add-area-chart](#)

Adds an area chart.

[excel/pie-data-series](#)

Build a pie chart data series

[excel/cell-address-range](#)

Build a cell address range

[top](#)

excel/add-sheet

(add-sheet wbook title)

(add-sheet wbook title options)

Adds a sheet with optional attributes to an Excel.

Options:

:no-header-row b	without header row, e.g. true, false
:default-column-width n	default column width in points, e.g. 100
:default-header-style s	default header style, e.g. :header
:default-body-style s	default body style, e.g. :body
:default-footer-style s	default footer style, e.g. :footer
:merged-region r	merged region [row-from row-to col-from col-to], e.g. [1 1 4 10]
:display-zeros b	display zeros, e.g. true, false. Defines if a cell should show 0 (zero) when containing zero value. When false, cells with zero value appear blank instead of showing the number zero.

```
(do
  (load-module :excel)
  (let [data [ {:first "John" :last "Doe" :age 28 }
                {:first "Sue" :last "Ford" :age 26 } ]
        wbook (excel/writer :xlsx)
        sheet (excel/add-sheet wbook "Sheet 1")]
    (excel/add-column sheet "First Name" { :field :first })
    (excel/add-column sheet "Last Name" { :field :last })
    (excel/add-column sheet "Age" { :field :age })
    (excel/write-items sheet data)
    (excel/auto-size-columns sheet)
    (excel/write->file wbook "sample.xlsx")))
```

```
(do
  (load-module :excel)
  (let [data [ {:first "John" :last "Doe" :age 28 }
                {:first "Sue" :last "Ford" :age 26 } ]
        wbook (excel/writer :xlsx)]
    (excel/add-font wbook :bold { :bold true })
    (excel/add-font wbook :italic { :italic true })
    (excel/add-style wbook :header { :font :bold })
    (excel/add-style wbook :body { :font :italic })
    (excel/add-style wbook :footer { :font :bold })

    (let [sheet (excel/add-sheet wbook "Sheet 1"]
```



```

      { :no-header-row false
        :default-column-width 100
        :default-header-style :header
        :default-body-style :body
        :default-footer-style :footer
        :display-zeros true}}]
(excel/add-column sheet "First Name" { :field :first })
(excel/add-column sheet "Last Name" { :field :last })
(excel/add-column sheet "Age" { :field :age })
(excel/write-items sheet data)
(excel/auto-size-column sheet 1)
(excel/auto-size-column sheet 2)
(excel/auto-size-column sheet 3)
(excel/write->file wbook "sample.xlsx"))))

```

SEE ALSO

[excel/add-column](#)

Defines a column with optional attributes on the sheet.

[excel/add-merge-region](#)

Add a merge region to the sheet.

[top](#)

excel/add-style

```

(add-style wbook style-id)
(add-style wbook style-id options)

```

Add a style with optional attributes to an Excel.

Options:

:format s	cell format, e.g. "#0" Default formats: - long: "###0" - integer: "###0" - float: "###0.00" - double: "###0.00" - date: "d.m.yyyy" - datetime: "d.m.yyyy hh:mm:ss"
:font r	font name, e.g. :header
:bg-color c	background color, either an Excel indexed color or a HTML color, e.g. :PLUM, "#00FF00" Note: only XLSX supports 24 bit colors
:wrap-text b	wrap text, e.g. true, false
:h-align e	horizontal alignment {:left, :center, :right}
:v-align e	vertical alignment {:top, :middle, :bottom}
:rotation r	rotation angle [degree], e.g. 45
:border-top s	border top style, e.g. :thin
:border-right s	border right style, e.g. :none
:border-bottom s	border bottom style, e.g. :thin
:border-left s	border left style, e.g. :none

Available border styles:

:none	:dotted	:medium-dashed	:medium-dash-dot-dot
:thin	:thick	:dash-dot	:slanted-dash-dot
:medium	:double	:medium-dash-dot	

:dashed :hair :dash-dot-dot

```
(do
  (load-module :excel)
  (let [data [ {:first "John" :last "Doe" :weight 70.5 }
                {:first "Sue" :last "Ford" :weight 54.2 } ]
        wbook (excel/writer :xlsx)]
    (excel/add-font wbook :header { :bold true })
    (excel/add-style wbook :header { :font :header
                                     :bg-color :GREY_25_PERCENT
                                     :h-align :center
                                     :rotation 0
                                     :border-top :thin
                                     :border-bottom :thin })
    (excel/add-style wbook :weight { :format "#,##0.0"
                                     :h-align :right })

    (let [sheet (excel/add-sheet wbook "Sheet 1"
                                { :no-header-row false
                                  :default-header-style :header })]
      (excel/add-column sheet "First Name" { :field :first })
      (excel/add-column sheet "Last Name" { :field :last })
      (excel/add-column sheet "Weight" { :field :weight
                                          :body-style :weight })

      (excel/write-items sheet data)
      (excel/auto-size-columns sheet)
      (excel/write->file wbook "sample.xlsx"))))
```

SEE ALSO

[excel/add-font](#)

Add font with optional attributes to an Excel.

[excel/add-sheet](#)

Adds a sheet with optional attributes to an Excel.

[top](#)

excel/addr->string

```
(addr->string row col)
```

Returns an Excel A1-style cell address string representation for a row and column address

```
(excel/addr->string 1 3)
```

```
(excel/addr->string 30 56)
```

```
(do
  (load-module :excel)
  (let [data [ {:a 100 :b 200 }
                {:a 101 :b 201 }
                {:a 102 :b 202 } ]
        wbook (excel/writer :xlsx)
        sheet (excel/add-sheet wbook "Sheet 1" { :no-header-row true })
        addr #(excel/addr->string %1 %2)
        sum #(str "SUM(" %1 "," %2 ")")]
    (excel/add-column sheet "A" { :field :a })
    (excel/add-column sheet "B" { :field :b })
```

```
(excel/add-column sheet "C" { :field :c })
(excel/write-items sheet data)
(excel/cell-formula sheet 1 3 (sum (addr 1 1) (addr 1 2)))
(excel/cell-formula sheet 2 3 (sum (addr 2 1) (addr 2 2)))
(excel/cell-formula sheet 3 3 (sum (addr 3 1) (addr 3 2)))
(excel/evaluate-formulas wbook)
(excel/auto-size-columns sheet)
(excel/write->file wbook "sample.xlsx")))
```

SEE ALSO

[excel/col->string](#)

Returns an Excel A-style column number string representation for a column number

[excel/cell-formula](#)

Set a formula for a specific cell given by its row and col.

[top](#)

excel/area-data-series

```
(area-data-series title data-address-range)
```

Build an area chart data series

Arguments:

title	The series title
data-address-range	The series data in the Excel

```
(excel/area-data-series "Countries" (excel/cell-address-range 2 2 1 5))
```

SEE ALSO

[excel/cell-address-range](#)

Build a cell address range

[top](#)

excel/auto-size-column

```
(auto-size-column sheet col)
```

Auto size the width of column col (1..n) in the sheet.

```
(do
  (load-module :excel)
  (let [data [ {:first "John" :last "Doe" :age 28 }
                {:first "Sue" :last "Ford" :age 26 } ]
        wbook (excel/writer :xlsx)
        sheet (excel/add-sheet wbook "Sheet 1")]
    (excel/add-column sheet "First Name" { :field :first })
    (excel/add-column sheet "Last Name" { :field :last })
    (excel/add-column sheet "Age" { :field :age })
    (excel/write-items sheet data)
    (excel/auto-size-column sheet 1)
    (excel/auto-size-column sheet 2)))
```

```
(excel/auto-size-column sheet 3)
(excel/write->file wbook "sample.xlsx"))
```

SEE ALSO

[excel/auto-size-columns](#)

Auto size the width of all columns in the sheet.

[excel/write-items](#)

Writes the passed data items, a sequence of maps of name/value pairs, to the sheet.

[excel/write-item](#)

Render a single data item to the sheet

[excel/write-value](#)

Writes a value to a specific cell given by its row and col.

[excel/cell-formula](#)

Set a formula for a specific cell given by its row and col.

[excel/row-height](#)

Set the height of a row (1..n) in the sheet.

[top](#)

excel/auto-size-columns

```
(auto-size-columns sheet)
```

Auto size the width of all columns in the sheet.

```
(do
  (load-module :excel)
  (let [data [ { :first "John" :last "Doe" :age 28 }
                { :first "Sue" :last "Ford" :age 26 } ]
        wbook (excel/writer :xlsx)
        sheet (excel/add-sheet wbook "Sheet 1")]
    (excel/add-column sheet "First Name" { :field :first })
    (excel/add-column sheet "Last Name" { :field :last })
    (excel/add-column sheet "Age" { :field :age })
    (excel/write-items sheet data)
    (excel/auto-size-columns sheet)
    (excel/write->file wbook "sample.xlsx")))
```

SEE ALSO

[excel/auto-size-column](#)

Auto size the width of column col (1..n) in the sheet.

[excel/write-items](#)

Writes the passed data items, a sequence of maps of name/value pairs, to the sheet.

[excel/write-item](#)

Render a single data item to the sheet

[excel/write-value](#)

Writes a value to a specific cell given by its row and col.

[excel/cell-formula](#)

Set a formula for a specific cell given by its row and col.

[excel/row-height](#)

Set the height of a row (1..n) in the sheet.

excel/bar-data-series

```
(bar-data-series title data-address-range)
```

Build a bar chart data series

Arguments:

title	The series title
data-address-range	The series data in the Excel

```
(excel/bar-data-series "Countries" (excel/cell-address-range 2 2 1 5))
```

SEE ALSO

[excel/cell-address-range](#)

Build a cell address range

excel/bg-color

```
(bg-color sheet row col color)
(bg-color sheet row col-start col-end color)
(bg-color sheet row-start row-end col-start col-end color & colors)
```

Sets a background color for a single cell, a range of columns within a row, or region of cells.

```
(do
  (load-module :excel)
  (let [wbook (excel/writer :xlsx)
        sheet (excel/add-sheet wbook "Data")]

    ;; single cells
    (excel/bg-color sheet 1 1 "#27ae60")
    (excel/bg-color sheet 1 2 "#52be80")
    (excel/bg-color sheet 1 3 "#7dcea0")

    ;; range of cells in row
    (excel/bg-color sheet 1 4 6 "#3498db")

    ;; area of cells
    (excel/bg-color sheet 1 6 7 9 "#aed6f1")
    (excel/bg-color sheet 1 6 10 12 "#bb8fce" "#d2b4de")
    (excel/bg-color sheet 1 6 13 15 "#f1c40f" "#f4d03f" "#f7dc6f")
    (excel/write->file wbook "sample.xlsx"))

  (do
    (load-module :excel)
    (let [wbook (excel/writer :xlsx)
          sheet (excel/add-sheet wbook "Data")]
      (excel/write-data sheet [[100 101 102]
                               [200 201 203]
                               [300 301 303]
                               [400 401 403]])))
```

```
[500 501 503]
[600 601 603]])
(excel/bg-color sheet 1 6 1 3 "#a9cafc" "#d9e7fc")
(excel/write->file wbook "sample.xlsx")))
```

SEE ALSO

[excel/add-style](#)

Add a style with optional attributes to an Excel.

[excel/add-font](#)

Add font with optional attributes to an Excel.

[excel/cell-style](#)

Apply a defined cell style to a cell

[top](#)

excel/cell-address-range

(cell-address-range row-first row-last col-first col-last)

Build a cell address range

```
(excel/cell-address-range 1 2 1 10)
```

SEE ALSO

[excel/cell-address](#)

Returns the cell address in A1 style for a cell at row/col in a sheet

[top](#)

excel/cell-empty?

(cell-empty? sheet row col)

Returns true if the sheet cell given by row/col is empty.

```
(do
  (load-module :excel)

  (defn test-xls []
    (let [wbook (excel/writer :xlsx)
          sheet (excel/add-sheet wbook "Data")]
      (excel/write-data sheet [[100 101 102] [200 201 202]])
      (excel/write->bytebuf wbook)))

  (let [wbook (excel/open (test-xls))
        sheet (excel/sheet wbook "Data")]
    [(excel/cell-empty? sheet 1 1)
     (excel/cell-empty? sheet 2 1)
     (excel/cell-empty? sheet 3 1)]))
```

SEE ALSO

[excel/cell-type](#)

Returns the sheet cell type as one of { :notfound, :blank, :string, :boolean, :numeric, :formula, :error, or :unknown }

[excel/read-string-val](#)

Returns the sheet cell value as string.

[excel/read-boolean-val](#)

Returns the sheet cell value as boolean.

[excel/read-long-val](#)

Returns the sheet cell value as long.

[excel/read-double-val](#)

Returns the sheet cell value as double.

[excel/read-date-val](#)

Returns the sheet cell value as a date (:java.time.LocalDate).

[excel/read-datetime-val](#)

Returns the sheet cell value as a datetime (:java.time.LocalDateTime).

[top](#)

excel/cell-formula

(cell-formula sheet row col formula)

Set a formula for a specific cell given by its row and col.

```
(do
  (load-module :excel)
  (let [data [ {:a 100 :b 200 }
                {:a 101 :b 201 }
                {:a 102 :b 202 } ]
        wbook (excel/writer :xlsx)
        sheet (excel/add-sheet wbook "Sheet 1" { :no-header-row true })]
    (excel/add-column sheet "A" { :field :a })
    (excel/add-column sheet "B" { :field :b })
    (excel/add-column sheet "C" { :field :c })
    (excel/write-items sheet data)
    (excel/cell-formula sheet 1 3 "SUM(A1,B1)")
    (excel/cell-formula sheet 2 3 "SUM(A2,B2)")
    (excel/cell-formula sheet 3 3 "SUM(A3,B3)")
    (excel/evaluate-formulas wbook)
    (excel/auto-size-columns sheet)
    (excel/write->file wbook "sample.xlsx")))
```

```
(do
  (load-module :excel)
  (let [data [ {:a 100 :b 200 }
                {:a 101 :b 201 }
                {:a 102 :b 202 } ]
        wbook (excel/writer :xlsx)
        sheet (excel/add-sheet wbook "Sheet 1" { :no-header-row true })]
    (excel/add-font wbook :bold { :bold true })
    (excel/add-style wbook :bold { :font :bold })
    (excel/add-column sheet "A" { :field :a })
    (excel/add-column sheet "B" { :field :b })
    (excel/add-column sheet "C" { :field :c })
    (excel/write-items sheet data)
    (excel/cell-formula sheet 1 3 "SUM(A1,B1)" :bold)
    (excel/cell-formula sheet 2 3 "SUM(A2,B2)" :bold)
    (excel/cell-formula sheet 3 3 "SUM(A3,B3)" :bold))
```

```
(excel/evaluate-formulas wbook)
(excel/auto-size-columns sheet)
(excel/write->file wbook "sample.xlsx")))
```

SEE ALSO

[excel/addr->string](#)

Returns an Excel A1-style cell address string representation for a row and column address

[excel/sum-formula](#)

Returns a sum formula for the given cell area

[excel/write-items](#)

Writes the passed data items, a sequence of maps of name/value pairs, to the sheet.

[excel/write-item](#)

Render a single data item to the sheet

[excel/write-value](#)

Writes a value to a specific cell given by its row and col.

[excel/auto-size-columns](#)

Auto size the width of all columns in the sheet.

[excel/auto-size-column](#)

Auto size the width of column col (1..n) in the sheet.

[excel/row-height](#)

Set the height of a row (1..n) in the sheet.

[top](#)

excel/cell-formula-result-type

```
(cell-formula-result-type sheet row col)
```

Returns the sheet cell type as one of { :notfound, :blank, :string, :boolean, :numeric, :formula, :error, or :unknown } after formula cell evaluation. For non formula cells this function is the same as the `cell-type` function.

```
(do
  (load-module :excel)

  (defn create-excel []
    (let [wbook (excel/writer :xlsx)
          sheet (excel/add-sheet wbook "Data")]
      (excel/write-data sheet [[10 20.123 {:formula "SUM(A1,B1)}]])
      (excel/write->bytebuf wbook)))

  (let [wbook (excel/open (create-excel))
        sheet (excel/sheet wbook "Data")]
    (excel/evaluate-formulas wbook)
    (printf "Cell (1,3): %s\n" (excel/cell-type sheet 1 3))
    (printf "Cell (1,3): %s (formula result type)\n"
      (excel/cell-formula-result-type sheet 1 3))))
```

SEE ALSO

[excel/cell-type](#)

Returns the sheet cell type as one of { :notfound, :blank, :string, :boolean, :numeric, :formula, :error, or :unknown }

[excel/cell-empty?](#)

Returns true if the sheet cell given by row/col is empty.

excel/read-string-val

Returns the sheet cell value as string.

excel/read-boolean-val

Returns the sheet cell value as boolean.

excel/read-long-val

Returns the sheet cell value as long.

excel/read-double-val

Returns the sheet cell value as double.

excel/read-date-val

Returns the sheet cell value as a date (:java.time.LocalDate).

excel/read-datetime-val

Returns the sheet cell value as a datetime (:java.time.LocalDateTime).

[top](#)

excel/cell-style

(cell-style sheet row col style-id)

(cell-style sheet row-from row-to col-from col-to style-id)

Apply a defined cell style to a cell

```
(do
  (load-module :excel)
  (let [wbook (excel/writer :xlsx)
        sheet (excel/add-sheet wbook "Sheet 1" { :no-header-row false })]
    (excel/add-font wbook :bold { :bold true
                                   :color "#54039c" })
    (excel/add-style wbook :style-1 { :font :bold
                                       :h-align :left
                                       :rotation 0 })
    (excel/add-style wbook :style-2 { :bg-color "#cae1fa"
                                       :h-align :center
                                       :rotation 0
                                       :border-top :thin
                                       :border-left :thin
                                       :border-bottom :thin
                                       :border-right :thin})
    (excel/add-style wbook :style-3 { :h-align :right
                                       :format "#,##0.00" })

    (excel/write-value sheet 2 1 100)
    (excel/write-value sheet 2 2 200)
    (excel/write-value sheet 2 3 300)

    (excel/cell-style sheet 2 1 :style-1)
    (excel/cell-style sheet 2 2 :style-2)
    (excel/cell-style sheet 2 3 :style-3)

    (excel/write->file wbook "sample.xlsx"))))

(do
  (load-module :excel)
  (let [wbook (excel/writer :xlsx)
        sheet (excel/add-sheet wbook "Sheet 1" { :no-header-row false })]
    (excel/add-style wbook :style { :bg-color "#cae1fa"
                                     :h-align :center
```

```

      :format "#,##0.00" })

(excel/write-value sheet 2 2 100)
(excel/write-value sheet 2 3 200)
(excel/write-value sheet 2 4 300)
(excel/write-value sheet 3 2 101)
(excel/write-value sheet 3 3 201)
(excel/write-value sheet 3 4 301)

(excel/cell-style sheet 2 3 2 4 :style)

(excel/write->file wbook "sample.xlsx"))))

```

SEE ALSO

[excel/add-style](#)

Add a style with optional attributes to an Excel.

[excel/add-font](#)

Add font with optional attributes to an Excel.

[excel/write-value](#)

Writes a value to a specific cell given by its row and col.

[top](#)

excel/cell-type

```
(cell-type sheet row col)
```

Returns the sheet cell type as one of { :notfound, :blank, :string, :boolean, :numeric, :formula, :error, or :unknown }

Note:

1. Excel returns cells containing long, double, date or datetime values as `:numeric`. The reader decides how to read a numeric cell using either of `excel/read-long-val`, `excel/read-double-val`, or `excel/read-date-val`.
2. To evaluate formulas to values call `excel/evaluate-formulas` on the workbook the right after opening the excel document.

```

(do
  (load-module :excel)

  (defn test-xls []
    (let [wbook (excel/writer :xlsx)
          sheet (excel/add-sheet wbook "Data")]
      (excel/write-data sheet [[100 "101" 102.0]])
      (excel/write->bytebuf wbook)))

  (let [wbook (excel/open (test-xls))
        sheet (excel/sheet wbook "Data")]
    [(excel/cell-type sheet 1 1)
     (excel/cell-type sheet 1 2)
     (excel/cell-type sheet 1 3)
     (excel/cell-type sheet 1 4)]))

```

SEE ALSO

[excel/cell-formula-result-type](#)

Returns the sheet cell type as one of { :notfound, :blank, :string, :boolean, :numeric, :formula, :error, or :unknown } after formula ...

[excel/cell-empty?](#)

Returns true if the sheet cell given by row/col is empty.

[excel/read-string-val](#)

Returns the sheet cell value as string.

[excel/read-boolean-val](#)

Returns the sheet cell value as boolean.

[excel/read-long-val](#)

Returns the sheet cell value as long.

[excel/read-double-val](#)

Returns the sheet cell value as double.

[excel/read-date-val](#)

Returns the sheet cell value as a date (:java.time.LocalDate).

[excel/read-datetime-val](#)

Returns the sheet cell value as a datetime (:java.time.LocalDateTime).

[top](#)

excel/col->string

```
(col->string col)
```

Returns an Excel A-style column number string representation for a column number

```
(excel/col->string 1)
```

```
(excel/col->string 56)
```

SEE ALSO

[excel/addr->string](#)

Returns an Excel A1-style cell address string representation for a row and column address

[top](#)

excel/col-width

```
(col-width sheet col width)
```

Set the width of a column (1..n) in the sheet.

```
(do
  (load-module :excel)
  (let [os      (io/file-out-stream "sample.xlsx")
        data   [ {:first "John" :last "Doe"   :age 28 }
                  {:first "Sue"  :last "Ford"   :age 26 } ]
        wbook  (excel/writer :xlsx)
        sheet  (excel/add-sheet wbook "Sheet 1")]
    (excel/add-column sheet "First Name" { :field :first })
    (excel/add-column sheet "Last Name"  { :field :last })
    (excel/add-column sheet "Age"        { :field :age })
    (excel/write-items sheet data)
    (excel/col-width sheet 1 80)
    (excel/col-width sheet 2 80)
    (excel/col-width sheet 3 60)
    (excel/write->file wbook "sample.xlsx")))
```

SEE ALSO

[excel/row-height](#)

Set the height of a row (1..n) in the sheet.

[excel/auto-size-columns](#)

Auto size the width of all columns in the sheet.

[excel/write-items](#)

Writes the passed data items, a sequence of maps of name/value pairs, to the sheet.

[excel/write-item](#)

Render a single data item to the sheet

[excel/write-value](#)

Writes a value to a specific cell given by its row and col.

[excel/cell-formula](#)

Set a formula for a specific cell given by its row and col.

[excel/auto-size-column](#)

Auto size the width of column col (1..n) in the sheet.

[top](#)

excel/convert->reader

(convert->reader builder)

Converts an excel or sheet builder to the corresponding reader.

```
(do
  (load-module :excel)
  (let [data [ {:a 100 :b 200 }
                {:a 101 :b 201 }
                {:a 102 :b 202 } ]
        wbook (excel/writer :xlsx)
        sheet (excel/add-sheet wbook "Sheet 1"
                                { :no-header-row true })]
    (excel/add-column sheet "A" { :field :a })
    (excel/add-column sheet "B" { :field :b })
    (excel/add-column sheet "C" { :field :c })
    (excel/write-items sheet data)
    (excel/cell-formula sheet 1 3 "SUM(A1,B1)")
    (excel/cell-formula sheet 2 3 "SUM(A2,B2)")
    (excel/cell-formula sheet 3 3 "SUM(A3,B3)")
    (let [reader (excel/convert->reader sheet)]
      (excel/evaluate-formulas reader)
      (excel/read-long-val reader 1 3))))
```

[top](#)

excel/convert->writer

(convert->writer reader)

Converts an excel or sheet reader to the corresponding writer.

```
(do
  (load-module :excel)

  (let [wbook-rd (excel/open "sample.xlsx")
        wbook-wr (excel/convert->writer wbook-rd)
        sheet-wr (excel/sheet wbook-wr 1) ]
    (excel/write-value sheet-wr 1 1 "foo")
    (excel/auto-size-columns sheet-wr)
    (excel/write->file wbook-wr "sample.xlsx")))
```

[top](#)

excel/evaluate-formulas

```
(evaluate-formulas it)
```

Evaluate all formulas in the Excel.

```
(do
  (load-module :excel)

  (defn test-xls []
    (let [wbook (excel/writer :xlsx)
          sheet (excel/add-sheet wbook "Data")]
      (excel/write-data sheet [[100 101 102] [200 201 202]])
      (excel/write->bytebuf wbook)))

  (let [wbook (excel/open (test-xls))]
    (excel/evaluate-formulas wbook)))
```

SEE ALSO

[excel/writer](#)

Creates a new Excel builder for the given type :xls or :xlsx.

[top](#)

excel/freeze-pane

```
(freeze-pane sheet rows cols)
```

Creates a split (freezepane). Any existing freezepane or split pane is overwritten.

If both rows and cols are 0 then the existing freeze pane is removed.

rows: the number of rows to freeze (starting from the first row) cols: the number of columns to freeze (starting from the first column)

```
(do
  (load-module :excel)
  (let [wbook (excel/writer :xlsx)
        sheet (excel/add-sheet wbook "Sheet 1" { :no-header-row false })]
    (excel/write-data sheet [(map #(str "Col " %) (range 1 11))])
    (excel/write-data sheet (partition 10 (range 100 500)) 2 1)
    (excel/freeze-pane sheet 1 0)
    (excel/auto-size-columns sheet)
    (excel/write->file wbook "sample.xlsx")))
```

SEE ALSO

[excel/add-merge-region](#)

Add a merge region to the sheet.

[top](#)

excel/hide-columns

(hide-columns sheet & columns)

Hide columns in the sheet.

```
;; hide column by column index (1..n)
(do
  (load-module :excel)
  (let [data [ {:first "John" :last "Doe" :age 28 }
                {:first "Sue" :last "Ford" :age 26 } ]
        wbook (excel/writer :xlsx)
        sheet (excel/add-sheet wbook "Sheet 1")]
    (excel/add-column sheet "Last Name" { :field :last })
    (excel/add-column sheet "First Name" { :field :first })
    (excel/add-column sheet "Age" { :field :age })
    (excel/write-items sheet data)
    (excel/auto-size-columns sheet)
    (excel/hide-columns sheet 2) ;; hide column #2
    (excel/write->file wbook "sample.xlsx"))))

;; hide column by column id
(do
  (load-module :excel)
  (let [data [ {:first "John" :last "Doe" :age 28 }
                {:first "Sue" :last "Ford" :age 26 } ]
        wbook (excel/writer :xlsx)
        sheet (excel/add-sheet wbook "Sheet 1")]
    (excel/add-column sheet "Last Name" { :field :last, :id "lastname"})
    (excel/add-column sheet "First Name" { :field :first, :id "firstname"})
    (excel/add-column sheet "Age" { :field :age, :id "age" })
    (excel/write-items sheet data)
    (excel/auto-size-columns sheet)
    (excel/hide-columns sheet "firstname") ;; hide column "firstname"
    (excel/write->file wbook "sample.xlsx"))))
```

SEE ALSO

[excel/auto-size-column](#)

Auto size the width of column col (1..n) in the sheet.

[excel/write-items](#)

Writes the passed data items, a sequence of maps of name/value pairs, to the sheet.

[excel/write-item](#)

Render a single data item to the sheet

[excel/write-value](#)

Writes a value to a specific cell given by its row and col.

[excel/cell-formula](#)

Set a formula for a specific cell given by its row and col.

[excel/row-height](#)

Set the height of a row (1..n) in the sheet.

excel/line-data-series

```
(line-data-series title smooth? marker data-address-range)
```

Build a line chart data series

Arguments:

title	The series title
smooth?	Smooth rendering (splines): <code>true</code> or <code>false</code>
marker	The marker type: <code>:CIRCLE</code> , <code>:DASH</code> , <code>:DIAMOND</code> , <code>:DOT</code> , <code>:NONE</code> , <code>:PLUS</code> , <code>:SQUARE</code> , <code>:STAR</code> , <code>:TRIANGLE</code>
data-address-range	The series data in the Excel

```
(excel/line-data-series "Countries"
  false
  :SQUARE
  (excel/cell-address-range 2 2 1 5))
```

SEE ALSO

[excel/cell-address-range](#)

Build a cell address range

excel/open

```
(open source)
```

Opens an Excel from a source and returns an Excel reader.

Supported sources are string file path, bytebuf, `:java.io.File`, or `:java.io.InputStream`.

```
(do
  (load-module :excel)

  (let [wbook (excel/open "sample.xlsx")]
    (println "Sheet count: " (excel/sheet-count wbook))))
```

SEE ALSO

[excel/sheet-count](#)

Returns the number of sheets in the Excel.

[excel/sheet](#)

Returns a sheet from the Excel reader referenced by its name or sheet index.

[excel/evaluate-formulas](#)

Evaluate all formulas in the Excel.

excel/pie-data-series

```
(pie-data-series data-address-range)
```

Build a pie chart data series

Arguments:

data-address-range The series data in the Excel

```
(excel/pie-data-series (excel/cell-address-range 2 2 1 5))
```

SEE ALSO

[excel/cell-address-range](#)

Build a cell address range

[top](#)

excel/read-boolean-val

```
(read-boolean-val sheet row col)
```

Returns the sheet cell value as boolean.

```
(do
  (load-module :excel)

  (defn test-xls []
    (let [wbook (excel/writer :xlsx)
          sheet (excel/add-sheet wbook "Data")]
      (excel/write-data sheet [[100 true 102]])
      (excel/write->bytebuf wbook)))

  (let [wbook (excel/open (test-xls))
        sheet (excel/sheet wbook "Data")]
    (excel/read-boolean-val sheet 1 2)))
```

SEE ALSO

[excel/cell-empty?](#)

Returns true if the sheet cell given by row/col is empty.

[excel/cell-type](#)

Returns the sheet cell type as one of { :notfound, :blank, :string, :boolean, :numeric, :formula, :error, or :unknown }

[excel/read-string-val](#)

Returns the sheet cell value as string.

[excel/read-long-val](#)

Returns the sheet cell value as long.

[excel/read-double-val](#)

Returns the sheet cell value as double.

[excel/read-date-val](#)

Returns the sheet cell value as a date (:java.time.LocalDate).

[excel/read-datetime-val](#)

Returns the sheet cell value as a datetime (:java.time.LocalDateTime).

[excel/read-val](#)

Returns the sheet cell value.

[top](#)

excel/read-date-val

```
(read-date-val sheet row col)
```

Returns the sheet cell value as a date (`:java.time.LocalDate`).

```
(do
  (load-module :excel)

  (defn test-xls []
    (let [wbook (excel/writer :xlsx)
          sheet (excel/add-sheet wbook "Data")
          dt1   (time/local-date 2021 1 1)
          dt2   (time/local-date 2022 4 15)]
      (excel/write-data sheet [[100 dt1 dt2 102]])
      (excel/write->bytebuf wbook)))

  (let [wbook (excel/open (test-xls))
        sheet (excel/sheet wbook "Data")]
    [(excel/read-date-val sheet 1 2)
     (excel/read-date-val sheet 1 3)]))
```

SEE ALSO

[excel/cell-empty?](#)

Returns true if the sheet cell given by row/col is empty.

[excel/cell-type](#)

Returns the sheet cell type as one of { `:notfound`, `:blank`, `:string`, `:boolean`, `:numeric`, `:formula`, `:error`, or `:unknown` }

[excel/read-string-val](#)

Returns the sheet cell value as string.

[excel/read-boolean-val](#)

Returns the sheet cell value as boolean.

[excel/read-long-val](#)

Returns the sheet cell value as long.

[excel/read-double-val](#)

Returns the sheet cell value as double.

[excel/read-datetime-val](#)

Returns the sheet cell value as a datetime (`:java.time.LocalDateTime`).

[excel/read-val](#)

Returns the sheet cell value.

[top](#)

excel/read-datetime-val

```
(read-datetime-val sheet row col)
```

Returns the sheet cell value as a datetime (`:java.time.LocalDateTime`).

```
(do
  (load-module :excel)

  (defn test-xls []
    (let [wbook (excel/writer :xlsx)
          sheet (excel/add-sheet wbook "Data")
          ts1   (time/local-date-time 2021 1 1 15 30 45)
          ts2   (time/local-date-time 2021 1 31 08 00 00)]
      (excel/write-data sheet [[100 ts1 ts2 102]])
      (excel/write->bytebuf wbook)))

  (let [wbook (excel/open (test-xls))
        sheet (excel/sheet wbook "Data")]
    [(excel/read-datetime-val sheet 1 2)
     (excel/read-datetime-val sheet 1 3)]))
```

SEE ALSO

[excel/cell-empty?](#)

Returns true if the sheet cell given by row/col is empty.

[excel/cell-type](#)

Returns the sheet cell type as one of { `:notfound`, `:blank`, `:string`, `:boolean`, `:numeric`, `:formula`, `:error`, or `:unknown` }

[excel/read-string-val](#)

Returns the sheet cell value as string.

[excel/read-boolean-val](#)

Returns the sheet cell value as boolean.

[excel/read-long-val](#)

Returns the sheet cell value as long.

[excel/read-double-val](#)

Returns the sheet cell value as double.

[excel/read-date-val](#)

Returns the sheet cell value as a date (`:java.time.LocalDate`).

[excel/read-val](#)

Returns the sheet cell value.

[top](#)

excel/read-double-val

(`read-double-val` sheet row col)

Returns the sheet cell value as double.

```
(do
  (load-module :excel)

  (defn test-xls []
    (let [wbook (excel/writer :xlsx)
          sheet (excel/add-sheet wbook "Data")]
      (excel/write-data sheet [[100 101.23 102]])
      (excel/write->bytebuf wbook)))

  (let [wbook (excel/open (test-xls))
```

```
sheet (excel/sheet wbook "Data")]
(excel/read-double-val sheet 1 2)))
```

SEE ALSO

[excel/cell-empty?](#)

Returns true if the sheet cell given by row/col is empty.

[excel/cell-type](#)

Returns the sheet cell type as one of { :notfound, :blank, :string, :boolean, :numeric, :formula, :error, or :unknown }

[excel/read-string-val](#)

Returns the sheet cell value as string.

[excel/read-boolean-val](#)

Returns the sheet cell value as boolean.

[excel/read-long-val](#)

Returns the sheet cell value as long.

[excel/read-date-val](#)

Returns the sheet cell value as a date (:java.time.LocalDate).

[excel/read-val](#)

Returns the sheet cell value.

[top](#)

excel/read-error-code

```
(read-error-code sheet row col)
```

Reads the error code from a cell. Returns a string indicating the error or nil if the cell is not in error state.

```
(do
  (load-module :excel)

  (defn test-xls []
    (let [wbook (excel/writer :xlsx)
          sheet (excel/add-sheet wbook "Data")]
      (excel/write-data sheet [[100 200 {:formula "1 / 0"}]])
      (excel/write->bytebuf wbook)))

  (let [wbook (excel/open (test-xls))
        sheet (excel/sheet wbook "Data")]
    (excel/evaluate-formulas wbook)
    (excel/read-error-code sheet 1 3))) ;; #DIV/0!
```

SEE ALSO

[excel/cell-empty?](#)

Returns true if the sheet cell given by row/col is empty.

[excel/cell-type](#)

Returns the sheet cell type as one of { :notfound, :blank, :string, :boolean, :numeric, :formula, :error, or :unknown }

[excel/read-string-val](#)

Returns the sheet cell value as string.

[excel/read-boolean-val](#)

Returns the sheet cell value as boolean.

[excel/read-long-val](#)

Returns the sheet cell value as long.

[excel/read-double-val](#)

Returns the sheet cell value as double.

[excel/read-date-val](#)

Returns the sheet cell value as a date (:java.time.LocalDate).

[excel/read-datetime-val](#)

Returns the sheet cell value as a datetime (:java.time.LocalDateTime).

[top](#)

excel/read-long-val

(read-long-val sheet row col)

Returns the sheet cell value as long.

```
(do
  (load-module :excel)

  (defn test-xls []
    (let [wbook (excel/writer :xlsx)
          sheet (excel/add-sheet wbook "Data")]
      (excel/write-data sheet [[100 101 102]])
      (excel/write->bytebuf wbook)))

  (let [wbook (excel/open (test-xls))
        sheet (excel/sheet wbook "Data")]
    (excel/read-long-val sheet 1 2)))

(do
  (load-module :excel)

  (defn test-xls []
    (let [data [ { :a 100 :b 200 } ]
          wbook (excel/writer :xlsx)
          sheet (excel/add-sheet wbook "Data"
                                { :no-header-row true })]
      (excel/add-column sheet "A" { :field :a })
      (excel/add-column sheet "B" { :field :b })
      (excel/write-items sheet data)
      (excel/cell-formula sheet 1 3 "SUM(A1,B1)")
      (excel/write->bytebuf wbook)))

  (let [wbook (excel/open (test-xls))
        sheet (excel/sheet wbook "Data")]
    (excel/read-long-val sheet 1 3)))
```

SEE ALSO

[excel/cell-empty?](#)

Returns true if the sheet cell given by row/col is empty.

[excel/cell-type](#)

Returns the sheet cell type as one of { :notfound, :blank, :string, :boolean, :numeric, :formula, :error, or :unknown }

[excel/read-string-val](#)

Returns the sheet cell value as string.

[excel/read-boolean-val](#)

Returns the sheet cell value as boolean.

[excel/read-double-val](#)

Returns the sheet cell value as double.

[excel/read-date-val](#)

Returns the sheet cell value as a date (:java.time.LocalDate).

[excel/read-datetime-val](#)

Returns the sheet cell value as a datetime (:java.time.LocalDateTime).

[excel/read-val](#)

Returns the sheet cell value.

[top](#)

excel/read-string-val

(read-string-val sheet row col)

Returns the sheet cell value as string.

```
(do
  (load-module :excel)

  (defn test-xls []
    (let [wbook (excel/writer :xlsx)
          sheet (excel/add-sheet wbook "Data")]
      (excel/write-data sheet [[100 "101" 102.0]])
      (excel/write->bytebuf wbook)))

  (let [wbook (excel/open (test-xls))
        sheet (excel/sheet wbook "Data")]
    (excel/read-string-val sheet 1 2)))
```

SEE ALSO

[excel/cell-empty?](#)

Returns true if the sheet cell given by row/col is empty.

[excel/cell-type](#)

Returns the sheet cell type as one of { :notfound, :blank, :string, :boolean, :numeric, :formula, :error, or :unknown }

[excel/read-boolean-val](#)

Returns the sheet cell value as boolean.

[excel/read-long-val](#)

Returns the sheet cell value as long.

[excel/read-double-val](#)

Returns the sheet cell value as double.

[excel/read-date-val](#)

Returns the sheet cell value as a date (:java.time.LocalDate).

[excel/read-datetime-val](#)

Returns the sheet cell value as a datetime (:java.time.LocalDateTime).

[excel/read-val](#)

Returns the sheet cell value.

[top](#)

excel/read-val

```
(read-val sheet row col)
```

Returns the sheet cell value.

Returns a *nil*, *string*, *boolean*, or *double* value depending on the cell's excel type *:blank*, *:string*, *:boolean*, or *:numeri*.

```
(do
  (load-module :excel)

  (defn test-xls []
    (let [wbook (excel/writer :xlsx)
          sheet (excel/add-sheet wbook "Data")]
      (excel/write-data sheet [[100 "101" 102.0]])
      (excel/write->bytebuf wbook)))

  (let [wbook (excel/open (test-xls))
        sheet (excel/sheet wbook "Data")]
    (excel/read-val sheet 1 2)))
```

SEE ALSO

[excel/cell-empty?](#)

Returns true if the sheet cell given by row/col is empty.

excel/cell-type

Returns the sheet cell type as one of { :notfound, :blank, :string, :boolean, :numeric, :formula, :error, or :unknown }

excel/read-string-val

Returns the sheet cell value as string.

[excel/read-boolean-val](#)

Returns the sheet cell value as boolean.

excel/read-long-val

Returns the sheet cell value as long.

excel/read-double-val

Returns the sheet cell value as double.

excel/read-date-val

Returns the sheet cell value as a date (:java.time.LocalDate).

[excel/read-datetime-val](#)

Returns the sheet cell value as a datetime (:java.time.LocalDateTime).

top

excel/row-height

```
(row-height sheet row height)
```

Set the height of a row (1..n) in the sheet.

```
(do  
  (load-module :excel)  
  (let [os      (io/file-out-stream "sample.xlsx")  
        data    [{:first "John"   :last "Doe"       :age 28 }  
                  {:first "Sue"    :last "Ford"       :age 26 }]  

```

```

wbook (excel/writer :xlsx)
sheet (excel/add-sheet wbook "Sheet 1")]
(excel/add-column sheet "First Name" { :field :first })
(excel/add-column sheet "Last Name" { :field :last })
(excel/add-column sheet "Age" { :field :age })
(excel/write-items sheet data)
(excel/auto-size-columns sheet)
(excel/row-height sheet 2 50)
(excel/write->file wbook "sample.xlsx"))))

```

SEE ALSO

[excel/col-width](#)

Set the width of a column (1..n) in the sheet.

[excel/auto-size-columns](#)

Auto size the width of all columns in the sheet.

[excel/write-items](#)

Writes the passed data items, a sequence of maps of name/value pairs, to the sheet.

[excel/write-item](#)

Render a single data item to the sheet

[excel/write-value](#)

Writes a value to a specific cell given by its row and col.

[excel/cell-formula](#)

Set a formula for a specific cell given by its row and col.

[excel/auto-size-column](#)

Auto size the width of column col (1..n) in the sheet.

[top](#)

excel/sheet

```
(sheet wbook ref)
```

Returns a sheet from the Excel reader referenced by its name or sheet index.

```

(do
  (load-module :excel)

  (defn test-xls []
    (let [wbook (excel/writer :xlsx)
          sheet1 (excel/add-sheet wbook "Data1")
          sheet2 (excel/add-sheet wbook "Data2")]
      (excel/write-data sheet1 [[100 101 102] [200 201 202]])
      (excel/write-data sheet2 [[100 101 102] [200 201 202]])
      (excel/write->bytebuf wbook)))

  (let [wbook (excel/open (test-xls))
        sheet1 (excel/sheet wbook "Data1")
        sheet2 (excel/sheet wbook 2)]
    ))

```

SEE ALSO

[excel/sheet-count](#)

Returns the number of sheets in the Excel.

[excel/evaluate-formulas](#)

Evaluate all formulas in the Excel.

[excel/sheet-name](#)

Returns the name of a sheet.

[excel/sheet-row-range](#)

Returns the first and the last row with data in a sheet as vector. Returns -1 values if no row exists.

[excel/sheet-col-range](#)

Returns the first and the last col with data in a sheet row as vector. Returns -1 values if the row does not exist or the row does ...

[excel/cell-empty?](#)

Returns true if the sheet cell given by row/col is empty.

[excel/cell-type](#)

Returns the sheet cell type as one of { :notfound, :blank, :string, :boolean, :numeric, :formula, :error, or :unknown }

[excel/read-string-val](#)

Returns the sheet cell value as string.

[excel/read-boolean-val](#)

Returns the sheet cell value as boolean.

[excel/read-long-val](#)

Returns the sheet cell value as long.

[excel/read-double-val](#)

Returns the sheet cell value as double.

[excel/read-date-val](#)

Returns the sheet cell value as a date (:java.time.LocalDate).

[excel/read-datetime-val](#)

Returns the sheet cell value as a datetime (:java.time.LocalDateTime).

[top](#)

excel/sheet-col-range

(`sheet-col-range` `sheet`)

Returns the first and the last col with data in a sheet row as vector. Returns -1 values if the row does not exist or the row does not have any columns.

```
(do
  (load-module :excel)

  (defn test-xls []
    (let [wbook (excel/writer :xlsx)
          sheet (excel/add-sheet wbook "Data")]
      (excel/write-data sheet [[100 101 102] [200 201 202]])
      (excel/write->bytebuf wbook)))

  (let [wbook (excel/open (test-xls))
        sheet (excel/sheet wbook "Data")]
    (excel/sheet-col-range sheet 1)))
```

SEE ALSO

[excel/sheet-row-range](#)

Returns the first and the last row with data in a sheet as vector. Returns -1 values if no row exists.

[top](#)

excel/sheet-count

(sheet-count wbook)

Returns the number of sheets in the Excel.

```
(do
  (load-module :excel)

  (defn test-xls []
    (let [wbook (excel/writer :xlsx)
          sheet (excel/add-sheet wbook "Data")]
      (excel/write-data sheet [[100 101 102] [200 201 202]])
      (excel/write->bytebuf wbook)))

  (let [wbook (excel/open (test-xls))]
    (excel/sheet-count wbook)))
```

SEE ALSO

[excel/sheet](#)

Returns a sheet from the Excel reader referenced by its name or sheet index.

[excel/evaluate-formulas](#)

Evaluate all formulas in the Excel.

[top](#)

excel/sheet-index

(sheet-index sheet)

Returns the index of a sheet.

```
(do
  (load-module :excel)

  (defn test-xls []
    (let [wbook (excel/writer :xlsx)
          sheet (excel/add-sheet wbook "Data")]
      (excel/write-data sheet [[100 101 102] [200 201 202]])
      (excel/write->bytebuf wbook)))

  (let [wbook (excel/open (test-xls))
        sheet (excel/sheet wbook "Data")]
    (excel/sheet-index sheet)))
```

[top](#)

excel/sheet-name

(sheet-name sheet)

Returns the name of a sheet.

```
(do
  (load-module :excel)

  (defn test-xls []
    (let [wbook (excel/writer :xlsx)
          sheet (excel/add-sheet wbook "Data")]
      (excel/write-data sheet [[100 101 102] [200 201 202]])
      (excel/write->bytebuf wbook)))

  (let [wbook (excel/open (test-xls))
        sheet (excel/sheet wbook "Data")]
    (excel/sheet-name sheet)))
```

top

excel/sheet-row-range

```
(sheet-row-range sheet)
```

Returns the first and the last row with data in a sheet as vector. Returns -1 values if no row exists.

```
(do
  (load-module :excel)

  (defn test-xls []
    (let [wbook (excel/writer :xlsx)
          sheet (excel/add-sheet wbook "Data")]
      (excel/write-data sheet [[100 101 102] [200 201 202]])
      (excel/write->bytebuf wbook)))

  (let [wbook (excel/open (test-xls))
        sheet (excel/sheet wbook "Data")]
    (excel/sheet-row-range sheet)))
```

SEE ALSO

[excel/sheet-col-range](#)

Returns the first and the last col with data in a sheet row as vector. Returns -1 values if the row does not exist or the row does ...

top

excel/sum-formula

```
(sum-formula sheet row-from row-to col-from col-to)
```

Returns a sum formula for the given cell area

```
(do
  (load-module :excel)
  (let [data [ { :a 100 :b 200 }
                { :a 101 :b 201 }
                { :a 102 :b 202 } ]
        wbook (excel/writer :xlsx)
        sheet (excel/add-sheet wbook "Sheet 1" { :no-header-row true })]
    (excel/add-column sheet "A" { :field :a })
    (excel/add-column sheet "B" { :field :b })))
```

```
(excel/add-column sheet "C" { :field :c })
(excel/write-items sheet data)
(excel/cell-formula sheet 1 3 (excel/sum-formula sheet 1 1 1 2))
(excel/cell-formula sheet 2 3 (excel/sum-formula sheet 2 2 1 2))
(excel/cell-formula sheet 3 3 (excel/sum-formula sheet 3 3 1 2))
(excel/evaluate-formulas wbook)
(excel/auto-size-columns sheet)
(excel/write->file wbook "sample.xlsx"))
```

SEE ALSO

[excel/addr->string](#)

Returns an Excel A1-style cell address string representation for a row and column address

[top](#)

excel/write->bytebuf

```
(write->bytebuf wbook os)
```

Writes the excel to a bytebuf. Returns the bytebuf.

```
(do
  (load-module :excel)
  (let [data [ {:first "John" :last "Doe" :age 28 }
                {:first "Sue" :last "Ford" :age 26 } ]
        wbook (excel/writer :xlsx)
        sheet (excel/add-sheet wbook "Sheet 1")]
    (excel/add-column sheet "First Name" { :field :first })
    (excel/add-column sheet "Last Name" { :field :last })
    (excel/add-column sheet "Age" { :field :age })
    (excel/write-items sheet data)
    (excel/auto-size-columns sheet)
    (excel/write->bytebuf wbook)))
```

SEE ALSO

[excel/write->file](#)

Writes the excel to a file.

[excel/write->stream](#)

Writes the excel to a Java :OutputStream.

[top](#)

excel/write->file

```
(write->file wbook f)
```

Writes the excel to a file.

```
(do
  (load-module :excel)
  (let [data [ {:first "John" :last "Doe" :age 28 }
                {:first "Sue" :last "Ford" :age 26 } ]
        wbook (excel/writer :xlsx)
        sheet (excel/add-sheet wbook "Sheet 1")]
    (excel/add-column sheet "First Name" { :field :first })
    (excel/add-column sheet "Last Name" { :field :last })
    (excel/add-column sheet "Age" { :field :age })
    (excel/write-items sheet data)
    (excel/auto-size-columns sheet)
    (excel/write->file wbook f)))
```

```
(excel/add-column sheet "First Name" { :field :first })
(excel/add-column sheet "Last Name" { :field :last })
(excel/add-column sheet "Age" { :field :age })
(excel/write-items sheet data)
(excel/auto-size-columns sheet)
(excel/write->file wbook "sample.xlsx"))
```

SEE ALSO

[excel/write->stream](#)

Writes the excel to a Java :OutputStream.

[excel/write->bytebuf](#)

Writes the excel to a bytebuf. Returns the bytebuf.

[top](#)

excel/write->stream

```
(write->stream wbook os)
```

Writes the excel to a Java :OutputStream.

```
(do
  (load-module :excel)
  (let [os      (io/file-out-stream "sample.xlsx")
        data   [ {:first "John" :last "Doe"   :age 28 }
                  {:first "Sue"  :last "Ford"  :age 26 } ]
        wbook   (excel/writer :xlsx)
        sheet   (excel/add-sheet wbook "Sheet 1")]
    (excel/add-column sheet "First Name" { :field :first })
    (excel/add-column sheet "Last Name" { :field :last })
    (excel/add-column sheet "Age" { :field :age })
    (excel/write-items sheet data)
    (excel/auto-size-columns sheet)
    (excel/write->stream wbook os)))
```

SEE ALSO

[excel/write->file](#)

Writes the excel to a file.

[excel/write->bytebuf](#)

Writes the excel to a bytebuf. Returns the bytebuf.

[top](#)

excel/write-data

```
(write-data sheet data)
(write-data sheet data row col)
```

Writes the data of a 2D array to an excel sheet.

Optionally the data can be written to a region starting at a row/col position.

```
(do
  (load-module :excel)
```

```
(let [wbook (excel/writer :xlsx)
      sheet (excel/add-sheet wbook "Data")
      dt (time/local-date 2021 1 1)
      ts (time/local-date-time 2021 1 1 15 30 45)
      data [[100 101 102 103 104 105]
            [200 "ab" 1.23 dt ts false]]]
  (excel/write-data sheet data)
  (excel/auto-size-columns sheet)
  (excel/write->file wbook "sample.xlsx"))

(do
  (load-module :excel)
  (let [wbook (excel/writer :xlsx)
        sheet (excel/add-sheet wbook "Data")]
    (excel/write-data sheet [[100 101 102] [200 201 203]])
    (excel/write-data sheet [[300 301 302] [400 401 403]] 3 4)
    (excel/auto-size-columns sheet)
    (excel/write->file wbook "sample.xlsx")))
```

SEE ALSO

[excel/write->stream](#)

Writes the excel to a Java :OutputStream.

[excel/write->bytebuf](#)

Writes the excel to a bytebuf. Returns the bytebuf.

top

excel/write-item

```
(write-item sheet item)
```

Render a single data item to the sheet

```
(do
  (load-module :excel)
  (let [wbook (excel/writer :xlsx)
        sheet (excel/add-sheet wbook "Sheet 1")]
    (excel/add-column sheet "First Name" { :field :first })
    (excel/add-column sheet "Last Name" { :field :last })
    (excel/add-column sheet "Age" { :field :age })
    (excel/write-item sheet {:first "John" :last "Doe" :age 28 })
    (excel/write-item sheet {:first "Sue" :last "Ford" :age 26 })
    (excel/auto-size-columns sheet)
    (excel/write->file wbook "sample.xlsx")))
```

SEE ALSO

[excel/write-items](#)

Writes the passed data items, a sequence of maps of name/value pairs, to the sheet.

[excel/write-value](#)

Writes a value to a specific cell given by its row and col.

[excel/cell-formula](#)

Set a formula for a specific cell given by its row and col.

[excel/auto-size-columns](#)

Auto size the width of all columns in the sheet.

[excel/auto-size-column](#)

Auto size the width of column col (1..n) in the sheet.

[excel/row-height](#)

Set the height of a row (1..n) in the sheet.

[top](#)

excel/write-items

```
(write-items sheet items)
```

Writes the passed data items, a sequence of maps of name/value pairs, to the sheet.

```
(do
  (load-module :excel)
  (let [data [ {:first "John" :last "Doe" :age 28 }
                {:first "Sue" :last "Ford" :age 26 } ]
        wbook (excel/writer :xlsx)
        sheet (excel/add-sheet wbook "Sheet 1")]
    (excel/add-column sheet "First Name" { :field :first })
    (excel/add-column sheet "Last Name" { :field :last })
    (excel/add-column sheet "Age" { :field :age })
    (excel/write-items sheet data)
    (excel/auto-size-columns sheet)
    (excel/write->file wbook "sample.xlsx")))
```

SEE ALSO

[excel/write-item](#)

Render a single data item to the sheet

[excel/write-value](#)

Writes a value to a specific cell given by its row and col.

[excel/cell-formula](#)

Set a formula for a specific cell given by its row and col.

[excel/auto-size-columns](#)

Auto size the width of all columns in the sheet.

[excel/auto-size-column](#)

Auto size the width of column col (1..n) in the sheet.

[excel/row-height](#)

Set the height of a row (1..n) in the sheet.

[top](#)

excel/write-value

```
(write-value sheet row col val)
```

Writes a value to a specific cell given by its row and col.

```
(do
  (load-module :excel)
  (let [wbook (excel/writer :xlsx)
        sheet (excel/add-sheet wbook "Sheet 1")]
    (excel/add-column sheet "First Name" { :field :first })))
```

```
(excel/add-column sheet "Last Name" { :field :last })
(excel/add-column sheet "Age" { :field :age })
(excel/write-value sheet 1 1 "John")
(excel/write-value sheet 1 2 "Doe")
(excel/write-value sheet 1 3 28)
(excel/write-value sheet 2 1 "Sue")
(excel/write-value sheet 2 2 "Ford")
(excel/write-value sheet 2 3 26)
(excel/auto-size-columns sheet)
(excel/write->file wbook "sample.xlsx")))
```

```
(do
  (load-module :excel)
  (let [wbook (excel/writer :xlsx)
        sheet (excel/add-sheet wbook "Sheet 1")]
    (excel/add-font wbook :italic { :italic true })
    (excel/add-font wbook :bold { :bold true })
    (excel/add-style wbook :italic { :font :italic })
    (excel/add-style wbook :bold { :font :bold })
    (excel/add-column sheet "First Name" { :field :first })
    (excel/add-column sheet "Last Name" { :field :last })
    (excel/add-column sheet "Age" { :field :age })
    (excel/write-value sheet 1 1 "John" :italic)
    (excel/write-value sheet 1 2 "Doe" :italic)
    (excel/write-value sheet 1 3 28 :bold)
    (excel/write-value sheet 2 1 "Sue" :italic)
    (excel/write-value sheet 2 2 "Ford" :italic)
    (excel/write-value sheet 2 3 26 :bold)
    (excel/auto-size-columns sheet)
    (excel/write->file wbook "sample.xlsx")))
```

SEE ALSO

[excel/write-items](#)

Writes the passed data items, a sequence of maps of name/value pairs, to the sheet.

[excel/write-item](#)

Render a single data item to the sheet

[excel/cell-formula](#)

Set a formula for a specific cell given by its row and col.

[excel/auto-size-columns](#)

Auto size the width of all columns in the sheet.

[excel/auto-size-column](#)

Auto size the width of column col (1..n) in the sheet.

[excel/row-height](#)

Set the height of a row (1..n) in the sheet.

[top](#)

excel/writer

(writer type)

Creates a new Excel builder for the given type :xls or :xlsx.

```
(do
  (load-module :excel)
  (let [data [ { :first "John" :last "Doe" :age 28 }
```

```

      { :first "Sue" :last "Ford" :age 26 } ]
      workbook (excel/writer :xlsx)
      sheet (excel/add-sheet workbook "Sheet 1")
      (excel/add-column sheet "First Name" { :field :first })
      (excel/add-column sheet "Last Name" { :field :last })
      (excel/add-column sheet "Age" { :field :age })
      (excel/write-items sheet data)
      (excel/auto-size-columns sheet)
      (excel/write->file workbook "sample.xlsx"))))

```

SEE ALSO

[excel/add-sheet](#)

Adds a sheet with optional attributes to an Excel.

[excel/add-font](#)

Add font with optional attributes to an Excel.

[excel/add-style](#)

Add a style with optional attributes to an Excel.

[excel/write->file](#)

Writes the excel to a file.

[excel/write->stream](#)

Writes the excel to a Java :OutputStream.

[excel/write->bytebuf](#)

Writes the excel to a bytebuf. Returns the bytebuf.

[excel/evaluate-formulas](#)

Evaluate all formulas in the Excel.

top

exists-class?

```
(exists-class? name)
```

Returns true the Java class for the given name exists otherwise returns false.

```

(exists-class? :java.util.ArrayList)
=> true

```

top

exp

```
(exp x)
```

Returns Euler's number e raised to the power of a value.

```

(exp 10)
=> 22026.465794806718

```

```

(exp 10.23)
=> 27722.51006805505

```



```
(exp 10.23M)
=> 27722.51006805505
```

SEE ALSO

[exp](#)

Returns Euler's number e raised to the power of a value.

[top](#)

extend

```
(extend type protocol fns*)
```

Extends protocol for type with the supplied functions.

Formats:

- `(extend :core/long P (foo [x] x))`
- `(extend :core/long P (foo [x] x) (foo [x y] x))`
- `(extend :core/long P (foo [x] x) (bar [x] x))`

```
(do
  (ns foo)
  (deftype :complex [re :long, im :long])
  (defprotocol XMath (+ [x y]
                       (- [x y]))
    (extend :foo/complex XMath
      (+ [x y] (complex. (core/+ (:re x) (:re y))
                          (core/+ (:im x) (:im y))))
      (- [x y] (complex. (core/- (:re x) (:re y))
                          (core/- (:im x) (:im y)))))
    (extend :core/long XMath
      (+ [x y] (core/+ x y))
      (- [x y] (core/- x y)))
    (foo/+ (complex. 1 1) (complex. 4 5)))
=> {:custom-type* :foo/complex :re 5 :im 6}
```

SEE ALSO

[defprotocol](#)

Defines a new protocol with the supplied function specs.

[extends?](#)

Returns true if the type extends the protocol.

[top](#)

extends?

```
(extends? type protocol)
```

Returns true if the type extends the protocol.

```
(do
  (ns foo)
  (deftype :complex [re :long, im :long])
```

```
(defprotocol XMath (+ [x y])
                  (- [x y]))
(extend :foo/complex XMath
  (+ [x y] (complex. (core/+ (:re x) (:re y))
                     (core/+ (:im x) (:im y)))))
  (- [x y] (complex. (core/- (:re x) (:re y))
                     (core/- (:im x) (:im y)))))

(extend :core/long XMath
  (+ [x y] (core/+ x y))
  (- [x y] (core/- x y)))
(extends? :foo/complex XMath))
=> true
```

SEE ALSO

[defprotocol](#)

Defines a new protocol with the supplied function specs.

[extend](#)

Extends protocol for type with the supplied functions.

[top](#)

false?

```
(false? x)
```

Returns true if x is false, false otherwise

```
(false? true)
=> false
```

```
(false? false)
=> true
```

```
(false? nil)
=> false
```

```
(false? 0)
=> false
```

```
(false? (== 1 2))
=> true
```

SEE ALSO

[true?](#)

Returns true if x is true, false otherwise

[not](#)

Returns true if x is logical false, false otherwise.

[top](#)

filter

```
(filter predicate coll)
```

Returns a collection of the items in coll for which `(predicate item)` returns logical true.
Returns a transducer when no collection is provided.

```
(filter even? [1 2 3 4 5 6 7])  
=> (2 4 6)
```

```
(filter #(even? (val %)) {:a 1 :b 2})  
=> ([:b 2])
```

```
(filter even? #{1 2 3})  
=> (2)
```

SEE ALSO

[map](#)

Applies f to the set of first items of each coll, followed by applying f to the set of second items in each coll, until any one of the ...

[reduce](#)

f should be a function of 2 arguments. If val is not supplied, returns the result of applying f to the first 2 items in coll, then ...

[top](#)

filter-k

```
(filter-k f map)
```

Returns a map with entries for which the predicate (f key) returns logical true. f is a function with one arguments.

```
(filter-k #(= % :a) {:a 1 :b 2 :c 3})  
=> {:a 1}
```

SEE ALSO

[filter-kv](#)

Returns a map with entries for which the predicate (f key value) returns logical true. f is a function with two arguments.

[top](#)

filter-kv

```
(filter-kv f map)
```

Returns a map with entries for which the predicate `(f key value)` returns logical true. f is a function with two arguments.

```
(filter-kv (fn [k v] (= k :a)) {:a 1 :b 2 :c 3})  
=> {:a 1}
```

```
(filter-kv (fn [k v] (= v 2)) {:a 1 :b 2 :c 3})  
=> {:b 2}
```

SEE ALSO

[filter-k](#)

Returns a map with entries for which the predicate (f key) returns logical true. f is a function with one arguments.

find

```
(find map key)
```

Returns the map entry for key, or nil if key not present.

```
(find {:a 1 :b 2} :b)
=> [:b 2]
```

```
(find {:a 1 :b 2} :z)
=> nil
```

finder

```
(finder & args)
```

Finds symbols that match one more glob patterns or regular expressions.

Filters the symbol names by 0 to n glob patterns or regular expressions.

Glob patterns and regular expressions are ANDed, flags are ORed.

Flags:

:function	filter functions
:macro	filter macros
:special-form	filter special forms
:protocol	filter protocols
:value	filter values
:machine	return the result as Venice data otherwise print it in table format

```
(finder "io/zip*")
io/zip                :core/function
io/zip-append         :core/function
io/zip-file           :core/function
io/zip-list           :core/function
io/zip-list-entry-names :core/function
io/zip-remove         :core/function
io/zip-size           :core/function
io/zip?               :core/function
=> nil
```

```
(finder "*delete-file*")
io/delete-file        :core/function
io/delete-file-on-exit :core/function
io/delete-file-tree   :core/function
io/delete-files-glob  :core/function
=> nil
```

```
(finder "io/zip*" :machine)
=> ([io/zip :core/function] [io/zip-append :core/function] [io/zip-file :core/function] [io/zip-list :core/function] [io/zip-list-entry-names :core/function] [io/zip-remove :core/function] [io/zip-size :core/function] [io/zip? :core/function])
```

```
(finder #"io/zip.*")
io/zip :core/function
io/zip-append :core/function
io/zip-file :core/function
io/zip-list :core/function
io/zip-list-entry-names :core/function
io/zip-remove :core/function
io/zip-size :core/function
io/zip? :core/function
=> nil
```

```
(finder #".*delete-file*.")
io/delete-file :core/function
io/delete-file-on-exit :core/function
io/delete-file-tree :core/function
io/delete-files-glob :core/function
=> nil
```

```
(finder #"io/zip.*" :machine)
=> ([io/zip :core/function] [io/zip-append :core/function] [io/zip-file :core/function] [io/zip-list :core/function] [io/zip-list-entry-names :core/function] [io/zip-remove :core/function] [io/zip-size :core/function] [io/zip? :core/function])
```

```
(finder zip)
geoup/download-maxmind-db-to-zipfile :core/function
grep/grep-zip :core/function
io/gzip :core/function
io/gzip-to-stream :core/function
io/gzip? :core/function
io/ungzip :core/function
io/ungzip-to-stream :core/function
io/unzip :core/function
io/unzip-all :core/function
io/unzip-first :core/function
io/unzip-nth :core/function
io/unzip-to-dir :core/function
io/zip :core/function
io/zip-append :core/function
io/zip-file :core/function
io/zip-list :core/function
io/zip-list-entry-names :core/function
io/zip-remove :core/function
io/zip-size :core/function
io/zip? :core/function
zipmap :core/function
zipvault/add-files :core/function
zipvault/add-folder :core/function
zipvault/add-stream :core/function
zipvault/encrypted? :core/function
zipvault/entries :core/function
zipvault/entropy :core/function
zipvault/extract-all :core/function
zipvault/extract-file :core/function
zipvault/extract-file-data :core/function
zipvault/remove-files :core/function
```

```
zipvault/valid-zip-file?      :core/function
zipvault/zip                  :core/function
=> nil
```

SEE ALSO

[doc](#)

Prints documentation for a var or special form given x as its name. Prints the definition of custom types.

[ns-list](#)

Without arg lists the loaded namespaces, else lists all the symbols in the specified namespace ns.

[modules](#)

Lists the available Venice modules

[top](#)

first

```
(first coll)
```

Returns the first element of coll or nil if coll is nil or empty.

```
(first nil)
=> nil
```

```
(first [])
=> nil
```

```
(first [1 2 3])
=> 1
```

```
(first '())
=> nil
```

```
(first '(1 2 3))
=> 1
```

```
(first "abc")
=> #\a
```

[top](#)

flatten

```
(flatten coll)
```

Takes any nested combination of collections (lists, vectors, etc.) and returns their contents as a single, flat sequence. `(flatten nil)` returns an empty list.

Returns a transducer when no collection is provided.

```
(flatten [])
=> []
```

```
(flatten [[1 2 3] [4 [5 6]] [7 [8 [9]]]])  
=> [1 2 3 4 5 6 7 8 9]
```

```
(flatten [1 2 {:a 3 :b [4 5 6]}])  
=> [1 2 {:a 3 :b [4 5 6]}]
```

```
(flatten (seq {:a 1 :b 2}))  
=> (:a 1 :b 2)
```

SEE ALSO

[mapcat](#)

Returns the result of applying concat to the result of applying map to fn and colls. Thus function fn should return a collection.

[top](#)

float-array

```
(float-array coll)  
(float-array len)  
(float-array len init-val)
```

Returns an array of Java primitive floats containing the contents of coll or returns an array with the given length and optional init value

```
(float-array '(1.0 2.0 3.0))  
=> [1.0, 2.0, 3.0]
```

```
(float-array '(1I 2 3.2 3.56M))  
=> [1.0, 2.0, 3.200000047683716, 3.559999942779541]
```

```
(float-array 10)  
=> [0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0]
```

```
(float-array 10 42.0)  
=> [42.0, 42.0, 42.0, 42.0, 42.0, 42.0, 42.0, 42.0, 42.0, 42.0]
```

[top](#)

floor

```
(floor x)
```

Returns the largest integer that is less than or equal to x

```
(floor 1.4)  
=> 1.0
```

```
(floor -1.4)  
=> -2.0
```

```
(floor 1.23M)  
=> 1.00M
```

```
(floor -1.23M)
=> -2.00M
```

SEE ALSO

[ceil](#)

Returns the largest integer that is greater than or equal to x

[top](#)

flush

```
(flush)
(flush os)
```

Without arg flushes the output stream that is the current value of `*out*`. With arg flushes the passed stream that must be a subclass of either `:java.io.OutputStream` OR `:java.io.Writer`.

Returns `nil`.

```
(flush)
=> nil
```

```
(flush *out*)
=> nil
```

```
(flush *err*)
=> nil
```

SEE ALSO

[io/flush](#)

Flushes a `:java.io.OutputStream` or a `:java.io.Writer`.

[io/close](#)

Closes a `:java.io.InputStream`, `:java.io.OutputStream`, `:java.io.Reader`, or a `:java.io.Writer`.

[top](#)

fn

```
(fn name? [params*] condition-map? expr*)
```

Defines an anonymous function.

```
(do
  (def sum (fn [x y] (+ x y)))
  (sum 2 3))
=> 5
```

```
;; multi-arity anonymous function
(let [f (fn ([x] x) ([x y] (+ x y)))]
  [(f 1) (f 4 6)])
=> [1 10]
```



```

(map (fn double [x] (* 2 x)) (range 1 5))
=> (2 4 6 8)

(map #(* 2 %) (range 1 5))
=> (2 4 6 8)

(map #(* 2 %1) (range 1 5))
=> (2 4 6 8)

;; anonymous function with two params, the second is destructured
(reduce (fn [m [k v]] (assoc m v k)) {} {:b 2 :a 1 :c 3})
=> {1 :a 2 :b 3 :c}

;; defining a pre-condition
(do
  (def square-root
    (fn [x]
      { :pre [(>= x 0)] }
      (. :java.lang.Math :sqrt x)))
  (square-root 4))
=> 2.0

;; closures
(do
  (defn pow [n]
    (fn [x] (apply * (repeat n x)))) ; closes over n

  ;; n is provided here as 2 and 3, then n goes out of scope
  (def square (pow 2))
  (def cubic (pow 3))
  (square 4))
=> 16

;; higher-order function
(do
  (def discount
    (fn [percentage]
      { :pre [(and (>= percentage 0) (<= percentage 100))] }
      (fn [price] (- price (* price percentage 0.01)))))
  ((discount 50) 300))
=> 150.0

```

SEE ALSO

defn

Same as (def name (fn name [args*] condition-map? expr*)) or (def name (fn name ([args*] condition-map? expr*)+))

defn-

Same as defn, yielding non-public def

def

Creates a global variable.

top

fn-about

(fn-about f)

Returns the meta information about a function

```
(fn-about and)
=> {:name "and" :ns "core" :type :macro :visibility :public :native false :class :VncMultiArityFunction :source
{:file "core" :line 482 :column 3}}
```

```
(fn-about println)
=> {:name "println" :ns "core" :type :function :visibility :public :native false :class :VncMultiArityFunction :
source {:file "core" :line 1476 :column 3}}
```

```
(fn-about +)
=> {:name "+" :ns "core" :type :function :visibility :public :native true :class :VncFunction :source {}}
```

SEE ALSO

[fn-name](#)

Returns the qualified name of a function or macro

[fn-body](#)

Returns the body (a list of forms) of a function.

[fn-pre-conditions](#)

Returns the pre-conditions (a vector of forms) of a function.

[top](#)

fn-body

```
(fn-body fn)
(fn-body fn arity)
```

Returns the body (a list of forms) of a function.

Returns `nil` if `fn` is not a function or if `fn` is a native function.

```
(do
  (defn calc [& x]
    (->> x
      (filter even?)
      (map #(* % 10)))))
  (fn-body (var-get calc)))
=> ((->> x (filter even?) (map (fn [%] (* % 10)))))
```

SEE ALSO

[fn-name](#)

Returns the qualified name of a function or macro

[fn-about](#)

Returns the meta information about a function

[fn-pre-conditions](#)

Returns the pre-conditions (a vector of forms) of a function.

[top](#)

fn-name

```
(fn-name f)
```

Returns the qualified name of a function or macro

```
(fn-name (fn sum [x y] (+ x y)))  
=> "user/sum"
```

```
(let [f str/digit?]  
  (fn-name f))  
=> "str/digit?"
```

SEE ALSO

[name](#)

Returns the name string of a string, symbol, keyword, or function. If applied to a string it returns the string itself.

[namespace](#)

Returns the namespace string of a symbol, keyword, or function. If x is a registered namespace returns x.

[fn-about](#)

Returns the meta information about a function

[fn-body](#)

Returns the body (a list of forms) of a function.

[fn-pre-conditions](#)

Returns the pre-conditions (a vector of forms) of a function.

[top](#)

fn-pre-conditions

```
(fn-pre-conditions fn)  
(fn-pre-conditions fn arity)
```

Returns the pre-conditions (a vector of forms) of a function.

Returns `nil` if fn is not a function.

```
(do  
  (defn sum [x y]  
    { :pre [(> x 0) (> y 0)] }  
    (+ x y))  
  (fn-pre-conditions (var-get sum)))  
=> [(> x 0) (> y 0)]
```

SEE ALSO

[fn-name](#)

Returns the qualified name of a function or macro

[fn-about](#)

Returns the meta information about a function

[fn-body](#)

Returns the body (a list of forms) of a function.

[top](#)

fn?

```
(fn? x)
```

Returns true if x is a function

```
(do
  (def sum (fn [x] (+ 1 x)))
  (fn? sum))
=> true
```

[top](#)

fnil

```
(fnil f x)
(fnil f x y)
(fnil f x y z)
```

Takes a function f, and returns a function that calls f, replacing a nil first argument to f with the supplied value x. Higher arity versions can replace arguments in the second and third positions (y, z). Note that the function f can take any number of arguments, not just the one(s) being nil-patched.

```
;; e.g.: change the `str/lower-case` handling of nil arguments by
;; returning an empty string instead of nil.
((fnil str/lower-case "") nil)
=> ""
```

```
((fnil + 10) nil)
=> 10
```

```
((fnil + 10) nil 1)
=> 11
```

```
((fnil + 10) nil 1 2)
=> 13
```

```
((fnil + 10) 20 1 2)
=> 23
```

```
((fnil + 10) nil 1 2 3 4)
=> 20
```

```
((fnil + 1000 100) nil nil)
=> 1100
```

```
((fnil + 1000 100) 2000 nil 1)
=> 2101
```

```
((fnil + 1000 100) nil 200 1 2)
=> 1203
```

```
((fnil + 1000 100) nil nil 1 2 3 4)
=> 1110
```

fonts/download-demo-fonts

```
(fonts/download-demo-fonts dir)
(fonts/download-demo-fonts dir silent)
```

Downloads the Venice demo fonts

- "Open Sans"
- "Source Code Pro"
- "Audiowide"
- "Roboto"

to the specified dir

```
(do
  (load-module :fonts)
  (fonts/download-demo-fonts (repl/libs-dir) false))
```

fonts/download-font-family

```
(fonts/download-font-family family-name options*)
```

Download a font family from the [Google fonts](#) repository

Some useful font families with name and true type font files globbing pattern to extract the files from the family zip file:

Family	TTF glob pattern
"Open Sans"	"static/OpenSans/*.ttf"
"Source Code Pro"	"static/*.ttf"
"Audiowide"	"*.ttf"
"Roboto"	"*.ttf"

Options:

:extract {true,false}	if true extract the TTF files from the font family ZIP, else just download the ZIP
:glob-pattern {pat}	an optional glob pattern to select the TTF files to be extracted. E.g.: "*.ttf"
:dir path	download dir, defaults to "."
:silent {true,false}	if silent is true does not print download info, defaults to true

```
(do
  (load-module :fonts)

  (fonts/download-font-family "Open Sans"
    :dir (repl/libs-dir)
    :extract true
    :glob-pattern "static/OpenSans/*.ttf"
    :silent false)

  (fonts/download-font-family "Source Code Pro"
    :dir (repl/libs-dir)
    :extract true
    :glob-pattern "static/*.ttf")
```

```
      :silent false)

(fonts/download-font-family "Roboto"
  :dir (repl/libs-dir)
  :extract true
  :glob-pattern "*.ttf"
  :silent false))
```

[top](#)

force

(force x)

If x is a delay, returns its value, else returns x

```
(do
  (def x (delay (println "working...") 100))
  (force x))
working...
=> 100
```

```
(force (+ 1 2))
=> 3
```

SEE ALSO

[delay](#)

Takes a body of expressions and yields a Delay object that will invoke the body only the first time it is forced (with force or deref ...

[deref](#)

Dereferences an atom, a future or a promise object. When applied to an atom, returns its current state. When applied to a future, will ...

[realized?](#)

Returns true if a value has been produced for a promise, delay, or future.

[top](#)

formal-type

(formal-type object)

Returns the *formal type* of a Java object.

The *formal type* of an object is defined as the explicit Java return type given by the function's definition. The *formal type* may differ from the real type of the returned Java object. A type cast will also change the object's formal type and set it to the cast type.

Venice must honor Java's static type system while interacting with Java objects. Therefore Venice adheres to *formal types* strictly when calling methods of Java objects.

Venice

```
;; The Circle constructor returns an object of type Circle
(let [c (. :Circle :new 1.5)]
  (. c :area)      ;; OK   Circle::area()
  (. c :radius))   ;; OK   Circle::radius()

;; Builder::circle returns an object of the formal type Shape
(let [c (. :Builder :circle 1.5)]
```

```
(. c :area)      ;; OK    Shape::area()
(. c :radius))   ;; FAIL  Shape::radius(), undefined method
```

Java

```
public class Builder {
  public static Shape circle(double radius) {
    return new Circle(radius);
  }
}

public interface Shape {
  double area();
}

public class Circle implements Shape {
  public Circle(double radius) {...}
  public double area() {...}
  public double radius() {...}
}
```

```
(do
  (import :java.awt.Point)
  (import :java.awt.geom.Point2D)

  ;; upcasting :java.awt.Point to :java.awt.geom.Point2D
  ;; Point2D does not define the translate method!
  (let [p1 (. :Point :new 1.0 1.0)
        p2 (cast :Point2D p1)]
    (println "p1 ->" p1)
    (println "p2 ->" p2)
    (println "Formal type p1 ->" (formal-type p1))
    (println "Formal type p2 ->" (formal-type p2))
    (println "p1' ->" (doto p1 (. :translate 2.0 2.0)))
    ;; the translate method is not defined by Point2D
    ;; and will fail with a JavaMethodInvocationException!
    ;; (doto p2 (. :translate 2.0 2.0))
  ))
p1 -> java.awt.Point[x=1,y=1]
p2 -> java.awt.Point[x=1,y=1]
Formal type p1 -> :java.awt.Point
Formal type p2 -> :java.awt.geom.Point2D
p1' -> java.awt.Point[x=3,y=3]
=> nil
```

SEE ALSO

[remove-formal-type](#)

Removes the formal type from a Java object.

[cast](#)

Casts a Java object to a specific type

[class](#)

Returns the Java class for the given name. Throws an exception if the class is not found.

[top](#)

format-micro-time

```
(format-micro-time time)
(format-micro-time time & options)
```

Formats a time given in microseconds as long or double.

Options:

:precision p e.g :precision 4 (defaults to 3)

```
(format-micro-time 203)
```

```
=> "203μs"
```

```
(format-micro-time 20389.0 :precision 2)
```

```
=> "0.02ms"
```

```
(format-micro-time 20389 :precision 2)
```

```
=> "0.02ms"
```

```
(format-micro-time 20389 :precision 0)
```

```
=> "0ms"
```

```
(format-micro-time 20386766)
```

```
=> "20.387s"
```

```
(format-micro-time 20386766 :precision 2)
```

```
=> "20.39s"
```

```
(format-micro-time 20386766 :precision 6)
```

```
=> "20.386766s"
```

SEE ALSO

[format-milli-time](#)

Formats a time given in milliseconds as long or double.

[format-nano-time](#)

Formats a time given in nanoseconds as long or double.

[top](#)

format-milli-time

```
(format-milli-time time)
```

```
(format-milli-time time & options)
```

Formats a time given in milliseconds as long or double.

Options:

:precision p e.g :precision 4 (defaults to 3)

```
(format-milli-time 203)
```

```
=> "203ms"
```

```
(format-milli-time 20389.0 :precision 2)
```

```
=> "20.39s"
```

```
(format-milli-time 20389 :precision 2)
```

```
=> "20.39s"
```



```
(format-milli-time 20389 :precision 0)
=> "20s"
```

SEE ALSO

[format-micro-time](#)

Formats a time given in microseconds as long or double.

[format-nano-time](#)

Formats a time given in nanoseconds as long or double.

[top](#)

format-nano-time

```
(format-nano-time time)
(format-nano-time time & options)
```

Formats a time given in nanoseconds as long or double.

Options:

:precision p e.g :precision 4 (defaults to 3)

```
(format-nano-time 203)
=> "203ns"
```

```
(format-nano-time 20389.0 :precision 2)
=> "20.39μs"
```

```
(format-nano-time 20389 :precision 2)
=> "20.39μs"
```

```
(format-nano-time 20389 :precision 0)
=> "20μs"
```

```
(format-nano-time 203867669)
=> "203.868ms"
```

```
(format-nano-time 20386766988 :precision 2)
=> "20.39s"
```

```
(format-nano-time 20386766988 :precision 6)
=> "20.386767s"
```

SEE ALSO

[format-milli-time](#)

Formats a time given in milliseconds as long or double.

[format-micro-time](#)

Formats a time given in microseconds as long or double.

[nano-time](#)

Returns the current value of the running Java Virtual Machine's high-resolution time source, in nanoseconds.

[top](#)

fourth

```
(fourth coll)
```

Returns the fourth element of coll.

```
(fourth nil)
=> nil
```

```
(fourth [])
=> nil
```

```
(fourth [1 2 3 4 5])
=> 4
```

```
(fourth '())
=> nil
```

```
(fourth '(1 2 3 4 5))
=> 4
```

[top](#)

frequencies

```
(frequencies coll)
```

Returns a map from distinct items in coll to the number of times they appear.

```
(frequencies [:a :b :a :a])
=> {:a 3 :b 1}
```

```
;; Turn a frequency map back into a coll.
(mapcat (fn [[x n]] (repeat n x)) {:a 2 :b 1 :c 3})
=> (:a :a :b :c :c :c)
```

[top](#)

future

```
(future fn)
```

Takes a function without arguments and yields a future object that will invoke the function in another thread, and will cache the result and return it on all subsequent calls to deref. If the computation has not yet finished, calls to deref will block, unless the variant of deref with timeout is used.

Thread local vars will be inherited by the future child thread. Changes of the child's thread local vars will not be seen on the parent.

```
(do
  (defn wait [] (sleep 300) 100)
```

```

(let [f (future wait)]
  (deref f))
=> 100

(let [f (future #(do (sleep 300) 100))]
  (deref f))
=> 100

(do
  (defn wait [x] (sleep 300) (+ x 100))
  (let [f (future (partial wait 10))]
    (deref f)))
=> 110

(do
  (defn sum [x y] (+ x y))
  (let [f (future (partial sum 3 4))]
    (deref f)))
=> 7

;; demonstrates the use of thread locals with futures
(do
  ;; parent thread locals
  (binding [a 10 b 20]
    ;; future with child thread locals
    (let [f (future (fn [] (binding [b 90] {:a a :b b})))
          {:child @f :parent {:a a :b b}})])
=> {:parent {:a 10 :b 20} :child {:a 10 :b 90}}

```

SEE ALSO

[deref](#)

Dereferences an atom, a future or a promise object. When applied to an atom, returns its current state. When applied to a future, will ...

[realized?](#)

Returns true if a value has been produced for a promise, delay, or future.

[done?](#)

Returns true if the future or promise is done otherwise false

[cancel](#)

Cancels a future or a promise

[cancelled?](#)

Returns true if the future or promise is cancelled otherwise false

[future-task](#)

Takes a function f without arguments and yields a future object that will invoke the function in another thread.

[promise](#)

Returns a promise object that can be read with deref, and set, once only, with deliver. Calls to deref prior to delivery will block, ...

[futures-fork](#)

Creates a list of count futures. The worker factory is single argument function that gets the worker index (0..count-1) as argument ...

[futures-wait](#)

Waits for all futures to get terminated. If the waiting thread is interrupted the futures are cancelled.

[top](#)

future-task

```
(future-task f completed-fn)
```

```
(future-task f success-fn failure-fn)
```

Takes a function `f` without arguments and yields a future object that will invoke the function in another thread.

If a single completed function is passed it will be called with the future as its argument as soon as the future has completed. If a success and a failure function are passed either the success or failure function will be called as soon as the future has completed. Upon success the success function will be called with the future's result as its argument, upon failure the failure function will be called with the exception as its argument.

In combination with a queue a completion service can be built. The tasks appear in the queue in the order they have completed.

Thread local vars will be inherited by the future child thread. Changes of the child's thread local vars will not be seen on the parent.

```
;; building a completion service
;; CompletionService = incoming worker queue + worker threads + output data queue
(do
  (def q (queue 10))
  (defn process [s v] (sleep s) v)
  (defn failure [s m] (sleep s) (throw (ex :VncException m)))
  (future-task (partial process 200 2) #(offer! q %) #(offer! q %))
  (future-task (partial process 400 4) #(offer! q %) #(offer! q %))
  (future-task (partial process 100 1) #(offer! q %) #(offer! q %))
  (future-task (partial failure 300 "Failed 3") #(offer! q %) #(offer! q %))
  (println (poll! q 1000))
  (println (poll! q 1000))
  (println (poll! q 1000))
  (println (poll! q 1000)))
1
2
com.github.jlangch.venice.VncException: Failed 3
4
=> nil
```

```
;; building a completion service (future-task API variant)
(do
  (def q (queue 10))
  (defn process [s v] (sleep s) v)
  (defn failure [s m] (sleep s) (throw (ex :VncException m)))
  (defn print_result [f] (try (println @f) (catch :Exception e (println e))))
  (future-task (partial process 200 2) #(offer! q %))
  (future-task (partial process 400 4) #(offer! q %))
  (future-task (partial process 100 1) #(offer! q %))
  (future-task (partial failure 300 "Failed 3") #(offer! q %))
  (print_result (poll! q 1000))
  (print_result (poll! q 1000))
  (print_result (poll! q 1000))
  (print_result (poll! q 1000)))
1
2
com.github.jlangch.venice.VncException: Failed 3
4
=> nil
```

SEE ALSO

[future](#)

Takes a function without arguments and yields a future object that will invoke the function in another thread, and will cache the result ...

[top](#)

future?

```
(future? f)
```

Returns true if f is a Future otherwise false

```
(future? (future (fn [] 100)))  
=> true
```

[top](#)

futures-fork

```
(futures-fork count worker-factory-fn)
```

Creates a list of count futures. The worker factory is single argument function that gets the worker index (0..count-1) as argument and returns a worker function. Returns a list with the created futures.

```
(do  
  (def mutex 0)  
  (defn log [& xs]  
    (locking mutex (println (apply str xs))))  
  (defn factory [n]  
    (fn [] (log "Worker" n)))  
  (apply futures-wait (futures-fork 3 factory)))  
Worker0  
Worker2  
Worker1  
=> nil
```

SEE ALSO

[future](#)

Takes a function without arguments and yields a future object that will invoke the function in another thread, and will cache the result ...

[futures-wait](#)

Waits for all futures to get terminated. If the waiting thread is interrupted the futures are cancelled.

[top](#)

futures-thread-pool-info

```
(futures-thread-pool-info)
```

Returns the thread pool info of the ThreadPoolExecutor serving the futures.

<i>core-pool-size</i>	the number of threads to keep in the pool, even if they are idle
<i>maximum-pool-size</i>	the maximum allowed number of threads
<i>current-pool-size</i>	the current number of threads in the pool
<i>largest-pool-size</i>	the largest number of threads that have ever simultaneously been in the pool
<i>active-thread-count</i>	the approximate number of threads that are actively executing tasks
<i>scheduled-task-count</i>	the approximate total number of tasks that have ever been scheduled for execution
<i>completed-task-count</i>	the approximate total number of tasks that have completed execution

```
(futures-thread-pool-info)  
=> {:core-pool-size 0 :maximum-pool-size 200 :current-pool-size 4 :largest-pool-size 4 :active-thread-count 0 :  
scheduled-task-count 24 :completed-task-count 24}
```

SEE ALSO

[future](#)

Takes a function without arguments and yields a future object that will invoke the function in another thread, and will cache the result ...

[top](#)

futures-wait

```
(futures-wait & futures)
```

Waits for all futures to get terminated. If the waiting thread is interrupted the futures are cancelled.

```
(do
  (def mutex 0)
  (defn log [& xs]
    (locking mutex (println (apply str xs))))
  (defn factory [n]
    (fn [] (log "Worker" n)))
  (apply futures-wait (futures-fork 3 factory)))
Worker0
Worker1
Worker2
=> nil
```

SEE ALSO

[future](#)

Takes a function without arguments and yields a future object that will invoke the function in another thread, and will cache the result ...

[futures-fork](#)

Creates a list of count futures. The worker factory is single argument function that gets the worker index (0..count-1) as argument ...

[top](#)

gc

```
(gc)
```

Run the Java garbage collector. Runs the finalization methods of any objects pending finalization prior to the GC.

```
(gc)
=> nil
```

[top](#)

gensym

```
(gensym)
(gensym prefix)
```

Generates a symbol.

```
(gensym)
=> G__24521
```

```
(gensym "prefix_")
=> prefix_24545
```

[top](#)

geoip/addr-ranges->trie

```
(geoip/addr-ranges->trie ranges)
```

Creates a trie map from a sequence of address ranges.

```
(do
  (def private-ip4-trie (geoip/addr-ranges->trie geoip/private-ip4-addresses))

  (defn private-ip? [ip]
    (some? (cidr/lookup-reverse private-ip4-trie ip)))

  (private-ip? "192.168.0.1"))
=> true
```

[top](#)

geoip/build-maxmind-city-db-url

```
(geoip/build-maxmind-city-db-url lic-key)
```

Build the URL for downloading the MaxMind city GEO IP database.

The download requires your personal MaxMind license key. The license to download the free MaxMind GeoLite databases can be obtained from the [MaxMind](#) home page.

```
(do
  (load-module :geoip)
  (geoip/build-maxmind-city-db-url "YOUR-MAXMIND-LIC-KEY"))
=> "https://download.maxmind.com/app/geoip_download?edition_id=GeoLite2-City-CSV&license_key=YOUR-MAXMIND-LIC-KEY&suffix=zip"
```

SEE ALSO

[geoip/download-maxmind-db](#)

Downloads the MaxMind country or city GEO IP database. Returns the DB as bytebuffer. The type is either :country or :city.

[geoip/download-maxmind-db-to-zipfile](#)

Downloads the MaxMind country or city GEO IP database to the given ZIP file. The type is either :country or :city.

[top](#)

geoip/build-maxmind-country-db-url

```
(geoip/build-maxmind-country-db-url lic-key)
```

Build the URL for the MaxMind country GEO IP database. The download requires a license key that is sent as part of the URL.

The download requires your personal MaxMind license key. The license to download the free MaxMind GeoLite databases can be obtained from the [MaxMind](#) home page.

```
(do
  (load-module :geoip)
  (geoip/build-maxmind-country-db-url "YOUR-MAXMIND-LIC-KEY"))
=> "https://download.maxmind.com/app/geoip_download?edition_id=GeoLite2-Country-CSV&license_key=YOUR-MAXMIND-LIC-KEY&suffix=zip"
```

SEE ALSO

[geoip/download-maxmind-db](#)

Downloads the MaxMind country or city GEO IP database. Returns the DB as bytebuffer. The type is either :country or :city.

[geoip/download-maxmind-db-to-zipfile](#)

Downloads the MaxMind country or city GEO IP database to the given ZIP file. The type is either :country or :city.

[top](#)

geoip/country-to-location-resolver

```
(geoip/country-to-location-resolver location-csv)
```

Returns a resolve function that resolves countries given by a country 2-digit ISO code to its latitude/longitude location. The resolve function returns the latitude/longitude or nil if the country is not supported.

The resolver loads Google country database and caches the data for location resolves.

```
(do
  (def rv (geoip/country-to-location-resolver geoip/download-google-country-db))
  (rv "PL")) ;; => ["51.919438", "19.145136"]
```

SEE ALSO

[geoip/download-maxmind-db-to-zipfile](#)

Downloads the MaxMind country or city GEO IP database to the given ZIP file. The type is either :country or :city.

[geoip/ip-to-country-resolver](#)

Returns a resolve function that resolves an IP addresses to its associated country. The resolve function returns the country information ...

[geoip/ip-to-country-loc-resolver](#)

Returns a resolve function that resolves an IP address to its associated country and latitude/longitude location. The resolve function ...

[geoip/ip-to-city-loc-resolver](#)

Returns a resolve function that resolves an IP address to its associated city and latitude/longitude location. The resolve function ...

[geoip/ip-to-city-loc-resolver-mem-optimized](#)

Returns a resolve function that resolves an IP address to its associated city and latitude/longitude location. The resolve function ...

[top](#)

geoip/download-google-country-db-to-csvfile

```
(geoip/download-google-country-db-to-csvfile csvfile)
```

Downloads the Google country GPS database to the given CSV file location. The database holds a mapping from country to location (latitude /longitude).

The Google country database URL is defined in the global var 'geoup/google-country-url'.

```
(do
  (load-module :geoup)
  (geoup/download-google-country-db-to-csvfile "./country-gps.csv"))
```

SEE ALSO

[geoup/download-google-country-db](#)

Downloads the Google country database. The database holds a mapping from country to location (latitude/longitude).

[top](#)

geoup/download-maxmind-db

```
(geoup/download-maxmind-db type lic-key)
```

Downloads the MaxMind country or city GEO IP database. Returns the DB as bytearray. The type is either :country or :city.

The download requires your personal MaxMind license key. The license to download the free MaxMind GeoLite databases can be obtained from the [MaxMind](#) home page.

```
(do
  (load-module :geoup)
  (geoup/download-maxmind-db :country "YOUR-MAXMIND-LIC-KEY"))
```

SEE ALSO

[geoup/build-maxmind-country-db-url](#)

Build the URL for the MaxMind country GEO IP database. The download requires a license key that is sent as part of the URL.

[geoup/build-maxmind-city-db-url](#)

Build the URL for downloading the MaxMind city GEO IP database.

[top](#)

geoup/download-maxmind-db-to-zipfile

```
(geoup/download-maxmind-db-to-zipfile zipfile type lic-key)
```

Downloads the MaxMind country or city GEO IP database to the given ZIP file. The type is either :country or :city.

The download requires your personal MaxMind license key. The license to download the free MaxMind GeoLite databases can be obtained from the [MaxMind](#) home page.

```
(do
  (load-module :geoup)
  (geoup/download-maxmind-db-to-zipfile "./geoup-country.zip"
    :country
    "YOUR-MAXMIND-LIC-KEY"))
```

SEE ALSO

[geoup/build-maxmind-country-db-url](#)

Build the URL for the MaxMind country GEO IP database. The download requires a license key that is sent as part of the URL.

[geoup/build-maxmind-city-db-url](#)

Build the URL for downloading the MaxMind city GEO IP database.

[top](#)

geoip/ip-to-city-loc-resolver

(geoip/ip-to-city-loc-resolver geoip-zip)

Returns a resolve function that resolves an IP address to its associated city and latitude/longitude location. The resolve function returns the city and the latitude/longitude or nil if no data is found.

The MindMax city geoip-zip may be a bytebuf, a file, a string (file path) or an InputStream.

The resolver loads the MindMax IPv4 and IPv6 city database and caches the data for IP address resolves.

As of July 2020 the MaxMind city database has:

2'917'097	IPv4 blocks
459'294	IPv6 blocks
118'189	cities

Note:

The MaxMind city IPv4 and IPv6 databases have 220MB of size on disk. It takes considerable time to load the data. Preprocessed and ready to work in the GEO IP modules ~3GB of memory is required.

Once the resolver has loaded the data the lookups are very fast.

```
(do
  (def rv (geoip/ip-to-city-loc-resolver "./geoip-city.zip"))

  (rv "192.241.235.46")) ;; => {:ip "192.241.235.46"
                                ;;   :loc ["37.7353" "-122.3732"]
                                ;;   :country-name "United States"
                                ;;   :country-iso "US"
                                ;;   :region "California"
                                ;;   :city "San Francisco"}
```

SEE ALSO

[geoip/download-maxmind-db-to-zipfile](#)

Downloads the MaxMind country or city GEO IP database to the given ZIP file. The type is either :country or :city.

[geoip/ip-to-country-resolver](#)

Returns a resolve function that resolves an IP addresses to its associated country. The resolve function returns the country information ...

[geoip/ip-to-country-loc-resolver](#)

Returns a resolve function that resolves an IP address to its associated country and latitude/longitude location. The resolve function ...

[geoip/ip-to-city-loc-resolver-mem-optimized](#)

Returns a resolve function that resolves an IP address to its associated city and latitude/longitude location. The resolve function ...

[geoip/country-to-location-resolver](#)

Returns a resolve function that resolves countries given by a country 2-digit ISO code to its latitude/longitude location. The resolve ...

[top](#)

geoip/ip-to-city-loc-resolver-mem-optimized

(geoip/ip-to-city-loc-resolver-mem-optimized geoip-zip)

Returns a resolve function that resolves an IP address to its associated city and latitude/longitude location. The resolve function returns the city and the latitude/longitude or nil if no data is found.

The MindMax city geoip-zip may be a bytebuf, a file, a string (file path) or an InputStream.

The resolver loads the MindMax IPv4 and IPv6 city database and caches the data for IP address resolves.

As of July 2020 the MaxMind city database has:

2'917'097	IPv4 blocks
459'294	IPv6 blocks
118'189	cities

Note:

The MaxMind city IPv4 and IPv6 databases have 220MB of size on disk. It takes considerable time to load the data. This is a memory optimized resolver version on the cost of performance.

For best performance on the cost of memory use the resolver 'geoip/ip-to-city-loc-resolver' instead!

```
(do
  (def rv (geoip/ip-to-city-loc-resolver-mem-optimized "./geoip-city.zip"))

  (rv "192.241.235.46")) ;; => {:ip "192.241.235.46"
                                ;;   :loc ["37.7353" "-122.3732"]
                                ;;   :country-name "United States"
                                ;;   :country-iso "US"
                                ;;   :region "California"
                                ;;   :city "San Francisco"}
```

SEE ALSO

[geoip/download-maxmind-db-to-zipfile](#)

Downloads the MaxMind country or city GEO IP database to the given ZIP file. The type is either :country or :city.

[geoip/ip-to-country-resolver](#)

Returns a resolve function that resolves an IP addresses to its associated country. The resolve function returns the country information ...

[geoip/ip-to-country-loc-resolver](#)

Returns a resolve function that resolves an IP address to its associated country and latitude/longitude location. The resolve function ...

[geoip/ip-to-city-loc-resolver](#)

Returns a resolve function that resolves an IP address to its associated city and latitude/longitude location. The resolve function ...

[geoip/country-to-location-resolver](#)

Returns a resolve function that resolves countries given by a country 2-digit ISO code to its latitude/longitude location. The resolve ...

[top](#)

geoip/ip-to-country-loc-resolver

```
(geoip/ip-to-country-loc-resolver geoip-zip location-csv)
```

Returns a resolve function that resolves an IP address to its associated country and latitude/longitude location. The resolve function returns the country and the latitude/longitude or nil if no data is found.

The MindMax country geoip-zip may be a bytebuf, a file, a string (file path) or an InputStream.

The resolver loads the MindMax IPv4 and IPv6 country and the Google country database and caches the data for IP address resolves.

```
(do
  (def rv (geoip/ip-to-country-loc-resolver
            "./geoip-country.zip"
            (geoip/download-google-country-db)))

  (rv "91.223.55.1")) ;; => {:ip "91.223.55.6"
```

```
;;      :loc ["51.919438" "19.145136"]
;;      :country-name "Poland"
;;      :country-iso "PL"}
```

SEE ALSO

[geoip/download-maxmind-db-to-zipfile](#)

Downloads the MaxMind country or city GEO IP database to the given ZIP file. The type is either :country or :city.

[geoip/ip-to-country-resolver](#)

Returns a resolve function that resolves an IP addresses to its associated country. The resolve function returns the country information ...

[geoip/ip-to-city-loc-resolver](#)

Returns a resolve function that resolves an IP address to its associated city and latitude/longitude location. The resolve function ...

[geoip/ip-to-city-loc-resolver-mem-optimized](#)

Returns a resolve function that resolves an IP address to its associated city and latitude/longitude location. The resolve function ...

[geoip/country-to-location-resolver](#)

Returns a resolve function that resolves countries given by a country 2-digit ISO code to its latitude/longitude location. The resolve ...

top

geoip/ip-to-country-resolver

```
(geoip/ip-to-country-resolver geoip-zip)
```

Returns a resolve function that resolves an IP addresses to its associated country. The resolve function returns the country information for a given IP address.

The MindMax country geoip-zip may be a bytebuf, a file, a string (file path) or an InputStream.

The resolver loads the MindMax IPv4 and IPv6 country databases and caches the data for subsequent IP resolves.

As of July 2020 the MaxMind country database has:

303'448	IPv4 blocks
107'641	IPv6 blocks
253	countries

```
(do
  (def rv (geoip/ip-to-country-resolver "./geoip-country.zip"))
  (rv "91.223.55.1")) ;; => { :country-name "Poland"
                           ;;      :country-iso "PL" }
```

SEE ALSO

[geoip/download-maxmind-db-to-zipfile](#)

Downloads the MaxMind country or city GEO IP database to the given ZIP file. The type is either :country or :city.

[geoip/ip-to-country-loc-resolver](#)

Returns a resolve function that resolves an IP address to its associated country and latitude/longitude location. The resolve function ...

[geoip/ip-to-city-loc-resolver](#)

Returns a resolve function that resolves an IP address to its associated city and latitude/longitude location. The resolve function ...

[geoip/ip-to-city-loc-resolver-mem-optimized](#)

Returns a resolve function that resolves an IP address to its associated city and latitude/longitude location. The resolve function ...

[geoip/country-to-location-resolver](#)

Returns a resolve function that resolves countries given by a country 2-digit ISO code to its latitude/longitude location. The resolve ...

top

geoip/map-location-to-numeric

```
(map-location-to-numeric loc)
```

Maps a location to numerical coordinates. A location is given as a vector of a latitude and a longitude.

Returns a location vector with a numerical latitude and a longitude.

```
(do
  (load-module :geoip)
  (geoip/map-location-to-numeric ["51.919438", "19.145136"]))
=> [51.919438 19.145136]
```

[top](#)

geoip/parse-maxmind-city-db

```
(geoip/parse-maxmind-city-db zip)
```

Parses the MaxMind city-location CSV file. Returns a map with the city geoname-id as key and the city/country data as value.

Return:

```
{ "2643743" {:country-iso "GB" :country-name "England"
              :region "England" :city "London"}
  "2661881" {:country-iso "CH" :country-name "Switzerland"
              :region "Aargau" :city "Aarau"} }
```

```
(do
  (load-module :geoip)
  (geoip/download-maxmind-db-to-zipfile "./geoip-city.zip"
    :city
    "YOUR-MAXMIND-LIC-KEY")
  (geoip/parse-maxmind-city-db "./geoip-city.zip"))
```

SEE ALSO

[geoip/download-maxmind-db-to-zipfile](#)

Downloads the MaxMind country or city GEO IP database to the given ZIP file. The type is either :country or :city.

[geoip/parse-maxmind-country-db](#)

Parses the MaxMind country-location CSV file. Returns a map with the country geoname-id as key and the country data as value.

[top](#)

geoip/parse-maxmind-city-ip-db

```
(geoip/parse-maxmind-city-ip-db ip-type zip maxmind-cities)
```

Parses the MaxMind city IP blocks database. Expects a MaxMind city IP database zip. ip-type is either :IPv4 or :IPv6. The zip may be a bytebuf, a file, a string (file path) or an InputStream.

The maxmind-countries are optional and map the geoname-id to country data.

Returns a trie datastructure with the CIDR address as the key and a map with city/country data as the value.

maxmind-cities:

```
{ "2643743" {:country-iso "GB" :country-name "England"
           :region "England" :city "London"}
  "2661881" {:country-iso "CH" :country-name "Switzerland"
           :region "Aargau" :city "Aarau"} }
```

```
(do
  (load-module :geoup)
  (geoup/download-maxmind-db-to-zipfile "./geoup-city.zip"
                                         :city
                                         "YOUR-MAXMIND-LIC-KEY")

  (geoup/parse-maxmind-city-ip-db
   :IPv4
   "./geoup-city.zip"
   nil))

(do
  (load-module :geoup)
  (geoup/download-maxmind-db-to-zipfile "./geoup-city.zip"
                                         :city
                                         "YOUR-MAXMIND-LIC-KEY")

  (geoup/parse-maxmind-city-ip-db
   :IPv6
   "./geoup-city.zip"
   (geoup/parse-maxmind-city-db "./geoup-city.zip")))
```

SEE ALSO

[geoup/download-maxmind-db-to-zipfile](#)

Downloads the MaxMind country or city GEO IP database to the given ZIP file. The type is either :country or :city.

[geoup/parse-maxmind-city-db](#)

Parses the MaxMind city-location CSV file. Returns a map with the city geoname-id as key and the city/country data as value.

[geoup/parse-maxmind-country-ip-db](#)

Parses the MaxMind country IP blocks database. Expects a Maxmind country IP database zip. ip-type is either :IPv4 or :IPv6. The zip ...

[top](#)

geoup/parse-maxmind-country-db

```
(geoup/parse-maxmind-country-db zip)
```

Parses the MaxMind country-location CSV file. Returns a map with the country geoname-id as key and the country data as value.

Return:

```
{ "49518" {:country-iso "RW" :country-name "Rwanda"}
  "51537" {:country-iso "SO" :country-name "Somalia"} }
```

```
(do
  (load-module :geoup)
  (geoup/download-maxmind-db-to-zipfile "./geoup-country.zip"
                                         :country
                                         "YOUR-MAXMIND-LIC-KEY")

  (geoup/parse-maxmind-country-db "./geoup-country.zip"))
```

SEE ALSO

[geoup/download-maxmind-db-to-zipfile](#)

Downloads the MaxMind country or city GEO IP database to the given ZIP file. The type is either :country or :city.

[geoip/parse-maxmind-city-db](#)

Parses the MaxMind city-location CSV file. Returns a map with the city geoname-id as key and the city/country data as value.

[top](#)

geoip/parse-maxmind-country-ip-db

```
(geoip/parse-maxmind-country-ip-db ip-type zip maxmind-countries)
```

Parses the MaxMind country IP blocks database. Expects a Maxmind country IP database zip. ip-type is either :IPv4 or :IPv6. The zip may be a bytebuf, a file, a string (file path) or an InputStream.

The maxmind-countries are optional and map the geoname-id to country data.

Returns a trie datastructure with the CIDR address as the key and a map with country data as the value.

maxmind-countries:

```
{ "49518" {:country-iso "RW" :country-name "Rwanda"}
  "51537" {:country-iso "SO" :country-name "Somalia"} }
```

Return:

```
{ 223 [ [(cidr-parse "223.255.254.0/24") {:country-iso "SG"
                                           :country-name "Singapore"}]
         [(cidr-parse "223.255.255.0/24") {:country-iso "AU"
                                           :country-name "Australia"}]
       ] }
```

```
(do
  (load-module :geoip)
  (geoip/download-maxmind-db-to-zipfile "./geoip-country.zip"
    :country
    "YOUR-MAXMIND-LIC-KEY")

  (geoip/parse-maxmind-country-ip-db
    :IPv4
    "./geoip-country.zip"
    nil))

(do
  (load-module :geoip)
  (geoip/download-maxmind-db-to-zipfile "./geoip-country.zip"
    :country
    "YOUR-MAXMIND-LIC-KEY")

  (geoip/parse-maxmind-country-ip-db
    :IPv6
    "./geoip-country.zip"
    (geoip/parse-maxmind-country-db "./geoip-country.zip")))
```

SEE ALSO

[geoip/download-maxmind-db-to-zipfile](#)

Downloads the MaxMind country or city GEO IP database to the given ZIP file. The type is either :country or :city.

[geoip/parse-maxmind-country-db](#)

Parses the MaxMind country-location CSV file. Returns a map with the country geoname-id as key and the country data as value.

[geoip/parse-maxmind-city-ip-db](#)

Parses the MaxMind city IP blocks database. Expects a MaxMind city IP database zip. ip-type is either :IPv4 or :IPv6. The zip may be ...

[top](#)

get

```
(get map key)
(get map key not-found)
```

Returns the value mapped to key, not-found or nil if key not present.

Note: `(get :x foo)` is almost twice as fast as `(:x foo)`

```
(get {:a 1 :b 2} :b)
=> 2
```

```
(get [0 1 2 3] 1)
=> 1
```

```
;; keywords act like functions on maps
(:b {:a 1 :b 2})
=> 2
```

[top](#)

get-in

```
(get-in m ks)
(get-in m ks not-found)
```

Returns the value in a nested associative structure, where ks is a sequence of keys. Returns nil if the key is not present, or the not-found value if supplied.

```
(get-in {:a 1 :b {:c 2 :d 3}} [:b :c])
=> 2
```

```
(get-in [:a :b :c] [0])
=> :a
```

```
(get-in [:a :b [:c :d :e]] [2 1])
=> :d
```

```
(get-in {:a 1 :b {:c [4 5 6]}} [:b :c 1])
=> 5
```

[top](#)

gradle/task

```
(gradle/task name & options)
(gradle/task name out-fn & options)
(gradle/task name out-fn err-fn throw-ex & options)
```

Runs a gradle task


```
(gradle/with-home "/Users/foo/Documents/Tools/gradle-5.6.2"
                  "/Users/foo/Documents/Projects/my-project"
  (gradle/task compile)
  (gradle/task compile "--warning-mode=all" "--stacktrace")
  (gradle/task compile println)
  (gradle/task compile println println true)
  (gradle/task compile println println true "--stacktrace"))
```

[top](#)

gradle/version

```
(gradle/version)
```

Returns the Gradle version

```
(gradle/with-home "/Users/foo/Documents/Tools/gradle-5.6.2"
                  "/Users/foo/Documents/Projects/my-project"
  (gradle/version))
```

[top](#)

gradle/with-home

```
(with-home gradle-dir proj-dir & forms)
```

Sets the Gradle home and the project directory for all subsequent forms.

```
(gradle/with-home "/Users/foo/Documents/Tools/gradle-5.6.2"
                  "/Users/foo/Documents/Projects/my-project"
  (gradle/version))
```

[top](#)

gradlew/run

```
(gradlew/run proj-home out-fn err-fn & args)
```

Runs one or more Gradle tasks.

Note: Use this module only for projects based on the Gradle wrapper

Arguments:

proj-home d	The project directory
:out-fn f	a function with a single string argument that receives line by line from the process' stdout.
:err-fn f	a function with a single string argument that receives line by line from the process' stderr.
args	Any number of task names and Gradle options

```
(do
  (load-module :gradlew)
  (let [java-home (system-env :JAVA_11_HOME)]
    (gradlew/run "/Users/foo/projects/bar"
```

```
println
println
;; tasks
"clean"
"build"
;; options
"--warning-mode=all"
"--console=plain"
"--stacktrace"
(str "-Dorg.gradle.java.home=\"" java-home "\""))
```

[top](#)

gradlew/run*

(gradlew/run* proj-home out-fn err-fn & args)

Runs one or more Gradle tasks and prints a list of the tasks and the options taken from the passed arguments.

Note: Use this module only for projects based on the Gradle wrapper

Apart from printing the information the function is identical to `gradlew/run`.

Arguments:

proj-home d	The project directory
:out-fn f	a function with a single string argument that receives line by line from the process' stdout. May be nil.
:err-fn f	a function with a single string argument that receives line by line from the process' stderr. May be nil.
args	Any number of task names and Gradle options

```
(do
  (load-module :gradlew)
  (let [java-home (system-env :JAVA_11_HOME)]
    (gradlew/run* "/Users/foo/projects/bar"
      println
      println
      ;; tasks
      "clean"
      "build"
      ;; options
      "--warning-mode=all"
      "--console=plain"
      "--stacktrace"
      (str "-Dorg.gradle.java.home=\"" java-home "\"")))
```

[top](#)

gradlew/version

(gradlew/version)

Returns the Gradle version

Note: Use this module only for projects based on the Gradle wrapper

```
(do
  (load-module :gradlew)
  (gradlew/version "/Users/foo/projects/bar"))
```

grep/grep

```
(grep dir file-glob line-pattern & options)
```

Search for lines that match a regular expression in text files. The search starts from a base directory and chooses all files that match a globbing pattern.

Options:

:print b e.g :print false, defaults to true

With the print option `:print true`, `grep` prints the matches in a human readable form, one line per match in the format `"{{filename}}:{{lineno}}:{{line}}"`.

With the print option `:print false`, `grep` prints the matches in a machine readable form. It returns a list of tuples `[[{{filename}}, {{lineno}}, {{line}}]`.

```
(do
  (load-module :grep)
  (grep/grep "/Users/foo/logs" "*.log" ".*Error.*"))
```

SEE ALSO

[grep/grep-zip](#)

Search for lines that match a regular expression in text files within ZIP files. The search chooses all files in the ZIP that match ...

[io/file-matches-glob?](#)

Returns true if the file `f` matches the glob pattern. `f` must be a file or a string (file path).

grep/grep-zip

```
(grep/grep-zip dir zipfile-glob file-glob line-pattern & options)
```

Search for lines that match a regular expression in text files within ZIP files. The search chooses all files in the ZIP that match a globbing pattern. The search starts from a base directory and chooses all ZIP files that match the zipfile globbing pattern.

Options:

:print b e.g :print false, defaults to true

With the print option `:print true`, `grep-zip` prints the matches in a human readable form, one line per match in the format `"{{zipfile}}!{{filename}}:{{lineno}}:{{line}}"`.

With the print option `:print false`, `grep-zip` prints the matches in a machine readable form. It returns a list of tuples `[[{{zipname}}, {{filename}}, {{lineno}}, {{line}}]`.

```
(do
  (load-module :grep)
  (grep/grep-zip "/Users/foo/logs" "logs*.zip" "**/*.log" ".*Error.*"))
```

SEE ALSO

[grep/grep](#)

Search for lines that match a regular expression in text files. The search starts from a base directory and chooses all files that ...

io/file-matches-glob?

Returns true if the file `f` matches the glob pattern. `f` must be a file or a string (file path).

top

group-by

```
(group-by f coll)
```

Returns a map of the elements of `coll` keyed by the result of `f` on each element. The value at each key will be a vector of the corresponding elements, in the order they appeared in `coll`.

```
(group-by count ["a" "as" "asd" "aa" "asdf" "qwer"])
=> {1 ["a"] 2 ["as" "aa"] 3 ["asd"] 4 ["asdf" "qwer"]}
```

```
(group-by odd? (range 10))
=> {false [0 2 4 6 8] true [1 3 5 7 9]}
```

```
(group-by identity (seq "abracadabra"))
=> {#\a [#\a #\a #\a #\a #\a #\a] #\b [#\b #\b] #\r [#\r #\r] #\c [#\c] #\d [#\d]}
```

top

halt-when

```
(halt-when pred)
(halt-when pred retf)
```

Returns a transducer that ends transduction when `pred` returns true for an input. When `retf` is supplied it must be a fn of 2 arguments - it will be passed the (completed) result so far and the input that triggered the predicate, and its return value (if it does not throw an exception) will be the return value of the transducer. If `retf` is not supplied, the input that triggered the predicate will be returned. If the predicate never returns true the transduction is unaffected.

```
(do
  (def xf (comp (halt-when #(== % 10)) (filter odd?)))
  (transduce xf conj [1 2 3 4 5 6 7 8 9]))
=> [1 3 5 7 9]
```

```
(do
  (def xf (comp (halt-when #(> % 5)) (filter odd?)))
  (transduce xf conj [1 2 3 4 5 6 7 8 9]))
=> 6
```

top

hash-map

```
(hash-map & keyvals)
(hash-map map)
```

Creates a new hash map containing the items.

```
(hash-map :a 1 :b 2)
=> {:a 1 :b 2}
```

```
(hash-map (sorted-map :a 1 :b 2))
=> {:a 1 :b 2}
```

top

hash-map?

```
(hash-map? obj)
```

Returns true if obj is a hash map

```
(hash-map? (hash-map :a 1 :b 2))
=> true
```

top

hexdump/dump

```
(dump s & opts)
```

Prints a hexdump of the given argument to `*out*`. Optionally supply byte offset (:offset, default: 0) and size (:size, default: :all) arguments. Can create hexdump from a collection of values, a bytebuf, a java.io.File, or a string representing a path to a file.

Example: `(hexdump/dump (range 100))`

```
00000000: 0001 0203 0405 0607 0809 0a0b 0c0d 0e0f  ....
00000010: 1011 1213 1415 1617 1819 1a1b 1c1d 1e1f  ....
00000020: 2021 2223 2425 2627 2829 2a2b 2c2d 2e2f  !"#$$%&'()*+,-./
00000030: 3031 3233 3435 3637 3839 3a3b 3c3d 3e3f  0123456789;<=>?
00000040: 4041 4243 4445 4647 4849 4a4b 4c4d 4e4f  @ABCDEFGHIJKLMNO
00000050: 5051 5253 5455 5657 5859 5a5b 5c5d 5e5f  PQRSTUVWXYZ[\]^_
00000060: 6061 6263                                     `abc
```

```
(hexdump/dump [0 1 2 3])
```

```
(hexdump/dump (range 1000))
```

```
(hexdump/dump (range 10000) :offset 9000 :size 256)
```

```
(hexdump/dump "./img.png")
```

```
(hexdump/dump "./img.png" :offset 0 :size 64)
```

```
(try-with [ps (io/capturing-print-stream)]
  (binding [*out* ps]
    (hexdump/dump [0 1 2 3])
    (str ps)))
```

top

highlight

(highlight form)

Syntax highlighting. Reads the form and returns a list of (token, token-class) tuples.

Token classes:

:comment	; ...
:whitespaces	" ", "\n", " \n"
:string	"lorem", """"lorem"""
:number	100, 100I, 100.0, 100.23M
:constant	nil, true, false
:keyword	:alpha
:symbol	alpha
:symbol-special-form	def, loop, ...
:symbol-function-name	+, println, ...
:quote	'
:quasi-quote	`
:unquote	~
:unquote-splicing	~@
:meta	^private, ^{:arglist '() :doc "...."}
:at	@
:hash	#
:brace-begin	{
:brace-end	}
:bracket-begin	[
:bracket-end]
:parenthesis-begin	(
:parenthesis-end)
:unknown	anything that could not be classified

```
(highlight "(+ 10 20)")
```

```
=> (((" :parenthesis-begin) ("+" :symbol-function-name) (" " :whitespaces) ("10" :number) (" " :whitespaces) ("20" :number) (")" :parenthesis-end))
```

```
(highlight "(if (= 1 2) true false)")
```

```
=> (((" :parenthesis-begin) ("if" :symbol-special-form) (" " :whitespaces) ((" :parenthesis-begin) ("=" :symbol-function-name) (" " :whitespaces) ("1" :number) (" " :whitespaces) ("2" :number) (")" :parenthesis-end) (" " :whitespaces) ("true" :constant) (" " :whitespaces) ("false" :constant) (")" :parenthesis-end))
```

[top](#)

host-address

(host-address)

Returns this host's ip address.

```
(host-address)
```

```
=> "192.168.178.27"
```

SEE ALSO

[host-name](#)

Returns this host's name.

host-name

```
(host-name)
```

Returns this host's name.

```
(host-name)  
=> "pluto.fritz.box"
```

SEE ALSO

[host-address](#)

Returns this host's ip address.

identity

```
(identity x)
```

Returns its argument.

```
(identity 4)  
=> 4  
  
(filter identity [1 2 3 nil 4 false true 1234])  
=> (1 2 3 4 true 1234)
```

if

```
(if test then else)  
(if test then)
```

Evaluates test. If logical true, evaluates and returns then expression, otherwise else expression, if supplied, else nil.

```
(if (< 10 20) "yes" "no")  
=> "yes"  
  
(if true "yes")  
=> "yes"  
  
(if false "yes")  
=> nil
```

SEE ALSO

[if-let](#)

bindings is a vector with 2 elements: binding-form test.

if-not

Evaluates test. If logical false, evaluates and returns then expression, otherwise else expression, if supplied, else nil.

when

Evaluates test. If logical true, evaluates body in an implicit do.

when-not

Evaluates test. If logical false, evaluates body in an implicit do.

when-let

bindings is a vector with 2 elements: binding-form test.

top

if-let

```
(if-let bindings then)
(if-let bindings then else)
```

bindings is a vector with 2 elements: binding-form test.
If test is true, evaluates then with binding-form bound to the value of test, if not, yields else

```
(if-let [value (* 100 2)]
  (str "The expression is true. value=" value)
  (str "The expression is false. "))
=> "The expression is true. value=200"
```

SEE ALSO

when-let

bindings is a vector with 2 elements: binding-form test.

let

Evaluates the expressions and binds the values to symbols in the new local context.

top

if-not

```
(if-not test then else)
(if-not test then)
```

Evaluates test. If logical false, evaluates and returns then expression, otherwise else expression, if supplied, else nil.

```
(if-not (== 1 2) 100 0)
=> 100

(if-not false 100)
=> 100

(if-not true 100)
=> nil
```

SEE ALSO

if

Evaluates test. If logical true, evaluates and returns then expression, otherwise else expression, if supplied, else nil.

if-let

bindings is a vector with 2 elements: binding-form test.

when

Evaluates test. If logical true, evaluates body in an implicit do.

when-not

Evaluates test. If logical false, evaluates body in an implicit do.

when-let

bindings is a vector with 2 elements: binding-form test.

[top](#)

import

```
(import class & classes)
(import class :as alias)
```

Imports one or multiple Java classes. Imports are bound to the current namespace.

Example

Without import

```
(. :java.lang.Math :max 2 10)
```

With import

```
(do
  (import :java.lang.Math)
  (. :Math :max 2 10))
```

Aliases

Aliases are helpful if Java classes have the same name but different packages like `java.util.Date` and `java.sql.Date` :

```
(do
  (import :java.util.Date)
  (import :java.sql.Date :as :SqlDate)

  (println (. :Date :new))
  (println (. :SqlDate :valueOf "2022-06-24")))
```

Static nested classes

Venice

```
(do
  (import :foo.OuterClass)
  (import :foo.OuterClass$NestedStaticClass)

  (-> (. :OuterClass :new)
    (. :message))
  (-> (. :OuterClass$NestedStaticClass :new)
    (. :message)))
```

Java

```
package foo;

public class OuterClass {
  public String message() {
    return "OuterClass::message()";
  }
}

public static class NestedStaticClass {
  public String message() {
    return "NestedStaticClass::message()";
  }
}
```

```
}  
}  
}
```

```
(do  
  (import :java.lang.Math)  
  (. :Math :max 2 10))  
=> 10
```

```
(do  
  (import :java.awt.Point  
          :java.lang.Math)  
  (. :Math :max 2 10))  
=> 10
```

```
(do  
  (import :java.awt.Color :as :AwtColor)  
  (. :AwtColor :new 200I 230I 255I 180I))  
=> java.awt.Color[r=200,g=230,b=255]
```

```
(do  
  (ns util)  
  (defn import? [clazz ns_]  
    (any? #(== % clazz) (map first (imports ns_))))  
  
  (ns alpha)  
  (import :java.lang.Math)  
  (println "alpha:" (util/import? :java.lang.Math 'alpha))  
  
  (ns beta)  
  (println "beta:" (util/import? :java.lang.Math 'beta))  
  
  (ns alpha)  
  (println "alpha:" (util/import? :java.lang.Math 'alpha))  
)  
alpha: true  
beta: false  
alpha: true  
=> nil
```

SEE ALSO

[imports](#)

Without namespace arg returns a list with the registered imports for the current namespace. With namespace arg returns a list with ...

[top](#)

imports

```
(imports & options)  
(imports ns & options)
```

Without namespace arg returns a list with the registered imports for the current namespace. With namespace arg returns a list with the registered imports for the given namespace.

Options:

:print print the import list to the current value of `*out*`

```

(do
  (import :java.lang.Math)
  (imports))
=> ([:com.github.jlangch.venice.AssertionException :AssertionException] [:com.github.jlangch.venice.
SecurityException :SecurityException] [:com.github.jlangch.venice.ValueException :ValueException] [:com.github.
jlangch.venice.VncException :VncException] [:java.lang.Exception :Exception] [:java.lang.
IllegalArgumentException :IllegalArgumentException] [:java.lang.Math :Math] [:java.lang.NullPointerException :
NullPointerException] [:java.lang.RuntimeException :RuntimeException] [:java.lang.Throwable :Throwable])

(do
  (import :java.lang.Math)
  (imports :print))
:com.github.jlangch.venice.AssertionException :as :AssertionException
:com.github.jlangch.venice.SecurityException :as :SecurityException
:com.github.jlangch.venice.ValueException :as :ValueException
:com.github.jlangch.venice.VncException :as :VncException
:java.lang.Exception :as :Exception
:java.lang.IllegalArgumentException :as :IllegalArgumentException
:java.lang.Math :as :Math
:java.lang.NullPointerException :as :NullPointerException
:java.lang.RuntimeException :as :RuntimeException
:java.lang.Throwable :as :Throwable
=> nil

(do
  (ns foo)
  (import :java.lang.Math)
  (ns bar)
  (imports 'foo))
=> ([:com.github.jlangch.venice.AssertionException :AssertionException] [:com.github.jlangch.venice.
SecurityException :SecurityException] [:com.github.jlangch.venice.ValueException :ValueException] [:com.github.
jlangch.venice.VncException :VncException] [:java.lang.Exception :Exception] [:java.lang.
IllegalArgumentException :IllegalArgumentException] [:java.lang.Math :Math] [:java.lang.NullPointerException :
NullPointerException] [:java.lang.RuntimeException :RuntimeException] [:java.lang.Throwable :Throwable])

```

SEE ALSO

[import](#)

Imports one or multiple Java classes. Imports are bound to the current namespace.

[top](#)

inc

```
(inc x)
```

Increments the number x

```
(inc 10)
=> 11
```

```
(inc 10I)
=> 11I
```

```
(inc 10.1)
=> 11.1
```

```
(inc 10.12M)
=> 11.12M
```

SEE ALSO

[dec](#)

Decrements the number x

[top](#)

inet/inet-addr

```
(inet/inet-addr addr)
```

Converts a stringified IPv4 or IPv6 to a Java InetAddress.

```
(inet/inet-addr "222.192.0.0")
```

```
=> /222.192.0.0
```

```
(inet/inet-addr "2001:0db8:85a3:08d3:1319:8a2e:0370:7347")
```

```
=> /2001:db8:85a3:8d3:1319:8a2e:370:7347
```

[top](#)

inet/inet-addr-from-bytes

```
(inet/inet-addr-bytes addr)
```

Converts a IPv4 or IPv6 byte address (a vector of unsigned integers) to a Java InetAddress.

```
(inet/inet-addr-from-bytes [222I 192I 12I 0I])
```

```
=> /222.192.12.0
```

```
(inet/inet-addr-from-bytes [32I 1I 13I 184I 133I 163I 8I 211I 19I 25I 138I 46I 3I 112I 115I 71I])
```

```
=> /2001:db8:85a3:8d3:1319:8a2e:370:7347
```

[top](#)

inet/inet-addr-to-bytes

```
(inet/inet-addr-to-bytes addr)
```

Converts a stringified IPv4/IPv6 address or a Java InetAddress to an InetAddress byte vector.

```
(inet/inet-addr-to-bytes "222.192.12.0")
```

```
=> [222I 192I 12I 0I]
```

```
(inet/inet-addr-to-bytes "2001:0db8:85a3:08d3:1319:8a2e:0370:7347")
```

```
=> [32I 1I 13I 184I 133I 163I 8I 211I 19I 25I 138I 46I 3I 112I 115I 71I]
```

```
(inet/inet-addr-to-bytes (inet/inet-addr "222.192.0.0"))
```

```
=> [222I 192I 0I 0I]
```

inet/ip4?

```
(inet/ip4? addr)
```

Returns true if addr is an IPv4 address.

```
(inet/ip4? "222.192.0.0")  
=> true
```

```
(inet/ip4? (inet/inet-addr "222.192.0.0"))  
=> true
```

inet/ip6?

```
(inet/ip6? addr)
```

Returns true if addr is an IPv6 address.

```
(inet/ip6? "2001:0db8:85a3:08d3:1319:8a2e:0370:7347")  
=> true
```

```
(inet/ip6? (inet/inet-addr "2001:0db8:85a3:08d3:1319:8a2e:0370:7347"))  
=> true
```

inet/linklocal-addr?

```
(inet/linklocal-addr? addr)
```

Returns true if addr is a link local address.

```
(inet/linklocal-addr? "169.254.0.0")  
=> true
```

```
(inet/linklocal-addr? (inet/inet-addr "169.254.0.0"))  
=> true
```

inet/multicast-addr?

```
(inet/multicast-addr? addr)
```

Returns true if addr is a multicast address.

```
(inet/multicast-addr? "224.0.0.1")
=> true

(inet/multicast-addr? (inet/inet-addr "224.0.0.1"))
=> true
```

[top](#)

inet/reachable?

```
(inet/reachable? addr timeout)
```

Test whether that address is reachable. Best effort is made by the implementation to try to reach the host, but firewalls and server configuration may block requests resulting in an unreachable status while some specific ports may be accessible. A typical implementation will use ICMP ECHO REQUESTs if the privilege can be obtained, otherwise it will try to establish a TCP connection on port 7 (Echo) of the destination host.

The timeout value, in milliseconds, indicates the maximum amount of time the try should take. If the operation times out before getting an answer, the host is deemed unreachable.

```
(inet/reachable? "google.com" 500)
=> false

(inet/reachable? "74.125.193.113" 500)
=> false
```

[top](#)

inet/sitelocal-addr?

```
(inet/sitelocal-addr? addr)
```

Returns true if addr is a site local address.

```
(inet/sitelocal-addr? "192.168.0.0")
=> true

(inet/sitelocal-addr? (inet/inet-addr "192.168.0.0"))
=> true
```

[top](#)

infinite?

```
(infinite? x)
```

Returns true if x is infinite else false. x must be a double!

```
(infinite? 1.0E300)
=> false
```

```
(infinite? (* 1.0E300 1.0E100))
=> true

(infinite? (/ 1.0 0))
=> true

(pr (/ 4.1 0))
:Infinite
=> nil
```

SEE ALSO

[nan?](#)

Returns true if x is a NaN else false. x must be a double!

[double](#)

Converts to double

[top](#)

installer/install-demo

```
(install-demo options*)
```

Install all demo fonts and the 3rdparty libraries for all Venice extension modules that require Java libraries:

- :jansi
- :bouncycastle
- :chatgpt
- :excel
- :pdf
- :qrbill
- :tomcat
- :xchart

Options:

:dir path	download dir, defaults to "." except when run in a REPL where it defaults to the value of <code>(repl/libs-dir)</code>
:silent {true,false}	if silent is true does not show a progress bar, defaults to true
:force {true,false}	if force is true download the artifact even if it exist already on the download dir, else skip the download if it exists. Defaults to true.

In the REPL run:

```
venice> (load-module :installer)
venice> (installer/install-demo)
venice> !restart
```

```
(do
  (load-module :installer)
  (installer/install-demo :dir (repl/libs-dir) :silent false))
```

SEE ALSO

[installer/install-demo-fonts](#)

Install the Venice demo fonts.

installer/install-demo-fonts

```
(install-demo-fonts options*)
```

Install the Venice demo fonts.

Installs the open source font families:

- Open Sans
- Source Code Pro
- Audiowide
- Roboto

Options:

:dir path download dir, defaults to "." except when run in a REPL where it defaults to the value of `(repl/libs-dir)`
:silent {true,false} if silent is true does not show a progress bar, defaults to true

In the REPL run:

```
venice> (load-module :installer)
venice> (installer/install-demo-fonts)
venice> !restart
```

```
(do
  (load-module :installer)
  (installer/install-demo-fonts :dir (repl/libs-dir) :silent false))
```

SEE ALSO

[installer/install-demo](#)

Install all demo fonts and the 3rdparty libraries for all Venice extension modules that require Java libraries:

installer/install-libs

```
(install-libs libs options*)
```

Install Java libraries.

Options:

:dir path download dir, defaults to "." except when run in a REPL where it defaults to the value of `(repl/libs-dir)`
:silent {true,false} if silent is true does not show a progress bar, defaults to true
:force {true,false} if force is true download the artifact even if it exist already on the download dir, else skip the download if it exists.
 Defaults to true.

```
(do
  (load-module :installer)
  (installer/install-libs ["org.fusesource.jansi:jansi:2.4.1"]
    :dir (repl/libs-dir)
    :silent false))
```

SEE ALSO

[installer/install-module](#)

Install the 3rdparty libraries for a Venice extension module.

[top](#)

installer/install-module

```
(install-module name options*)
```

Install the 3rdparty libraries for a Venice extension module.

Options:

:dir path	download dir, defaults to "." except when run in a REPL where it defaults to the value of <code>(repl/libs-dir)</code>
:silent {true,false}	if silent is true does not show a progress bar, defaults to true
:force {true,false}	if force is true download the artifact even if it exist already on the download dir, else skip the download if it exists. Defaults to true.

```
(do
  (load-module :installer)
  (installer/install-module :pdf :dir (repl/libs-dir) :silent false))
```

SEE ALSO

[installer/install-libs](#)

Install Java libraries.

[top](#)

instance-of?

```
(instance-of? type x)
```

Returns true if x is an instance of the given type

```
(instance-of? :long 500)
=> true
```

```
(instance-of? :java.math.BigInteger 500)
=> false
```

SEE ALSO

[type](#)

Returns the type of x.

[supertype](#)

Returns the super type of x.

[supertypes](#)

Returns the super types of x.

[top](#)

int

```
(int x)
```

Converts to int

```
(int 1)
```

```
=> 1I
```

```
(int nil)
```

```
=> 0I
```

```
(int false)
```

```
=> 0I
```

```
(int true)
```

```
=> 1I
```

```
(int 1.2)
```

```
=> 1I
```

```
(int 1.2M)
```

```
=> 1I
```

```
(int "1")
```

```
=> 1I
```

```
(int (char "A"))
```

```
=> 65I
```

[top](#)

int-array

```
(int-array coll)
```

```
(int-array len)
```

```
(int-array len init-val)
```

Returns an array of Java primitive ints containing the contents of coll or returns an array with the given length and optional init value

```
(int-array '(1I 2I 3I))
```

```
=> [1I, 2I, 3I]
```

```
(int-array '(1I 2 3.2 3.56M))
```

```
=> [1I, 2I, 3I, 3I]
```

```
(int-array 10)
```

```
=> [0I, 0I, 0I, 0I, 0I, 0I, 0I, 0I, 0I, 0I]
```

```
(int-array 10 42I)
```

```
=> [42I, 42I, 42I, 42I, 42I, 42I, 42I, 42I, 42I, 42I]
```

[top](#)

int?

```
(int? n)
```

Returns true if n is an int

```
(int? 4I)  
=> true
```

```
(int? 4)  
=> false
```

```
(int? 3.1)  
=> false
```

```
(int? true)  
=> false
```

```
(int? nil)  
=> false
```

```
(int? {})  
=> false
```

[top](#)

interleave

```
(interleave c1 c2)  
(interleave c1 c2 & colls)
```

Returns a collection of the first item in each coll, then the second etc.

Supports lazy sequences as long as at least one collection is not a lazy sequence.

```
(interleave [:a :b :c] [1 2])  
=> (:a 1 :b 2)
```

```
(interleave [:a :b :c] (lazy-seq 1 inc))  
=> (:a 1 :b 2 :c 3)
```

```
(interleave (lazy-seq (constantly :v)) [1 2 3])  
=> (:v 1 :v 2 :v 3)
```

[top](#)

interpose

```
(interpose sep coll)
```

Returns a collection of the elements of coll separated by sep.

```
(interpose ", " [1 2 3])  
=> (1 ", " 2 ", " 3)
```

```
(apply str (interpose ", " [1 2 3]))  
=> "1, 2, 3"
```

[top](#)

intersection

```
(intersection s1)  
(intersection s1 s2)  
(intersection s1 s2 & sets)
```

Return a set that is the intersection of the input sets

```
(intersection (set 1))  
=> #{1}
```

```
(intersection (set 1 2) (set 2 3))  
=> #{2}
```

```
(intersection (set 1 2) (set 3 4))  
=> #{} 
```

SEE ALSO

[union](#)

Return a set that is the union of the input sets

[difference](#)

Return a set that is the first set without elements of the remaining sets

[cons](#)

Returns a new collection where x is the first element and coll is the rest.

[conj](#)

Returns a new collection with the x, xs 'added'. (conj nil item) returns (item) and (conj item) returns item.

[disj](#)

Returns a new set with the x, xs removed.

[top](#)

into

```
(into)  
(into to)  
(into to from)
```

Returns a new coll consisting of to coll with all of the items of from coll conjoined.

```
(into (sorted-map) [ [:a 1] [:c 3] [:b 2] ])  
=> {:a 1 :b 2 :c 3}
```

```
(into (sorted-map) [ {:a 1} {:c 3} {:b 2} ])  
=> {:a 1 :b 2 :c 3}
```

```

(into (sorted-map) [(map-entry :b 2) (map-entry :c 3) (map-entry :a 1)])
=> {:a 1 :b 2 :c 3}

(into (sorted-map) {:b 2 :c 3 :a 1})
=> {:a 1 :b 2 :c 3}

(into [] {:a 1, :b 2})
=> [[:a 1] [:b 2]]

(into [] '(1 2 3))
=> [1 2 3]

(into '() '(1 2 3))
=> (3 2 1)

(into [1 2 3] '(4 5 6))
=> [1 2 3 4 5 6]

(into '(1 2 3) '(4 5 6))
=> (6 5 4 1 2 3)

(into [] (bytebuf [0 1 2]))
=> [0 1 2]

(into '() (bytebuf [0 1 2]))
=> (0 1 2)

(into [] "abc")
=> [#\a #\b #\c]

(into '() "abc")
=> (#\a #\b #\c)

```

SEE ALSO

[concat](#)

Returns a list of the concatenation of the elements in the supplied collections.

[merge](#)

Returns a map that consists of the rest of the maps conj-ed onto the first. If a key occurs in more than one map, the mapping from ...

[top](#)

into!

```

(into!)
(into! to)
(into! to from)

```

Adds all of the items of 'from' conjoined to the mutable 'to' collection

```

(into! (queue) [1 2 3 4])
=> (1 2 3 4)

(into! (stack) [1 2 3 4])
=> (4 3 2 1)

```

```
(do
  (into! (. :java.util.concurrent.CopyOnWriteArrayList :new)
    (doto (. :java.util.ArrayList :new)
      (. :add 3)
      (. :add 4))))
=> (3 4)
```

```
(do
  (into! (. :java.util.concurrent.CopyOnWriteArrayList :new)
    '(3 4)))
=> (3 4)
```

SEE ALSO

[concat](#)

Returns a list of the concatenation of the elements in the supplied collections.

[merge](#)

Returns a map that consists of the rest of the maps conj-ed onto the first. If a key occurs in more than one map, the mapping from ...

[top](#)

io/->uri

```
(io/->uri s)
(io/->uri scheme user-info host port path)
(io/->uri scheme user-info host port path query)
(io/->uri scheme user-info host port path query fragment)
```

Converts *s* to an URI or builds an URI from its spec elements.

s may be:

- a string (a spec string to be parsed as a URI.)
- a `java.io.File`
- a `java.nio.file.Path`
- a `java.net.URL`

Arguments:

scheme Scheme name
userInfo User name and authorization information
host Host name
port Port number
path Path
query Query
fragment Fragment

```
(io/->uri "file:/tmp/test.txt")
=> file:/tmp/test.txt
```

```
(io/->uri (io/file "/tmp/test.txt"))
=> file:/tmp/test.txt
```

```
(io/->uri (io->url (io/file "/tmp/test.txt")))
=> file:/tmp/test.txt
```

```
(str (io/->uri (io/file "/tmp/test.txt")))
=> "file:/tmp/test.txt"
```

```
;; to create an URL from spec details:
(io/->uri "http" nil "foo.org" 8080 "/info.html" nil nil)
=> http://foo.org:8080/info.html
```

SEE ALSO

[io/file](#)

Returns a java.io.File from file path, or from a parent path and one or multiple children. The path and parent may be a file or a string ...

[io/->url](#)

Converts s to an URL or builds an URL from its spec elements.

top

io/->url

```
(io/->url s)
(io/->url protocol host port file)
```

Converts s to an URL or builds an URL from its spec elements.

s may be:

- a string (a spec string to be parsed as a URL.)
- a `java.io.File`
- a `java.nio.file.Path`
- a `java.net.URI`

Arguments:

protocol the name of the protocol to use.
host the name of the host.
port the port number on the host.
file the file on the host

```
(io/->url "file:/tmp/test.txt")
=> file:/tmp/test.txt

(io/->url (io/file "/tmp/test.txt"))
=> file:/tmp/test.txt

(io/->url (io/->uri (io/file "/tmp/test.txt")))
=> file:/tmp/test.txt

(str (io/->url (io/file "/tmp/test.txt")))
=> "file:/tmp/test.txt"
```

```
;; to create an URL from spec details:
(io/->url "http" "foo.org" 8080 "/info.html")
=> http://foo.org:8080/info.html
```

SEE ALSO

[io/file](#)

Returns a java.io.File from file path, or from a parent path and one or multiple children. The path and parent may be a file or a string ...

[io/->uri](#)

Converts s to an URI or builds an URI from its spec elements.

io/await-for

```
(io/await-for timeout time-unit file & modes)
```

Blocks the current thread until the file has been created, deleted, or modified according to the passed modes `{:created, :deleted, :modified}`, or the timeout has elapsed. Returns logical false if returning due to timeout, logical true otherwise.

Supported time units are: `{:milliseconds, :seconds, :minutes, :hours, :days}`

```
(io/await-for 10 :seconds "/tmp/data.json" :created)
```

SEE ALSO

[io/watch-dir](#)

Watch a directory for changes, and call the function `event-fn` when it does. Calls the optional `failure-fn` if errors occur. On closing ...

io/buffered-reader

```
(io/buffered-reader f & options)
```

Create a `java.io.Reader` from `f`.

`f` may be a:

- string
- bytebuffer
- `java.io.File`, e.g. `(io/file "/temp/foo.json")`
- `java.nio.file.Path`
- `java.io.InputStream`
- `java.io.Reader`
- `java.net.URL`
- `java.net.URI`

Options:

`:encoding enc` e.g.: `:encoding :utf-8`, defaults to `:utf-8`

`io/buffered-reader` supports load paths. See the `loadpath/paths` doc for a description of the *load path* feature.

Note: The caller is responsible for closing the reader!

```
(let [data (bytebuf [108 105 110 101 32 49 10 108 105 110 101 32 50])]
  (try-with [rd (io/buffered-reader data :encoding :utf-8)]
    (println (read-line rd))
    (println (read-line rd))))
```

line 1

line 2

=> nil

```
(try-with [rd (io/buffered-reader "1\n2\n3\n4")]
  (println (read-line rd))
  (println (read-line rd)))
```

1


```
2
=> nil
```

SEE ALSO

[read-line](#)

Without `arg` reads the next line from the stream that is the current value of `*in*`. With `arg` reads the next line from the passed stream ...

[io/string-reader](#)

Creates a `java.io.StringReader` from a string.

[io/buffered-writer](#)

Creates a `java.io.Writer` for `f`.

[top](#)

io/buffered-writer

```
(io/buffered-writer f & options)
```

Creates a `java.io.Writer` for `f`.

`f` may be a:

- `java.io.File`, e.g. `(io/file "/temp/foo.json")`
- `java.nio.file.Path`
- `java.io.OutputStream`
- `java.io.Writer` Options:

`:append true/false` e.g.: `:append true`, defaults to `false`

`:encoding enc` e.g.: `:encoding :utf-8`, defaults to `:utf-8`

`io/buffered-writer` supports load paths. See the `loadpath/paths` doc for a description of the *load path* feature.

SEE ALSO

[println](#)

Prints the values `xs` to the stream that is the current value of `*out*` or to the passed output stream `os` if given followed by a (newline).

[io/string-writer](#)

Creates a `java.io.StringWriter`.

[io/buffered-reader](#)

Create a `java.io.Reader` from `f`.

[top](#)

io/bytebuf-in-stream

```
(io/bytebuf-in-stream buf)
```

Returns a `java.io.InputStream` from a `bytebuf`.

Note: The caller is responsible for closing the stream!

```
(try-with [is (io/bytebuf-in-stream (bytebuf [97 98 99]))]
  ; do something with is
)
```

SEE ALSO

[io/slurp-stream](#)

Slurps binary or string data from a `java.io.InputStream` is. Supports the option `:binary` to either slurp binary or string data. For ...

[io/file-in-stream](#)

Returns a `java.io.InputStream` for the file `f`.

[io/string-in-stream](#)

Returns a `java.io.InputStream` for the string `s`.

[top](#)

io/bytebuf-out-stream

`(io/bytebuf-out-stream)`

Returns a new `java.io.ByteArrayOutputStream` .

Dereferencing a `:ByteArrayOutputStream` returns the captured `bytebuf`.

Note: The caller is responsible for closing the stream!

```
(try-with [os (io/bytebuf-out-stream)]
  (io/spit-stream os (bytebuf [97 98 99]) :flush true)
  (str/format-bytebuf @os ", " :prefix0x))
=> "0x61, 0x62, 0x63"
```

SEE ALSO

[io/slurp-stream](#)

Slurps binary or string data from a `java.io.InputStream` is. Supports the option `:binary` to either slurp binary or string data. For ...

[io/file-in-stream](#)

Returns a `java.io.InputStream` for the file `f`.

[io/string-in-stream](#)

Returns a `java.io.InputStream` for the string `s`.

[top](#)

io/capturing-print-stream

`(io/capturing-print-stream)`

Creates a new capturing print stream.

Dereferencing a capturing print stream returns the captured string.

Note: The caller is responsible for closing the stream!

```
(try-with [ps (io/capturing-print-stream)]
  (binding [*out* ps]
    (println 100)
    (println 200)
    (flush)
    @ps))
=> "100\n200\n"
```

```
(try-with [ps (io/capturing-print-stream)]
  (println ps 100)
  (println ps 200)
  (flush ps)
  @ps)
=> "100\n200\n"
```

top

io/classpath-resource?

```
(io/classpath-resource? name)
```

Returns true if the classpath resource exists otherwise false.

```
(io/classpath-resource? "com/github/jlangch/venice/images/venice.png")
=> true
```

SEE ALSO

[io/load-classpath-resource](#)

Loads a classpath resource. Returns a bytebuf

top

io/close

```
(io/close s)
```

Closes a `:java.io.InputStream`, `:java.io.OutputStream`, `:java.io.Reader`, or a `:java.io.Writer`.

Often it is more elegant to use try-with to let Venice implicitly close the stream when its leaves the scope:

```
(let [file (io/file "foo.txt")]
  (try-with [is (io/file-in-stream file)]
    (io/slurp-stream is :binary false)))
```

SEE ALSO

[io/flush](#)

Flushes a `:java.io.OutputStream` or a `:java.io.Writer`.

top

io/close-watcher

```
(io/close-watcher watcher)
```

Closes a watcher created from 'io/watch-dir'.

SEE ALSO

[io/watch-dir](#)

Watch a directory for changes, and call the function event-fn when it does. Calls the optional failure-fn if errors occur. On closing ...

io/copy-file

(io/copy-file source dest & options)

Copies source to dest. Returns nil or throws a VncException. Source must be a file or a string (file path), dest must be a file, a string (file path), or an `java.io.OutputStream`.

Options:

:replace true/false	e.g.: if true replace an existing file, defaults to false
:copy-attributes true/false	e.g.: if true copy attributes to the new file, defaults to false
:no-follow-links true/false	e.g.: if true do not follow symbolic links, defaults to false

SEE ALSO

[io/copy-files-glob](#)

Copies all files that match the glob pattern from a source to a destination directory. src-dir and dst-dir must be a file or a string ...

[io/copy-file-tree](#)

Copies a file tree from source to dest. Returns nil or throws a VncException. Source must be a file or a string (file path), dest must ...

[io/move-file](#)

Moves source to target. Returns nil or throws a VncException. Source and target must be a file or a string (file path).

[io/delete-file](#)

Deletes one or multiple files. Silently skips delete if the file does not exist. If f is a directory the directory must be empty. f ...

[io/touch-file](#)

Updates the lastModifiedTime of the file to the current time, or creates a new empty file if the file doesn't already exist. File must ...

[io/copy-stream](#)

Copies the input stream to the output stream. Returns nil on success or throws a VncException on failure. Input and output must be a ...

io/copy-file-tree

(io/copy-file-tree source dest & options)

Copies a file tree from source to dest. Returns nil or throws a VncException. Source must be a file or a string (file path), dest must be a file, a string (file path), or an `java.io.OutputStream`.

Options:

:replace true/false	e.g.: if true replace an existing file, defaults to false
:copy-attributes true/false	e.g.: if true copy attributes to the new file, defaults to false
:no-follow-links true/false	e.g.: if true do not follow symbolic links, defaults to false

SEE ALSO

[io/copy-file](#)

Copies source to dest. Returns nil or throws a VncException. Source must be a file or a string (file path), dest must be a file, a ...

[io/copy-files-glob](#)

Copies all files that match the glob pattern from a source to a destination directory. src-dir and dst-dir must be a file or a string ...

[io/move-file](#)

Moves source to target. Returns nil or throws a VncException. Source and target must be a file or a string (file path).

[io/delete-file](#)

Deletes one or multiple files. Silently skips delete if the file does not exist. If f is a directory the directory must be empty. f ...

[io/touch-file](#)

Updates the lastModifiedTime of the file to the current time, or creates a new empty file if the file doesn't already exist. File must ...

[io/copy-stream](#)

Copies the input stream to the output stream. Returns nil on sucess or throws a VncException on failure. Input and output must be a ...

[top](#)

io/copy-files-glob

```
(io/copy-files-glob src-dir dst-dir glob & options)
```

Copies all files that match the glob pattern from a source to a destination directory. src-dir and dst-dir must be a file or a string (file path).

Options:

:replace true/false	e.g.: if true replace an existing file, defaults to false
:copy-attributes true/false	e.g.: if true copy attributes to the new file, defaults to false
:no-follow-links true/false	e.g.: if true do not follow symbolic links, defaults to false

Globbing patterns

<code>*.txt</code>	Matches a path that represents a file name ending in .txt
<code>*.*</code>	Matches file names containing a dot
<code>*.{txt,xml}</code>	Matches file names ending with .txt or .xml
<code>foo.?[xy]</code>	Matches file names starting with foo. and a single character extension followed by a 'x' or 'y' character
<code>/home/*/</code>	Matches <code>/home/gus/data</code> on UNIX platforms
<code>/home/**</code>	Matches <code>/home/gus</code> and <code>/home/gus/data</code> on UNIX platforms
<code>C:*</code>	Matches <code>C:\\foo</code> and <code>C:\\bar</code> on the Windows platform

Ranges

The pattern `[A-E]` would match any character that included ABCDE. Ranges can be used in conjunction with each other to make powerful patterns. Alphanumerical strings are matched by `[A-Za-z0-9]`. This would match the following:

- `[A-Z]` All uppercase letters from A to Z
- `[a-z]` All lowercase letters from a to z
- `[0-9]` All numbers from 0 to 9

Complementation

Globs can be used in complement with special characters that can change how the pattern works. The two complement characters are exclamation marks `(!)` and backslashes `(\\)`.

The exclamation mark can negate a pattern that it is put in front of. As `[CBR]at` matches Cat, Bat, or Rat the negated pattern `[!CBR]at` matches anything like Kat, Pat, or Vat.

Backslashes are used to remove the special meaning of single characters `'?'`, `'*'`, and `'['`, so that they can be used in patterns.

```
(io/copy-files-glob "from" "to" "*.log")
```

SEE ALSO

[io/copy-file](#)

Copies source to dest. Returns nil or throws a VncException. Source must be a file or a string (file path), dest must be a file, a ...

[io/copy-file-tree](#)

Copies a file tree from source to dest. Returns nil or throws a VncException. Source must be a file or a string (file path), dest must ...

[io/move-files-glob](#)

Move all files that match the glob pattern from a source to a destination directory. src-dir and dst-dir must be a file or a string (file path).

[io/delete-files-glob](#)

Removes all files in a directory that match the glob pattern. dir must be a file or a string (file path).

[io/list-files-glob](#)

Lists all files in a directory that match the glob pattern. dir must be a file or a string (file path). Returns files as java.io.File

[top](#)

io/copy-stream

```
(io/copy-stream in-stream out-stream)
```

Copies the input stream to the output stream. Returns `nil` on success or throws a VncException on failure. Input and output must be a `java.io.InputStream` and `java.io.OutputStream`.

SEE ALSO

[io/copy-file](#)

Copies source to dest. Returns nil or throws a VncException. Source must be a file or a string (file path), dest must be a file, a ...

[top](#)

io/create-hard-link

```
(io/create-hard-link link target)
```

Creates a hard link to a target. link and target must be a file or a string (file path).

```
(io/create-hard-link "/tmp/hard-link" "/tmp/test.txt")
```

SEE ALSO

[io/create-symbolic-link](#)

Creates a symbolic link to a target. link and target must be a file or a string (file path).

[io/symbolic-link?](#)

Returns true if the file f exists and is a symbolic link. f must be a file or a string (file path).

[top](#)

io/create-symbolic-link

```
(io/create-symbolic-link link target)
```

Creates a symbolic link to a target. link and target must be a file or a string (file path).

```
(io/create-symbolic-link "/tmp/sym-link" "/tmp/test.txt")
```

SEE ALSO

[io/create-hard-link](#)

Creates a hard link to a target. link and target must be a file or a string (file path).

[io/symbolic-link?](#)

Returns true if the file f exists and is a symbolic link. f must be a file or a string (file path).

[top](#)

io/default-charset

(io/default-charset)

Returns the default charset.

[top](#)

io/delete-file

(io/delete-file f & files)

Deletes one or multiple files. Silently skips delete if the file does not exist. If f is a directory the directory must be empty. f must be a file or a string (file path).

SEE ALSO

[io/delete-files-glob](#)

Removes all files in a directory that match the glob pattern. dir must be a file or a string (file path).

[io/delete-file-tree](#)

Deletes a file or a directory with all its content. Silently skips delete if the file or directory does not exist. f must be a file ...

[io/delete-file-on-exit](#)

Requests that the files or directories be deleted when the virtual machine terminates. Files (or directories) are deleted in the reverse ...

[io/copy-file](#)

Copies source to dest. Returns nil or throws a VncException. Source must be a file or a string (file path), dest must be a file, a ...

[io/move-file](#)

Moves source to target. Returns nil or throws a VncException. Source and target must be a file or a string (file path).

[top](#)

io/delete-file-on-exit

(io/delete-file-on-exit f & fs)

Requests that the files or directories be deleted when the virtual machine terminates. Files (or directories) are deleted in the reverse order that they are registered. Invoking this method to delete a file or directory that is already registered for deletion has no effect. Deletion will be attempted only for normal termination of the virtual machine, as defined by the Java Language Specification.

f must be a file or a string (file path).

```
(let [file1 (io/temp-file "test-", ".data")
      file2 (io/temp-file "test-", ".data")]
  (io/delete-file-on-exit file1 file2)
  (io/spit file1 "123")
  (io/spit file2 "ABC"))
```

SEE ALSO

- [io/delete-file](#)
Deletes one or multiple files. Silently skips delete if the file does not exist. If f is a directory the directory must be empty. f ...
- [io/delete-file-tree](#)
Deletes a file or a directory with all its content. Silently skips delete if the file or directory does not exist. f must be a file ...
- [io/delete-files-glob](#)
Removes all files in a directory that match the glob pattern. dir must be a file or a string (file path).

top

io/delete-file-tree

```
(io/delete-file-tree f & files)
```

Deletes a file or a directory with all its content. Silently skips delete if the file or directory does not exist. f must be a file or a string (file path)

SEE ALSO

- [io/delete-files-glob](#)
Removes all files in a directory that match the glob pattern. dir must be a file or a string (file path).
- [io/delete-file](#)
Deletes one or multiple files. Silently skips delete if the file does not exist. If f is a directory the directory must be empty. f ...
- [io/delete-file-on-exit](#)
Requests that the files or directories be deleted when the virtual machine terminates. Files (or directories) are deleted in the reverse ...

top

io/delete-files-glob

```
(io/delete-files-glob dir glob)
```

Removes all files in a directory that match the glob pattern. dir must be a file or a string (file path).

Globbing patterns

*.txt	Matches a path that represents a file name ending in .txt
.	Matches file names containing a dot
*.{txt,xml}	Matches file names ending with .txt or .xml
foo.?[xy]	Matches file names starting with foo. and a single character extension followed by a 'x' or 'y' character
/home/*/	Matches /home/gus/data on UNIX platforms
/home/**	Matches /home/gus and /home/gus/data on UNIX platforms
C:*	Matches C:\\foo and C:\\bar on the Windows platform

Ranges

The pattern `[A-E]` would match any character that included ABCDE. Ranges can be used in conjunction with each other to make powerful patterns. Alphanumerical strings are matched by `[A-Za-z0-9]`. This would match the following:

- `[A-Z]` All uppercase letters from A to Z
- `[a-z]` All lowercase letters from a to z
- `[0-9]` All numbers from 0 to 9

Complementation

Globs can be used in complement with special characters that can change how the pattern works. The two complement characters are exclamation marks `(!)` and backslashes `(\)`.

The exclamation mark can negate a pattern that it is put in front of. As `[CBR]at` matches Cat, Bat, or Rat the negated pattern `[!CBR]at` matches anything like Kat, Pat, or Vat.

Backslashes are used to remove the special meaning of single characters `'?'`, `'*'`, and `'['`, so that they can be used in patterns.

```
(io/delete-files-glob "." "/*.log")
```

SEE ALSO

[io/delete-file](#)

Deletes one or multiple files. Silently skips delete if the file does not exist. If `f` is a directory the directory must be empty. `f ...`

[io/delete-file-tree](#)

Deletes a file or a directory with all its content. Silently skips delete if the file or directory does not exist. `f` must be a file ...

[io/move-files-glob](#)

Move all files that match the glob pattern from a source to a destination directory. `src-dir` and `dst-dir` must be a file or a string (file path).

[io/copy-files-glob](#)

Copies all files that match the glob pattern from a source to a destination directory. `src-dir` and `dst-dir` must be a file or a string ...

[io/list-files-glob](#)

Lists all files in a directory that match the glob pattern. `dir` must be a file or a string (file path). Returns files as `java.io.File`

[top](#)

io/download

```
(io/download uri & options)
```

Downloads the content from the uri and reads it as text (string) or binary (bytebuf). Supports http and https protocols!

Options:

<code>:binary true/false</code>	e.g.: <code>:binary true</code> , defaults to false
<code>:user-agent agent</code>	e.g.: <code>:user-agent "Mozilla"</code> , defaults to nil
<code>:encoding enc</code>	e.g.: <code>:encoding :utf-8</code> , defaults to :utf-8
<code>:conn-timeout val</code>	e.g.: <code>:conn-timeout 10000</code> , connection timeout in milliseconds. 0 is interpreted as an infinite timeout.
<code>:read-timeout val</code>	e.g.: <code>:read-timeout 10000</code> , read timeout in milliseconds. 0 is interpreted as an infinite timeout.
<code>:progress-fn fn</code>	a progress function that takes 2 args [1] progress (0..100%) [2] status {:start :progress :end :failed}

Note:

If the server returns the HTTP response status code 403 (*Access Denied*) sending a user agent like "Mozilla" may fool the website and solve the problem.

```
(-<> "https://live.staticflickr.com/65535/51007202541_ea453871d8_o_d.jpg"
  (io/download <> :binary true :user-agent "Mozilla")
  (io/spit "space-x.jpg" <>))

(do
  (load-module :ansi)
  (-<> "https://live.staticflickr.com/65535/51007202541_ea453871d8_o_d.jpg"
    (io/download <> :binary true
      :user-agent "Mozilla"
      :progress-fn (ansi/progress :caption "Download:"))
    (io/spit "space-x.jpg" <>)))
```

[top](#)

io/exists-dir?

```
(io/exists-dir? f)
```

Returns true if the file *f* exists and is a directory. *f* must be a file or a string (file path).

```
(io/exists-dir? (io/file "/temp"))
=> false
```

SEE ALSO

[io/exists-file?](#)

Returns true if the file *f* exists and is a file. *f* must be a file or a string (file path).

[io/symbolic-link?](#)

Returns true if the file *f* exists and is a symbolic link. *f* must be a file or a string (file path).

[top](#)

io/exists-file?

```
(io/exists-file? f)
```

Returns true if the file *f* exists and is a file. *f* must be a file or a string (file path).

```
(io/exists-file? "/tmp/test.txt")
=> false
```

SEE ALSO

[io/exists-dir?](#)

Returns true if the file *f* exists and is a directory. *f* must be a file or a string (file path).

[io/symbolic-link?](#)

Returns true if the file *f* exists and is a symbolic link. *f* must be a file or a string (file path).

[top](#)

io/file

```
(io/file path)
(io/file parent child)
(io/file parent child & children)
```

Returns a java.io.File from file path, or from a parent path and one or multiple children. The path and parent may be a file or a string (file path), child and children must be strings.

```
(io/file "/tmp/test.txt")
=> /tmp/test.txt

(io/file "/temp" "test.txt")
=> /temp/test.txt

(io/file "/" "temp" "test" "test.txt")
=> /temp/test/test.txt

(io/file (io/file "/" "temp") "test" "test.txt")
=> /temp/test/test.txt

(io/file (. :java.io.File :new "/tmp/test.txt"))
=> /tmp/test.txt

;; Windows:
;; (io/file "C:\\tmp\\test.txt")
;; (io/file "C:/tmp/test.txt")

;; (io/file "C:" "tmp" "test.txt")
```

SEE ALSO

[io/file-name](#)

Returns the name of the file f as a string. f must be a file or a string (file path).

[io/file-parent](#)

Returns the parent file of the file f. f must be a file or a string (file path).

[io/file-path](#)

Returns the path of the file f as a string. f must be a file or a string (file path).

[io/file-absolute](#)

Returns the absolute path of the file f. f must be a file or a string (file path).

[io/file-canonical](#)

Returns the canonical path of the file f. f must be a file or a string (file path).

[top](#)

io/file-absolute

```
(io/file-absolute f)
```

Returns the absolute path of the file f. f must be a file or a string (file path).

```
(io/file-absolute (io/file "/tmp/test/x.txt"))
=> /tmp/test/x.txt
```

SEE ALSO

[io/file-path](#)

Returns the path of the file `f` as a string. `f` must be a file or a string (file path).

[io/file-canonical](#)

Returns the canonical path of the file `f`. `f` must be a file or a string (file path).

[io/file](#)

Returns a `java.io.File` from file path, or from a parent path and one or multiple children. The path and parent may be a file or a string ...

[io/file-absolute?](#)

Returns true if file `f` has an absolute path else false. `f` must be a file or a string (file path).

[top](#)

io/file-absolute?

```
(io/file-absolute? f)
```

Returns true if file `f` has an absolute path else false. `f` must be a file or a string (file path).

```
(io/file-absolute? (io/file "/tmp/test/x.txt"))  
=> true
```

SEE ALSO

[io/file-path](#)

Returns the path of the file `f` as a string. `f` must be a file or a string (file path).

[io/file-canonical](#)

Returns the canonical path of the file `f`. `f` must be a file or a string (file path).

[io/file](#)

Returns a `java.io.File` from file path, or from a parent path and one or multiple children. The path and parent may be a file or a string ...

[io/file-absolute](#)

Returns the absolute path of the file `f`. `f` must be a file or a string (file path).

[top](#)

io/file-basename

```
(io/file-basename f)
```

Returns the base name (file name without file extension) of the file `f` as a string. `f` must be a file or a string (file path).

```
(io/file-basename (io/file "/tmp/test/x.txt"))  
=> "x"
```

SEE ALSO

[io/file-name](#)

Returns the name of the file `f` as a string. `f` must be a file or a string (file path).

[io/file-parent](#)

Returns the parent file of the file `f`. `f` must be a file or a string (file path).

[io/file-ext](#)

Returns the file extension of a file. `f` must be a file or a string (file path).

[io/file](#)

Returns a `java.io.File` from file path, or from a parent path and one or multiple children. The path and parent may be a file or a string ...

io/file-can-execute?

```
(io/file-can-execute? f)
```

Returns true if the file or directory `f` exists and can be executed. `f` must be a file or a string (file path).

```
(io/file-can-execute? "/tmp/test.txt")
```

SEE ALSO

[io/file-set-executable](#)

Set the owner's execute permission to the file or directory `f`. `f` must be a file or a string (file path).

[io/file-can-read?](#)

Returns true if the file or directory `f` exists and can be read. `f` must be a file or a string (file path).

[io/file-can-write?](#)

Returns true if the file or directory `f` exists and can be written. `f` must be a file or a string (file path).

[io/file-hidden?](#)

Returns true if the file or directory `f` exists and is hidden. `f` must be a file or a string (file path).

[io/symbolic-link?](#)

Returns true if the file `f` exists and is a symbolic link. `f` must be a file or a string (file path).

io/file-can-read?

```
(io/file-can-read? f)
```

Returns true if the file or directory `f` exists and can be read. `f` must be a file or a string (file path).

```
(io/file-can-read? "/tmp/test.txt")
```

SEE ALSO

[io/file-set-readable](#)

Set the owner's read permission to the file or directory `f`. `f` must be a file or a string (file path).

[io/file-can-write?](#)

Returns true if the file or directory `f` exists and can be written. `f` must be a file or a string (file path).

[io/file-can-execute?](#)

Returns true if the file or directory `f` exists and can be executed. `f` must be a file or a string (file path).

[io/file-hidden?](#)

Returns true if the file or directory `f` exists and is hidden. `f` must be a file or a string (file path).

[io/symbolic-link?](#)

Returns true if the file `f` exists and is a symbolic link. `f` must be a file or a string (file path).

io/file-can-write?

```
(io/file-can-write? f)
```

Returns true if the file or directory `f` exists and can be written. `f` must be a file or a string (file path).

```
(io/file-can-write? "/tmp/test.txt")
```

SEE ALSO

[io/file-set-writable](#)

Set the owner's write permission to the file or directory `f`. `f` must be a file or a string (file path).

[io/file-can-read?](#)

Returns true if the file or directory `f` exists and can be read. `f` must be a file or a string (file path).

[io/file-can-execute?](#)

Returns true if the file or directory `f` exists and can be executed. `f` must be a file or a string (file path).

[io/file-hidden?](#)

Returns true if the file or directory `f` exists and is hidden. `f` must be a file or a string (file path).

[io/symbolic-link?](#)

Returns true if the file `f` exists and is a symbolic link. `f` must be a file or a string (file path).

[top](#)

io/file-canonical

```
(io/file-canonical f)
```

Returns the canonical path of the file `f`. `f` must be a file or a string (file path).

```
(io/file-canonical (io/file "/tmp/test/../x.txt"))  
=> /private/tmp/x.txt
```

SEE ALSO

[io/file-path](#)

Returns the path of the file `f` as a string. `f` must be a file or a string (file path).

[io/file-absolute](#)

Returns the absolute path of the file `f`. `f` must be a file or a string (file path).

[io/file](#)

Returns a `java.io.File` from file path, or from a parent path and one or multiple children. The path and parent may be a file or a string ...

[top](#)

io/file-ext

```
(io/file-ext f)
```

Returns the file extension of a file. `f` must be a file or a string (file path).

```
(io/file-ext "some.txt")
=> "txt"

(io/file-ext "/tmp/test/some.txt")
=> "txt"

(io/file-ext "/tmp/test/some")
=> nil
```

SEE ALSO

[io/file-ext?](#)

Returns true if the file *f* has the extension *ext*. *f* must be a file or a string (file path).

[io/file-basename](#)

Returns the base name (file name without file extension) of the file *f* as a string. *f* must be a file or a string (file path).

[top](#)

io/file-ext?

```
(io/file-ext? f ext & exts)
```

Returns true if the file *f* has the extension *ext*. *f* must be a file or a string (file path).

```
(io/file-ext? "/tmp/test/x.txt" "txt")
=> true

(io/file-ext? (io/file "/tmp/test/x.txt") ".txt")
=> true

(io/file-ext? "/tmp/test/x.docx" "doc" "docx")
=> false
```

SEE ALSO

[io/file-ext](#)

Returns the file extension of a file. *f* must be a file or a string (file path).

[top](#)

io/file-hidden?

```
(io/file-hidden? f)
```

Returns true if the file or directory *f* exists and is hidden. *f* must be a file or a string (file path).

```
(io/file-hidden? "/tmp/test.txt")
```

SEE ALSO

[io/file-can-read?](#)

Returns true if the file or directory *f* exists and can be read. *f* must be a file or a string (file path).

[io/file-can-write?](#)

Returns true if the file or directory *f* exists and can be written. *f* must be a file or a string (file path).

[io/file-can-execute?](#)

Returns true if the file or directory `f` exists and can be executed. `f` must be a file or a string (file path).

[io/symbolic-link?](#)

Returns true if the file `f` exists and is a symbolic link. `f` must be a file or a string (file path).

[top](#)

io/file-in-stream

```
(io/file-in-stream f)
```

Returns a `java.io.InputStream` for the file `f`.

`f` may be a:

- string file path, e.g: `"/temp/foo.json"`
- `java.io.File`, e.g: `(io/file "/temp/foo.json")`

`io/file-in-stream` supports load paths. See the `loadpath/paths` doc for a description of the *load path* feature.

Note: The caller is responsible for closing the stream!

SEE ALSO

[io/slurp](#)

Reads the content of file `f` as text (string) or binary (bytebuf).

[io/slurp-stream](#)

Slurps binary or string data from a `java.io.InputStream` `is`. Supports the option `:binary` to either slurp binary or string data. For ...

[io/string-in-stream](#)

Returns a `java.io.InputStream` for the string `s`.

[io/bytebuf-in-stream](#)

Returns a `java.io.InputStream` from a `bytebuf`.

[loadpath/paths](#)

Returns the list of the defined load paths. A load path is either a file, a ZIP file, or a directory. Load paths are defined at the ...

[top](#)

io/file-last-modified

```
(io/file-last-modified f)
```

Returns the last modification time (a Java `LocalDateTime`) of `f` or `nil` if `f` does not exist. `f` must be a file or a string (file path).

```
(io/file-last-modified "/tmp/test.txt")
```

SEE ALSO

[io/file-can-read?](#)

Returns true if the file or directory `f` exists and can be read. `f` must be a file or a string (file path).

[io/file-can-write?](#)

Returns true if the file or directory `f` exists and can be written. `f` must be a file or a string (file path).

[io/file-can-execute?](#)

Returns true if the file or directory `f` exists and can be executed. `f` must be a file or a string (file path).

[top](#)

io/file-matches-glob?

```
(io/file-matches-glob? glob f)
```

Returns true if the file `f` matches the glob pattern. `f` must be a file or a string (file path).

Globbing patterns

<code>*.txt</code>	Matches a path that represents a file name ending in <code>.txt</code>
<code>*.*</code>	Matches file names containing a dot
<code>*.{txt,xml}</code>	Matches file names ending with <code>.txt</code> or <code>.xml</code>
<code>foo.?[xy]</code>	Matches file names starting with <code>foo.</code> and a single character extension followed by a <code>'x'</code> or <code>'y'</code> character
<code>/home/*/*</code>	Matches <code>/home/gus/data</code> on UNIX platforms
<code>/home/**</code>	Matches <code>/home/gus</code> and <code>/home/gus/data</code> on UNIX platforms
<code>C:*</code>	Matches <code>C:\\foo</code> and <code>C:\\bar</code> on the Windows platform

Ranges

The pattern `[A-E]` would match any character that included ABCDE. Ranges can be used in conjunction with each other to make powerful patterns. Alphanumerical strings are matched by `[A-Za-z0-9]`. This would match the following:

- `[A-Z]` All uppercase letters from A to Z
- `[a-z]` All lowercase letters from a to z
- `[0-9]` All numbers from 0 to 9

Complementation

Globs can be used in complement with special characters that can change how the pattern works. The two complement characters are exclamation marks `(!)` and backslashes `(\\)`.

The exclamation mark can negate a pattern that it is put in front of. As `[CBR]at` matches Cat, Bat, or Rat the negated pattern `[!CBR]at` matches anything like Kat, Pat, or Vat.

Backslashes are used to remove the special meaning of single characters `'?'`, `'*'`, and `'['`, so that they can be used in patterns.

```
(io/file-matches-glob? "*.log" "file.log")
=> true
```

```
(io/file-matches-glob? "**/*.log" "x/y/file.log")
=> true
```

```
(io/file-matches-glob? "**/*.log" "file.log") ; take care, doesn't match!
=> false
```

```
(io/file-matches-glob? (io/glob-path-matcher "*.log") (io/file "file.log"))
=> true
```

```
(io/file-matches-glob? (io/glob-path-matcher "**/*.log") (io/file "x/y/file.log"))
=> true
```

SEE ALSO

[io/glob-path-matcher](#)

Returns a file matcher for glob file patterns.

[io/list-files-glob](#)

Lists all files in a directory that match the glob pattern. `dir` must be a file or a string (file path). Returns files as `java.io.File`

[top](#)

[io/file-name](#)

```
(io/file-name f)
```

Returns the name of the file `f` as a string. `f` must be a file or a string (file path).

```
(io/file-name (io/file "/tmp/test/x.txt"))  
=> "x.txt"
```

SEE ALSO

[io/file-basename](#)

Returns the base name (file name without file extension) of the file `f` as a string. `f` must be a file or a string (file path).

[io/file-parent](#)

Returns the parent file of the file `f`. `f` must be a file or a string (file path).

[io/file](#)

Returns a `java.io.File` from file path, or from a parent path and one or multiple children. The path and parent may be a file or a string ...

[top](#)

[io/file-out-stream](#)

```
(io/file-out-stream f options)
```

Returns a `java.io.OutputStream` for the file `f`.

`f` may be a:

- string file path, e.g: `"/temp/foo.json"`
- `java.io.File`, e.g: `(io/file "/temp/foo.json")`

Options:

`:append true/false` e.g.: `:append true`, defaults to `false`

`:encoding enc` e.g.: `:encoding utf-8`, defaults to `utf-8`

`io/file-out-stream` supports load paths. See the `loadpath/paths` doc for a description of the *load path* feature.

Note: The caller is responsible for closing the stream!

SEE ALSO

[io/slurp](#)

Reads the content of file `f` as text (string) or binary (bytebuf).

[io/slurp-stream](#)

Slurps binary or string data from a `java.io.InputStream` `is`. Supports the option `:binary` to either slurp binary or string data. For ...

[io/string-in-stream](#)

Returns a `java.io.InputStream` for the string `s`.

[io/bytebuf-in-stream](#)

Returns a `java.io.InputStream` from a `bytebuf`.

[loadpath/paths](#)

Returns the list of the defined load paths. A load path is either a file, a ZIP file, or a directory. Load paths are defined at the ...

[top](#)

io/file-parent

```
(io/file-parent f)
```

Returns the parent file of the file `f`. `f` must be a file or a string (file path).

```
(io/file-path (io/file-parent (io/file "/tmp/test/x.txt")))
=> "/tmp/test"
```

SEE ALSO

[io/file-name](#)

Returns the name of the file `f` as a string. `f` must be a file or a string (file path).

[io/file](#)

Returns a `java.io.File` from file path, or from a parent path and one or multiple children. The path and parent may be a file or a string ...

[top](#)

io/file-path

```
(io/file-path f)
```

Returns the path of the file `f` as a string. `f` must be a file or a string (file path).

```
(io/file-path (io/file "/tmp/test/x.txt"))
=> "/tmp/test/x.txt"
```

SEE ALSO

[io/file-absolute](#)

Returns the absolute path of the file `f`. `f` must be a file or a string (file path).

[io/file-canonical](#)

Returns the canonical path of the file `f`. `f` must be a file or a string (file path).

[io/file](#)

Returns a `java.io.File` from file path, or from a parent path and one or multiple children. The path and parent may be a file or a string ...

[top](#)

io/file-path-slashify

```
(io/file-path-slashify f)
```

Returns the path of the file `f` as a string, turns backslashes into slashes.

`f` must be a file or a string (file path).

```
C:\Users\foo\image.png -> C:/Users/foo/image.png
```

Note: Windows only. On other OSs works identical to 'io/file-path'.

```
(io/file-path-slashify (io/file "C:" "Users" "foo" "image.png"))  
=> "C:/Users/foo/image.png"
```

SEE ALSO

[io/file-path](#)

Returns the path of the file *f* as a string. *f* must be a file or a string (file path).

[top](#)

io/file-set-executable

```
(io/file-set-executable f executable owner-only)
```

Set the owner's execute permission to the file or directory *f*. *f* must be a file or a string (file path).

Returns true if and only if the operation succeeded. The operation will fail if the user does not have permission to change the access permissions of this abstract pathname. If 'readable' is false and the underlying file system does not implement a read permission, then the operation will fail.

If 'executable' is true sets the access permission to allow execute operations; if false to disallow execute operations.

If 'owner-only' is true the execute permission applies only to the owner's execute permission; otherwise, it applies to everybody. If the underlying file system can not distinguish the owner's execute permission from that of others, then the permission will apply to everybody, regardless of this value.

```
(io/file-set-executable "/tmp/test.txt" true true)
```

SEE ALSO

[io/file-can-execute?](#)

Returns true if the file or directory *f* exists and can be executed. *f* must be a file or a string (file path).

[io/file-set-readable](#)

Set the owner's read permission to the file or directory *f*. *f* must be a file or a string (file path).

[io/file-set-writable](#)

Set the owner's write permission to the file or directory *f*. *f* must be a file or a string (file path).

[top](#)

io/file-set-readable

```
(io/file-set-readable f readable owner-only)
```

Set the owner's read permission to the file or directory *f*. *f* must be a file or a string (file path).

Returns true if and only if the operation succeeded. The operation will fail if the user does not have permission to change the access permissions of this abstract pathname. If 'readable' is false and the underlying file system does not implement a read permission, then the operation will fail.

If 'readable' is true sets the access permission to allow read operations; if false to disallow read operations.

If 'owner-only' is true the read permission applies only to the owner's read permission; otherwise, it applies to everybody. If the underlying file system can not distinguish the owner's read permission from that of others, then the permission will apply to everybody, regardless of this value.

```
(io/file-set-readable "/tmp/test.txt" true true)
```

SEE ALSO

[io/file-can-read?](#)

Returns true if the file or directory *f* exists and can be read. *f* must be a file or a string (file path).

[io/file-set-writable](#)

Set the owner's write permission to the file or directory *f*. *f* must be a file or a string (file path).

[io/file-set-executable](#)

Set the owner's execute permission to the file or directory *f*. *f* must be a file or a string (file path).

[top](#)

io/file-set-writable

```
(io/file-set-writable f writable owner-only)
```

Set the owner's write permission to the file or directory *f*. *f* must be a file or a string (file path).

Returns true if and only if the operation succeeded. The operation will fail if the user does not have permission to change the access permissions of this abstract pathname. If 'writable' is false and the underlying file system does not implement a read permission, then the operation will fail.

If 'writable' is true sets the access permission to allow write operations; if false to disallow write operations.

If 'owner-only' is true the write permission applies only to the owner's write permission; otherwise, it applies to everybody. If the underlying file system can not distinguish the owner's write permission from that of others, then the permission will apply to everybody, regardless of this value.

```
(io/file-set-writable "/tmp/test.txt" true true)
```

SEE ALSO

[io/file-can-write?](#)

Returns true if the file or directory *f* exists and can be written. *f* must be a file or a string (file path).

[io/file-set-readable](#)

Set the owner's read permission to the file or directory *f*. *f* must be a file or a string (file path).

[io/file-set-executable](#)

Set the owner's execute permission to the file or directory *f*. *f* must be a file or a string (file path).

[top](#)

io/file-size

```
(io/file-size f)
```

Returns the size of the file *f*. *f* must be a file or a string (file path).

```
(io/file-size "/tmp/test.txt")
```

SEE ALSO

[io/file](#)

Returns a java.io.File from file path, or from a parent path and one or multiple children. The path and parent may be a file or a string ...

io/file-within-dir?

```
(io/file-within-dir? dir file)
```

Returns true if the file is within the dir else false.

The file and dir args must be absolute paths.

```
(io/file-within-dir? (io/file "/temp/foo")  
                     (io/file "/temp/foo/img.png"))  
  
=> true  
  
(io/file-within-dir? (io/file "/temp/foo")  
                     (io/file "/temp/foo/../bar/img.png"))  
  
=> false
```

SEE ALSO

[io/file](#)

Returns a java.io.File from file path, or from a parent path and one or multiple children. The path and parent may be a file or a string ...

io/file?

```
(io/file? f)
```

Returns true if x is a java.io.File.

```
(io/file? (io/file "/tmp/test.txt"))  
  
=> true
```

io/filesystem-total-space

```
(io/filesystem-total-space)  
(io/filesystem-total-space file)
```

Returns the total disk space in bytes. With no args returns the total disk space of the current working directory's file store. With a file argument returns the total disk space of the file store the file is located.

```
(io/filesystem-total-space)
```

SEE ALSO

[io/filesystem-usable-space](#)

Returns the usable disk space in bytes. With no args returns the usable disk space of the current working directory's file store. With ...

io/filesystem-usable-space

(io/filesystem-usable-space)
(io/filesystem-usable-space file)

Returns the usable disk space in bytes. With no args returns the usable disk space of the current working directory's file store. With a file argument returns the usable disk space of the file store the file is located.

(io/filesystem-usable-space)

SEE ALSO

[io/filesystem-total-space](#)
Returns the total disk space in bytes. With no args returns the total disk space of the current working directory's file store. With ...

top

io/flush

(io/flush s)

Flushes a :java.io.OutputStream or a :java.io.Writer .

SEE ALSO

[io/close](#)
Closes a :java.io.InputStream, :java.io.OutputStream, :java.io.Reader, or a :java.io.Writer.

top

io/glob-path-matcher

(io/glob-path-matcher pattern)

Returns a file matcher for glob file patterns.

Globbering patterns

*.txt	Matches a path that represents a file name ending in .txt
.	Matches file names containing a dot
*.{txt,xml}	Matches file names ending with .txt or .xml
foo.?[xy]	Matches file names starting with foo. and a single character extension followed by a 'x' or 'y' character
/home/*/*	Matches /home/gus/data on UNIX platforms
/home/**	Matches /home/gus and /home/gus/data on UNIX platforms
C:*	Matches C:\\foo and C:\\bar on the Windows platform

Ranges

The pattern [A-E] would match any character that included ABCDE. Ranges can be used in conjunction with each other to make powerful patterns. Alphanumerical strings are matched by [A-Za-z0-9] . This would match the following:

- [A-Z] All uppercase letters from A to Z

- `[a-z]` All lowercase letters from a to z
- `[0-9]` All numbers from 0 to 9

Complementation

Globs can be used in complement with special characters that can change how the pattern works. The two complement characters are exclamation marks `(!)` and backslashes `(\)`.

The exclamation mark can negate a pattern that it is put in front of. As `[CBR]at` matches Cat, Bat, or Rat the negated pattern `[!CBR]at` matches anything like Kat, Pat, or Vat.

Backslashes are used to remove the special meaning of single characters `'?'`, `'*'`, and `'['`, so that they can be used in patterns.

```
(io/glob-path-matcher "*.log")
```

```
(io/glob-path-matcher "**/*.log")
```

SEE ALSO

[io/file-matches-glob?](#)

Returns true if the file `f` matches the glob pattern. `f` must be a file or a string (file path).

[io/list-files-glob](#)

Lists all files in a directory that match the glob pattern. `dir` must be a file or a string (file path). Returns files as `java.io.File`

[top](#)

io/gzip

```
(io/gzip f)
```

`gzipt f`. `f` may be a file, a string (file path), a `bytebuf` or an `InputStream`. Returns a `bytebuf`.

```
(->> (io/gzip "a.txt")
      (io/spit "a.gz"))
```

```
(io/gzip (bytebuf-from-string "abcdef" :utf-8))
```

SEE ALSO

[io/gzip?](#)

Returns true if `f` is a gzipped file. `f` may be a file, a string (file path), a `bytebuf`, or an `InputStream`

[io/ungzip](#)

`ungzipt f`. `f` may be a file, a string (file path), a `bytebuf`, or an `InputStream`. Returns a `bytebuf`.

[io/zip](#)

Creates a zip containing the entries. An entry is given by a name and data. The entry data may be `nil`, a `bytebuf`, a file, a string ...

[io/spit](#)

Opens file `f`, writes content, and then closes `f`. `f` may be a file or a string (file path). The content may be a string or a `bytebuf`.

[top](#)

io/gzip-to-stream

```
(io/gzip f os)
```


gzips f to the OutputStream os. f may be a file, a string (file path), a bytebuf, or an InputStream.

```
(do
  (import :java.io.ByteArrayOutputStream)
  (try-with [os (. :ByteArrayOutputStream :new)]
    (-> (bytebuf-from-string "abcdef" :utf-8)
      (io/gzip-to-stream os))
    (-> (. os :toByteArray)
      (io/ungzip)
      (bytebuf-to-string :utf-8))))
=> "abcdef"
```

SEE ALSO

[io/gzip](#)

gzips f. f may be a file, a string (file path), a bytebuf or an InputStream. Returns a bytebuf.

top

io/gzip?

```
(io/gzip? f)
```

Returns true if f is a gzipped file. f may be a file, a string (file path), a bytebuf, or an InputStream

```
(-> (io/gzip (bytebuf-from-string "abc" :utf-8))
  (io/gzip?))
=> true
```

SEE ALSO

[io/gzip](#)

gzips f. f may be a file, a string (file path), a bytebuf or an InputStream. Returns a bytebuf.

top

io/internet-avail?

```
(io/internet-avail?)
(io/internet-avail? url)
```

Checks if an internet connection is present for a given url. Defaults to URL *http://www.google.com*.

```
(io/internet-avail?)
```

```
(io/internet-avail? "http://www.google.com")
```

top

io/list-file-tree

```
(io/list-file-tree dir)
(io/list-file-tree dir filter-fn)
```

Lists all files in a directory tree. `dir` must be a file or a string (file path). `filter-fn` is an optional filter that filters the files found. The filter gets a `java.io.File` as argument.

Returns files as `java.io.File`

```
(io/list-file-tree "/tmp")
```

```
(io/list-file-tree "/tmp" #(io/file-ext? % ".log"))
```

SEE ALSO

[io/list-file-tree-lazy](#)

Returns a lazy sequence of all the files in a directory tree. `dir` must be a file or a string (file path). `filter-fn` is an optional ...

[io/list-files](#)

Lists files in a directory. `dir` must be a file or a string (file path). `filter-fn` is an optional filter that filters the files found.

[io/list-files-glob](#)

Lists all files in a directory that match the glob pattern. `dir` must be a file or a string (file path). Returns files as `java.io.File`

[top](#)

io/list-file-tree-lazy

```
(io/list-file-tree-lazy dir)
(io/list-file-tree-lazy dir filter-fn)
```

Returns a lazy sequence of all the files in a directory tree. `dir` must be a file or a string (file path). `filter-fn` is an optional filter that filters the files found. The filter gets a `java.io.File` as argument.

The lazy sequence returns files as `java.io.File`

```
(->> (io/list-file-tree-lazy "/tmp")
      (docoll println))

(->> (io/list-file-tree-lazy "/tmp" #(io/file-ext? % ".log"))
      (docoll println))
```

SEE ALSO

[io/list-file-tree](#)

Lists all files in a directory tree. `dir` must be a file or a string (file path). `filter-fn` is an optional filter that filters the files ...

[io/list-files](#)

Lists files in a directory. `dir` must be a file or a string (file path). `filter-fn` is an optional filter that filters the files found.

[io/list-files-glob](#)

Lists all files in a directory that match the glob pattern. `dir` must be a file or a string (file path). Returns files as `java.io.File`

[top](#)

io/list-files

```
(io/list-files dir)
(io/list-files dir filter-fn)
```

Lists files in a directory. `dir` must be a file or a string (file path). `filter-fn` is an optional filter that filters the files found. The filter gets a `java.io.File` as argument.

Returns files as `java.io.File`

```
(io/list-files "/tmp")
```

```
(io/list-files "/tmp" #(io/file-ext? % ".log"))
```

SEE ALSO

[io/list-files-glob](#)

Lists all files in a directory that match the glob pattern. `dir` must be a file or a string (file path). Returns files as `java.io.File`

[io/list-file-tree](#)

Lists all files in a directory tree. `dir` must be a file or a string (file path). `filter-fn` is an optional filter that filters the files ...

[io/list-file-tree-lazy](#)

Returns a lazy sequence of all the files in a directory tree. `dir` must be a file or a string (file path). `filter-fn` is an optional ...

[top](#)

io/list-files-glob

```
(io/list-files-glob dir glob)
```

Lists all files in a directory that match the glob pattern. `dir` must be a file or a string (file path). Returns files as `java.io.File`

Globbering patterns

<code>*.txt</code>	Matches a path that represents a file name ending in <code>.txt</code>
<code>*.*</code>	Matches file names containing a dot
<code>*.{txt,xml}</code>	Matches file names ending with <code>.txt</code> or <code>.xml</code>
<code>foo.?[xy]</code>	Matches file names starting with <code>foo.</code> and a single character extension followed by a 'x' or 'y' character
<code>/home/*/*</code>	Matches <code>/home/gus/data</code> on UNIX platforms
<code>/home/**</code>	Matches <code>/home/gus</code> and <code>/home/gus/data</code> on UNIX platforms
<code>C:*</code>	Matches <code>C:\\foo</code> and <code>C:\\bar</code> on the Windows platform

Ranges

The pattern `[A-E]` would match any character that included `ABCDE`. Ranges can be used in conjunction with each other to make powerful patterns. Alphanumerical strings are matched by `[A-Za-z0-9]`. This would match the following:

- `[A-Z]` All uppercase letters from A to Z
- `[a-z]` All lowercase letters from a to z
- `[0-9]` All numbers from 0 to 9

Complementation

Globs can be used in complement with special characters that can change how the pattern works. The two complement characters are exclamation marks `(!)` and backslashes `(\\)`.

The exclamation mark can negate a pattern that it is put in front of. As `[CBR]at` matches `Cat`, `Bat`, or `Rat` the negated pattern `[!CBR]at` matches anything like `Kat`, `Pat`, or `Vat`.

Backslashes are used to remove the special meaning of single characters `'?'`, `'*'`, and `'['`, so that they can be used in patterns.

```
(io/list-files-glob "." "sample*.txt")
```

SEE ALSO

[io/list-files](#)

Lists files in a directory. dir must be a file or a string (file path). filter-fn is an optional filter that filters the files found.

[io/list-file-tree](#)

Lists all files in a directory tree. dir must be a file or a string (file path). filter-fn is an optional filter that filters the files ...

[io/list-file-tree-lazy](#)

Returns a lazy sequence of all the files in a directory tree. dir must be a file or a string (file path). filter-fn is an optional ...

[top](#)

io/load-classpath-resource

```
(io/load-classpath-resource name)
```

Loads a classpath resource. Returns a bytebuf

```
(io/load-classpath-resource "com/github/jlangch/venice/images/venice.png")
=> [137 80 78 71 13 10 26 10 0 0 0 13 73 72 68 82 0 0 3 254 0 0 0 242 8 6 0 0 0 244 182 30 43 0 0 12 70 105 67
67 80 73 67 67 32 80 114 111 102 105 108 101 0 0 72 137 149 87 7 88 83 201 22 158 91 82 73 104 129 8 72 9 189
137 82 164 75 9 161 69 16 144 42 216 8 73 32 161 196 144 16 68 236 46 203 42 184 118 17 1 ...]
```

SEE ALSO

[io/classpath-resource?](#)

Returns true if the classpath resource exists otherwise false.

[top](#)

io/mime-type

```
(io/mime-type file)
```

Returns the mime-type for the file if available else nil.

```
(io/mime-type "document.pdf")
=> "application/pdf"

(io/mime-type (io/file "document.pdf"))
=> "application/pdf"
```

[top](#)

io/mkdir

```
(io/mkdir dir)
```

Creates the directory. dir must be a file or a string (file path).

SEE ALSO

[io/mkdirs](#)

Creates the directory including any necessary but nonexistent parent directories. dir must be a file or a string (file path).

[top](#)

io/mkdirs

```
(io/mkdirs dir)
```

Creates the directory including any necessary but nonexistent parent directories. dir must be a file or a string (file path).

SEE ALSO

[io/mkdir](#)

Creates the directory. dir must be a file or a string (file path).

[top](#)

io/move-file

```
(io/move-file source target & options)
```

Moves source to target. Returns nil or throws a VncException. Source and target must be a file or a string (file path).

Options:

:replace true/false e.g.: if true replace an existing file, defaults to false

:atomic-move true/false e.g.: if true move the file as an atomic file system operation, defaults to false

SEE ALSO

[io/copy-file](#)

Copies source to dest. Returns nil or throws a VncException. Source must be a file or a string (file path), dest must be a file, a ...

[io/delete-file](#)

Deletes one or multiple files. Silently skips delete if the file does not exist. If f is a directory the directory must be empty. f ...

[io/touch-file](#)

Updates the lastModifiedTime of the file to the current time, or creates a new empty file if the file doesn't already exist. File must ...

[top](#)

io/move-files-glob

```
(io/move-files-glob src-dir dst-dir glob & options)
```

Move all files that match the glob pattern from a source to a destination directory. src-dir and dst-dir must be a file or a string (file path).

Options:

:replace true/false e.g.: if true replace an existing file, defaults to false

:atomic-move true/false e.g.: if true move the file as an atomic file system operation, defaults to false

Globbing patterns

`*.txt` Matches a path that represents a file name ending in .txt

<code>*.*</code>	Matches file names containing a dot
<code>*.{txt,xml}</code>	Matches file names ending with .txt or .xml
<code>foo.?[xy]</code>	Matches file names starting with foo. and a single character extension followed by a 'x' or 'y' character
<code>/home/*/*</code>	Matches <code>/home/gus/data</code> on UNIX platforms
<code>/home/**</code>	Matches <code>/home/gus</code> and <code>/home/gus/data</code> on UNIX platforms
<code>C:*</code>	Matches <code>C:\\foo</code> and <code>C:\\bar</code> on the Windows platform

Ranges

The pattern `[A-E]` would match any character that included ABCDE. Ranges can be used in conjunction with each other to make powerful patterns. Alphanumerical strings are matched by `[A-Za-z0-9]`. This would match the following:

- `[A-Z]` All uppercase letters from A to Z
- `[a-z]` All lowercase letters from a to z
- `[0-9]` All numbers from 0 to 9

Complementation

Globs can be used in complement with special characters that can change how the pattern works. The two complement characters are exclamation marks `(!)` and backslashes `(\\)`.

The exclamation mark can negate a pattern that it is put in front of. As `[CBR]at` matches Cat, Bat, or Rat the negated pattern `[!CBR]at` matches anything like Kat, Pat, or Vat.

Backslashes are used to remove the special meaning of single characters `'?'`, `'*'`, and `'['`, so that they can be used in patterns.

```
(io/move-files-glob "from" "to" "*.log")
```

SEE ALSO

[io/move-file](#)

Moves source to target. Returns nil or throws a VncException. Source and target must be a file or a string (file path).

[io/move-files-glob](#)

Move all files that match the glob pattern from a source to a destination directory. src-dir and dst-dir must be a file or a string (file path).

[io/copy-files-glob](#)

Copies all files that match the glob pattern from a source to a destination directory. src-dir and dst-dir must be a file or a string ...

[io/delete-files-glob](#)

Removes all files in a directory that match the glob pattern. dir must be a file or a string (file path).

[io/list-files-glob](#)

Lists all files in a directory that match the glob pattern. dir must be a file or a string (file path). Returns files as java.io.File

top

io/print

```
(io/print os s)
```

Prints a string s to an output stream. The output stream may be a `:java.io.Writer` or a `:java.io.PrintStream`!

top

io/print-line

```
(io/print-line os)
(io/print-line os s)
```

Prints a string `s` to an output stream. The output stream may be a `:java.io.Writer` or a `:java.io.PrintStream`!

top

io/read-char

```
(io/read-char is)
```

With `arg` reads the next char from the passed stream that must be a subclass of `:java.io.Reader`.

Returns `nil` if the end of the stream is reached.

SEE ALSO

[io/read-line](#)

Reads the next line from the passed stream that must be a subclass of `:java.io.BufferedReader`.

top

io/read-line

```
(io/read-line is)
```

Reads the next line from the passed stream that must be a subclass of `:java.io.BufferedReader`.

Returns `nil` if the end of the stream is reached.

SEE ALSO

[io/read-char](#)

With `arg` reads the next char from the passed stream that must be a subclass of `:java.io.Reader`.

top

io/slurp

```
(io/slurp f & options)
```

Reads the content of file `f` as text (string) or binary (bytebuf).

`f` may be a:

- string file path, e.g: `"/temp/foo.json"`
- `bytebuffer`
- `java.io.File`, e.g: `(io/file "/temp/foo.json")`
- `java.io.InputStream`
- `java.io.Reader`
- `java.nio.file.Path`
- `java.net.URL`

- `java.net.URI`

Returns a `bytebuf` or string depending on the passed `:binary` option.

Options:

`:binary true/false` e.g.: `:binary true` , defaults to `false`

`:encoding enc` e.g.: `:encoding utf-8` , defaults to `utf-8`

`io/slurp` supports load paths. See the `loadpath/paths` doc for a description of the *load path* feature.

Note: For HTTP and HTTPS downloads prefer to use `io/download` .

SEE ALSO

[io/slurp-lines](#)

Read all lines from f.

[io/slurp-stream](#)

Slurps binary or string data from a `java.io.InputStream` is. Supports the option `:binary` to either slurp binary or string data. For ...

[io/slurp-reader](#)

Slurps string data from a `java.io.Reader` rd.Note:

[io/spit](#)

Opens file f, writes content, and then closes f. f may be a file or a string (file path). The content may be a string or a `bytebuf`.

[io/download](#)

Downloads the content from the uri and reads it as text (string) or binary (`bytebuf`). Supports http and https protocols!

[loadpath/paths](#)

Returns the list of the defined load paths. A load path is either a file, a ZIP file, or a directory. Load paths are defined at the ...

top

io/slurp-lines

`(io/slurp-lines f & options)`

Read all lines from f.

f may be a:

- string file path, e.g: `"/temp/foo.json"`
- `bytebuffer`
- `java.io.File` , e.g: `(io/file "/temp/foo.json")`
- `java.io.InputStream`
- `java.io.Reader`
- `java.nio.file.Path`
- `java.net.URL`
- `java.net.URI`

Returns the a list of strings.

Options:

`:encoding enc` e.g.: `:encoding utf-8` , defaults to `utf-8`

`io/slurp-lines` supports load paths. See the `loadpath/paths` doc for a description of the *load path* feature.

```
(->> "1\n2\n3"
io/string-in-stream
```



```
io/slurp-lines)
=> ("1" "2" "3")
```

SEE ALSO

[str/split-lines](#)

Splits `s` into lines.

[io/slurp](#)

Reads the content of file `f` as text (string) or binary (bytebuf).

[io/slurp-stream](#)

Slurps binary or string data from a `java.io.InputStream` `is`. Supports the option `:binary` to either slurp binary or string data. For ...

[io/spit](#)

Opens file `f`, writes content, and then closes `f`. `f` may be a file or a string (file path). The content may be a string or a bytebuf.

[io/string-in-stream](#)

Returns a `java.io.InputStream` for the string `s`.

[loadpath/paths](#)

Returns the list of the defined load paths. A load path is either a file, a ZIP file, or a directory. Load paths are defined at the ...

[top](#)

io/slurp-reader

```
(io/slurp-reader rd)
```

Slurps string data from a `java.io.Reader` `rd`. Note:

`io/slurp-reader` offers the same functionality as `io/slurp` but it opens more flexibility with sandbox configuration. `io/slurp` can be blacklisted to prevent reading data from the filesystem and still having `io/slurp-reader` for readers input available!

```
(do
  (let [file (io/temp-file "test-", ".txt")]
    (io/delete-file-on-exit file)
    (io/spit file "123456789" :append true)
    (try-with [rd (io/buffered-reader file :encoding :utf-8)]
      (io/slurp-reader rd)))
  )
=> "123456789"
```

SEE ALSO

[io/slurp-stream](#)

Slurps binary or string data from a `java.io.InputStream` `is`. Supports the option `:binary` to either slurp binary or string data. For ...

[io/slurp](#)

Reads the content of file `f` as text (string) or binary (bytebuf).

[io/slurp-lines](#)

Read all lines from `f`.

[io/spit](#)

Opens file `f`, writes content, and then closes `f`. `f` may be a file or a string (file path). The content may be a string or a bytebuf.

[io/uri-stream](#)

Returns a `java.io.InputStream` from the `uri`.

[io/file-in-stream](#)

Returns a `java.io.InputStream` for the file `f`.

[io/string-in-stream](#)

Returns a `java.io.InputStream` for the string `s`.

[io/bytebuf-in-stream](#)

Returns a `java.io.InputStream` from a `bytebuf`.

[top](#)

io/slurp-stream

`(io/slurp-stream is & options)`

Slurps binary or string data from a `java.io.InputStream` `is`. Supports the option `:binary` to either slurp binary or string data. For string data an optional encoding can be specified.

Returns the result as a `bytebuf` or string depending on the passed `:binary` option.

Options:

`:binary true/false` e.g.: `:binary true`, defaults to `false`

`:encoding enc` e.g.: `:encoding utf-8`, defaults to `utf-8`

Note:

`io/slurp-stream` offers the same functionality as `io/slurp` but it opens more flexibility with sandbox configuration. `io/slurp` can be blacklisted to prevent reading data from the filesystem and still having `io/slurp-stream` for stream input available!

```
(do
  (let [file (io/temp-file "test-", ".txt")]
    (io/delete-file-on-exit file)
    (io/spit file "123456789" :append true)
    (try-with [is (io/file-in-stream file)]
      (io/slurp-stream is :binary false)))
  )
=> "123456789"
```

SEE ALSO

[io/slurp-reader](#)

Slurps string data from a `java.io.Reader` `rd`. Note:

[io/slurp](#)

Reads the content of file `f` as text (string) or binary (bytebuf).

[io/slurp-lines](#)

Read all lines from `f`.

[io/spit](#)

Opens file `f`, writes content, and then closes `f`. `f` may be a file or a string (file path). The content may be a string or a bytebuf.

[io/uri-stream](#)

Returns a `java.io.InputStream` from the `uri`.

[io/file-in-stream](#)

Returns a `java.io.InputStream` for the file `f`.

[io/string-in-stream](#)

Returns a `java.io.InputStream` for the string `s`.

[io/bytebuf-in-stream](#)

Returns a `java.io.InputStream` from a `bytebuf`.

[top](#)

io/spit

```
(io/spit f content & options)
```

Opens file `f`, writes content, and then closes `f`. `f` may be a file or a string (file path). The content may be a string or a bytebuf.

Options:

:append true/false e.g.: `:append true`, defaults to false

:encoding enc e.g.: `:encoding :utf-8`, defaults to `:utf-8`

`io/spit` supports load paths. See the `loadpath/paths` doc for a description of the *load path* feature.

SEE ALSO

[io/spit-stream](#)

Writes content (string or bytebuf) to the `java.io.OutputStream` `os`. If content is of type string an optional encoding (defaults to UTF-8) ...

[io/spit-writer](#)

Writes text to the `java.io.Writer` `wr`. The writer can optionally be flushed after the operation.

[io/slurp](#)

Reads the content of file `f` as text (string) or binary (bytebuf).

[io/slurp-lines](#)

Read all lines from `f`.

[loadpath/paths](#)

Returns the list of the defined load paths. A load path is either a file, a ZIP file, or a directory. Load paths are defined at the ...

top

io/spit-stream

```
(io/spit-stream os content & options)
```

Writes content (string or bytebuf) to the `java.io.OutputStream` `os`. If content is of type string an optional encoding (defaults to UTF-8) is supported. The stream can optionally be flushed after the operation.

Options:

:flush true/false e.g.: `:flush true`, defaults to false

:encoding enc e.g.: `:encoding :utf-8`, defaults to `:utf-8`

Note:

`io/spit-stream` offers the same functionality as `io/spit` but it opens more flexibility with sandbox configuration. `io/spit` can be blacklisted to prevent writing data to the filesystem and still having `io/spit-stream` for stream output available!

```
(do
  (let [file (io/temp-file "test-", ".txt")]
    (io/delete-file-on-exit file)
    (try-with [os (io/file-out-stream file)]
      (io/spit-stream os "123456789" :flush true))))
=> nil
```

SEE ALSO

[io/spit-writer](#)

Writes text to the `java.io.Writer` `wr`. The writer can optionally be flushed after the operation.

[io/spit](#)

Opens file `f`, writes content, and then closes `f`. `f` may be a file or a string (file path). The content may be a string or a `bytebuf`.

[top](#)

io/spit-writer

```
(io/spit-writer wr text)
```

Writes text to the `java.io.Writer` `wr`. The writer can optionally be flushed after the operation.

Options:

`:flush true/false` e.g.: `:flush true`, defaults to `false`

Note:

`io/spit-writer` offers the same functionality as `io/spit` but it opens more flexibility with sandbox configuration. `io/spit` can be blacklisted to prevent writing data to the filesystem and still having `io/spit-writer` for stream output available!

```
(do
  (let [file (io/temp-file "test-", ".txt")
        os  (io/file-out-stream file)]
    (io/delete-file-on-exit file)
    (try-with [wr (io/buffered-writer os :encoding :utf-8)]
      (io/spit-writer wr "123456789" :flush true))))
=> nil
```

SEE ALSO

[io/spit-stream](#)

Writes content (string or `bytebuf`) to the `java.io.OutputStream` `os`. If content is of type string an optional encoding (defaults to UTF-8) ...

[io/spit](#)

Opens file `f`, writes content, and then closes `f`. `f` may be a file or a string (file path). The content may be a string or a `bytebuf`.

[top](#)

io/string-in-stream

```
(io/string-in-stream s & options)
```

Returns a `java.io.InputStream` for the string `s`.

Options:

`:encoding enc` e.g.: `:encoding :utf-8`, defaults to `:utf-8`

Note: The caller is responsible for closing the stream!

```
(let [text "The quick brown fox jumped over the lazy dog"]
  (try-with [is (io/string-in-stream text)]
    ; do something with is
  ))
```

SEE ALSO

[io/slurp-stream](#)

Slurps binary or string data from a `java.io.InputStream` `is`. Supports the option `:binary` to either slurp binary or string data. For ...

[io/file-in-stream](#)

Returns a `java.io.InputStream` for the file `f`.

[io/bytebuf-in-stream](#)

Returns a `java.io.InputStream` from a `bytebuf`.

[top](#)

io/string-reader

`(io/string-reader s)`

Creates a `java.io.StringReader` from a string.

Note: The caller is responsible for closing the reader!

```
(try-with [rd (io/string-reader "1234")]  
  (println (read-char rd))  
  (println (read-char rd))  
  (println (read-char rd)))  
1  
2  
3  
=> nil
```

```
(let [rd (io/string-reader "1\n2\n3\n4")]  
  (try-with [br (io/buffered-reader rd)]  
    (println (read-line br))  
    (println (read-line br))  
    (println (read-line br))))  
1  
2  
3  
=> nil
```

SEE ALSO

[read-line](#)

Without `arg` reads the next line from the stream that is the current value of `*in*`. With `arg` reads the next line from the passed stream ...

[io/buffered-reader](#)

Create a `java.io.Reader` from `f`.

[io/string-writer](#)

Creates a `java.io.StringWriter`.

[top](#)

io/string-writer

`(io/string-writer)`

Creates a `java.io.StringWriter` .

Dereferencing a string writer returns the captured string.

Note: The caller is responsible for closing the writer!

```
(try-with [sw (io/string-writer)])  
  (print sw 100)  
  (print sw "-")  
  (print sw 200)  
  (flush sw)  
  (println @sw))  
100-200  
=> nil
```

SEE ALSO

[println](#)

Prints the values xs to the stream that is the current value of *out* or to the passed output stream os if given followed by a (newline).

[io/buffered-writer](#)

Creates a java.io.Writer for f.

[io/buffered-reader](#)

Create a java.io.Reader from f.

[top](#)

io/symbolic-link?

```
(io/symbolic-link? f)
```

Returns true if the file f exists and is a symbolic link. f must be a file or a string (file path).

```
(io/symbolic-link? "/tmp/test.txt")
```

SEE ALSO

[io/file-hidden?](#)

Returns true if the file or directory f exists and is hidden. f must be a file or a string (file path).

[io/file-can-read?](#)

Returns true if the file or directory f exists and can be read. f must be a file or a string (file path).

[io/file-can-write?](#)

Returns true if the file or directory f exists and can be written. f must be a file or a string (file path).

[io/file-can-execute?](#)

Returns true if the file or directory f exists and can be executed. f must be a file or a string (file path).

[top](#)

io/temp-dir

```
(io/temp-dir prefix)
```

Creates a new temp directory with prefix. Returns a :java.io.File.

```
(io/temp-dir "test-")  
=> /var/folders/q0/gg9f6pqx5079cfvp9g5lqbzh0000gn/T/test-2403768146958499015
```

SEE ALSO

[io/tmp-dir](#)

Returns the tmp dir as a `java.io.File`.

[io/temp-file](#)

Creates an empty temp file with the given prefix and suffix. Returns a `java.io.File`.

[top](#)

io/temp-file

```
(io/temp-file prefix suffix)
```

Creates an empty temp file with the given prefix and suffix. Returns a `java.io.File`.

```
(do
  (let [file (io/temp-file "test-", ".txt")]
    (io/spit file "123456789" :append true)
    (io/slurp file :binary false :remove true))
)
=> "123456789"
```

SEE ALSO

[io/temp-dir](#)

Creates a new temp directory with prefix. Returns a `java.io.File`.

[io/delete-file-on-exit](#)

Requests that the files or directories be deleted when the virtual machine terminates. Files (or directories) are deleted in the reverse ...

[top](#)

io/tmp-dir

```
(io/tmp-dir)
```

Returns the tmp dir as a `java.io.File`.

```
(io/tmp-dir)
=> /var/folders/q0/gg9f6pqx5079cfvp9g5lqbzh0000gn/T
```

SEE ALSO

[io/user-dir](#)

Returns the user dir (current working dir) as a `java.io.File`.

[io/user-home-dir](#)

Returns the user's home dir as a `java.io.File`.

[io/temp-dir](#)

Creates a new temp directory with prefix. Returns a `java.io.File`.

[top](#)

io/touch-file

```
(io/touch-file file)
```

Updates the *lastModifiedTime* of the file to the current time, or creates a new empty file if the file doesn't already exist. File must be a file or a string (file path). Returns the file

SEE ALSO

[io/move-file](#)

Moves source to target. Returns nil or throws a VncException. Source and target must be a file or a string (file path).

[io/copy-file](#)

Copies source to dest. Returns nil or throws a VncException. Source must be a file or a string (file path), dest must be a file, a ...

[io/delete-file](#)

Deletes one or multiple files. Silently skips delete if the file does not exist. If f is a directory the directory must be empty. f ...

[top](#)

io/ungzip

(io/ungzip f)

ungzips f. f may be a file, a string (file path), a bytebuf, or an InputStream. Returns a bytebuf.

```
(-> (bytebuf-from-string "abcdef" :utf-8)
  (io/gzip)
  (io/ungzip))
=> [97 98 99 100 101 102]
```

SEE ALSO

[io/gzip](#)

gzips f. f may be a file, a string (file path), a bytebuf or an InputStream. Returns a bytebuf.

[io/gzip?](#)

Returns true if f is a gzipped file. f may be a file, a string (file path), a bytebuf, or an InputStream

[io/ungzip-to-stream](#)

ungzips a bytebuf returning an InputStream to read the deflated data from.

[top](#)

io/ungzip-to-stream

(io/ungzip-to-stream buf)

ungzips a bytebuf returning an InputStream to read the deflated data from.

```
(-> (bytebuf-from-string "abcdef" :utf-8)
  (io/gzip)
  (io/ungzip-to-stream)
  (io/slurp-stream :binary false :encoding :utf-8))
=> "abcdef"
```

SEE ALSO

[io/gzip](#)

gzips f. f may be a file, a string (file path), a bytebuf or an InputStream. Returns a bytebuf.

io/unzip

```
(io/unzip f entry-name)
```

Unzips an entry from zip *f* the entry's data as a bytebuf. *f* may be a bytebuf, a file, a string (file path) or an InputStream.

```
(-> (io/zip "a.txt" (bytebuf-from-string "abcdef" :utf-8))
    (io/unzip "a.txt"))
=> [97 98 99 100 101 102]
```

SEE ALSO

[io/zip](#)

Creates a zip containing the entries. An entry is given by a name and data. The entry data may be nil, a bytebuf, a file, a string ...

[io/zip?](#)

Returns true if *f* is a zipped file. *f* may be a file, a string (file path), a bytebuf, or an InputStream

io/unzip-all

```
(io/unzip-all f)
(io/unzip-all glob f)
```

Unzips all entries of the zip *f* returning a map with the entry names as key and the entry data as bytebuf values. *f* may be a bytebuf, a file, a string (file path) or an InputStream.

An optional globbing pattern can be passed to filter the files to be unzipped.

Note: globbing patterns with unzip are always relative. E.g. `static/**/*.png`

Globbing patterns:

<code>*.txt</code>	Matches a path that represents a file name ending in .txt
<code>*.*</code>	Matches file names containing a dot
<code>*.{txt,xml}</code>	Matches file names ending with .txt or .xml
<code>foo.?</code>	Matches file names starting with foo. and a single character extension
<code>/home/*/*</code>	Matches <code>/home/gus/data</code> on UNIX platforms
<code>/home/**</code>	Matches <code>/home/gus</code> and <code>/home/gus/data</code> on UNIX platforms
<code>C:*</code>	Matches <code>C:\\foo</code> and <code>C:\\bar</code> on the Windows platform

```
(-> (io/zip "a.txt" (bytebuf-from-string "abc" :utf-8)
          "b.txt" (bytebuf-from-string "def" :utf-8)
          "c.txt" (bytebuf-from-string "ghi" :utf-8))
    (io/unzip-all))
=> {"a.txt" [97 98 99] "b.txt" [100 101 102] "c.txt" [103 104 105]}
```

```
(->> (io/zip "foo/a.txt" (bytebuf-from-string "abc" :utf-8)
        "bar/b.txt" (bytebuf-from-string "def" :utf-8)
        "bar/c.log" (bytebuf-from-string "ghi" :utf-8))
      (io/unzip-all "bar/*.txt"))
=> {"bar/b.txt" [100 101 102]}
```

SEE ALSO

[io/unzip-to-dir](#)

Unzips the zip *f* to a directory. *f* may be a file, a string (file path), a bytebuf, or an InputStream.

[io/unzip-nth](#)

Unzips the *nth* (zero.based) entry of the zip *f* returning its data as a bytebuf. *f* may be a bytebuf, a file, a string (file path) or ...

[io/unzip-first](#)

Unzips the first entry of the zip *f* returning its data as a bytebuf. *f* may be a bytebuf, a file, a string (file path) or an InputStream.

[io/zip](#)

Creates a zip containing the entries. An entry is given by a name and data. The entry data may be nil, a bytebuf, a file, a string ...

[io/zip?](#)

Returns true if *f* is a zipped file. *f* may be a file, a string (file path), a bytebuf, or an InputStream

[top](#)

io/unzip-first

```
(io/unzip-first zip)
```

Unzips the first entry of the zip *f* returning its data as a bytebuf. *f* may be a bytebuf, a file, a string (file path) or an InputStream.

```
(-> (io/zip "a.txt" (bytebuf-from-string "abc" :utf-8)
           "b.txt" (bytebuf-from-string "def" :utf-8))
    (io/unzip-first))
=> [97 98 99]
```

SEE ALSO

[io/unzip-to-dir](#)

Unzips the zip *f* to a directory. *f* may be a file, a string (file path), a bytebuf, or an InputStream.

[io/unzip-nth](#)

Unzips the *nth* (zero.based) entry of the zip *f* returning its data as a bytebuf. *f* may be a bytebuf, a file, a string (file path) or ...

[io/unzip-all](#)

Unzips all entries of the zip *f* returning a map with the entry names as key and the entry data as bytebuf values. *f* may be a bytebuf, ...

[io/zip](#)

Creates a zip containing the entries. An entry is given by a name and data. The entry data may be nil, a bytebuf, a file, a string ...

[io/zip?](#)

Returns true if *f* is a zipped file. *f* may be a file, a string (file path), a bytebuf, or an InputStream

[top](#)

io/unzip-nth

```
(io/unzip-nth zip n)
```

Unzips the *nth* (zero.based) entry of the zip *f* returning its data as a bytebuf. *f* may be a bytebuf, a file, a string (file path) or an InputStream.

```
(-> (io/zip "a.txt" (bytebuf-from-string "abc" :utf-8)
           "b.txt" (bytebuf-from-string "def" :utf-8))
    (io/unzip-nth zip 0))
=> [97 98 99]
```

```
"c.txt" (bytebuf-from-string "ghi" :utf-8))
(io/unzip-nth 1))
=> [100 101 102]
```

SEE ALSO

[io/unzip-to-dir](#)

Unzips the zip *f* to a directory. *f* may be a file, a string (file path), a bytebuf, or an InputStream.

[io/unzip-first](#)

Unzips the first entry of the zip *f* returning its data as a bytebuf. *f* may be a bytebuf, a file, a string (file path) or an InputStream.

[io/unzip-all](#)

Unzips all entries of the zip *f* returning a map with the entry names as key and the entry data as bytebuf values. *f* may be a bytebuf, ...

[io/zip](#)

Creates a zip containing the entries. An entry is given by a name and data. The entry data may be nil, a bytebuf, a file, a string ...

[io/zip?](#)

Returns true if *f* is a zipped file. *f* may be a file, a string (file path), a bytebuf, or an InputStream

[top](#)

io/unzip-to-dir

```
(io/unzip-to-dir f dir)
```

Unzips the zip *f* to a directory. *f* may be a file, a string (file path), a bytebuf, or an InputStream.

```
(> (io/zip "a.txt" (bytebuf-from-string "abc" :utf-8)
          "b.txt" (bytebuf-from-string "def" :utf-8)
          "c.txt" (bytebuf-from-string "ghi" :utf-8))
   (io/unzip-to-dir "."))
```

SEE ALSO

[io/unzip](#)

Unzips an entry from zip *f* the entry's data as a bytebuf. *f* may be a bytebuf, a file, a string (file path) or an InputStream.

[io/unzip-nth](#)

Unzips the *nth* (zero.based) entry of the zip *f* returning its data as a bytebuf. *f* may be a bytebuf, a file, a string (file path) or ...

[io/unzip-first](#)

Unzips the first entry of the zip *f* returning its data as a bytebuf. *f* may be a bytebuf, a file, a string (file path) or an InputStream.

[io/unzip-all](#)

Unzips all entries of the zip *f* returning a map with the entry names as key and the entry data as bytebuf values. *f* may be a bytebuf, ...

[io/zip](#)

Creates a zip containing the entries. An entry is given by a name and data. The entry data may be nil, a bytebuf, a file, a string ...

[io/zip?](#)

Returns true if *f* is a zipped file. *f* may be a file, a string (file path), a bytebuf, or an InputStream

[top](#)

io/uri-stream

```
(io/uri-stream uri)
```

Returns a `java.io.InputStream` from the uri.

Note: The caller is responsible for closing the stream!

```
(let [url "https://www.w3schools.com/xml/books.xml"]
  (try-with [is (io/uri-stream url)]
    (io/slurp-stream is :binary false :encoding :utf-8)))
```

SEE ALSO

[io/slurp-stream](#)

Slurps binary or string data from a `java.io.InputStream` is. Supports the option `:binary` to either slurp binary or string data. For ...

top

io/user-dir

```
(io/user-dir)
```

Returns the user dir (current working dir) as a `java.io.File`.

SEE ALSO

[io/tmp-dir](#)

Returns the tmp dir as a `java.io.File`.

[io/user-home-dir](#)

Returns the user's home dir as a `java.io.File`.

top

io/user-home-dir

```
(io/user-home-dir)
```

Returns the user's home dir as a `java.io.File`.

SEE ALSO

[user-name](#)

Returns the logged-in's user name.

[io/user-dir](#)

Returns the user dir (current working dir) as a `java.io.File`.

[io/tmp-dir](#)

Returns the tmp dir as a `java.io.File`.

top

io/watch-dir

```
(io/watch-dir dir event-fn)
(io/watch-dir dir event-fn failure-fn)
```

```
(io/watch-dir dir event-fn failure-fn termination-fn)
```

Watch a directory for changes, and call the function `event-fn` when it does. Calls the optional `failure-fn` if errors occur. On closing the watcher `termination-fn` is called.

`event-fn` is a two argument function that receives the path and mode `{:created, :deleted, :modified}` of the changed file.

`failure-fn` is a two argument function that receives the watch dir and the failure exception.

`termination-fn` is a one argument function that receives the watch dir.

Returns a *watcher* that is actively watching a directory. The *watcher* is a resource which should be closed with `(io/close-watcher w)`.

```
(do
  (defn log [msg] (locking log (println msg)))

  (let [w (io/watch-dir "/tmp"
                        #(log (str %1 " " %2))
                        (sleep 30 :seconds)
                        (io/close-watcher w)))]

    (do
      (defn log [msg] (locking log (println msg)))

      (let [w (io/watch-dir "/tmp"
                            #(log (str %1 " " %2))
                            #(log (str "failure " (:message %2)))
                            #(log (str "terminated watching " %1)))]

        (sleep 30 :seconds)
        (io/close-watcher w))))
```

SEE ALSO

[io/close-watcher](#)

Closes a watcher created from 'io/watch-dir'.

[io/await-for](#)

Blocks the current thread until the file has been created, deleted, or modified according to the passed modes `{:created, :deleted, ...}`

[top](#)

io/wrap-is-with-buffered-reader

```
(io/wrap-is-with-buffered-reader is encoding?)
```

Wraps an `java.io.InputStream` `is` with a `java.io.BufferedReader` using an optional encoding (defaults to `:utf-8`).

Note: The caller is responsible for closing the reader!

```
(let [data (bytebuf [108 105 110 101 32 49 10 108 105 110 101 32 50])]
  (try-with [is (io/bytebuf-in-stream data)
             rd (io/wrap-is-with-buffered-reader is :utf-8)]
    (println (read-line rd))
    (println (read-line rd))))
line 1
line 2
=> nil
```

SEE ALSO

[io/buffered-reader](#)

Create a java.io.Reader from f.

top

io/wrap-os-with-buffered-writer

(io/wrap-os-with-buffered-writer os encoding?)

Wraps a `java.io.OutputStream` `os` with a `java.io.BufferedWriter` using an optional encoding (defaults to :utf-8).

Note: The caller is responsible for closing the writer!

```
(try-with [os (io/bytebuf-out-stream)
           wr (io/wrap-os-with-buffered-writer os :utf-8)])
  (println wr "100")
  (println wr "200")
  (flush wr)
  (bytebuf-to-string @os :utf-8))
=> "100\n200\n"
```

SEE ALSO

[io/wrap-os-with-print-writer](#)

Wraps an `java.io.OutputStream` `os` with a `java.io.PrintWriter` using an optional encoding (defaults to :utf-8).

top

io/wrap-os-with-print-writer

(io/wrap-os-with-print-writer os encoding?)

Wraps an `java.io.OutputStream` `os` with a `java.io.PrintWriter` using an optional encoding (defaults to :utf-8).

Note: The caller is responsible for closing the writer!

```
(let [os (io/bytebuf-out-stream)]
  (try-with [pr (io/wrap-os-with-print-writer os :utf-8)]
    (println pr "line 1")
    (println pr "line 2")
    (flush pr)
    @os))
=> [108 105 110 101 32 49 10 108 105 110 101 32 50 10]
```

SEE ALSO

[io/wrap-os-with-buffered-writer](#)

Wraps a `java.io.OutputStream` `os` with a `java.io.BufferedWriter` using an optional encoding (defaults to :utf-8).

top

io/zip

(io/zip & entries)

Creates a zip containing the entries. An entry is given by a name and data. The entry data may be nil, a bytebuf, a file, a string (file path), or an InputStream.

An entry name with a trailing '/' creates a directory. Returns the zip as bytebuf.

```
; single entry
(->> (io/zip "a.txt" (bytebuf-from-string "abc" :utf-8))
      (io/spit "test.zip"))

; multiple entries
(->> (io/zip "a.txt" (bytebuf-from-string "abc" :utf-8)
           "b.txt" (bytebuf-from-string "def" :utf-8)
           "c.txt" (bytebuf-from-string "ghi" :utf-8))
      (io/spit "test.zip"))

; multiple entries with subdirectories
(->> (io/zip "a.txt" (bytebuf-from-string "abc" :utf-8)
           "x/b.txt" (bytebuf-from-string "def" :utf-8)
           "x/y/c.txt" (bytebuf-from-string "ghi" :utf-8))
      (io/spit "test.zip"))

; empty directory z/
(->> (io/zip "a.txt" (bytebuf-from-string "abc" :utf-8)
           "z/" nil)
      (io/spit "test.zip"))
```

SEE ALSO

[io/zip-file](#)

Zips files and directories recursively. Does not zip hidden files and does not follow symbolic links. The zip-file may be a file, a ...

[io/unzip](#)

Unzips an entry from zip f the entry's data as a bytebuf. f may be a bytebuf, a file, a string (file path) or an InputStream.

[io/gzip](#)

gzips f. f may be a file, a string (file path), a bytebuf or an InputStream. Returns a bytebuf.

[io/spit](#)

Opens file f, writes content, and then closes f. f may be a file or a string (file path). The content may be a string or a bytebuf.

[io/zip-list](#)

List the content of a the zip f and prints it to the current value of out. f may be a bytebuf, a file, a string (file path), or an ...

[io/zip-list-entry-names](#)

Returns a list of the zip's entry names.

[io/zip-append](#)

Appends entries to an existing zip file f. Overwrites existing entries. An entry is given by a name and data. The entry data may be ...

[io/zip-remove](#)

Remove entries from a zip file f.

[top](#)

io/zip-append

```
(io/zip-append f & entries)
```

Appends entries to an existing zip file f. Overwrites existing entries. An entry is given by a name and data. The entry data may be nil, a bytebuf, a file, a string (file path), or an InputStream.

An entry name with a trailing '/' creates a directory.

```
(let [data (bytebuf-from-string "abc" :utf-8)]
  ; create the zip with a first file
  (->> (io/zip "a.txt" data)
    (io/spit "test.zip"))
  ; add text files
  (io/zip-append "test.zip" "b.txt" data "x/c.txt" data)
  ; add an empty directory
  (io/zip-append "test.zip" "x/y/" nil))
```

SEE ALSO

[io/zip-file](#)

Zips files and directories recursively. Does not zip hidden files and does not follow symbolic links. The zip-file may be a file, a ...

[io/zip-remove](#)

Remove entries from a zip file f.

[top](#)

io/zip-file

```
(io/zip-file options* zip-file & files)
```

Zips files and directories recursively. Does not zip hidden files and does not follow symbolic links. The zip-file may be a file, a string (file path) or an OutputStream.

Options:

- :filter-fn fn a predicate function that filters the files to be added to the zip.
- :mapper-fn fn a mapper function that can map the file content of a file before it gets zipped. Returns nil or a :java.io.InputStream. The real file is used when nil is returned.
- :silent b if false prints the added entries to *out*, defaults to false

Example:

```
venice> (io/zip-file :silent false "test.zip" "dirA" "dirB")
```

Output:

```
adding: dirA/
adding: dirA/a1.png
adding: dirA/a2.png
adding: dirB/
adding: dirB/b1.png
```

```
; zip files
(io/zip-file "test.zip" "a.txt" "x/b.txt")

; zip all files from a directory
(io/zip-file "test.zip" "dir")

; zip all files in from two directories
(io/zip-file "test.zip" "dirA" "dirB")

; zip all files in from two directories and print the added entries
(io/zip-file :silent false "test.zip" "dirA" "dirB")

; zip all *.txt files from a directory
(io/zip-file :filter-fn (fn [dir name] (str/ends-with? name ".txt"))
  "test.zip"
  "dir")
```


SEE ALSO

[io/zip](#)

Creates a zip containing the entries. An entry is given by a name and data. The entry data may be nil, a bytebuf, a file, a string ...

[io/zip-list](#)

List the content of a the zip *f* and prints it to the current value of *out*. *f* may be a bytebuf, a file, a string (file path), or an ...

[top](#)

io/zip-list

```
(io/zip-list options* f)
```

List the content of a the zip *f* and prints it to the current value of *out*. *f* may be a bytebuf, a file, a string (file path), or an InputStream. Returns nil in print mode otherwise returns a list with attributes for each zip file entry.

Options:

:verbose *b* if true print verbose output, defaults to false

:print *b* if true print the entries to *out*, defaults to true

Example:

```
venice> (io/zip-list "test.zip")
Length      Date/Time Name
-----
      0  2021-01-05 10:32 dirA/
309977  2021-01-05 10:32 dirA/a1.png
309977  2021-01-05 10:32 dirA/a2.png
      0  2021-01-05 10:32 dirB/
309977  2021-01-05 10:32 dirB/b1.png
-----
929931                      5 files
=> nil
```

```
venice> (io/zip-list :verbose true "test.zip")
Length Method      Size  Cmpr      Date/Time      CRC-32  Name
-----
      0 Stored         0    0%  2021-01-05 10:32 00000000 dirA/
309977 Defl:N    297691    4%  2021-01-05 10:32 C7F24B5C dirA/a1.png
309977 Defl:N    297691    4%  2021-01-05 10:32 C7F24B5C dirA/a2.png
      0 Stored         0    0%  2021-01-05 10:32 00000000 dirB/
309977 Defl:N    297691    4%  2021-01-05 10:32 C7F24B5C dirB/b1.png
-----
929931    null    893073    4%                      5 files
=> nil
```

```
venice> (io/zip-list :print false "test.zip")
=> ({:size 0 :method "Stored" :name "dirA/" ...} ...)
```

```
(io/zip-list "test-file.zip")
```

```
(io/zip-list :verbose true "test-file.zip")
```

SEE ALSO

[io/zip-list-entry-names](#)

Returns a list of the zip's entry names.

[io/zip-file](#)

Zips files and directories recursively. Does not zip hidden files and does not follow symbolic links. The zip-file may be a file, a ...

[io/zip](#)

Creates a zip containing the entries. An entry is given by a name and data. The entry data may be nil, a bytebuf, a file, a string ...

[io/unzip](#)

Unzips an entry from zip f the entry's data as a bytebuf. f may be a bytebuf, a file, a string (file path) or an InputStream.

[top](#)

io/zip-list-entry-names

```
(io/zip-list-entry-names)
```

Returns a list of the zip's entry names.

```
(io/zip-list-entry-names "test-file.zip")
```

SEE ALSO

[io/zip-list](#)

List the content of a the zip f and prints it to the current value of out. f may be a bytebuf, a file, a string (file path), or an ...

[io/zip](#)

Creates a zip containing the entries. An entry is given by a name and data. The entry data may be nil, a bytebuf, a file, a string ...

[io/unzip](#)

Unzips an entry from zip f the entry's data as a bytebuf. f may be a bytebuf, a file, a string (file path) or an InputStream.

[top](#)

io/zip-remove

```
(io/zip-remove f & entry-names)
```

Remove entries from a zip file f.

```
; remove files from zip
(io/zip-remove "test.zip" "x/a.txt" "x/b.txt")
```

```
; remove directory from zip
(io/zip-remove "test.zip" "x/y/")
```

SEE ALSO

[io/zip-file](#)

Zips files and directories recursively. Does not zip hidden files and does not follow symbolic links. The zip-file may be a file, a ...

[io/zip-append](#)

Appends entries to an existing zip file f. Overwrites existing entries. An entry is given by a name and data. The entry data may be ...

[top](#)

io/zip?

```
(io/zip? f)
```

Returns true if f is a zipped file. f may be a file, a string (file path), a bytebuf, or an InputStream

```
(-> (io/zip "a" (bytebuf-from-string "abc" :utf-8))
      (io/zip?))
=> true
```

SEE ALSO

[io/zip-file](#)

Zips files and directories recursively. Does not zip hidden files and does not follow symbolic links. The zip-file may be a file, a ...

[io/zip](#)

Creates a zip containing the entries. An entry is given by a name and data. The entry data may be nil, a bytebuf, a file, a string ...

[top](#)

ip-private?

```
(ip-private? addr)
```

Returns true if the IP address is private.

IPv4 addresses reserved for private networks:

- 192.168.0.0 - 192.168.255.255
- 172.16.0.0 - 172.31.255.255
- 10.0.0.0 - 10.255.255.255

```
(ip-private? "192.168.170.181")
=> true
```

[top](#)

jansi-version

```
(jansi-version)
```

Returns the Jansi version or nil if not available.

[top](#)

jar-maven-manifest-version

```
(jar-maven-manifest-version group-id artefact-id)
```

Returns the Maven version for a loaded JAR's manifest or nil if there is no Maven manifest.

Reads the version from the JAR's Maven 'pom.properties' file at:
/META-INF/maven/{group-id}/{artefact-id}/pom.properties

A 'pom.properties' may look like:

- artifactId=xchart
- groupId=org.knowm.xchart
- version=3.8.0

```
(jar-maven-manifest-version :com.github.librepdf :openpdf)
=> "1.3.35"
```

SEE ALSO

[java-package-version](#)

Returns version information for a Java package or nil if the package does not exist or is not visible.

[top](#)

java-enumeration-to-list

```
(java-enumeration-to-list e)
```

Converts a Java enumeration to a list

[top](#)

java-iterator-to-list

```
(java-iterator-to-list e)
```

Converts a Java iterator to a list

[top](#)

java-major-version

```
(java-major-version)
```

Returns the Java major version (8, 9, 11, ...).

```
(java-major-version)
```

```
=> 8
```

SEE ALSO

[java-version](#)

Returns the Java VM version (1.8.0_252, 11.0.7, ...)

[java-version-info](#)

Returns the Java VM version info.

[top](#)

java-obj?

```
(java-obj? obj)
```

Returns true if obj is a Java object

```
(java-obj? (. :java.math.BigInteger :new "0"))  
=> true
```

[top](#)

java-package-version

(java-package-version class)

Returns version information for a Java package or nil if the package does not exist or is not visible.

```
(java-package-version :java.lang.String)  
=> {:implementation-title "Java Runtime Environment" :implementation-vendor "Azul Systems, Inc." :  
implementation-version "1.8.0_392" :specification-title "Java Platform API Specification" :specification-vendor  
"Oracle Corporation" :specification-version "1.8"}
```

```
(java-package-version (class :java.lang.String))  
=> {:implementation-title "Java Runtime Environment" :implementation-vendor "Azul Systems, Inc." :  
implementation-version "1.8.0_392" :specification-title "Java Platform API Specification" :specification-vendor  
"Oracle Corporation" :specification-version "1.8"}
```

SEE ALSO

[jar-maven-manifest-version](#)

Returns the Maven version for a loaded JAR's manifest or nil if there is no Maven manifest.

[class](#)

Returns the Java class for the given name. Throws an exception if the class is not found.

[top](#)

java-source-location

(java-source-location class)

Returns the path of the source location of a class (fully qualified class name).

```
(java-source-location :com.github.jlangch.venice.Venice)
```

[top](#)

java-unwrap-optional

(java-unwrap-optional val)

Unwraps a Java :java.util.Optional to its contained value or nil

[top](#)

java-version

(java-version)

Returns the Java VM version (1.8.0_252, 11.0.7, ...)

(java-version)

=> "1.8.0_392"

SEE ALSO

[java-major-version](#)

Returns the Java major version (8, 9, 11, ...).

[java-version-info](#)

Returns the Java VM version info.

[top](#)

java-version-info

(java-version-info)

Returns the Java VM version info.

(java-version-info)

=> {:version "1.8.0_392" :vendor "Azul Systems, Inc." :vm-version "25.392-b08" :vm-name "OpenJDK 64-Bit Server VM" :vm-vendor "Azul Systems, Inc."}

SEE ALSO

[java-version](#)

Returns the Java VM version (1.8.0_252, 11.0.7, ...)

[java-major-version](#)

Returns the Java major version (8, 9, 11, ...).

[top](#)

java/as-biconsumer

(as-biconsumer f)

Wraps the function f in a [java.util.function.BiConsumer](#)

(do

 (load-module :java ['java :as 'j])

 (import :com.github.jlangch.venice.demo.FunctionalInterfaces)

;; public static void testBiConsumer(BiConsumer<Long,Long> f, Long t, Long u) {

;; f.accept(t,u);

;; }

(defn op [t u] (println "consumed" t u))

```
(. :FunctionalInterfaces :testBiConsumer (j/as-biconsumer op) 1 2))
consumed 1 2
=> nil
```

SEE ALSO

[java/as-bipredicate](#)

Wraps the function f in a [java.util.function.BiPredicate](#) (<https://docs.oracle.com/javase/8/docs/api/java/util/function/BiPredicate.html>)

[java/as-bifunction](#)

Wraps the function f in a [java.util.function.BiFunction](#) (<https://docs.oracle.com/javase/8/docs/api/java/util/function/BiFunction.html>)

[java/as-unaryoperator](#)

Wraps the function f in a [java.util.function.UnaryOperator](#) (<https://docs.oracle.com/javase/8/docs/api/java/util/function/UnaryOperator.html>)

[java/as-binaryoperator](#)

Wraps the function f in a [java.util.function.BinaryOperator](#) (<https://docs.oracle.com/javase/8/docs/api/java/util/function/BinaryOperator.html>)

[top](#)

java/as-bifunction

(as-bifunction f)

Wraps the function f in a [java.util.function.BiFunction](#)

```
(do
  (load-module :java ['java :as 'j])
  (import :com.github.jlangch.venice.demo.FunctionalInterfaces)

  ;; public static Long testBiFunction(BiFunction<Long,Long,Long> f, Long t, Long u) {
  ;;   return f.apply(t,u);
  ;; }

  (defn op [t u] (+ t u))
  (. :FunctionalInterfaces :testBiFunction (j/as-bifunction op) 1 2))
=> 3
```

SEE ALSO

[java/as-bipredicate](#)

Wraps the function f in a [java.util.function.BiPredicate](#) (<https://docs.oracle.com/javase/8/docs/api/java/util/function/BiPredicate.html>)

[java/as-biconsumer](#)

Wraps the function f in a [java.util.function.BiConsumer](#) (<https://docs.oracle.com/javase/8/docs/api/java/util/function/BiConsumer.html>)

[java/as-unaryoperator](#)

Wraps the function f in a [java.util.function.UnaryOperator](#) (<https://docs.oracle.com/javase/8/docs/api/java/util/function/UnaryOperator.html>)

[java/as-binaryoperator](#)

Wraps the function f in a [java.util.function.BinaryOperator](#) (<https://docs.oracle.com/javase/8/docs/api/java/util/function/BinaryOperator.html>)

[top](#)

java/as-binaryoperator

(as-binaryoperator f)

Wraps the function f in a [java.util.function.BinaryOperator](#)

```

(do
  (load-module :java ['java :as 'j])
  (import :com.github.jlangch.venice.demo.FunctionalInterfaces)

  ;; public static Long testBinaryOperator(BinaryOperator<Long> f, Long t, Long u) {
  ;;   return f.apply(t,u);
  ;; }

  (defn op [t u] (+ t u))
  (. :FunctionalInterfaces :testBinaryOperator (j/as-binaryoperator op) 1 2))
=> 3

```

SEE ALSO

[java/as-bipredicate](#)

Wraps the function f in a [java.util.function.BiPredicate](https://docs.oracle.com/javase/8/docs/api/java/util/function/BiPredicate.html) (<https://docs.oracle.com/javase/8/docs/api/java/util/function/BiPredicate.html>)

[java/as-bifunction](#)

Wraps the function f in a [java.util.function.BiFunction](https://docs.oracle.com/javase/8/docs/api/java/util/function/BiFunction.html) (<https://docs.oracle.com/javase/8/docs/api/java/util/function/BiFunction.html>)

[java/as-biconsumer](#)

Wraps the function f in a [java.util.function.BiConsumer](https://docs.oracle.com/javase/8/docs/api/java/util/function/BiConsumer.html) (<https://docs.oracle.com/javase/8/docs/api/java/util/function/BiConsumer.html>)

[java/as-unaryoperator](#)

Wraps the function f in a [java.util.function.UnaryOperator](https://docs.oracle.com/javase/8/docs/api/java/util/function/UnaryOperator.html) (<https://docs.oracle.com/javase/8/docs/api/java/util/function/UnaryOperator.html>)

[top](#)

java/as-bipredicate

```
(as-bipredicate f)
```

Wraps the function f in a [java.util.function.BiPredicate](#)

```

(do
  (load-module :java ['java :as 'j])
  (import :com.github.jlangch.venice.demo.FunctionalInterfaces)

  ;; public static boolean testBiPredicate(BiPredicate<Long,Long> f, Long t, Long u) {
  ;;   return f.test(t,u);
  ;; }

  (defn op [t u] (> t u))
  (. :FunctionalInterfaces :testBiPredicate (j/as-bipredicate op) 1 2))
=> false

```

SEE ALSO

[java/as-bifunction](#)

Wraps the function f in a [java.util.function.BiFunction](https://docs.oracle.com/javase/8/docs/api/java/util/function/BiFunction.html) (<https://docs.oracle.com/javase/8/docs/api/java/util/function/BiFunction.html>)

[java/as-biconsumer](#)

Wraps the function f in a [java.util.function.BiConsumer](https://docs.oracle.com/javase/8/docs/api/java/util/function/BiConsumer.html) (<https://docs.oracle.com/javase/8/docs/api/java/util/function/BiConsumer.html>)

[java/as-unaryoperator](#)

Wraps the function f in a [java.util.function.UnaryOperator](https://docs.oracle.com/javase/8/docs/api/java/util/function/UnaryOperator.html) (<https://docs.oracle.com/javase/8/docs/api/java/util/function/UnaryOperator.html>)

[java/as-binaryoperator](#)

Wraps the function f in a [java.util.function.BinaryOperator](https://docs.oracle.com/javase/8/docs/api/java/util/function/BinaryOperator.html) (<https://docs.oracle.com/javase/8/docs/api/java/util/function/BinaryOperator.html>)

[top](#)

java/as-callable

(as-callable f)

Wraps the function f in a [java.util.concurrent.Callable](#)

```
(do
  (load-module :java ['java :as 'j])
  (import :com.github.jlangch.venice.demo.FunctionalInterfaces)

  ;; public static Long testCallable(Callable<Long> c) throws Exception {
  ;;   return c.call();
  ;; }

  (defn op [] 4)
  (. :FunctionalInterfaces :testCallable (j/as-callable op)))
=> 4
```

SEE ALSO

[java/as-runnable](#)

Wraps the function f in a [java.lang.Runnable](https://docs.oracle.com/javase/8/docs/api/java/lang/Runnable.html) (<https://docs.oracle.com/javase/8/docs/api/java/lang/Runnable.html>)

[java/as-predicate](#)

Wraps the function f in a [java.util.function.Predicate](https://docs.oracle.com/javase/8/docs/api/java/util/function/Predicate.html) (<https://docs.oracle.com/javase/8/docs/api/java/util/function/Predicate.html>)

[java/as-function](#)

Wraps the function f in a [java.util.function.Function](https://docs.oracle.com/javase/8/docs/api/java/util/function/Function.html) (<https://docs.oracle.com/javase/8/docs/api/java/util/function/Function.html>)

[java/as-consumer](#)

Wraps the function f in a [java.util.function.Consumer](https://docs.oracle.com/javase/8/docs/api/java/util/function/Consumer.html) (<https://docs.oracle.com/javase/8/docs/api/java/util/function/Consumer.html>)

[java/as-supplier](#)

Wraps the function f in a [java.util.function.Supplier](https://docs.oracle.com/javase/8/docs/api/java/util/function/Supplier.html) (<https://docs.oracle.com/javase/8/docs/api/java/util/function/Supplier.html>)

[top](#)

java/as-consumer

(as-consumer f)

Wraps the function f in a [java.util.function.Consumer](#)

```
(do
  (load-module :java ['java :as 'j])
  (import :com.github.jlangch.venice.demo.FunctionalInterfaces)

  ;; public static void testConsumer(Consumer<Long> f, Long t) {
  ;;   f.accept(t);
  ;; }

  (defn op [t] (println "consumed" t))
  (. :FunctionalInterfaces :testConsumer (j/as-consumer op) 4))
consumed 4
=> nil
```

SEE ALSO

[java/as-runnable](#)

Wraps the function f in a `java.lang.Runnable` (<https://docs.oracle.com/javase/8/docs/api/java/lang/Runnable.html>)

[java/as-callable](#)

Wraps the function f in a `java.util.concurrent.Callable` (<https://docs.oracle.com/javase/8/docs/api/java/util/concurrent/Callable.html>)

[java/as-predicate](#)

Wraps the function f in a `java.util.function.Predicate` (<https://docs.oracle.com/javase/8/docs/api/java/util/function/Predicate.html>)

[java/as-function](#)

Wraps the function f in a `java.util.function.Function` (<https://docs.oracle.com/javase/8/docs/api/java/util/function/Function.html>)

[java/as-supplier](#)

Wraps the function f in a `java.util.function.Supplier` (<https://docs.oracle.com/javase/8/docs/api/java/util/function/Supplier.html>)

[top](#)

java/as-function

`(as-function f)`

Wraps the function f in a [java.util.function.Function](#)

```
(do
  (load-module :java ['java :as 'j])
  (import :com.github.jlangch.venice.demo.FunctionalInterfaces)

  ;; public static Long testFunction(Function<Long,Long> f, Long t) {
  ;;   return f.apply(t);
  ;; }

  (defn op [t] (+ t 1))
  (. :FunctionalInterfaces :testFunction (j/as-function op) 4))
=> 5
```

SEE ALSO

[java/as-runnable](#)

Wraps the function f in a `java.lang.Runnable` (<https://docs.oracle.com/javase/8/docs/api/java/lang/Runnable.html>)

[java/as-callable](#)

Wraps the function f in a `java.util.concurrent.Callable` (<https://docs.oracle.com/javase/8/docs/api/java/util/concurrent/Callable.html>)

[java/as-predicate](#)

Wraps the function f in a `java.util.function.Predicate` (<https://docs.oracle.com/javase/8/docs/api/java/util/function/Predicate.html>)

[java/as-consumer](#)

Wraps the function f in a `java.util.function.Consumer` (<https://docs.oracle.com/javase/8/docs/api/java/util/function/Consumer.html>)

[java/as-supplier](#)

Wraps the function f in a `java.util.function.Supplier` (<https://docs.oracle.com/javase/8/docs/api/java/util/function/Supplier.html>)

[top](#)

java/as-predicate

`(as-predicate f)`

Wraps the function f in a [java.util.function.Predicate](#)

```
(do
  (load-module :java ['java :as 'j])
  (import :com.github.jlangch.venice.demo.FunctionalInterfaces)

  ;; public static boolean testPredicate(Predicate<Long> p, Long t) {
  ;;   return p.test(t);
  ;; }

  (defn op [t] (pos? t))
  (. :FunctionalInterfaces :testPredicate (j/as-predicate op) 4))
=> true
```

SEE ALSO

[java/as-runnable](#)

Wraps the function f in a [java.lang.Runnable](https://docs.oracle.com/javase/8/docs/api/java/lang/Runnable.html) (<https://docs.oracle.com/javase/8/docs/api/java/lang/Runnable.html>)

[java/as-callable](#)

Wraps the function f in a [java.util.concurrent.Callable](https://docs.oracle.com/javase/8/docs/api/java/util/concurrent/Callable.html) (<https://docs.oracle.com/javase/8/docs/api/java/util/concurrent/Callable.html>)

[java/as-function](#)

Wraps the function f in a [java.util.function.Function](https://docs.oracle.com/javase/8/docs/api/java/util/function/Function.html) (<https://docs.oracle.com/javase/8/docs/api/java/util/function/Function.html>)

[java/as-consumer](#)

Wraps the function f in a [java.util.function.Consumer](https://docs.oracle.com/javase/8/docs/api/java/util/function/Consumer.html) (<https://docs.oracle.com/javase/8/docs/api/java/util/function/Consumer.html>)

[java/as-supplier](#)

Wraps the function f in a [java.util.function.Supplier](https://docs.oracle.com/javase/8/docs/api/java/util/function/Supplier.html) (<https://docs.oracle.com/javase/8/docs/api/java/util/function/Supplier.html>)

[top](#)

java/as-runnable

```
(as-runnable f)
```

Wraps the function f in a [java.lang.Runnable](#)

```
(do
  (load-module :java ['java :as 'j])
  (import :com.github.jlangch.venice.demo.FunctionalInterfaces)

  ;; public static void testRunnable(final Runnable r) {
  ;;   r.run();
  ;; }

  (defn op [] (println "running"))
  (. :FunctionalInterfaces :testRunnable (j/as-runnable op)))
running
=> nil
```

SEE ALSO

[java/as-callable](#)

Wraps the function f in a [java.util.concurrent.Callable](https://docs.oracle.com/javase/8/docs/api/java/util/concurrent/Callable.html) (<https://docs.oracle.com/javase/8/docs/api/java/util/concurrent/Callable.html>)

[java/as-predicate](#)

Wraps the function f in a [java.util.function.Predicate](https://docs.oracle.com/javase/8/docs/api/java/util/function/Predicate.html) (<https://docs.oracle.com/javase/8/docs/api/java/util/function/Predicate.html>)

[java/as-function](#)

Wraps the function f in a [java.util.function.Function](https://docs.oracle.com/javase/8/docs/api/java/util/function/Function.html) (<https://docs.oracle.com/javase/8/docs/api/java/util/function/Function.html>)

[java/as-consumer](#)

Wraps the function `f` in a `java.util.function.Consumer` (<https://docs.oracle.com/javase/8/docs/api/java/util/function/Consumer.html>)

[java/as-supplier](#)

Wraps the function `f` in a `java.util.function.Supplier` (<https://docs.oracle.com/javase/8/docs/api/java/util/function/Supplier.html>)

[top](#)

java/as-supplier

`(as-supplier f)`

Wraps the function `f` in a [java.util.function.Supplier](#)

```
(do
  (load-module :java ['java :as 'j])
  (import :com.github.jlangch.venice.demo.FunctionalInterfaces)

  ;; public static Long testSupplier(Supplier<Long> f) {
  ;;   return f.get();
  ;; }

  (defn op [] 5)
  (. :FunctionalInterfaces :testSupplier (j/as-supplier op)))
=> 5
```

SEE ALSO

[java/as-runnable](#)

Wraps the function `f` in a `java.lang.Runnable` (<https://docs.oracle.com/javase/8/docs/api/java/lang/Runnable.html>)

[java/as-callable](#)

Wraps the function `f` in a `java.util.concurrent.Callable` (<https://docs.oracle.com/javase/8/docs/api/java/util/concurrent/Callable.html>)

[java/as-predicate](#)

Wraps the function `f` in a `java.util.function.Predicate` (<https://docs.oracle.com/javase/8/docs/api/java/util/function/Predicate.html>)

[java/as-function](#)

Wraps the function `f` in a `java.util.function.Function` (<https://docs.oracle.com/javase/8/docs/api/java/util/function/Function.html>)

[java/as-consumer](#)

Wraps the function `f` in a `java.util.function.Consumer` (<https://docs.oracle.com/javase/8/docs/api/java/util/function/Consumer.html>)

[top](#)

java/as-unaryoperator

`(as-unaryoperator f)`

Wraps the function `f` in a [java.util.function.UnnaryOperator](#)

```
(do
  (load-module :java ['java :as 'j])
  (import :com.github.jlangch.venice.demo.FunctionalInterfaces)

  ;; public static Long testUnaryOperator(UnaryOperator<Long> f, Long t) {
  ;;   return f.apply(t);
  ;; }
```

```
(defn op [t] (+ t 1))
(. :FunctionalInterfaces :testUnaryOperator (j/as-unaryoperator op) 1))
=> 2
```

SEE ALSO

[java/as-bipredicate](#)

Wraps the function f in a java.util.function.BiPredicate (<https://docs.oracle.com/javase/8/docs/api/java/util/function/BiPredicate.html>)

[java/as-bifunction](#)

Wraps the function f in a java.util.function.BiFunction (<https://docs.oracle.com/javase/8/docs/api/java/util/function/BiFunction.html>)

[java/as-biconsumer](#)

Wraps the function f in a java.util.function.BiConsumer (<https://docs.oracle.com/javase/8/docs/api/java/util/function/BiConsumer.html>)

[java/as-binaryoperator](#)

Wraps the function f in a java.util.function.BinaryOperator (<https://docs.oracle.com/javase/8/docs/api/java/util/function/BinaryOperator.html>)

top

java/javadoc

```
(javadoc class-or-object)
```

Opens a browser window displaying the javadoc for argument.

```
(java/javadoc :java.lang.String)
```

top

json/pretty-print

```
(json/pretty-print s & options)
```

Pretty prints a JSON string

Options:

:indent s The indent for indented output. Must contain spaces or tabs only. Defaults to two spaces.

```
(-> (json/write-str {:a 100 :b 100 :c [1 2 3]}))
    (json/pretty-print)
    (println))
{
  "a": 100,
  "b": 100,
  "c": [1,2,3]
}
=> nil

(-> (json/write-str {:a 100 :b 100 :c [1 2 {:x 7 :y 8}] :d {:z 9}})
    (json/pretty-print :indent "  ")
    (println))
{
  "a": 100,
  "b": 100,
  "c": [1,2,{
    "x": 7,
```

```
      "y": 8
    }],
    "d": {
      "z": 9
    }
  }
=> nil
```

SEE ALSO

[json/write-str](#)

Writes the val to a JSON string.

[json/read-str](#)

Reads a JSON string and returns it as a Venice datatype.

[json/spit](#)

Spits the JSON converted val to the output.

[json/slurp](#)

Slurps a JSON data from a source and returns it as a Venice data.

[top](#)

json/read-str

([json/read-str](#) s & options)

Reads a JSON string and returns it as a Venice datatype.

Options:

- :key-fn fn Single argument function called on JSON property names; return value will replace the property names in the output. Default is 'identity', use 'keyword' to get keyword properties.
- :value-fn fn Function to transform values in JSON objects in the output. For each JSON property, value-fn is called with two arguments: the property name (transformed by key-fn) and the value. The return value of value-fn will replace the value in the output. The default value-fn returns the value unchanged.
- :decimal b If true use BigDecimal for decimal numbers instead of Double. Default is false.

```
(json/read-str (json/write-str {:a 100 :b 100}))
=> {"a" 100 "b" 100}
```

```
(json/read-str (json/write-str {:a 100 :b 100}) :key-fn keyword)
=> {:a 100 :b 100}
```

```
(json/read-str (json/write-str {:a 100 :b 100})
  :value-fn (fn [k v] (if (== "a" k) (inc v) v)))
=> {"a" 101 "b" 100}
```

SEE ALSO

[json/write-str](#)

Writes the val to a JSON string.

[json/spit](#)

Spits the JSON converted val to the output.

[json/slurp](#)

Slurps a JSON data from a source and returns it as a Venice data.

[json/pretty-print](#)

Pretty prints a JSON string

json/slurp

```
(json/slurp source & options)
```

Slurps a JSON data from a source and returns it as a Venice data.

The source may be a:

- `java.io.File`, e.g: `(io/file "/temp/foo.json")`
- `java.nio.Path`
- `java.io.InputStream`
- `java.io.Reader`

Options:

:key-fn fn	Single-argument function called on JSON property names; return value will replace the property names in the output. Default is 'identity', use 'keyword' to get keyword properties.
:value-fn fn	Function to transform values in JSON objects in the output. For each JSON property, value-fn is called with two arguments: the property name (transformed by key-fn) and the value. The return value of value-fn will replace the value in the output. The default value-fn returns the value unchanged.
:decimal b	If true use BigDecimal for decimal numbers instead of Double. Default is false.
:encoding e	e.g :encoding :utf-8, defaults to :utf-8

```
(let [json (json/write-str {:a 100 :b 100 :c 1.233})]
  (try-with [in (io/string-reader json)]
    (pr-str (json/slurp in))))
=> "{ \"a\" 100 \"b\" 100 \"c\" 1.233}"

(let [json (json/write-str {:a 100 :b 100 :c 1.233})]
  (try-with [in (io/string-reader json)]
    (pr-str (json/slurp in :decimal true :key-fn keyword))))
=> "{:a 100 :b 100 :c 1.233M}"
```

SEE ALSO

[json/write-str](#)

Writes the val to a JSON string.

[json/read-str](#)

Reads a JSON string and returns it as a Venice datatype.

[json/spit](#)

Spits the JSON converted val to the output.

[json/pretty-print](#)

Pretty prints a JSON string

json/spit

```
(json/spit out val & options)
```

Spits the JSON converted val to the output.

The out may be a:

- `java.io.File`, e.g: `(io/file "/temp/foo.json")`
- `java.nio.Path`
- `java.io.OutputStream`
- `java.io.Writer`

Options:

:pretty b Enables/disables pretty printing. Defaults to false.
:decimal-as-double b If true emit a decimal as double else as string. Defaults to false.
:encoding e e.g :encoding :utf-8, defaults to :utf-8

```
(try-with [out (io/bytebuf-out-stream)]  
  (json/spit out {:a 100 :b 100 :c [10 20 30]}))  
(flush out)  
(bytebuf-to-string @out :utf-8))  
=> "{ \"a\":100, \"b\":100, \"c\": [10,20,30] }"
```

SEE ALSO

[json/write-str](#)

Writes the val to a JSON string.

[json/read-str](#)

Reads a JSON string and returns it as a Venice datatype.

[json/slurp](#)

Slurps a JSON data from a source and returns it as a Venice data.

[json/pretty-print](#)

Pretty prints a JSON string

top

json/write-str

```
(json/write-str val & options)
```

Writes the val to a JSON string.

Options:

:pretty b Enables/disables pretty printing. Defaults to false.
:decimal-as-double b If true emit a decimal as double else as string. Defaults to false.

```
(json/write-str {:a 100 :b 100})  
=> "{ \"a\":100, \"b\":100 }"
```



```
(json/write-str {:a 100 :b 100} :pretty true)  
=> "{\n  \"a\": 100,\n  \"b\": 100\n}"
```

SEE ALSO

[json/read-str](#)

Reads a JSON string and returns it as a Venice datatype.

[json/spit](#)

Spits the JSON converted val to the output.

json/slurp

Slurps a JSON data from a source and returns it as a Venice data.

json/pretty-print

Pretty prints a JSON string

[top](#)

json/lazy-seq-slurper

(jsonl/lazy-seq-slurper in & options)

Returns a lazy sequence of the parsed JSON line strings from the input 'in'.

'in' may be a: `java.io.InputStream` or `java.io.Reader`

Note: The caller is responsible for closing the in stream/reader!

Options:

- :key-fn fn Single argument function called on JSON property names; return value will replace the property names in the output. Default is 'identity', use 'keyword' to get keyword properties.
- :value-fn fn Function to transform values in JSON objects in the output. For each JSON property, value-fn is called with two arguments: the property name (transformed by key-fn) and the value. The return value of value-fn will replace the value in the output. The default value-fn returns the value unchanged.
- :decimal b If true use BigDecimal for decimal numbers instead of Double. Default is false.
- :filter-fn fn Single argument function called on every read value from a JSON line. If it returns true the value will be kept otherwise it will be skipped
- :encoding e e.g :encoding :utf-8, defaults to :utf-8

`jsonl/lazy-seq-slurper` supports load paths. See the `loadpath/paths` doc for a description of the *load path* feature.

```
;; use a lazy sequence to read the JSON lines data
(do
  (load-module :jsonl)
  (let [file (io/temp-file "data-" ".jsonl")]
    (io/delete-file-on-exit file)
    (try-with [wr (io/buffered-writer file)]
      (jsonl/spit wr [{:a 100 :b 200} {:a 101 :b 201} {:a 102 :b 202}])
      (flush wr))
    (try-with [rd (io/buffered-reader file)]
      (let [slurper (jsonl/lazy-seq-slurper rd :key-fn keyword)]
        ;; realize the lazy sequence
        (doall slurper))))))
```

```
=> ({:a 100 :b 200} {:a 101 :b 201} {:a 102 :b 202})
```

```
;; use a transducer to efficiently map and filter the JSON lines data
```

```
(do
  (load-module :jsonl)

  (defn test-data []
    (try-with [sw (io/string-writer)]
      (println sw (json/write-str {:a 100 :b 200 :c 300}))
      (println sw (json/write-str {:a 101 :b 201 :c 301}))
      (println sw (json/write-str {:a 100 :b 202 :c 302}))
      (flush sw)
      @sw))

  (def xform (comp (map #(dissoc % :c))
    (map #(update % :b (fn [x] (+ x 5))))))
```

```
(filter #(= 100 (:a %))))))
```

```
(let [json (test-data)]
  (try-with [rd (io/buffered-reader json)]
    (let [slurper (jsonl/lazy-seq-slurper rd :key-fn keyword)]
      ;; transduce the lazy sequence
      (pr-str (transduce xform conj slurper))))))
=> "[{:a 100 :b 205} {:a 100 :b 207}]"
```

SEE ALSO

[jsonl/slurp](#)

Slurps a list of JSON line strings from the input 'in' and returns it as a list of Venice data types.

[jsonl/read-str](#)

Reads a JSON line string 's' and returns it as a Venice data type.

[top](#)

jsonl/read-str

```
(jsonl/read-str s & options)
```

Reads a JSON line string 's' and returns it as a Venice data type.

Options:

- :key-fn fn Single argument function called on JSON property names; return value will replace the property names in the output. Default is 'identity', use 'keyword' to get keyword properties.
- :value-fn fn Function to transform values in JSON objects in the output. For each JSON property, value-fn is called with two arguments: the property name (transformed by key-fn) and the value. The return value of value-fn will replace the value in the output. The default value-fn returns the value unchanged.
- :decimal b If true use BigDecimal for decimal numbers instead of Double. Default is false.

```
(do
  (load-module :jsonl)
  (let [json (jsonl/write-str {:a 100 :b 200})]
    (jsonl/read-str json :key-fn keyword)))
=> ({:a 100 :b 200})

(do
  (load-module :jsonl)
  (let [json (jsonl/write-str [{:a 100 :b 200} {:a 100 :b 200}])]
    (jsonl/read-str json :key-fn keyword)))
=> ({:a 100 :b 200} {:a 100 :b 200})

(do
  (load-module :jsonl)
  (try-with [sw (io/string-writer)]
    (println sw (jsonl/write-str {:a 100 :b 200}))
    (println sw (jsonl/write-str {:a 101 :b 201}))
    (println sw (jsonl/write-str {:a 102 :b 202}))
    (flush sw)
    (let [json @sw]
      (jsonl/read-str json :key-fn keyword))))
=> ({:a 100 :b 200} {:a 101 :b 201} {:a 102 :b 202})
```

SEE ALSO

[jsonl/write-str](#)

Writes the value 'val' to a JSON lines string.

[top](#)

jsonl/slurp

(jsonl/slurp in & options)

Slurps a list of JSON line strings from the input 'in' and returns it as a list of Venice data types.

'in' may be a: *string* `bytebuf` `java.io.File`, e.g: `(io/file "/temp/foo.json")` `java.nio.file.Path` `java.io.InputStream` `java.io.Reader`

Note: The caller is responsible for closing the in stream/reader!

Options:

- :key-fn fn Single argument function called on JSON property names; return value will replace the property names in the output. Default is 'identity', use 'keyword' to get keyword properties.
- :value-fn fn Function to transform values in JSON objects in the output. For each JSON property, value-fn is called with two arguments: the property name (transformed by key-fn) and the value. The return value of value-fn will replace the value in the output. The default value-fn returns the value unchanged.
- :decimal b If true use BigDecimal for decimal numbers instead of Double. Default is false.
- :filter-fn fn Single argument function called on every read value from a JSON line. If it returns true the value will be kept otherwise it will be skipped. The filter is applied after the 'key-fn' and the 'value-fn' have been applied to the line data value.
- :encoding e e.g :encoding :utf-8, defaults to :utf-8

`jsonl/slurp` supports load paths. See the `loadpath/paths` doc for a description of the *load path* feature.

```
(do
  (load-module :jsonl)
  (let [file (io/temp-file "data-" ".jsonl")]
    (io/delete-file-on-exit file)
    (try-with [wr (io/buffered-writer file)]
      (jsonl/spit wr [{:a 100 :b 200} {:a 101 :b 201} {:a 102 :b 202}]))
    (flush wr))
    (try-with [rd (io/buffered-reader file)]
      (jsonl/slurp rd :key-fn keyword))))
=> ({:a 100 :b 200} {:a 101 :b 201} {:a 102 :b 202})

;; slurp JSON Lines applying mapping functions and a filter on the lines
(do
  (load-module :jsonl)
  (let [file (io/temp-file "data-" ".jsonl")
        now (time/local-date-time)]
    (io/delete-file-on-exit file)
    (try-with [wr (io/buffered-writer file)]
      (jsonl/spit wr [{:a 100 :b (time/plus now :days 1) :c 10.12M}
                     {:a 101 :b (time/plus now :days 2) :c 20.12M}
                     {:a 100 :b (time/plus now :days 3) :c 30.12M}]))
    (flush wr))
    (try-with [rd (io/buffered-reader file)]
      (jsonl/slurp rd :key-fn keyword
                    :value-fn (fn [k v]
                               (case k
                                 :b (time/local-date-time-parse v :iso)
                                 :c (decimal v)
                                 v))
                    :filter-fn #(= 100 (:a %))))))
=> ({:a 100 :b 2024-03-11T17:12:23.922 :c 10.12M} {:a 100 :b 2024-03-13T17:12:23.922 :c 30.12M})
```

SEE ALSO

jsonl/read-str

Reads a JSON line string 's' and returns it as a Venice data type.

jsonl/lazy-seq-slurper

Returns a lazy sequence of the parsed JSON line strings from the input 'in'.

[top](#)

jsonl/spit

(jsonl/spit out val & options)

Spits the JSON Lines converted value 'val' to the output 'out'.

The 'out' may be a:

- `java.io.File`, e.g. `(io/file "/temp/foo.json")`
- `java.nio.Path`
- `java.io.OutputStream`
- `java.io.Writer`

Note: The caller is responsible for closing the out stream/writer!

Any reasonable Venice value like string, integer, long, double, decimal, boolean, list, vector, set, or map can be passed. Sequences like list or vector are converted to multiple JSON lines, one line for each value in the sequence. All other types are converted to a single JSON line.

Options:

:decimal-as-double b If true emit a decimal as double else as string. Defaults to false.

:append true/false e.g.: `:append true`, defaults to false

:encoding e e.g. `:encoding utf-8`, defaults to `:utf-8`

`jsonl/spit` supports load paths. See the `loadpath/paths` doc for a description of the *load path* feature.

```
(do
  (load-module :jsonl)
  (let [file (io/temp-file "data-" ".jsonl")]
    (io/delete-file-on-exit file)
    (try-with [wr (io/buffered-writer file)]
      (jsonl/spit wr [{:a 100 :b 200} {:a 101 :b 201} {:a 102 :b 202}])
      (flush wr))
    ;; print the json lines data
    (println (io/slurp file :encoding :utf-8))))
{"a":100,"b":200}
{"a":101,"b":201}
{"a":102,"b":202}
=> nil
```

;; spit a list of json lines (linefeeds are added implicitly)

```
(do
  (load-module :jsonl)
  (let [file (io/temp-file "data-" ".jsonl")]
    (io/delete-file-on-exit file)
    (try-with [wr (io/buffered-writer file)]
      (jsonl/spit wr [{"a" 100, "b" 200}
                      {"a" 101, "b" 201}
                      {"a" 102, "b" 202}])
      (flush wr))
    ;; print the json lines data
    (println (io/slurp file :encoding :utf-8))))
{"a":100,"b":200}
```

```

{"a":101,"b":201}
{"a":102,"b":202}
=> nil

;; spit a list of json lines line by line (linefeeds must be added explicitly)
(do
  (load-module :jsonl)
  (let [file (io/temp-file "data-" ".jsonl")]
    (io/delete-file-on-exit file)
    (try-with [wr (io/buffered-writer file)]
      (jsonl/spit wr {"a" 100, "b" 200})
      (println wr)
      (jsonl/spit wr {"a" 101, "b" 201})
      (println wr)
      (jsonl/spit wr {"a" 102, "b" 202})
      (flush wr))
    ;; print the json lines data
    (println (io/slurp file :encoding :utf-8))))
{"a":100,"b":200}
{"a":101,"b":201}
{"a":102,"b":202}
=> nil

```

SEE ALSO

[jsonl/write-str](#)

Writes the value 'val' to a JSON lines string.

[jsonl/slurp](#)

Slurps a list of JSON line strings from the input 'in' and returns it as a list of Venice data types.

[top](#)

jsonl/spitln

(jsonl/spitln out val & options)

Spits the JSON Lines converted value 'val' to the output 'out' and adds a new line after the last emitted line.

This function is useful when lines are spitted to a stream/writer line by line.

The 'out' may be a:

- `java.io.File`, e.g: `(io/file "/temp/foo.json")`
- `java.nio.Path`
- `java.io.OutputStream`
- `java.io.Writer`

Note: The caller is responsible for closing the out stream/writer!

Any reasonable Venice value like string, integer, long, double, decimal, boolean, list, vector, set, or map can be passed. Sequences like list or vector are converted to multiple JSON lines, one line for each value in the sequence. All other types are converted to a single JSON line.

Options:

:decimal-as-double b If true emit a decimal as double else as string. Defaults to false.

:append true/false e.g.: `:append true`, defaults to false

:encoding e e.g :encoding utf-8, defaults to :utf-8

`jsonl/spitln` supports load paths. See the `loadpath/paths` doc for a description of the *load path* feature.

```
;; spit a list of json lines line by line
(do
  (load-module :jsonl)
  (let [file (io/temp-file "data-" ".jsonl")]
    (io/delete-file-on-exit file)
    (try-with [wr (io/buffered-writer file)]
      (jsonl/spitln wr {"a" 100, "b" 200})
      (jsonl/spitln wr {"a" 101, "b" 201})
      (jsonl/spit wr {"a" 102, "b" 202})      ;; last line no LF
      (flush wr))
    ;; print the json lines from the written file
    (println (io/slurp file :encoding :utf-8))))
{"a":100,"b":200}
{"a":101,"b":201}
{"a":102,"b":202}
=> nil
```

SEE ALSO

[jsonl/write-str](#)

Writes the value 'val' to a JSON lines string.

[jsonl/slurp](#)

Slurps a list of JSON line strings from the input 'in' and returns it as a list of Venice data types.

[top](#)

jsonl/write-str

(jsonl/write-str val & options)

Writes the value 'val' to a JSON lines string.

Any reasonable Venice value like string, integer, long, double, decimal, boolean, list, vector, set, or map can be passed. Sequences like list or vector are converted to multiple JSON lines, one line for each value in the sequence. All other types are converted to a single JSON line.

Options:

:decimal-as-double b If true emit a decimal as double else as string. Defaults to false

```
(do
  (load-module :jsonl)
  (println (jsonl/write-str {:a 100 :b 200})))
{"a":100,"b":200}
=> nil

(do
  (load-module :jsonl)
  (println (jsonl/write-str [{:a 100 :b 200}
                             {:a 101 :b 201}
                             {:a 102 :b 202}])))
{"a":100,"b":200}
{"a":101,"b":201}
{"a":102,"b":202}
=> nil
```

SEE ALSO

[jsonl/spit](#)

Spits the JSON Lines converted value 'val' to the output 'out'.

[jsonl/read-str](#)

Reads a JSON line string 's' and returns it as a Venice data type.

top

just

```
(just x)
```

Creates a wrapped x, that is dereferenceable

```
(just 10)
=> (just 10)
```

```
(just "10")
=> (just "10")
```

```
(deref (just 10))
=> 10
```

top

just?

```
(just? x)
```

Returns true if x is of type just

```
(just? (just 1))
=> true
```

top

juxt

```
(juxt f)
(juxt f g)
(juxt f g h)
(juxt f g h & fs)
```

Takes a set of functions and returns a fn that is the juxtaposition of those fns. The returned fn takes a variable number of args, and returns a vector containing the result of applying each fn to the args (left-to-right).

```
((juxt a b c) x) => [(a x) (b x) (c x)]
```

```
((juxt first last) '(1 2 3 4))
=> [1 4]
```

```
(do
  (defn index-by [coll key-fn]
    (into {} (map (juxt key-fn identity) coll)))

  (index-by [{:id 1 :name "foo"}
             {:id 2 :name "bar"}]
```

```
      {:id 3 :name "baz"}}]
      :id))
=> {1 {:name "foo" :id 1} 2 {:name "bar" :id 2} 3 {:name "baz" :id 3}}
```

[top](#)

keep

```
(keep f coll)
```

Returns a sequence of the non-nil results of `(f item)`. Note, this means false return values will be included. `f` must be free of side-effects. Returns a transducer when no collection is provided.

```
(keep even? (range 1 4))
=> (false true false)
```

```
(keep (fn [x] (if (odd? x) x)) (range 4))
=> (1 3)
```

```
(keep #{3 5 7} '(1 3 5 7 9))
=> (3 5 7)
```

[top](#)

key

```
(key e)
```

Returns the key of the map entry.

```
(key (find {:a 1 :b 2} :b))
=> :b
```

```
(key (first (entries {:a 1 :b 2 :c 3})))
=> :a
```

SEE ALSO

[map](#)

Applies `f` to the set of first items of each coll, followed by applying `f` to the set of second items in each coll, until any one of the ...

[entries](#)

Returns a collection of the map's entries.

[val](#)

Returns the val of the map entry.

[keys](#)

Returns a collection of the map's keys.

[top](#)

keys


```
(keys map)
```

Returns a collection of the map's keys.

Please note that the functions 'keys' and 'vals' applied to the same map are not guaranteed not return the keys and vals in the same order!

To achieve this, keys and vals can be calculated based on the map's entry list:

```
(let [e (entries {:a 1 :b 2 :c 3})]  
  (println (map key e))  
  (println (map val e)))
```

```
(keys {:a 1 :b 2 :c 3})  
=> (:a :b :c)
```

SEE ALSO

[vals](#)

Returns a collection of the map's values.

[entries](#)

Returns a collection of the map's entries.

[map](#)

Applies f to the set of first items of each coll, followed by applying f to the set of second items in each coll, until any one of the ...

[top](#)

keyword

```
(keyword name)  
(keyword ns name)
```

Returns a keyword from the given name

```
(keyword "a")  
=> :a
```

```
(keyword :a)  
=> :a
```

```
(keyword :foo/a)  
=> :foo/a
```

```
(keyword "foo" "a")  
=> :foo/a
```

```
(keyword (. :java.time.Month :JANUARY)) ;; java enum to keyword  
=> :JANUARY
```

```
(name :foo/a)  
=> "a"
```

```
(namespace :foo/a)  
=> "foo"
```

SEE ALSO

[name](#)

Returns the name string of a string, symbol, keyword, or function. If applied to a string it returns the string itself.

[namespace](#)

Returns the namespace string of a symbol, keyword, or function. If x is a registered namespace returns x.

[top](#)

keyword?

```
(keyword? x)
```

Returns true if x is a keyword

```
(keyword? (keyword "a"))  
=> true
```

```
(keyword? :a)  
=> true
```

```
(keyword? nil)  
=> false
```

```
(keyword? 'a)  
=> false
```

[top](#)

kira/escape-html

```
(kira/escape-html val)  
(kira/escape-html val f)
```

Returns a HTML escaped string. If the passed data is not of type string it will be converted first to a string using the 'str' function.

An optional function f transforms the value before being converted to a string and HTML escaped.

```
(do  
  (ns test)  
  (load-module :kira)  
  
  (println (kira/eval "<div><%= (kira/escape-html formula) %></div>"  
    { :formula "x > 100" })))  
  
  (defn format [t] (time/format t "yyyy-MM-dd"))  
  (println (kira/eval "<div><%= (kira/escape-html date test/format) %></div>"  
    { :date (time/local-date 2000 8 1) })))  
<div>x &gt; 100</div>  
<div>2000-08-01</div>  
=> nil
```

SEE ALSO

[kira/escape-xml](#)

Returns an XML escaped string. If the passed data is not of type string it will be converted first to a string using the 'str' function.

[top](#)

kira/escape-xml

```
(kira/escape-xml val)
(kira/escape-xml val f)
```

Returns an XML escaped string. If the passed data is not of type string it will be converted first to a string using the 'str' function.

An optional function f transforms the value before being converted to a string and XML escaped.

```
(do
  (ns test)
  (load-module :kira)

  (println (kira/eval "<formula><%= (kira/escape-xml formula) %></formula>"
    { :formula "x > 100" }))

  (defn format [t] (time/format t "yyyy-MM-dd"))
  (println (kira/eval "<date><%= (kira/escape-xml date test/format) %></date>"
    { :date (time/local-date 2000 8 1) })))
<formula>x &gt; 100</formula>
<date>2000-08-01</date>
=> nil
```

SEE ALSO

[kira/escape-html](#)

Returns a HTML escaped string. If the passed data is not of type string it will be converted first to a string using the 'str' function.

[top](#)

kira/eval

```
(kira/eval source)
(kira/eval source bindings)
(kira/eval source delimiters bindings)
```

Evaluate a template using the supplied bindings. The template source may be a string, or an I/O source such as a File, Reader or InputStream.

```
(do
  (ns test)
  (load-module :kira)

  (println (kira/eval "Hello <%= name %>" { :name "Alice" }))
  (println (kira/eval "1 + 2 = <%= (+ 1 2) %>"))
  (println (kira/eval "2 + 3 = <%= (print (+ 2 3)) %>"))
  (println (kira/eval "${$=x}$ + {$=y}$ = {$= (+ x y) }$"
    ["${" "}"]
    { :x 4 :y 5 })))

  (println (kira/eval "margin: <%= (if large 100 10) %>"
    { :large false }))
  (println (kira/eval "fruits: <%= (doseq [f fruits] %><%= f %> <%= ) %>"
    { :fruits '("apple" "peach") })))
  (println (kira/eval "fruits: <%= (doseq [f fruits] %><%= f %> <%= ) %>"
    { :fruits '("apple" "peach") })))

  (println (kira/eval "when: <%= (when large %>is large<%= ) %>"))
```

```

      { :large true })})
  (println (kira/eval "if: <% (if large (do %>100<% ) (do %>1<% )) %>"
    { :large true })))

  (println (kira/eval "<div><%= (kira/escape-html formula) %></div>"
    { :formula "12 < 15" })))

Hello Alice
1 + 2 = 3
2 + 3 = 5
4 + 5 = 9
margin: 10
fruits: apple peach
fruits: apple peach
when: is large
if: 100
<div>12 &lt; 15</div>
=> nil

```

SEE ALSO

[kira/fn](#)

Compile a template into a function that takes the supplied arguments. The template source may be a string, or an I/O source such as ...

[kira/escape-xml](#)

Returns an XML escaped string. If the passed data is not of type string it will be converted first to a string using the 'str' function.

[kira/escape-html](#)

Returns a HTML escaped string. If the passed data is not of type string it will be converted first to a string using the 'str' function.

[top](#)

kira/fn

```

(kira/fn args source)
(kira/fn args source delimiters)

```

Compile a template into a function that takes the supplied arguments. The template source may be a string, or an I/O source such as a File, Reader or InputStream.

```

(do
  (load-module :kira)

  (def hello (kira/fn [name] "Hello <%= name %>"))
  (println (hello "Alice"))
  (println (hello "Bob")))
Hello Alice
Hello Bob
=> nil

```

SEE ALSO

[kira/eval](#)

Evaluate a template using the supplied bindings. The template source may be a string, or an I/O source such as a File, Reader or InputStream.

[kira/escape-xml](#)

Returns an XML escaped string. If the passed data is not of type string it will be converted first to a string using the 'str' function.

[kira/escape-html](#)

Returns a HTML escaped string. If the passed data is not of type string it will be converted first to a string using the 'str' function.

[top](#)

last

```
(last coll)
```

Returns the last element of coll.

```
(last nil)
=> nil
```

```
(last [])
=> nil
```

```
(last [1 2 3])
=> 3
```

```
(last '())
=> nil
```

```
(last '(1 2 3))
=> 3
```

```
(last "abc")
=> #\c
```

[top](#)

lazy-seq

```
(lazy-seq)
(lazy-seq f)
(lazy-seq seed f)
(lazy-seq head tail-lazy-seq)
```

Creates a new lazy sequence.

```
(lazy-seq)
empty lazy sequence
```

```
(lazy-seq f)
```

(theoretically) infinitely lazy sequence using a repeatedly invoked supplier function for each next value. The supplier function f is a no arg function. The sequence ends if the supplier function returns nil.

```
(lazy-seq seed f)
```

(theoretically) infinitely lazy sequence with a seed value and a supplier function to calculate the next value based on the previous. f is a single arg function. The sequence ends if the supplier function returns nil.

```
(lazy-seq head tail-lazy-seq)
```

Constructs a lazy sequence of a head element and a lazy sequence tail supplier.

```
; empty lazy sequence
(->> (lazy-seq)
      (doall))
=> ()
```

```
; lazy sequence with a supplier function producing random longs
(->> (lazy-seq rand-long))
```

```

    (take 4)
    (doall))
=> (2727401322258994458 1956333083039352076 5697639933867969658 1088896454310259271)

```

; lazy sequence with a constant value

```

(->> (lazy-seq (constantly 5))
    (take 4)
    (doall))
=> (5 5 5 5)

```

; lazy sequence with a seed value and a supplier function
; producing of all positive numbers (1, 2, 3, 4, ...)

```

(->> (lazy-seq 1 inc)
    (take 10)
    (doall))
=> (1 2 3 4 5 6 7 8 9 10)

```

; producing of all positive even numbers (2, 4, 6, ...)

```

(->> (lazy-seq 2 #( + % 2))
    (take 10)
    (doall))
=> (2 4 6 8 10 12 14 16 18 20)

```

; lazy sequence as value producing function

```

(interleave [:a :b :c] (lazy-seq 1 inc))
=> (:a 1 :b 2 :c 3)

```

; lazy sequence with a mapping

```

(->> (lazy-seq 1 (fn [x] (do (println "realized" x)
                             (inc x)))))

    (take 10)
    (map #(* 10 %))
    (take 2)
    (doall))
realized 1
=> (10 20)

```

; finite lazy sequence from a vector

```

(->> (lazy-seq [1 2 3 4])
    (doall))
=> (1 2 3 4)

```

; finite lazy sequence with a supplier function that
; returns nil to terminate the sequence

```

(do
  (def counter (atom 5))
  (defn generate []
    (swap! counter dec)
    (if (pos? @counter) @counter nil))
  (doall (lazy-seq generate)))
=> (4 3 2 1)

```

; lazy sequence from a head element and a tail lazy
; sequence

```

(->> (cons -1 (lazy-seq 0 #( + % 1)))
    (take 5)
    (doall))
=> (-1 0 1 2 3)

```

; lazy sequence from a head element and a tail lazy
; sequence

```
(->> (lazy-seq -1 (lazy-seq 0 #(+ % 1)))
      (take 5)
      (doall))
=> (-1 0 1 2 3)

; lazy sequence show its power to generate the Fibonacci sequence
(do
  (def fib (map first (lazy-seq [0N 1N] (fn [[a b]] [b (+ a b)]))))
  (doall (take 10 fib)))
=> (0N 1N 1N 2N 3N 5N 8N 13N 21N 34N)
```

SEE ALSO

[doall](#)

When lazy sequences are produced doall can be used to force any effects and realize the lazy sequence. Returns the realized items in a list!

[lazy-seq?](#)

Returns true if obj is a lazyseq

[cons](#)

Returns a new collection where x is the first element and coll is the rest.

[cycle](#)

Returns a lazy (infinite!) sequence of repetitions of the items in coll.

[repeat](#)

Returns a lazy sequence of x values or a collection with the value x repeated n times.

[top](#)

lazy-seq?

```
(lazy-seq? obj)
```

Returns true if obj is a lazyseq

```
(lazy-seq? (lazy-seq rand-long))
=> true
```

SEE ALSO

[lazy-seq](#)

Creates a new lazy sequence.

[top](#)

let

```
(let [bindings*] exprs*)
```

Evaluates the expressions and binds the values to symbols in the new local context.

```
(let [x 1] x)
=> 1
```

```
(let [x 1
      y 2]
```

```
(+ x y))
=> 3

;; Destructured list
(let [[x y] '(1 2)]
  (printf "x: %d, y: %d\n" x y))
x: 1, y: 2
=> nil

;; Destructured map
(let [{:keys [width height title]
      :or {width 640 height 500}
      :as styles}
      {:width 1000 :title "Title"}]
  (println "width: " width)
  (println "height: " height)
  (println "title: " title)
  (println "styles: " styles))
width: 1000
height: 500
title: Title
styles: {:width 1000 :title Title}
=> nil
```

SEE ALSO

[letfn](#)

Takes a vector of function specs and a body, and generates a set of bindings of functions to their names. All of the names are available ...

[if-let](#)

bindings is a vector with 2 elements: binding-form test.

[when-let](#)

bindings is a vector with 2 elements: binding-form test.

[binding](#)

Evaluates the expressions and binds the values to dynamic (thread-local) symbols

[top](#)

letfn

```
(letfn [fnspec*] exprs*)
```

Takes a vector of function specs and a body, and generates a set of bindings of functions to their names. All of the names are available in all of the definitions of the functions, as well as the body.

fnspec ==> (fname [params*] exprs) or (fname ([params*] exprs)+)

```
(letfn [(foo [] "abc")] (foo))
```

is equivalent to

```
(let [foo (fn [] "abc")] (foo))
```

```
(letfn [(foo [] "abc")
        (bar [] (str (foo) "def"))]
  (bar))
=> "abcdef"
```

SEE ALSO

let

Evaluates the expressions and binds the values to symbols in the new local context.

top

list

```
(list & items)
```

Creates a new list containing the items.

```
(list)
```

```
=> ()
```

```
(list 1 2 3)
```

```
=> (1 2 3)
```

```
(list 1 2 3 [:a :b])
```

```
=> (1 2 3 [:a :b])
```

top

list*

```
(list* args)
```

```
(list* a args)
```

```
(list* a b args)
```

```
(list* a b c args)
```

```
(list* a b c d & more)
```

Creates a new list containing the items prepended to the rest, the last of which will be treated as a collection.

```
(list* 1 '(2 3))
```

```
=> (1 2 3)
```

```
(list* 1 2 3 [4])
```

```
=> (1 2 3 4)
```

```
(list* 1 2 3 '(4 5))
```

```
=> (1 2 3 4 5)
```

```
(list* '(1 2) 3 [4])
```

```
=> ((1 2) 3 4)
```

```
(list* nil)
```

```
=> nil
```

```
(list* nil [2 3])
```

```
=> (nil 2 3)
```

```
(list* 1 2 nil)
```

```
=> (1 2)
```

SEE ALSO

[cons](#)

Returns a new collection where x is the first element and coll is the rest.

[conj](#)

Returns a new collection with the x, xs 'added'. (conj nil item) returns (item) and (conj item) returns item.

[concat](#)

Returns a list of the concatenation of the elements in the supplied collections.

[vector*](#)

Creates a new vector containing the items prepended to the rest, the last of which will be treated as a collection.

[top](#)

list-comp

```
(list-comp seq-exprs body-expr)
```

List comprehension. Takes a vector of one or more binding-form or collection-expr pairs, each followed by zero or more modifiers, and yields a collection of evaluations of expr.

Supported modifiers are: `:when` predicate

```
(list-comp [x (range 10)] x)
=> (0 1 2 3 4 5 6 7 8 9)
```

```
(list-comp [x (range 5)] (* x 2))
=> (0 2 4 6 8)
```

```
(list-comp [x (range 10) :when (odd? x)] x)
=> (1 3 5 7 9)
```

```
(list-comp [x (range 10) :when (odd? x)] (* x 2))
=> (2 6 10 14 18)
```

```
(list-comp [x (seq "abc") y [0 1 2]] [x y])
=> ([#\a 0] [#\a 1] [#\a 2] [#\b 0] [#\b 1] [#\b 2] [#\c 0] [#\c 1] [#\c 2])
```

SEE ALSO

[doseq](#)

Repeatedly executes body (presumably for side-effects) with bindings and filtering as provided by list-comp. Does not retain the head ...

[dotimes](#)

Repeatedly executes body with name bound to integers from 0 through n-1.

[top](#)

list?

```
(list? obj)
```

Returns true if obj is a list

```
(list? (list 1 2))
=> true
```

```
(list? '(1 2))
=> true
```

[top](#)

load-classpath-file

```
(load-classpath-file f)
(load-classpath-file f force)
(load-classpath-file f nsalias)
(load-classpath-file f force nsalias)
```

Sequentially read and evaluate the set of forms contained in the classpath file. The function is restricted to classpath files with the extension '.venice'.

Returns a tuple with the file's name and the keyword `:loaded` if the file has been successfully loaded or `:already-loaded` if the file has been already loaded. Throws an exception on any loading error.

With 'force' set to `false` (the default) the file is only loaded once and interpreted once. Subsequent load attempts will be skipped. With 'force' set to `true` it is always loaded and interpreted.

Loaded files are cached by Venice and subsequent loads are just skipped. To enforce a reload call the file load with the force flag set to true:

```
(load-classpath-file "com/github/jlangch/venice/test.venice" true)
```

An optional namespace alias can be passed: `(load-classpath-file "com/github/jlangch/venice/test.venice" ['test :as 't])`

`load-classpath-file` supports load paths. See the `loadpath/paths` doc for a description of the *load path* feature.

```
(do
  (load-classpath-file "com/github/jlangch/venice/test-support.venice")
  (test-support/test-fn "hello"))
=> "test: hello"

(do
  (load-classpath-file "com/github/jlangch/venice/test-support.venice")
  (test-support/test-fn "hello")
  ; reload the classpath file
  (ns-remove 'test-support)
  (load-classpath-file "com/github/jlangch/venice/test-support.venice" true)
  (test-support/test-fn "hello"))
=> "test: hello"

;; namespace aliases
(do
  (load-classpath-file "com/github/jlangch/venice/test-support.venice" ['test-support :as 't])
  (t/test-fn "hello"))
=> "test: hello"
```

SEE ALSO

[load-file](#)

Sequentially read and evaluate the set of forms contained in the file.

[load-string](#)

Sequentially read and evaluate the set of forms contained in the string.

[load-module](#)

Loads a Venice predefined extension module.

[loadpath/paths](#)

Returns the list of the defined load paths. A load path is either a file, a ZIP file, or a directory. Load paths are defined at the ...

load-file

```
(load-file f)
(load-file f force)
(load-file f nsalias)
(load-file f force nsalias)
```

Sequentially read and evaluate the set of forms contained in the file.

If the file is found on one of the defined load paths it is read and the forms it contains are evaluated. If the file is not found an exception is raised.

Returns a tuple with the file's name and the keyword `:loaded` if the file has been successfully loaded or `:already-loaded` if the file has been already loaded. Throws an exception on any loading error.

With 'force' set to `false` (the default) the file is only loaded once and interpreted once. Subsequent load attempts will be skipped. With 'force' set to `true` it is always loaded and interpreted.

The function is restricted to load files with the extension '.venice'. If the file extension is missing '.venice' will be implicitly added.

An optional namespace alias can be passed: `(load-file "coffee.venice" ['coffee :as 'c])`

`load-file` supports load paths. See the `loadpath/paths` doc for a description of the *load path* feature.

```
;; With load-paths: [/users/foo/scripts]
;;      -> loads: /users/foo/scripts/coffee.venice
(load-file "coffee")

;; With load-paths: [/users/foo/scripts]
;;      -> loads: /users/foo/scripts/coffee.venice
(load-file "coffee.venice")

;; With load-paths: [/users/foo/scripts]
;;      -> loads: /users/foo/scripts/beverages/coffee.venice
(load-file "beverages/coffee")

;; With load-paths: [/users/foo/resources.zip]
;;      -> loads: /users/foo/resources.zip!beverages/coffee.venice
(load-file "beverages/coffee")
```

SEE ALSO

[load-classpath-file](#)

Sequentially read and evaluate the set of forms contained in the classpath file. The function is restricted to classpath files with ...

[load-string](#)

Sequentially read and evaluate the set of forms contained in the string.

[load-module](#)

Loads a Venice predefined extension module.

[loadpath/paths](#)

Returns the list of the defined load paths. A load path is either a file, a ZIP file, or a directory. Load paths are defined at the ...

load-module

```
(load-module m)
```

```
(load-module m force)
(load-module m nsalias)
(load-module m force nsalias)
```

Loads a Venice predefined extension module.

Returns a tuple with the module's name and the keyword `:loaded` if the module has been successfully loaded or `:already-loaded` if the module has been already loaded. Throws an exception on any loading error.

With 'force' set to `false` (the default) the module is only loaded once and interpreted once. Subsequent load attempts will be skipped. With 'force' set to `true` it is always loaded and interpreted.

Loaded modules are cached by Venice and subsequent loads are just skipped. To enforce a reload call the module load with the force flag set to true: `(load-module :hexdump true)`

An optional namespace alias can be passed: `(load-module :hexdump ['hexdump :as 'h])`

`load-module` supports load paths. See the `loadpath/paths` doc for a description of the *load path* feature.

```
(load-module :trace)

;; loading the :trace modul and define a ns alias 't for namespace
;; 'trace used in the module
(load-module :trace ['trace :as 't])

;; reloading a module
(do
  (load-module :trace)
  ; reload the module
  (ns-remove 'trace)
  (load-module :trace true))

;; namespace aliases
(do
  (load-module :hexdump ['hexdump :as 'h])
  (h/dump (range 32 64)))

;; dynamically load a module
(let [mname (keyword "hexdump")]
  (load-module mname))
```

SEE ALSO

[load-file](#)

Sequentially read and evaluate the set of forms contained in the file.

[load-classpath-file](#)

Sequentially read and evaluate the set of forms contained in the classpath file. The function is restricted to classpath files with ...

[load-string](#)

Sequentially read and evaluate the set of forms contained in the string.

[loaded-modules](#)

Returns the names of the loaded modules.

[loadpath/paths](#)

Returns the list of the defined load paths. A load path is either a file, a ZIP file, or a directory. Load paths are defined at the ...

[top](#)

load-string

(load-string s)

Sequentially read and evaluate the set of forms contained in the string.

```
(do
  (load-string "(def x 1)")
  (+ x 2))
=> 3
```

SEE ALSO

[load-file](#)

Sequentially read and evaluate the set of forms contained in the file.

[load-classpath-file](#)

Sequentially read and evaluate the set of forms contained in the classpath file. The function is restricted to classpath files with ...

[loaded-modules](#)

Returns the names of the loaded modules.

[top](#)

loaded-modules

(loaded-modules)

Returns the names of the loaded modules.

SEE ALSO

[load-module](#)

Loads a Venice predefined extension module.

[top](#)

loadpath/normalize

(loadpath/normalize f)

Normalize a relative file regarding the load paths.

With the load paths: `["/Users/foo/img.png", "/Users/foo/resources"]`

- `(loadpath/normalize "img.png") -> "/Users/foo/img.png"`
- `(loadpath/normalize "test.json") -> "/Users/foo/resources/test.json"`
- `(loadpath/normalize "/tmp/data.json") -> "/tmp/data.json"`

SEE ALSO

[loadpath/paths](#)

Returns the list of the defined load paths. A load path is either a file, a ZIP file, or a directory. Load paths are defined at the ...

[loadpath/unrestricted?](#)

Returns true if the load paths are unrestricted.

loadpath/paths

(loadpath/paths)

Returns the list of the defined load paths. A load path is either a file, a ZIP file, or a directory. Load paths are defined at the application level. They are passed as part of the sandbox to the Venice evaluator.

The functions that support load paths try sequentially every load path to access files. If a load path is a ZIP file, files can be read from within that ZIP file.

Example:

```
/Users/foo/demo
|
+--- resources.zip
|
+--- /data
    |
    +--- config.json
    |
    +--- /scripts
        |
        +--- script1.venice
```

With a load path configuration of `["/Users/foo/demo/resources.zip", "/Users/foo/demo/data"]`

- `(io/slurp "config.json")` -> slurps `/Users/foo/demo/data/config.json`
- `(io/slurp "scripts/script1.venice")` -> slurps `/Users/foo/demo/data/scripts/script1.venice`
- `(io/slurp "img1.png")` -> slurps `/Users/foo/demo/resources.ziplimg1.png`

I/O functions with support for load paths:

- `load-file`
- `io/slurp`
- `io/slurp-lines`
- `io/spit`
- `io/file-in-stream`
- `io/file-out-stream`
- `io/delete-file`

To enforce a Venice script to read/write files on the load paths only:

- Define a custom sandbox
- Disable all I/O functions
- Enable the I/O functions that support load paths

SEE ALSO

[loadpath/unrestricted?](#)

Returns true if the load paths are unrestricted.

[loadpath/normalize](#)

Normalize a relative file regarding the load paths.

[load-file](#)

Sequentially read and evaluate the set of forms contained in the file.

loadpath/unrestricted?

(loadpath/unrestricted?)

Returns true if the load paths are unrestricted.

SEE ALSO

[loadpath/paths](#)

Returns the list of the defined load paths. A load path is either a file, a ZIP file, or a directory. Load paths are defined at the ...

[loadpath/normalize](#)

Normalize a relative file regarding the load paths.

top

lock

(lock)

Creates a new lock object.

The lock object implements the Java `AutoClosable` interface thus it can be used with try-with-resources.

```
(let [l (lock)]
  (acquire l)
  ;; do something
  (release l))
=> nil
```

```
(let [l (lock)]
  (try-with [l (acquire l)]
    ;; do something
  ))
=> nil
```

SEE ALSO

[acquire](#)

Acquires a lock, blocking until the lock is available.

[try-acquire](#)

Acquires a lock within the given timeout time. Without a timeout returns immediately if the lock is not available.

[release](#)

Releases a lock.

[locked?](#)

Returns true if the lock is in use else false.

[lock?](#)

Returns true if o is a lock object else false.

top

lock?


```
(lock? o)
```

Returns `true` if `o` is a lock object else `false`.

```
(let [l (lock)]  
  (lock? l))  
=> true
```

SEE ALSO

[acquire](#)

Acquires a lock, blocking until the lock is available.

[try-acquire](#)

Acquires a lock within the given timeout time. Without a timeout returns immediately if the lock is not available.

[release](#)

Releases a lock.

[locked?](#)

Returns true if the lock is in use else false.

[top](#)

locked?

```
(locked? lock)
```

Returns `true` if the lock is in use else `false`.

```
(let [l (lock)]  
  (acquire l)  
  (locked? l))  
=> true
```

SEE ALSO

[lock](#)

Creates a new lock object.

[acquire](#)

Acquires a lock, blocking until the lock is available.

[try-acquire](#)

Acquires a lock within the given timeout time. Without a timeout returns immediately if the lock is not available.

[release](#)

Releases a lock.

[top](#)

locking

```
(locking x & exprs)
```

Executes 'exprs' in an implicit do, while holding the monitor of 'x'. Will release the monitor of 'x' in all circumstances. Locking operates like the synchronized keyword in Java.

```
(do
  (def x 1)
  (locking x
    (println 100)
    (println 200)))

100
200
=> nil

;; Locks are reentrant
(do
  (def x 1)
  (locking x
    (locking x
      (println "in"))
    (println "out")))

in
out
=> nil

(defn log [msg] (locking log (println msg)))
(log "message")
message
=> nil
```

[top](#)

log

(log x)

Returns the natural logarithm (base e) of a value

```
(log 10)
=> 2.302585092994046
```

```
(log 10.23)
=> 2.325324579963535
```

```
(log 10.23M)
=> 2.325324579963535
```

SEE ALSO

[log10](#)

Returns the base 10 logarithm of a value

[log2](#)

Returns the base 2 logarithm of a value

[top](#)

log10

(log10 x)

Returns the base 10 logarithm of a value

```
(log10 10)
=> 1.0

(log10 10.23)
=> 1.0098756337121602

(log10 10.23M)
=> 1.0098756337121602

;; the number of digits
(long (+ (floor (log10 235)) 1))
=> 3
```

SEE ALSO

[log](#)

Returns the natural logarithm (base e) of a value

[log2](#)

Returns the base 2 logarithm of a value

[top](#)

log2

```
(log2 x)
```

Returns the base 2 logarithm of a value

```
(log2 8)
=> 3.0

(log2 10.23)
=> 3.354734239970604

(log2 10.23M)
=> 3.354734239970604
```

SEE ALSO

[log](#)

Returns the natural logarithm (base e) of a value

[log10](#)

Returns the base 10 logarithm of a value

[top](#)

long

```
(long x)
```

Converts to long

```
(long 1)
=> 1

(long nil)
=> 0

(long false)
=> 0

(long true)
=> 1

(long 1.2)
=> 1

(long 1.2M)
=> 1

(long "1")
=> 1

(long (char "A"))
=> 65
```

[top](#)

long-array

```
(long-array coll)
(long-array len)
(long-array len init-val)
```

Returns an array of Java primitive longs containing the contents of coll or returns an array with the given length and optional init value

```
(long-array '(1 2 3))
=> [1, 2, 3]

(long-array '(1I 2 3.2 3.56M))
=> [1, 2, 3, 3]

(long-array 10)
=> [0, 0, 0, 0, 0, 0, 0, 0, 0, 0]

(long-array 10 42)
=> [42, 42, 42, 42, 42, 42, 42, 42, 42, 42]
```

[top](#)

long?

```
(long? n)
```

Returns true if n is a long

```
(long? 4)
=> true

(long? 4I)
=> false

(long? 3.1)
=> false

(long? true)
=> false

(long? nil)
=> false

(long? {})
=> false
```

top

loop

```
(loop [bindings*] exprs*)
```

Evaluates the exprs and binds the bindings. Creates a recursion point with the bindings.

```
;; tail recursion
(loop [x 10]
  (when (> x 1)
    (println x)
    (recur (- x 2)))))

10
8
6
4
2
=> nil

;; tail recursion
(do
  (defn sum [n]
    (loop [cnt n acc 0]
      (if (zero? cnt)
        acc
        (recur (dec cnt) (+ acc cnt))))))
  (sum 10000))
=> 50005000
```

SEE ALSO

[recur](#)

Evaluates the exprs and rebinds the bindings of the recursion point to the values of the exprs. The recur expression must be at the ...

top

macro?

```
(macro? x)
```

Returns true if x is a macro

```
(macro? and)
=> true
```

[top](#)

macroexpand

```
(macroexpand form)
```

If form represents a macro form, returns its expansion, else returns form.

To recursively expand all macros in a form use `(macroexpand-all form)`.

```
(macroexpand '(> c (+ 3) (* 2)))
=> (* (+ c 3) 2)
```

SEE ALSO

[defmacro](#)

Macro definition

[macroexpand-all](#)

Recursively expands all macros in the form.

[top](#)

macroexpand-all

```
(macroexpand-all form)
```

Recursively expands all macros in the form.

```
(macroexpand-all '(and true true))
=> (let [cond__22739__auto true] (if cond__22739__auto true cond__22739__auto))
```

```
(macroexpand-all '(and true (or true false) true))
=> (let [cond__22762__auto true] (if cond__22762__auto (let [cond__22762__auto (let [cond__22763__auto true]
(if cond__22763__auto cond__22763__auto false))] (if cond__22762__auto true cond__22762__auto))
cond__22762__auto))
```

```
(macroexpand-all '(let [n 5] (cond (< n 0) -1 (> n 0) 1 :else 0)))
=> (let [n 5] (if (< n 0) -1 (if (> n 0) 1 (if :else 0 nil))))
```

SEE ALSO

[macroexpand](#)

If form represents a macro form, returns its expansion, else returns form.

defmacro

Macro definition

[top](#)

macroexpand-on-load?

```
(macroexpand-on-load?)
```

Returns true if `macroexpand-on-load` feature is enabled else false.

The activation of `macroexpand-on-load` (upfront macro expansion) results in 3x to 15x better performance. Upfront macro expansion can be activated through the `!macroexpand` command in the REPL.

```
(macroexpand-on-load?)
```

```
=> false
```

[top](#)

make-array

```
(make-array type len)
```

```
(make-array type dim &more-dims)
```

Returns an array of the given type and length

```
(str (make-array :long 5))
```

```
=> "[0, 0, 0, 0, 0]"
```

```
(str (make-array :java.lang.Long 5))
```

```
=> "[nil, nil, nil, nil, nil]"
```

```
(str (make-array :long 2 3))
```

```
=> "[[0 0 0], [0 0 0]]"
```

```
(aset (make-array :java.lang.Long 5) 3 9999)
```

```
=> [nil, nil, nil, 9999, nil]
```

[top](#)

map

```
(map f coll colls*)
```

Applies `f` to the set of first items of each `coll`, followed by applying `f` to the set of second items in each `coll`, until any one of the `colls` is exhausted. Any remaining items in other `colls` are ignored.

Returns a transducer when no collection is provided.

Note: if Java collections are used the mapper converts all mapped items back to Java data types to keep Java compatibility as much as possible!

To avoid this just convert the Java collection to a Venice collection. E.g.: `(into [] ...)`.

```
(map inc [1 2 3 4])
```

```
=> (2 3 4 5)
```

```

(map + [1 2 3 4] [10 20 30 40])
=> (11 22 33 44)

(map list '(1 2 3 4) '(10 20 30 40))
=> ((1 10) (2 20) (3 30) (4 40))

(map vector (lazy-seq 1 inc) [10 20 30 40])
=> ([1 10] [2 20] [3 30] [4 40])

(map (fn [[k v]] [k v]) {:a 1 :b 2})
=> ([:a 1] [:b 2])

(map (fn [e] [(key e) (inc (val e))]) {:a 1 :b 2})
=> ([:a 2] [:b 3])

(map inc #{1 2 3})
=> (2 3 4)

;; Venice enforces Java types when using java collections instead
;; of Venice collections!
;; -> The returned element type is a 'java.util.ArrayList'
;; and not a 'core/vector'
(->> (doto (. :java.util.ArrayList :new) (. :add 1) (. :add 2))
      (map (fn [x] [(inc x)])) ;; map to a 'core/vector'
      (first)
      (type))
=> :java.util.ArrayList

;; Same example with a Venice collection!
;; -> The returned element type is a 'core/vector'
(->> [1 2]
      (map (fn [x] [(inc x)])) ;; map to a 'core/vector'
      (first)
      (type))
=> :core/vector

```

SEE ALSO

[filter](#)

Returns a collection of the items in coll for which (predicate item) returns logical true.

[reduce](#)

f should be a function of 2 arguments. If val is not supplied, returns the result of applying f to the first 2 items in coll, then ...

[map-indexed](#)

Returns a collection of applying f to 0 and the first item of coll, followed by applying f to 1 and the second item of coll, etc. until ...

[top](#)

map-entry

```
(map-entry key val)
```

Creates a new map entry

```

(map-entry :a 1)
=> [:a 1]

```



```
(key (map-entry :a 1))  
=> :a
```

```
(val (map-entry :a 1))  
=> 1
```

```
(entries {:a 1 :b 2 :c 3})  
=> ([:a 1] [:b 2] [:c 3])
```

SEE ALSO

[map-entry?](#)

Returns true if m is a map entry

[entries](#)

Returns a collection of the map's entries.

[map](#)

Applies f to the set of first items of each coll, followed by applying f to the set of second items in each coll, until any one of the ...

[key](#)

Returns the key of the map entry.

[val](#)

Returns the val of the map entry.

[top](#)

map-entry?

```
(map-entry? m)
```

Returns true if m is a map entry

```
(map-entry? (map-entry :a 1))  
=> true
```

```
(map-entry? (first (entries {:a 1 :b 2})))  
=> true
```

SEE ALSO

[map-entry](#)

Creates a new map entry

[entries](#)

Returns a collection of the map's entries.

[map](#)

Applies f to the set of first items of each coll, followed by applying f to the set of second items in each coll, until any one of the ...

[top](#)

map-indexed

```
(map-indexed f coll)
```

Returns a collection of applying f to 0 and the first item of coll, followed by applying f to 1 and the second item of coll, etc. until coll is exhausted. Returns a stateful transducer when no collection is provided.

```
(map-indexed (fn [idx val] [idx val]) [:a :b :c])
=> ([0 :a] [1 :b] [2 :c])

(map-indexed vector [:a :b :c])
=> ([0 :a] [1 :b] [2 :c])

;; start at index 1 instead of zero
(map-indexed #(vector (inc %1) %2) [:a :b :c])
=> ([1 :a] [2 :b] [3 :c])

(map-indexed vector "abcdef")
=> ([0 #\a] [1 #\b] [2 #\c] [3 #\d] [4 #\e] [5 #\f])

(map-indexed hash-map [:a :b :c])
=> ({0 :a} {1 :b} {2 :c})
```

SEE ALSO

[map](#)

Applies f to the set of first items of each coll, followed by applying f to the set of second items in each coll, until any one of the ...

[top](#)

map-invert

```
(map-invert m)
```

Returns the map with the vals mapped to the keys.

```
(map-invert {:a 1 :b 2 :c 3})
=> {1 :a 2 :b 3 :c}
```

[top](#)

map-keys

```
(map-keys f m)
```

Applies function f to the keys of the map m.

```
(map-keys name {:a 1 :b 2 :c 3})
=> {"a" 1 "b" 2 "c" 3}
```

SEE ALSO

[map-vals](#)

Applies function f to the values of the map m.

[map-invert](#)

Returns the map with the vals mapped to the keys.

map-vals

```
(map-vals f m)
```

Applies function `f` to the values of the map `m`.

```
(map-vals inc {:a 1 :b 2 :c 3})  
=> {:a 2 :b 3 :c 4}
```

```
(map-vals :len {:a {:col 1 :len 10} :b {:col 2 :len 20} :c {:col 3 :len 30}})  
=> {:a 10 :b 20 :c 30}
```

SEE ALSO

[map-keys](#)

Applies function `f` to the keys of the map `m`.

[map-invert](#)

Returns the map with the vals mapped to the keys.

map?

```
(map? obj)
```

Returns true if `obj` is a map

```
(map? {:a 1 :b 2})  
=> true
```

mapcat

```
(mapcat fn & colls)
```

Returns the result of applying `concat` to the result of applying `map` to `fn` and `colls`. Thus function `fn` should return a collection.

```
(mapcat identity [[1 2 3] [4 5 6] [7 8 9]])  
=> (1 2 3 4 5 6 7 8 9)
```

```
(mapcat identity [[1 2 [3 4]] [5 6 [7 8]]])  
=> (1 2 [3 4] 5 6 [7 8])
```

```
(mapcat reverse [[3 2 1] [6 5 4] [9 8 7]])  
=> (1 2 3 4 5 6 7 8 9)
```

```
(mapcat list [:a :b :c] [1 2 3])  
=> (:a 1 :b 2 :c 3)
```

```
(mapcat #(remove even? %) [[1 2] [2 2] [2 3]])
=> (1 3)

(mapcat #(repeat 2 %) [1 2])
=> (1 1 2 2)

(mapcat (juxt inc dec) [1 2 3 4])
=> (2 0 3 1 4 2 5 3)

;; Turn a frequency map back into a coll.
(mapcat (fn [[x n]] (repeat n x)) {:a 2 :b 1 :c 3})
=> (:a :a :a :b :c :c :c)
```

SEE ALSO

[map](#)

Applies f to the set of first items of each coll, followed by applying f to the set of second items in each coll, until any one of the ...

[flatten](#)

Takes any nested combination of collections (lists, vectors, etc.) and returns their contents as a single, flat sequence. (flatten ...

[top](#)

mapv

```
(mapv f coll colls*)
```

Returns a vector consisting of the result of applying f to the set of first items of each coll, followed by applying f to the set of second items in each coll, until any one of the colls is exhausted. Any remaining items in other colls are ignored.

```
(mapv inc [1 2 3 4])
=> [2 3 4 5]

(mapv + [1 2 3 4] [10 20 30 40])
=> [11 22 33 44]

(mapv vector [1 2 3 4] [10 20 30 40])
=> [[1 10] [2 20] [3 30] [4 40]]
```

SEE ALSO

[docoll](#)

Applies f to the items of the collection presumably for side effects. Returns nil.

[top](#)

match?

```
(match? s regex)
```

Returns true if the string s matches the regular expression regex.

The argument 'regex' may be a string representing a regular expression or a `java.util.regex.Pattern`.

See the functions in the 'regex' namespace if more than a simple regex match is required! E.g. `regex/matches?` performs much better on matching many strings against the same pattern:

```
(let [m (regex/matcher #"[0-9]+" "")]
  (filter #(regex/matches? m %) ["100" "1a1" "200"])))
```

```
(match? "1234" "[0-9]+")
=> true
```

```
(match? "1234ss" "[0-9]+")
=> false
```

```
(match? "1234" #"[0-9]+")
=> true
```

SEE ALSO

[not-match?](#)

Returns true if the string `s` does not match the regular expression `regex`.

[regex/matches?](#)

Attempts to match the entire region against the pattern. Returns true if the patterns matches the string else false.

[regex/matches-not?](#)

Attempts to match the entire region against the pattern. Returns false if the patterns matches the string else true.

[regex/pattern](#)

Returns an instance of `java.util.regex.Pattern`.

[regex/matcher](#)

Returns an instance of `java.util.regex.Matcher`.

[regex/matches](#)

Returns the matches, if any, for the matcher with the pattern of a string, using `java.util.regex.Matcher.matches()`.

[regex/find](#)

Returns the next regex match or nil if there is no further match. Returns nil if there is no match.

[regex/find-all](#)

Returns all regex matches as list or an empty list if there are no matches.

[top](#)

math/acos

```
(math/acos x)
```

Returns the arc cosine of a value; the returned angle is in the range `0.0` through `pi`

```
(math/acos 0.5)
=> 1.0471975511965979
```

SEE ALSO

[math/cos](#)

Returns the trigonometric cosine of an angle given in radians

[math/asin](#)

Returns the arc sine of a value; the returned angle is in the range `-pi/2` through `pi/2`

[math/atan](#)

Returns the arc tangent of a value; the returned angle is in the range `-pi/2` through `pi/2`.

[top](#)

math/asin

(math/asin x)

Returns the arc sine of a value; the returned angle is in the range $-\pi/2$ through $\pi/2$

```
(math/asin 0.8660254037844386)
=> 1.0471975511965976
```

SEE ALSO

[math/sin](#)

Returns the trigonometric sine of an angle given in radians

[math/acos](#)

Returns the arc cosine of a value; the returned angle is in the range 0.0 through π

[math/atan](#)

Returns the arc tangent of a value; the returned angle is in the range $-\pi/2$ through $\pi/2$.

[top](#)

math/atan

(math/atan x)

Returns the arc tangent of a value; the returned angle is in the range $-\pi/2$ through $\pi/2$.

```
(math/atan 1.7320508075688767)
=> 1.0471975511965976
```

SEE ALSO

[math/tan](#)

Returns the trigonometric tangent of an angle given in radians

[math/asin](#)

Returns the arc sine of a value; the returned angle is in the range $-\pi/2$ through $\pi/2$

[math/acos](#)

Returns the arc cosine of a value; the returned angle is in the range 0.0 through π

[top](#)

math/cos

(math/cos x)

Returns the trigonometric cosine of an angle given in radians

```
(math/cos (/ math/PI 3.0))
=> 0.5000000000000001
```

SEE ALSO

[math/sin](#)

Returns the trigonometric sine of an angle given in radians

[math/tan](#)

Returns the trigonometric tangent of an angle given in radians

[top](#)

math/mean

```
(math/mean x)
(math/mean x y)
(math/mean x y & more)
```

Returns the mean value of the values

```
(math/mean 10 20 30)
=> 20.0

(math/mean 1.4 3.6)
=> 2.5

(math/mean 2.8M 6.4M)
=> 4.6000000000000000M
```

SEE ALSO

[math/median](#)

Returns the median of the values

[math/standard-deviation](#)

Returns the standard deviation of the values for data sample type :population or :sample.

[math/quantile](#)

Returns the quantile [0.0 .. 1.0] of the values

[math/quartiles](#)

Returns the quartiles (1st, 2nd, and 3rd) of the values

[top](#)

math/median

```
(math/median coll)
```

Returns the median of the values

```
(math/median '(3 1 2))
=> 2.0

(math/median '(3 2 1 4))
=> 2.5

(math/median '(3.6 1.4 4.8))
=> 3.6
```

```
(math/median '(3.6M 1.4M 4.8M))  
=> 3.6M
```

SEE ALSO

[math/mean](#)

Returns the mean value of the values

[math/standard-deviation](#)

Returns the standard deviation of the values for data sample type :population or :sample.

[math/quantile](#)

Returns the quantile [0.0 .. 1.0] of the values

[math/quartiles](#)

Returns the quartiles (1st, 2nd, and 3rd) of the values

[top](#)

math/quantile

```
(math/quantile q coll)
```

Returns the quantile [0.0 .. 1.0] of the values

```
(math/quantile 0.5 '(3, 7, 8, 5, 12, 14, 21, 13, 18))  
=> 12.0
```

```
(math/quantile 0.5 '(3, 7, 8, 5, 12, 14, 21, 15, 18, 14))  
=> 13.0
```

SEE ALSO

[math/mean](#)

Returns the mean value of the values

[math/median](#)

Returns the median of the values

[math/standard-deviation](#)

Returns the standard deviation of the values for data sample type :population or :sample.

[math/quartiles](#)

Returns the quartiles (1st, 2nd, and 3rd) of the values

[top](#)

math/quartiles

```
(math/quartiles coll)
```

Returns the quartiles (1st, 2nd, and 3rd) of the values

```
(math/quartiles '(3, 7, 8, 5, 12, 14, 21, 13, 18))  
=> (6.0 12.0 16.0)
```

```
(math/quartiles '(3, 7, 8, 5, 12, 14, 21, 15, 18, 14))  
=> (7.0 13.0 15.0)
```


SEE ALSO

[math/mean](#)

Returns the mean value of the values

[math/median](#)

Returns the median of the values

[math/standard-deviation](#)

Returns the standard deviation of the values for data sample type `:population` or `:sample`.

[math/quantile](#)

Returns the quantile [0.0 .. 1.0] of the values

[top](#)

math/sin

```
(math/sin x)
```

Returns the trigonometric sine of an angle given in radians

```
(math/sin (/ math/PI 3.0))  
=> 0.8660254037844386
```

SEE ALSO

[math/cos](#)

Returns the trigonometric cosine of an angle given in radians

[math/tan](#)

Returns the trigonometric tangent of an angle given in radians

[top](#)

math/softmax

```
(math/softmax coll)
```

Softmax algorithm

```
(math/softmax [3.2 1.3 0.2 0.8])  
=> [0.7751495482986049 0.1159380476300716 0.03859242355646149 0.07031998051486205]
```

[top](#)

math/standard-deviation

```
(math/standard-deviation type coll)
```

Returns the standard deviation of the values for data sample type `:population` or `:sample`.

```
(math/standard-deviation :sample '(10 8 30 22 15))
=> 9.055385138137417

(math/standard-deviation :population '(10 8 30 22 15))
=> 8.099382692526634

(math/standard-deviation :sample '(1.4 3.6 7.8 9.0 2.2))
=> 3.40587727318528

(math/standard-deviation :sample '(2.8M 6.4M 2.0M 4.4M))
=> 1.942506971244462
```

SEE ALSO

[math/mean](#)

Returns the mean value of the values

[math/median](#)

Returns the median of the values

[math/quantile](#)

Returns the quantile [0.0 .. 1.0] of the values

[math/quartiles](#)

Returns the quartiles (1st, 2nd, and 3rd) of the values

[top](#)

math/tan

```
(math/tan x)
```

Returns the trigonometric tangent of an angle given in radians

```
(math/tan (/ math/PI 3.0))
=> 1.7320508075688767
```

SEE ALSO

[math/sin](#)

Returns the trigonometric sine of an angle given in radians

[math/cos](#)

Returns the trigonometric cosine of an angle given in radians

[top](#)

math/to-degrees

```
(math/to-degrees x)
```

Converts an angle measured in radians to an approximately equivalent angle measured in degrees. The conversion from radians to degrees is generally inexact; users should not expect (cos (to-radians 90.0)) to exactly equal 0.0

```
(math/to-degrees 3)
=> 171.88733853924697
```

```
(math/to-degrees 3.1415926)
=> 179.99999692953102
```

```
(math/to-degrees 3.1415926M)
=> 179.99999692953102
```

SEE ALSO

[math/to-radians](#)

Converts an angle measured in degrees to an approximately equivalent angle measured in radians. The conversion from degrees to radians ...

top

math/to-radians

```
(math/to-radians x)
```

Converts an angle measured in degrees to an approximately equivalent angle measured in radians. The conversion from degrees to radians is generally inexact.

```
(math/to-radians 90)
=> 1.5707963267948966
```

```
(math/to-radians 90.0)
=> 1.5707963267948966
```

```
(math/to-radians 90.0M)
=> 1.5707963267948966
```

SEE ALSO

[math/to-degrees](#)

Converts an angle measured in radians to an approximately equivalent angle measured in degrees. The conversion from radians to degrees ...

top

matrix/add-column-at-end

```
(matrix/add-column-at-end m c)
```

Add a column to a matrix after the last column.

```
(do
  (load-module :matrix)

  ;; | 1 2 3 | + | 4 8 | => | 1 2 3 4 |
  ;; | 5 6 7 |      | 5 6 7 8 |

  (matrix/add-column-at-end [[1 2 3] [5 6 7]] [4 8]))
=> [[1 2 3 4] [5 6 7 8]]
```

top

matrix/add-column-at-start

```
(matrix/add-column-at-start m c)
```

Add a column to a matrix before the first column.

```
(do
  (load-module :matrix)

  ;; | 2 3 4 | + | 1 5 | => | 1 2 3 4 |
  ;; | 6 7 8 |      | 5 6 7 8 |

  (matrix/add-column-at-start [[2 3 4] [6 7 8]] [1 5]))
=> [[1 2 3 4] [5 6 7 8]]
```

[top](#)

matrix/add-row-at-end

```
(matrix/add-row-at-end m r)
```

Add a row to a matrix after the last row.

```
(do
  (load-module :matrix)

  ;; | 1 2 3 | + | 7 8 9 | => | 1 2 3 |
  ;; | 4 5 6 |      | 4 5 6 |
  ;; | 7 8 9 |      | 7 8 9 |

  (matrix/add-row-at-end [[1 2 3] [4 5 6]] [7 8 9]))
=> [[1 2 3] [4 5 6] [7 8 9]]
```

[top](#)

matrix/add-row-at-start

```
(matrix/add-row-at-start m r)
```

Add a row to a matrix before the first row.

```
(do
  (load-module :matrix)

  ;; | 4 5 6 | + | 1 2 3 | => | 1 2 3 |
  ;; | 7 8 9 |      | 4 5 6 |
  ;; | 7 8 9 |      | 7 8 9 |

  (matrix/add-row-at-start [[4 5 6] [7 8 9]] [1 2 3]))
=> [[1 2 3] [4 5 6] [7 8 9]]
```

[top](#)

matrix/assoc-element

```
(matrix/assoc-element m row col val)
```

Replaces an element in the matrix

```
(do
  (load-module :matrix)
  (matrix/assoc-element [[1 2 3] [4 5 6]] 1 2 9))
=> [[1 2 3] [4 5 9]]
```

[top](#)

matrix/column

```
(matrix/column m n)
```

Returns the matrix column n

```
(do
  (load-module :matrix)
  (matrix/column [[1 2 3] [4 5 6]] 1))
=> [2 5]
```

[top](#)

matrix/columns

```
(matrix/columns m)
```

Returns the number of columns in the matrix

```
(do
  (load-module :matrix)
  (matrix/columns [[1 2 3]
                  [4 5 6]]))
=> 3
```

[top](#)

matrix/element

```
(matrix/element m row col)
```

Returns the matrix element at the row and column

```
(do
  (load-module :matrix)
  (matrix/element [[1 2 3] [4 5 6]] 1 2))
=> 6
```

[top](#)

matrix/empty?

```
(matrix/empty? m)
```

Returns true if the matrix is empty else false

```
(do
  (load-module :matrix)
  (matrix/empty? []))
=> true
```

[top](#)

matrix/format

```
(matrix/format m)
(matrix/format m fmt)
```

Formats a matrix.

```
(println (matrix/format [[1 2] [3 4] [5 6]]))
```

```
| 1 2 |
| 3 4 |
| 5 6 |
```

```
(do
  (load-module :matrix)
  (println (matrix/format [[1 2] [3 14] [10 6]]))
  (println)
  (println (matrix/format [[1.8 2.0] [3.0 4.8] [5.1 6.8]]))
  (println)
  (println (matrix/format [[1.845 2.009] [3.054 4.889] [5.132 6.878]]
    (fn [x] (str/format "%.2f" x)))))
```

```
| 1 2 |
| 3 14 |
| 10 6 |
```

```
| 1.8 2.0 |
| 3.0 4.8 |
| 5.1 6.8 |
```

```
| 1.85 2.01 |
| 3.05 4.89 |
| 5.13 6.88 |
```

```
=> nil
```

[top](#)

matrix/remove-column

```
(matrix/remove-column m n)
```

Remove a column from a matrix.

```
(do
  (load-module :matrix)
  (matrix/remove-column [[2 3 4] [6 7 8]] 1))
=> [[2 4] [6 8]]
```

[top](#)

matrix/remove-row

```
(matrix/remove-row m n)
```

Remove a row from a matrix.

```
(do
  (load-module :matrix)
  (matrix/remove-row [[1 2] [3 4] [5 6]] 1))
=> [[1 2] [5 6]]
```

[top](#)

matrix/row

```
(matrix/row m n)
```

Returns the matrix row n

```
(do
  (load-module :matrix)
  (matrix/row [[1 2 3] [4 5 6]] 1))
=> [4 5 6]
```

[top](#)

matrix/rows

```
(matrix/rows m)
```

Returns the number of rows in the matrix

```
(do
  (load-module :matrix)
  (matrix/rows [[1 2 3]
                [4 5 6]]))
=> 2
```

[top](#)

matrix/transpose

```
(matrix/transpose m)
```

Transposes a matrix. A matrix is a vector of vectors `[[1 2] [3 4]]`

```
(do
  (load-module :matrix)

  ;; | 1 2 3 |   => | 1 4 |
  ;; | 4 5 6 |   | 2 5 |
  ;;           | 3 6 |
  (matrix/transpose [[1 2 3]
                     [4 5 6]]))
=> [[1 4] [2 5] [3 6]]
```

[top](#)

matrix/validate

`(matrix/validate m)`

Validates a matrix. A matrix is a vector of vectors `[[1 2] [3 4]]`

Returns the matrix if valid else throws an exception.

- A matrix must be an empty vector or a vector of vectors!
- All rows must have the same number of columns

```
(do
  (load-module :matrix)
  (matrix/validate [[1 2 3]
                   [4 5 6]]))
=> [[1 2 3] [4 5 6]]
```

[top](#)

matrix/vector2d

`(matrix/vector2d m)`

Converts a 2D sequential collection into a 2D vector

```
(do
  (load-module :matrix)
  (matrix/vector2d (list (list 1 2 3) (list 4 5 6))))
=> [[1 2 3] [4 5 6]]
```

[top](#)

maven/artifact-filename

`(maven/artifact-filename artifact file-suffix)`

Returns the artifact file name

"org.knowm.xchart:xchart:3.8.6" -> "xchart-3.8.6.jar"


```
(do
  (load-module :maven)
  (maven/artifact-filename "org.knowm.xchart:xchart:3.8.6" ".jar"))

(do
  (load-module :maven)
  (maven/artifact-filename "org.knowm.xchart:xchart:3.8.6" "-sources.jar"))
```

SEE ALSO

[maven/parse-artifact](#)

Parses a Maven artifact

[maven/artifact-uri](#)

Returns the artifact URI

[maven/download](#)

Downloads an artifact in the format 'group-id:artifact-id:version' from a Maven repository. Can download any combination of the jar, ...

[maven/get](#)

Downloads artifact in the format 'group-id:artifact-id:version' from a Maven repository. The artifact type 'type' is one of {jar, ...

[top](#)

maven/artifact-uri

```
(maven/artifact-uri artifact file-suffix)
(maven/artifact-uri artifact file-suffix repo)
```

Returns the artifact URI

"org.knowm.xchart:xchart:3.8.6" -> "https://repo1.maven.org/maven2/org/knowm/xchart/xchart-3.8.6.jar"

```
(do
  (load-module :maven)
  (maven/artifact-uri "org.knowm.xchart:xchart:3.8.6" ".jar"))

(do
  (load-module :maven)
  (maven/artifact-uri "org.knowm.xchart:xchart:3.8.6" "-sources.jar"))

(do
  (load-module :maven)
  (maven/artifact-uri "org.knowm.xchart:xchart:3.8.6" ".pom"))

(do
  (load-module :maven)
  (maven/artifact-uri "org.knowm.xchart:xchart:3.8.6"
    ".jar"
    "https://repo1.maven.org/maven2"))
```

SEE ALSO

[maven/parse-artifact](#)

Parses a Maven artifact

[maven/artifact-filename](#)

Returns the artifact file name

[maven/download](#)

Downloads an artifact in the format 'group-id:artifact-id:version' from a Maven repository. Can download any combination of the jar, ...

[maven/get](#)

Downloads artifact in the format 'group-id:artifact-id:version' from a Maven repository. The artifact type 'type' is one of {jar, ...

[top](#)

maven/dependencies

(maven/dependencies artifacts & options)

Returns the dependency tree of an artifact

Relies on the environment variable `MAVEN_HOME` to access Maven.

Options:

<code>:scope s</code>	A scope. <code>:compile</code> , <code>:provided</code> , <code>:runtime</code> , <code>:test</code> . Defaults to <code>:compile</code>
<code>:verbose v</code>	if true invokes for verbose output else standard output. Defaults to false
<code>:excludes e</code>	A list of excluded dependencies
<code>:format f</code>	An output format. <code>:raw</code> <code>:dependency-tree</code> <code>:dependency-list</code> . Defaults to <code>:dependency-tree</code>
<code>:print p</code>	If true prints the data else returns the data
<code>:print-pom p</code>	If true print the generated pom for debugging purposes. Defaults to false.
<code>:managed-dependencies d</code>	A list of managed dependencies (artifacts). See example 2.

The scope is one of:

- `:compile` - build, test and run
- `:provided` - build and test
- `:runtime` - test and run
- `:test` - compile and test

Excludes dependencies with the group ids (except for `:test` scope):

- `org.junit.*`
- `org.opentest4j`
- `org.apiguardian`
- `junit`

Example 1:

```
(maven/dependencies [ "org.knowm.xchart:xchart:3.8.6" ])  
  
org.knowm.xchart:xchart:jar:3.8.6:compile  
+- de.erichseifert.vectorgraphics2d:VectorGraphics2D:jar:0.13:compile  
+- de.rototor.pdfbox:graphics2d:jar:3.0.0:compile  
| \- org.apache.pdfbox:pdfbox:jar:3.0.0:compile  
|   +- org.apache.pdfbox:pdfbox-io:jar:3.0.0:compile  
|   +- org.apache.pdfbox:fontbox:jar:3.0.0:compile  
|   \- commons-logging:commons-logging:jar:1.2:compile  
\- com.madgag:animated-gif-lib:jar:1.4:compile
```

Example 2:

lock down a transitive dependency to a specific version using Maven managed dependencies

```
(maven/dependencies ["org.knowm.xchart:xchart:3.8.6"]  
                    :managed-dependencies ["org.apache.pdfbox:pdfbox:2.0.27"])  
  
org.knowm.xchart:xchart:jar:3.8.6::compile  
+- de.erichseifert.vectorgraphics2d:VectorGraphics2D:jar:0.13:runtime  
+- de.rototor.pdfbox:graphics2d:jar:3.0.0:runtime  
| \- org.apache.pdfbox:pdfbox:jar:2.0.27:runtime
```

```
|      +- org.apache.pdfbox:fontbox:jar:2.0.27:runtime
|      \- commons-logging:commons-logging:jar:1.2:runtime
\-- com.madgag:animated-gif-lib:jar:1.4:runtime
```

```
(do
  (load-module :maven)
  (maven/dependencies [ "org.knowm.xchart:xchart:3.8.6" ]))

(do
  (load-module :maven)
  (maven/dependencies [ "org.knowm.xchart:xchart:3.8.6" ]
    :scope :compile
    :verbose true))
```

[top](#)

maven/download

(maven/download artifact options*)

Downloads an artifact in the format 'group-id:artifact-id:version' from a Maven repository. Can download any combination of the jar, sources, or pom artifacts to a directory.

Options:

:jar {true,false}	download the jar, defaults to true
:sources {true,false}	download the sources, defaults to false
:pom {true,false}	download the pom, defaults to false
:dir path	download dir, defaults to "."
:repo maven-repo	a maven repo, defaults to "https://repo1.maven.org/maven2"
:silent {true,false}	if silent is true does not show a progress bar, defaults to true
:force {true,false}	if force is true download the artifact even if it exist already on the download dir, else skip the download if it exists. Defaults to true.

```
(do
  (load-module :maven)
  (maven/download "org.knowm.xchart:xchart:3.8.6"))
```

```
(do
  (load-module :maven)
  (maven/download "org.knowm.xchart:xchart:3.8.6"
    :sources true
    :pom true))
```

```
(do
  (load-module :maven)
  (maven/download "org.knowm.xchart:xchart:3.8.6"
    :dir "."
    :jar false
    :sources true))
```

```
(do
  (load-module :maven)
  (maven/download "org.knowm.xchart:xchart:3.8.6"
    :dir "."
    :sources true))
```

```
(do
  (load-module :maven)
  (maven/download "org.knowm.xchart:xchart:3.8.6"
    :dir "."
    :sources true
    :repo "https://repo1.maven.org/maven2"))

(do
  (load-module :maven)
  (maven/download "org.knowm.xchart:xchart:3.8.6"
    :dir "."
    :silent false))
```

SEE ALSO

[maven/get](#)

Downloads artifact in the format 'group-id:artifact-id:version' from a Maven repository. The artifact type 'type' is one of {jar, ...

[maven/parse-artifact](#)

Parses a Maven artifact

[top](#)

maven/get

(maven/get artifact type options*)

Downloads artifact in the format 'group-id:artifact-id:version' from a Maven repository. The artifact type 'type' is one of {jar, :sources, :pom}.

Returns the artifact as byte buffer.

Options:

:repo maven-repo a maven repo, defaults to "https://repo1.maven.org/maven2"
:silent {true,false} if silent is true does not show a progress bar, defaults to true

```
(do
  (load-module :maven)
  (maven/get "org.knowm.xchart:xchart:3.8.6" :jar))

(do
  (load-module :maven)
  (maven/get "org.knowm.xchart:xchart:3.8.6" :jar :silent false))

(do
  (load-module :maven)
  (maven/get "org.knowm.xchart:xchart:3.8.6" :sources))

(do
  (load-module :maven)
  (maven/get "org.knowm.xchart:xchart:3.8.6"
    :jar
    :repo "https://repo1.maven.org/maven2"))
```

SEE ALSO

[maven/download](#)

Downloads an artifact in the format 'group-id:artifact-id:version' from a Maven repository. Can download any combination of the jar, ...

[maven/parse-artifact](#)

maven/home-dir

(maven/home-dir)

Returns the Apache Maven home directory or nil if Maven is not installed.

If a REPL is active checks first for local Apache Maven installation in the REPL, if none is available checks the environment variable 'MAVEN_HOME'.

If a REPL is not active checks the environment variable 'MAVEN_HOME'.

```
(do
  (load-module :maven)
  (maven/home-dir))
```

SEE ALSO

[maven/mvn](#)

Runs a Maven command

[maven/version](#)

Runs the Maven version command and prints the commands output.

maven/install

(maven/install)
(maven/install version)

Installs Apache Maven to {repl-home-dir}/tools/apache-maven-x.y.z

Installation is possible from within a REPL only!

```
(do
  (load-module :maven)
  (maven/install)) ;; installs default version 3.9.6
```

```
(do
  (load-module :maven)
  (maven/install "3.9.5"))
```

SEE ALSO

[maven/home-dir](#)

Returns the Apache Maven home directory or nil if Maven is not installed.

[maven/uninstall](#)

Uninstalls Apache Maven from {repl-home-dir}/tools

maven/mvn

```
(maven/mvn proj-dir & args)
```

Runs a Maven command

Relies on the environment variable `MAVEN_HOME` to access Maven.

```
(do
  (load-module :maven)
  (->> (maven/mvn "/Users/foo/projects/my-project" "compile")
        (println)))

(do
  (load-module :maven)
  (->> (maven/mvn "/Users/foo/projects/my-project" "-X" "package")
        (println)))
```

SEE ALSO

[maven/version](#)

Runs the Maven version command and prints the commands output.

[maven/home-dir](#)

Returns the Apache Maven home directory or nil if Maven is not installed.

[top](#)

maven/parse-artifact

```
(maven/parse-artifact artifact)
```

Parses a Maven artifact

Form 1: "org.knowm.xchart:xchart:3.8.6"

```
{ :group-id      "org.knowm.xchart"
  :artifact-id   "xchart"
  :version       "3.8.6" }
```

Form 2: "org.knowm.xchart:jar:xchart:3.8.6"

```
{ :group-id      "org.knowm.xchart"
  :artifact-id   "xchart"
  :version       "3.8.6"
  :type          :jar }
```

Form 3: "org.knowm.xchart:jar:xchart:3.8.6:compile"

```
{ :group-id      "org.knowm.xchart"
  :artifact-id   "xchart"
  :version       "3.8.6"
  :type          :jar
  :scope         :compile }
```

```
(do
  (load-module :maven)
  (maven/parse-artifact "org.knowm.xchart:xchart:3.8.6"))
```

SEE ALSO

[maven/artifact-filename](#)

Returns the artifact file name

[maven/artifact-uri](#)

Returns the artifact URI

[maven/download](#)

Downloads an artifact in the format 'group-id:artifact-id:version' from a Maven repository. Can download any combination of the jar, ...

[maven/get](#)

Downloads artifact in the format 'group-id:artifact-id:version' from a Maven repository. The artifact type 'type' is one of {jar, ...

[top](#)

maven/uninstall

(maven/uninstall)

Uninstalls Apache Maven from {repl-home-dir}/tools

Uninstallation is possible from within a REPL only!

```
(do
  (load-module :maven)
  (maven/uninstall))
```

SEE ALSO

[maven/home-dir](#)

Returns the Apache Maven home directory or nil if Maven is not installed.

[maven/install](#)

Installs Apache Maven to {repl-home-dir}/tools/apache-maven-x.y.z

[top](#)

maven/version

(maven/version)

Runs the Maven version command and prints the commands output.

Relies on the environment variable `MAVEN_HOME` to access Maven.

```
(do
  (load-module :maven)
  (maven/version))
```

SEE ALSO

[maven/mvn](#)

Runs a Maven command

[maven/home-dir](#)

Returns the Apache Maven home directory or nil if Maven is not installed.

[top](#)

max

```
(max x)
(max x y)
(max x y & more)
```

Returns the greatest of the values

```
(max 1)
=> 1

(max 1 2)
=> 2

(max 4 3 2 1)
=> 4

(max 1I 2I)
=> 2I

(max 1.0)
=> 1.0

(max 1.0 2.0)
=> 2.0

(max 4.0 3.0 2.0 1.0)
=> 4.0

(max 1.0M)
=> 1.0M

(max 1.0M 2.0M)
=> 2.0M

(max 4.0M 3.0M 2.0M 1.0M)
=> 4.0M

(max 1.0M 2)
=> 2
```

SEE ALSO

[min](#)

Returns the smallest of the values

[top](#)

memoize

```
(memoize f)
```

Returns a memoized version of a referentially transparent function.

Note:

Use memoization for expensive calculations. If used with fast calculations it has the opposite effect and can slow it down actually!

```
(do
  (def fibonacci
    (memoize
      (fn [n]
        (cond
          (<= n 0) 0
          (< n 2) 1
          :else (+ (fibonacci (- n 1)) (fibonacci (- n 2)))))))

  (time (fibonacci 25)))
```

Elapsed time: 1.04ms

=> 75025

```
(do
  (defn test [a b]
    (println (str "calculating a=" a ", b=" b))
    (+ a b))

  (def test-memo (memoize test))
```

```
(test-memo 1 1)
(test-memo 1 2)
(test-memo 1 1)
(test-memo 1 2)
(test-memo 1 1)
```

calculating a=1, b=1

calculating a=1, b=2

=> 2

SEE ALSO

[delay](#)

Takes a body of expressions and yields a Delay object that will invoke the body only the first time it is forced (with force or deref ...

[top](#)

merge

```
(merge & maps)
```

Returns a map that consists of the rest of the maps conj-ed onto the first. If a key occurs in more than one map, the mapping from the latter (left-to-right) will be the mapping in the result.

```
(merge {:a 1 :b 2 :c 3} {:b 9 :d 4})
=> {:a 1 :b 9 :c 3 :d 4}
```

```
(merge {:a 1} nil)
=> {:a 1}
```

```
(merge nil {:a 1})
=> {:a 1}
```

```
(merge nil nil)
=> nil
```

SEE ALSO

[merge-with](#)

Returns a map that consists of the rest of the maps conj-ed onto the first. If a key occurs in more than one map, the mapping(s) from ...

[merge-deep](#)

Recursively merges maps.

[into](#)

Returns a new coll consisting of to coll with all of the items of from coll conjoined.

[concat](#)

Returns a list of the concatenation of the elements in the supplied collections.

[top](#)

merge-deep

```
(merge-deep values)
```

```
(merge-deep strategy & values)
```

Recursively merges maps.

If the first parameter is a keyword it defines the strategy to use when merging non-map collections. Options are:

1. *:replace*, the default, the last value is used
2. *:into*, if the value in every map is a collection they are concatenated using `into`. Thus the type of (first) value is maintained.

```
(merge-deep {:a {:c 2}} {:a {:b 1}})
```

```
=> {:a {:b 1 :c 2}}
```

```
(merge-deep :replace {:a [1]} {:a [2]})
```

```
=> {:a [2]}
```

```
(merge-deep :into {:a [1]} {:a [2]})
```

```
=> {:a [1 2]}
```

```
(merge-deep {:a 1} nil)
```

```
=> nil
```

SEE ALSO

[merge](#)

Returns a map that consists of the rest of the maps conj-ed onto the first. If a key occurs in more than one map, the mapping from ...

[merge-with](#)

Returns a map that consists of the rest of the maps conj-ed onto the first. If a key occurs in more than one map, the mapping(s) from ...

[top](#)

merge-with

```
(merge-with f & maps)
```

Returns a map that consists of the rest of the maps conj-ed onto the first. If a key occurs in more than one map, the mapping(s) from the latter (left-to-right) will be combined with the mapping in the result by calling (f val-in-result val-in-latter).

```
(merge-with + {:a 1 :b 2} {:a 9 :b 98 :c 0})  
=> {:a 10 :b 100 :c 0}
```

```
(merge-with into {:a [1] :b [2]} {:b [3 4] :c [5 6]})  
=> {:a [1] :b [2 3 4] :c [5 6]}
```

SEE ALSO

[merge](#)

Returns a map that consists of the rest of the maps conj-ed onto the first. If a key occurs in more than one map, the mapping from ...

[merge-deep](#)

Recursively merges maps.

[top](#)

meta

```
(meta obj)
```

Returns the metadata of obj, returns nil if there is no metadata.

```
(meta (vary-meta [1 2] assoc :foo 3))  
=> {:foo 3 :line 35 :column 28 :file "example"}
```

SEE ALSO

[vary-meta](#)

Returns a copy of the object obj, with (apply f (meta obj) args) as its metadata.

[with-meta](#)

Returns a copy of the object obj, with a map m as its metadata.

[var-val-meta](#)

Returns the var's value meta data.

[var-sym-meta](#)

Returns the var's symbol meta data.

[top](#)

min

```
(min x)  
(min x y)  
(min x y & more)
```

Returns the smallest of the values

```
(min 1)  
=> 1
```

```
(min 1 2)  
=> 1
```

```
(min 4 3 2 1)  
=> 1
```

```
(min 1I 2I)
=> 1I

(min 1.0)
=> 1.0

(min 1.0 2.0)
=> 1.0

(min 4.0 3.0 2.0 1.0)
=> 1.0

(min 1.0M)
=> 1.0M

(min 1.0M 2.0M)
=> 1.0M

(min 4.0M 3.0M 2.0M 1.0M)
=> 1.0M

(min 1.0M 2)
=> 1.0M
```

SEE ALSO

[max](#)

Returns the greatest of the values

[top](#)

mod

```
(mod n d)
```

Modulus of n and d.

```
(mod 10 4)
=> 2
```

```
(mod -1 5)
=> 4
```

```
(mod 10I 4I)
=> 2I
```

SEE ALSO

[mod-floor](#)

floor a number towards 0 to the nearest multiple of a number

[top](#)

mod-floor

```
(mod-floor n m)
```

floor a number towards 0 to the nearest multiple of a number

```
(mod-floor 9 3)  
=> 9
```

```
(mod-floor 10 3)  
=> 9
```

```
(mod-floor 11 3)  
=> 9
```

```
(mod-floor -11 3)  
=> -9
```

SEE ALSO

[mod](#)

Modulus of n and d.

[top](#)

module-name

```
(module-name class)
```

Returns the Java module name of a class.

```
(module-name (class :java.util.ArrayList))
```

SEE ALSO

[class](#)

Returns the Java class for the given name. Throws an exception if the class is not found.

[class-name](#)

Returns the Java class name of a class.

[top](#)

modules

```
(modules)
```

Lists the available Venice modules

SEE ALSO

[doc](#)

Prints documentation for a var or special form given x as its name. Prints the definition of custom types.

[ns-list](#)

Without arg lists the loaded namespaces, else lists all the symbols in the specified namespace ns.

mutable-list

```
(mutable-list & items)
```

Creates a new mutable list containing the items.

The list is backed by `java.util.ArrayList` and is not thread-safe.

```
(mutable-list)
```

```
=> ()
```

```
(mutable-list 1 2 3)
```

```
=> (1 2 3)
```

```
(mutable-list 1 2 3 [:a :b])
```

```
=> (1 2 3 [:a :b])
```

mutable-list?

```
(mutable-list? obj)
```

Returns true if obj is a mutable list

```
(mutable-list? (mutable-list 1 2))
```

```
=> true
```

mutable-map

```
(mutable-map & keyvals)
```

```
(mutable-map map)
```

Creates a new mutable threadsafe map containing the items.

```
(mutable-map :a 1 :b 2)
```

```
=> {:a 1 :b 2}
```

```
(mutable-map {:a 1 :b 2})
```

```
=> {:a 1 :b 2}
```

mutable-map?

```
(mutable-map? obj)
```

Returns true if obj is a mutable map

```
(mutable-map? (mutable-map :a 1 :b 2))  
=> true
```

[top](#)

mutable-set

```
(mutable-set & items)
```

Creates a new mutable set containing the items.

```
(mutable-set)  
=> #{}  
  
(mutable-set nil)  
=> #{nil}  
  
(mutable-set 1)  
=> #{1}  
  
(mutable-set 1 2 3)  
=> #{1 2 3}  
  
(mutable-set [1 2] 3)  
=> #{3 [1 2]}
```

[top](#)

mutable-set?

```
(mutable-set? obj)
```

Returns true if obj is a mutable-set

```
(mutable-set? (mutable-set 1))  
=> true
```

[top](#)

mutable-vector

```
(mutable-vector & items)
```

Creates a new mutable threadsafe vector containing the items.

```
(mutable-vector)  
=> []
```

```
(mutable-vector 1 2 3)
```

```
=> [1 2 3]
```

```
(mutable-vector 1 2 3 [:a :b])
```

```
=> [1 2 3 [:a :b]]
```

top

mutable-vector?

```
(mutable-vector? obj)
```

Returns true if obj is a mutable vector

```
(mutable-vector? (mutable-vector 1 2))
```

```
=> true
```

top

name

```
(name x)
```

Returns the name string of a string, symbol, keyword, or function. If applied to a string it returns the string itself.

```
(name 'foo) ;; symbol
```

```
=> "foo"
```

```
(name 'user/foo) ;; symbol
```

```
=> "foo"
```

```
(name (symbol "user/foo")) ;; symbol
```

```
=> "foo"
```

```
(name :foo) ;; keyword
```

```
=> "foo"
```

```
(name :user/foo) ;; keyword
```

```
=> "foo"
```

```
(name +) ;; function
```

```
=> "+"
```

```
(name str/digit?) ;; function
```

```
=> "digit?"
```

```
(name "ab/text") ;; string
```

```
=> "ab/text"
```

```
(name (. :java.time.Month :JANUARY)) ;; java enum
```

```
=> "JANUARY"
```


SEE ALSO

[qualified-name](#)

Returns the qualified name String of a string, symbol, keyword, or function

[namespace](#)

Returns the namespace string of a symbol, keyword, or function. If x is a registered namespace returns x.

[fn-name](#)

Returns the qualified name of a function or macro

[top](#)

namespace

```
(namespace x)
```

Returns the namespace string of a symbol, keyword, or function. If x is a registered namespace returns x.

Throws an exception if x does not support namespaces like `(namespace 2)`.

```
(namespace 'user/foo) ;; symbol  
=> "user"
```

```
(namespace (symbol "user/foo")) ;; symbol  
=> "user"
```

```
(namespace :user/foo) ;; keyword  
=> "user"
```

```
(namespace str/digit?) ;; function  
=> "str"
```

```
(namespace *ns*) ;; symbol  
=> "user"
```

SEE ALSO

[name](#)

Returns the name string of a string, symbol, keyword, or function. If applied to a string it returns the string itself.

[fn-name](#)

Returns the qualified name of a function or macro

[ns](#)

Opens a namespace.

[*ns*](#)

The current namespace

[var-ns](#)

Returns the namespace of the var's symbol.

[top](#)

nan?

```
(nan? x)
```

Returns true if x is a NaN else false. x must be a double!

```
(nan? 0.0)
=> false
```

```
(nan? (/ 0.0 0))
=> true
```

```
(nan? (sqrt -1))
=> true
```

```
(pr (sqrt -1))
:NaN
=> nil
```

SEE ALSO

[infinite?](#)

Returns true if x is infinite else false. x must be a double!

[double](#)

Converts to double

top

nano-time

```
(nano-time)
```

Returns the current value of the running Java Virtual Machine's high-resolution time source, in nanoseconds.

```
(nano-time)
=> 245224231834875
```

```
(let [t (nano-time)
      _ (sleep 100)
      e (nano-time)]
  (format-nano-time (- e t) :precision 2))
=> "105.03ms"
```

SEE ALSO

[current-time-millis](#)

Returns the current time in milliseconds.

[format-nano-time](#)

Formats a time given in nanoseconds as long or double.

top

neg?

```
(neg? x)
```

Returns true if x smaller than zero else false

```
(neg? -3)
=> true

(neg? 3)
=> false

(neg? (int -3))
=> true

(neg? -3.2)
=> true

(neg? -3.2M)
=> true
```

SEE ALSO

[zero?](#)

Returns true if x zero else false

[pos?](#)

Returns true if x greater than zero else false

[negate](#)

Negates x

[top](#)

negate

```
(negate x)
```

Negates x

```
(negate 10)
=> -10

(negate 10I)
=> -10I

(negate 1.23)
=> -1.23

(negate 1.23M)
=> -1.23M
```

SEE ALSO

[abs](#)

Returns the absolute value of the number

[sgn](#)

sgn function for a number.

[top](#)

newline

```
(newline)
(newline os)
```

Without arg writes a platform-specific newline to the output channel that is the current value of `*out*`. With arg writes a newline to the passed stream that must be a subclass of either `:java.io.PrintStream` or `:java.io.Writer`.

Returns `nil`.

```
(newline)
=> nil
```

```
(newline *out*)
=> nil
```

```
(newline *err*)
=> nil
```

SEE ALSO

[print](#)

Prints the values xs to the stream that is the current value of `*out*` or to the passed stream os that must be a subclass of either ...

[println](#)

Prints the values xs to the stream that is the current value of `*out*` or to the passed output stream os if given followed by a (newline).

[printf](#)

Without output stream prints formatted output as per format to the stream that is the current value of `*out*`. With a stream prints ...

[top](#)

nfirst

```
(nfirst coll n)
```

Returns a collection of the first n items

```
(nfirst nil 2)
=> ()
```

```
(nfirst [] 2)
=> []
```

```
(nfirst [1] 2)
=> [1]
```

```
(nfirst [1 2 3] 2)
=> [1 2]
```

```
(nfirst '() 2)
=> ()
```

```
(nfirst '(1) 2)
=> (1)
```

```
(nfirst '(1 2 3) 2)
=> (1 2)

(nfirst "abcdef" 2)
=> (#\a #\b)

(nfirst (lazy-seq 1 #(+ % 1)) 4)
=> (...)
```

SEE ALSO

[str/nfirst](#)

Returns a string of the n first characters of s.

[top](#)

nil?

```
(nil? x)
```

Returns true if x is nil, false otherwise

```
(nil? nil)
=> true
```

```
(nil? 0)
=> false
```

```
(nil? false)
=> false
```

SEE ALSO

[some?](#)

Returns true if x is not nil, false otherwise

[top](#)

nlast

```
(nlast coll n)
```

Returns a collection of the last n items

```
(nlast nil 2)
=> ()
```

```
(nlast [] 2)
=> []
```

```
(nlast [1] 2)
=> [1]
```

```
(nlast [1 2 3] 2)
=> [2 3]

(nlast '() 2)
=> ()

(nlast '(1) 2)
=> (1)

(nlast '(1 2 3) 2)
=> (2 3)

(nlast "abcdef" 2)
=> (#\e #\f)
```

SEE ALSO

[str/nlast](#)

Returns a string of the n last characters of s.

[top](#)

not

```
(not x)
```

Returns true if x is logical false, false otherwise.

```
(not true)
=> false
```

```
(not (== 1 2))
=> true
```

SEE ALSO

[and](#)

Ands the predicate forms

[or](#)

Ors the predicate forms

[top](#)

not-any?

```
(not-any? pred coll)
```

Returns false if the predicate is true for at least one collection item, true otherwise

```
(not-any? number? nil)
=> true
```

```
(not-any? number? [])  
=> true  
  
(not-any? number? [1 :a :b])  
=> false  
  
(not-any? number? [1 2 3])  
=> false  
  
(not-any? #(>= % 10) [1 5 10])  
=> false
```

SEE ALSO

[any?](#)

Returns true if the predicate is true for at least one collection item, false otherwise.

[every?](#)

Returns true if the predicate is true for all collection items, false otherwise.

[not-every?](#)

Returns false if the predicate is true for all collection items, true otherwise

[top](#)

not-contains?

```
(not-contains? coll key)
```

Returns true if key is not present in the given collection, otherwise returns false.

```
(not-contains? #{:a :b} :c)  
=> true  
  
(not-contains? {:a 1 :b 2} :c)  
=> true  
  
(not-contains? [10 11 12] 1)  
=> false  
  
(not-contains? [10 11 12] 5)  
=> true  
  
(not-contains? "abc" 1)  
=> false  
  
(not-contains? "abc" 5)  
=> true
```

SEE ALSO

[contains?](#)

Returns true if key is present in the given collection, otherwise returns false.

[top](#)

not-empty?

```
(not-empty? x)
```

Returns true if x is not empty. Accepts strings, collections and bytebufs.

```
(not-empty? {:a 1})  
=> true
```

```
(not-empty? [1 2])  
=> true
```

```
(not-empty? '(1 2))  
=> true
```

```
(not-empty? "abc")  
=> true
```

```
(not-empty? nil)  
=> false
```

```
(not-empty? "")  
=> false
```

SEE ALSO

[empty?](#)

Returns true if x is empty. Accepts strings, collections and bytebufs.

[top](#)

not-every?

```
(not-every? pred coll)
```

Returns false if the predicate is true for all collection items, true otherwise

```
(not-every? number? nil)  
=> true
```

```
(not-every? number? [])  
=> true
```

```
(not-every? number? [1 2 3 4])  
=> false
```

```
(not-every? number? [1 2 3 :a])  
=> true
```

```
(not-every? #(>= % 10) [10 11 12])  
=> false
```

SEE ALSO

[every?](#)

Returns true if the predicate is true for all collection items, false otherwise.

[any?](#)

Returns true if the predicate is true for at least one collection item, false otherwise.

[not-any?](#)

Returns false if the predicate is true for at least one collection item, true otherwise

[top](#)

not-match?

```
(not-match? s regex)
```

Returns true if the string `s` does not match the regular expression `regex`.

The argument 'regex' may be a string representing a regular expression or a `java.util.regex.Pattern`.

See the functions in the 'regex' namespace if more than a simple regex match is required! E.g. `regex/matches-not?` performs much better on matching many strings against the same pattern:

```
(let [m (regex/matcher #"[0-9]+" "")]
  (filter #(regex/matches-not? m %) ["100" "1a1" "200"])))
```

```
(not-match? "S1000" "[0-9]+")
=> true
```

```
(not-match? "S1000" #"[0-9]+")
=> true
```

```
(not-match? "1000" "[0-9]+")
=> false
```

SEE ALSO

[match?](#)

Returns true if the string `s` matches the regular expression `regex`.

[regex/matches-not?](#)

Attempts to match the entire region against the pattern. Returns false if the patterns matches the string else true.

[regex/matches?](#)

Attempts to match the entire region against the pattern. Returns true if the patterns matches the string else false.

[regex/pattern](#)

Returns an instance of `java.util.regex.Pattern`.

[regex/matcher](#)

Returns an instance of `java.util.regex.Matcher`.

[regex/matches](#)

Returns the matches, if any, for the matcher with the pattern of a string, using `java.util.regex.Matcher.matches()`.

[regex/find](#)

Returns the next regex match or nil if there is no further match. Returns nil if there is no match.

[regex/find-all](#)

Returns all regex matches as list or an empty list if there are no matches.

[top](#)

not=

```
(not= x)
(not= x y)
(not= x y & more)
```

Same as (not (= x y))

```
(not= "abc" "abc")
=> false
```

```
(not= 0 0)
=> false
```

```
(not= 0 1)
=> true
```

```
(not= 0 0.0)
=> true
```

```
(not= 0 0.0M)
=> true
```

```
(not= "0" 0)
=> true
```

```
(not= 4)
=> false
```

```
(not= 1 2 3)
=> true
```

SEE ALSO

[=](#)

Returns true if both operands have equivalent type and value

[==](#)

Returns true if both operands have equivalent value.

[top](#)

ns

```
(ns sym)
```

Opens a namespace.

```
(do
  (ns xxx)
  (def foo 1)
  (ns yyy)
  (def foo 5))
```

```
(println xxx/foo foo yyy/foo))
1 5 5
=> nil
```

SEE ALSO

[*ns*](#)

The current namespace

[ns?](#)

Returns true if n is an existing namespace that has been defined with (ns n) else false.

[ns-unmap](#)

Removes the mappings for the symbol from the namespace.

[ns-remove](#)

Removes the mappings for all symbols from the namespace.

[ns-list](#)

Without arg lists the loaded namespaces, else lists all the symbols in the specified namespace ns.

[ns-alias](#)

Add an alias in the current namespace to another namespace. Arguments are two symbols: the alias to be used, and the symbolic name ...

[ns-meta](#)

Returns the meta data of the namespace n or nil if n is not an existing namespace

[namespace](#)

Returns the namespace string of a symbol, keyword, or function. If x is a registered namespace returns x.

[var-ns](#)

Returns the namespace of the var's symbol.

[top](#)

ns-alias

```
(ns-alias alias namespace-sym)
```

Add an alias in the current namespace to another namespace. Arguments are two symbols: the alias to be used, and the symbolic name of the target namespace.

```
(ns-alias 'p 'parsatron)
=> nil
```

```
(do
  (load-module :hexdump)
  (ns-alias 'h 'hexdump)
  (h/dump [0 1 2 3]))
00000000: 0001 0203                . . . .
=> nil
```

SEE ALSO

[ns-unalias](#)

Removes a namespace alias in the current namespace.

[ns-aliases](#)

Returns a map of the aliases defined in the current namespace.

[*ns*](#)

The current namespace

[ns](#)

Opens a namespace.

top

ns-aliases

(ns-aliases)

Returns a map of the aliases defined in the current namespace.

```
(ns-aliases)
=> {}

(do
  (ns-alias 'h 'hexdump)
  (ns-alias 'p 'parsatron)
  (ns-aliases))
=> {h hexdump p parsatron}
```

SEE ALSO

[ns-alias](#)

Add an alias in the current namespace to another namespace. Arguments are two symbols: the alias to be used, and the symbolic name ...

[ns-unalias](#)

Removes a namespace alias in the current namespace.

[*ns*](#)

The current namespace

[ns](#)

Opens a namespace.

top

ns-list

(ns-list)
(ns-list ns)

Without arg lists the loaded namespaces, else lists all the symbols in the specified namespace ns.

```
(ns-list 'regex)
=> (regex/count regex/find regex/find+ regex/find-all regex/find-all+ regex/find? regex/group regex/groups regex/matcher regex/matches regex/matches-not? regex/matches? regex/pattern regex/reset)

(ns-list)
=> ("ansi" "app" "ascii-table" "benchmark" "cargo" "cargo-arangodb" "cidr" "component" "config" "crypt" "csv" "dag" "dec" "docker" "excel" "fonts" "geoip" "gradle" "gradlew" "grep" "hexdump" "inet" "installer" "io" "java" "json" "jsonl" "kira" "loadpath" "math" "matrix" "maven" "parsifal" "pdf" "qrref" "regex" "sandbox" "semver" "sh" "shell" "str" "test" "time" "timing" "trace" "xchart" "xml" "zipvault")

;; dynamically list all public symbols of a module
(let [module-name$ (keyword "hexdump")
      ns-name$      (symbol "hexdump")]
  (load-module module-name$)
  (->> (ns-list ns-name$))
```

```
(filter #(not (:private (meta %) false)))
(sort)))
```

```
=> (hexdump/ascii hexdump/ascii-lines hexdump/byte hexdump/byte-offsets hexdump/dump hexdump/hex-ascii-lines
hexdump/hex-lines)
```

SEE ALSO

[ns](#)

Opens a namespace.

[*ns*](#)

The current namespace

[ns-unmap](#)

Removes the mappings for the symbol from the namespace.

[ns-remove](#)

Removes the mappings for all symbols from the namespace.

[namespace](#)

Returns the namespace string of a symbol, keyword, or function. If x is a registered namespace returns x.

[var-ns](#)

Returns the namespace of the var's symbol.

[top](#)

ns-meta

```
(ns-meta n)
```

Returns the meta data of the namespace n or `nil` if n is not an existing namespace

```
(do
  (ns foo)
  (ns-meta foo))
=> {}

(do
  (ns foo)
  (ns-meta 'foo))
=> {}

(do
  (ns foo)
  (def n 'foo)
  (ns-meta (var-get n)))
=> {}
```

SEE ALSO

[alter-ns-meta!](#)

Alters the metadata for a namespace. f must be free of side-effects.

[reset-ns-meta!](#)

Resets the metadata for a namespace

[ns](#)

Opens a namespace.

[top](#)

ns-remove

```
(ns-remove ns)
```

Removes the mappings for all symbols from the namespace.

```
(do
  (ns foo)
  (def x 1)
  (ns bar)
  (def y 1)
  (ns-remove 'foo)
  (println "ns foo:" (ns-list 'foo))
  (println "ns bar:" (ns-list 'bar)))
ns foo: ()
ns bar: (bar/y)
=> nil
```

SEE ALSO

[ns](#)

Opens a namespace.

[ns-unmap](#)

Removes the mappings for the symbol from the namespace.

[ns-list](#)

Without arg lists the loaded namespaces, else lists all the symbols in the specified namespace ns.

[namespace](#)

Returns the namespace string of a symbol, keyword, or function. If x is a registered namespace returns x.

[var-ns](#)

Returns the namespace of the var's symbol.

[top](#)

ns-unalias

```
(ns-unalias alias)
```

Removes a namespace alias in the current namespace.

```
(do
  (ns-alias 'h 'hexdump)
  (ns-unalias 'h))
=> nil
```

SEE ALSO

[ns-alias](#)

Add an alias in the current namespace to another namespace. Arguments are two symbols: the alias to be used, and the symbolic name ...

[ns-aliases](#)

Returns a map of the aliases defined in the current namespace.

[*ns*](#)

The current namespace

[ns](#)

Opens a namespace.

[top](#)

ns-unmap

```
(ns-unmap ns sym)
```

Removes the mappings for the symbol from the namespace.

```
(do
  (ns foo)
  (def x 1)
  (ns-unmap 'foo 'x)
  (ns-unmap *ns* 'x))
=> nil
```

SEE ALSO

[ns](#)

Opens a namespace.

[*ns*](#)

The current namespace

[ns-remove](#)

Removes the mappings for all symbols from the namespace.

[ns-list](#)

Without arg lists the loaded namespaces, else lists all the symbols in the specified namespace ns.

[namespace](#)

Returns the namespace string of a symbol, keyword, or function. If x is a registered namespace returns x.

[var-ns](#)

Returns the namespace of the var's symbol.

[top](#)

ns?

```
(ns? n)
```

Returns true if n is an existing namespace that has been defined with `(ns n)` else false.

```
(do
  (ns foo)
  (ns? foo))
=> true
```

SEE ALSO

[ns](#)

Opens a namespace.

[top](#)

nth

```
(nth coll idx)
(nth coll idx defaultVal)
```

Returns the nth element of coll.

Throws an exception if the index does not exist and there is no default value passed else returns the default value.

```
(nth nil 1)
=> nil
```

```
(nth [1 2 3] 1)
=> 2
```

```
(nth '(1 2 3) 1)
=> 2
```

```
(nth "abc" 2)
=> #\c
```

```
(nth nil 1 9)
=> nil
```

```
(nth [1 2 3] 6 9)
=> 9
```

```
(nth '(1 2 3) 6 9)
=> 9
```

```
(nth "abc" 6 9)
=> 9
```

[top](#)

number?

```
(number? n)
```

Returns true if n is a number (int, long, double, or decimal)

```
(number? 4I))
=> true
```

```
(number? 4)
=> true
```

```
(number? 4.0M)
=> true
```

```
(number? 4.0)
=> true
```



```
(number? true)
=> false
```

```
(number? "a")
=> false
```

[top](#)

object-array

```
(object-array coll)
(object-array len)
(object-array len init-val)
```

Returns an array of Java Objects containing the contents of coll or returns an array with the given length and optional init value

```
(object-array '(1 2 3 4 5))
=> [1, 2, 3, 4, 5]
```

```
(object-array '(1 2.0 3.45M "4" true))
=> [1, 2.0, 3.45M, 4, true]
```

```
(object-array 10)
=> [nil, nil, nil, nil, nil, nil, nil, nil, nil, nil]
```

```
(object-array 10 42)
=> [42, 42, 42, 42, 42, 42, 42, 42, 42, 42]
```

[top](#)

odd?

```
(odd? n)
```

Returns true if n is odd, throws an exception if n is not an integer

```
(odd? 3)
=> true
```

```
(odd? 4)
=> false
```

```
(odd? (int 4))
=> false
```

SEE ALSO

[even?](#)

Returns true if n is even, throws an exception if n is not an integer

[top](#)

offer!

```
(offer! queue v)
(offer! queue timeout v)
```

Offers an item to a queue with an optional timeout in milliseconds. If a timeout is given waits up to the specified wait time if necessary for space to become available. For an indefinite timeout pass the timeout value `:indefinite`. If no timeout is given returns immediately false if the queue does not have any more capacity. Returns true if the element was added to this queue, else false.

```
(let [q (queue)]
  (offer! q 1)
  (offer! q 1000 2)
  (offer! q :indefinite 3)
  (offer! q 3)
  (poll! q)
  q)
=> (2 3 3)
```

SEE ALSO

[queue](#)

Creates a new mutable threadsafe bounded or unbounded queue.

[put!](#)

Puts an item to a queue. The operation is synchronous, it waits indefinitely until the value can be placed on the queue. Returns always nil.

[take!](#)

Retrieves and removes the head value of the queue, waiting if necessary until a value becomes available.

[poll!](#)

Polls an item from a queue with an optional timeout in milliseconds. For an indefinite timeout pass the timeout value `:indefinite`.

[peek](#)

For a list, same as `first`, for a vector, same as `last`, for a stack the top element (or nil if the stack is empty), for a queue the ...

[empty?](#)

Returns true if x is empty. Accepts strings, collections and bytebufs.

[count](#)

Returns the number of items in the collection. `(count nil)` returns 0. Also works on strings, and Java Collections

[top](#)

or

```
(or x)
(or x & next)
```

Ors the predicate forms

```
(or true false)
=> true
```

```
(or false false)
=> false
```

```
(or nil 100)
=> 100
```

```
(or)
=> false
```

SEE ALSO

[and](#)

Ands the predicate forms

[not](#)

Returns true if x is logical false, false otherwise.

[top](#)

or-timeout

```
(or-timeout p time time-unit)
```

Exceptionally completes the promise with a `TimeoutException` if not otherwise completed before the given timeout.

```
(-> (promise (fn [] (sleep 100) "The quick brown fox"))
    (or-timeout 500 :milliseconds)
    (then-apply str/upper-case)
    (deref))
=> "THE QUICK BROWN FOX"
```

```
(-> (promise (fn [] (sleep 300) "The quick brown fox"))
    (or-timeout 200 :milliseconds)
    (then-apply str/upper-case)
    (deref))
=> TimeoutException: java.util.concurrent.TimeoutException
```

```
(-> (promise (fn [] (sleep 300) "The quick brown fox"))
    (then-apply str/upper-case)
    (or-timeout 200 :milliseconds)
    (deref))
=> TimeoutException: java.util.concurrent.TimeoutException
```

SEE ALSO

[promise](#)

Returns a promise object that can be read with `deref`, and `set`, once only, with `deliver`. Calls to `deref` prior to delivery will block, ...

[then-accept](#)

Returns a new promise that, when this promise completes normally, is executing the function `f` with this stage's result as the argument.

[then-accept-both](#)

Returns a new promise that, when either this or the other given promise completes normally, is executing the function `f` with the two ...

[then-apply](#)

Applies a function `f` on the result of the previous stage of the promise `p`.

[then-combine](#)

Applies a function `f` to the result of the previous stage of promise `p` and the result of another promise `p-other`

[then-compose](#)

Composes the result of two promises. `f` receives the result of the first promise `p` and returns a new promise that composes that value ...

[when-complete](#)

Returns the promise `p` with the same result or exception at this stage, that executes the action `f`. Passes the current stage's result ...

[accept-either](#)

Returns a new promise that, when either this or the other given promise completeness normally, is executed with the corresponding result ...

[apply-to-either](#)

Returns a new promise that, when either this or the other given promise completes normally, is executed with the corresponding result ...

[complete-on-timeout](#)

Completes the promise with the given value if not otherwise completed before the given timeout.

[top](#)

ordered-map

```
(ordered-map & keyvals)
(ordered-map map)
```

Creates a new ordered map containing the items.

```
(ordered-map :a 1 :b 2)
=> {:a 1 :b 2}

(ordered-map (hash-map :a 1 :b 2))
=> {:a 1 :b 2}
```

[top](#)

ordered-map?

```
(ordered-map? obj)
```

Returns true if obj is an ordered map

```
(ordered-map? (ordered-map :a 1 :b 2))
=> true
```

[top](#)

os-arch

```
(os-arch)
```

Returns the OS architecture. E.g: "x86_64"

```
(os-arch)
=> "aarch64"
```

SEE ALSO

[os-type](#)

Returns the OS type. Type is one of :windows, :mac-osx, :linux, :unix, or :unknown

[os-type?](#)

Returns true if the OS id of the type otherwise false. Type is one of :windows, :mac-osx, :linux, or :unix

[os-name](#)

Returns the OS name. E.g.: "Mac OS X"

[os-version](#)

Returns the OS version

[top](#)

os-name

([os-name](#))

Returns the OS name. E.g.: "Mac OS X"

([os-name](#))

=> "Mac OS X"

SEE ALSO

[os-type](#)

Returns the OS type. Type is one of :windows, :mac-osx, :linux, :unix, or :unknown

[os-type?](#)

Returns true if the OS id of the type otherwise false. Type is one of :windows, :mac-osx, :linux, or :unix

[os-arch](#)

Returns the OS architecture. E.g: "x86_64"

[os-version](#)

Returns the OS version

[top](#)

os-type

([os-type](#))

Returns the OS type. Type is one of `:windows`, `:mac-osx`, `:linux`, `:unix`, or `:unknown`

([os-type](#))

=> `:mac-osx`

SEE ALSO

[os-type?](#)

Returns true if the OS id of the type otherwise false. Type is one of :windows, :mac-osx, :linux, or :unix

[os-arch](#)

Returns the OS architecture. E.g: "x86_64"

[os-name](#)

Returns the OS name. E.g.: "Mac OS X"

[os-version](#)

Returns the OS version

[top](#)

os-type?

```
(os-type? type)
```

Returns true if the OS id of the type otherwise false. Type is one of `:windows`, `:mac-osx`, `:linux`, or `:unix`

```
(os-type? :mac-osx)  
=> true
```

```
(os-type? :windows)  
=> false
```

SEE ALSO

[os-type](#)

Returns the OS type. Type is one of `:windows`, `:mac-osx`, `:linux`, `:unix`, or `:unknown`

[os-arch](#)

Returns the OS architecture. E.g: "x86_64"

[os-name](#)

Returns the OS name. E.g.: "Mac OS X"

[os-version](#)

Returns the OS version

[top](#)

os-version

```
(os-version)
```

Returns the OS version

```
(os-version)  
=> "14.2.1"
```

SEE ALSO

[os-type](#)

Returns the OS type. Type is one of `:windows`, `:mac-osx`, `:linux`, `:unix`, or `:unknown`

[os-type?](#)

Returns true if the OS id of the type otherwise false. Type is one of `:windows`, `:mac-osx`, `:linux`, or `:unix`

[os-arch](#)

Returns the OS architecture. E.g: "x86_64"

[os-name](#)

Returns the OS name. E.g.: "Mac OS X"

[top](#)

parsifal/>>

```
(>> p)  
(>> p q)  
(>> p q & ps)
```

Returns a new parser that parses a list of parsers. Returns the value of the last parser if all parsers succeed, else the parser fails.

Note: *Parsifal* is not implementing backtracking by default, and instead relies on the programmer to implement backtracking using constructs like `lookahead` and `attempt`.

The parser `>>` does not rewind the input state if any of the sub parsers fails. `>>*` is the backtracking version of `>>` that wraps the parsers within a call to `attempt`. See the backtracking example below.

```
(do
  (load-module :parsifal ['parsifal :as 'p])

  (p/run (p/>> (p/char #\lparen) (p/digit) (p/char #\rparen)) "(1)")
  ; => #\)

  ; Using bindings
  (p/run (p/let->> [l (p/char #\lparen)
                    d (p/digit)
                    r (p/char #\rparen)]
                (p/always (str l d r)))
        "(1)")
  ; => "(1)"
)

; Backtracking demo
(do
  (load-module :parsifal ['parsifal :as 'p])

  ; No backtracking with ``>>`` parser
  (p/run (p/either (p/>> (p/letter) (p/digit))
            (p/letter))
        "abc")
  ; => ParseError: Unexpected token 'b' at line: 1 column: 2

  ; Backtracking with ``>>*`` parser
  (p/run (p/either (p/>>* (p/letter) (p/digit))
            (p/letter))
        "abc")
  ; => #\a
)
```

[top](#)

parsifal/SourcePosition

Defines a protocol to add line and column information for custom tokens.

Definition:

```
(defprotocol SourcePosition
  (line [p])
  (column [p]))
```

```
(do
  (load-module :parsifal ['parsifal :as 'p])

  (deftype :Token [type :keyword, val :string, line :long, column :long]
    Object
    (toString [this] (str/format "[%s %s (%d,%d)]"
                                   (pr-str (:type this))
                                   (pr-str (:val this))
                                   (:line this)
                                   (:column this))))
```

```

p/SourcePosition
  (line [this] (:line this))
  (column [this] (:column this)))

(p/defparser lbracket []
  (p/let->> [[l c] (p/pos)
             t      (p/char #\[)]
            (p/always (Token. :lbracket (str t) l c))))

(p/run (lbracket) "[1,2,3]")
; => [:lbracket "[" (1,1)]
)

```

SEE ALSO

[defprotocol](#)

Defines a new protocol with the supplied function specs.

[deftype](#)

Defines a new custom record type for the name with the fields.

[top](#)

parsifal/always

```
(always x)
```

A parser that always succeeds with the value given and consumes no input.

```

(do
  (load-module :parsifal ['parsifal :as 'p])

  (p/defparser integer []
    (p/let->> [t (p/many1 (p/digit))]
              (p/always (long (apply str t)))))

  (p/run (integer) "400")
  ; => 400
)

(do
  (load-module :parsifal ['parsifal :as 'p])

  (p/defparser optional [p default-value]
    (p/either (p/attempt p)
              (p/always default-value)))

  (p/run (optional (p/char #\X) #\?) "X400")
  ; => #\X

  (p/run (optional (p/char #\X) #\?) "400")
  ; => #\?
)

```

[top](#)

parsifal/any

(any)

Consume any single item from the head of the input. This parser will fail to consume if the input is empty.

```
(do
  (load-module :parsifal ['parsifal :as 'p])

  (p/run (p/any) "Cats")
  ; => #\C

  (p/run (p/any) [#\C #\a #\t #\s])
  ; => #\C
)
```

[top](#)

parsifal/any-char

(any-char)

Consume any character.

Note: Works with char items only!

```
(do
  (load-module :parsifal ['parsifal :as 'p])

  (p/run (p/any-char) "Cats")
  ; => #\C

  (p/run (p/any-char) [#\C #\a #\t #\s])
  ; => #\C
)
```

[top](#)

parsifal/any-char-of

(any-char-of s)

Consume any of the characters given in the string. E.g.: (any-char-of "({") .

Note: Works with char items only!

```
(do
  (load-module :parsifal ['parsifal :as 'p])

  (p/run (p/any-char-of "HXYZ") "Hello, world!")
  ; => #\H
)
```

[top](#)

parsifal/attempt

```
(attempt p)
```

A parser that will attempt to parse `p`, and upon failure never consume any input.

Note: *Parsifal* is not implementing backtracking by default, and instead relies on the programmer to implement backtracking using constructs like `lookahead` and `attempt`.

The parsers `>>` and `let->>` do not rewind the input state if any of the sub parsers fails. To add backtracking parsers can be wrapped with `attempt!`

```
(do
  (load-module :parsifal ['parsifal :as 'p])

  (p/defparser optional [p default-value]
    (p/either (p/attempt p)
              (p/always default-value)))

  (p/run (optional (p/char #\X) #\?) "400")
  ; => #\?
)

(do
  (load-module :parsifal ['parsifal :as 'p])

  ; Backtracking

  ; No implicit backtracking with `>>` parser!
  (p/run (p/either (p/>> (p/letter) (p/digit))
                  (p/letter))
        "abc")
  ; => ParseError: Unexpected token 'b' at line: 1 column: 2

  ; Explicit backtracking with `>>>` parser using `attempt!`
  (p/run (p/either (p/attempt (p/>>> (p/letter) (p/digit)))
                  (p/letter))
        "abc")
  ; => #\a
)
```

[top](#)

parsifal/between

```
(between open close p)
```

Returns a new parser that parses `open`, `p`, and `close` returning the value of `p` and discarding the values of `open` and `close`. Does not consume any input on failure.

```
(do
  (load-module :parsifal ['parsifal :as 'p])
  (p/run (p/between (p/char #\lparen)
                    (p/char #\rparen)
                    (p/many1 (p/digit)))
        "(123)")
  ; => [#\1 #\2 #\3]
)
```

[top](#)

parsifal/char

(char)

Consume the given character.

Note: Works with char items only!

```
(do
  (load-module :parsifal ['parsifal :as 'p])

  (p/run (p/char #\H) "Hello")
  ; => #\H

  (p/run (p/char #\H) [#\H #\e #\l #\l #\o])
  ; => #\H
)
```

[top](#)

parsifal/choice

(choice & p)

Returns a new parser that tries each given parsers in turn, returning the value of the first one that succeeds.

```
(do
  (load-module :parsifal ['parsifal :as 'p])

  (p/run (p/choice (p/many1 (p/digit)) (p/many1 (p/letter))) "Hello")
  ; => [#\H #\e #\l #\l #\o]

  (p/run (p/choice (p/many1 (p/digit)) (p/many1 (p/letter))) "42")
  ; => [#\4 #\2]
)
```

[top](#)

parsifal/defparser

(defparser name args & body)

The `defparser` macro defines `_functions_` that create parsers.

Note: *Parsifal* is not implementing backtracking by default, and instead relies on the programmer to implement backtracking using constructs like `lookahead` and `attempt`.

The parsers created by this macro do not rewind the input state if one of the sub parsers fails. To allow backtracking `attempt` can be used!

```
(do
  (load-module :parsifal ['parsifal :as 'p])

  (p/defparser sample []
    (p/string "Hello")
    (p/always 42))
)
```

```

(p/run (sample) "Hello, world!")
; => 42
)

(do
  (load-module :parsifal ['parsifal :as 'p])

  ; Backtracking

  (p/defparser letter-and-digit []
    (p/letter)
    (p/digit))

  ; No implicit backtracking!
  (p/run (p/either (letter-and-digit) (p/letter)) "abc")
  ; => ParseError: Unexpected token 'b' at line: 1 column: 2

  ; Explicit backtracking with `attempt`!
  (p/run (p/either (p/attempt (letter-and-digit)) (p/letter)) "abc")
  ; => #\a
)

```

[top](#)

parsifal/digit

(digit)

Consume a digit [0-9] character.

Note: Works with char items only!

```

(do
  (load-module :parsifal ['parsifal :as 'p])

  (p/run (p/digit) "123")
  ; => #\1

  (p/run (p/any-char) [#\1 #\2 #\3])
  ; => #\1
)

```

[top](#)

parsifal/either

(either p q)

Returns a new parser that tries `p`, upon success, returning its value, and upon failure (if no input was consumed) tries to parse `q`

```

(do
  (load-module :parsifal ['parsifal :as 'p])

  (p/run (p/either (p/many1 (p/digit)) (p/many1 (p/letter))) "Hello")
  ; => [#\H #\e #\l #\l #\o]
)

```

```
(p/run (p/either (p/many1 (p/digit)) (p/many1 (p/letter)))) "42")
; => [#\4 #\2]
)
```

[top](#)

parsifal/eof

```
(eof)
(eof err-msg)
```

A parser to detect the end of input. If there is nothing more to consume from the underlying input, this parser succeeds with a `nil` value, otherwise it fails.

A custom error message can be provided for the case the parser fails.

```
(do
  (load-module :parsifal ['parsifal :as 'p])

  (p/run (p/eof) "")
  ; => nil

  (p/run (p/eof) "a")
  ; => ParseError: Expected end of input at line: 1 column: 1
)
```

[top](#)

parsifal/hexdigit

```
(hexdigit)
```

Consume a hex digit [0-9a-fA-F] character.

Note: Works with char items only!

```
(do
  (load-module :parsifal ['parsifal :as 'p])

  (p/run (p/hexdigit) "A00")
  ; => #\A

  (p/run (p/hexdigit) [#\A #\0 #\0])
  ; => #\A
)
```

[top](#)

parsifal/let->>

```
(let->> [[& bindings_] & body])
```

Binds parser results to names for further processing input.

Note: *Parsifal* is not implementing backtracking by default, and instead relies on the programmer to implement backtracking using constructs like `lookahead` and `attempt`.

The parser `let->>` does not rewind the input state if one of the sub parsers fails. `let->>*` is the backtracking version of `let->>` that wraps the parsers within a call to `attempt`. See the backtracking example below.

```
(do
  (load-module :parsifal ['parsifal :as 'p])

  (p/defparser float []
    (p/let->> [i (p/many1 (p/digit))
               d (p/char #\.)
               f (p/many1 (p/digit))]
      (p/always (apply str (flatten (list i d f))))))

  (p/run (float) "10.56")
  ; => "10.56"
)

(do
  (load-module :parsifal ['parsifal :as 'p])

  (p/defparser int []
    (p/let->> [i (p/many1 (p/digit))]
      (let [n (long (apply str i))]
        (if (even? n)
            (p/always (str n " is even"))
            (p/always (str n " is odd"))))))))

  (p/run (int) "500")
  ; => "500 is even"
)

; Backtracking demo
(do
  (load-module :parsifal ['parsifal :as 'p])

  ; No backtracking with `let->>` parser!
  (p/run (p/either (p/let->> [c (p/letter)
                             d (p/digit)]
                        (p/always (list c d)))
            (p/letter))
    "abc")
  ; => ParseError: Unexpected token 'b' at line: 1 column: 2

  ; Backtracking with `let->>*` parser
  (p/run (p/either (p/let->>* [c (p/letter)
                              d (p/digit)]
                       (p/always (list c d)))
            (p/letter))
    "abc")
  ; => #\a
)
```

[top](#)

parsifal/letter

```
(letter)
```

Consume a letter character defined by Java `Character.isLetter(ch)` .

Note: Works with char items only!

```
(do
  (load-module :parsifal ['parsifal :as 'p])

  (p/run (p/letter) "Cats")
  ; => #\C

  (p/run (p/letter) [#\C #\a #\t #\s])
  ; => #\C
)
```

[top](#)

parsifal/letter-or-digit

(letter-or-digit)

Consume a letter or digit character defined by Java `Character.isLetterOrDigit(ch)` .

Note: Works with char items only!

```
(do
  (load-module :parsifal ['parsifal :as 'p])

  (p/run (p/letter-or-digit) "Cats")
  ; => #\C

  (p/run (p/letter-or-digit) "5Cats")
  ; => #\5

  (p/run (p/letter-or-digit) [#\C #\a #\t #\s])
  ; => #\C
)
```

[top](#)

parsifal/lineno

(lineno)

A parser that returns the current line number. It consumes no input.

```
(do
  (load-module :parsifal ['parsifal :as 'p])

  (p/defparser integer []
    (p/let->> [l (p/lineno)
               t (p/many1 (p/digit))]
      (p/always [:int (apply str t) l])))

  (p/run (integer) "400")
  ; => [:int "400" 1]
)
```

parsifal/lookahead

(lookahead p)

A parser that upon success consumes no input, but returns what was parsed.

Note: *Parsifal* is not implementing backtracking by default, and instead relies on the programmer to implement backtracking using constructs like `lookahead` and `attempt`.

```
(do
  (load-module :parsifal ['parsifal :as 'p])

  (p/defparser block-string-tok []
    (p/between (p/times 3 (p/char #\quote))
      (p/times 3 (p/char #\quote))
      (p/many (p/let->> [cs (p/lookahead (p/times 3 (p/any-char)))]
        (if (= cs [#\quote #\quote #\quote])
          (p/never)
          (p/any-char)))))))

  (p/defparser block-string []
    (p/let->> [s (block-string-tok)]
      (p/always (apply str s))))

  (p/run (block-string) "\"\"\"A \"string\" with quotes!\"\"\"")
  ; => "A \"string\" with quotes!"
)
```

parsifal/many

(many p)

Returns a new parser that will parse zero or more items that match the given parser `p`. The matched items are concatenated into a sequence.

Note: A `ParseError` will be thrown if this combinator is applied to a parser that accepts the empty string, as that would cause the parser to loop forever.

```
(do
  (load-module :parsifal ['parsifal :as 'p])

  (p/run (p/many (p/digit)) "1234-0000")
  ; => [#\1 #\2 #\3 #\4]

  (p/run (p/many (p/digit)) "ABC-12345")
  ; => []
)
```

parsifal/many1


```
(many1 p)
```

Returns a new parser that will parse one or more items that match the given parser `p`. The matched items are concatenated into a sequence.

Note: A `ParseError` will be thrown if this combinator is applied to a parser that accepts the empty string, as that would cause the parser to loop forever.

```
(do
  (load-module :parsifal ['parsifal :as 'p])

  (p/run (p/many1 (p/digit)) "1234-0000")
  ; => [#\1 #\2 #\3 #\4]

  (p/run (p/many1 (p/digit)) "ABC-12345")
  ; => ParseError: Unexpected token 'A' at line: 1 column: 1
)
```

[top](#)

parsifal/never

```
(never)
(never err-msg)
(never err-msg line column)
```

A parser that always fails, consuming no input.

```
(do
  (load-module :parsifal ['parsifal :as 'p])

  ;; parse a string with a single integer
  (p/defparser single-integer []
    (p/let->> [i (p/many1 (p/digit))
               t (p/either (p/eof) (p/any))])
    (if (nil? t)
        (p/always (apply str i))
        (p/never (str "Unexpected token '" t "'")))))

  (p/run (single-integer) "400")
  ; => "400"

  (p/run (single-integer) "400-")
  ; => ParseError: Unexpected token '-' at line: 1 column: 5
)
```

[top](#)

parsifal/none-char-of

```
(none-char-of s)
```

Consume all but of the characters given in the string. E.g.: `(none-char-of "({")`.

Note: Works with char items only!

```
(do
  (load-module :parsifal ['parsifal :as 'p])
```

```
(p/run (p/none-char-of "()[]{}") "Hello, world!")
; => #\H
)
```

top

parsifal/not-char

(not-char)

Consume all but the given character

```
(do
  (load-module :parsifal ['parsifal :as 'p])

  (p/run (p/not-char #\x) "Cats")
  ; => #\C

  (p/run (p/not-char #\x) [#\C #\a #\t #\s])
  ; => #\C
)
```

top

parsifal/pos

(pos)

A parser that returns the current line/column number as tuple of `[line col]`. It consumes no input.

```
(do
  (load-module :parsifal ['parsifal :as 'p])

  (p/defparser integer []
    (p/let->> [[l c] (p/pos)
               t      (p/many1 (p/digit))]]
    (p/always [:int (apply str t) (list l c)])))

  (p/run (integer) "400")
  ; => [:int "400" (1,1)]
)
```

top

parsifal/run

(run p input)

Run a parser `p` over some input. The input can be a string or a seq of tokens, if the parser produces an error, its message is wrapped in a *ParseError* and thrown, and if the parser succeeds, its value is returned.

Parsifal is port of Nate Young's Clojure Parsatron [parser combinators](#) project.

Parsifal is not implementing backtracking by default, and instead relies on the programmer to implement backtracking using constructs like `lookahead` and `attempt`.

A simple parser example:

```
(do
  (load-module :parsifal ['parsifal :as 'p])

  (p/run (p/char #\H) "Hello")
  ; => #\H

  (p/run (p/char #\H) [#\H #\e #\l #\l #\o])
  ; => #\H
)
```

[top](#)

parsifal/string

```
(string s)
```

Consume the given string and returns a string. Does not consume any input upon failure.

Note: Works with char items only!

```
(do
  (load-module :parsifal ['parsifal :as 'p])

  (p/run (p/string "Hello") "Hello, world!")
  ; => "Hello"

  (p/run (p/string "Hello") (seq "Hello, world!"))
  ; => "Hello"
)

(do
  (load-module :parsifal ['parsifal :as 'p])

  (p/run (p/either (p/string "Hello") (p/letter)) "Hello, world!")
  ; => "Hello"

  (p/run (p/either (p/string "Hello") (p/letter)) "Hello, world!")
  ; => #\H
)
```

[top](#)

parsifal/times

```
(times n p)
```

Returns a new parser that consumes exactly *n* times what the parser `p` matches. The matched items are concatenated into a sequence. Does not consume any input if not all of the repetitions match.

```
(do
  (load-module :parsifal ['parsifal :as 'p])
```

```
(p/run (p/times 5 (p/letter)) "Hello, world!")
; => [#\H #\e #\l #\l #\o]

;; Note: `p/times` is different from parsing letters explicitly
(p/run (p/>> (p/letter)
            (p/letter)
            (p/letter)
            (p/letter)
            (p/letter))
      "Hello, world!")
; => [#\o]
)
```

[top](#)

parsifal/token

(token)

Consume a single item from the head of the input if `(consume? item)` predicate is not `nil`. This parser will fail to consume if either the `consume?` test returns `false` or if the input is empty.

```
(do
  (load-module :parsifal ['parsifal :as 'p])

  (p/run (p/token #(< % 5)) [3 5 7])
  ; => 3

  (p/run (p/token str/upper-case) "Hello")
  ; => #\H
)
```

[top](#)

partial

(partial f args*)

Takes a function `f` and fewer than the normal arguments to `f`, and returns a fn that takes a variable number of additional args. When called, the returned function calls `f` with `args` + additional args.

```
((partial * 2) 3)
=> 6

(map (partial * 2) [1 2 3 4])
=> (2 4 6 8)

(map (partial reduce +) [[1 2 3 4] [5 6 7 8]])
=> (10 26)

(do
  (def hundred-times (partial * 100))
  (hundred-times 5))
=> 500
```

partition

```
(partition n coll)
(partition n step coll)
(partition n step padcoll coll)
```

Returns a collection of lists of *n* items each, at offsets *step* apart. If *step* is not supplied, defaults to *n*, i.e. the partitions do not overlap. If a *padcoll* collection is supplied, use its elements as necessary to complete last partition upto *n* items. In case there are not enough padding elements, return a partition with less than *n* items. *padcoll* may be a lazy sequence

```
(partition 3 [0 1 2 3 4 5 6])
=> ([0 1 2] [3 4 5])

(partition 3 3 (repeat 99) [0 1 2 3 4 5 6])
=> ([0 1 2] [3 4 5] [6 99 99])

(partition 3 3 [] [0 1 2 3 4 5 6])
=> ([0 1 2] [3 4 5] [6])

(partition 2 3 [0 1 2 3 4 5 6])
=> ([0 1] [3 4])

(partition 3 1 [0 1 2 3 4 5 6])
=> ([0 1 2] [1 2 3] [2 3 4] [3 4 5] [4 5 6])

(partition 3 6 ["a"] (range 20))
=> ((0 1 2) (6 7 8) (12 13 14) (18 19 "a"))

(partition 4 6 ["a" "b" "c" "d"] (range 20))
=> ((0 1 2 3) (6 7 8 9) (12 13 14 15) (18 19 "a" "b"))
```

SEE ALSO

[partition-all](#)

Returns a collection of lists of *n* items each, at offsets *step* apart. If *step* is not supplied, defaults to *n*, i.e. the partitions do ...

[partition-by](#)

Applies *f* to each value in *coll*, splitting it each time *f* returns a new value.

partition-all

```
(partition-all n coll)
(partition-all n step coll)
```

Returns a collection of lists of *n* items each, at offsets *step* apart. If *step* is not supplied, defaults to *n*, i.e. the partitions do not overlap. May include partitions with fewer than *n* items at the end.

```
(partition-all 3 [0 1 2 3 4 5 6])
=> ([0 1 2] [3 4 5] [6])
```

```
(partition-all 2 3 [0 1 2 3 4 5 6])
=> ([0 1] [3 4] [6])

(partition-all 3 1 [0 1 2 3 4 5 6])
=> ([0 1 2] [1 2 3] [2 3 4] [3 4 5] [4 5 6] [5 6])

(partition-all 3 6 ["a"])
=> (["a"])

(partition-all 2 2 ["a" "b" "c" "d"])
=> (["a" "b"] ["c" "d"])
```

SEE ALSO

[partition](#)

Returns a collection of lists of *n* items each, at offsets *step* apart. If *step* is not supplied, defaults to *n*, i.e. the partitions do ...

[partition-by](#)

Applies *f* to each value in *coll*, splitting it each time *f* returns a new value.

[top](#)

partition-by

```
(partition-by f coll)
```

Applies *f* to each value in *coll*, splitting it each time *f* returns a new value.

```
(partition-by even? [1 2 4 3 5 6])
=> ((1) (2 4) (3 5) (6))

(partition-by identity (seq "ABBA"))
=> ((#\A) (#\B #\B) (#\A))

(partition-by identity [1 1 1 1 2 2 3])
=> ((1 1 1 1) (2 2) (3))
```

SEE ALSO

[partition](#)

Returns a collection of lists of *n* items each, at offsets *step* apart. If *step* is not supplied, defaults to *n*, i.e. the partitions do ...

[partition-all](#)

Returns a collection of lists of *n* items each, at offsets *step* apart. If *step* is not supplied, defaults to *n*, i.e. the partitions do ...

[top](#)

pcalls

```
(pcalls & fns)
```

Executes the no-arg *fns* in parallel, returning a sequence of their values in the same order the functions are passed. In contrast, side effects of *fns* (if any) are coming in random order!

`pcalls` is implemented using Venice futures and processes `(+ 2 (cpus))` functions in parallel.

```
(pcalls #(+ 1 2) #(+ 2 3) #(+ 3 4))  
=> (3 5 7)
```

SEE ALSO

[pmap](#)

Like map, except f is applied in parallel. Only useful for computationally intensive functions where the time of f dominates the coordination ...

[preduce](#)

Reduces a collection using a parallel reduce-combine strategy. The collection is partitioned into groups of approximately n items, ...

[cpus](#)

Returns the number of available processors or number of hyperthreads if the CPU supports hyperthreads.

[top](#)

pdf/available?

```
(pdf/available?)
```

Checks if the 3rd party libraries required for generating PDFs are available.

```
(pdf/available?)
```

[top](#)

pdf/check-required-libs

```
(pdf/check-required-libs)
```

Checks if the 3rd party libraries required for generating PDFs are available. Throws an exception if not.

```
(pdf/check-required-libs)
```

[top](#)

pdf/copy

```
(pdf/copy pdf & page-nr)
```

Copies pages from a PDF to a new PDF. The PDF is passed as bytebuf. Returns the new PDF as a bytebuf.

```
; copy the first and second page
```

```
(pdf/copy pdf :1 :2)
```

```
; copy the last and second last page
```

```
(pdf/copy pdf :-1 :-2)
```

```
; copy the pages 1, 2, 6-10, and 12
```

```
(pdf/copy pdf :1 :2 :6-10 :12)
```

SEE ALSO

[pdf/merge](#)

Merge multiple PDFs into a single PDF. The PDFs are passed as bytearray. Returns the new PDF as a bytearray.

[pdf/pages](#)

Returns the number of pages of a PDF. The PDF is passed as bytearray.

[pdf/watermark](#)

Adds a watermark text to the pages of a PDF. The passed PDF pdf is a bytearray. Returns the new PDF as a bytearray.

[top](#)

pdf/merge

```
(pdf/merge pdfs)
```

Merge multiple PDFs into a single PDF. The PDFs are passed as bytearray. Returns the new PDF as a bytearray.

```
(pdf/merge pdf1 pdf2)
```

```
(pdf/merge pdf1 pdf2 pdf3)
```

SEE ALSO

[pdf/copy](#)

Copies pages from a PDF to a new PDF. The PDF is passed as bytearray. Returns the new PDF as a bytearray.

[pdf/pages](#)

Returns the number of pages of a PDF. The PDF is passed as bytearray.

[pdf/watermark](#)

Adds a watermark text to the pages of a PDF. The passed PDF pdf is a bytearray. Returns the new PDF as a bytearray.

[top](#)

pdf/pages

```
(pdf/pages pdf)
```

Returns the number of pages of a PDF. The PDF is passed as bytearray.

```
(->> (str/lorem-ipsu :paragraphs 30)
      (pdf/text-to-pdf)
      (pdf/pages))
=> 3
```

SEE ALSO

[pdf/merge](#)

Merge multiple PDFs into a single PDF. The PDFs are passed as bytearray. Returns the new PDF as a bytearray.

[pdf/copy](#)

Copies pages from a PDF to a new PDF. The PDF is passed as bytearray. Returns the new PDF as a bytearray.

[pdf/watermark](#)

Adds a watermark text to the pages of a PDF. The passed PDF pdf is a bytearray. Returns the new PDF as a bytearray.

[top](#)

pdf/render

```
(pdf/render xhtml & options)
```

Renders a PDF.

Options:

:base-url url a base url for resources . E.g.: "classpath:"
:resources resmap a resource map for dynamic resources

```
(pdf/render xhtml :base-url "classpath:/")
```

```
(pdf/render xhtml  
  :base-url "classpath/"  
  :resources {"/chart_1.png" (chart-create :2018)  
             "/chart_2.png" (chart-create :2019) })
```

SEE ALSO

[pdf/text-to-pdf](#)

Creates a PDF from simple text. The tool process line-feeds '\n' and form-feeds. To start a new page just insert a form-feed marker ...

[top](#)

pdf/text-to-pdf

```
(pdf/text-to-pdf text & options)
```

Creates a PDF from simple text. The tool process line-feeds '\n' and form-feeds. To start a new page just insert a form-feed marker "<form-feed>".

Options:

:font-size n font size in pt (double), defaults to 9.0
:font-weight n font weight (0...1000) (long), defaults to 200
:font-monospace b if true use monospaced font, defaults to false

```
(->> (pdf/text-to-pdf "Lorem Ipsum...")  
  (io/spit "text.pdf"))
```

SEE ALSO

[pdf/render](#)

Renders a PDF.

[pdf/to-text](#)

Extracts the text from a PDF.

[top](#)

pdf/to-text

```
(pdf/to-text pdf)
```

Extracts the text from a PDF.

pdf may be a:

- string file path, e.g: `"/temp/foo.pdf"`
- `bytebuffer`
- `java.io.File`, e.g: `(io/file "/temp/foo.pdf")`
- `java.io.InputStream`

```
(-> (pdf/text-to-pdf "Lorem Ipsum...")
    (pdf/to-text)
    (println))
```

SEE ALSO

[pdf/text-to-pdf](#)

Creates a PDF from simple text. The tool process line-feeds '\n' and form-feeds. To start a new page just insert a form-feed marker ...

[pdf/render](#)

Renders a PDF.

[top](#)

pdf/watermark

```
(pdf/watermark pdf options-map)
(pdf/watermark pdf & options)
```

Adds a watermark text to the pages of a PDF. The passed PDF pdf is a bytebuf. Returns the new PDF as a bytebuf.

Options:

:text s	watermark text (string), defaults to "WATERMARK"
:font-size n	font size in pt (double), defaults to 24.0
:font-char-spacing n	font character spacing (double), defaults to 0.0
:color s	font color (HTML color string), defaults to #000000
:opacity n	opacity 0.0 ... 1.0 (double), defaults to 0.4
:outline-color s	font outline color (HTML color string), defaults to #000000
:outline-opacity n	outline opacity 0.0 ... 1.0 (double), defaults to 0.8
:outline-width n	outline width 0.0 ... 10.0 (double), defaults to 0.5
:angle n	angle 0.0 ... 360.0 (double), defaults to 45.0
:over-content b	print text over the content (boolean), defaults to true
:skip-top-pages n	the number of top pages to skip (long), defaults to 0
:skip-bottom-pages n	the number of bottom pages to skip (long), defaults to 0

```
(pdf/watermark pdf :text "CONFIDENTIAL" :font-size 64 :font-char-spacing 10.0)
```

```
(let [watermark { :text "CONFIDENTIAL"
                  :font-size 64
                  :font-char-spacing 10.0 } ]
    (pdf/watermark pdf watermark))
```

SEE ALSO

[pdf/merge](#)

Merge multiple PDFs into a single PDF. The PDFs are passed as bytebuf. Returns the new PDF as a bytebuf.

[pdf/copy](#)

Copies pages from a PDF to a new PDF. The PDF is passed as bytebuf. Returns the new PDF as a bytebuf.

[pdf/pages](#)

Returns the number of pages of a PDF. The PDF is passed as bytebuf.

[top](#)

peek

```
(peek coll)
```

For a list, same as first, for a vector, same as last, for a stack the top element (or nil if the stack is empty), for a queue the head element (or nil if the queue is empty).

```
(peek '(1 2 3 4))  
=> 1
```

```
(peek [1 2 3 4])  
=> 4
```

```
(let [s (conj! (stack) 1 2 3 4)]  
      (peek s))  
=> 4
```

```
(let [q (conj! (queue) 1 2 3 4)]  
      (peek q))  
=> 1
```

[top](#)

perf

```
(perf expr warmup-iterations test-iterations)
```

Performance test with the given expression.

Runs the test in 3 phases:

1. Runs the expr in a warmup phase to allow the HotSpot compiler to do optimizations.
2. Runs the garbage collector.
3. Runs the expression under profiling. Returns nil.

After a test run metrics data can be obtained with (prof :data-formatted)

```
(do  
  (perf (+ 120 200) 12000 1000)  
  (println (prof :data-formatted)))
```

SEE ALSO

[time](#)

Evaluates expr and prints the time it took. Returns the value of expr.

[prof](#)

Controls the code profiling. See the companion functions/macros 'dorun' and 'perf'. The perf macro is built on prof and dorun and provides ...

pid

```
(pid)
```

Returns the PID of this process.

```
(pid)
=> "2437"
```

pmap

```
(pmap f coll)
(pmap f coll & colls)
```

Like `map`, except `f` is applied in parallel. Only useful for computationally intensive functions where the time of `f` dominates the coordination overhead.

The result collection is sorted in the same way as for `map`, i.e. it preserves the items' order in the `coll` (or `colls`) parameter(s) of `pmap`. In other words: calculation is done parallel, but the result is delivered in the order the input came (in `coll/colls`). In contrast, side effects of `f` (if any) are coming in random order!

`pmap` is implemented using Venice futures and processes `(+ 2 (cpus))` items in parallel.

```
;; With `pmap`, the total elapsed time is just over 2 seconds:
```

```
(do
  (defn long-running-job [n]
    (sleep 2000) ; wait for 2 seconds
    (+ n 10))
  (time (pmap long-running-job (range 4))))
Elapsed time: 2.00s
=> (10 11 12 13)
```

```
;; With `map`, the total elapsed time is roughly 4 * 2 seconds:
```

```
(do
  (defn long-running-job [n]
    (sleep 2000) ; wait for 2 seconds
    (+ n 10))
  (time (map long-running-job (range 4))))
Elapsed time: 8.02s
=> (10 11 12 13)
```

SEE ALSO

[pcalls](#)

Executes the no-arg fns in parallel, returning a sequence of their values in the same order the functions are passed. In contrast, ...

[preduce](#)

Reduces a collection using a parallel reduce-combine strategy. The collection is partitioned into groups of approximately `n` items, ...

[map](#)

Applies `f` to the set of first items of each `coll`, followed by applying `f` to the set of second items in each `coll`, until any one of the ...

[cpus](#)

Returns the number of available processors or number of hyperthreads if the CPU supports hyperthreads.

poll!

```
(poll! queue)
(poll! queue timeout)
```

Polls an item from a queue with an optional timeout in milliseconds. For an indefinite timeout pass the timeout value `:indefinite`. If no timeout is given returns the item if one is available else returns `nil`. With a timeout returns the item if one is available within the given timeout else returns `nil`.

```
(let [q (conj! (queue) 1 2 3 4)]
  (poll! q)
  (poll! q 1000)
  q)
=> (3 4)
```

SEE ALSO

[queue](#)

Creates a new mutable threadsafe bounded or unbounded queue.

[put!](#)

Puts an item to a queue. The operation is synchronous, it waits indefinitely until the value can be placed on the queue. Returns always `nil`.

[take!](#)

Retrieves and removes the head value of the queue, waiting if necessary until a value becomes available.

[offer!](#)

Offers an item to a queue with an optional timeout in milliseconds. If a timeout is given waits up to the specified wait time if necessary ...

[peek](#)

For a list, same as `first`, for a vector, same as `last`, for a stack the top element (or `nil` if the stack is empty), for a queue the ...

[empty?](#)

Returns true if `x` is empty. Accepts strings, collections and `bytebufs`.

[count](#)

Returns the number of items in the collection. `(count nil)` returns 0. Also works on strings, and Java Collections

pop

```
(pop coll)
```

For a list, returns a new list without the first item, for a vector, returns a new vector without the last item.

```
(pop '(1 2 3 4))
=> (2 3 4)
```

```
(pop [1 2 3 4])
=> [1 2 3]
```

pop!

```
(pop! stack)
```

Pops an item from a stack.

```
(let [s (stack)]
  (push! s 1)
  (push! s 2)
  (push! s 3)
  (pop! s))
=> 3
```

SEE ALSO

[stack](#)

Creates a new mutable threadsafe stack.

[peek](#)

For a list, same as first, for a vector, same as last, for a stack the top element (or nil if the stack is empty), for a queue the ...

[push!](#)

Pushes an item to a stack.

[empty?](#)

Returns true if x is empty. Accepts strings, collections and bytebufs.

[count](#)

Returns the number of items in the collection. (count nil) returns 0. Also works on strings, and Java Collections

top

pos?

```
(pos? x)
```

Returns true if x greater than zero else false

```
(pos? 3)
=> true
```

```
(pos? -3)
=> false
```

```
(pos? (int 3))
=> true
```

```
(pos? 3.2)
=> true
```

```
(pos? 3.2M)
=> true
```

SEE ALSO

[zero?](#)

Returns true if x zero else false

[neg?](#)

Returns true if x smaller than zero else false

[top](#)

postwalk

```
(postwalk f form)
```

Performs a depth-first, post-order traversal of form. Calls f on each sub-form, uses f's return value in place of the original.

```
(postwalk (fn [x] (println "Walked:" (pr-str x)) x)
          '(1 2 {:a 1 :b 2}))
```

```
Walked: 1
Walked: 2
Walked: :a
Walked: 1
Walked: [:a 1]
Walked: :b
Walked: 2
Walked: [:b 2]
Walked: {:a 1 :b 2}
Walked: (1 2 {:a 1 :b 2})
=> (1 2 {:a 1 :b 2})
```

SEE ALSO

[prewalk](#)

Performs a depth-last, pre-order traversal of form. Calls f on each sub-form, uses f's return value in place of the original.

[top](#)

postwalk-replace

```
(postwalk-replace smap form)
```

Recursively transforms form by replacing keys in smap with their values. Like `replace` but works on any data structure. Does replacement at the leaves of the tree first.

`postwalk-replace` is the equivalent of *Common Lisp's* `sublis` function.

```
(postwalk-replace {:a 1 :b 2} [:a :b])
=> [1 2]
```

```
(postwalk-replace {:a 1 :b 2} [:a :b :c])
=> [1 2 :c]
```

```
(postwalk-replace {:a 1 :b 2} [:a :b [:a :b] :c])
=> [1 2 [1 2] :c]
```

```
(postwalk-replace {'x 1 'y 2} '(+ x y))
=> (+ 1 2)
```

SEE ALSO

[prewalk-replace](#)

Recursively transforms form by replacing keys in smap with their values. Like replace but works on any data structure. Does replacement ...

[postwalk](#)

Performs a depth-first, post-order traversal of form. Calls f on each sub-form, uses f's return value in place of the original.

[top](#)

pow

```
(pow x y)
```

Returns the value of x raised to the power of y

```
(pow 10 2)
=> 100.0
```

```
(pow 10.23 2)
=> 104.6529
```

```
(pow 10.23 2.5)
=> 334.7257199023319
```

[top](#)

pr

```
(pr & xs)
(pr os & xs)
```

Prints the values `xs` to the output stream that is the current value of `*out*` or to the passed output stream `os` if given. The passed stream must be a subclass of either `:java.io.PrintStream` or `:java.io.Writer`.

Prints the values, separated by spaces if there is more than one. `pr` and `prn` print in a way that objects can be read by the reader.

Returns `nil`.

```
(pr "hello")
"hello"
=> nil
```

```
(pr {:foo "hello" :bar 34.5})
{:foo "hello" :bar 34.5}
=> nil
```

```
(pr ['a :b "\n" #\space "c"])
[a :b "\n" #\space "c"]
=> nil
```

```
(pr *out* [10 20 30])
[10 20 30]
=> nil
```

```
(pr *err* [10 20 30])
[10 20 30]
=> nil
```


SEE ALSO

[prn](#)

Prints the values `xs` to the output stream that is the current value of `*out*` or to the passed stream `os` if given followed by a (newline).

[newline](#)

Without `arg` writes a platform-specific newline to the output channel that is the current value of `*out*`. With `arg` writes a newline ...

[pr-str](#)

With no args, returns the empty string. With one arg `x`, returns `x.toString()`. With more than one arg, returns the concatenation of ...

[top](#)

pr-str

```
(pr-str & xs)
```

With no args, returns the empty string. With one arg `x`, returns `x.toString()`. With more than one arg, returns the concatenation of the str values of the args with delimiter `' '`.

```
(pr-str)
```

```
=> ""
```

```
(pr-str 1 2 3)
```

```
=> "1 2 3"
```

SEE ALSO

[str](#)

With no args, returns the empty string. With one arg `x`, returns `x.toString()`. `(str nil)` returns the empty string. With more than one ...

[top](#)

preduce

```
(preduce n combine-fn combine-seed reduce-fn reduce-seed coll)
```

```
(preduce n reduce-fn reduce-seed coll)
```

Reduces a collection using a parallel reduce-combine strategy. The collection is partitioned into groups of approximately `n` items, each of which is reduced with `reduce-fn` (with `reduce-seed` as its seed value) in parallel. The results of these reductions are then reduced with the `combine-fn` (with `combine-seed` as its seed value). Without an explicit `combine-fn` the `reduce-fn` and its seed `reduce-seed` will be used as `combine-fn` and `combine-seed`.

```
(preduce 3 + 0 + 0 [1 2 3 4 5])
```

```
=> 15
```

```
(preduce 3 (fn [acc x] (+ acc x)) 0 (fn [acc x] (+ acc x)) 0 [1 2 3 4 5])
```

```
=> 15
```

```
(preduce 3 + 0 [1 2 3 4 5])
```

```
=> 15
```

```
(preduce 3 (fn [acc x] (+ acc x)) 0 [1 2 3 4 5])
```

```
=> 15
```

SEE ALSO

[reduce](#)

f should be a function of 2 arguments. If val is not supplied, returns the result of applying f to the first 2 items in coll, then ...

[map](#)

Applies f to the set of first items of each coll, followed by applying f to the set of second items in each coll, until any one of the ...

[filter](#)

Returns a collection of the items in coll for which (predicate item) returns logical true.

[pmap](#)

Like map, except f is applied in parallel. Only useful for computationally intensive functions where the time of f dominates the coordination ...

[pcalls](#)

Executes the no-arg fns in parallel, returning a sequence of their values in the same order the functions are passed. In contrast, ...

[top](#)

prewalk

```
(prewalk f form)
```

Performs a depth-last, pre-order traversal of form. Calls f on each sub-form, uses f's return value in place of the original.

```
(prewalk (fn [x] (println "Walked:" (pr-str x)) x)
          '(1 2 {:a 1 :b 2}))
```

```
Walked: (1 2 {:a 1 :b 2})
```

```
Walked: 1
```

```
Walked: 2
```

```
Walked: {:a 1 :b 2}
```

```
Walked: [:a 1]
```

```
Walked: :a
```

```
Walked: 1
```

```
Walked: [:b 2]
```

```
Walked: :b
```

```
Walked: 2
```

```
=> (1 2 {:a 1 :b 2})
```

SEE ALSO

[postwalk](#)

Performs a depth-first, post-order traversal of form. Calls f on each sub-form, uses f's return value in place of the original.

[top](#)

prewalk-replace

```
(prewalk-replace smap form)
```

Recursively transforms form by replacing keys in smap with their values. Like `replace` but works on any data structure. Does replacement at the root of the tree first.

```
(prewalk-replace {:a 1 :b 2} [:a :b])
```

```
=> [1 2]
```

```
(prewalk-replace {:a 1 :b 2} [:a :b :c])
=> [1 2 :c]



```
(prewalk-replace {:a 1 :b 2} [:a :b [:a :b] :c])
=> [1 2 [1 2] :c]
```



```
(prewalk-replace {'x 1 'y 2} '(+ x y))
=> (+ 1 2)
```


```

SEE ALSO

[postwalk-replace](#)

Recursively transforms form by replacing keys in smap with their values. Like `replace` but works on any data structure. Does replacement ...

[prewalk](#)

Performs a depth-last, pre-order traversal of form. Calls `f` on each sub-form, uses `f`'s return value in place of the original.

[top](#)

print

```
(print & xs)
(print os & xs)
```

Prints the values `xs` to the stream that is the current value of `*out*` or to the passed stream `os` that must be a subclass of either `:java.io.PrintStream` or `:java.io.Writer`.

Prints the values, separated by spaces if there is more than one. `print` and `println` print in a human readable form.

If the printed data needs to be read back by a Venice reader use the functions `pr` and `prn` instead.

Returns `nil`.

```
(print [10 20 30])
[10 20 30]
=> nil



```
(print *out* [10 20 30])
[10 20 30]
=> nil


```
(print *err* [10 20 30])
[10 20 30]
=> nil
```


```


```

SEE ALSO

[println](#)

Prints the values `xs` to the stream that is the current value of `*out*` or to the passed output stream `os` if given followed by a (newline).

[printf](#)

Without output stream prints formatted output as per `format` to the stream that is the current value of `*out*`. With a stream prints ...

[newline](#)

Without `arg` writes a platform-specific newline to the output channel that is the current value of `*out*`. With `arg` writes a newline ...

[top](#)

printf

```
(printf fmt & args)
(printf os fmt & args)
```

Without output stream prints formatted output as per format to the stream that is the current value of `*out*` . With a stream prints to that stream that must be a subclass of either `:java.io.PrintStream` or `:java.io.Writer` .

Prints like `print` and `println` in a human readable form.

Returns `nil` .

See: [Java Formatter](#)

```
(printf "%s: %d" "abc" 100)
abc: 100
=> nil
```

```
(printf "line 1: %s\nline 2: %s\n" "123" "456")
line 1: 123
line 2: 456
=> nil
```

```
(printf "%d%" 42)
42%
=> nil
```

```
(printf *out* "%s: %d" "abc" 100)
abc: 100
=> nil
```

```
(printf *err* "%s: %d" "abc" 100)
abc: 100
=> nil
```

SEE ALSO

[print](#)

Prints the values `xs` to the stream that is the current value of `*out*` or to the passed stream `os` that must be a subclass of either ...

[println](#)

Prints the values `xs` to the stream that is the current value of `*out*` or to the passed output stream `os` if given followed by a (newline).

[newline](#)

Without `arg` writes a platform-specific newline to the output channel that is the current value of `*out*`. With `arg` writes a newline ...

[top](#)

println

```
(println & xs)
(println os & xs)
```

Prints the values `xs` to the stream that is the current value of `*out*` or to the passed output stream `os` if given followed by a `(newline)` . The passed stream must be a subclass of either `:java.io.PrintStream` or `:java.io.Writer` .

Prints the values, separated by spaces if there is more than one. `print` and `println` print in a human readable form.

If the printed data needs to be read back by a Venice reader use the functions `pr` and `prn` instead.

Returns `nil`.

```
(println 200)
200
=> nil
```

```
(println [10 20 30])
[10 20 30]
=> nil
```

```
(println *out* 200)
200
=> nil
```

```
(println *err* 200)
200
=> nil
```

SEE ALSO

[print](#)

Prints the values `xs` to the stream that is the current value of `*out*` or to the passed stream `os` that must be a subclass of either ...

[printf](#)

Without output stream prints formatted output as per `format` to the stream that is the current value of `*out*`. With a stream prints ...

[newline](#)

Without `arg` writes a platform-specific newline to the output channel that is the current value of `*out*`. With `arg` writes a newline ...

[top](#)

prn

```
(prn & xs)
(prn os & xs)
```

Prints the values `xs` to the output stream that is the current value of `*out*` or to the passed stream `os` if given followed by a `(newline)`. The passed stream must be a subclass of either `:java.io.PrintStream` or `:java.io.Writer`.

Prints the values, separated by spaces if there is more than one. `pr` and `prn` print in a way that objects can be read by the reader.

Returns `nil`.

```
(prn "hello")
"hello"
=> nil
```

```
(prn {:foo "hello" :bar 34.5})
{:foo "hello" :bar 34.5}
=> nil
```

```
(prn ['a :b "\n" #\space "c"])
[a :b "\n" #\space "c"]
=> nil
```

```
(prn *out* [10 20 30])
[10 20 30]
=> nil
```

```
(prn *err* [10 20 30])
[10 20 30]
=> nil
```

SEE ALSO

[pr](#)

Prints the values xs to the output stream that is the current value of *out* or to the passed output stream os if given. The passed ...

[newline](#)

Without arg writes a platform-specific newline to the output channel that is the current value of *out*. With arg writes a newline ...

[pr-str](#)

With no args, returns the empty string. With one arg x, returns x.toString(). With more than one arg, returns the concatenation of ...

[top](#)

prof

```
(prof opts)
```

Controls the code profiling. See the companion functions/macros 'dorun' and 'perf'. The perf macro is built on prof and dorun and provides all for simple Venice profiling.

The profiler reports a function's elapsed time as "time with children"!

Profiling recursive functions:

Because the profiler reports "time with children" and accumulates the elapsed time across all recursive calls the resulting time for a particular recursive function is higher than the effective time.

```
(do
  (prof :on)    ; turn profiler on
  (prof :off)   ; turn profiler off
  (prof :status) ; returns the profiler on/off status
  (prof :clear) ; clear profiler data captured so far
  (prof :data)  ; returns the profiler data as map
  (prof :data-formatted) ; returns the profiler data as formatted text
  (prof :data-formatted "Metrics") ; returns the profiler data as formatted text with a title
  nil)
=> nil
```

SEE ALSO

[perf](#)

Performance test with the given expression.

[time](#)

Evaluates expr and prints the time it took. Returns the value of expr.

[top](#)

promise

```
(promise)
(promise fn)
```

Returns a promise object that can be read with deref, and set, once only, with deliver. Calls to deref prior to delivery will block, unless the variant of deref with timeout is used. All subsequent derefs will return the same delivered value without blocking.

Promises are implemented on top of Java's `CompletableFuture` .

```
(do
  (def p (promise))
  (deliver p 10)
  (deliver p 20) ; no effect
  @p)
=> 10

;; deliver the promise from a future
(do
  (def p (promise))
  (defn task1 [] (sleep 500) (deliver p 10))
  (defn task2 [] (sleep 800) (deliver p 20))
  (future task1)
  (future task2)
  @p)
=> 10

;; deliver the promise from a task's return value
(do
  (defn task [] (sleep 300) 10)
  (def p (promise task))
  @p)
=> 10

(let [p (promise #(do (sleep 300) 10))]
  @p)
=> 10
```

SEE ALSO

[deliver](#)

Delivers the supplied value to the promise, releasing any pending derefs. A subsequent call to deliver on a promise will have no effect.

[promise?](#)

Returns true if f is a Promise otherwise false

[realized?](#)

Returns true if a value has been produced for a promise, delay, or future.

[deref](#)

Dereferences an atom, a future or a promise object. When applied to an atom, returns its current state. When applied to a future, will ...

[done?](#)

Returns true if the future or promise is done otherwise false

[cancel](#)

Cancels a future or a promise

[cancelled?](#)

Returns true if the future or promise is cancelled otherwise false

[all-of](#)

Returns a new promise that is completed when all of the given promises complete. If any of the given promises complete exceptionally, ...

[any-of](#)

Returns a new promise that is completed when any of the given promises complete, with the same result. Otherwise, if it completed exceptionally, ...

[then-accept](#)

Returns a new promise that, when this promise completes normally, is executing the function f with this stage's result as the argument.

[then-accept-both](#)

Returns a new promise that, when either this or the other given promise completes normally, is executing the function f with the two ...

[then-apply](#)

Applies a function `f` on the result of the previous stage of the promise `p`.

[then-combine](#)

Applies a function `f` to the result of the previous stage of promise `p` and the result of another promise `p-other`

[then-compose](#)

Composes the result of two promises. `f` receives the result of the first promise `p` and returns a new promise that composes that value ...

[when-complete](#)

Returns the promise `p` with the same result or exception at this stage, that executes the action `f`. Passes the current stage's result ...

[accept-either](#)

Returns a new promise that, when either this or the other given promise completes normally, is executed with the corresponding result ...

[apply-to-either](#)

Returns a new promise that, when either this or the other given promise completes normally, is executed with the corresponding result ...

[or-timeout](#)

Exceptionally completes the promise with a `TimeoutException` if not otherwise completed before the given timeout.

[complete-on-timeout](#)

Completes the promise with the given value if not otherwise completed before the given timeout.

[timeout-after](#)

Returns a promise that timeouts after the specified time. The promise throws a `TimeoutException`.

[top](#)

promise?

```
(promise? p)
```

Returns true if `f` is a `Promise` otherwise false

```
(promise? (promise))  
=> true
```

[top](#)

proxify

```
(proxify interface method-map)
```

Proxies a Java interface to be passed as a `Callback` object to Java functions. The interface's methods are implemented by Venice functions.

The dynamic invocation handler takes care that the methods are called in the context of a Venice sandbox even if the Java method that invokes the callback methods is running in another thread.

Supports default method implementations in the proxied Java interface. These Java interface methods can be either overridden by a Venice function or just be omitted. In the latter case the return value of methods default implementation will be handed back.

In case a Java `FunctionalInterface` is required the proxy wrappers from the `java` module are often simpler to use:

- `java/as-runnable`
- `java/as-callable`
- `java/as-predicate`
- `java/as-function`
- `java/as-consumer`
- `java/as-supplier`

- `java/as-bipredicate`
- `java/as-bifunction`
- `java/as-biconsumer`
- `java/as-binaryoperator`

```
(do
  (import :java.io.File :java.io FilenameFilter)

  (def file-filter
    (fn [dir name] (str/ends-with? name ".xxx")))

  (let [dir (io/tmp-dir)]
    ;; create a dynamic proxy for the interface FilenameFilter
    ;; and implement its function 'accept' by 'file-filter'
    (. dir :list (proxify :FilenameFilter {:accept file-filter}))))

=> []
```

;; Instead of explicit proxies, functional interface wrappers are
 ;; often simpler to use

```
(do
  (load-module :java)
  (import :java.util.stream.Collectors)

  (-> (. [1 2 3 4] :stream)
    (. :filter (java/as-predicate #(> % 2)))
    (. :map (java/as-function #(* % 10)))
    (. :collect (. :Collectors :toList)))

=> (30 40)
```

SEE ALSO

[java/as-runnable](#)

Wraps the function `f` in a `java.lang.Runnable` (<https://docs.oracle.com/javase/8/docs/api/java/lang/Runnable.html>)

[java/as-callable](#)

Wraps the function `f` in a `java.util.concurrent.Callable` (<https://docs.oracle.com/javase/8/docs/api/java/util/concurrent/Callable.html>)

[java/as-predicate](#)

Wraps the function `f` in a `java.util.function.Predicate` (<https://docs.oracle.com/javase/8/docs/api/java/util/function/Predicate.html>)

[java/as-function](#)

Wraps the function `f` in a `java.util.function.Function` (<https://docs.oracle.com/javase/8/docs/api/java/util/function/Function.html>)

[java/as-consumer](#)

Wraps the function `f` in a `java.util.function.Consumer` (<https://docs.oracle.com/javase/8/docs/api/java/util/function/Consumer.html>)

[java/as-supplier](#)

Wraps the function `f` in a `java.util.function.Supplier` (<https://docs.oracle.com/javase/8/docs/api/java/util/function/Supplier.html>)

[java/as-bipredicate](#)

Wraps the function `f` in a `java.util.function.BiPredicate` (<https://docs.oracle.com/javase/8/docs/api/java/util/function/BiPredicate.html>)

[java/as-bifunction](#)

Wraps the function `f` in a `java.util.function.BiFunction` (<https://docs.oracle.com/javase/8/docs/api/java/util/function/BiFunction.html>)

[java/as-biconsumer](#)

Wraps the function `f` in a `java.util.function.BiConsumer` (<https://docs.oracle.com/javase/8/docs/api/java/util/function/BiConsumer.html>)

[java/as-binaryoperator](#)

Wraps the function `f` in a `java.util.function.BinaryOperator` (<https://docs.oracle.com/javase/8/docs/api/java/util/function/BinaryOperator.html>)

push!

```
(push! stack v)
```

Pushes an item to a stack.

```
(let [s (stack)]
  (push! s 1)
  (push! s 2)
  (push! s 3)
  (pop! s))
=> 3
```

SEE ALSO

[stack](#)

Creates a new mutable threadsafe stack.

[peek](#)

For a list, same as first, for a vector, same as last, for a stack the top element (or nil if the stack is empty), for a queue the ...

[pop!](#)

Pops an item from a stack.

[empty?](#)

Returns true if x is empty. Accepts strings, collections and bytebufs.

[count](#)

Returns the number of items in the collection. (count nil) returns 0. Also works on strings, and Java Collections

top

put!

```
(put! queue val)
(put! queue val delay)
```

Puts an item to a queue. The operation is synchronous, it waits indefinitely until the value can be placed on the queue. Returns always nil.

```
queue: (put! queue val)
```

Puts the value 'val' to the tail of the queue.

```
delay-queue: (put! queue val delay)
```

Puts the value 'val' with a delay of 'delay' milliseconds to a delay-queue

```
(let [q (queue)]
  (put! q 1)
  (poll! q)
  q)
=> ()

(let [q (delay-queue)]
  (put! q 1 100)
  (take! q))
=> 1
```

SEE ALSO

[queue](#)

take!

offer!

poll!

peek

empty?

count

Returns the number of items in the collection. (count nil) returns 0. Also works on strings, and Java Collections

top

```
(format s)
```

Format a QR reference.

```
(do
  (load-module :qrref ['qrref :as 'qr])
  (qr/format "0000000000000000000000001234011"))
=> "00 00000 00000 00000 00012 34011"
```

```
(do
  (load-module :qrref ['qrref :as 'qr])
  (qr/format (qr/qr-ref 1 :bill "1234")))
=> "00 00000 00000 00000 00012 34011"
```

SEE ALSO

[qrref/qr-ref](#)

Creates a QR reference according to the Swiss payment standards.

qrref/parse

Parse a QR reference. The reference may be formatted.

top

(parse ref)

Parse a QR reference. The reference may be formatted.

```
(do
  (load-module :qrref ['qrref :as 'qr])
  (qr/parse (qr/qr-ref 1 :bill "1234")))
=> {:bill-typ :bill :bill-nr "1234" :version 1}
```

```
(do
  (load-module :qrref ['qrref :as 'qr])
  (qr/parse "0000000000000000000000001234011"))
=> {:bill-typ :bill :bill-nr "1234" :version 1}
```

```
(do
  (load-module :qrref ['qrref :as 'qr])
  (qr/parse "00 00000 00000 00000 00012 34011"))
=> {:bill-typ :bill :bill-nr "1234" :version 1}
```

SEE ALSO

[qrref/qr-ref](#)

Creates a QR reference according to the Swiss payment standards.

[qrref/format](#)

Format a QR reference.

[top](#)

qrref/qr-ref

```
(qr-ref version bill-type bill-nr)
```

Creates a QR reference according to the Swiss payment standards.

- *version*, an integer [1..9]
- *bill-type*, one of {:bill, :reminder-1, :reminder-2, :reminder-3}
- *bill-nr*, a string with up to 24 digits '0'..'9'

[Swiss Payment Standards / de](#)

[Swiss Payment Standards / en](#)

```
(do
  (load-module :qrref ['qrref :as 'qr])
  (qr/qr-ref 1 :bill "1234"))
=> "0000000000000000000000001234011"
```

SEE ALSO

[qrref/parse](#)

Parse a QR reference. The reference may be formatted.

[qrref/format](#)

Format a QR reference.

[top](#)

qualified-name

```
(name x)
```

Returns the qualified name String of a string, symbol, keyword, or function

```
(qualified-name :user/x)
=> "user/x"
```

```
(qualified-name 'x)
=> "x"

(qualified-name "x")
=> "x"

(qualified-name str/digit?)
=> "str/digit?"
```

SEE ALSO

[name](#)

Returns the name string of a string, symbol, keyword, or function. If applied to a string it returns the string itself.

[namespace](#)

Returns the namespace string of a symbol, keyword, or function. If x is a registered namespace returns x.

[fn-name](#)

Returns the qualified name of a function or macro

[top](#)

qualified-symbol?

```
(qualified-symbol? x)
```

Returns true if x is a qualified symbol

```
(qualified-symbol? 'foo/a)
=> true
```

```
(qualified-symbol? (symbol "foo/a"))
=> true
```

```
(qualified-symbol? 'a)
=> false
```

```
(qualified-symbol? nil)
=> false
```

```
(qualified-symbol? :a)
=> false
```

[top](#)

quasiquote

```
(quasiquote form)
```

Quasi quotes also called syntax quotes (a backquote) suppress evaluation of the form that follows it and all the nested forms.

unquote:

It is possible to unquote part of the form that is quoted with `~`. Unquoting allows you to evaluate parts of the syntax quoted expression.

unquote-splicing:

Unquote evaluates to a collection of values and inserts the collection into the quoted form. But sometimes you want to unquote a list and insert its elements (not the list) inside the quoted form. This is where `~@` (unquote-splicing) comes to rescue.

```

(quasiquote (16 17 (inc 17)))
=> (16 17 (inc 17))

`(16 17 (inc 17))
=> (16 17 (inc 17))

`(16 17 ~(inc 17))
=> (16 17 18)

`(16 17 ~(map inc [16 17]))
=> (16 17 (17 18))

`(16 17 ~@(map inc [16 17]))
=> (16 17 17 18)

`(1 2 ~@#{1 2 3})
=> (1 2 1 2 3)

`(1 2 ~@{:a 1 :b 2 :c 3})
=> (1 2 [:a 1] [:b 2] [:c 3])

```

SEE ALSO

[quote](#)

There are two equivalent ways to quote a form either with `quote` or with `'`. They prevent the quoted form from being evaluated.

[top](#)

queue

```

(queue)
(queue capacity)

```

Creates a new mutable threadsafe bounded or unbounded queue.

The queue can be turned into a synchronous queue when using the functions `put!` and `take!`. `put!` waits until the value be added and `take!` waits until a value is available from queue thus synchronizing the producer and consumer.

```

; unbounded queue
(let [q (queue)]
  (offer! q 1)
  (offer! q 2)
  (offer! q 3)
  (poll! q)
  q)
=> (2 3)

; bounded queue
(let [q (queue 10)]
  (offer! q 1000 1)
  (offer! q 1000 2)
  (offer! q 1000 3)
  (poll! q 1000)
  q)
=> (2 3)

```

```
; synchronous unbounded queue
(let [q (queue)]
  (put! q 1)
  (put! q 2)
  (put! q 3)
  (take! q)
  q)
=> (2 3)
```

```
; synchronous bounded queue
(let [q (queue 10)]
  (put! q 1)
  (put! q 2)
  (put! q 3)
  (take! q)
  q)
=> (2 3)
```

SEE ALSO

[peek](#)

For a list, same as first, for a vector, same as last, for a stack the top element (or nil if the stack is empty), for a queue the ...

[put!](#)

Puts an item to a queue. The operation is synchronous, it waits indefinitely until the value can be placed on the queue. Returns always nil.

[take!](#)

Retrieves and removes the head value of the queue, waiting if necessary until a value becomes available.

[offer!](#)

Offers an item to a queue with an optional timeout in milliseconds. If a timeout is given waits up to the specified wait time if necessary ...

[poll!](#)

Polls an item from a queue with an optional timeout in milliseconds. For an indefinite timeout pass the timeout value :indefinite.

[empty](#)

Returns an empty collection of the same category as coll, or nil if coll is nil. If the collection is mutable clears the collection ...

[empty?](#)

Returns true if x is empty. Accepts strings, collections and bytebufs.

[count](#)

Returns the number of items in the collection. (count nil) returns 0. Also works on strings, and Java Collections

[queue?](#)

Returns true if coll is a queue

[reduce](#)

f should be a function of 2 arguments. If val is not supplied, returns the result of applying f to the first 2 items in coll, then ...

[transduce](#)

Reduce with a transformation of a reduction function f (xf). If init is not supplied, (f) will be called to produce it. f should be ...

[docoll](#)

Applies f to the items of the collection presumably for side effects. Returns nil.

[into!](#)

Adds all of the items of 'from' conjoined to the mutable 'to' collection

[conj!](#)

Returns a new mutable collection with the x, xs 'added'. (conj! nil item) returns (item) and (conj! item) returns item.

[top](#)

queue?

```
(queue? coll)
```

Returns true if coll is a queue

```
(queue? (queue))  
=> true
```

[top](#)

quote

```
(quote form)
```

There are two equivalent ways to quote a form either with `quote` or with `'`. They prevent the quoted form from being evaluated.

Regular quotes work recursively with any kind of forms and types: strings, maps, lists, vectors...

```
(quote (1 2 3))  
=> (1 2 3)
```

```
(quote (+ 1 2))  
=> (+ 1 2)
```

```
'(1 2 3)  
=> (1 2 3)
```

```
'(+ 1 2)  
=> (+ 1 2)
```

```
'(a (b (c d (+ 1 2))))  
=> (a (b (c d (+ 1 2))))
```

SEE ALSO

[quasiquote](#)

Quasi quotes also called syntax quotes (a backquote) suppress evaluation of the form that follows it and all the nested forms.

[top](#)

rand-double

```
(rand-double)  
(rand-double max)
```

Without argument returns a double between 0.0 and 1.0. With argument max returns a random double between 0.0 and max.

This function is based on a cryptographically strong random number generator (RNG).

```
(rand-double)  
=> 0.6816110745536327
```

```
(rand-double 100.0)  
=> 79.93630449311812
```


SEE ALSO

[rand-long](#)

Without argument returns a random long between 0 and MAX_LONG. With argument max returns a random long between 0 and max exclusive.

[rand-gaussian](#)

Without argument returns a Gaussian distributed double value with mean 0.0 and standard deviation 1.0. With argument mean and stddev ...

[bytebuf-allocate-random](#)

Allocates a new bytebuf. The values will be all preset with randombytes

[top](#)

rand-gaussian

```
(rand-gaussian)
(rand-gaussian mean stddev)
```

Without argument returns a Gaussian distributed double value with mean 0.0 and standard deviation 1.0. With argument mean and stddev returns a Gaussian distributed double value with the given mean and standard deviation.

This function is based on a cryptographically strong random number generator (RNG)

```
(rand-gaussian)
=> -0.15518415428852778
```

```
(rand-gaussian 0.0 5.0)
=> -3.2719126496511244
```

SEE ALSO

[rand-long](#)

Without argument returns a random long between 0 and MAX_LONG. With argument max returns a random long between 0 and max exclusive.

[rand-double](#)

Without argument returns a double between 0.0 and 1.0. With argument max returns a random double between 0.0 and max.

[bytebuf-allocate-random](#)

Allocates a new bytebuf. The values will be all preset with randombytes

[top](#)

rand-long

```
(rand-long)
(rand-long max)
```

Without argument returns a random long between 0 and MAX_LONG. With argument max returns a random long between 0 and max exclusive.

This function is based on a cryptographically strong random number generator (RNG).

```
(rand-long)
=> 2145124054174672935
```

```
(rand-long 100)
=> 52
```

SEE ALSO

rand-double

Without argument returns a double between 0.0 and 1.0. With argument max returns a random double between 0.0 and max.

rand-gaussian

Without argument returns a Gaussian distributed double value with mean 0.0 and standard deviation 1.0. With argument mean and stddev ...

bytebuf-allocate-random

Allocates a new bytebuf. The values will be all preset with randombytes

top

range

```
(range)
(range end)
(range start end)
(range start end step)
```

Returns a collection of numbers from start (inclusive) to end (exclusive), by step, where start defaults to 0 and step defaults to 1. When start is equal to end, returns empty list. Without args returns a lazy sequence generating numbers starting with 0 and incrementing by 1.

```
(range 10)
=> (0 1 2 3 4 5 6 7 8 9)
```

```
(range 10 20)
=> (10 11 12 13 14 15 16 17 18 19)
```

```
(range 10 20 3)
=> (10 13 16 19)
```

```
(range (int 10) (int 20))
=> (10I 11I 12I 13I 14I 15I 16I 17I 18I 19I)
```

```
(range (int 10) (int 20) (int 3))
=> (10I 13I 16I 19I)
```

```
(range 10 15 0.5)
=> (10 10.5 11.0 11.5 12.0 12.5 13.0 13.5 14.0 14.5)
```

```
(range 1.1M 2.2M 0.1M)
=> (1.1M 1.2M 1.3M 1.4M 1.5M 1.6M 1.7M 1.8M 1.9M 2.0M 2.1M)
```

```
(range 100N 200N 10N)
=> (100N 110N 120N 130N 140N 150N 160N 170N 180N 190N)
```

```
;; capital letters
(map char (range (int #\A) (inc (int #\Z))))
=> (#\A #\B #\C #\D #\E #\F #\G #\H #\I #\J #\K #\L #\M #\N #\O #\P #\Q #\R #\S #\T #\U #\V #\W #\X #\Y #\Z)
```

top

read-char

```
(read-char)
(read-char is)
```

Without arg reads the next char from the stream that is the current value of `*in*`. With arg reads the next char from the passed stream that must be a subclass of `:java.io.Reader`.

Returns `nil` if the end of the stream is reached.

```
(try-with [rd (io/buffered-reader "1234")]  
  (println (read-char rd))  
  (println (read-char rd)))  
1  
2  
=> nil
```

SEE ALSO

[read-line](#)

Without arg reads the next line from the stream that is the current value of `*in*`. With arg reads the next line from the passed stream ...

top

read-line

```
(read-line)  
(read-line is)
```

Without arg reads the next line from the stream that is the current value of `*in*`. With arg reads the next line from the passed stream that must be a subclass of `:java.io.BufferedReader`.

Returns `nil` if the end of the stream is reached.

```
(try-with [rd (io/buffered-reader "1\n2\n3\n4")]  
  (println (read-line rd))  
  (println (read-line rd)))  
1  
2  
=> nil
```

SEE ALSO

[read-char](#)

Without arg reads the next char from the stream that is the current value of `*in*`. With arg reads the next char from the passed stream ...

top

read-string

```
(read-string s)  
(read-string s origin)
```

Reads Venice source from a string and transforms its content into a Venice data structure, following the rules of the Venice syntax.

```
(do  
  (eval (read-string "(def x 100)" "test"))  
  x)  
=> 100
```

SEE ALSO

[eval](#)

Evaluates the form data structure (not text!) and returns the result.

[top](#)

realized?

(realized? x)

Returns true if a value has been produced for a promise, delay, or future.

```
(do
  (def task (fn [] 100))
  (let [f (future task)]
    (println (realized? f))
    (println @f)
    (println (realized? f))))
false
100
true
=> nil
```

```
(do
  (def p (promise))
  (println (realized? p))
  (deliver p 123)
  (println @p)
  (println (realized? p)))
false
123
true
=> nil
```

```
(do
  (def x (delay 100))
  (println (realized? x))
  (println @x)
  (println (realized? x)))
false
100
true
=> nil
```

SEE ALSO

[future](#)

Takes a function without arguments and yields a future object that will invoke the function in another thread, and will cache the result ...

[delay](#)

Takes a body of expressions and yields a Delay object that will invoke the body only the first time it is forced (with force or deref ...

[promise](#)

Returns a promise object that can be read with deref, and set, once only, with deliver. Calls to deref prior to delivery will block, ...

[top](#)

recur

```
(recur expr*)
```

Evaluates the `exprs` and rebinds the bindings of the recursion point to the values of the `exprs`. The `recur` expression must be at the tail position. The tail position is a position which an expression would return a value from.

```
;; tail recursion
(loop [x 10]
  (when (> x 1)
    (println x)
    (recur (- x 2)))))
```

```
10
8
6
4
2
=> nil
```

```
;; tail recursion
(do
  (defn sum [n]
    (loop [cnt n acc 0]
      (if (zero? cnt)
        acc
        (recur (dec cnt) (+ acc cnt)))))
  (sum 10000)))
```

```
=> 50005000
```

SEE ALSO

[loop](#)

Evaluates the `exprs` and binds the bindings. Creates a recursion point with the bindings.

[top](#)

reduce

```
(reduce f coll)
(reduce f val coll)
```

`f` should be a function of 2 arguments. If `val` is not supplied, returns the result of applying `f` to the first 2 items in `coll`, then applying `f` to that result and the 3rd item, etc. If `coll` contains no items, `f` must accept no arguments as well, and `reduce` returns the result of calling `f` with no arguments. If `coll` has only 1 item, it is returned and `f` is not called. If `val` is supplied, returns the result of applying `f` to `val` and the first item in `coll`, then applying `f` to that result and the 2nd item, etc. If `coll` contains no items, returns `val` and `f` is not called.

`reduce` can work with queues as collection, given that the end of the queue is marked by adding a `nil` element. Otherwise the reducer does not know when to stop reading elements from the queue.

```
(reduce + [1 2 3 4 5 6 7])
=> 28
```

```
(reduce + 10 [1 2 3 4 5 6 7])
=> 38
```

```
(reduce (fn [x y] (+ x y 10)) [1 2 3 4 5 6 7])
=> 88
```

```

(reduce (fn [x y] (+ x y 10)) 10 [1 2 3 4 5 6 7])
=> 108

((reduce comp [(partial + 1) (partial * 2) (partial + 3)]) 100)
=> 207

(reduce (fn [m [k v]] (assoc m k v)) {} [[:a 1] [:b 2] [:c 3]])
=> {:a 1 :b 2 :c 3}

(reduce (fn [m [k v]] (assoc m v k)) {} {:b 2 :a 1 :c 3})
=> {1 :a 2 :b 3 :c}

(reduce (fn [m c] (assoc m (first c) c)) {} [[:a 1] [:b 2] [:c 3]])
=> {:a [:a 1] :b [:b 2] :c [:c 3]}

;; sliding window (width 3) average
(->> (partition 3 1 (repeatedly 10 #(rand-long 30)))
      (map (fn [window] (/ (reduce + window) (count window)))))
=> (11 19 16 12 10 11 16 12)

;; reduce all elements of a queue.
;; calls (take! queue) to get the elements of the queue.
;; note: use nil to mark the end of the queue otherwise
;;       reduce will block forever!
(let [q (conj! (queue) 1 2 3 4 5 6 7 nil)]
  (reduce + q))
=> 28

;; reduce data supplied by a finit lazy seq
(do
  (def counter (atom 5))
  (defn generate []
    (swap! counter dec)
    (if (pos? @counter) @counter nil))
  (reduce + 100 (lazy-seq generate)))
=> 110

```

SEE ALSO

[reduce-kv](#)

Reduces an associative collection. f should be a function of 3 arguments. Returns the result of applying f to init, the first key and ...

[map](#)

Applies f to the set of first items of each coll, followed by applying f to the set of second items in each coll, until any one of the ...

[filter](#)

Returns a collection of the items in coll for which (predicate item) returns logical true.

[top](#)

reduce-kv

```
(reduce-kv f init coll)
```

Reduces an associative collection. f should be a function of 3 arguments. Returns the result of applying f to init, the first key and the first value in coll, then applying f to that result and the 2nd key and value, etc. If coll contains no entries, returns init and f is not called. Note that reduce-kv is supported on vectors, where the keys will be the ordinals.

```
(reduce-kv (fn [m k v] (assoc m v k))
  {}
  {:a 1 :b 2 :c 3})
=> {1 :a 2 :b 3 :c}
```

```
(reduce-kv (fn [m k v] (assoc m k (:col v)))
  {}
  {:a {:col :red :len 10}
   :b {:col :green :len 20}
   :c {:col :blue :len 30} })
=> {:a :red :b :green :c :blue}
```

SEE ALSO

[reduce](#)

f should be a function of 2 arguments. If val is not supplied, returns the result of applying f to the first 2 items in coll, then ...

[map](#)

Applies f to the set of first items of each coll, followed by applying f to the set of second items in each coll, until any one of the ...

[filter](#)

Returns a collection of the items in coll for which (predicate item) returns logical true.

[top](#)

reduced

```
(reduced x)
```

Wraps x in a way such that a reduce will terminate with the value x.

[top](#)

reduced?

```
(reduced? x)
```

Returns true if x is the result of a call to reduced.

[top](#)

regex/count

```
(regex/count matcher)
```

Returns the matcher's group count.

```
(let [m (regex/matcher #"([0-9]+)(.*)" "100abc")]
  (regex/count m))
=> 2
```

SEE ALSO

[match?](#)

Returns true if the string `s` matches the regular expression `regex`.

[regex/matcher](#)

Returns an instance of `java.util.regex.Matcher`.

[regex/pattern](#)

Returns an instance of `java.util.regex.Pattern`.

[top](#)

regex/find

```
(regex/find matcher)
(regex/find pattern s)
```

Returns the next regex match or `nil` if there is no further match. Returns `nil` if there is no match.

To get the positional data for the matched group use `(regex/find+ matcher)`.

```
(regex/find #"[0-9]+" "672-345-456-3212")
=> "672"
```

```
(let [m (regex/matcher #"[0-9]+" "672-345-456-3212")]
  (println (regex/find m))
  (println (regex/find m))
  (println (regex/find m))
  (println (regex/find m))
  (println (regex/find m)))
672
345
456
3212
nil
=> nil
```

SEE ALSO

[match?](#)

Returns true if the string `s` matches the regular expression `regex`.

[regex/find-all](#)

Returns all regex matches as list or an empty list if there are no matches.

[regex/find+](#)

Returns the next regex match and returns the group with its positional data. Returns `nil` if there is no match.

[regex/matcher](#)

Returns an instance of `java.util.regex.Matcher`.

[regex/pattern](#)

Returns an instance of `java.util.regex.Pattern`.

[top](#)

regex/find+

```
(regex/find+ matcher)
(regex/find+ pattern s)
```


Returns the next regex match and returns the group with its positional data. Returns `nil` if there is no match.

```
(regex/find+ #"[0-9]+" "672-345-456-3212")
=> {:start 0 :end 3 :group "672"}

(let [m (regex/matcher #"[0-9]+" "672-345-456-3212")]
  (println (regex/find+ m))
  (println (regex/find+ m))
  (println (regex/find+ m))
  (println (regex/find+ m))
  (println (regex/find+ m)))

{:start 0 :end 3 :group 672}
{:start 4 :end 7 :group 345}
{:start 8 :end 11 :group 456}
{:start 12 :end 16 :group 3212}
nil
=> nil
```

SEE ALSO

[match?](#)

Returns true if the string `s` matches the regular expression `regex`.

[regex/find-all+](#)

Returns the all regex matches and returns the groups with its positional data. Returns an empty list if there are no matches.

[regex/find](#)

Returns the next regex match or `nil` if there is no further match. Returns `nil` if there is no match.

[regex/matcher](#)

Returns an instance of `java.util.regex.Matcher`.

[regex/pattern](#)

Returns an instance of `java.util.regex.Pattern`.

[top](#)

regex/find-all

```
(regex/find-all matcher)
(regex/find-all pattern s)
```

Returns all regex matches as list or an empty list if there are no matches.

To get the positional data for the matched groups use `'regex/find-all+'`.

```
(regex/find-all #"\\d+" "672-345-456-3212")
=> ("672" "345" "456" "3212")

(->> (regex/matcher #"\\d+" "672-345-456-3212")
      (regex/find-all))
=> ("672" "345" "456" "3212")

(->> (regex/matcher "([^\"]\\S*|\".+?\\\")\\S*" "1 2 \"3 4\" 5")
      (regex/find-all))
=> ("1 " "2 " "\"3 4\" " "5")
```

SEE ALSO

[match?](#)

Returns true if the string `s` matches the regular expression `regex`.

[regex/find](#)

Returns the next regex match or nil if there is no further match. Returns nil if there is no match.

[regex/find-all+](#)

Returns the all regex matches and returns the groups with its positional data. Returns an empty list if there are no matches.

[regex/groups](#)

Attempts to match the entire region against the pattern and returns all matched groups. The entire regions is the first item in the ...

[regex/matcher](#)

Returns an instance of `java.util.regex.Matcher`.

[regex/pattern](#)

Returns an instance of `java.util.regex.Pattern`.

[top](#)

regex/find-all+

```
(regex/find-all+ matcher)
(regex/find-all+ pattern s)
```

Returns the all regex matches and returns the groups with its positional data. Returns an empty list if there are no matches.

```
(regex/find-all+ #"[0-9]+" "672-345-456-3212")
=> ({:start 0 :end 3 :group "672"} {:start 4 :end 7 :group "345"} {:start 8 :end 11 :group "456"} {:start 12 :
end 16 :group "3212"})

(let [m (regex/matcher #"[0-9]+" "672-345-456-3212")]
  (regex/find-all+ m))

=> ({:start 0 :end 3 :group "672"} {:start 4 :end 7 :group "345"} {:start 8 :end 11 :group "456"} {:start 12 :
end 16 :group "3212"})
```

SEE ALSO

[match?](#)

Returns true if the string `s` matches the regular expression `regex`.

[regex/find+](#)

Returns the next regex match and returns the group with its positional data. Returns nil if there is no match.

[regex/find-all](#)

Returns all regex matches as list or an empty list if there are no matches.

[regex/groups](#)

Attempts to match the entire region against the pattern and returns all matched groups. The entire regions is the first item in the ...

[regex/matcher](#)

Returns an instance of `java.util.regex.Matcher`.

[regex/pattern](#)

Returns an instance of `java.util.regex.Pattern`.

[top](#)

regex/find?

```
(regex/find? matcher)
```

Attempts to find the next subsequence that matches the pattern. If the match succeeds then more information can be obtained via the `regex/group` function

```
(let [m (regex/matcher #"[0-9]+" "100")]
  (regex/find? m))
=> true

(let [m (regex/matcher #"[0-9]+" "xxx: 100")]
  (regex/find? m))
=> true

(let [m (regex/matcher #"[0-9]+" "xxx: 100 200")]
  (when (regex/find? m)
    (println (regex/group m 0)))
  (when (regex/find? m)
    (println (regex/group m 0)))
  (when (regex/find? m)
    (println (regex/group m 0))))
100
200
=> nil
```

SEE ALSO

[match?](#)

Returns true if the string `s` matches the regular expression `regex`.

[regex/group](#)

Returns the input subsequence captured by the given group during the previous match operation.

[regex/matches?](#)

Attempts to match the entire region against the pattern. Returns true if the patterns matches the string else false.

[regex/pattern](#)

Returns an instance of `java.util.regex.Pattern`.

[top](#)

regex/group

```
(regex/group matcher group)
```

Returns the input subsequence captured by the given group during the previous match operation.

Note: Do not forget to call the `regex/matches?` function!

```
(let [m (regex/matcher #"(\d+)(.*)" "100abc")]
  (if (regex/matches? m)
    [(regex/group m 1) (regex/group m 2)]
    []))
=> ["100" "abc"]

(do
  (ns-alias 'r 'regex)
  (defn swap [s]
    (let [m (r/matcher #"(\d+)([^\d]*)" s)]
      (if (r/matches? m)
        (str (r/group m 3) (r/group m 2) (r/group m 1))
```

```
s)))  
(swap "100::200")  
=> "200::100"
```

SEE ALSO

[match?](#)

Returns true if the string *s* matches the regular expression *regex*.

[regex/groups](#)

Attempts to match the entire region against the pattern and returns all matched groups. The entire regions is the first item in the ...

[regex/matcher](#)

Returns an instance of `java.util.regex.Matcher`.

[regex/matches?](#)

Attempts to match the entire region against the pattern. Returns true if the patterns matches the string else false.

[regex/pattern](#)

Returns an instance of `java.util.regex.Pattern`.

[top](#)

regex/groups

```
(regex/groups matcher)
```

Attempts to match the entire region against the pattern and returns all matched groups. The entire regions is the first item in the returned group list. Returns an empty list if the entire region does not match the pattern.

```
(let [m (regex/matcher #"(\d+)(.*)" "100abc")]  
      (regex/groups m))  
=> ("100abc" "100" "abc")  
  
(let [m (regex/matcher #"(\d+)([a-z]+)" "100abc:")]  
      (regex/groups m))  
=> ()
```

SEE ALSO

[match?](#)

Returns true if the string *s* matches the regular expression *regex*.

[regex/group](#)

Returns the input subsequence captured by the given group during the previous match operation.

[regex/find-all](#)

Returns all regex matches as list or an empty list if there are no matches.

[regex/matcher](#)

Returns an instance of `java.util.regex.Matcher`.

[regex/matches?](#)

Attempts to match the entire region against the pattern. Returns true if the patterns matches the string else false.

[regex/pattern](#)

Returns an instance of `java.util.regex.Pattern`.

[top](#)

regex/matcher

([regex/matcher](#) pattern str)

Returns an instance of `java.util.regex.Matcher` .

The pattern can be either a string or a pattern created by ([regex/pattern](#) s) .

Matchers are mutable and are not safe for use by multiple concurrent threads!

JavaDoc: [Pattern](#)

```
(regex/matcher #"\[0-9\]+" "100")  
=> java.util.regex.Matcher[pattern=[0-9]+ region=0,3 lastmatch=]
```

```
(regex/matcher (regex/pattern"[0-9]+") "100")  
=> java.util.regex.Matcher[pattern=[0-9]+ region=0,3 lastmatch=]
```

```
(regex/matcher "[0-9]+" "100")  
=> java.util.regex.Matcher[pattern=[0-9]+ region=0,3 lastmatch=]
```

SEE ALSO

[match?](#)

Returns true if the string s matches the regular expression regex.

[regex/pattern](#)

Returns an instance of `java.util.regex.Pattern`.

[regex/matches?](#)

Attempts to match the entire region against the pattern. Returns true if the patterns matches the string else false.

[regex/find?](#)

Attempts to find the next subsequence that matches the pattern. If the match succeeds then more information can be obtained via the ...

[regex/reset](#)

Resets the matcher with a new string

[regex/matches](#)

Returns the matches, if any, for the matcher with the pattern of a string, using `java.util.regex.Matcher.matches()`.

[regex/find](#)

Returns the next regex match or nil if there is no further match. Returns nil if there is no match.

[regex/find-all](#)

Returns all regex matches as list or an empty list if there are no matches.

[top](#)

regex/matches

([regex/matches](#) pattern str)

Returns the matches, if any, for the matcher with the pattern of a string, using `java.util.regex.Matcher.matches()` .

If the matcher's pattern matches the entire region sequence returns a list with the entire region sequence and the matched groups otherwise returns an empty list.

Returns matching info as meta data on the region and the groups.

Region meta data:

:start	start pos of the overall group
:end	end pos of the overall group
:group-count	the number of matched elements groups

Group meta data:

:start start pos of the element group

:end end pos of the element group

JavaDoc: [Pattern](#)

```
;; Entire region sequence matched
(regex/matches "hello, (.*)" "hello, world")
=> ("hello, world" "world")

;; Entire region sequence not matched
(regex/matches "HEllo, (.*)" "hello, world")
=> ()

;; Matching multiple groups
(regex/matches "([0-9]+)-([0-9]+)-([0-9]+)-([0-9]+)" "672-345-456-212")
=> ("672-345-456-212" "672" "345" "456" "212")

;; Matching multiple groups
(let [p (regex/pattern "([0-9]+)-([0-9]+)")]
  (regex/matches p "672-345"))
=> ("672-345" "672" "345")

;; Access matcher's region meta info
(let [pattern "([0-9]+)-([0-9]+)-([0-9]+)-([0-9]+)"
      matches (regex/matches pattern "672-345-456-212")]
  (println "meta info:" (pr-str (meta matches)))
  (println "matches: " (pr-str matches)))
meta info: {:group-count 4 :start 0 :end 15}
matches:   ("672-345-456-212" "672" "345" "456" "212")
=> nil

;; Access matcher's region meta info and the meta info of each group
(let [pattern "([0-9]+)-([0-9]+)-([0-9]+)-([0-9]+)"
      matches (regex/matches pattern "672-345-456-212")]
  (println "region info: " (pr-str (meta matches)))
  (println "group count: " (count matches) "(region included)")
  (println "group matches: " (pr-str (nth matches 0)) (meta (nth matches 0)))
  (println " " (pr-str (nth matches 1)) (meta (nth matches 1)))
  (println " " (pr-str (nth matches 2)) (meta (nth matches 2)))
  (println " " (pr-str (nth matches 3)) (meta (nth matches 3)))
  (println " " (pr-str (nth matches 4)) (meta (nth matches 4))))
region info:  {:group-count 4 :start 0 :end 15}
group count:  5 (region included)
group matches: "672-345-456-212" {:start 0 :end 15}
               "672" {:start 0 :end 3}
               "345" {:start 4 :end 7}
               "456" {:start 8 :end 11}
               "212" {:start 12 :end 15}
=> nil
```

SEE ALSO

[match?](#)

Returns true if the string *s* matches the regular expression *regex*.

[regex/pattern](#)

Returns an instance of `java.util.regex.Pattern`.

regex/matches-not?

```
(regex/matches-not? matcher)
(regex/matches-not? matcher str)
```

Attempts to match the entire region against the pattern. Returns false if the patterns matches the string else true.

```
(let [m (regex/matcher #"[0-9]+" "10A")]
  (regex/matches-not? m))
=> true

(let [m (regex/matcher #"[0-9]+" "value: 10A")]
  (regex/matches-not? m))
=> true

(let [m (regex/matcher #"[0-9]+" "")]
  (filter #(regex/matches-not? m %) ["100" "10A" "200"]))
=> ("10A")
```

SEE ALSO

[match?](#)

Returns true if the string s matches the regular expression regex.

[regex/matcher](#)

Returns an instance of java.util.regex.Matcher.

[regex/matches](#)

Returns the matches, if any, for the matcher with the pattern of a string, using java.util.regex.Matcher.matches().

[regex/pattern](#)

Returns an instance of java.util.regex.Pattern.

[top](#)

regex/matches?

```
(regex/matches? matcher)
(regex/matches? matcher str)
```

Attempts to match the entire region against the pattern. Returns true if the patterns matches the string else false.

```
(let [m (regex/matcher #"[0-9]+" "100")]
  (regex/matches? m))
=> true

(let [m (regex/matcher #"[0-9]+" "value: 100")]
  (regex/matches? m))
=> false

(let [m (regex/matcher #"[0-9]+" "")]
  (filter #(regex/matches? m %) ["100" "1a1" "200"]))
=> ("100" "200")
```

SEE ALSO

[match?](#)

Returns true if the string `s` matches the regular expression `regex`.

[regex/matcher](#)

Returns an instance of `java.util.regex.Matcher`.

[regex/matches](#)

Returns the matches, if any, for the matcher with the pattern of a string, using `java.util.regex.Matcher.matches()`.

[regex/pattern](#)

Returns an instance of `java.util.regex.Pattern`.

[top](#)

regex/pattern

```
(regex/pattern s)
```

Returns an instance of `java.util.regex.Pattern`.

Patterns are immutable and are safe for use by multiple concurrent threads!

Alternatively regex pattern literals can be used to define a pattern: `"[0-9+]"`

```
"\\d" ;; regex string to match one digit
```

Notice that you have to escape the backslash to get a literal backslash in the string. However, regex pattern literals are smart. They don't need to double escape:

```
"#\\d" ;; regex pattern literal to match one digit
```

JavaDoc: [Pattern](#)

```
(regex/pattern "[0-9]+")
```

```
=> [0-9]+
```

```
(regex/pattern "\\d+")
```

```
=> \\d+
```

```
"[0-9]+"
```

```
=> [0-9]+
```

```
"#\\d+"
```

```
=> \\d+
```

SEE ALSO

[match?](#)

Returns true if the string `s` matches the regular expression `regex`.

[regex/matcher](#)

Returns an instance of `java.util.regex.Matcher`.

[regex/matches](#)

Returns the matches, if any, for the matcher with the pattern of a string, using `java.util.regex.Matcher.matches()`.

[regex/find](#)

Returns the next regex match or nil if there is no further match. Returns nil if there is no match.

[regex/find-all](#)

Returns all regex matches as list or an empty list if there are no matches.

[top](#)

regex/reset

(regex/reset matcher str)

Resets the matcher with a new string

```
(do
  (let [m (regex/matcher #"[0-9]+" "100")]
    (println (regex/find m))
    (let [m (regex/reset m "200")]
      (println (regex/find m)))))
100
200
=> nil
```

SEE ALSO

[match?](#)

Returns true if the string *s* matches the regular expression *regex*.

[regex/matcher](#)

Returns an instance of `java.util.regex.Matcher`.

[regex/pattern](#)

Returns an instance of `java.util.regex.Pattern`.

[top](#)

release

(release lock)

Releases a lock.

```
(let [l (lock)]
  (acquire l)
  ;; do something
  (release l))
=> nil
```

SEE ALSO

[lock](#)

Creates a new lock object.

[acquire](#)

Acquires a lock, blocking until the lock is available.

[try-acquire](#)

Acquires a lock within the given timeout time. Without a timeout returns immediately if the lock is not available.

[locked?](#)

Returns true if the lock is in use else false.

[top](#)

remove

```
(remove predicate coll)
```

Returns a collection of the items in `coll` for which `(predicate item)` returns logical false.
Returns a transducer when no collection is provided.

```
(remove nil? [1 nil nil 4 5 6])  
=> (1 4 5 6)
```

```
(remove even? [1 2 3 4 5 6 7])  
=> (1 3 5 7)
```

```
(remove #{3 5} '(1 3 5 7 9))  
=> (1 7 9)
```

```
(remove #(= 3 %) '(1 2 3 4 5 6))  
=> (1 2 4 5 6)
```

[top](#)

remove-formal-type

```
(remove-formal-type object)
```

Removes the *formal type* from a Java object.

This is identical to casting an object back to its real type without knowing its real type.

```
(do  
  (let [p0 (. :java.awt.Point :new 0 0)  
        p1 (cast :java.lang.Object p0)  
        p2 (remove-formal-type p1)]  
    (println "p0 ->" (formal-type p0))  
    (println "p1 ->" (formal-type p1))  
    (println "p2 ->" (formal-type p2))))  
p0 -> :java.awt.Point  
p1 -> :java.lang.Object  
p2 -> :java.awt.Point  
=> nil
```

SEE ALSO

[formal-type](#)

Returns the formal type of a Java object.

[cast](#)

Casts a Java object to a specific type

[class](#)

Returns the Java class for the given name. Throws an exception if the class is not found.

[top](#)

remove-watch

```
(remove-watch ref key)
```

Removes a watch function from an agent/atom reference.

```
(do
  (def x (agent 10))
  (defn watcher [key ref old new]
    (println "watcher: " key))
  (add-watch x :test watcher)
  (remove-watch x :test))
=> nil
```

SEE ALSO

[agent](#)

Creates and returns an agent with an initial value of state and zero or more options.

top

repeat

```
(repeat x)
(repeat n x)
```

Returns a lazy sequence of x values or a collection with the value x repeated n times.

```
(repeat 3 "hello")
=> ("hello" "hello" "hello")

(repeat 5 [1 2])
=> ([1 2] [1 2] [1 2] [1 2] [1 2])

(repeat ":")
=> (...)

(interleave [:a :b :c] (repeat 100))
=> (:a 100 :b 100 :c 100)
```

SEE ALSO

[repeatedly](#)

Takes a function of no args, presumably with side effects, and returns a collection of n calls to it

[dotimes](#)

Repeatedly executes body with name bound to integers from 0 through n-1.

[constantly](#)

Returns a function that takes any number of arguments and returns always the value x.

top

repeatedly

```
(repeatedly n fn)
```

Takes a function of no args, presumably with side effects, and returns a collection of n calls to it

```
(repeatedly 5 #(rand-long 11))  
=> (4 10 10 7 3)
```

```
;; compare with repeat, which only calls the 'rand-long'  
;; function once, repeating the value five times.  
(repeat 5 (rand-long 11))  
=> (1 1 1 1 1)
```

SEE ALSO

[repeat](#)

Returns a lazy sequence of x values or a collection with the value x repeated n times.

[dotimes](#)

Repeatedly executes body with name bound to integers from 0 through n-1.

[constantly](#)

Returns a function that takes any number of arguments and returns always the value x.

[top](#)

repl/color-theme

```
(repl/color-theme)
```

Returns REPL's color theme (:light, :dark, :none)

```
(repl/color-theme)
```

SEE ALSO

[repl?](#)

Returns true if running within a REPL.

[repl/color-theme!](#)

Set the REPL's color theme (:light, :dark)

[repl/prompt!](#)

Sets the REPL prompt string

[repl/handler!](#)

Sets the REPL command handler

[repl/info](#)

Returns information on the REPL.

[top](#)

repl/color-theme!

```
(repl/color-theme! theme)
```

Set the REPL's color theme (:light, :dark)

```
(repl/color-theme!)
```

SEE ALSO

[repl?](#)

Returns true if running within a REPL.

[repl/color-theme](#)

Returns REPL's color theme (:light, :dark, :none)

[repl/prompt!](#)

Sets the REPL prompt string

[repl/handler!](#)

Sets the REPL command handler

[repl/info](#)

Returns information on the REPL.

[top](#)

repl/handler!

```
(repl/handler! f)
```

Sets the REPL command handler

```
(do
  (defn handle-command [cmd]
    ;; run the command 'cmd'
    (println "Demo:" cmd))

  (repl/handler! handle-command))
```

SEE ALSO

[repl?](#)

Returns true if running within a REPL.

[repl/prompt!](#)

Sets the REPL prompt string

[repl/color-theme](#)

Returns REPL's color theme (:light, :dark, :none)

[repl/info](#)

Returns information on the REPL.

[top](#)

repl/home-dir

```
(repl/home-dir)
```

Returns the REPL home directory.

Note: This function is only available when called from within a REPL!

SEE ALSO

[repl?](#)

Returns true if running within a REPL.

[repl/libs-dir](#)

Returns the REPL libs directory

top

repl/info

(repl/info)

Returns information on the REPL.

Note: This function is only available when called from within a REPL!

E.g.:

```
{ :term-name "JLine terminal"
  :term-type "xterm-256color"
  :term-cols 80
  :term-rows 24
  :term-colors 256
  :term-class :org.repackage.org.jline.terminal.impl.PosixSysTerminal
  :color-mode :light }
```

SEE ALSO

[repl?](#)

Returns true if running within a REPL.

[repl/term-rows](#)

Returns number of rows in the REPL terminal.

[repl/term-cols](#)

Returns number of columns in the REPL terminal.

top

repl/libs-dir

(repl/libs-dir)

Returns the REPL libs directory

Note: This function is only available when called from within a REPL!

SEE ALSO

[repl?](#)

Returns true if running within a REPL.

[repl/home-dir](#)

Returns the REPL home directory.

top

repl/prompt!

(repl/prompt! s)

Sets the REPL prompt string

```
(repl/prompt! "venice> ")
```

SEE ALSO

[repl?](#)

Returns true if running within a REPL.

[repl/handler!](#)

Sets the REPL command handler

[repl/color-theme](#)

Returns REPL's color theme (:light, :dark, :none)

[repl/info](#)

Returns information on the REPL.

[top](#)

repl/term-cols

```
(repl/term-cols)
```

Returns number of columns in the REPL terminal.

Note: This function is only available when called from within a REPL!

SEE ALSO

[repl?](#)

Returns true if running within a REPL.

[repl/term-rows](#)

Returns number of rows in the REPL terminal.

[repl/info](#)

Returns information on the REPL.

[top](#)

repl/term-rows

```
(repl/term-rows)
```

Returns number of rows in the REPL terminal.

Note: This function is only available when called from within a REPL!

SEE ALSO

[repl?](#)

Returns true if running within a REPL.

[repl/term-cols](#)

Returns number of columns in the REPL terminal.

[repl/info](#)

Returns information on the REPL.

repl?

```
(repl?)
```

Returns true if running within a REPL.

```
(repl?)
```

replace

```
(replace smap coll)
```

Given a map of replacement pairs and a collection, returns a collection with any elements that are a key in smap replaced with the corresponding value in smap.

```
(replace {2 :two, 4 :four} [4 2 3 4 5 6 2])  
=> [:four :two 3 :four 5 6 :two]
```

```
(replace {2 :two, 4 :four} #{1 2 3 4 5})  
=> #{1 3 5 :four :two}
```

```
(replace [{:a 10} [:c 30]] {:a 10 :b 20})  
=> {:b 20 :c 30}
```

reset!

```
(reset! box newval)
```

Sets the value of an atom or a volatile to newval without regard for the current value. Returns newval.

```
(do  
  (def counter (atom 0))  
  (reset! counter 99)  
  @counter)  
=> 99
```

```
(do  
  (def counter (atom 0))  
  (reset! counter 99))  
=> 99
```

```
(do  
  (def counter (volatile 0))
```



```
(reset! counter 99)
@counter
=> 99
```

SEE ALSO

[atom](#)

Creates an atom with the initial value x.

[volatile](#)

Creates a volatile with the initial value x

top

reset-ns-meta!

```
(reset-ns-meta! n datamap)
```

Resets the metadata for a namespace

```
(do
  (ns foo)
  (reset-ns-meta! foo {}))
=> {}
```

```
(do
  (ns foo)
  (def n 'foo)
  (reset-ns-meta! (var-get n) {}))
  (pr-str (ns-meta (var-get n))))
=> "{}"
```

SEE ALSO

[ns-meta](#)

Returns the meta data of the namespace n or nil if n is not an existing namespace

[alter-ns-meta!](#)

Alters the metadata for a namespace. f must be free of side-effects.

[ns](#)

Opens a namespace.

top

resolve

```
(resolve symbol)
```

Resolves a symbol.

```
(resolve '+)
=> +
```

```
(resolve 'y)
=> nil
```

```
(resolve (symbol "+"))  
=> +  
  
((resolve (symbol "core" "+")) 1 2)  
=> 3  
  
((-> "first" symbol resolve) [1 2 3])  
=> 1
```

SEE ALSO

[symbol](#)

Returns a symbol from the given name

[top](#)

rest

```
(rest coll)
```

Returns a possibly empty collection of the items after the first.

```
(rest nil)  
=> nil
```

```
(rest [])  
=> []
```

```
(rest [1])  
=> []
```

```
(rest [1 2 3])  
=> [2 3]
```

```
(rest '())  
=> ()
```

```
(rest '(1))  
=> ()
```

```
(rest '(1 2 3))  
=> (2 3)
```

```
(rest "1234")  
=> (#\2 #\3 #\4)
```

SEE ALSO

[str/rest](#)

Returns a possibly empty string of the characters after the first.

[top](#)

restart-agent

```
(restart-agent agent state)
```

When an agent is failed, changes the agent state to new-state and then un-fails the agent so that sends are allowed again.

```
(do
  (def x (agent 100))
  (restart-agent x 200)
  (deref x))
=> 200
```

SEE ALSO

[agent](#)

Creates and returns an agent with an initial value of state and zero or more options.

[top](#)

reverse

```
(reverse coll)
```

Returns a collection of the items in coll in reverse order.
Returns a stateful transducer when no collection is provided.

```
(reverse [1 2 3 4 5 6])
=> [6 5 4 3 2 1]

(reverse "abcdef")
=> (#\f #\e #\d #\c #\b #\a)
```

SEE ALSO

[str/reverse](#)

Reverses a string

[top](#)

rf-any?

```
(rf-any? pred)
```

Returns a reducing function for a transducer that returns true if the predicate is true for at least one the items, false otherwise.

```
(transduce (filter number?) (rf-any? pos?) [true -1 1 2 false])
=> true
```

SEE ALSO

[rf-first](#)

Returns a reducing function for a transducer that returns the first item.

[rf-last](#)

Returns a reducing function for a transducer that returns the last item.

[rf-every?](#)

Returns a reducing function for a transducer that returns true if the predicate is true for all the items, false otherwise.

rf-every?

```
(rf-every? pred)
```

Returns a reducing function for a transducer that returns true if the predicate is true for all the items, false otherwise.

```
(transduce (filter number?) (rf-every? pos?) [1 2 3])  
=> true
```

SEE ALSO

[rf-first](#)

Returns a reducing function for a transducer that returns the first item.

[rf-last](#)

Returns a reducing function for a transducer that returns the last item.

[rf-any?](#)

Returns a reducing function for a transducer that returns true if the predicate is true for at least one the items, false otherwise.

rf-first

```
(rf-first)
```

Returns a reducing function for a transducer that returns the first item.

```
(transduce (filter number?) rf-first [false 1 2])  
=> 1
```

```
(transduce identity rf-first [nil 1 2])  
=> nil
```

SEE ALSO

[rf-last](#)

Returns a reducing function for a transducer that returns the last item.

[rf-any?](#)

Returns a reducing function for a transducer that returns true if the predicate is true for at least one the items, false otherwise.

[rf-every?](#)

Returns a reducing function for a transducer that returns true if the predicate is true for all the items, false otherwise.

rf-last

```
(rf-last)
```

Returns a reducing function for a transducer that returns the last item.

```
(transduce (filter number?) rf-last [false 1 2])
=> 2
```

```
(transduce identity rf-last [1 2 1.2])
=> 1.2
```

SEE ALSO

[rf-first](#)

Returns a reducing function for a transducer that returns the first item.

[rf-any?](#)

Returns a reducing function for a transducer that returns true if the predicate is true for at least one the items, false otherwise.

[rf-every?](#)

Returns a reducing function for a transducer that returns true if the predicate is true for all the items, false otherwise.

[top](#)

run!

```
(run! f coll)
```

Runs the supplied function, for purposes of side effects, on successive items in the collection. Returns `nil`

```
(run! prn [1 2 3 4])
1
2
3
4
=> nil
```

SEE ALSO

[docoll](#)

Applies f to the items of the collection presumably for side effects. Returns nil.

[mapv](#)

Returns a vector consisting of the result of applying f to the set of first items of each coll, followed by applying f to the set of ...

[top](#)

sandbox/functions

```
(sandbox/functions group)
```

Lists the sandboxed functions defined by a sandbox function group.

Groups:

- `:io`
- `:print`
- `:concurrency`
- `:java-interop`
- `:system`
- `:special-forms`

- :unsafe

```
(sandbox/functions :print)
```

SEE ALSO

[sandboxed?](#)

Returns true if there is a sandbox other than :AcceptAllInterceptor otherwise false.

top

sandbox/type

```
(sandbox/type)
```

Returns the sandbox type.

Venice sandbox types:

- :AcceptAllInterceptor - accepts all (no restrictions)
- :RejectAllInterceptor - safe sandbox, rejects access to all I/O functions, system properties, environment vars, extension modules, dynamic code loading, multi-threaded functions (futures, agents, ...), and Java calls
- :SandboxInterceptor - customized sandbox

```
(sandbox/type)
```

```
=> :AcceptAllInterceptor
```

SEE ALSO

[sandboxed?](#)

Returns true if there is a sandbox other than :AcceptAllInterceptor otherwise false.

top

sandboxed?

```
(sandboxed?)
```

Returns true if there is a sandbox other than :AcceptAllInterceptor otherwise false.

```
(sandboxed?)
```

```
=> false
```

SEE ALSO

[sandbox/type](#)

Returns the sandbox type.

top

schedule-at-fixed-rate

```
(schedule-at-fixed-rate fn initial-delay period time-unit)
```

Creates and executes a periodic action that becomes enabled first after the given initial delay, and subsequently with the given period. Returns a future. `(future? f)`, `(cancel f)`, and `(done? f)` will work on the returned future. Time unit is one of `:milliseconds`, `:seconds`, `:minutes`, `:hours`, or `:days`.

```
(schedule-at-fixed-rate #(println "test") 1 2 :seconds)
```

```
(let [s (schedule-at-fixed-rate #(println "test") 1 2 :seconds)]  
  (sleep 16 :seconds)  
  (cancel s))
```

SEE ALSO

[schedule-delay](#)

Creates and executes a one-shot action that becomes enabled after the given delay.

[top](#)

schedule-delay

```
(schedule-delay fn delay time-unit)
```

Creates and executes a one-shot action that becomes enabled after the given delay. Returns a future. `(deref f)`, `(future? f)`, `(cancel f)`, and `(done? f)` will work on the returned future. Time unit is one of `:milliseconds`, `:seconds`, `:minutes`, `:hours`, or `:days`.

```
(schedule-delay (fn [] (println "test")) 1 :seconds)
```

```
(deref (schedule-delay (fn [] 100) 2 :seconds))
```

SEE ALSO

[schedule-at-fixed-rate](#)

Creates and executes a periodic action that becomes enabled first after the given initial delay, and subsequently with the given period.

[top](#)

second

```
(second coll)
```

Returns the second element of `coll`.

```
(second nil)  
=> nil
```

```
(second [])  
=> nil
```

```
(second [1 2 3])  
=> 2
```

```
(second '())  
=> nil  
  
(second '(1 2 3))  
=> 2
```

[top](#)

select-keys

```
(select-keys map keyseq)
```

Returns a map containing only those entries in map whose key is in keys

```
(select-keys {:a 1 :b 2} [:a])  
=> {:a 1}  
  
(select-keys {:a 1 :b 2} [:a :c])  
=> {:a 1}  
  
(select-keys {:a 1 :b 2 :c 3} [:a :c])  
=> {:a 1 :c 3}
```

SEE ALSO

[keys](#)

Returns a collection of the map's keys.

[entries](#)

Returns a collection of the map's entries.

[map](#)

Applies f to the set of first items of each coll, followed by applying f to the set of second items in each coll, until any one of the ...

[top](#)

semver/cmp

```
(semver/cmp a b)
```

Compares versions a and b, returning -1 if a is older than b, 0 if they're the same version, and 1 if a is newer than b.

```
(semver/cmp "1.2.3" "1.5.4")  
=> -1  
  
(semver/cmp (semver/version "1.2.3") (semver/version "1.5.4"))  
=> -1
```

SEE ALSO

[semver/equal?](#)

Is version a the same as version b?

[semver/newer?](#)

Is version a newer than version b?

[semver/older?](#)

Is version a older than version b?

[top](#)

semver/equal?

```
(semver/equal? a b)
```

Is version a the same as version b?

```
(semver/newer? "1.2.3" "1.2.3")  
=> false
```

```
(semver/newer? (semver/version "1.2.3") (semver/version "1.2.3"))  
=> false
```

SEE ALSO

[semver/newer?](#)

Is version a newer than version b?

[semver/older?](#)

Is version a older than version b?

[semver/cmp](#)

Compares versions a and b, returning -1 if a is older than b, 0 if they're the same version, and 1 if a is newer than b.

[top](#)

semver/newer?

```
(semver/newer? a b)
```

Is version a newer than version b?

```
(semver/newer? "1.5.4" "1.2.3")  
=> true
```

```
(semver/newer? (semver/version "1.5.4") (semver/version "1.2.3"))  
=> true
```

SEE ALSO

[semver/older?](#)

Is version a older than version b?

[semver/equal?](#)

Is version a the same as version b?

[semver/cmp](#)

Compares versions a and b, returning -1 if a is older than b, 0 if they're the same version, and 1 if a is newer than b.

[top](#)

semver/older?

```
(semver/older? a b)
```

Is version a older than version b?

```
(semver/newer? "1.2.3" "1.5.4")  
=> false
```

```
(semver/newer? (semver/version "1.2.3") (semver/version "1.5.4"))  
=> false
```

SEE ALSO

[semver/newer?](#)

Is version a newer than version b?

[semver/equal?](#)

Is version a the same as version b?

[semver/cmp](#)

Compares versions a and b, returning -1 if a is older than b, 0 if they're the same version, and 1 if a is newer than b.

[top](#)

semver/parse

```
(semver/parse s)
```

Parses string 's' into a semantic version map.

Semantic versioning format:

```
standard  
  version:      1.0.0  
  pre-release:  1.0.0-beta  
  meta data:    1.0.0-beta+001
```

```
with revision  
  version:      1.0.0.0  
  pre-release:  1.0.0.0-beta  
  meta data:    1.0.0.0-beta+001
```

```
E.g.: { :major 1, :minor 3, :patch 5 }  
      { :major 1, :minor 3, :patch 5 :pre-release "beta"}  
      { :major 1, :minor 3, :patch 5 :pre-release "beta"}  
      { :major 1, :minor 3, :patch 5 :pre-release "beta" :meta "001"}
```

```
(semver/parse "1.2.3")  
=> {:patch 3 :meta-data nil :minor 2 :major 1 :revision nil :pre-release nil}
```

```
(semver/parse "1.2.3-beta")  
=> {:patch 3 :meta-data nil :minor 2 :major 1 :revision nil :pre-release "beta"}
```

```
(semver/parse "1.2.3-beta+001")  
=> {:patch 3 :meta-data "001" :minor 2 :major 1 :revision nil :pre-release "beta"}
```

SEE ALSO

[semver/version](#)

If 'o' is a valid version map, returns the map. Otherwise, it'll attempt to parse 'o' and return a version map.

[semver/valid-format?](#)

Checks the string 's' for semantic versioning formatting

[top](#)

semver/valid-format?

```
(semver/valid-format? s)
```

Checks the string 's' for semantic versioning formatting

```
(semver/valid-format? "1.2.3")  
=> true
```

SEE ALSO

[semver/parse](#)

Parses string 's' into a semantic version map.

[semver/valid?](#)

Checks if the supplied version map is valid regarding semantic versioning or not.

[top](#)

semver/valid?

```
(semver/valid? v)
```

Checks if the supplied version map is valid regarding semantic versioning or not.

```
(semver/valid? (semver/parse "1.2.3"))  
=> true
```

SEE ALSO

[semver/parse](#)

Parses string 's' into a semantic version map.

[semver/valid?](#)

Checks if the supplied version map is valid regarding semantic versioning or not.

[top](#)

semver/version

```
(semver/version o)
```

If 'o' is a valid version map, returns the map. Otherwise, it'll attempt to parse 'o' and return a version map.

```
(semver/version "1.2.3")
=> {:patch 3 :meta-data nil :minor 2 :major 1 :revision nil :pre-release nil}
```

SEE ALSO

[semver/parse](#)

Parses string 's' into a semantic version map.

[top](#)

send

```
(send agent action-fn args)
```

Dispatch an action to an agent. Returns the agent immediately.

The state of the agent will be set to the value of:

```
(apply action-fn state-of-agent args)
```

```
(do
  (def x (agent 100))
  (send x + 5)
  (send x (partial + 7))
  (sleep 100)
  (deref x))
=> 112
```

SEE ALSO

[agent](#)

Creates and returns an agent with an initial value of state and zero or more options.

[send-off](#)

Dispatch a potentially blocking action to an agent. Returns the agent immediately.

[top](#)

send-off

```
(send-off agent fn args)
```

Dispatch a potentially blocking action to an agent. Returns the agent immediately.

The state of the agent will be set to the value of:

```
(apply action-fn state-of-agent args)
```

```
(do
  (def x (agent 100))
  (send-off x + 5)
  (send-off x (partial + 7))
  (sleep 100)
  (deref x))
=> 112
```

SEE ALSO

[agent](#)

Creates and returns an agent with an initial value of state and zero or more options.

send

Dispatch an action to an agent. Returns the agent immediately.

[top](#)

seq

```
(seq coll)
```

Returns a seq on the collection. If the collection is empty, returns nil. `(seq nil)` returns nil. seq also works on Strings and converts Java streams to lists.

```
(seq nil)
=> nil
```

```
(seq [])
=> nil
```

```
(seq [1 2 3])
=> (1 2 3)
```

```
(seq '(1 2 3))
=> (1 2 3)
```

```
(seq {:a 1 :b 2})
=> ([:a 1] [:b 2])
```

```
(seq "abcd")
=> (#\a #\b #\c #\d)
```

[top](#)

sequential?

```
(sequential? coll)
```

Returns true if coll is a sequential collection

```
(sequential? '(1))
=> true
```

```
(sequential? [1])
=> true
```

```
(sequential? {:a 1})
=> false
```

```
(sequential? nil)
=> false
```

```
(sequential? "abc")
=> false
```

service

(service name method & args)

Calls a service with the specified name from the Venice's service registry.

Venice's service registry is used with application scripting scenarios where multiple external services must be made available to Venice. E.g.: the service registry can be used to register an application's *Spring Framework* services and make them discoverable by a Venice script.

Example:

```
Venice venice = new Venice();

venice.getServiceRegistry()
    .register("Calculator", new Calculator())
    .registerServiceDiscovery(new TestServiceDiscovery());

long r = (Long)venice.eval("(service :Calculator :multiply 10 20)");
venice.eval("(service :Logger :log (version))");
```

while `Calculator` and `TestServiceDiscovery` are defined as:

```
public static class TestServiceDiscovery implements IServiceDiscovery {
    @Override public Object lookup(final String name) {
        if (name == null) {
            throw new IllegalArgumentException("A service name must not be null");
        }
        else if (name.equals("Logger")) {
            return logger;
        }
        else {
            throw new VncException("Service " + name + " is not registered");
        }
    }
    private final Logger logger = new Logger();
}

public class Calculator {
    public long multiply(long v1, long v2) {
        return v1 * v2;
    }
}

public static class Logger {
    public void log(String message) {
        System.out.println(message);
    }
}
```

```
(service :UserService :find "Smith" "John")
```

SEE ALSO

[service?](#)

Returns true if the named service exists otherwise false

service?

```
(service? name)
```

Returns true if the named service exists otherwise false

```
(service? :UserService
```

SEE ALSO

[service](#)

Calls a service with the specified name from the Venice's service registry.

[top](#)

set

```
(set & items)
```

Creates a new set containing the items.

```
(set)  
=> #{} 
```

```
(set nil)  
=> #{nil} 
```

```
(set 1)  
=> #{1} 
```

```
(set 1 2 3)  
=> #{1 2 3} 
```

```
(set [1 2] 3)  
=> #{[1 2] 3} 
```

[top](#)

set!

```
(set! var-symbol expr)
```

Sets a global or thread-local variable to the value of the expression.

```
(do  
  (def x 10)  
  (set! x 20)  
  x)  
=> 20 
```

```
(do  
  (def-dynamic x 100)  
  (set! x 200)  
  x)  
=> 200 
```

```
(do
  (def-dynamic x 100)
  (without-str
    (print x)
    (binding [x 200]
      (print (str "-" x))
      (set! x (inc x))
      (print (str "-" x)))
    (print (str "-" x))))
=> "100-200-201-100"
```

SEE ALSO

[def](#)

Creates a global variable.

[def-dynamic](#)

Creates a dynamic variable that starts off as a global variable and can be bound with 'binding' to a new value on the local thread.

[top](#)

set-error-handler!

```
(set-error-handler! agent handler-fn)
```

Sets the error-handler of an agent to `handler-fn`. If an action being run by the agent throws an exception `handler-fn` will be called with two arguments: the agent and the exception.

```
(do
  (def x (agent 100))
  (defn err-handler-fn [ag ex]
    (println "error occured: "
      (:message ex)
      " and we still have value"
      @ag))
  (set-error-handler! x err-handler-fn)
  (send x (fn [n] (/ n 0))))
=> (agent :value 100)
```

SEE ALSO

[agent](#)

Creates and returns an agent with an initial value of state and zero or more options.

[agent-error-mode](#)

Returns the agent's error mode

[agent-error](#)

Returns the exception thrown during an asynchronous action of the agent if the agent is failed. Returns nil if the agent is not failed.

[top](#)

set?

```
(set? obj)
```

Returns true if obj is a set


```
(set? (set 1))  
=> true
```

[top](#)

sgn

```
(sgn x)
```

sgn function for a number.

```
-1 if x < 0  
0  if x = 0  
1  if x > 0
```

```
(sgn -10)  
=> -1
```

```
(sgn 0)  
=> 0
```

```
(sgn 10)  
=> 1
```

```
(sgn -10I)  
=> -1
```

```
(sgn -10.1)  
=> -1
```

```
(sgn -10.12M)  
=> -1
```

SEE ALSO

[abs](#)

Returns the absolute value of the number

[negate](#)

Negates x

[top](#)

sh

```
(sh & args)
```

Launches a new sub-process.

Options:

:in	may be given followed by input source as InputStream, Reader, File, ByteBuf, or String, to be fed to the sub-process's stdin.
:in-enc	option may be given followed by a String, used as a character encoding name (for example "UTF-8" or "ISO-8859-1") to convert the input string specified by the :in option to the sub-process's stdin. Defaults to "UTF-8". If the :in option provides a byte array, then the bytes are passed unencoded, and this option is ignored.
:out-enc	option may be given followed by :bytes or a String. If a String is given, it will be used as a character encoding name (for example

"UTF-8" or "ISO-8859-1") to convert the sub-process's stdout to a String which is returned. If :bytes is given, the sub-process's stdout will be stored in a Bytebuf and returned. Defaults to UTF-8.

:out-fn a function with a single string argument that receives line by line from the process' stdout. If passed the :out value in the return map will be empty.

:err-fn a function with a single string argument that receives line by line from the process' stderr. If passed the :err value in the return map will be empty.

:env override the process env with a map.

:dir override the process dir with a String or java.io.File.

:throw-ex If true throw an exception if the exit code is not equal to zero, if false returns the exit code. Defaults to false. It's recommended to use

```
(with-sh-throw (sh "ls" "-l"))
```

instead.

:timeout A timeout in milliseconds

You can bind :env, :dir for multiple operations using with-sh-env or with-sh-dir . with-sh-throw is binds :throw-ex as true.

sh returns a map of

:exit => sub-process's exit code

:out => sub-process's stdout (as Bytebuf or String)

:err => sub-process's stderr (String via platform default encoding)

E.g.:

```
(sh "uname" "-r")
```

```
=> {:err "" :out "20.5.0\n" :exit 0}
```

```
(println (sh "ls" "-l"))
```

```
(println (sh "ls" "-l" "/tmp"))
```

```
(println (sh "sed" "s/[aeiou]/oo/g" :in "hello there\n"))
```

```
(println (sh "cat" :in "x\u25bax\n"))
```

```
(println (sh "echo" "x\u25bax"))
```

```
(println (sh "/bin/sh" "-c" "ls -l"))
```

```
(sh "ls" "-l" :out-fn println)
```

```
(sh "ls" "-l" :out-fn println :err-fn println)
```

```
;; background process
```

```
(println (sh "/bin/sh" "-c" "sleep 30 >/dev/null 2>&1 &"))
```

```
(println (sh "/bin/sh" "-c" "nohup sleep 30 >/dev/null 2>&1 &"))
```

```
;; asynchronously slurping stdout and stderr
```

```
(sh "/bin/sh"
```

```
  "-c" "for i in {1..5}; do sleep 1; echo \"Hello $i\"; done"
```

```
  :out-fn println
```

```
  :err-fn println)
```

```
;; asynchronously slurping stdout and stderr with a timeout
```

```
(sh "/bin/sh"
```

```
  "-c" "for i in {1..5}; do sleep 1; echo \"Hello $i\"; done"
```

```
  :out-fn println
```

```
  :err-fn println
```

```
  :timeout 2500)
```

```
;; reads 4 single-byte chars
(println (sh "echo" "x\u25bax" :out-enc "ISO-8859-1"))

;; reads binary file into bytes[]
(println (sh "cat" "birds.jpg" :out-enc :bytes))

;; working directory
(println (with-sh-dir "/tmp" (sh "ls" "-l") (sh "pwd"))))

(println (sh "pwd" :dir "/tmp"))

;; throw an exception if the shell's subprocess exit code is not equal to 0
(println (with-sh-throw (sh "ls" "-l"))))

(println (sh "ls" "-l" :throw-ex true))

;; windows
(println (sh "cmd" "/c dir 1>&2"))
```

SEE ALSO

[with-sh-throw](#)

Shell commands executed within a with-sh-throw context throw an exception if the spawned shell process returns an exit code other than 0.

[with-sh-dir](#)

Sets the directory for use with sh, see sh for details.

[with-sh-env](#)

Sets the environment for use with sh.

[top](#)

sh/open

```
(sh/open f)
```

Opens a *file* or an *URL* with the associated platform specific application.

Uses the OS commands:

- *MacOS*: `/usr/bin/open f`
- *Windows*: `cmd /C start f`
- *Linux*: `/usr/bin/xdg-open f`

Note: `sh/open` can only be run from a REPL!

```
(sh/open "sample.pdf")
```

```
(sh/open "https://github.com/jlangch/venice")
```

[top](#)

sh/pwd

```
(sh/pwd)
```

Returns the current working directory.

Note:

You can't change the current working directory of the Java VM but if you were to launch another process using (sh & args) you can specify the working directory for the new spawned process.

(sh/pwd)

SEE ALSO

[sh](#)

Launches a new sub-process.

[top](#)

shell/alive?

(alive? pid)

(alive? process-handle)

Returns true if the process represented by a PID or a process handle is alive otherwise false.

Requires Java 9+.

(shell/alive? 4556)

SEE ALSO

[shell/pid](#)

Without argument returns the PID (type long) of this process. With a process-handle (:java.lang.ProcessHandle) returns the PID for ...

[shell/processes](#)

Returns a snapshot of all processes visible to the current process. Returns a list of :java.lang.ProcessHandle for the processes.

[top](#)

shell/descendant-processes

(descendant-processes pid)

(descendant-processes process-handle)

Returns the descendants (:java.lang.ProcessHandle) of a process represented by a PID or a process handle.

Requires Java 9+.

(shell/descendant-processes 4556)

```
(->> (shell/current-process)
      (shell/descendant-processes)
      (map shell/process-info))
```

SEE ALSO

[shell/process-info](#)

Returns the process info for a process represented by a PID or a process handle.

[shell/pid](#)

Without argument returns the PID (type long) of this process. With a process-handle (:java.lang.ProcessHandle) returns the PID for ...

top

shell/diff

```
(diff file1 file2)
```

Compare two files and print the differences.

```
(diff "/tmp/x.txt" "/tmp/y.txt")
```

top

shell/kill

```
(kill pid)
(kill process-handle)
```

Requests the process to be killed. Returns true if the process is killed and false if the process stays alive. Returns nil if the process does not exist. Accepts a PID or a process handle (:java.lang.ProcessHandle).

Requires Java 9+.

```
(shell/kill 4556)
```

SEE ALSO

[shell/pid](#)

Without argument returns the PID (type long) of this process. With a process-handle (:java.lang.ProcessHandle) returns the PID for ...

[shell/kill-forcibly](#)

Requests the process to be killed forcibly. Returns true if the process is killed and false if the process stays alive. Returns nil ...

[shell/processes](#)

Returns a snapshot of all processes visible to the current process. Returns a list of :java.lang.ProcessHandle for the processes.

top

shell/kill-forcibly

```
(kill-forcibly pid)
(kill-forcibly process-handle)
```

Requests the process to be killed forcibly. Returns true if the process is killed and false if the process stays alive. Returns nil if the process does not exist. Accepts a PID or a process handle (:java.lang.ProcessHandle).

Requires Java 9+.

```
(shell/kill-forcibly 4556)
```

SEE ALSO

[shell/pid](#)

Without argument returns the PID (type long) of this process. With a process-handle (:java.lang.ProcessHandle) returns the PID for ...

[shell/kill](#)

Requests the process to be killed. Returns true if the process is killed and false if the process stays alive. Returns nil if the process ...

[shell/processes](#)

Returns a snapshot of all processes visible to the current process. Returns a list of :java.lang.ProcessHandle for the processes.

[top](#)

shell/open

(open url)

Opens a file or an url with the associated platform specific application.

```
(shell/open "img.png")
```

```
(shell/open "https://www.heise.de/")
```

SEE ALSO

[shell/open-macos-app](#)

Opens a Mac OSX app.

[top](#)

shell/open-macos-app

(open-macos-app name & args)

Opens a Mac OSX app.

```
(shell/open-macos-app "Calendar")
```

```
(shell/open-macos-app "Maps")
```

```
(shell/open-macos-app "TextEdit" "example.txt")
```

SEE ALSO

[shell/open](#)

Opens a file or an url with the associated platform specific application.

[top](#)

shell/parent-process

(parent-process pid)

(parent-process process-handle)

Returns the parent (:java.lang.ProcessHandle) of a process represented by a PID or a process handle.

Requires Java 9+.

```
(shell/parent-process 4556)
```

```
(->> (shell/current-process)
      (shell/parent-process)
      (shell/process-info))
```

SEE ALSO

[shell/process-info](#)

Returns the process info for a process represented by a PID or a process handle.

[shell/pid](#)

Without argument returns the PID (type long) of this process. With a process-handle (:java.lang.ProcessHandle) returns the PID for ...

[shell/processes](#)

Returns a snapshot of all processes visible to the current process. Returns a list of :java.lang.ProcessHandle for the processes.

[top](#)

shell/pid

```
(pid)
(pid process-handle)
```

Without argument returns the PID (type long) of this process. With a process-handle (:java.lang.ProcessHandle) returns the PID for the process represented by the handle.

Requires Java 9+.

```
(shell/pid)
```

SEE ALSO

[shell/process-handle](#)

Returns the process handle (:java.lang.ProcessHandle) for a PID or nil if there is no process.

[shell/process-info](#)

Returns the process info for a process represented by a PID or a process handle.

[shell/alive?](#)

Returns true if the process represented by a PID or a process handle is alive otherwise false.

[shell/kill](#)

Requests the process to be killed. Returns true if the process is killed and false if the process stays alive. Returns nil if the process ...

[shell/processes](#)

Returns a snapshot of all processes visible to the current process. Returns a list of :java.lang.ProcessHandle for the processes.

[top](#)

shell/process-handle

```
(process-handle pid)
```

Returns the process handle (:java.lang.ProcessHandle) for a PID or nil if there is no process.

Requires Java 9+.

([shell/process-handle](#) 4556)

SEE ALSO

[shell/pid](#)

Without argument returns the PID (type long) of this process. With a process-handle (:java.lang.ProcessHandle) returns the PID for ...

[shell/alive?](#)

Returns true if the process represented by a PID or a process handle is alive otherwise false.

[shell/process-info](#)

Returns the process info for a process represented by a PID or a process handle.

[shell/kill](#)

Requests the process to be killed. Returns true if the process is killed and false if the process stays alive. Returns nil if the process ...

[top](#)

shell/process-handle?

(process-handle? p)

Returns true if p is a process handle (:java.lang.ProcessHandle).

Requires Java 9+.

[top](#)

shell/process-info

(process-info pid)
(process-info process-handle)

Returns the process info for a process represented by a PID or a process handle.

The process info is a map with the keys:

:pid	the PID
:alive	true if the process is alive else false
:arguments	the list of strings of the arguments of the process
:command	the executable pathname of the process
:command-line	the command line of the process
:start-time	the start time of the process
:total-cpu-millis	the total cputime accumulated of the process
:user	the user of the process.

Requires Java 9+.

([shell/process-info](#) 4556)

```
;; find the PID of the ArangoDB process
;; like: pgrep -lf ArangoDB3 | cut -d ' ' -f 1
(->> (shell/processes)
      (map shell/process-info
           (filter #(str/contains? (:command-line %) "ArangoDB3"))
           (map :pid)))
```


SEE ALSO

[shell/pid](#)

Without argument returns the PID (type long) of this process. With a process-handle (:java.lang.ProcessHandle) returns the PID for ...

[shell/process-handle](#)

Returns the process handle (:java.lang.ProcessHandle) for a PID or nil if there is no process.

top

shell/processes

(processes)

Returns a snapshot of all processes visible to the current process. Returns a list of :java.lang.ProcessHandle for the processes.

Requires Java 9+.

([shell/processes](#))

```
;; find the PID of the ArangoDB process
;; like: pgrep -lf ArangoDB3 | cut -d ' ' -f 1
(->> (shell/processes)
      (map shell/process-info)
      (filter #(str/contains? (:command-line %) "ArangoDB3"))
      (map :pid))
```

SEE ALSO

[shell/processes-info](#)

Returns a snapshot of all processes visible to the current process. Returns a list of process infos for the processes.

top

shell/processes-info

(processes-info)

Returns a snapshot of all processes visible to the current process. Returns a list of process infos for the processes.

The process info is a map with the keys:

:pid	the PID
:alive	true if the process is alive else false
:arguments	the list of strings of the arguments of the process
:command	the executable pathname of the process
:command-line	the command line of the process
:start-time	the start time of the process
:total-cpu-millis	the total cputime accumulated of the process
:user	the user of the process.

Requires Java 9+.

([shell/processes-info](#))

```
;; find the PID of the ArangoDB process
;; like: pgrep -lf ArangoDB3 | cut -d ' ' -f 1
(->> (shell/processes-info)
      (filter #(str/contains? (:command-line %) "ArangoDB3"))
      (map :pid))
```

SEE ALSO

[shell/processes](#)

Returns a snapshot of all processes visible to the current process. Returns a list of :java.lang.ProcessHandle for the processes.

top

shell/wait-for-process-exit

```
(wait-for-process-exit pid timeout)
(wait-for-process-exit process-handle timeout)
```

Waits until the process with the pid exits. Waits max timeout seconds. Returns nil if the process exits before reaching the timeout, else the pid is returned. Accepts a PID or a process handle (:java.lang.ProcessHandle).

Requires Java 9+.

```
(shell/wait-for-process-exit 12345 20)
```

SEE ALSO

[shell/pid](#)

Without argument returns the PID (type long) of this process. With a process-handle (:java.lang.ProcessHandle) returns the PID for ...

[shell/kill](#)

Requests the process to be killed. Returns true if the process is killed and false if the process stays alive. Returns nil if the process ...

[shell/processes](#)

Returns a snapshot of all processes visible to the current process. Returns a list of :java.lang.ProcessHandle for the processes.

top

shuffle

```
(shuffle coll)
```

Returns a collection of the items in coll in random order.

```
(shuffle '(1 2 3 4 5 6))
=> (1 3 5 2 4 6)
```

```
(shuffle [1 2 3 4 5 6])
=> [5 4 2 1 3 6]
```

```
(shuffle "abcdef")
=> (#\a #\e #\f #\d #\b #\c)
```

top

shutdown-agents

(shutdown-agents)

Initiates a shutdown of the thread pools that back the agent system. Running actions will complete, but no new actions will be accepted

```
(do
  (def x1 (agent 100))
  (def x2 (agent 100))
  (shutdown-agents))
```

SEE ALSO

[agent](#)

Creates and returns an agent with an initial value of state and zero or more options.

[top](#)

shutdown-agents?

(shutdown-agents?)

Returns true if the thread-pool that backs the agents is shut down

```
(do
  (def x1 (agent 100))
  (def x2 (agent 100))
  (shutdown-agents)
  (sleep 300)
  (shutdown-agents?))
```

SEE ALSO

[agent](#)

Creates and returns an agent with an initial value of state and zero or more options.

[top](#)

shutdown-hook

(shutdown-hook f)

Registers the function `f` as a JVM shutdown hook.

Shutdown hooks can be tested in a REPL:

- start a REPL
- run `(shutdown-hook (fn [] (println "SHUTDOWN") (sleep 3000)))`
- exit the REPL with `!exit`

The sandbox is active within the shutdown hook:

- start a REPL
- run `!sandbox customized`

- run `!sandbox add-rule blacklist:venice:func:+`
- run `(shutdown-hook (fn [] (try (+ 1 2) (catch :SecurityException ex (println ex) (sleep 3000)))))`
- exit the REPL with `!exit`

```
(shutdown-hook (fn [] (println "shutdown")))
```

[top](#)

sleep

```
(sleep n)
(sleep n time-unit)
```

Sleep for the time n. The default time unit is milliseconds.

Time unit is one of :milliseconds, :seconds, :minutes, :hours, or :days or their abbreviations :msec, :ms, :sec, :s, :min, :hr, :h, :d.

```
(sleep 30)
=> nil

(sleep 30 :milliseconds)
=> nil

(sleep 30 :msec)
=> nil

(sleep 5 :seconds)
=> nil

(sleep 5 :sec)
=> nil
```

[top](#)

some

```
(some pred coll)
```

Returns the first logical true value of (pred x) for any x in coll, else nil.

Stops processing the collection if the first value is found that meets the predicate.

```
(some even? '(1 2 3 4))
=> true

(some even? '(1 3 5 7))
=> nil

(some #{5} [1 2 3 4 5])
=> 5

(some #(== 5 %) [1 2 3 4 5])
=> true
```

```
(some #(if (even? %) %) [1 2 3 4])  
=> 2
```

[top](#)

some->

```
(some-> expr & forms)
```

When expr is not nil, threads it into the first form (via `->`), and when that result is not nil, through the next etc.

```
(some-> {:y 3 :x 5}  
      :y  
      (- 2))  
=> 1
```

```
(some-> {:y 3 :x 5}  
      :z  
      (- 2))  
=> nil
```

SEE ALSO

[some->>](#)

When expr is not nil, threads it into the first form (via `->>`), and when that result is not nil, through the next etc.

[top](#)

some->>

```
(some->> expr & forms)
```

When expr is not nil, threads it into the first form (via `->>`), and when that result is not nil, through the next etc.

```
(some->> {:y 3 :x 5}  
      :y  
      (- 2))  
=> -1
```

```
(some->> {:y 3 :x 5}  
      :z  
      (- 2))  
=> nil
```

SEE ALSO

[some->](#)

When expr is not nil, threads it into the first form (via `->`), and when that result is not nil, through the next etc.

[top](#)

some?

```
(some? x)
```

Returns true if x is not nil, false otherwise

```
(some? nil)  
=> false
```

```
(some? 0)  
=> true
```

```
(some? 4.0)  
=> true
```

```
(some? false)  
=> true
```

```
(some? [])  
=> true
```

```
(some? {})  
=> true
```

SEE ALSO

[nil?](#)

Returns true if x is nil, false otherwise

[top](#)

sort

```
(sort coll)  
(sort comparefn coll)
```

Returns a sorted list of the items in coll. If no compare function comparefn is supplied, uses the natural compare. The compare function takes two arguments and returns -1, 0, or 1

```
(sort [3 2 5 4 1 6])  
=> [1 2 3 4 5 6]
```

```
(sort compare [3 2 5 4 1 6])  
=> [1 2 3 4 5 6]
```

```
; reversed  
(sort (comp - compare) [3 2 5 4 1 6])  
=> [6 5 4 3 2 1]
```

```
(sort {:c 3 :a 1 :b 2})  
=> ([:a 1] [:b 2] [:c 3])
```

SEE ALSO

[sort-by](#)

Returns a sorted sequence of the items in coll, where the sort order is determined by comparing (keyfn item). If no comparator is supplied, ...

[top](#)

sort-by

```
(sort-by keyfn coll)
(sort-by keyfn compfn coll)
```

Returns a sorted sequence of the items in `coll`, where the sort order is determined by comparing (`keyfn` item). If no comparator is supplied, uses `compare`.

To sort by multiple values use `juxt`, see the examples below.

```
(sort-by :id [{:id 2 :name "Smith"} {:id 1 :name "Jones"} ])
=> [{:name "Jones" :id 1} {:name "Smith" :id 2}]
```

```
(sort-by count ["aaa" "bb" "c"])
=> ["c" "bb" "aaa"]
```

```
; reversed
(sort-by count (comp - compare) ["aaa" "bb" "c"])
=> ["aaa" "bb" "c"]
```

```
(sort-by first [[1 2] [3 4] [2 3]])
=> [[1 2] [2 3] [3 4]]
```

```
; sort tuples by first value, and where first value is equal,
; sort by second value
(sort-by (juxt first second) [[3 2] [1 3] [3 1] [1 2]])
=> [[1 2] [1 3] [3 1] [3 2]]
```

```
; reversed
(sort-by first (comp - compare) [[1 2] [3 4] [2 3]])
=> [[3 4] [2 3] [1 2]]
```

```
(sort-by :rank [{:rank 2} {:rank 3} {:rank 1}])
=> [{:rank 1} {:rank 2} {:rank 3}]
```

```
; reversed
(sort-by :rank (comp - compare) [{:rank 2} {:rank 3} {:rank 1}])
=> [{:rank 3} {:rank 2} {:rank 1}]
```

```
; sort entries in a map by value
(sort-by val {:foo 7, :bar 3, :baz 5})
=> ([:bar 3] [:baz 5] [:foo 7])
```

```
; sort by :foo, and where :foo is equal, sort by :bar
(do
  (def x [ {:foo 2 :bar 11}
            {:foo 1 :bar 99}
            {:foo 2 :bar 55}
            {:foo 1 :bar 77} ])
  (sort-by (juxt :foo :bar) x))
=> [{:foo 1 :bar 77} {:foo 1 :bar 99} {:foo 2 :bar 11} {:foo 2 :bar 55}]
```

```
; sort by a given key order
(do
  (def x [ {:foo 2 :bar 11}
            {:foo 1 :bar 99}
            {:foo 2 :bar 55}
            {:foo 1 :bar 77} ])
```

```
(def order [55 77 99 11])
(sort-by #((into {} (map-indexed (fn [i e] [e i]) order)) (:bar %))
  x))
=> [{:foo 2 :bar 55} {:foo 1 :bar 77} {:foo 1 :bar 99} {:foo 2 :bar 11}]
```

SEE ALSO

[sort](#)

Returns a sorted list of the items in coll. If no compare function comparefn is supplied, uses the natural compare. The compare function ...

[top](#)

sorted

```
(sorted cmp coll)
```

Returns a sorted collection using the compare function cmp. The compare function takes two arguments and returns -1, 0, or 1. Returns a stateful transducer when no collection is provided.

```
(sorted compare [4 2 1 5 6 3])
=> [1 2 3 4 5 6]
```

```
(sorted (comp (partial * -1) compare) [4 2 1 5 6 3])
=> [6 5 4 3 2 1]
```

[top](#)

sorted-map

```
(sorted-map & keyvals)
(sorted-map map)
```

Creates a new sorted map containing the items.

```
(sorted-map :a 1 :b 2)
=> {:a 1 :b 2}
```

```
(sorted-map (hash-map :a 1 :b 2))
=> {:a 1 :b 2}
```

[top](#)

sorted-map?

```
(sorted-map? obj)
```

Returns true if obj is a sorted map

```
(sorted-map? (sorted-map :a 1 :b 2))
=> true
```

[top](#)

sorted-set

(sorted-set & items)

Creates a new sorted-set containing the items.

```
(sorted-set)
```

```
=> #{} 
```

```
(sorted-set nil)
```

```
=> #{nil} 
```

```
(sorted-set 1)
```

```
=> #{1} 
```

```
(sorted-set 6 2 4)
```

```
=> #{2 4 6} 
```

```
(str (sorted-set [2 3] [1 2]))
```

```
=> "#[[1 2] [2 3]]" 
```

[top](#)

sorted-set?

(sorted-set? obj)

Returns true if obj is a sorted-set

```
(sorted-set? (sorted-set 1))
```

```
=> true 
```

[top](#)

split-at

(split-at n coll)

Returns a vector of [(take n coll) (drop n coll)]

```
(split-at 2 [1 2 3 4 5])
```

```
=> [(1 2) (3 4 5)] 
```

```
(split-at 3 [1 2])
```

```
=> [(1 2) ()] 
```

[top](#)

split-with

```
(split-with pred coll)
```

Splits the collection at the first false/nil predicate result in a vector with two lists

```
(split-with odd? [1 3 5 6 7 9])  
=> [(1 3 5) (6 7 9)]
```

```
(split-with odd? [1 3 5])  
=> [(1 3 5) ()]
```

```
(split-with odd? [2 4 6])  
=> [() (2 4 6)]
```

[top](#)

sqrt

```
(sqrt x)
```

Square root of x

```
(sqrt 10)  
=> 3.1622776601683795
```

```
(sqrt 10I)  
=> 3.1622776601683795
```

```
(sqrt 10.23)  
=> 3.1984371183438953
```

```
(sqrt 10.23M)  
=> 3.198437118343895324557024650857783854007720947265625M
```

```
(sqrt 10N)  
=> 3.162277660168379522787063251598738133907318115234375M
```

SEE ALSO

[square](#)
Square of x

[top](#)

square

```
(square x)
```

Square of x

```
(square 10)  
=> 100
```

```
(square 10I)
=> 100I

(square 10.23)
=> 104.6529

(square 10.23M)
=> 104.6529M
```

SEE ALSO

[sqrt](#)

Square root of x

[top](#)

stack

```
(stack)
```

Creates a new mutable threadsafe stack.

```
(let [s (stack)]
  (push! s 1)
  (push! s 2)
  (push! s 3))
=> (3 2 1)
```

SEE ALSO

[peek](#)

For a list, same as first, for a vector, same as last, for a stack the top element (or nil if the stack is empty), for a queue the ...

[pop!](#)

Pops an item from a stack.

[push!](#)

Pushes an item to a stack.

[empty](#)

Returns an empty collection of the same category as coll, or nil if coll is nil. If the collection is mutable clears the collection ...

[empty?](#)

Returns true if x is empty. Accepts strings, collections and bytebufs.

[count](#)

Returns the number of items in the collection. (count nil) returns 0. Also works on strings, and Java Collections

[into!](#)

Adds all of the items of 'from' conjoined to the mutable 'to' collection

[conj!](#)

Returns a new mutable collection with the x, xs 'added'. (conj! nil item) returns (item) and (conj! item) returns item.

[stack?](#)

Returns true if coll is a stack

[top](#)

stack?

```
(stack? coll)
```

Returns true if coll is a stack

```
(stack? (stack))  
=> true
```

top

stacktrace

```
(stacktrace ex)
```

Returns the stacktrace of a java exception

```
(println (stacktrace (. :VncException :new (str "test"))))
```

top

str

```
(str & xs)
```

With no args, returns the empty string. With one arg x, returns x.toString(). (str nil) returns the empty string. With more than one arg, returns the concatenation of the str values of the args.

```
(str)  
=> ""
```

```
(str 1 2 3)  
=> "123"
```

```
(str +)  
=> "+"
```

```
(str [1 2 3])  
=> "[1 2 3]"
```

```
(str "total " 100)  
=> "total 100"
```

```
(str #\h #\i)  
=> "hi"
```

SEE ALSO

[pr-str](#)

With no args, returns the empty string. With one arg x, returns x.toString(). With more than one arg, returns the concatenation of ...

top

str/align

```
(str/align width align overflow text)
```

Aligns a text within a string of width characters.

align: :left, :center, :right

overflow: :newline :clip-left, :clip-right, :ellipsis-left, :ellipsis-right

```
(str/align 6 :left :clip-right "abc")  
=> "abc  "
```

```
(str/align 6 :center :clip-right "abc")  
=> "  abc "
```

```
(str/align 6 :right :clip-right "abc")  
=> "    abc"
```

```
(str/align 6 :left :clip-left "abcdefgh")  
=> "cdefgh"
```

```
(str/align 6 :left :ellipsis-left "abcdefgh")  
=> "...defgh"
```

```
(str/align 6 :left :ellipsis-right "abcdefgh")  
=> "abcde..."
```

SEE ALSO

[str/trim-to-nil](#)

Trims leading and trailing whitespaces from s. Returns nil if the resulting string is empty

[str/trim-left](#)

Trims leading whitespaces from s.

[str/trim-right](#)

Trims trailing whitespaces from s.

[top](#)

str/blank?

```
(str/blank? s)
```

True if s is nil, empty, or contains only whitespace.

```
(str/blank? nil)  
=> true
```

```
(str/blank? "")  
=> true
```

```
(str/blank? " ")  
=> true
```

```
(str/blank? "abc")  
=> false
```

SEE ALSO

[str/not-blank?](#)

True if s contains at least one non whitespace char.

[empty?](#)

Returns true if x is empty. Accepts strings, collections and bytebufs.

[not-empty?](#)

Returns true if x is not empty. Accepts strings, collections and bytebufs.

[nil?](#)

Returns true if x is nil, false otherwise

[top](#)

str/butlast

```
(str/butlast s)
```

Returns a possibly empty string of the characters without the last.

```
(str/butlast "abcdef")  
=> "abcde"
```

[top](#)

str/butnlast

```
(str/butnlast s n)
```

Returns a possibly empty string of the characters without the n last characters.

```
(str/butnlast "abcdef" 3)  
=> "abc"
```

[top](#)

str/bytebuf-to-hex

```
(str/bytebuf-to-hex data)  
(str/bytebuf-to-hex data :upper)
```

Converts byte data to a hex string using the hexadecimal digits: `0123456789abcdef` .

If the `:upper` options is passed the hex digits `0123456789ABCDEF` are used.

```
(str/bytebuf-to-hex (bytebuf [0 1 2 3 4 5 6]))  
=> "00010203040506"
```

```
(str/bytebuf-to-hex (bytebuf [202 254]) :upper)
=> "CAFE"
```

[top](#)

str/char?

```
(str/char? s)
```

Returns true if s is a char or a single char string.

```
(str/char? "x")
=> true
```

```
(str/char? #\x)
=> true
```

[top](#)

str/chars

```
(str/chars s)
```

Converts a string to a char list.

```
(str/chars "abcdef")
=> (#\a #\b #\c #\d #\e #\f)
```

```
(str/join (str/chars "abcdef"))
=> "abcdef"
```

[top](#)

str/contains?

```
(str/contains? s substr)
```

True if s contains with substr.

```
(str/contains? "abc" "ab")
=> true
```

```
(str/contains? "abc" #\b)
=> true
```

[top](#)

str/cr-lf

```
(str/cr-lf s mode)
```

Convert a text to use LF or CR-LF.

```
(str/cr-lf "line1  
line2  
line3" :cr-lf)
```

```
(str/cr-lf "line1  
line2  
line3" :lf)
```

[top](#)

str/decode-base64

```
(str/decode-base64 s)
```

Base64 decode.

```
(str/decode-base64 (str/encode-base64 (bytebuf [0 1 2 3 4 5 6])))  
=> [0 1 2 3 4 5 6]
```

[top](#)

str/decode-url

```
(str/decode-url s)
```

URL decode.

```
(str/decode-url "The+string+%C3%BC%40foo-bar")  
=> "The string ü@foo-bar"
```

[top](#)

str/digit?

```
(str/digit? s)
```

True if s is a char and the char is a digit.

Defined by Java Character.isDigit(ch).

```
(str/digit? #\8)  
=> true
```

```
(str/digit? "8")  
=> false
```

SEE ALSO

[str/letter?](#)

True if s is a char and the char is a letter.

[str/hexdigit?](#)

True if s is a char and the char is a hex digit.

[top](#)

str/double-quote

```
(str/double-quote str)
```

Double quotes a string.

```
(str/double-quote "abc")  
=> "\"abc\""
```

```
(str/double-quote "")  
=> "\"\""
```

[top](#)

str/double-quoted?

```
(str/double-quoted? str)
```

Returns true if the string is double quoted.

```
(str/double-quoted? "\"abc\"")  
=> true
```

[top](#)

str/double-unquote

```
(str/double-unquote str)
```

Unquotes a double quoted string.

```
(str/double-unquote "\"abc\"")  
=> "abc"
```

```
(str/double-unquote "\"\"")  
=> ""
```

```
(str/double-unquote nil)  
=> nil
```

[top](#)

str/encode-base64

```
(str/encode-base64 data)
```

Base64 encode.

```
(str/encode-base64 (bytebuf [0 1 2 3 4 5 6]))  
=> "AAECAwQFBg=="
```

[top](#)

str/encode-url

```
(str/encode-url s)
```

URL encode.

```
(str/encode-url "The string ü@foo-bar")  
=> "The+string+%C3%BC%40foo-bar"
```

[top](#)

str/ends-with?

```
(str/ends-with? s substr)
```

True if s ends with substr.

```
(str/ends-with? "abc" "bc")  
=> true
```

[top](#)

str/equals-ignore-case?

```
(str/equals-ignore-case? s1 s2)
```

Compares two strings ignoring case. True if both are equal.

```
(str/equals-ignore-case? "abc" "abC")  
=> true
```

[top](#)

str/escape-html

```
(str/escape-html s)
```

HTML escape. Escapes `&`, `<`, `>`, `"`, `'`, and the non blocking space `U+00A0`

```
(str/escape-html "1 2 3 & < > \" ' \u00A0")  
=> "1 2 3 &amp; &lt; &gt; &quot; &apos; "
```

[top](#)

str/escape-xml

```
(str/escape-xml s)
```

XML escape. Escapes `&`, `<`, `>`, `"`, `'`

```
(str/escape-xml "1 2 3 & < > \" ' ")  
=> "1 2 3 &amp; &lt; &gt; &quot; &apos; "
```

[top](#)

str/expand

```
(str/expand s len fill mode*)
```

Expands a string to the max lenght len. Fills up with the fillstring if the string needs to be expanded. The fill string is added to the start or end of the string depending on the mode `:start`, `:end`. The mode defaults to `:end`

```
(str/expand "abcdefghij" 8 ".")  
=> "abcdefghij"
```

```
(str/expand "abcdefghij" 20 ".")  
=> "abcdefghij....."
```

```
(str/expand "abcdefghij" 20 "." :start)  
=> ".....abcdefghij"
```

```
(str/expand "abcdefghij" 20 "." :end)  
=> "abcdefghij....."
```

```
(str/expand "abcdefghij" 30 "1234" :start)  
=> "12341234123412341234abcdefghij"
```

```
(str/expand "abcdefghij" 30 "1234" :end)  
=> "abcdefghij12341234123412341234"
```

[top](#)

str/format

```
(str/format format args*)
```

```
(str/format locale format args*)
```

Returns a formatted string using the specified format string and arguments.
Venice uses the Java format syntax.

JavaDoc: [Format Syntax](#)

```
(str/format "value: %.4f" 1.45)
=> "value: 1.4500"

(str/format (. :java.util.Locale :new "de" "DE") "value: %.4f" 1.45)
=> "value: 1,4500"

(str/format (. :java.util.Locale :GERMANY) "value: %.4f" 1.45)
=> "value: 1,4500"

(str/format (. :java.util.Locale :new "de" "CH") "value: %,d" 2345000)
=> "value: 2'345'000"

(str/format [ "de" ] "value: %,2f" 100000.45)
=> "value: 100.000,45"

(str/format [ "de" "DE" ] "value: %,2f" 100000.45)
=> "value: 100.000,45"

(str/format [ "de" "CH" ] "value: %,2f" 100000.45)
=> "value: 100'000.45"

(str/format [ "en" "US" ] "value: %,2f" 100000.45)
=> "value: 100,000.45"

(str/format [ "de" "DE" ] "value: %,d" 2345000)
=> "value: 2.345.000"
```

[top](#)

str/format-bytebuf

(str/format-bytebuf data delimiter & options)

Formats a bytebuffer.

Options

:prefix0x prefix with 0x

```
(str/format-bytebuf (bytebuf [0 34 67 -30 -1]) nil)
=> "002243E2FF"

(str/format-bytebuf (bytebuf [0 34 67 -30 -1]) "")
=> "002243E2FF"

(str/format-bytebuf (bytebuf [0 34 67 -30 -1]) ", ")
=> "00, 22, 43, E2, FF"

(str/format-bytebuf (bytebuf [0 34 67 -30 -1]) ", " :prefix0x)
=> "0x00, 0x22, 0x43, 0xE2, 0xFF"
```

[top](#)

str/hex-to-bytebuf

```
(str/hex-to-bytebuf hex)
```

Converts a hex string to a bytebuf

```
(str/hex-to-bytebuf "005E4AFF")  
=> [0 94 74 255]
```

```
(str/hex-to-bytebuf "005e4aff")  
=> [0 94 74 255]
```

[top](#)

str/hexdigit?

```
(str/hexdigit? s)
```

True if s is a char and the char is a hex digit.

```
(str/hexdigit? #\8)  
=> true
```

```
(str/hexdigit? #\a)  
=> true
```

```
(str/hexdigit? #\A)  
=> true
```

```
(str/hexdigit? #\Y)  
=> false
```

[top](#)

str/index-of

```
(str/index-of s value)  
(str/index-of s value from-index)
```

Return index of value (string or char) in s, optionally searching forward from from-index. Return nil if value not found.

```
(str/index-of "abcdefabc" "ab")  
=> 0
```

SEE ALSO

[str/index-of-char](#)

Return index of the first char of chars (string or sequence of chars) in s, optionally searching forward from from-index. Return nil ...

[str/index-of-not-char](#)

Return index of the first char not of chars (string or sequence of chars) in s, optionally searching forward from from-index. Return ...

[str/last-index-of](#)

Return last index of value (string or char) in s, optionally searching backward from from-index. Return nil if value not found.

[top](#)

str/index-of-char

```
(str/index-of-char s chars)
(str/index-of-char s chars from-index)
```

Return index of the first char of chars (string or sequence of chars) in s, optionally searching forward from from-index. Return nil if value not found.

```
(str/index-of-char "-+-123+-123" "012")
=> 3
```

```
(str/index-of-char "-+-123+-123" [#\0 #\1 #\2])
=> 3
```

```
(str/index-of-char "-+-123+-123" "012" 7)
=> 9
```

SEE ALSO

[str/index-of-not-char](#)

Return index of the first char not of chars (string or sequence of chars) in s, optionally searching forward from from-index. Return ...

[str/index-of](#)

Return index of value (string or char) in s, optionally searching forward from from-index. Return nil if value not found.

[str/last-index-of](#)

Return last index of value (string or char) in s, optionally searching backward from from-index. Return nil if value not found.

[top](#)

str/index-of-not-char

```
(str/index-of-not-char s chars)
(str/index-of-not-char s chars from-index)
```

Return index of the first char not of chars (string or sequence of chars) in s, optionally searching forward from from-index. Return nil if value not found.

```
(str/index-of-not-char "-+-123+-123" "-+")
=> 3
```

```
(str/index-of-not-char "-+-123+-123" [#\- #\+])
=> 3
```

```
(str/index-of-not-char "-+-123+-123" "-+" 7)
=> 9
```

SEE ALSO

[str/index-of-char](#)

Return index of the first char of chars (string or sequence of chars) in s, optionally searching forward from from-index. Return nil ...

[str/index-of](#)

Return index of value (string or char) in s, optionally searching forward from from-index. Return nil if value not found.

[str/last-index-of](#)

Return last index of value (string or char) in s, optionally searching backward from from-index. Return nil if value not found.

[top](#)

str/join

```
(str/join coll)
(str/join separator coll)
```

Joins all elements in coll separated by an optional separator.

```
(str/join [1 2 3])
=> "123"

(str/join "-" [1 2 3])
=> "1-2-3"

(str/join "-" [(char "a") 1 "xyz" 2.56M])
=> "a-1-xyz-2.56M"

(str/join #\- [1 2 3])
=> "1-2-3"
```

[top](#)

str/last-index-of

```
(str/last-index-of s value)
(str/last-index-of s value from-index)
```

Return last index of value (string or char) in s, optionally searching backward from from-index. Return nil if value not found.

```
(str/last-index-of "abcdefabc" "ab")
=> 6

(str/last-index-of "abcdefabc" "de" 6)
=> 3
```

SEE ALSO

[str/index-of](#)

Return index of value (string or char) in s, optionally searching forward from from-index. Return nil if value not found.

[str/index-of-char](#)

Return index of the first char of chars (string or sequence of chars) in s, optionally searching forward from from-index. Return nil ...

[str/index-of-not-char](#)

Return index of the first char not of chars (string or sequence of chars) in s, optionally searching forward from from-index. Return ...

[top](#)

str/letter?

```
(str/letter? s)
```

True if `s` is a char and the char is a letter.

Defined by Java `Character.isLetter(ch)`.

```
(str/letter? #\x)
=> true
```

[top](#)

str/levenshtein

```
(str/levenshtein s1 s2)
```

Returns the *Levenshtein* distance of two strings.

The *Damerau-Levenshtein* algorithm is an extension to the *Levenshtein* algorithm which solves the edit distance problem between a source string and a target string with the following operations:

- Character Insertion
- Character Deletion
- Character Replacement
- Adjacent Character Swap

Note that the adjacent character swap operation is an edit that may be applied when two adjacent characters in the source string match two adjacent characters in the target string, but in reverse order, rather than a general allowance for adjacent character swaps.

This implementation allows the client to specify the costs of the various edit operations with the restriction that the cost of two swap operations must not be less than the cost of a delete operation followed by an insert operation. This restriction is required to preclude two swaps involving the same character being required for optimality which, in turn, enables a fast dynamic programming solution.

The cost of the *Damerau-Levenshtein* algorithm is $O(n*m)$ where `n` is the length of the source string and `m` is the length of the target string. This implementation consumes $O(n*m)$ space.

```
(str/levenshtein "Tier" "Tor")
=> 2
```

```
(str/levenshtein "Tier" "tor")
=> 3
```

[top](#)

str/linefeed?

```
(str/linefeed? s)
```

True if `s` is a char and the char is a linefeed.

```
(str/linefeed? #\newline)
=> true
```



```
(str/linefeed? (first "
"))
=> true
```

[top](#)

str/lorem-ipsum

```
(str/lorem-ipsum & options)
```

Creates an arbitrary length Lorem Ipsum text.

Options:

:chars n returns n characters (limited to 1000000)

:paragraphs n returns n paragraphs (limited to 100)

```
(str/lorem-ipsum :chars 250)
=> "Lorem ipsum dolor sit amet, consectetur adipiscing elit. Praesent ac iaculis turpis. Duis dictum id sem et
consectetur. Nullam lobortis, libero non consequat aliquet, lectus diam fringilla velit, finibus eleifend ipsum
urna at lacus. Phasellus sit am"
```

```
(str/lorem-ipsum :paragraphs 1)
=> "Lorem ipsum dolor sit amet, consectetur adipiscing elit. Praesent ac iaculis turpis. Duis dictum id sem et
consectetur. Nullam lobortis, libero non consequat aliquet, lectus diam fringilla velit, finibus eleifend ipsum
urna at lacus. Phasellus sit amet nisl fringilla, cursus est in, mollis lacus. Proin dignissim rhoncus dolor.
Cras tellus odio, elementum sed erat sit amet, euismod tincidunt nisl. In hac habitasse platea dictumst. Duis
aliquam sollicitudin tempor. Sed gravida tincidunt felis at fringilla. Morbi tempor enim at commodo vulputate.
Aenean et ultrices lorem, placerat pretium augue. In hac habitasse platea dictumst. Cras fringilla ligula quis
interdum hendrerit. Etiam at massa tempor, facilisis lacus placerat, congue erat."
```

[top](#)

str/lower-case

```
(str/lower-case s)
(str/lower-case locale s)
```

Converts s to lowercase.

Since case mappings are not always 1:1 character mappings when a locale is given, the resulting string may be a different length than the original!

```
(str/lower-case "aBcDeF")
=> "abcdef"
```

```
(str/lower-case #\A)
=> #\a
```

```
(str/lower-case (. :java.util.Locale :new "de" "DE") "aBcDeF")
=> "abcdef"
```

```
(str/lower-case (. :java.util.Locale :GERMANY) "aBcDeF")
=> "abcdef"
```

```
(str/lower-case (. :java.util.Locale :new "de" "CH") "aBcDeF")
=> "abcdef"
```

```
(str/lower-case [ "de" ] "aBcDeF")
=> "abcdef"
```

```
(str/lower-case [ "de" "DE" ] "aBcDeF")
=> "abcdef"
```

```
(str/lower-case [ "de" "DE" ] "aBcDeF")
=> "abcdef"
```

SEE ALSO

[str/upper-case](#)

Converts s to uppercase.

[top](#)

str/lower-case?

```
(str/lower-case? s)
```

True if s is a char and the char is a lower case char.

Defined by Java Character.isLowerCase(ch).

```
(str/lower-case? #\x)
=> true
```

```
(str/lower-case? #\X)
=> false
```

```
(str/lower-case? #\8)
=> false
```

[top](#)

str/nfirst

```
(str/nfirst s n)
```

Returns a string of the n first characters of s.

```
(str/nfirst "abcdef" 2)
=> "ab"
```

```
(str/nfirst "abcdef" 10)
=> "abcdef"
```

```
(str/nfirst "abcdef" 0)
=> ""
```

str/nlast

```
(str/nlast s n)
```

Returns a string of the n last characters of s.

```
(str/nlast "abcdef" 2)  
=> "ef"
```

```
(str/nlast "abcdef" 10)  
=> "abcdef"
```

```
(str/nlast "abcdef" 0)  
=> ""
```

str/not-blank?

```
(str/not-blank? s)
```

True if s contains at least one non whitespace char.

```
(str/not-blank? "abc")  
=> true
```

```
(str/not-blank? " a ")  
=> true
```

```
(str/not-blank? nil)  
=> false
```

```
(str/not-blank? "")  
=> false
```

```
(str/not-blank? " ")  
=> false
```

SEE ALSO

[str/blank?](#)

True if s is nil, empty, or contains only whitespace.

[empty?](#)

Returns true if x is empty. Accepts strings, collections and bytebufs.

[not-empty?](#)

Returns true if x is not empty. Accepts strings, collections and bytebufs.

[nil?](#)

Returns true if x is nil, false otherwise

str/nrest

```
(str/nrest s n)
```

Returns a possibly empty string of the characters after the n first characters.

```
(str/nrest "abcdef" 3)  
=> "def"
```

[top](#)

str/pos

```
(str/pos s pos)
```

Returns the 0 based row/column position within a string based on absolute character position. Returns a map with the keys 'row' and 'col'.

Note: CR & LF count together as one each regarding the absolute position.

```
(str/pos "abcdefghij" 4)  
=> {:col 4 :row 0}
```

```
(str/pos "ab  
cdefghij" 6)  
=> {:col 3 :row 1}
```

[top](#)

str/quote

```
(str/quote str q)  
(str/quote str start end)
```

Quotes a string.

```
(str/quote "abc" "-")  
=> "-abc-"
```

```
(str/quote "abc" "<" ">")  
=> "<abc>"
```

[top](#)

str/quoted?

```
(str/quoted? str q)  
(str/quoted? str start end)
```

Returns true if the string is quoted.

```
(str/quoted? "-abc-" "-")
=> true

(str/quoted? "<abc>" "<" ">")
=> true
```

[top](#)

str/repeat

```
(str/repeat s n)
(str/repeat s n sep)
```

Repeats s n times with an optional separator.

```
(str/repeat "abc" 0)
=> ""

(str/repeat "abc" 3)
=> "abcabcabc"

(str/repeat "abc" 3 "-")
=> "abc-abc-abc"

(str/repeat #\* 0)
=> ""

(str/repeat #\* 3)
=> "***"

(str/repeat #\* 3 #\-)
=> "*-*-*"
```

[top](#)

str/replace-all

```
(str/replace-all s search replacement)
```

Replaces the all occurrences of search in s. The search arg may be a string or a regex pattern

```
(str/replace-all "abcdefabc" "ab" "__")
=> "__cdef__c"

(str/replace-all "a0b01c012d" (regex/pattern "[0-9]+") "_")
=> "a_b_c_d"

(str/replace-all "a0b01c012d" #"[0-9]+" "_")
=> "a_b_c_d"
```

SEE ALSO

[str/replace-first](#)

Replaces the first occurrence of search in s. The search arg may be a string or a regex pattern. If the search arg is of type string ...

[str/replace-last](#)

Replaces the last occurrence of search in s.

[top](#)

str/replace-first

```
(str/replace-first s search replacement & options)
```

Replaces the first occurrence of search in s. The search arg may be astring or a regex pattern. If the search arg is of type string the options : ignore-case and :nfirst are supported.

Options:

:ignore-case b if true ignores case, defaults to false
:nfirst n e.g :nfirst 2, defaults to 1

```
(str/replace-first "ab-cd-ef-ab-cd" "ab" "XYZ")  
=> "XYZ-cd-ef-ab-cd"
```

```
(str/replace-first "AB-CD-EF-AB-CD" "ab" "XYZ" :ignore-case true)  
=> "XYZ-CD-EF-AB-CD"
```

```
(str/replace-first "ab-ab-cd-ab-ef-ab-cd" "ab" "XYZ" :nfirst 3)  
=> "XYZ-XYZ-cd-XYZ-ef-ab-cd"
```

```
(str/replace-first "a0b01c012d" (regex/pattern "[0-9]+") "_")  
=> "a_b01c012d"
```

```
(str/replace-first "a0b01c012d" #"[0-9]+" "_")  
=> "a_b01c012d"
```

SEE ALSO

[str/replace-last](#)

Replaces the last occurrence of search in s.

[str/replace-all](#)

Replaces the all occurrences of search in s. The search arg may be a string or a regex pattern

[top](#)

str/replace-last

```
(str/replace-last s search replacement & options)
```

Replaces the last occurrence of search in s.

Options:

:ignore-case b if true ignores case, defaults to false

```
(str/replace-last "abcdefabc" "ab" "XYZ")  
=> "abcdeXYZc"
```

```
(str/replace-last "foo.JPG" ".jpg" ".png" :ignore-case true)
=> "foo.png"
```

SEE ALSO

[str/replace-first](#)

Replaces the first occurrence of search in s. The search arg may be a string or a regex pattern. If the search arg is of type string ...

[str/replace-all](#)

Replaces the all occurrences of search in s. The search arg may be a string or a regex pattern

[top](#)

str/rest

```
(str/rest s)
```

Returns a possibly empty string of the characters after the first.

```
(str/rest "abcdef")
=> "bcdef"
```

[top](#)

str/reverse

```
(str/reverse s)
```

Reverses a string

```
(str/reverse "abcdef")
=> "fedcba"
```

[top](#)

str/split

```
(str/split s regex)
(str/split s regex limit)
```

Splits string on a regular expression. Optional argument limit is the maximum number of splits. Returns a list of the splits.

```
(str/split "abc,def,ghi" ",")
=> ("abc" "def" "ghi")
```

```
(str/split "James Peter Robert" " " 2)
=> ("James" "Peter Robert")
```

```
(str/split "abc , def , ghi" " *, *")
=> ("abc" "def" "ghi")
```

```
(str/split "abc,def,ghi" "((?<=,)|(?=,))")
=> ("abc" ", " "def" ", " "ghi")

(str/split "q1w2e3r4t5y6u7i8o9p0" #"\\d+")
=> ("q" "w" "e" "r" "t" "y" "u" "i" "o" "p")

(str/split "q1w2e3r4t5y6u7i8o9p0" #"\\d+" 5)
=> ("q" "w" "e" "r" "t5y6u7i8o9p0")

(str/split "1234567890" #"(?<=\\G.{4})")
=> ("1234" "5678" "90")

(str/split "1234567890" #"(?=(. {4})+$)")
=> ("12" "3456" "7890")

(str/split " q1w2 " #"")
=> (" " "q" "1" "w" "2" " ")

(str/split nil ",")
=> ()
```

SEE ALSO

[str/split-lines](#)

Splits s into lines.

[top](#)

str/split-at

```
(str/split-at s pos)
```

Splits string at the given position. Returns a list of the splits.

```
(str/split-at nil 1)
=> ("" "")

(str/split-at "" 1)
=> ("" "")

(str/split-at "abc" 0)
=> (" " "abc")

(str/split-at "abc" 1)
=> ("a" "bc")

(str/split-at "abc" 2)
=> ("ab" "c")

(str/split-at "abc" 3)
=> ("abc" "")
```

SEE ALSO

[str/split-lines](#)

Splits s into lines.

str/split-columns

```
(str/split-columns s cols)
```

Splits a string into columns. The columns are given by their start positions.

```
(str/split-columns "1abc 2d 3gh" [0 6 12])  
=> ("1abc" "2d" "3gh")
```

SEE ALSO

[str/split](#)

Splits string on a regular expression. Optional argument limit is the maximum number of splits. Returns a list of the splits.

str/split-lines

```
(str/split-lines s)
```

Splits s into lines.

```
(str/split-lines "line1  
line2  
line3")  
=> ("line1" "line2" "line3")
```

SEE ALSO

[str/split](#)

Splits string on a regular expression. Optional argument limit is the maximum number of splits. Returns a list of the splits.

[io/slurp-lines](#)

Read all lines from f.

str/starts-with?

```
(str/starts-with? s substr)
```

True if s starts with substr.

```
(str/starts-with? "abc" "ab")  
=> true
```

str/strip-end

```
(str/strip-end s substr)
```

Removes a substr only if it is at the end of a s, otherwise returns s.

```
(str/strip-end "abcdef" "def")  
=> "abc"
```

```
(str/strip-end "abcdef" "abc")  
=> "abcdef"
```

[top](#)

str/strip-indent

```
(str/strip-indent s)
```

Strip the indent of a multi-line string. The first line's leading whitespaces define the indent.

```
(str/strip-indent "  line1  
    line2  
    line3")  
=> "line1\n  line2\n  line3"
```

[top](#)

str/strip-margin

```
(str/strip-margin s)
```

Strips leading whitespaces upto and including the margin '|' from each line in a multi-line string.

```
(str/strip-margin "line1  
|  line2  
|  line3")  
=> "line1\n  line2\n  line3"
```

[top](#)

str/strip-start

```
(str/strip-start s substr)
```

Removes a substr only if it is at the beginning of a s, otherwise returns s.

```
(str/strip-start "abcdef" "abc")  
=> "def"
```

```
(str/strip-start "abcdef" "def")  
=> "abcdef"
```

str/subs

```
(str/subs s start)
(str/subs s start end)
```

Returns the substring of *s* beginning at *start* inclusive, and ending at *end* (defaults to length of string), exclusive.

```
(str/subs "abcdef" 2)
=> "cdef"

(str/subs "abcdef" 2 5)
=> "cde"
```

str/trim

```
(str/trim s)
```

Trims leading and trailing whitespaces from *s*.

```
(str/trim " abc ")
=> "abc"
```

SEE ALSO

[str/trim-to-nil](#)

Trims leading and trailing whitespaces from *s*. Returns nil if the resulting string is empty

[str/trim-left](#)

Trims leading whitespaces from *s*.

[str/trim-right](#)

Trims trailing whitespaces from *s*.

str/trim-left

```
(str/trim-left s)
```

Trims leading whitespaces from *s*.

```
(str/trim-left " abc ")
=> "abc "
```

SEE ALSO

[str/trim-right](#)

Trims trailing whitespaces from *s*.

[str/trim](#)

Trims leading and trailing whitespaces from s.

[str/trim-to-nil](#)

Trims leading and trailing whitespaces from s. Returns nil if the resulting string is empty

[top](#)

str/trim-right

```
(str/trim-right s)
```

Trims trailing whitespaces from s.

```
(str/trim-right " abc ")  
=> " abc"
```

SEE ALSO

[str/trim-left](#)

Trims leading whitespaces from s.

[str/trim](#)

Trims leading and trailing whitespaces from s.

[str/trim-to-nil](#)

Trims leading and trailing whitespaces from s. Returns nil if the resulting string is empty

[top](#)

str/trim-to-nil

```
(str/trim-to-nil s)
```

Trims leading and trailing whitespaces from s. Returns nil if the resulting string is empty

```
(str/trim-to-nil "")  
=> nil
```

```
(str/trim-to-nil "   ")  
=> nil
```

```
(str/trim-to-nil nil)  
=> nil
```

```
(str/trim-to-nil " abc ")  
=> "abc"
```

SEE ALSO

[str/trim](#)

Trims leading and trailing whitespaces from s.

[str/trim-left](#)

Trims leading whitespaces from s.

[str/trim-right](#)

Trims trailing whitespaces from s.

str/truncate

```
(str/truncate s maxlen marker mode*)
```

Truncates a string to the max length maxlen and adds the marker if the string needs to be truncated. The marker is added to the start, middle, or end of the string depending on the mode :start, :middle, :end. The mode defaults to :end

```
(str/truncate "abcdefghij" 20 "...")  
=> "abcdefghij"
```

```
(str/truncate "abcdefghij" 9 "...")  
=> "abcdef..."
```

```
(str/truncate "abcdefghij" 4 "...")  
=> "a..."
```

```
(str/truncate "abcdefghij" 7 "...":start)  
=> "...ghij"
```

```
(str/truncate "abcdefghij" 7 "...":middle)  
=> "ab...ij"
```

```
(str/truncate "abcdefghij" 7 "...":end)  
=> "abcd..."
```

str/upper-case

```
(str/upper-case s)  
(str/upper-case locale s)
```

Converts s to uppercase.

Since case mappings are not always 1:1 character mappings when a locale is given, the resulting string may be a different length than the original!

```
(str/upper-case "aBcDeF")  
=> "ABCDEF"
```

```
(str/upper-case #\a)  
=> #\A
```

```
(str/upper-case (. :java.util.Locale :new "de" "DE") "aBcDeF")  
=> "ABCDEF"
```

```
(str/upper-case (. :java.util.Locale :GERMANY) "aBcDeF")  
=> "ABCDEF"
```

```
(str/upper-case (. :java.util.Locale :new "de" "CH") "aBcDeF")  
=> "ABCDEF"
```

```
(str/upper-case [ "de" ] "aBcDeF")
=> "ABCDEF"
```

```
(str/upper-case [ "de" "DE" ] "aBcDeF")
=> "ABCDEF"
```

```
(str/upper-case [ "de" "DE" ] "aBcDeF")
=> "ABCDEF"
```

SEE ALSO

[str/lower-case](#)

Converts s to lowercase.

top

str/upper-case?

```
(str/upper-case? s)
```

True if s is a char and the char is an upper case char.

Defined by Java Character.isUpperCase(ch).

```
(str/upper-case? #\x)
=> false
```

```
(str/upper-case? #\X)
=> true
```

```
(str/upper-case? #\8)
=> false
```

top

str/valid-email-addr?

```
(str/valid-email-addr? e)
```

Returns true if e is a valid email address according to RFC5322, else returns false

```
(str/valid-email-addr? "user@domain.com")
=> true
```

```
(str/valid-email-addr? "user@domain.co.in")
=> true
```

```
(str/valid-email-addr? "user.name@domain.com")
=> true
```

```
(str/valid-email-addr? "user_name@domain.com")
=> true
```

```
(str/valid-email-addr? "username@yahoo.corporate.in")
=> true
```

[top](#)

str/whitespace?

```
(str/whitespace? s)
```

True if s is char and the char is a whitespace.

Defined by Java Character.isWhitespace(ch).

```
(str/whitespace? #\space)
=> true
```

[top](#)

str/wrap

```
(str/wrap text & options)
```

Wraps ascii text to lines with a length of maxlen characters .

Options:

:maxlen n the max len of line (default 80)

:line-wrap controls the line wrap

```
{:
 anywhere,
:break-
 word}
```

```
(-> (str/lorem-ipsum :paragraphs 1)
    (str/wrap :maxlen 80 :line-wrap :break-word))
=> "Lorem ipsum dolor sit amet, consectetur adipiscing elit. Praesent ac iaculis\nturpis. Duis dictum id sem et
consectetur. Nullam lobortis, libero non consequat\naliquet, lectus diam fringilla velit, finibus eleifend
ipsum urna at lacus.\nPhasellus sit amet nisl fringilla, cursus est in, mollis lacus. Proin dignissim\nrhoncus
dolor. Cras tellus odio, elementum sed erat sit amet, euismod tincidunt\nnisl. In hac habitasse platea
dictumst. Duis aliquam sollicitudin tempor. Sed\ngravida tincidunt felis at fringilla. Morbi tempor enim at
commodo vulputate.\nAenean et ultrices lorem, placerat pretium augue. In hac habitasse platea\ndictumst. Cras
fringilla ligula quis interdum hendrerit. Etiam at massa tempor,\nfacilisis lacus placerat, congue erat."
```

[top](#)

string-array

```
(string-array coll)
(string-array len)
(string-array len init-val)
```

Returns an array of Java strings containing the contents of coll or returns an array with the given length and optional init value

```
(string-array '("1" "2" "3"))
=> [1, 2, 3]

(string-array 10)
=> [nil, nil, nil, nil, nil, nil, nil, nil, nil, nil]

(string-array 10 "42")
=> [42, 42, 42, 42, 42, 42, 42, 42, 42, 42]
```

[top](#)

string?

```
(string? x)
```

Returns true if x is a string

```
(string? "abc")
=> true
```

```
(string? 1)
=> false
```

```
(string? nil)
=> false
```

[top](#)

sublist

```
(sublist l start) (sublist l start end)
```

Returns a list of the items in list from start (inclusive) to end (exclusive). If end is not supplied, defaults to (count list).

`sublist` accepts a lazy-seq if both start and end is given.

```
(sublist '(1 2 3 4 5 6) 2)
=> (3 4 5 6)
```

```
(sublist '(1 2 3 4 5 6) 2 3)
=> (3)
```

```
(doall (sublist (lazy-seq 1 inc) 3 7))
=> (4 5 6 7)
```

SEE ALSO

[subvec](#)

Returns a vector of the items in vector from start (inclusive) to end (exclusive). If end is not supplied, defaults to (count vector)

[top](#)

subset?


```
(subset? set1 set2)
```

Return true if set1 is a subset of set2

```
(subset? #{2 3} #{1 2 3 4})  
=> true
```

```
(subset? #{2 5} #{1 2 3 4})  
=> false
```

SEE ALSO

[set](#)

Creates a new set containing the items.

[superset?](#)

Return true if set1 is a superset of set2

[union](#)

Return a set that is the union of the input sets

[difference](#)

Return a set that is the first set without elements of the remaining sets

[intersection](#)

Return a set that is the intersection of the input sets

[top](#)

subvec

```
(subvec v start) (subvec v start end)
```

Returns a vector of the items in vector from start (inclusive) to end (exclusive). If end is not supplied, defaults to (count vector)

```
(subvec [1 2 3 4 5 6] 2)  
=> [3 4 5 6]
```

```
(subvec [1 2 3 4 5 6] 2 3)  
=> [3]
```

SEE ALSO

[sublist](#)

Returns a list of the items in list from start (inclusive) to end (exclusive). If end is not supplied, defaults to (count list).

[top](#)

supers

```
(supers class)
```

Returns the immediate and indirect superclasses and interfaces of class, if any.

```
(supers :java.util.ArrayList)
=> (:java.util.AbstractList :java.util.AbstractCollection :java.util.List :java.util.Collection :java.lang.
Iterable)
```

top

superset?

```
(superset? set1 set2)
```

Return true if set1 is a superset of set2

```
(superset? #{1 2 3 4} #{2 3} )
=> true
```

```
(superset? #{1 2 3 4} #{2 5})
=> false
```

SEE ALSO

[set](#)

Creates a new set containing the items.

[subset?](#)

Return true if set1 is a subset of set2

[union](#)

Return a set that is the union of the input sets

[difference](#)

Return a set that is the first set without elements of the remaining sets

[intersection](#)

Return a set that is the intersection of the input sets

top

supertype

```
(supertype x)
```

Returns the super type of x.

```
(supertype 5)
=> :core/number
```

```
(supertype [1 2])
=> :core/sequence
```

```
(supertype (. :java.math.BigInteger :valueOf 100))
=> :java.lang.Number
```

SEE ALSO

[type](#)

Returns the type of x.

supertypes

Returns the super types of x.

instance-of?

Returns true if x is an instance of the given type

top

supertypes

```
(supertypes x)
```

Returns the super types of x.

```
(supertypes 5)
=> (:core/number :core/val)

(supertypes [1 2])
=> (:core/sequence :core/collection :core/val)

(supertypes (. :java.math.BigInteger :valueOf 100))
=> (:java.lang.Number :java.lang.Object)
```

SEE ALSO

type

Returns the type of x.

supertype

Returns the super type of x.

instance-of?

Returns true if x is an instance of the given type

top

swap!

```
(swap! box f & args)
```

Atomically swaps the value of an atom or a volatile to be: `(apply f current-value-of-box args)` . Note that f may be called multiple times, and thus should be free of side effects. Returns the value that was swapped in.

```
(do
  (def counter (atom 0))
  (swap! counter inc))
=> 1

(do
  (def counter (atom 0))
  (swap! counter inc)
  (swap! counter + 1)
  (swap! counter #(inc %))
  (swap! counter (fn [x] (inc x))))
@counter
=> 4
```

```
(do
  (def fruits (atom ()))
  (swap! fruits conj :apple)
  (swap! fruits conj :mango)
  @fruits)
=> (:apple :mango)

(do
  (def counter (volatile 0))
  (swap! counter (partial + 6))
  @counter)
=> 6
```

SEE ALSO

[swap-vals!](#)

Atomically swaps the value of an atom to be: (apply f current-value-of-atom args). Note that f may be called multiple times, and thus ...

[reset!](#)

Sets the value of an atom or a volatile to newval without regard for the current value. Returns newval.

[compare-and-set!](#)

Atomically sets the value of atom to newval if and only if the current value of the atom is identical to oldval. Returns true if set ...

[atom](#)

Creates an atom with the initial value x.

[volatile](#)

Creates a volatile with the initial value x

[top](#)

swap-vals!

```
(swap-vals! atom f & args)
```

Atomically swaps the value of an atom to be: (apply f current-value-of-atom args) . Note that f may be called multiple times, and thus should be free of side effects. Returns [old new], the value of the atom before and after the swap.

```
(do
  (def queue (atom '(1 2 3)))
  (swap-vals! queue pop))
=> [(1 2 3) (2 3)]
```

SEE ALSO

[swap!](#)

Atomically swaps the value of an atom or a volatile to be: (apply f current-value-of-box args). Note that f may be called multiple ...

[reset!](#)

Sets the value of an atom or a volatile to newval without regard for the current value. Returns newval.

[compare-and-set!](#)

Atomically sets the value of atom to newval if and only if the current value of the atom is identical to oldval. Returns true if set ...

[atom](#)

Creates an atom with the initial value x.

[volatile](#)

Creates a volatile with the initial value x

[top](#)

symbol

```
(symbol name)
(symbol ns name)
```

Returns a symbol from the given name

```
(symbol "a")
=> a

(symbol "foo" "a")
=> foo/a

(symbol *ns* "a")
=> user/a

(symbol 'a)
=> a

((resolve (symbol "core" "+")) 1 2)
=> 3

(name str/reverse)
=> "reverse"

(namespace str/reverse)
=> "str"
```

SEE ALSO

[resolve](#)

Resolves a symbol.

[name](#)

Returns the name string of a string, symbol, keyword, or function. If applied to a string it returns the string itself.

[namespace](#)

Returns the namespace string of a symbol, keyword, or function. If x is a registered namespace returns x.

[top](#)

symbol?

```
(symbol? x)
```

Returns true if x is a symbol

```
(symbol? 'a)
=> true

(symbol? (symbol "a"))
=> true
```

```
(symbol? nil)
=> false
```

```
(symbol? :a)
=> false
```

[top](#)

system-env

```
(system-env)
(system-env name)
(system-env name default-val)
```

Returns the system env variable with the given name. Returns the default-val if the variable does not exist or it's value is nil.

Without arguments returns all system env variables authorized by the configured sandbox.

```
(system-env :SHELL)
=> "/bin/zsh"

(system-env :FOO "test")
=> "test"

(system-env "SHELL")
=> "/bin/zsh"
```

SEE ALSO

[system-prop](#)

Returns the system property with the given name. Returns the default-val if the property does not exist or it's value is nil.

[top](#)

system-exit-code

```
(system-exit-code code)
```

Defines the exit code that is used if the Java VM exits. Defaults to 0.

Note:

The exit code is only used when the Venice launcher has been used to run a script file, a command line script, a Venice app archive, or the REPL.

```
(system-exit-code 0)
```

[top](#)

system-prop

```
(system-prop)
(system-prop name)
(system-prop name default-val)
```

Returns the system property with the given name. Returns the default-val if the property does not exist or it's value is nil.

Without arguments returns all system properties authorized by the configured sandbox.

```
(system-prop :os.name)
=> "Mac OS X"
```

```
(system-prop :foo.org "abc")
=> "abc"
```

```
(system-prop "os.name")
=> "Mac OS X"
```

SEE ALSO

[system-env](#)

Returns the system env variable with the given name. Returns the default-val if the variable does not exist or it's value is nil.

[top](#)

tail-pos

```
(tail-pos)
(tail-pos name)
```

Throws a `NotInTailPositionException` if the expr is not in tail position otherwise returns nil.

Definition:

The tail position is a position which an expression would return a value from. There are no more forms evaluated after the form in the tail position is evaluated.

```
;; in tail position
(do 1 (tail-pos))
=> nil

;; not in tail position
(do (tail-pos) 1)
=> NotInTailPositionException: Not in tail position
```

[top](#)

take

```
(take n coll)
```

Returns a collection of the first n items in coll, or all items if there are fewer than n.

Returns a stateful transducer when no collection is provided. Returns a lazy sequence if coll is a lazy sequence.

```
(take 3 [1 2 3 4 5])
=> [1 2 3]
```

```
(take 10 [1 2 3 4 5])
=> [1 2 3 4 5]
```

```
(doall (take 4 (repeat 3)))  
=> (3 3 3 3)  
  
(doall (take 10 (cycle (range 0 3)))))  
=> (0 1 2 0 1 2 0 1 2 0)
```

[top](#)

take!

```
(take! queue)
```

Retrieves and removes the head value of the queue, waiting if necessary until a value becomes available.

```
(let [q (queue)]  
  (put! q 1)  
  (take! q)  
  q)  
=> ()
```

SEE ALSO

[queue](#)

Creates a new mutable threadsafe bounded or unbounded queue.

[put!](#)

Puts an item to a queue. The operation is synchronous, it waits indefinitely until the value can be placed on the queue. Returns always nil.

[offer!](#)

Offers an item to a queue with an optional timeout in milliseconds. If a timeout is given waits up to the specified wait time if necessary ...

[poll!](#)

Polls an item from a queue with an optional timeout in milliseconds. For an indefinite timeout pass the timeout value :indefinite.

[peek](#)

For a list, same as first, for a vector, same as last, for a stack the top element (or nil if the stack is empty), for a queue the ...

[empty?](#)

Returns true if x is empty. Accepts strings, collections and bytebufs.

[count](#)

Returns the number of items in the collection. (count nil) returns 0. Also works on strings, and Java Collections

[top](#)

take-last

```
(take-last n coll)
```

Return a sequence of the last n items in coll.

Returns a stateful transducer when no collection is provided.

```
(take-last 3 [1 2 3 4 5])  
=> [3 4 5]  
  
(take-last 10 [1 2 3 4 5])  
=> [1 2 3 4 5]
```


take-while

```
(take-while predicate coll)
```

Returns a list of successive items from coll while `(predicate item)` returns logical true.

Returns a transducer when no collection is provided.

```
(take-while neg? [-2 -1 0 1 2 3])
=> [-2 -1]
```

test/deftest

```
(deftest name & body)
```

Defines a test function with no arguments.

All assertion macros are available for test assertions within the test function body:

- `assert`
- `assert-false`
- `assert-eq`
- `assert-ne`
- `assert-throws`
- `assert-does-not-throw`
- `assert-throws-with-msg`

It's recommended to use dedicated test namespaces for the tests and to group tests by namespaces.

Note: Actually, the test body goes in the `:test` metadata on the var, and the real function (the value of the var) calls `test-var` on itself.

```
(do
  (load-module :test)

  (ns foo-test)

  (test/deftest add-test []
    (assert-eq 0 (+ 0 0))
    (assert-eq 3 (+ 1 2)))

  (test/deftest mul-test []
    (assert-eq 6 (* 2 3)))

  (ns bar)
  (test/run-tests 'foo-test))
```

Testing namespace 'foo-test

PASS foo-test/add-test

PASS foo-test/mul-test

Ran 2 tests with 3 assertions

```

0 failures, 0 errors.
=> {:assert 3 :error 0 :pass 2 :test 2 :type :summary :fail 0}

;; Explicit setup/teardown
(do
  (ns foo-test)
  (load-module :test)

  (test/deftest sum-test []
    (let [f (io/temp-file "test-", ".txt")]
      (try
        (io/spit f "1234" :append true)
        (assert-eq "1234" (io/slurp f :binary false))
        (finally
          (io/delete-file f))))))

  (test/run-tests *ns*))

Testing namespace 'foo-test

PASS foo-test/sum-test

Ran 1 tests with 1 assertions
0 failures, 0 errors.
=> {:assert 1 :error 0 :pass 1 :test 1 :type :summary :fail 0}

```

SEE ALSO

[test/run-tests](#)

Runs all tests in the given namespaces; prints results. The tests are run grouped the namespace.

[test/run-test-var](#)

Runs a single test; prints results. Returns a map summarizing the test results.

[test/use-fixtures](#)

Wrap test runs in a fixture function to perform setup and teardown. Fixtures are always bound to a namespace, hence tests from different ...

[test/successful?](#)

Returns true if the given test summary indicates all tests were successful, false otherwise.

[assert](#)

Evaluates expr and throws an :AssertionException exception if it does not evaluate to logical true.

[assert-false](#)

Evaluates expr and throws an :AssertionException exception if it does not evaluate to logical false.

[assert-eq](#)

Assert that expected and actual are equal. Throws an :AssertionException exception if they are not equal.

[assert-ne](#)

Assert that unexpected and actual are not equal. Throws an :AssertionException exception if they are equal.

[assert-throws](#)

Evaluates expr and throws an :AssertionException exception if it does not throw the expected exception of type ex-type.

[assert-does-not-throw](#)

Evaluates expr and throws an :AssertionException exception if it does throw any kind of exception.

[top](#)

test/run-test-var

```
(run-test-var v)
```

Runs a single test; prints results. Returns a map summarizing the test results.

```
(do
  (ns foo-test)
  (load-module :test)

  (test/deftest plus-test []
    (assert-eq 3 (+ 1 2)))

  (test/run-test-var plus-test))

Testing namespace 'foo-test

PASS foo-test/plus-test

Ran 1 tests with 1 assertions
0 failures, 0 errors.
=> {:assert 1 :error 0 :pass 1 :test 1 :type :summary :fail 0}
```

SEE ALSO

[test/deftest](#)

Defines a test function with no arguments.

[test/run-tests](#)

Runs all tests in the given namespaces; prints results. The tests are run grouped the namespace.

[test/use-fixtures](#)

Wrap test runs in a fixture function to perform setup and teardown. Fixtures are always bound to a namespace, hence tests from different ...

[top](#)

test/run-tests

(run-tests & namespaces)

Runs all tests in the given namespaces; prints results. The tests are run grouped the namespace.

Returns a map summarizing test results.

```
(do
  (load-module :test)

  (ns foo-test)
  (test/deftest add-test []
    (assert-eq 3 (+ 1 2)))
  (test/deftest sub-test []
    (assert-eq 1 (- 2 1)))

  (ns bar-test)
  (test/deftest mul-test []
    (assert-eq 2 (* 1 2)))

  (test/run-tests 'foo-test 'bar-test))
```

Testing namespace 'foo-test

PASS foo-test/add-test

PASS foo-test/sub-test

Testing namespace 'bar-test

```
PASS bar-test/mul-test
```

```
Ran 3 tests with 3 assertions  
0 failures, 0 errors.  
=> {:assert 3 :error 0 :pass 3 :test 3 :type :summary :fail 0}
```

SEE ALSO

[test/deftest](#)

Defines a test function with no arguments.

[test/run-test-var](#)

Runs a single test; prints results. Returns a map summarizing the test results.

[test/use-fixtures](#)

Wrap test runs in a fixture function to perform setup and teardown. Fixtures are always bound to a namespace, hence tests from different ...

[top](#)

test/successful?

```
(successful? summary)
```

Returns true if the given test summary indicates all tests were successful, false otherwise.

```
(do  
  (ns foo-test)  
  (load-module :test)  
  
  (test/deftest plus-test []  
    (assert-eq 3 (+ 1 2)))  
  
  (let [summary (test/run-tests 'foo-test)]  
    (test/successful? summary)))
```

```
Testing namespace 'foo-test
```

```
PASS foo-test/plus-test
```

```
Ran 1 tests with 1 assertions  
0 failures, 0 errors.  
=> true
```

SEE ALSO

[test/deftest](#)

Defines a test function with no arguments.

[test/run-tests](#)

Runs all tests in the given namespaces; prints results. The tests are run grouped the namespace.

[test/run-test-var](#)

Runs a single test; prints results. Returns a map summarizing the test results.

[test/use-fixtures](#)

Wrap test runs in a fixture function to perform setup and teardown. Fixtures are always bound to a namespace, hence tests from different ...

[top](#)

test/use-fixtures

```
(use-fixtures ns fixture-type & fixture-fns)
```

Wrap test runs in a fixture function to perform setup and teardown. Fixtures are always bound to a namespace, hence tests from different namespaces have different fixtures.

A fixture of type `:each` is called before and after each test in the fixture's namespace.

A fixture of type `:once` is called before the first and after the last test in the fixture's namespace serving as an initial setup and final teardown.

To pass a value from a fixture to the tests dynamic vars can be used. See the 3rd example below.

```
;; Fixtures :each
;; Adds logic for a setup and teardown method that will be called
;; before and after each test
(do
  (load-module :test)

  (defn each-time-setup []
    (println "FIXTURE each time setup"))

  (defn each-time-teardown []
    (println "FIXTURE each time teardown"))

  (defn each-fixture [f]
    (each-time-setup)
    (try
      (f)
      (finally (each-time-teardown))))

  ;; register as an each-time callback
  (test/use-fixtures *ns* :each each-fixture)

  (test/deftest add-test []
    (assert-eq 3 (+ 1 2)))

  (test/deftest sub-test []
    (assert-eq 3 (- 4 1)))

  (test/run-tests *ns*))
```

Testing namespace 'user

```
FIXTURE each time setup
PASS user/add-test
FIXTURE each time teardown
FIXTURE each time setup
PASS user/sub-test
FIXTURE each time teardown
```

```
Ran 2 tests with 2 assertions
0 failures, 0 errors.
=> {:assert 2 :error 0 :pass 2 :test 2 :type :summary :fail 0}
```

```
;; Fixtures :once
;; Adds logic for a setup and teardown method that will be called
;; before the first and after the last test as an initial setup
;; and final teardown
(do
  (load-module :test)
```

```

(defn one-time-setup []
  (println "FIXTURE one time setup"))

(defn one-time-teardown []
  (println "FIXTURE one time teardown"))

(defn one-fixture [f]
  (one-time-setup)
  (try
    (f)
    (finally (one-time-teardown))))

;; register as a one-time callback
(test/use-fixtures *ns* :once one-fixture)

(test/deftest add-test []
  (assert-eq 3 (+ 1 2)))

(test/deftest sub-test []
  (assert-eq 3 (- 4 1)))

(test/run-tests *ns*)

Testing namespace 'user

FIXTURE one time setup
PASS user/add-test
PASS user/sub-test
FIXTURE one time teardown

Ran 2 tests with 2 assertions
0 failures, 0 errors.
=> {:assert 2 :error 0 :pass 2 :test 2 :type :summary :fail 0}

;; Passing a value from a setup fixture to the tests
(do
  (load-module :test)

  (def-dynamic *state* 0)

  (defn one-time-setup []
    (println "FIXTURE one-time setup")
    100)

  (defn one-time-teardown []
    (println "FIXTURE one-time teardown"))

  (defn one-fixture [f]
    (binding [*state* (one-time-setup)]
      (try
        (f)
        (finally (one-time-teardown))))))

;; register as a one-time callback
(test/use-fixtures *ns* :once one-fixture)

(test/deftest add-test []
  (println "state user/add-test:" *state*)
  (assert-eq 3 (+ 1 2)))

(test/deftest sub-test []
  (println "state user/sub-test:" *state*)
  (assert-eq 3 (- 4 1)))

```

```
(test/run-tests *ns*)
```

Testing namespace 'user'

```
FIXTURE one-time setup
state user/add-test: 100
PASS user/add-test
state user/sub-test: 100
PASS user/sub-test
FIXTURE one-time teardown
```

```
Ran 2 tests with 2 assertions
0 failures, 0 errors.
=> {:assert 2 :error 0 :pass 2 :test 2 :type :summary :fail 0}
```

SEE ALSO

[test/deftest](#)

Defines a test function with no arguments.

[test/run-tests](#)

Runs all tests in the given namespaces; prints results. The tests are run grouped the namespace.

[test/run-test-var](#)

Runs a single test; prints results. Returns a map summarizing the test results.

[top](#)

then-accept

```
(then-accept p f)
```

Returns a new promise that, when this promise completes normally, is executing the function `f` with this stage's result as the argument.

```
(-> (promise (fn [] "the quick brown fox"))
    (then-accept (fn [v] (println (pr-str v)))))
(deref)
"the quick brown fox"
=> nil

(let [result (promise)
      p      (promise)]
  (thread #(deliver p 5))
  (then-accept p (fn [v] (deliver result (+ v 2)))))
[@p @result])
=> [5 7]
```

SEE ALSO

[promise](#)

Returns a promise object that can be read with `deref`, and set, once only, with `deliver`. Calls to `deref` prior to delivery will block, ...

[then-accept-both](#)

Returns a new promise that, when either this or the other given promise completes normally, is executing the function `f` with the two ...

[then-apply](#)

Applies a function `f` on the result of the previous stage of the promise `p`.

[then-combine](#)

Applies a function `f` to the result of the previous stage of promise `p` and the result of another promise `p-other`

[then-compose](#)

Composes the result of two promises. `f` receives the result of the first promise `p` and returns a new promise that composes that value ...

[when-complete](#)

Returns the promise `p` with the same result or exception at this stage, that executes the action `f`. Passes the current stage's result ...

[accept-either](#)

Returns a new promise that, when either this or the other given promise completes normally, is executed with the corresponding result ...

[apply-to-either](#)

Returns a new promise that, when either this or the other given promise completes normally, is executed with the corresponding result ...

[or-timeout](#)

Exceptionally completes the promise with a `TimeoutException` if not otherwise completed before the given timeout.

[complete-on-timeout](#)

Completes the promise with the given value if not otherwise completed before the given timeout.

[top](#)

then-accept-both

```
(then-accept-both p p-other f)
```

Returns a new promise that, when either this or the other given promise completes normally, is executing the function `f` with the two results as arguments.

```
(-> (promise (fn [] (sleep 200) "The quick brown fox"))
    (then-accept-both (promise (fn [] (sleep 100) "jumps over the lazy dog"))
                      (fn [u v] (println (pr-str (str u " " v))))))
    (deref))
"The quick brown fox jumps over the lazy dog"
=> nil
```

SEE ALSO

[promise](#)

Returns a promise object that can be read with `deref`, and set, once only, with `deliver`. Calls to `deref` prior to delivery will block, ...

[then-accept](#)

Returns a new promise that, when this promise completes normally, is executing the function `f` with this stage's result as the argument.

[then-apply](#)

Applies a function `f` on the result of the previous stage of the promise `p`.

[apply-to-either](#)

Returns a new promise that, when either this or the other given promise completes normally, is executed with the corresponding result ...

[then-combine](#)

Applies a function `f` to the result of the previous stage of promise `p` and the result of another promise `p-other`

[then-compose](#)

Composes the result of two promises. `f` receives the result of the first promise `p` and returns a new promise that composes that value ...

[when-complete](#)

Returns the promise `p` with the same result or exception at this stage, that executes the action `f`. Passes the current stage's result ...

[accept-either](#)

Returns a new promise that, when either this or the other given promise completes normally, is executed with the corresponding result ...

[or-timeout](#)

Exceptionally completes the promise with a `TimeoutException` if not otherwise completed before the given timeout.

[complete-on-timeout](#)

Completes the promise with the given value if not otherwise completed before the given timeout.

then-apply

```
(then-apply p f)
```

Applies a function `f` on the result of the previous stage of the promise `p`.

```
(-> (promise (fn [] "the quick brown fox"))
    (then-apply str/upper-case)
    (then-apply #(str % " jumps over the lazy dog"))
    (deref))
=> "THE QUICK BROWN FOX jumps over the lazy dog"
```

SEE ALSO

[promise](#)

Returns a promise object that can be read with `deref`, and `set`, once only, with `deliver`. Calls to `deref` prior to delivery will block, ...

[then-accept](#)

Returns a new promise that, when this promise completes normally, is executing the function `f` with this stage's result as the argument.

[then-accept-both](#)

Returns a new promise that, when either this or the other given promise completes normally, is executing the function `f` with the two ...

[then-combine](#)

Applies a function `f` to the result of the previous stage of promise `p` and the result of another promise `p-other`

[then-compose](#)

Composes the result of two promises. `f` receives the result of the first promise `p` and returns a new promise that composes that value ...

[when-complete](#)

Returns the promise `p` with the same result or exception at this stage, that executes the action `f`. Passes the current stage's result ...

[accept-either](#)

Returns a new promise that, when either this or the other given promise completest normally, is executed with the corresponding result ...

[apply-to-either](#)

Returns a new promise that, when either this or the other given promise completes normally, is executed with the corresponding result ...

[or-timeout](#)

Exceptionally completes the promise with a `TimeoutException` if not otherwise completed before the given timeout.

[complete-on-timeout](#)

Completes the promise with the given value if not otherwise completed before the given timeout.

then-combine

```
(then-combine p p-other f)
```

Applies a function `f` to the result of the previous stage of promise `p` and the result of another promise `p-other`

```
(-> (promise (fn [] "The Quick Brown Fox"))
    (then-apply str/upper-case)
    (then-combine (-> (promise (fn [] "Jumps Over The Lazy Dog"))
                     (then-apply str/lower-case)))
```

```
      #(str %1 " " %2))
    (deref))
=> "THE QUICK BROWN FOX jumps over the lazy dog"
```

SEE ALSO

[promise](#)

Returns a promise object that can be read with `deref`, and `set`, once only, with `deliver`. Calls to `deref` prior to delivery will block, ...

[then-accept](#)

Returns a new promise that, when this promise completes normally, is executing the function `f` with this stage's result as the argument.

[then-accept-both](#)

Returns a new promise that, when either this or the other given promise completes normally, is executing the function `f` with the two ...

[then-apply](#)

Applies a function `f` on the result of the previous stage of the promise `p`.

[then-compose](#)

Composes the result of two promises. `f` receives the result of the first promise `p` and returns a new promise that composes that value ...

[when-complete](#)

Returns the promise `p` with the same result or exception at this stage, that executes the action `f`. Passes the current stage's result ...

[accept-either](#)

Returns a new promise that, when either this or the other given promise completes normally, is executed with the corresponding result ...

[apply-to-either](#)

Returns a new promise that, when either this or the other given promise completes normally, is executed with the corresponding result ...

[or-timeout](#)

Exceptionally completes the promise with a `TimeoutException` if not otherwise completed before the given timeout.

[complete-on-timeout](#)

Completes the promise with the given value if not otherwise completed before the given timeout.

[top](#)

then-compose

```
(then-compose p f)
```

Composes the result of two promises. `f` receives the result of the first promise `p` and returns a new promise that composes that value with this promise.

```
(> (promise (fn [] "The Quick Brown Fox"))
    (then-apply str/upper-case)
    (then-compose (fn [x] (> (promise (fn [] "Jumps Over The Lazy Dog"))
                             (then-apply str/lower-case)
                             (then-apply #(str x " " %1)))))
    (deref))
=> "THE QUICK BROWN FOX jumps over the lazy dog"
```

SEE ALSO

[promise](#)

Returns a promise object that can be read with `deref`, and `set`, once only, with `deliver`. Calls to `deref` prior to delivery will block, ...

[then-accept](#)

Returns a new promise that, when this promise completes normally, is executing the function `f` with this stage's result as the argument.

[then-accept-both](#)

Returns a new promise that, when either this or the other given promise completes normally, is executing the function `f` with the two ...

then-apply

Applies a function f on the result of the previous stage of the promise p.

then-combine

Applies a function f to the result of the previous stage of promise p and the result of another promise p-other

when-complete

Returns the promise p with the same result or exception at this stage, that executes the action f. Passes the current stage's result ...

accept-either

Returns a new promise that, when either this or the other given promise completes normally, is executed with the corresponding result ...

apply-to-either

Returns a new promise that, when either this or the other given promise completes normally, is executed with the corresponding result ...

or-timeout

Exceptionally completes the promise with a TimeoutException if not otherwise completed before the given timeout.

complete-on-timeout

Completes the promise with the given value if not otherwise completed before the given timeout.

top

third

```
(third coll)
```

Returns the third element of coll.

```
(third nil)
=> nil
```

```
(third [])
=> nil
```

```
(third [1 2 3])
=> 3
```

```
(third '())
=> nil
```

```
(third '(1 2 3))
=> 3
```

top

thread

```
(thread f)
(thread f name)
```

Executes the function f in another thread, returning immediately to the calling thread. Returns a `promise` which will receive the result of calling the function f when completed. Optionally a name can be assigned to the spawned thread.

Note: Each call to `thread` creates a new expensive system thread. Consider to use futures or promises that use an *ExecutorService* to deal efficiently with threads.

```
@(thread #(do (sleep 100) 1))
=> 1

@(thread #(do (sleep 100) (thread-name)))
=> "venice-thread-3"

@(thread #(do (sleep 100) (thread-name)) "job")
=> "job-1"

;; consumer / producer
(do
  (defn produce [q]
    (doseq [x (range 4)] (put! q x) (sleep 100))
    (put! q nil))
  (defn consume [q]
    (transduce (map println) (constantly nil) q))
  (let [q (queue 10)]
    (thread #(produce q))
    @(thread #(consume q))))

0
1
2
3
=> nil
```

SEE ALSO

[future](#)

Takes a function without arguments and yields a future object that will invoke the function in another thread, and will cache the result ...

[promise](#)

Returns a promise object that can be read with deref, and set, once only, with deliver. Calls to deref prior to delivery will block, ...

[agent](#)

Creates and returns an agent with an initial value of state and zero or more options.

[top](#)

thread-daemon?

```
(thread-daemon?)
```

Returns true if this Thread is a daemon thread else false.

```
(thread-daemon?)
```

```
=> false
```

SEE ALSO

[thread-name](#)

Returns this thread's name.

[top](#)

thread-id

```
(thread-id)
```

Returns the identifier of this Thread. The thread ID is a positive number generated when this thread was created. The thread ID is unique and remains unchanged during its lifetime. When a thread is terminated, this thread ID may be reused.

```
(thread-id)  
=> 1
```

SEE ALSO

[thread-name](#)
Returns this thread's name.

[top](#)

thread-interrupted

```
(thread-interrupted)
```

Tests whether the current thread has been interrupted. The interrupted status of the thread is cleared by this method. In other words, if this method were to be called twice in succession, the second call would return false (unless the current thread were interrupted again, after the first call had cleared its interrupted status and before the second call had examined it).

Returns true if the current thread has been interrupted else false.

```
(thread-interrupted)  
=> false
```

SEE ALSO

[thread-interrupted?](#)
Tests whether this thread has been interrupted. The interrupted status of the thread is unaffected by this method. Returns true if ...

[top](#)

thread-interrupted?

```
(thread-interrupted?)
```

Tests whether this thread has been interrupted. The interrupted status of the thread is unaffected by this method. Returns true if the current thread has been interrupted else false.

```
(thread-interrupted?)  
=> false
```

SEE ALSO

[thread-interrupted](#)
Tests whether the current thread has been interrupted. The interrupted status of the thread is cleared by this method. In other words, ...

[top](#)

thread-local

```
(thread-local)
```

Creates a new thread-local accessor

```
(do
  (assoc! (thread-local) :a 1)
  (get (thread-local) :a))
=> 1

(do
  (assoc! (thread-local) :a 1)
  (get (thread-local) :b 999))
=> 999

(do
  (thread-local :a 1 :b 2)
  (get (thread-local) :a))
=> 1

(do
  (thread-local { :a 1 :b 2 })
  (get (thread-local) :a))
=> 1

(do
  (thread-local-clear)
  (assoc! (thread-local) :a 1 :b 2)
  (dissoc! (thread-local) :a)
  (get (thread-local) :a 999))
=> 999
```

SEE ALSO

[thread-local-clear](#)

Removes all thread local vars

[thread-local-map](#)

Returns a snapshot of the thread local vars as a map.

[assoc!](#)

Associates key/vals with a mutable map, returns the map

[dissoc!](#)

Dissociates keys from a mutable map, returns the map

[get](#)

Returns the value mapped to key, not-found or nil if key not present.

[top](#)

thread-local-clear

```
(thread-local-clear)
```

Removes all thread local vars

```
(thread-local-clear)
=> thread-local-clear
```

SEE ALSO

[thread-local](#)

Creates a new thread-local accessor

[dissoc!](#)

Dissociates keys from a mutable map, returns the map

[top](#)

thread-local-map

```
(thread-local-map)
```

Returns a snapshot of the thread local vars as a map.

Note:

The returned map is a copy of the current thread local vars. Thus modifying this map is not modifying the thread local vars! Use `assoc!` and `dissoc!` for that purpose!

```
(do
  (thread-local-clear)
  (thread-local :a 1 :b 2)
  (thread-local-map))
=> {:a 1 :b 2 :*assertions* (0)}
```

SEE ALSO

[thread-local](#)

Creates a new thread-local accessor

[get](#)

Returns the value mapped to key, not-found or nil if key not present.

[assoc!](#)

Associates key/vals with a mutable map, returns the map

[dissoc!](#)

Dissociates keys from a mutable map, returns the map

[top](#)

thread-local?

```
(thread-local? x)
```

Returns true if x is a thread-local, otherwise false

```
(do
  (def x (thread-local))
  (thread-local? x))
=> true
```

SEE ALSO

[thread-local](#)

Creates a new thread-local accessor

[top](#)

thread-name

```
(thread-name)
```

Returns this thread's name.

```
(thread-name)
=> "main"
```

SEE ALSO

[thread-id](#)

Returns the identifier of this Thread. The thread ID is a positive number generated when this thread was created. The thread ID is ...

[top](#)

throw

```
(throw)
(throw val)
(throw ex)
```

Throws an exception.

```
(throw)
```

Throws a :ValueException with `nil` as its value.

```
(throw val)
```

With *va* as a Venice value throws a :ValueException with *va* as its value.
E.g: `(throw [1 2 3])`

```
(throw ex)
```

With a *ex* as an exception type throws the exception.
E.g: `(throw (ex :VncException "invalid data"))`

```
(try
  (+ 100 200)
  (catch :Exception e
    "caught ~(ex-message e)"))
=> 300
```

```
(try
  (+ 100 200)
  (throw)
  (catch :ValueException e
    "caught ~(pr-str (ex-value e))"))
=> "caught nil"
```

```
(try
  (+ 100 200)
  (throw 100)
  (catch :ValueException e
    "caught ~(ex-value e)"))
=> "caught 100"
```

;; The finally block is just for side effects, like
;; closing resources. It never returns a value!


```

(try
  (+ 100 200)
  (throw [100 {:a 3}])
  (catch :ValueException e
    "caught ~(ex-value e)")
  (finally (println "#finally")
    :finally))
#finally
=> "caught [100 {:a 3}]"

(try
  (throw (ex :RuntimeException "#test"))
  (catch :RuntimeException e
    "caught ~(ex-message e)")
=> "caught #test"

;; Venice wraps thrown checked exceptions with a RuntimeException!
(do
  (import :java.io.IOException)
  (try
    (throw (ex :IOException "#test"))
    (catch :RuntimeException e
      "caught ~(ex-message (ex-cause e))")))
=> "caught #test"

```

SEE ALSO

[ex](#)

Creates an exception of type class with optional args. The class must be a subclass of :java.lang.Exception

[try](#)

Exception handling: try - catch - finally

[try-with](#)

try-with-resources allows the declaration of resources to be used in a try block with the assurance that the resources will be closed ...

[top](#)

time

```
(time expr)
```

Evaluates expr and prints the time it took. Returns the value of expr.

```

(time (+ 100 200))
Elapsed time: 3.67µs
=> 300

```

SEE ALSO

[dorun](#)

Runs the expr count times in the most effective way. It's main purpose is supporting benchmark tests. Returns the expression result ...

[top](#)

time/after?

```
(time/after? date1 date2)
(time/after? date1 date2 & more)
```

Returns true if all dates are ordered from the latest to the earliest (same semantics as [>](#))

```
(time/after? (time/local-date 2019 1 1)
             (time/local-date 2018 1 1))
=> true

(time/after? (time/local-date-time "2019-01-01T10:00:00.000")
             (time/local-date-time "2018-01-01T10:00:00.000"))
=> true

(time/after? (time/zoned-date-time "2019-01-01T10:00:00.000+01:00")
             (time/zoned-date-time "2018-01-01T10:00:00.000+01:00"))
=> true
```

SEE ALSO

[time/before?](#)

Returns true if all dates are ordered from the earliest to the latest (same semantics as [<](#))

[time/not-after?](#)

Returns true if date1 is not-after date2 else false (same semantics as [<=](#))

[time/not-before?](#)

Returns true if date1 is not-before date2 else false (same semantics as [>=](#))

[top](#)

time/before?

```
(time/before? date1 date2)
(time/before? date1 date2 & more)
```

Returns true if all dates are ordered from the earliest to the latest (same semantics as [<](#))

```
(time/before? (time/local-date 2018 1 1)
              (time/local-date 2019 1 1))
=> true

(time/before? (time/local-date-time "2018-01-01T10:00:00.000")
              (time/local-date-time "2019-01-01T10:00:00.000"))
=> true

(time/before? (time/zoned-date-time "2018-01-01T10:00:00.000+01:00")
              (time/zoned-date-time "2019-01-01T10:00:00.000+01:00"))
=> true
```

SEE ALSO

[time/after?](#)

Returns true if all dates are ordered from the latest to the earliest (same semantics as [>](#))

[time/not-after?](#)

Returns true if date1 is not-after date2 else false (same semantics as [<=](#))

[time/not-before?](#)

Returns true if date1 is not-before date2 else false (same semantics as [>=](#))

time/date

```
(time/date)
(time/date x)
```

Creates a new date of type 'java.util.Date'. x can be a long representing milliseconds since the epoch, a 'java.time.LocalDate', a 'java.time.LocalDateTime', or a 'java.time.ZonedDateTime'

```
(time/date)
=> Sun Mar 10 17:12:15 CET 2024
```

time/date?

```
(time/date? date)
```

Returns true if date is a 'java.util.Date' else false

```
(time/date? (time/date))
=> true
```

time/day-of-month

```
(time/day-of-month date)
```

Returns the day of the month (1..31)

```
(time/day-of-month (time/local-date))
=> 10
```

```
(time/day-of-month (time/local-date-time))
=> 10
```

```
(time/day-of-month (time/zoned-date-time))
=> 10
```

SEE ALSO

[time/year](#)

Returns the year of the date

[time/month](#)

Returns the month of the date 1..12

[time/day-of-year](#)

Returns the day of the year (1..366)

[time/first-day-of-month](#)

Returns the first day of a month as a local-date.

[time/last-day-of-month](#)

Returns the last day of a month as a local-date.

[time/day-of-week](#)

Returns the day of the week (:MONDAY ... :SUNDAY)

[top](#)

time/day-of-week

([time/day-of-week](#) date)

Returns the day of the week (:MONDAY ... :SUNDAY)

([time/day-of-week](#) ([time/local-date](#)))

=> :SUNDAY

([time/day-of-week](#) ([time/local-date-time](#)))

=> :SUNDAY

([time/day-of-week](#) ([time/zoned-date-time](#)))

=> :SUNDAY

SEE ALSO

[time/year](#)

Returns the year of the date

[time/month](#)

Returns the month of the date 1..12

[time/day-of-year](#)

Returns the day of the year (1..366)

[time/day-of-month](#)

Returns the day of the month (1..31)

[time/first-day-of-month](#)

Returns the first day of a month as a local-date.

[time/last-day-of-month](#)

Returns the last day of a month as a local-date.

[top](#)

time/day-of-year

([time/day-of-year](#) date)

Returns the day of the year (1..366)

([time/day-of-year](#) ([time/local-date](#)))

=> 70

([time/day-of-year](#) ([time/local-date-time](#)))

=> 70

```
(time/day-of-year (time/zoned-date-time))  
=> 70
```

SEE ALSO

[time/year](#)

Returns the year of the date

[time/month](#)

Returns the month of the date 1..12

[time/day-of-month](#)

Returns the day of the month (1..31)

[time/first-day-of-month](#)

Returns the first day of a month as a local-date.

[time/last-day-of-month](#)

Returns the last day of a month as a local-date.

[time/day-of-week](#)

Returns the day of the week (:MONDAY ... :SUNDAY)

[top](#)

time/earliest

```
(time/earliest coll)
```

Returns the earliest date from a collection of dates. All dates must be of equal type. The coll may be empty or nil.

```
(time/earliest [(time/local-date 2018 8 4) (time/local-date 2018 8 3)])  
=> 2018-08-03
```

[top](#)

time/first-day-of-month

```
(time/first-day-of-month date)
```

Returns the first day of a month as a local-date.

```
(time/first-day-of-month (time/local-date))  
=> 2024-03-01
```

```
(time/first-day-of-month (time/local-date-time))  
=> 2024-03-01
```

```
(time/first-day-of-month (time/zoned-date-time))  
=> 2024-03-01
```

SEE ALSO

[time/year](#)

Returns the year of the date

[time/month](#)

Returns the month of the date 1..12

[time/day-of-year](#)

Returns the day of the year (1..366)

[time/day-of-month](#)

Returns the day of the month (1..31)

[time/last-day-of-month](#)

Returns the last day of a month as a local-date.

[time/day-of-week](#)

Returns the day of the week (:MONDAY ... :SUNDAY)

[top](#)

time/format

```
(time/format date format)
(time/format date format locale)
(time/format date formatter)
(time/format date formatter locale)
```

Formats a date with a format.

To format a large number of dates a pre instantiated formatter delivers best performance:

```
(let [fmt (time/formatter "yyyy-MM-dd'T'HH:mm:ss")]
  (dotimes [n 100] (time/format (time/local-date-time) fmt)))
```

```
(time/format (time/local-date) "dd-MM-yyyy")
=> "10-03-2024"
```

```
(time/format (time/local-date) (time/formatter "dd-MM-yyyy"))
=> "10-03-2024"
```

```
(time/format (time/local-date) :iso)
=> "2024-03-10"
```

```
(time/format (time/local-date-time) "yyyy-MM-dd'T'HH:mm:ss")
=> "2024-03-10T17:12:17"
```

```
(time/format (time/local-date-time) (time/formatter "yyyy-MM-dd'T'HH:mm:ss"))
=> "2024-03-10T17:12:17"
```

```
(time/format (time/local-date-time) :iso)
=> "2024-03-10T17:12:17.199"
```

```
(time/format (time/zoned-date-time) "yyyy-MM-dd'T'HH:mm:ss.SSSz")
=> "2024-03-10T17:12:17.216CET"
```

```
(time/format (time/zoned-date-time) :iso)
=> "2024-03-10T17:12:17.236+01:00"
```

```
(time/format (time/zoned-date-time) (time/formatter "yyyy-MM-dd'T'HH:mm:ss.SSSz"))
=> "2024-03-10T17:12:17.254CET"
```

SEE ALSO

[time/formatter](#)

Creates a formatter

top

time/formatter

```
(time/formatter format)
(time/formatter format locale)
```

Creates a formatter

```
(time/formatter "dd-MM-yyyy")

(time/formatter "dd-MM-yyyy" :en_EN)

(time/formatter "dd-MM-yyyy" "en_EN")

(time/formatter "yyyy-MM-dd'T'HH:mm:ss.SSSz")

(time/formatter :ISO_OFFSET_DATE_TIME)
```

SEE ALSO

[time/format](#)

Formats a date with a format.

top

time/hour

```
(time/hour date)
```

Returns the hour of the date 0..23

```
(time/hour (time/local-date))
=> 0

(time/hour (time/local-date-time))
=> 17

(time/hour (time/zoned-date-time))
=> 17
```

SEE ALSO

[time/minute](#)

Returns the minute of the date 0..59

[time/second](#)

Returns the second of the date 0..59

[time/milli](#)

Returns the millis of the date 0..999

top

time/last-day-of-month

```
(time/last-day-of-month date)
```

Returns the last day of a month as a local-date.

```
(time/last-day-of-month (time/local-date))  
=> 2024-03-31
```

```
(time/last-day-of-month (time/local-date-time))  
=> 2024-03-31
```

```
(time/last-day-of-month (time/zoned-date-time))  
=> 2024-03-31
```

SEE ALSO

[time/year](#)

Returns the year of the date

[time/month](#)

Returns the month of the date 1..12

[time/day-of-year](#)

Returns the day of the year (1..366)

[time/day-of-month](#)

Returns the day of the month (1..31)

[time/first-day-of-month](#)

Returns the first day of a month as a local-date.

[time/day-of-week](#)

Returns the day of the week (:MONDAY ... :SUNDAY)

[top](#)

time/latest

```
(time/latest coll)
```

Returns the latest date from a collection of dates. All dates must be of equal type. The coll may be empty or nil.

```
(time/latest [(time/local-date 2018 8 1) (time/local-date 2018 8 3)])  
=> 2018-08-03
```

[top](#)

time/leap-year?

```
(time/leap-year? date)
```

Checks if the year is a leap year.


```
(time/leap-year? 2000)
=> true

(time/leap-year? (time/local-date 2000 1 1))
=> true

(time/leap-year? (time/local-date-time))
=> true

(time/leap-year? (time/zoned-date-time))
=> true
```

SEE ALSO

[time/length-of-year](#)

Returns the length of the year represented by this date.

[time/length-of-month](#)

Returns the length of the month represented by this date.

[top](#)

time/length-of-month

```
(time/length-of-month date)
```

Returns the length of the month represented by this date.

This returns the length of the month in days. For example, a date in January would return 31.

```
(time/length-of-month (time/local-date 2000 2 1))
=> 29

(time/length-of-month (time/local-date 2001 2 1))
=> 28

(time/length-of-month (time/local-date-time))
=> 31

(time/length-of-month (time/zoned-date-time))
=> 31
```

SEE ALSO

[time/length-of-year](#)

Returns the length of the year represented by this date.

[time/leap-year?](#)

Checks if the year is a leap year.

[top](#)

time/length-of-year

```
(time/length-of-year date)
```

Returns the length of the year represented by this date.

This returns the length of the year in days, either 365 or 366.

```
(time/length-of-year (time/local-date 2000 1 1))  
=> 366
```

```
(time/length-of-year (time/local-date 2001 1 1))  
=> 365
```

```
(time/length-of-year (time/local-date-time))  
=> 366
```

```
(time/length-of-year (time/zoned-date-time))  
=> 366
```

SEE ALSO

[time/length-of-month](#)

Returns the length of the month represented by this date.

[time/leap-year?](#)

Checks if the year is a leap year.

[top](#)

time/local-date

```
(time/local-date)  
(time/local-date year month day)  
(time/local-date date)
```

Creates a new local-date. A local-date is represented by 'java.time.LocalDate'

```
(time/local-date)  
=> 2024-03-10
```

```
(time/local-date 2018 8 1)  
=> 2018-08-01
```

```
(time/local-date "2018-08-01")  
=> 2018-08-01
```

```
(time/local-date (time/local-date-time 2018 8 1 14 20 10))  
=> 2018-08-01
```

```
(time/local-date 1375315200000)  
=> 2013-08-01
```

```
(time/local-date (. :java.util.Date :new))  
=> 2024-03-10
```

SEE ALSO

[time/local-date-time](#)

Creates a new local-date-time. A local-date-time is represented by 'java.time.LocalDateTime'

[time/zoned-date-time](#)

Creates a new zoned-date-time. A zoned-date-time is represented by 'java.time.ZonedDateTime'

[top](#)

time/local-date-parse

```
(time/local-date-parse str format
(time/local-date-parse str format locale
```

Parses a local-date.

To parse a large number of dates a pre instantiated formatter delivers best performance:

```
(let [fmt (time/formatter "yyyy-MM-dd")]
(dotimes [n 100] (time/local-date-parse "2018-12-01" fmt)))
```

```
(time/local-date-parse "2018-12-01" "yyyy-MM-dd")
=> 2018-12-01
```

```
(time/local-date-parse "2018-Dec-01" "yyyy-MMM-dd" :ENGLISH)
=> 2018-12-01
```

```
(time/local-date-parse "2018-12-01" :iso)
=> 2018-12-01
```

[top](#)

time/local-date-time

```
(time/local-date-time)
(time/local-date-time year month day)
(time/local-date-time year month day hour minute second)
(time/local-date-time year month day hour minute second millis)
(time/local-date-time date)
```

Creates a new local-date-time. A local-date-time is represented by 'java.time.LocalDateTime'

```
(time/local-date-time)
=> 2024-03-10T17:12:15.824
```

```
(time/local-date-time 2018 8 1)
=> 2018-08-01T00:00
```

```
(time/local-date-time 2018 8 1 14 20 10)
=> 2018-08-01T14:20:10
```

```
(time/local-date-time 2018 8 1 14 20 10 200)
=> 2018-08-01T14:20:10.200
```

```
(time/local-date-time "2018-08-01T14:20:10.200")
=> 2018-08-01T14:20:10.200
```

```
(time/local-date-time (time/local-date 2018 8 1))
=> 2018-08-01T00:00
```

```
(time/local-date-time 1375315200000)
=> 2013-08-01T02:00
```

```
(time/local-date-time (. :java.util.Date :new))
=> 2024-03-10T17:12:15.941
```

SEE ALSO

[time/local-date](#)

Creates a new local-date. A local-date is represented by 'java.time.LocalDate'

[time/zoned-date-time](#)

Creates a new zoned-date-time. A zoned-date-time is represented by 'java.time.ZonedDateTime'

[top](#)

time/local-date-time-parse

```
(time/local-date-time-parse str format
(time/local-date-time-parse str format locale
```

Parses a local-date-time.

To parse a large number of dates a pre instantiated formatter delivers best performance:

```
(let [fmt (time/formatter "yyyy-MM-dd HH:mm:ss")]
(dotimes [n 100] (time/local-date-time-parse "2018-12-01 14:20:01" fmt)))
```

```
(time/local-date-time-parse "2018-08-01 14:20" "yyyy-MM-dd HH:mm")
=> 2018-08-01T14:20
```

```
(time/local-date-time-parse "2018-08-01 14:20:01.231" "yyyy-MM-dd HH:mm:ss.SSS")
=> 2018-08-01T14:20:01.231
```

```
(time/local-date-time-parse "2018-08-01T14:20:01.231" :iso)
=> 2018-08-01T14:20:01.231
```

[top](#)

time/local-date-time?

```
(time/local-date-time? date)
```

Returns true if date is a local-date-time ('java.time.LocalDateTime') else false

```
(time/local-date-time? (time/local-date-time))
=> true
```

[top](#)

time/local-date?

```
(time/local-date? date)
```

Returns true if date is a locale date ('java.time.LocalDate') else false

```
(time/local-date? (time/local-date))  
=> true
```

[top](#)

time/milli

(time/milli date)

Returns the millis of the date 0..999

```
(time/milli (time/local-date))  
=> 0
```

```
(time/milli (time/local-date-time))  
=> 811
```

```
(time/milli (time/zoned-date-time))  
=> 827
```

SEE ALSO

[time/hour](#)

Returns the hour of the date 0..23

[time/minute](#)

Returns the minute of the date 0..59

[time/second](#)

Returns the second of the date 0..59

[top](#)

time/minus

(time/minus date unit n)
(time/minus date temporal)

Subtracts the n units from the date. Units: {years :months :weeks :days :hours :minutes :seconds :milliseconds}

In the two argument version subtracts a java.time.Temporal (Period, Duration) from the date.

```
(time/minus (time/local-date) :days 2)  
=> 2024-03-08
```

```
(time/minus (time/local-date-time) :days 2)  
=> 2024-03-08T17:12:17.798
```

```
(time/minus (time/zoned-date-time) :days 2)  
=> 2024-03-08T17:12:17.815+01:00[Europe/Zurich]
```

```
(time/minus (time/local-date) (. :java.time.Period :ofDays 2))  
=> 2024-03-08
```

```
(time/minus (time/local-date-time) (. :java.time.Period :ofDays 2))  
=> 2024-03-08T17:12:17.851
```

```
(time/minus (time/zoned-date-time) (. :java.time.Period :ofDays 2))  
=> 2024-03-08T17:12:17.867+01:00[Europe/Zurich]
```

SEE ALSO

[time/plus](#)

Adds the n units to the date. Units: {years :months :weeks :days :hours :minutes :seconds :milliseconds}

[top](#)

time/minute

```
(time/minute date)
```

Returns the minute of the date 0..59

```
(time/minute (time/local-date))  
=> 0
```

```
(time/minute (time/local-date-time))  
=> 12
```

```
(time/minute (time/zoned-date-time))  
=> 12
```

SEE ALSO

[time/hour](#)

Returns the hour of the date 0..23

[time/second](#)

Returns the second of the date 0..59

[time/milli](#)

Returns the millis of the date 0..999

[top](#)

time/month

```
(time/month date)
```

Returns the month of the date 1..12

```
(time/month (time/local-date))  
=> 3
```

```
(time/month (time/local-date-time))  
=> 3
```

```
(time/month (time/zoned-date-time))  
=> 3
```

SEE ALSO

[time/year](#)

Returns the year of the date

[time/day-of-year](#)

Returns the day of the year (1..366)

[time/day-of-month](#)

Returns the day of the month (1..31)

[time/first-day-of-month](#)

Returns the first day of a month as a local-date.

[time/last-day-of-month](#)

Returns the last day of a month as a local-date.

[time/day-of-week](#)

Returns the day of the week (:MONDAY ... :SUNDAY)

[top](#)

time/not-after?

```
(time/not-after? date1 date2)
```

Returns true if date1 is not-after date2 else false (same semantics as `<=`)

```
(time/not-after? (time/local-date 2018 1 1)
                 (time/local-date 2019 1 1))
=> true
```

```
(time/not-after? (time/local-date-time "2018-01-01T10:00:00.000")
                 (time/local-date-time "2019-01-01T10:00:00.000"))
=> true
```

```
(time/not-after? (time/zoned-date-time "2018-01-01T10:00:00.000+01:00")
                 (time/zoned-date-time "2019-01-01T10:00:00.000+01:00"))
=> true
```

SEE ALSO

[time/after?](#)

Returns true if all dates are ordered from the latest to the earliest (same semantics as `>`)

[time/before?](#)

Returns true if all dates are ordered from the earliest to the latest (same semantics as `<`)

[time/not-before?](#)

Returns true if date1 is not-before date2 else false (same semantics as `>=`)

[top](#)

time/not-before?

```
(time/not-before? date1 date2)
```

Returns true if date1 is not-before date2 else false (same semantics as `>=`)

```
(time/not-before? (time/local-date 2019 1 1)
                  (time/local-date 2019 1 1))
=> true

(time/not-before? (time/local-date-time "2019-01-01T10:00:00.000")
                  (time/local-date-time "2018-01-01T10:00:00.000"))
=> true

(time/not-before? (time/zoned-date-time "2019-01-01T10:00:00.000+01:00")
                  (time/zoned-date-time "2018-01-01T10:00:00.000+01:00"))
=> true
```

SEE ALSO

[time/after?](#)

Returns true if all dates are ordered from the latest to the earliest (same semantics as >)

[time/before?](#)

Returns true if all dates are ordered from the earliest to the latest (same semantics as <)

[time/not-after?](#)

Returns true if date1 is not-after date2 else false (same semantics as <=)

[top](#)

time/period

```
(time/period from to unit)
```

Returns the period interval of two dates in the specified unit.

Units: {years :months :weeks :days :hours :minutes :seconds :milliseconds}

```
(time/period (time/local-date) (time/plus (time/local-date) :days 3) :days)
=> 3
```

```
(time/period (time/local-date-time) (time/plus (time/local-date-time) :days 3) :days)
=> 3
```

```
(time/period (time/zoned-date-time) (time/plus (time/zoned-date-time) :days 3) :days)
=> 3
```

SEE ALSO

[time/local-date](#)

Creates a new local-date. A local-date is represented by 'java.time.LocalDate'

[time/local-date-time](#)

Creates a new local-date-time. A local-date-time is represented by 'java.time.LocalDateTime'

[time/zoned-date-time](#)

Creates a new zoned-date-time. A zoned-date-time is represented by 'java.time.ZonedDateTime'

[top](#)

time/plus

```
(time/plus date unit n)
```


(time/minus plus temporal)

Adds the n units to the date. Units: {years :months :weeks :days :hours :minutes :seconds :milliseconds}

In the two argument version add a :java.time.Temporal (Period, Duration) to the date.

```
(time/plus (time/local-date) :days 2)
```

```
=> 2024-03-12
```

```
(time/plus (time/local-date-time) :days 2)
```

```
=> 2024-03-12T17:12:17.698
```

```
(time/plus (time/zoned-date-time) :days 2)
```

```
=> 2024-03-12T17:12:17.714+01:00[Europe/Zurich]
```

```
(time/plus (time/local-date) (. :java.time.Period :ofDays 2))
```

```
=> 2024-03-12
```

```
(time/plus (time/local-date-time) (. :java.time.Period :ofDays 2))
```

```
=> 2024-03-12T17:12:17.748
```

```
(time/plus (time/zoned-date-time) (. :java.time.Period :ofDays 2))
```

```
=> 2024-03-12T17:12:17.765+01:00[Europe/Zurich]
```

SEE ALSO

[time/minus](#)

Subtracts the n units from the date. Units: {years :months :weeks :days :hours :minutes :seconds :milliseconds}

[top](#)

time/second

(time/second date)

Returns the second of the date 0..59

```
(time/second (time/local-date))
```

```
=> 0
```

```
(time/second (time/local-date-time))
```

```
=> 16
```

```
(time/second (time/zoned-date-time))
```

```
=> 16
```

SEE ALSO

[time/hour](#)

Returns the hour of the date 0..23

[time/minute](#)

Returns the minute of the date 0..59

[time/milli](#)

Returns the millis of the date 0..999

[top](#)

time/to-millis

```
(time/to-millis date)
```

Converts the passed date to milliseconds since epoch

```
(time/to-millis (time/date))
```

```
=> 1710087137998
```

```
(time/to-millis (time/local-date))
```

```
=> 1710025200000
```

```
(time/to-millis (time/local-date-time))
```

```
=> 1710087138031
```

```
(time/to-millis (time/zoned-date-time))
```

```
=> 1710087138050
```

[top](#)

time/with-time

```
(time/with-time date hour minute second)
```

```
(time/with-time date hour minute second millis)
```

Sets the time of a date. Returns a new date

```
(time/with-time (time/local-date) 22 00 15 333)
```

```
=> 2024-03-10T22:00:15.333
```

```
(time/with-time (time/local-date-time) 22 00 15 333)
```

```
=> 2024-03-10T22:00:15.333
```

```
(time/with-time (time/zoned-date-time) 22 00 15 333)
```

```
=> 2024-03-10T22:00:15.333+01:00[Europe/Zurich]
```

SEE ALSO

[time/local-date](#)

Creates a new local-date. A local-date is represented by 'java.time.LocalDate'

[time/local-date-time](#)

Creates a new local-date-time. A local-date-time is represented by 'java.time.LocalDateTime'

[time/zoned-date-time](#)

Creates a new zoned-date-time. A zoned-date-time is represented by 'java.time.ZonedDateTime'

[top](#)

time/within?

```
(time/within? date start end)
```

Returns true if the date is after or equal to the start and is before or equal to the end. All three dates must be of the same type. The start and end date may each be nil meaning start is -infinity and end is +infinity. (same semantics as `start <= date <= end`)

```
(time/within? (time/local-date 2018 8 15)
              (time/local-date 2018 8 10)
              (time/local-date 2018 8 20))
=> true

(time/within? (time/local-date 2018 8 25)
              (time/local-date 2018 8 10)
              (time/local-date 2018 8 20))
=> false

(time/within? (time/local-date 2018 8 20)
              (time/local-date 2018 8 10)
              nil)
=> true

(time/within? (time/local-date-time "2019-01-01T10:00:00.000")
              (time/local-date-time "2010-01-01T10:00:00.000")
              (time/local-date-time "2020-01-01T10:00:00.000"))
=> true

(time/within? (time/zoned-date-time "2010-01-01T10:00:00.000+01:00")
              (time/zoned-date-time "2019-01-01T10:00:00.000+01:00")
              (time/zoned-date-time "2020-01-01T10:00:00.000+01:00"))
=> false
```

[top](#)

time/year

```
(time/year date)
```

Returns the year of the date

```
(time/year (time/local-date))
=> 2024

(time/year (time/local-date-time))
=> 2024

(time/year (time/zoned-date-time))
=> 2024
```

SEE ALSO

[time/month](#)

Returns the month of the date 1..12

[time/day-of-year](#)

Returns the day of the year (1..366)

[time/day-of-month](#)

Returns the day of the month (1..31)

[time/first-day-of-month](#)

Returns the first day of a month as a local-date.

time/last-day-of-month

Returns the last day of a month as a local-date.

time/day-of-week

Returns the day of the week (:MONDAY ... :SUNDAY)

top

time/zone

(time/zone date)

Returns the zone of the date

```
(time/zone (time/zoned-date-time))
```

```
=> "Europe/Zurich"
```

top

time/zone-ids

(time/zone-ids)

Returns all available zone ids with time offset

```
(nfirst (seq (time/zone-ids)) 10)
```

```
=> (["Africa/Abidjan" "+00:00"] ["Africa/Accra" "+00:00"] ["Africa/Addis_Ababa" "+03:00"] ["Africa/Algiers"
"+01:00"] ["Africa/Asmara" "+03:00"] ["Africa/Asmera" "+03:00"] ["Africa/Bamako" "+00:00"] ["Africa/Bangui"
"+01:00"] ["Africa/Banjul" "+00:00"] ["Africa/Bissau" "+00:00"])
```

top

time/zone-offset

(time/zone-offset date)

Returns the zone-offset of the date in minutes

```
(time/zone-offset (time/zoned-date-time))
```

$$\Rightarrow 60$$

SEE ALSO

time/zoned-date-time

Creates a new zoned-date-time. A zoned-date-time is represented by 'java.time.ZonedDateTime'

top

time/zoned-date-time

```
(time/zoned-date-time)
(time/zoned-date-time year month day)
(time/zoned-date-time year month day hour minute second)
(time/zoned-date-time year month day hour minute second millis)
(time/zoned-date-time date)
(time/zoned-date-time zone-id)
(time/zoned-date-time zone-id year month day)
(time/zoned-date-time zone-id year month day hour minute second)
(time/zoned-date-time zone-id year month day hour minute second millis)
(time/zoned-date-time zone-id date)
```

Creates a new zoned-date-time. A zoned-date-time is represented by 'java.time.ZonedDateTime'

```
(time/zoned-date-time)
=> 2024-03-10T17:12:16.022+01:00[Europe/Zurich]

(time/zoned-date-time 2018 8 1)
=> 2018-08-01T00:00+02:00[Europe/Zurich]

(time/zoned-date-time 2018 8 1 14 20 10)
=> 2018-08-01T14:20:10+02:00[Europe/Zurich]

(time/zoned-date-time 2018 8 1 14 20 10 200)
=> 2018-08-01T14:20:10.200+02:00[Europe/Zurich]

(time/zoned-date-time "2018-08-01T14:20:10.200+01:00")
=> 2018-08-01T14:20:10.200+01:00

(time/zoned-date-time (time/local-date 2018 8 1))
=> 2018-08-01T00:00+02:00[Europe/Zurich]

(time/zoned-date-time (time/local-date-time 2018 8 1 14 20 10))
=> 2018-08-01T14:20:10+02:00[Europe/Zurich]

(time/zoned-date-time 1375315200000)
=> 2013-08-01T02:00+02:00[Europe/Zurich]

(time/zoned-date-time (. :java.util.Date :new))
=> 2024-03-10T17:12:16.155+01:00[Europe/Zurich]

(time/zoned-date-time "UTC")
=> 2024-03-10T16:12:16.171Z[UTC]

(time/zoned-date-time "UTC" 2018 8 1)
=> 2018-08-01T00:00Z[UTC]

(time/zoned-date-time "UTC" 2018 8 1 14 20 10)
=> 2018-08-01T14:20:10Z[UTC]

(time/zoned-date-time "UTC" 2018 8 1 14 20 10 200)
=> 2018-08-01T14:20:10.200Z[UTC]

(time/zoned-date-time "UTC" "2018-08-01T14:20:10.200+01:00")
=> 2018-08-01T14:20:10.200Z[UTC]

(time/zoned-date-time "UTC" (time/local-date 2018 8 1))
=> 2018-08-01T00:00Z[UTC]
```

```
(time/zoned-date-time "UTC" (time/local-date-time 2018 8 1 14 20 10))
=> 2018-08-01T14:20:10Z[UTC]
```

```
(time/zoned-date-time "UTC" 1375315200000)
=> 2013-08-01T00:00Z[UTC]
```

```
(time/zoned-date-time "UTC" (. :java.util.Date :new))
=> 2024-03-10T16:12:16.303Z[UTC]
```

SEE ALSO

[time/local-date](#)

Creates a new local-date. A local-date is represented by 'java.time.LocalDate'

[time/local-date-time](#)

Creates a new local-date-time. A local-date-time is represented by 'java.time.LocalDateTime'

[top](#)

time/zoned-date-time-parse

```
(time/zoned-date-time-parse str format
time/zoned-date-time-parse str format locale)
```

Parses a zoned-date-time.

To parse a large number of dates a pre instantiated formatter delivers best performance:

```
(let [fmt (time/formatter "yyyy-MM-dd'T'HH:mm:ssz")]
(dotimes [n 100] (time/zoned-date-time-parse "2018-12-01T14:20:01+01:00" fmt)))
```

```
(time/zoned-date-time-parse "2018-08-01T14:20:01+01:00" "yyyy-MM-dd'T'HH:mm:ssz")
=> 2018-08-01T14:20:01+01:00
```

```
(time/zoned-date-time-parse "2018-08-01T14:20:01.000+01:00" "yyyy-MM-dd'T'HH:mm:ss.SSSz")
=> 2018-08-01T14:20:01+01:00
```

```
(time/zoned-date-time-parse "2018-08-01T14:20:01.000+01:00" :iso)
=> 2018-08-01T14:20:01+01:00
```

```
(time/zoned-date-time-parse "2018-08-01 14:20:01.000 +01:00" "yyyy-MM-dd' 'HH:mm:ss.SSS' 'z")
=> 2018-08-01T14:20:01+01:00
```

[top](#)

time/zoned-date-time?

```
(time/zoned-date-time? date)
```

Returns true if date is a zoned-date-time ('java.time.ZonedDateTime') else false

```
(time/zoned-date-time? (time/zoned-date-time))
=> true
```

[top](#)

timeout-after

```
(timeout-after p time time-unit)
```

Returns a promise that timeouts after the specified time. The promise throws a `TimeoutException`.

```
(-> (promise (fn [] (sleep 100) "The quick brown fox"))
      (accept-either (timeout-after 500 :milliseconds)
                     (fn [v] (println (pr-str v)))))
      (deref))
"The quick brown fox"
=> nil

(-> (promise (fn [] (sleep 1000) "The quick brown fox"))
      (accept-either (timeout-after 500 :milliseconds)
                     (fn [v] (println (pr-str v)))))
      (deref))
=> TimeoutException: java.util.concurrent.TimeoutException

(-> (promise (fn [] (sleep 1000) "The quick brown fox"))
      (accept-either (timeout-after 500 :milliseconds)
                     (fn [v] (println (pr-str v)))))
      (deref 2000 :timeout))
=> :timeout

(-> (promise (fn [] (sleep 200) "The quick brown fox"))
      (apply-to-either (timeout-after 100 :milliseconds)
                       identity)
      (deref))
=> TimeoutException: java.util.concurrent.TimeoutException
```

SEE ALSO

[promise](#)

Returns a promise object that can be read with `deref`, and set, once only, with `deliver`. Calls to `deref` prior to delivery will block, ...

[then-accept](#)

Returns a new promise that, when this promise completes normally, is executing the function `f` with this stage's result as the argument.

[then-accept-both](#)

Returns a new promise that, when either this or the other given promise completes normally, is executing the function `f` with the two ...

[then-apply](#)

Applies a function `f` on the result of the previous stage of the promise `p`.

[then-combine](#)

Applies a function `f` to the result of the previous stage of promise `p` and the result of another promise `p-other`

[then-compose](#)

Composes the result of two promises. `f` receives the result of the first promise `p` and returns a new promise that composes that value ...

[when-complete](#)

Returns the promise `p` with the same result or exception at this stage, that executes the action `f`. Passes the current stage's result ...

[accept-either](#)

Returns a new promise that, when either this or the other given promise completes normally, is executed with the corresponding result ...

[apply-to-either](#)

Returns a new promise that, when either this or the other given promise completes normally, is executed with the corresponding result ...

[or-timeout](#)

Exceptionally completes the promise with a `TimeoutException` if not otherwise completed before the given timeout.

[complete-on-timeout](#)

Completes the promise with the given value if not otherwise completed before the given timeout.

[top](#)

timing/elapsed

```
(timing/elapsed f)
```

Runs a function `f` and returns the elapsed time in milliseconds.

```
(timing/elapsed #(sleep 500))  
=> 505
```

SEE ALSO

[timing/run](#)

Runs a function `f` with printing the elapsed time. Returns the value that `f` has produced.

[top](#)

timing/run

```
(timing/run f)  
(timing/run f start-msg)
```

Runs a function `f` with printing the elapsed time. Returns the value that `f` has produced.

```
(timing/run #(sleep 500))  
Elapsed: 501ms  
=> nil
```

```
(timing/run #(sleep 500) "Sleeping...")  
Sleeping...  
Elapsed: 505ms  
=> nil
```

SEE ALSO

[timing/elapsed](#)

Runs a function `f` and returns the elapsed time in milliseconds.

[top](#)

total-memory

```
(total-memory)
```

Returns the total amount of memory available to the Java VM.

```
(total-memory)  
=> "774.0MB"
```


SEE ALSO

[used-memory](#)

Returns the currently used memory by the Java VM.

[top](#)

trace/tee

```
(tee x)
```

Allows to branch off values passed to `tee` to a printer.

The form is equivalent to:

```
(tee-> x #(println "trace:" %))
```

```
(tee->> x #(println "trace:" %))
```

when used with the threading macros `->` and `->>`

```
(do
  (-> 5
    (+ 3)
    trace/tee
    (/ 2)
    trace/tee
    (- 1)))
```

```
trace: 8
```

```
trace: 4
```

```
=> 3
```

SEE ALSO

[trace/tee->](#)

Allows to branch off values passed through the forms of a `->` macro

[trace/tee->>](#)

Allows to branch off values passed through the form of a `->>` macro

[top](#)

trace/tee->

```
(tee-> x f!)
```

Allows to branch off values passed through the forms of a `->` macro

```
(do
  (-> 5
    (+ 3)
    (trace/tee-> #(println "trace:" %))
    (/ 2)
    (trace/tee-> #(println "trace:" %))
    (- 1)))
```

```
trace: 8
```

```
trace: 4
```

```
=> 3
```

SEE ALSO

[trace/tee->>](#)

Allows to branch off values passed through the form of a `->>` macro

[trace/tee](#)

Allows to branch off values passed to tee to a printer.

[top](#)

trace/tee->>

```
(tee->> x f!)
```

Allows to branch off values passed through the form of a `->>` macro

```
(do
  (->> 5
    (+ 3)
    (trace/tee->> #(println "trace:" %))
    (/ 32)
    (trace/tee->> #(println "trace:" %))
    (- 1)))
trace: 8
trace: 4
=> -3
```

SEE ALSO

[trace/tee->](#)

Allows to branch off values passed through the forms of a `->` macro

[trace/tee](#)

Allows to branch off values passed to tee to a printer.

[top](#)

trace/trace

```
(trace val)
(trace name val)
```

Sends name (optional) and value to the tracer function, then returns value. May be wrapped around any expression without affecting the result.

```
(trace/trace (+ 1 2))
TRACE: 3
=> 3
```

```
(trace/trace "add" (+ 1 2))
TRACE add: 3
=> 3
```

```
(* 4 (trace/trace (+ 1 2)))
TRACE: 3
=> 12
```

SEE ALSO

[trace/trace-var](#)

Traces the var

[trace/trace-str-limit](#)

Manages the trace string limit for the current thread. Without argument returns the current limit. With argument sets the trace string ...

[top](#)

trace/trace-str-limit

```
(trace-str-limit)
(trace-str-limit n)
```

Manages the trace string limit for the current thread. Without argument returns the current limit. With argument sets the trace string length limit to n. The limit defaults to 80.

```
(trace/trace-str-limit 120)
=> 120
```

SEE ALSO

[trace/trace-var](#)

Traces the var

[trace/trace](#)

Sends name (optional) and value to the tracer function, then returns value. May be wrapped around any expression without affecting the result.

[top](#)

trace/trace-var

```
(trace-var v)
```

Traces the var

```
(do
  (load-module :trace)

  (trace/trace-var +)
  (+ 1 2))
TRACE t72718: (core/+ 1 2)
TRACE t72718: | => 3
=> 3
```

```
(do
  (load-module :trace)

  (defn foo [x] (+ x 2))
  (defn bar [x] (foo x))

  (trace/trace-var +)
  (trace/trace-var foo)
  (trace/trace-var bar)

  (bar 5))
```

```
TRACE t72742: (user/bar 5)
TRACE t72743: | (user/foo 5)
TRACE t72744: | | (core/+ 5 2)
TRACE t72744: | | | => 7
TRACE t72743: | | => 7
TRACE t72742: | => 7
=> 7
```

SEE ALSO

[trace/untrace-var](#)

Untraces the var

[trace/traced?](#)

Returns true if the given var is currently traced, false otherwise

[trace/traceable?](#)

Returns true if the given var can be traced, false otherwise

[trace/trace](#)

Sends name (optional) and value to the tracer function, then returns value. May be wrapped around any expression without affecting the result.

[trace/trace-str-limit](#)

Manages the trace string limit for the current thread. Without argument returns the current limit. With argument sets the trace string ...

[top](#)

trace/traceable?

```
(traceable? v)
```

Returns true if the given var can be traced, false otherwise

```
(trace/traceable? +)
```

```
=> true
```

SEE ALSO

[trace/trace-var](#)

Traces the var

[trace/traced?](#)

Returns true if the given var is currently traced, false otherwise

[top](#)

trace/traced?

```
(traced? v)
```

Returns true if the given var is currently traced, false otherwise

```
(trace/traced? +)
```

```
=> false
```

SEE ALSO

[trace/trace-var](#)

Traces the var

[trace/untrace-var](#)

Untraces the var

[trace/traceable?](#)

Returns true if the given var can be traced, false otherwise

[trace/trace](#)

Sends name (optional) and value to the tracer function, then returns value. May be wrapped around any expression without affecting the result.

[top](#)

trace/untrace-var

```
(untrace-var v)
```

Untraces the var

```
(trace/untrace-var +)  
=> nil
```

SEE ALSO

[trace/trace-var](#)

Traces the var

[trace/traced?](#)

Returns true if the given var is currently traced, false otherwise

[top](#)

trampoline

```
(trampoline f)  
(trampoline f & args)
```

trampoline can be used to convert algorithms requiring mutual recursion without stack consumption. Calls f with supplied args, if any. If f returns a fn, calls that fn with no arguments, and continues to repeat, until the return value is not a fn, then returns that non-fn value.

Note that if you want to return a fn as a final value, you must wrap it in some data structure and unpack it after trampoline returns.

```
(do  
  (defn factorial  
    ([n] #(factorial n 1N))  
    ([n acc] (if (< n 2)  
                acc  
                #(factorial (dec n) (* acc n))))))  
  
  (trampoline (factorial 20)))  
=> 2432902008176640000N
```

[top](#)

transduce

```
(transduce xform f coll)
(transduce xform f init coll)
```

Reduce with a transformation of a reduction function $f(xf)$. If `init` is not supplied, `(f)` will be called to produce it. `f` should be a reducing step function that accepts both 1 and 2 arguments. Returns the result of applying (the transformed) `xf` to `init` and the first item in `coll`, then applying `xf` to that result and the 2nd item, etc. If `coll` contains no items, returns `init` and `f` is not called.

`transduce` can work with queues as collection, given that the end of the queue is marked by adding a `nil` element. Otherwise the transducer does not know when to stop reading elements from the queue.

Transformations		Reductions	Control
-----		-----	-----
<code>map</code>	<code>map-indexed</code>	<code>rf-first</code>	<code>halt-when</code>
<code>filter</code>	<code>flatten</code>	<code>rf-last</code>	
<code>drop</code>	<code>drop-while</code>	<code>rf-any?</code>	
<code>drop-last</code>	<code>remove</code>	<code>rf-every?</code>	
<code>take</code>	<code>take-while</code>		
<code>take-last</code>	<code>keep</code>	<code>conj</code>	
<code>dedupe</code>	<code>distinct</code>	<code>+</code> , <code>*</code>	
<code>sorted</code>	<code>reverse</code>	<code>max</code> , <code>min</code>	

```
(transduce identity + [1 2 3 4])
=> 10
```

```
(transduce (map #(+ % 3)) + [1 2 3 4])
=> 22
```

```
(transduce identity max [1 2 3])
=> 3
```

```
(transduce identity rf-last [1 2 3])
=> 3
```

```
(transduce identity (rf-every? pos?) [1 2 3])
=> true
```

```
(transduce (map inc) conj [1 2 3])
=> [2 3 4]
```

```
;; transduce all elements of a queue.
;; calls (take! queue) to get the elements of the queue.
;; note: use nil to mark the end of the queue otherwise
;;       transduce will block forever!
(let [q (conj! (queue) 1 2 3 nil)]
  (transduce (map inc) conj q))
=> [2 3 4]
```

```
;; reduce data supplied by a finite lazy seq
(do
  (def counter (atom 5))
  (defn generate []
    (swap! counter dec)
    (if (pos? @counter) @counter nil))
  (transduce (map inc) conj (lazy-seq generate)))
=> [5 4 3 2]
```

```
(do
  (def xform (comp (drop 2) (take 3)))
  (transduce xform conj [1 2 3 4 5 6]))
=> [3 4 5]
```

```
(do
  (def xform (comp
    (map #(* % 10))
    (map #(+ % 1))
    (sorted compare)
    (drop 3)
    (take 2)
    (reverse)))
  (transduce xform conj [1 2 3 4 5 6]))
=> [51 41]
```

[top](#)

true?

```
(true? x)
```

Returns true if x is true, false otherwise

```
(true? true)
=> true
```

```
(true? false)
=> false
```

```
(true? nil)
=> false
```

```
(true? 0)
=> false
```

```
(true? (== 1 1))
=> true
```

SEE ALSO

[false?](#)

Returns true if x is false, false otherwise

[not](#)

Returns true if x is logical false, false otherwise.

[top](#)

try

```
(try expr*)
(try expr* (catch selector ex-sym expr*)*)
(try expr* (catch selector ex-sym expr*)* (finally expr*))
```

Exception handling: try - catch - finally

`(try)` without any expression returns `nil`.

The exception types

- `java.lang.Exception`

- :java.lang.RuntimeException
- :com.github.jlangch.venice.VncException
- :com.github.jlangch.venice.ValueException

are imported implicitly so its alias :Exception, :RuntimeException, :VncException, and :ValueException can be used as selector without an import of the class.

Selectors

- a class: (e.g., :RuntimeException, :java.text.ParseException), matches any instance of that class
- a key-values vector: (e.g., [key val & kvs]), matches any instance of :ValueException where the exception's value meets the expression
(and (= (get ex-value key) val) ...)
- a predicate: (a function of one argument like map?, set?), matches any instance of :ValueException where the predicate applied to the exception's value returns true

Notes:

The finally block is just for side effects, like closing resources. It never returns a value!

All exceptions in Venice are *unchecked*. If *checked* exceptions are thrown in Venice they are immediately wrapped in a :RuntimeException before being thrown! If Venice catches a *checked* exception from a Java interop call it wraps it in a :RuntimeException before handling it by the catch block selectors.

Venice follows the Java rules when propagating exceptions:

1. exception from finally block
2. exception from catch block
3. exception from body block

```
(try
  (throw "test")
  (catch :ValueException e
    "caught ~(ex-value e)"))
=> "caught test"

(try
  (throw 100)
  (catch :Exception e -100))
=> -100

(try
  (throw 100)
  (catch :ValueException e (ex-value e))
  (finally (println "...finally")))
...finally
=> 100

(try
  (throw (ex :RuntimeException "message"))
  (catch :RuntimeException e (ex-message e)))
=> "message"

;; exception type selector:
(try
  (throw [1 2 3])
  (catch :ValueException e (ex-value e))
  (catch :RuntimeException e "runtime ex")
  (finally (println "...finally")))
...finally
=> [1 2 3]
```



```
;; key-value selector:
(try
  (throw {:a 100, :b 200})
  (catch [:a 100] e
    (println "ValueException, value: ~(ex-value e)"))
  (catch [:a 100, :b 200] e
    (println "ValueException, value: ~(ex-value e)")))
ValueException, value: {:a 100 :b 200}
=> nil

;; key-value selector (exception cause):
(try
  (throw (ex :java.io.IOException "failure"))
  (catch [:cause-type :java.io.IOException] e
    (println "IOException, msg: ~(ex-message (ex-cause e))"))
  (catch :RuntimeException e
    (println "RuntimeException, msg: ~(ex-message e)")))
IOException, msg: failure
=> nil

;; predicate selector:
(try
  (throw {:a 100, :b 200})
  (catch long? e
    (println "ValueException, value: ~(ex-value e)"))
  (catch map? e
    (println "ValueException, value: ~(ex-value e)"))
  (catch #(and (map? %) (= 100 (:a %))) e
    (println "ValueException, value: ~(ex-value e)")))
ValueException, value: {:a 100 :b 200}
=> nil

;; predicate selector with custom types:
(do
  (deftype :my-exception1 [message :string, position :long])
  (deftype :my-exception2 [message :string])

  (try
    (throw (my-exception1. "error" 100))
    (catch my-exception1? e
      (println (:value e)))
    (catch my-exception2? e
      (println (:value e))))
  {:custom-type* :user/my-exception1 :message error :position 100})
=> nil
```

SEE ALSO

[try-with](#)

try-with-resources allows the declaration of resources to be used in a try block with the assurance that the resources will be closed ...

[throw](#)

Throws an exception.

[ex](#)

Creates an exception of type class with optional args. The class must be a subclass of `java.lang.Exception`

[top](#)

try-acquire

```
(try-acquire lock)
(try-acquired lock timeout time-unit)
```

Acquires a lock within the given timeout time. Without a timeout returns immediately if the lock is not available.

Returns `true` if the lock could be acquired within the given time else `false` .

```
(let [l (lock)]
  (when (try-acquire l)
    ;; do something
    (release l)))
=> nil

(let [l (lock)]
  (when (try-acquire l 3 :seconds)
    ;; do something
    (release l)))
=> nil
```

SEE ALSO

[lock](#)

Creates a new lock object.

[acquire](#)

Acquires a lock, blocking until the lock is available.

[release](#)

Releases a lock.

[locked?](#)

Returns true if the lock is in use else false.

[top](#)

try-with

```
(try-with [bindings*] expr*)
(try-with [bindings*] expr* (catch selector ex-sym expr*)*)
(try-with [bindings*] expr* (catch selector ex-sym expr*)* (finally expr))
```

try-with-resources allows the declaration of resources to be used in a try block with the assurance that the resources will be closed after execution of that block. The resources declared must implement the `Closeable` or `AutoCloseable` interface.

Venice follows the Java rules when propagating exceptions:

1. exception from finally block
2. exception from catch block
3. exception from body block
4. exception from resource auto-close

```
(do
  (let [file (io/temp-file "test-", ".txt")]
    (io/spit file "123456789" :append true)
    (try-with [is (io/file-in-stream file)]
      (io/slurp-stream is :binary false))))
=> "123456789"
```

SEE ALSO

try

Exception handling: try - catch - finally

throw

Throws an exception.

ex

Creates an exception of type class with optional args. The class must be a subclass of :java.lang.Exception

top

type

```
(type x)
```

Returns the type of x.

```
(type 5)
=> :core/long
```

```
(type [1 2])
=> :core/vector
```

```
(type (. :java.math.BigInteger :valueOf 100))
=> :java.math.BigInteger
```

SEE ALSO

[supertype](#)

Returns the super type of x.

[supertypes](#)

Returns the super types of x.

[instance-of?](#)

Returns true if x is an instance of the given type

top

union

```
(union s1)
(union s1 s2)
(union s1 s2 & sets)
```

Return a set that is the union of the input sets

```
(union (set 1 2 3))
=> #{1 2 3}
```

```
(union (set 1 2) (set 2 3))
=> #{1 2 3}
```

```
(union (set 1 2 3) (set 1 2) (set 1 4) (set 3))
=> #{1 2 3 4}
```

SEE ALSO

[difference](#)

Return a set that is the first set without elements of the remaining sets

[intersection](#)

Return a set that is the intersection of the input sets

[cons](#)

Returns a new collection where x is the first element and coll is the rest.

[conj](#)

Returns a new collection with the x, xs 'added'. (conj nil item) returns (item) and (conj item) returns item.

[disj](#)

Returns a new set with the x, xs removed.

[top](#)

update

```
(update m k f)
(update m k f & fargs)
```

Updates a value in an associative structure, where k is a key and f is a function that will take the old value and any supplied fargs and return the new value. Returns a new structure.

If the key does not exist, `nil` is passed as the old value. The optional fargs are passed to the function f as `(f old-value (f old-value arg1 arg2 ...) ...)`.

```
(update [] 0 (fn [x] 5))
=> [5]
```

```
(update [0 1 2] 0 (fn [x] 5))
=> [5 1 2]
```

```
(update [0 1 2] 1 (fn [x] (+ x 3)))
=> [0 4 2]
```

```
(update {} :a (fn [x] 5))
=> {:a 5}
```

```
(update {:a 0} :b (fn [x] 5))
=> {:a 0 :b 5}
```

```
(update {:a 0 :b 1} :a (fn [x] (+ x 5)))
=> {:a 5 :b 1}
```

```
(update [0 1 2] 1 + 3)
=> [0 4 2]
```

```
(update {:a 0 :b 1} :b * 4)
=> {:a 0 :b 4}
```

SEE ALSO

[assoc](#)

When applied to a map, returns a new map of the same type, that contains the mapping of key(s) to val(s). When applied to a vector, ...

[dissoc](#)

Returns a new coll of the same type, that does not contain a mapping for key(s)

[top](#)

update!

```
(update! m k f & fargs)
```

Updates a value in a mutable associative structure, where `k` is a key and `f` is a function that will take the old value and any supplied `fargs` and return the new value. Returns a new structure.

If the key does not exist, `nil` is passed as the old value. The optional `fargs` are passed to the function `f` as `(f old-value arg1 arg2 ...)`.

```
(update! (mutable-vector) 0 (fn [x] 5))  
=> [5]
```

```
(update! (mutable-vector 0 1 2) 0 (fn [x] 5))  
=> [5 1 2]
```

```
(update! (mutable-vector 0 1 2) 0 (fn [x] (+ x 1)))  
=> [1 1 2]
```

```
(update! (mutable-map) :a (fn [x] 5))  
=> {:a 5}
```

```
(update! (mutable-map :a 0) :b (fn [x] 5))  
=> {:a 0 :b 5}
```

```
(update! (mutable-map :a 0 :b 1) :a (fn [x] 5))  
=> {:a 5 :b 1}
```

```
(update! (mutable-vector 0 1 2) 0 + 4)  
=> [4 1 2]
```

```
(update! (mutable-map :a 0 :b 1) :b * 4)  
=> {:a 0 :b 4}
```

SEE ALSO

[assoc!](#)

Associates key/vals with a mutable map, returns the map

[dissoc!](#)

Dissociates keys from a mutable map, returns the map

[top](#)

update-in

```
(update-in [m ks f & fargs])
```

Updates' a value in a nested associative structure, where `ks` is a sequence of keys and `f` is a function that will take the old value and any supplied `fargs` and return the new value, and returns a new nested structure.

If any levels do not exist, hash-maps will be reated.

```
(do
  (def users [ {:name "James" :age 26}
                {:name "John" :age 43} ])
  (update-in users [1 :age] inc))
=> [{:name "James" :age 26} {:name "John" :age 44}]

(update-in {:a 12} [:a] * 4)
=> {:a 48}

(update-in {:a 12} [:a] + 3 4)
=> {:a 19}
```

[top](#)

used-memory

```
(used-memory)
```

Returns the currently used memory by the Java VM.

```
(used-memory)
=> "184.2MB"
```

SEE ALSO

[total-memory](#)

Returns the total amount of memory available to the Java VM.

[top](#)

user-name

```
(user-name)
```

Returns the logged-in's user name.

```
(user-name)
=> "juerg"
```

SEE ALSO

[io/user-home-dir](#)

Returns the user's home dir as a java.io.File.

[top](#)

uuid

```
(uuid)
```

Generates a UUID.

```
(uuid)
=> "c15b73e9-52ed-4150-bdc7-6fb19137ac64"
```

top

val

```
(val e)
```

Returns the val of the map entry.

```
(val (find {:a 1 :b 2} :b))
=> 2
```

```
(val (first (entries {:a 1 :b 2 :c 3})))
=> 1
```

SEE ALSO

[map](#)

Applies f to the set of first items of each coll, followed by applying f to the set of second items in each coll, until any one of the ...

[entries](#)

Returns a collection of the map's entries.

[key](#)

Returns the key of the map entry.

[vals](#)

Returns a collection of the map's values.

top

vals

```
(vals map)
```

Returns a collection of the map's values.

Please note that the functions 'keys' and 'vals' applied to the same map are not guaranteed not return the keys and vals in the same order!

To achieve this, keys and vals can be calculated based on the map's entry list:

```
(let [e (entries {:a 1 :b 2 :c 3})]
  (println (map key e))
  (println (map val e)))
```

```
(vals {:a 1 :b 2 :c 3})
=> (1 2 3)
```

SEE ALSO

[keys](#)

Returns a collection of the map's keys.

[entries](#)

Returns a collection of the map's entries.

[map](#)

Applies f to the set of first items of each coll, followed by applying f to the set of second items in each coll, until any one of the ...

[top](#)

var-get

```
(var-get v)
```

Returns a var's value.

The var must exist (bound with a value) otherwise nil is returned.

```
(var-get +)
```

```
=> +
```

```
(var-get '+)
```

```
=> +
```

```
(var-get (symbol "+"))
```

```
=> +
```

```
((var-get +) 1 2)
```

```
=> 3
```

```
(do
```

```
  (def x 10)
```

```
  (var-get 'x))
```

```
=> 10
```

SEE ALSO

[var-sym](#)

Returns the var's symbol.

[var-name](#)

Returns the unqualified name of the var's symbol.

[var-ns](#)

Returns the namespace of the var's symbol.

[var-val-meta](#)

Returns the var's value meta data.

[var-local?](#)

Returns true if the var is local else false

[var-global?](#)

Returns true if the var is global else false

[var-thread-local?](#)

Returns true if the var is thread-local else false

[top](#)

var-global?

```
(var-global? v)
```


Returns true if the var is global else false

```
(var-global? +)
=> true

(var-global? '+)
=> true

(var-global? (symbol "+"))
=> true

(do
  (def x 10)
  (var-global? x))
=> true

(let [x 10]
  (var-global? x))
=> false
```

SEE ALSO

[var-get](#)

Returns a var's value.

[var-name](#)

Returns the unqualified name of the var's symbol.

[var-ns](#)

Returns the namespace of the var's symbol.

[var-local?](#)

Returns true if the var is local else false

[var-thread-local?](#)

Returns true if the var is thread-local else false

[bound?](#)

Returns true if the symbol is bound to a value else false

[top](#)

var-local?

```
(var-local? v)
```

Returns true if the var is local else false

```
(var-local? +)
=> true

(var-local? '+)
=> true

(var-local? (symbol "+"))
=> true
```

```
(let [x 10]
  (var-local? x))
=> true
```

```
(do
  (def x 10)
  (var-local? x))
=> false
```

SEE ALSO

[var-get](#)

Returns a var's value.

[var-name](#)

Returns the unqualified name of the var's symbol.

[var-ns](#)

Returns the namespace of the var's symbol.

[var-global?](#)

Returns true if the var is global else false

[var-thread-local?](#)

Returns true if the var is thread-local else false

[bound?](#)

Returns true if the symbol is bound to a value else false

[top](#)

var-name

```
(var-name v)
```

Returns the unqualified name of the var's symbol.

The var must exist (bound with a value) otherwise nil is returned.

```
(var-name +)
=> "+"
```

```
(var-name '+)
=> "+"
```

```
(var-name (symbol "+"))
=> "+"
```

```
;; aliased function
(do
  (ns foo)
  (def add +)
  (var-name add))
=> "add"
```

```
(do
  (def x 10)
  (var-name x))
=> "x"
```

```
(let [x 10]
  (var-name x))
=> "x"

;; compare with name
(do
  (ns foo)
  (def add +)
  (name add))
=> "+"

;; compare aliased function with name
(do
  (ns foo)
  (def add +)
  (name add))
=> "+"
```

SEE ALSO

[name](#)

Returns the name string of a string, symbol, keyword, or function. If applied to a string it returns the string itself.

[var-get](#)

Returns a var's value.

[var-sym](#)

Returns the var's symbol.

[var-ns](#)

Returns the namespace of the var's symbol.

[var-sym-meta](#)

Returns the var's symbol meta data.

[var-local?](#)

Returns true if the var is local else false

[var-global?](#)

Returns true if the var is global else false

[var-thread-local?](#)

Returns true if the var is thread-local else false

[top](#)

var-ns

```
(var-ns v)
```

Returns the namespace of the var's symbol.

The var must exist (bound with a value) otherwise nil is returned.

```
(var-ns +)
=> "core"
```

```
(var-ns '+)
=> "core"
```

```
(var-ns (symbol "+"))
=> "core"
```

```
;; aliased function
(do
  (ns foo)
  (def add +)
  (var-ns add))
=> "foo"

(do
  (def x 10)
  (var-ns x))
=> "user"

(let [x 10]
  (var-ns x))
=> nil

;; compare with namespace
(do
  (ns foo)
  (def add +)
  (namespace add))
=> nil

;; compare aliased function with namespace
(do
  (ns foo)
  (def add +)
  (namespace add))
=> nil
```

SEE ALSO

[namespace](#)

Returns the namespace string of a symbol, keyword, or function. If x is a registered namespace returns x.

[var-get](#)

Returns a var's value.

[var-name](#)

Returns the unqualified name of the var's symbol.

[var-local?](#)

Returns true if the var is local else false

[var-global?](#)

Returns true if the var is global else false

[var-thread-local?](#)

Returns true if the var is thread-local else false

[top](#)

var-sym

```
(var-sym v)
```

Returns the var's symbol.

The var must exist (bound with a value) otherwise nil is returned.

```
(var-sym +)
=> core/+

(var-sym '+)
=> core/+

(var-sym (symbol "+"))
=> core/+

(do
  (ns test)
  (defn x [] nil)
  (var-sym x))
=> test/x

(let [x 100] (var-sym x))
=> x

(binding [x 100] (var-sym x))
=> x

(do
  (defn foo [x] (var-sym x))
  (foo nil))
=> x
```

SEE ALSO

[var-get](#)

Returns a var's value.

[var-name](#)

Returns the unqualified name of the var's symbol.

[var-ns](#)

Returns the namespace of the var's symbol.

[var-sym-meta](#)

Returns the var's symbol meta data.

[var-local?](#)

Returns true if the var is local else false

[var-global?](#)

Returns true if the var is global else false

[var-thread-local?](#)

Returns true if the var is thread-local else false

[top](#)

var-sym-meta

```
(var-sym-meta v)
```

Returns the var's symbol meta data.

The var must exist (bound with a value) otherwise nil is returned.

```
(do
  (def ^{:foo 3} x 100))
```

```
(:foo (var-sym-meta 'x)))
=> 3

(do
  (let [{:foo 3} x 100]
    (:foo (var-sym-meta 'x))))
=> 3

(do
  (defn bar [{:foo 3} x]
    (:foo (var-sym-meta 'x)))
  (bar 100))
=> 3
```

SEE ALSO

[var-val-meta](#)

Returns the var's value meta data.

[var-get](#)

Returns a var's value.

[var-sym](#)

Returns the var's symbol.

[var-name](#)

Returns the unqualified name of the var's symbol.

[bound?](#)

Returns true if the symbol is bound to a value else false

[top](#)

var-thread-local?

```
(var-thread-local? v)
```

Returns true if the var is thread-local else false

```
(binding [x 100]
  (var-thread-local? x))
=> true
```

SEE ALSO

[var-get](#)

Returns a var's value.

[var-name](#)

Returns the unqualified name of the var's symbol.

[var-ns](#)

Returns the namespace of the var's symbol.

[var-local?](#)

Returns true if the var is local else false

[var-global?](#)

Returns true if the var is global else false

[bound?](#)

Returns true if the symbol is bound to a value else false

var-val-meta

```
(var-val-meta v)
```

Returns the var's value meta data.

The var must exist (bound with a value) otherwise nil is returned.

```
(do
  (def x ^{:foo 4} 100)
  (:foo (var-val-meta 'x)))
=> 4

(do
  (def x (vary-meta 100 assoc :foo 4))
  (:foo (var-val-meta 'x)))
=> 4

(do
  (let [x ^{:foo 4} 100]
    (:foo (var-val-meta 'x))))
=> 4

(do
  (defn bar [x]
    (:foo (var-val-meta 'x)))
  (bar (vary-meta 100 assoc :foo 4)))
=> 4
```

SEE ALSO

[var-sym-meta](#)

Returns the var's symbol meta data.

[var-get](#)

Returns a var's value.

[var-sym](#)

Returns the var's symbol.

[var-name](#)

Returns the unqualified name of the var's symbol.

[bound?](#)

Returns true if the symbol is bound to a value else false

vary-meta

```
(vary-meta obj f & args)
```

Returns a copy of the object obj, with (apply f (meta obj) args) as its metadata.

```
(meta (vary-meta [1 2] assoc :foo 3))
=> {:foo 3 :line 35 :column 28 :file "example"}
```

SEE ALSO

[meta](#)

Returns the metadata of obj, returns nil if there is no metadata.

[with-meta](#)

Returns a copy of the object obj, with a map m as its metadata.

[var-val-meta](#)

Returns the var's value meta data.

[var-sym-meta](#)

Returns the var's symbol meta data.

[top](#)

vector

```
(vector & items)
```

Creates a new vector containing the items.

```
(vector)
```

```
=> []
```

```
(vector 1 2 3)
```

```
=> [1 2 3]
```

```
(vector 1 2 3 [:a :b])
```

```
=> [1 2 3 [:a :b]]
```

```
(vector "abc")
```

```
=> ["abc"]
```

[top](#)

vector*

```
(vector* args)
```

```
(vector* a args)
```

```
(vector* a b args)
```

```
(vector* a b c args)
```

```
(vector* a b c d & more)
```

Creates a new vector containing the items prepended to the rest, the last of which will be treated as a collection.

```
(vector* 1 [2 3])
```

```
=> [1 2 3]
```

```
(vector* 1 2 3 [4])
```

```
=> [1 2 3 4]
```

```
(vector* 1 2 3 '(4 5))
```

```
=> [1 2 3 4 5]
```



```
(vector* '[1 2] 3 [4])
=> [[1 2] 3 4]

(vector* nil)
=> nil

(vector* nil [2 3])
=> [nil 2 3]

(vector* 1 2 nil)
=> (1 2)
```

SEE ALSO

[cons](#)

Returns a new collection where x is the first element and coll is the rest.

[conj](#)

Returns a new collection with the x, xs 'added'. (conj nil item) returns (item) and (conj item) returns item.

[concat](#)

Returns a list of the concatenation of the elements in the supplied collections.

[list*](#)

Creates a new list containing the items prepended to the rest, the last of which will be treated as a collection.

[top](#)

vector?

```
(vector? obj)
```

Returns true if obj is a vector

```
(vector? (vector 1 2))
=> true
```

```
(vector? [1 2])
=> true
```

[top](#)

version

```
(version)
```

Returns the Venice version.

```
(version)
=> "0.0.0"
```

[top](#)

volatile

```
(volatile x)
```

Creates a volatile with the initial value x

```
(do
  (def counter (volatile 0))
  (swap! counter inc)
  (deref counter))
=> 1

(do
  (def counter (volatile 0))
  (reset! counter 9)
  @counter)
=> 9
```

SEE ALSO

[deref](#)

Dereferences an atom, a future or a promise object. When applied to an atom, returns its current state. When applied to a future, will ...

[reset!](#)

Sets the value of an atom or a volatile to newval without regard for the current value. Returns newval.

[swap!](#)

Atomically swaps the value of an atom or a volatile to be: (apply f current-value-of-box args). Note that f may be called multiple ...

[top](#)

volatile?

```
(volatile? x)
```

Returns true if x is a volatile, otherwise false

```
(do
  (def counter (volatile 0))
  (volatile? counter))
=> true
```

[top](#)

when

```
(when test & body)
```

Evaluates test. If logical true, evaluates body in an implicit do.

```
(when (== 1 1) true)
=> true
```

SEE ALSO

[when-not](#)

Evaluates test. If logical false, evaluates body in an implicit do.

[when-let](#)

bindings is a vector with 2 elements: binding-form test.

[if](#)

Evaluates test. If logical true, evaluates and returns then expression, otherwise else expression, if supplied, else nil.

[if-not](#)

Evaluates test. If logical false, evaluates and returns then expression, otherwise else expression, if supplied, else nil.

[if-let](#)

bindings is a vector with 2 elements: binding-form test.

[top](#)

when-complete

```
(when-complete p f)
```

Returns the promise p with the same result or exception at this stage, that executes the action f. Passes the current stage's result value as first and a possible exception as second argument to the function. The asynchronous function f is called presumably for handling side effects.

```
(-> (promise (fn [] "The Quick Brown Fox"))
    (then-apply str/upper-case)
    (when-complete (fn [v,e] (println (pr-str {:value v :ex e}))))
    (then-apply str/lower-case)
    (deref))
{:value "THE QUICK BROWN FOX" :ex nil}
=> "the quick brown fox"
```

SEE ALSO

[promise](#)

Returns a promise object that can be read with deref, and set, once only, with deliver. Calls to deref prior to delivery will block, ...

[then-accept](#)

Returns a new promise that, when this promise completes normally, is executing the function f with this stage's result as the argument.

[then-accept-both](#)

Returns a new promise that, when either this or the other given promise completes normally, is executing the function f with the two ...

[then-apply](#)

Applies a function f on the result of the previous stage of the promise p.

[then-combine](#)

Applies a function f to the result of the previous stage of promise p and the result of another promise p-other

[then-compose](#)

Composes the result of two promises. f receives the result of the first promise p and returns a new promise that composes that value ...

[accept-either](#)

Returns a new promise that, when either this or the other given promise completes normally, is executed with the corresponding result ...

[apply-to-either](#)

Returns a new promise that, when either this or the other given promise completes normally, is executed with the corresponding result ...

[or-timeout](#)

Exceptionally completes the promise with a TimeoutException if not otherwise completed before the given timeout.

[complete-on-timeout](#)

Completes the promise with the given value if not otherwise completed before the given timeout.

[top](#)

when-let

```
(when-let bindings & body)
```

bindings is a vector with 2 elements: binding-form test.

If test is true, evaluates the body expressions with binding-form bound to the value of test, if not, yields nil

```
(when-let [value (* 100 2)]  
  (str "The expression is true. value=" value))  
=> "The expression is true. value=200"
```

SEE ALSO

[if-let](#)

bindings is a vector with 2 elements: binding-form test.

[let](#)

Evaluates the expressions and binds the values to symbols in the new local context.

[top](#)

when-not

```
(when-not test & body)
```

Evaluates test. If logical false, evaluates body in an implicit do.

```
(when-not (== 1 2) true)  
=> true
```

SEE ALSO

[when](#)

Evaluates test. If logical true, evaluates body in an implicit do.

[when-let](#)

bindings is a vector with 2 elements: binding-form test.

[if](#)

Evaluates test. If logical true, evaluates and returns then expression, otherwise else expression, if supplied, else nil.

[if-not](#)

Evaluates test. If logical false, evaluates and returns then expression, otherwise else expression, if supplied, else nil.

[if-let](#)

bindings is a vector with 2 elements: binding-form test.

[top](#)

while

```
(while test & body)
```

Repeatedly executes body while test expression is true. Presumes some side-effect will cause test to become false/nil. Returns nil.

```
(do
  (def a (atom 5))
  (while (pos? @a)
    (println @a)
    (swap! a dec)))
5
4
3
2
1
=> nil
```

[top](#)

with-err-str

(with-err-str & forms)

Evaluates exprs in a context in which `*err*` is bound to a capturing output stream. Returns the string created by any nested printing calls. `with-err-str` can be nested.

```
(with-err-str (println *err* "a string"))
=> "a string\n"
```

SEE ALSO

[with-out-str](#)

Evaluates exprs in a context in which `*out*` is bound to a capturing output stream. Returns the string created by any nested printing ...

[top](#)

with-meta

(with-meta obj m)

Returns a copy of the object `obj`, with a map `m` as its metadata.

```
(meta (with-meta [1 2] {:foo 3}))
=> {:foo 3}
```

SEE ALSO

[meta](#)

Returns the metadata of `obj`, returns `nil` if there is no metadata.

[vary-meta](#)

Returns a copy of the object `obj`, with `(apply f (meta obj) args)` as its metadata.

[var-val-meta](#)

Returns the var's value meta data.

[var-sym-meta](#)

Returns the var's symbol meta data.

[top](#)

with-out-str

(with-out-str & forms)

Evaluates exprs in a context in which `*out*` is bound to a capturing output stream. Returns the string created by any nested printing calls. `with-out-str` can be nested.

```
(with-out-str (println "a string"))  
=> "a string\n"
```

SEE ALSO

[with-err-str](#)

Evaluates exprs in a context in which `*err*` is bound to a capturing output stream. Returns the string created by any nested printing ...

[top](#)

with-sh-dir

(with-sh-dir dir & forms)

Sets the directory for use with sh, see sh for details.

```
(with-sh-dir "/tmp" (sh "ls" "-l"))
```

SEE ALSO

[sh](#)

Launches a new sub-process.

[with-sh-env](#)

Sets the environment for use with sh.

[with-sh-throw](#)

Shell commands executed within a with-sh-throw context throw an exception if the spawned shell process returns an exit code other than 0.

[top](#)

with-sh-env

(with-sh-env env & forms)

Sets the environment for use with `sh`.

```
(with-sh-env {"NAME" "foo"} (sh "ls" "-l"))
```

SEE ALSO

[sh](#)

Launches a new sub-process.

[with-sh-dir](#)

Sets the directory for use with sh, see sh for details.

with-sh-throw

Shell commands executed within a with-sh-throw context throw an exception if the spawned shell process returns an exit code other than 0.

[top](#)

with-sh-throw

(with-sh-throw forms)

Shell commands executed within a with-sh-throw context throw an exception if the spawned shell process returns an exit code other than 0.

For use with `sh`, see `sh` for details. `with-sh-throw` can be nested.

```
(with-sh-throw (sh "ls" "-l"))
```

SEE ALSO

[sh](#)

Launches a new sub-process.

[with-sh-env](#)

Sets the environment for use with `sh`.

[with-sh-dir](#)

Sets the directory for use with `sh`, see `sh` for details.

[top](#)

xml/children

(xml/children nodes)

Returns the children of the XML nodes collection

```
(do
  (load-module :xml)
  (xml/children
    (list (xml/parse-str "<a><b>B</b></a>"))))
=> ({:content ["B"] :tag "b"})
```

[top](#)

xml/parse

(xml/parse s)
(xml/parse s handler)

Parses and loads the XML from the source `s` with the parser `XMLHandler` handler. The source may be an `InputSource` or an `InputStream`.

Returns a tree of XML element maps with the keys `:tag`, `:attrs`, and `:content`.

[top](#)

xml/parse-str

```
(xml/parse-str s)
(xml/parse-str s handler)
```

Parses an XML from the string s. Returns a tree of XML element maps with the keys :tag, :attrs, and :content.

```
(do
  (load-module :xml)
  (xml/parse-str "<a><b>B</b></a>"))
=> {:content [{:content ["B"] :tag "b"}] :tag "a"}
```

[top](#)

xml/path->

```
(xml/path-> path nodes)
```

Applies the path to a node or a collection of nodes

```
(do
  (load-module :xml)
  (let [nodes (xml/parse-str "<a><b><c>C</c></b></a>")
        path [(xml/tag= "b")
               (xml/tag= "c")
               xml/text
               first]]
    (xml/path-> path nodes)))
=> "C"
```

[top](#)

xml/text

```
(xml/text nodes)
```

Returns a list of text contents of the XML nodes collection

```
(do
  (load-module :xml)
  (let [nodes (xml/parse-str "<a><b>B</b></a>")
        path [(xml/tag= "b")
               xml/text]]
    (xml/path-> path nodes)))
=> ("B")
```

[top](#)

zero?

```
(zero? x)
```


Returns true if x zero else false

```
(zero? 0)
=> true
```

```
(zero? 2)
=> false
```

```
(zero? (int 0))
=> true
```

```
(zero? 0.0)
=> true
```

```
(zero? 0.0M)
=> true
```

SEE ALSO

[neg?](#)

Returns true if x smaller than zero else false

[pos?](#)

Returns true if x greater than zero else false

[top](#)

zipmap

```
(zipmap keys vals)
```

Returns a map with the keys mapped to the corresponding vals.

To create a list of tuples from two or more lists use

```
(map list '(1 2 3) '(4 5 6)) .
```

```
(zipmap [:a :b :c :d :e] [1 2 3 4 5])
=> {:a 1 :b 2 :c 3 :d 4 :e 5}
```

```
(zipmap [:a :b :c] [1 2 3 4 5])
=> {:a 1 :b 2 :c 3}
```

[top](#)

zipvault/add-files

```
(zipvault/add-files zip passphrase & files)
```

Adds a list of files to the zip.

```
(do
  (load-module :zipvault)

  (let [zip (io/file "vault.zip")
```

```

tmp-1 (io/file (io/tmp-dir) "a1.txt")
tmp-2 (io/file (io/tmp-dir) "a2.txt")]
(io/spit tmp-1 "1234")
(io/spit tmp-2 "2345")
(io/delete-file-on-exit tmp-1)
(io/delete-file-on-exit tmp-2)

(zipvault/zip zip "pwd" "a.txt" "A")
(zipvault/add-files zip "pwd" tmp-1 tmp-2)))

```

SEE ALSO

[zipvault/zip](#)

Creates an AES-256 encrypted and password protected zip form the entries and writes it to out. out may be a file or an output stream.

[zipvault/add-folder](#)

Adds a folder to the zip file.

[zipvault/add-stream](#)

Creates a new entry in the zip file and adds the content of the input stream to the zip file.

[zipvault/remove-files](#)

Removes all files from the zip file that match the names in the input list.

[top](#)

zipvault/add-folder

```

(zipvault/add-folder zip passphrase folder)
(zipvault/add-folder zip passphrase folder include-root-folder)
(zipvault/add-folder zip passphrase folder include-root-folder exclude-fn)

```

Adds a folder to the zip file.

If 'include-root-folder' (default true) is true the root folder name will be added to the entry name as folder.

The 'exclude-fn' filters the files in the folder that are to be excluded from the zip. 'exclude-fn' is a single argument function that receives a file and returns true if the files is to be excluded otherwise it returns false.

```

(do
  (load-module :zipvault)

  (let [zip      (io/file "vault.zip")
        tmp-folder (io/file (io/tmp-dir) "ziptest")
        tmp-1     (io/file tmp-folder "a1.txt")
        tmp-2     (io/file tmp-folder "a2.txt")]
    (io/mkdir tmp-folder)
    (io/spit tmp-1 "1234")
    (io/spit tmp-2 "2345")
    (io/delete-file-on-exit tmp-folder)

    (zipvault/zip zip "pwd" "a.txt" "A")
    (zipvault/add-folder zip "pwd" tmp-folder)))

(do
  (load-module :zipvault)

  (defn exclude-fn [file] (io/file-ext? file "log"))

  (let [zip      (io/file "vault.zip")
        tmp-folder (io/file (io/tmp-dir) "ziptest")
        tmp-1     (io/file tmp-folder "a.txt")]

```

```
tmp-2      (io/file tmp-folder "b.txt")
tmp-3      (io/file tmp-folder "c.log")]
(io/mkdir tmp-folder)
(io/spit tmp-1 "12")
(io/spit tmp-2 "23")
(io/spit tmp-3 "34")
(io/delete-file-on-exit tmp-folder)

(zipvault/zip zip "pwd")
(zipvault/add-folder zip "pwd" tmp-folder true exclude-fn)))
```

SEE ALSO

[zipvault/zip](#)

Creates an AES-256 encrypted and password protected zip form the entries and writes it to out. out may be a file or an output stream.

[zipvault/add-files](#)

Adds a list of files to the zip.

[zipvault/add-stream](#)

Creates a new entry in the zip file and adds the content of the input stream to the zip file.

[zipvault/remove-files](#)

Removes all files from the zip file that match the names in the input list.

[top](#)

zipvault/add-stream

```
(zipvault/add-stream zip passphrase name is)
```

Creates a new entry in the zip file and adds the content of the input stream to the zip file.

```
(do
  (load-module :zipvault)

  (let [zip (io/file "vault.zip")
        is (io/string-in-stream "abc")]
    (zipvault/zip zip "pwd" "a.txt" "A")
    (zipvault/add-stream zip "pwd" "a.txt" is)))
```

SEE ALSO

[zipvault/zip](#)

Creates an AES-256 encrypted and password protected zip form the entries and writes it to out. out may be a file or an output stream.

[zipvault/add-files](#)

Adds a list of files to the zip.

[zipvault/add-folder](#)

Adds a folder to the zip file.

[zipvault/remove-files](#)

Removes all files from the zip file that match the names in the input list.

[top](#)

zipvault/encrypted?

```
(zipvault/encrypted? zip)
```

Extracts a specific file from the zip file to the destination path.

```
(do
  (load-module :zipvault)

  (zipvault/zip (io/file "vault.zip") "pwd" "a.txt" "abc")
  (zipvault/encrypted? (io/file "vault.zip")))
```

[top](#)

zipvault/entropy

```
(zipvault/entropy passphrase)
```

Returns the passphrase's entropy in bits.

The password entropy using the formula: **E = log₂(RL)**

- **E** stands for password entropy, measured in bits
- **Log₂** is a mathematical formula that converts the total number of possible character combinations to bits
- **R** stands for the range of characters
- **L** stands for the number of characters in a password

The entropy is calculated based on 26 lower and upper case letters, 10 digits, and 24 symbols like °+*%&/()=?'`^:_.-\$\$£!#~;

Note: The function just calculates the entropy. A strong passphrase does not rely on the entropy solely. Avoid passphrases containing words from the dictionary ("admin_passw0rd"), dates (birthdate, ...), repetitions ("aaaaa"), or sequences ("123456")!

```
(do
  (load-module :zipvault)
  (zipvault/entropy "uibsd6b38hs7b_La'sdgk898wbver"))
=> 186.36167788636087
```

SEE ALSO

[zipvault/zip](#)

Creates an AES-256 encrypted and password protected zip form the entries and writes it to out. out may be a file or an output stream.

[top](#)

zipvault/extract-all

```
(zipvault/extract-all zip destpath)
(zipvault/extract-all zip passphrase destpath)
```

Extracts all files from the zip file to the destination path.

```
(do
  (load-module :zipvault)

  (zipvault/zip (io/file "vault.zip")
    "pwd"
    "a.txt" "abc"
    "b.txt" "def"))
```

```
(zipvault/extract-all (io/file "vault.zip")
  "pwd"
  "."))
```

SEE ALSO

[zipvault/zip](#)

Creates an AES-256 encrypted and password protected zip form the entries and writes it to out. out may be a file or an output stream.

[zipvault/extract-file](#)

Extracts a specific file or folder from the zip file to the destination path.

[zipvault/extract-file-data](#)

Extracts a specific file from the zip file and returns it as binary data. in may be a file or an input stream.

[top](#)

zipvault/extract-file

```
(zipvault/extract-file zip password filename destpath)
```

Extracts a specific file or folder from the zip file to the destination path.

```
(do
  (load-module :zipvault)

  (zipvault/zip (io/file "vault.zip")
    "pwd"
    "a.txt" "abc"
    "b.txt" "def")

  ;; extract a file
  (zipvault/extract-file (io/file "vault.zip")
    "pwd"
    "a.txt"
    "."))

(do
  (load-module :zipvault)

  (zipvault/zip (io/file "vault.zip")
    "pwd"
    "words/one.txt" "one"
    "words/two.txt" "two"
    "logs/001.log" "xxx")

  ;; extract a folder
  (zipvault/extract-file (io/file "vault.zip")
    "pwd"
    "words/"
    "."))
```

SEE ALSO

[zipvault/zip](#)

Creates an AES-256 encrypted and password protected zip form the entries and writes it to out. out may be a file or an output stream.

[zipvault/extract-all](#)

Extracts all files from the zip file to the destination path.

zipvault/extract-file-data

Extracts a specific file from the zip file and returns it as binary data. in may be a file or an input stream.

[top](#)

zipvault/extract-file-data

```
(zipvault/extract-file-data in passphrase filename)
```

Extracts a specific file from the zip file and returns it as binary data. in may be a file or an input stream.

Returns `nil` if the file does not exist.

```
(do
  (load-module :zipvault)

  (zipvault/zip (io/file "vault.zip")
    "pwd"
    "a.txt" "abc"
    "b.txt" "def")

  (zipvault/extract-file-data (io/file "vault.zip")
    "pwd"
    "a.txt"))
```

SEE ALSO

[zipvault/zip](#)

Creates an AES-256 encrypted and password protected zip form the entries and writes it to out. out may be a file or an output stream.

[zipvault/extract-file](#)

Extracts a specific file or folder from the zip file to the destination path.

[zipvault/extract-all](#)

Extracts all files from the zip file to the destination path.

[top](#)

zipvault/remove-files

```
(zipvault/remove-files zip passphrase & files)
```

Removes all files from the zip file that match the names in the input list.

If any of the file is a directory, all the files and directories under this directory will be removed as well.

```
(do
  (load-module :zipvault)

  (let [zip (io/file "vault.zip")]
    (zipvault/zip zip "pwd" "a.txt" "A" "b.txt" "B")
    (zipvault/remove-files zip "pwd" "a.txt")))
```

SEE ALSO

[zipvault/zip](#)

Creates an AES-256 encrypted and password protected zip form the entries and writes it to out. out may be a file or an output stream.

[zipvault/add-files](#)

Adds a list of files to the zip.

[zipvault/add-folder](#)

Adds a folder to the zip file.

[zipvault/add-stream](#)

Creates a new entry in the zip file and adds the content of the input stream to the zip file.

[top](#)

zipvault/valid-zip-file?

```
(zipvault/valid-zip-file? zip)
```

Returns true if the zip is a valid zip file else false.

```
(do
  (load-module :zipvault)

  (zipvault/zip (io/file "vault.zip") "pwd" "a.txt" "abc")
  (zipvault/valid-zip-file? (io/file "vault.zip")))
```

[top](#)

zipvault/zip

```
(zipvault/zip out passphrase & entries)
```

Creates an AES-256 encrypted and password protected zip form the entries and writes it to out. out may be a file or an output stream.

An entry is given by a name and data. The entry data may be nil, a bytebuf, a string, a file, an input stream, or a producer function. An entry name with a trailing '/' creates a directory.

Entry value types:

nil	an empty file is written to the zip entry
bytebuf	the bytes are written to the zip entry
string	the string is written to the zip entry
file	the content of the file is written to the zip entry
input stream	the slurped input stream data is written to the zip entry
function	a producer function with a single output stream argument. All data written to the stream is written to the zip entry. The stream can be flushed but must not be closed!

Passphrases:

The AES-256 algorithm requires a 256-bit key as input. One should use a passphrase with at least 128 bits of entropy (that's roughly a 20-character passphrase of random upper/lower/digits/symbols). Less is dropping below general limits of safety, and more than 256 bits won't accomplish anything.

See function: `zipvault/entropy`

```
(do
  (load-module :zipvault)
  (zipvault/zip (io/file "vault.zip") "pwd")) ; empty zip
```

```

(do
  (load-module :zipvault)
  (zipvault/zip (io/file "vault.zip") "pwd" "a.txt" "abc"))

(do
  (load-module :zipvault)
  (zipvault/zip (io/file-out-stream "vault.zip")
    "pwd"
    "a.txt"      "abc"
    "b.txt"      (bytebuf [100 101 102])))

(do
  (load-module :zipvault)

  (let [file (io/file (io/tmp-dir) "c.txt")]
    (io/spit file "1234")
    (io/delete-file-on-exit c-tmp)

    ;; create "vault.zip"
    ;;      |
    ;;      |--- a.txt
    ;;      |--- b.txt
    ;;      |--- c.txt
    ;;      |--- d.txt
    ;;      |--- e.txt
    ;;      |--- empty.txt
    ;;      |--- xx
    ;;      |--- g.txt
    (zipvault/zip
      (io/file "vault.zip")
      "pwd"
      "a.txt"      "abc"
      "b.txt"      (bytebuf "def")
      file          file ; equivalent: (io/file-basename file) file
      "d.txt"      (io/string-in-stream "ghi")
      "e.txt"      (fn [os]
        (let [wr (io/wrap-os-with-buffered-writer os)]
          (println wr "200")
          (flush wr)))
      "empty.txt"  nil
      "xx/g.txt"   "jkl"))))

```

SEE ALSO

[zipvault/entries](#)

Returns a list of the entry names in the zip.

[zipvault/add-files](#)

Adds a list of files to the zip.

[zipvault/add-folder](#)

Adds a folder to the zip file.

[zipvault/add-stream](#)

Creates a new entry in the zip file and adds the content of the input stream to the zip file.

[zipvault/remove-files](#)

Removes all files from the zip file that match the names in the input list.

[zipvault/extract-file](#)

Extracts a specific file or folder from the zip file to the destination path.

[zipvault/extract-all](#)

Extracts all files from the zip file to the destination path.

[zipvault/extract-file-data](#)

Extracts a specific file from the zip file and returns it as binary data. in may be a file or an input stream.

[zipvault/entropy](#)

Returns the passphrase's entropy in bits.

[top](#)



Creates a hash map.

```
{:a 10 :b 20}
```

```
=> {:a 10 :b 20}
```