

Clojure Cheat Sheet (Clojure 1.3 - 1.6, sheet v30)

Documentation

|               |  |
|---------------|--|
| clojure.repl/ | doc find-doc apropos dir source pst javadoc (foo.bar/ is namespace for later syms) |
|---------------|--|

Primitives

|            |   |
|------------|---|
| Numbers    |   |
| Literals   | Long: 7, hex 0xff, oct 017, base 2 2r1011, base 36 36rCRAZY<br>BigInt: 7N Ratio: -22/7 Double: 2.78 -1.2e-5 BigDecimal: 4.2M  |
| Arithmetic | + - * / quot rem mod inc dec max min +' -' *' inc' dec'   |
| Compare    | == < > <= >= compare  |
| Bitwise    | bit-and bit-or bit-xor bit-not bit-flip bit-set bit-shift-right<br>bit-shift-left bit-and-not bit-clear bit-test (1.6)<br>unsigned-bit-shift-right (see BigInteger for integers larger than Long) |
| Cast       | byte short int long float double bigdec bigint num rationalize<br>biginteger  |
| Test       | zero? pos? neg? even? odd? number? rational? integer? ratio?<br>decimal? float?   |
| Random     | rand rand-int   |
| BigDecimal | with-precision  |
| Unchecked  | *unchecked-math* unchecked-add unchecked-dec unchecked-inc<br>unchecked-multiply unchecked-negative unchecked-subtract  |

Strings

|         |   |
|---------|---|
| Create  | str format "a string" "escapes \b\f\n\t\r\" octal \377 hex \ucafe"<br>See also IO/to string   |
| Use     | count get subs compare (clojure.string/) join escape split split-lines<br>replace replace-first reverse (1.5) re-quote-replacement (String)<br>.indexOf .lastIndexOf  |
| Regex   | #"pattern" re-find re-seq re-matches re-pattern re-matcher<br>re-groups (clojure.string/) replace replace-first (1.5)<br>re-quote-replacement Note: \ in #" is not escape char. (re-pattern<br>"\\s*\\d+") can be written #"\\s*\\d+" |
| Letters | (clojure.string/) capitalize lower-case upper-case  |
| Trim    | (clojure.string/) trim trim-newline triml trimr   |
| Test    | char char? string? (clojure.string/) blank? (String) .startsWith<br>.endsWith .contains   |

Other

|            |  |
|------------|--|
| Characters | char char-name-string char-escape-string literals: \a \newline<br>(more at link) |
| Keywords   | keyword keyword? find-keyword literals: :kw :my.ns/kw<br>::in-cur-ns             |
| Symbols    | symbol symbol? gensym literals: my-sym my.ns/foo                                 |
| Misc       | literals: true false nil   |

Collections

|               |   |
|---------------|---|
| Collections   |   |
| Generic ops   | count empty not-empty into conj (clojure.walk/) walk prewalk<br>prewalk-demo prewalk-replace postwalk postwalk-demo<br>postwalk-replace |
| Content tests | distinct? empty? every? not-every? some not-any?  |
| Capabilities  | sequential? associative? sorted? counted? reversible?   |
| Type tests    | coll? list? vector? set? map? seq? (1.6) record?  |

Lists (conj, pop, & peek at beginning)

|          |                                      |
|----------|--------------------------------------|
| Create   | () list list*                        |
| Examine  | first nth peek .indexOf .lastIndexOf |
| 'Change' | cons conj rest pop                   |

Vectors (conj, pop, & peek at end)

|          |   |
|----------|---|
| Create   | [] vector vec vector-of (1.4) mapv filterv (clojure.core.rrb-vector/)<br>vector vec vector-of |
| Examine  | (my-vec idx) → ( nth my-vec idx) get peek .indexOf .lastIndexOf                               |
| 'Change' | assoc pop subvec replace conj rseq  |
| Ops      | (1.4) reduce-kv   |

Sets

|                 |  |
|-----------------|--|
| Create unsorted | #{} set hash-set (clojure.data.int-map/) int-set dense-int-set   |
| Create sorted   | sorted-set sorted-set-by (clojure.data.avl/) sorted-set<br>sorted-set-by (flatland.ordered.set/) ordered-set<br>(my-set item) → ( get my-set item) contains? |
| Examine         | conj disj  |
| 'Change'        | (clojure.set/) union difference intersection select See also Re-<br>lations  |
| Set ops         | (clojure.set/) union difference intersection select See also Re-<br>lations  |
| Test            | (clojure.set/) subset? superset?   |
| Sorted sets     | rseq subseq rsubseq  |

Maps

|                 |  |
|-----------------|--|
| Create unsorted | { } hash-map array-map zipmap bean frequencies group-by<br>(clojure.set/) index (clojure.data.int-map/) int-map  |
| Create sorted   | sorted-map sorted-map-by (clojure.data.avl/) sorted-map<br>sorted-map-by (flatland.ordered.map/) ordered-map<br>(clojure.data.priority-map/) priority-map (flatland.useful.map/)<br>ordering-map |
| Examine         | (my-map k) → ( get my-map k) also (:key my-map) → ( get<br>my-map :key) get-in contains? find keys vals  |
| 'Change'        | assoc assoc-in dissoc merge merge-with select-keys<br>update-in (clojure.set/) rename-keys map-invert GitHub: Medley   |
| Ops             | (1.4) reduce-kv  |
| Entry           | key val  |
| Sorted maps     | rseq subseq rsubseq  |

Queues (conj at end, peek & pop from beginning)

|          |   |
|----------|---|
| Create   | clojure.lang.PersistentQueue/EMPTY (no literal syntax or<br>constructor fn) |
| Examine  | peek  |
| 'Change' | conj pop  |

Relations (set of maps, each with same keys, aka rels)

|             |  |
|-------------|--|
| Rel algebra | (clojure.set/) join select project union difference intersection<br>index rename |
|-------------|--|

Transients (clojure.org/transients)

|        |   |
|--------|---|
| Create | transient persistent!   |
| Change | conj! pop! assoc! dissoc! disj! Note: always use return value for later<br>changes, never original! |

Misc

|         |   |
|---------|---|
| Compare | = identical? not= not compare clojure.data/diff |
| Test    | true? false? instance? nil? (1.6) some?         |

Sequences

Creating a Lazy Seq

|                  |   |
|------------------|---|
| From collection  | seq vals keys rseq subseq rsubseq sequence  |
| From producer fn | lazy-seq repeatedly iterate   |
| From constant    | repeat range  |
| From other       | file-seq line-seq resultset-seq re-seq tree-seq xml-seq<br>iterator-seq enumeration-seq |
| From seq         | keep keep-indexed   |

Seq in, Seq out

|               |  |
|---------------|--|
| Get shorter   | distinct filter remove take-nth for  |
| Get longer    | cons conj concat lazy-cat mapcat cycle interleave interpose  |
| Tail-items    | rest nthrest next fnext nnext drop drop-while take-last for  |
| Head-items    | take take-while butlast drop-last for  |
| 'Change'      | conj concat distinct flatten group-by partition partition-all<br>partition-by split-at split-with filter remove replace<br>shuffle |
| Rearrange     | reverse sort sort-by compare   |
| Process items | map pmap map-indexed mapcat for replace seque  |

Using a Seq

|                  |  |
|------------------|--|
| Extract item     | first second last rest next ffirst nfirst fnext nnext nth<br>nthnext rand-nth when-first max-key min-key |
| Construct coll   | zipmap into reduce reductions set vec into-array<br>to-array-2d (1.4) mapv filterv                       |
| Pass to fn       | apply  |
| Search           | some filter  |
| Force evaluation | doseq dorun doall  |
| Check for forced | realized?  |

Zippers (clojure.zip/)

|          |   |
|----------|---|
| Create   | zipper seq-zip vector-zip xml-zip   |
| Get loc  | up down left right leftmost rightmost   |
| Get seq  | lefts rights path children  |
| 'Change' | make-node replace edit insert-child insert-left insert-right<br>append-child remove |
| Move     | next prev   |
| Misc     | root node branch? end?  |

IO

|              |   |
|--------------|---|
| to/from      | spit slurp (to writer/from reader, Socket, string with file name, URI,<br>etc.)   |
| ...          |   |
| to *out*     | pr prn print printf println newline (clojure.pprint/) print-table<br>(clojure.pprint/) pprint cl-format also: (binding [*out* writer]<br>...)   |
| to writer    | format with-out-str pr-str prn-str print-str println-str<br>read-line (clojure.tools.reader.edn/) read<br>line-seq (clojure.tools.reader.edn/) read also: (binding [*in*<br>reader] ...) java.io.Reader |
| from string  | with-in-str (clojure.tools.reader.edn/) read-string   |
| Open         | with-open (clojure.java.io/) text: reader writer binary:<br>input-stream output-stream  |
| Binary       | (.write ostream byte-arr) (.read istream byte-arr)<br>java.io.OutputStream java.io.InputStream GitHub: gloss<br>byte-spec   |
| Misc         | flush (.close s) file-seq *in* *out* *err* (clojure.java.io/)<br>file copy delete-file resource as-file as-url as-relative-path<br>GitHub: fs   |
| Data readers | (1.4) *data-readers* default-data-readers (1.5)<br>*default-data-reader-fn*   |

Functions

|        |   |
|--------|---|
| Create | fn defn defn- definline identity constantly memfn comp complement<br>partial juxt memoize fnil every-pred some-fn |
| Call   | apply -> ->> trampoline (1.5) as-> cond-> cond->> some-> some->>  |
| Test   | fn? ifn?  |

## Abstractions (Clojure type selection flowchart)

### Protocols (clojure.org/protocols)

|             |  |
|-------------|--|
| Define      | (defprotocol Slicey (slice [at]))            |
| Extend      | (extend-type String Slicey (slice [at] ...)) |
| Extend null | (extend-type nil Slicey (slice [_] nil))     |
| Reify       | (reify Slicey (slice [at] ...))              |
| Test        | satisfies? extends?                          |
| Other       | extend extend-protocol extenders             |

### Records (clojure.org/datatypes)

|        |                        |
|--------|------------------------|
| Define | (defrecord Pair [h t]) |
| Access | (:h (Pair. 1 2)) → 1   |
| Create | Pair. →Pair map->Pair  |
| Test   | record?                |

### Types (clojure.org/datatypes)

|              |  |
|--------------|--|
| Define       | (deftype Pair [h t])                     |
| Access       | (.h (Pair. 1 2)) → 1                     |
| Create       | Pair. →Pair                              |
|              | (deftype Pair [h t]                      |
| With methods | Object                                   |
|              | (toString [this] (str "<" h " " t ">"))) |

### Multimethods (clojure.org/multimethods)

|               |  |
|---------------|--|
| Define        | (defmulti my-mm dispatch-fn)                       |
| Method define | (defmethod my-mm :dispatch-value [args] ...)       |
| Dispatch      | get-method methods                                 |
| Remove        | remove-method remove-all-methods                   |
| Prefer        | prefer-method prefers                              |
| Relation      | derive underive isa? parents ancestors descendants |
|               | make-hierarchy                                     |

### Macros

|         |   |
|---------|---|
| Create  | defmacro definline  |
| Debug   | macroexpand-1 macroexpand (clojure.walk/) macroexpand-all   |
| Branch  | and or when when-not when-let when-first if-not if-let cond condp case (1.6) when-some if-some                    |
| Loop    | for doseq dotimes while   |
| Arrange | .. doto → →> (1.5) as-> cond-> cond->> some-> some->>   |
| Scope   | binding locking time with-in-str with-local-vars with-open with-out-str with-precision with-redefs with-redefs-fn |
| Lazy    | lazy-cat lazy-seq delay   |
| Doc.    | assert comment doc  |

## Special Characters (clojure.org/reader, tutorial)

|       |   |
|-------|---|
| ,     | Comma reads as white space. Often used between map key/value pairs for readability.                     |
| '     | quote: 'form → ( quote form)  |
| /     | Namespace separator (see Primitives/Other section)  |
| \     | Character literal (see Primitives/Other section)  |
| :     | Keyword (see Primitives/Other section)  |
| ;     | Single line comment   |
| ~     | Metadata (see Metadata section)   |
| *foo* | 'earmuffs' - convention to indicate dynamic vars, compiler warns if not dynamic                         |
| @     | Deref: @form → ( deref form)  |
| '     | Syntax-quote  |
| -     | Unquote   |
| ~@    | Unquote-splicing  |
| ->    | 'thread first' macro ->   |
| ->>   | 'thread last' macro ->>   |
| (     | List literal (see Collections/Lists section)  |
| [     | Vector literal (see Collections/Vectors section)  |
| {     | Map literal (see Collections/Maps section)  |
| #'    | Var-quote #'x → ( var x)  |
| #"    | #"p" reads as regex pattern p (see Strings/Regex section)   |
| #{    | Set literal (see Collections/Sets section)  |
| #(    | Anonymous function literal: #(...) → (fn [args] (...))  |
| %     | Anonymous function argument: %N is value of anonymous function arg N. % short for %1. %& for rest args. |
| \$    | JavaContainerClass\$InnerClass  |
| foo?  | conventional ending for a predicate, e.g.: zero? vector? instance? (unenforced)                         |
| foo!  | conventional ending for an unsafe operation, e.g.: set! swap! alter-meta! (unenforced)                  |
| _     | conventional name for an unused value (unenforced)  |
| #_    | Ignore next form  |

## Metadata (clojure.org/reader, special\_forms)

|          |  |
|----------|--|
| General  | ~{:key1 val1 :key2 val2 ...}                                       |
| Abbrevs  | ~Type → ~{:tag Type}, ~:key → ~{:key true}                         |
| Common   | ~:dynamic ~:private ~:doc ~:const                                  |
| Examples | (defn ~:private ~String my-fn ...) (def ~:dynamic *dyn-var* val)   |
| On Vars  | meta with-meta vary-meta alter-meta! reset-meta! doc find-doc test |

## Special Forms (clojure.org/special\_forms)

|   |   |
|---|---|
| def if do let letfn quote var fn loop recur set! throw try monitor-enter monitor-exit |   |
| Binding Forms /   | (examples) let fn defn defmacro loop for doseq if-let |
| Destructuring   | when-let (1.6) if-some when-some                      |

## Vars and global environment (clojure.org/vars)

|                |  |
|----------------|--|
| Def variants   | def defn defn- definline defmacro defmethod defmulti defonce defrecord   |
| Interned vars  | declare intern binding find-var var                                      |
| Var objects    | with-local-vars var-get var-set alter-var-root var? bound? thread-bound? |
| Var validators | set-validator! get-validator   |

## Namespace

|               |  |
|---------------|--|
| Current       | *ns*   |
| Create/Switch | (tutorial) ns in-ns create-ns  |
| Add           | alias def import intern refer  |
| Find          | all-ns find-ns   |
| Examine       | ns-name ns-aliases ns-map ns-interns ns-publics ns-refers ns-imports |
| From symbol   | resolve ns-resolve namespace the-ns                                  |
| Remove        | ns-unalias ns-unmap remove-ns  |

## Loading

|             |  |
|-------------|--|
| Load libs   | (tutorial) require use import refer    |
| List loaded | loaded-libs                            |
| Load misc   | load load-file load-reader load-string |

## Concurrency

|         |   |
|---------|---|
| Atoms   | atom swap! reset! compare-and-set!  |
| Futures | future future-call future-done? future-cancel future-cancelled? future?                       |
| Threads | bound-fn bound-fn* get-thread-bindings push-thread-bindings pop-thread-bindings thread-bound? |
| Misc    | locking pcalls pvalues pmap seque promise deliver   |

## Refs and Transactions (clojure.org/refs)

|                |   |
|----------------|---|
| Create         | ref   |
| Examine        | deref @ (@form → (deref form))                    |
| Transaction    | sync dosync io!                                   |
| In transaction | ensure ref-set alter commute                      |
| Validators     | set-validator! get-validator                      |
| History        | ref-history-count ref-min-history ref-max-history |

## Agents and Asynchronous Actions (clojure.org/agents)

|                 |  |
|-----------------|--|
| Create          | agent  |
| Examine         | agent-error  |
| Change state    | send send-off restart-agent (1.5) send-via set-agent-send-executor! set-agent-send-off-executor! |
| Block waiting   | await await-for  |
| Ref validators  | set-validator! get-validator   |
| Watchers        | add-watch remove-watch   |
| Thread handling | shutdown-agents  |
| Error           | error-handler set-error-handler! error-mode set-error-mode!                                      |
| Misc            | *agent* release-pending-sends  |

## Java Interoperation (clojure.org/java\_interop)

|            |  |
|------------|--|
| General    | .. doto Classname/ Classname. new bean comparator enumeration-seq import iterator-seq memfn set! class class? bases supers type gen-class gen-interface definterface |
| Cast       | boolean byte short char int long float double bigdec bigint num cast biginteger  |
| Exceptions | throw try catch finally pst (1.4) ex-info ex-data  |

## Arrays

|        |  |
|--------|--|
| Create | make-array object-array boolean-array byte-array short-array char-array int-array long-array float-array double-array aclone to-array to-array-2d into-array |
| Use    | aget aset aset-boolean aset-byte aset-short aset-char aset-int aset-long aset-float aset-double alength amap areduce   |
| Cast   | booleans bytes shorts chars ints longs floats doubles  |

## Proxy (Clojure type selection flowchart)

|        |  |
|--------|--|
| Create | proxy get-proxy-class construct-proxy init-proxy |
| Misc   | proxy-mappings proxy-super update-proxy          |

## Other

|                 |   |
|-----------------|---|
| XML             | clojure.xml/parse xml-seq   |
| REPL            | *1 *2 *3 *e *print-dup* *print-length* *print-level* *print-meta* *print-readably*  |
| Code            | *compile-files* *compile-path* *file* *warn-on-reflection* compile loaded-libs test |
| Misc            | eval force hash name *clojure-version* clojure-version *command-line-args*          |
| Browser / Shell | (clojure.java.browse/) browse-url (clojure.java.shell/) sh with-sh-dir with-sh-env  |