

The Data Frame Reference Manual

Data frames for Common Lisp, version 2.0

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1 Systems

The main system appears first, followed by any subsystem dependency.

1.1 data-frame

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Source Control

(:git "https://github.com/lisp-stat/data-frame.git")

Bug Tracker

<https://github.com/Lisp-Stat/data-frame/issues>

License MS-PL

Description

Data frames for Common Lisp

Long Description

A data manipulation package, conceptually similar to R's data.frame

Version 2.0

Dependencies

- alexandria
- alexandria+
- anaphora
- array-operations
- num-utils
- select
- let-plus

Source [data-frame.asd], page 3, (file)

Directory s:/src/data-frame/

Components

- [pkgdcl.lisp], page 3, (file)
- [utils.lisp], page 3, (file)
- [data-frame.lisp], page 3, (file)
- [pprint.lisp], page 5, (file)
- [formatted-output.lisp], page 5, (file)
- [summary.lisp], page 6, (file)
- [defdf.lisp], page 7, (file)
- [properties.lisp], page 8, (file)
- [missing.lisp], page 8, (file)

2 Files

Files are sorted by type and then listed depth-first from the systems components trees.

2.1 Lisp

2.1.1 data-frame.asd

Location `/src/data-frame/data-frame.asd`

Systems `[data-frame]`, page 1, (system)

2.1.2 data-frame/pkgdcl.lisp

Parent `[data-frame]`, page 1, (system)

Location `pkgdcl.lisp`

Packages `[data-frame]`, page 9,

2.1.3 data-frame/utils.lisp

Dependency

`[pkgdcl.lisp]`, page 3, (file)

Parent `[data-frame]`, page 1, (system)

Location `utils.lisp`

Exported Definitions

`[column-type]`, page 16, (function)

Internal Definitions

- `[get-type]`, page 30, (function)
- `[types-in-column]`, page 34, (function)

2.1.4 data-frame/data-frame.lisp

Dependency

`[utils.lisp]`, page 3, (file)

Parent `[data-frame]`, page 1, (system)

Location `data-frame.lisp`

Exported Definitions

- `[add-column!]`, page 15, (function)
- `[add-columns]`, page 16, (function)
- `[add-columns!]`, page 16, (function)
- `[alist-df]`, page 16, (function)
- `[alist-dv]`, page 16, (function)
- `[column]`, page 16, (function)
- `[(setf column)]`, page 16, (function)
- `[column-names]`, page 16, (function)
- `[columns]`, page 16, (function)
- `[copy]`, page 17, (function)
- `[count-rows]`, page 17, (function)

- [data-frame], page 25, (class)
- [data-vector], page 26, (class)
- [df], page 17, (function)
- [df-remove-duplicates], page 17, (function)
- [do-rows], page 17, (function)
- [doc-string], page 21, (method)
- [(setf doc-string)], page 21, (method)
- [duplicate-key], page 22, (condition)
- [dv], page 17, (function)
- [key-not-found], page 23, (condition)
- [keys], page 18, (function)
- [make-df], page 18, (function)
- [make-dv], page 18, (function)
- [map-columns], page 18, (function)
- [map-df], page 18, (function)
- [map-rows], page 18, (function)
- [mask-rows], page 18, (function)
- [matrix-df], page 19, (function)
- [name], page 22, (method)
- [(setf name)], page 22, (method)
- [plist-df], page 19, (function)
- [plist-dv], page 19, (function)
- [remove-columns], page 19, (function)
- [replace-column], page 19, (function)
- [replace-column!], page 20, (function)
- [rows], page 20, (function)
- [substitute-key!], page 20, (function)

Internal Definitions

- [add-key!], page 27, (function)
- [add-keys], page 27, (function)
- [alist-data], page 27, (function)
- [check-column-compatibility], page 35, (generic function)
- [check-column-compatibility], page 35, (method)
- [check-column-compatibility], page 35, (method)
- [copy-ordered-keys], page 28, (function)
- [data], page 37, (class)
- [define-data-subclass], page 26, (macro)
- [ensure-arguments-alist], page 29, (function)
- [guess-alist?], page 30, (function)
- [key-index], page 30, (function)
- [keys-count], page 30, (function)
- [keys-vector], page 30, (function)
- [make-data], page 31, (function)

- [make-ordered-keys], page 31, (function)
- [ordered-keys], page 32, (function)
- [ordered-keys], page 36, (structure)
- [ordered-keys-p], page 32, (function)
- [ordered-keys-table], page 32, (function)
- [plist-data], page 32, (function)

2.1.5 data-frame/pprint.lisp

Dependency

[data-frame.lisp], page 3, (file)

Parent

[data-frame], page 1, (system)

Location

pprint.lisp

Exported Definitions

- [head], page 21, (method)
- [pprint-array], page 19, (function)
- [pprint-data-frame], page 19, (function)
- [tail], page 22, (method)

Internal Definitions

- [*max-digits*], page 26, (special variable)
- [*row-numbers-p*], page 26, (special variable)
- [2d-array-to-list], page 27, (function)
- [column-type-format], page 28, (function)
- [default-column-formats], page 36, (method)
- [max-decimal], page 31, (function)
- [max-width], page 31, (function)
- [printer-status], page 32, (function)
- [reverse-df], page 33, (function)

2.1.6 data-frame/formatted-output.lisp

Dependency

[pprint.lisp], page 5, (file)

Parent

[data-frame], page 1, (system)

Location

formatted-output.lisp

Exported Definitions

- [df-print], page 17, (function)
- [pprint-markdown], page 19, (function)

Internal Definitions

- [aesthetic-string], page 27, (function)
- [print-table], page 32, (function)
- [weave], page 35, (function)

2.1.7 data-frame/summary.lisp

Dependency

[formatted-output.lisp], page 5, (file)

Parent

[data-frame], page 1, (system)

Location

summary.lisp

Exported Definitions

- [*distinct-maximum*], page 15, (special variable)
- [*distinct-threshold*], page 15, (special variable)
- [*quantile-threshold*], page 15, (special variable)
- [*summary-minimum-length*], page 15, (special variable)
- [bit-variable-summary], page 23, (structure)
- [factor-variable-summary], page 23, (structure)
- [generic-variable-summary], page 24, (structure)
- [get-summaries], page 17, (function)
- [real-variable-summary], page 24, (structure)
- [summarize-column], page 20, (function)
- [summary], page 22, (method)

Internal Definitions

- [bit-variable-summary-count], page 27, (function)
- [bit-variable-summary-desc], page 27, (function)
- [bit-variable-summary-length], page 27, (function)
- [bit-variable-summary-missing], page 27, (function)
- [bit-variable-summary-name], page 27, (function)
- [bit-variable-summary-p], page 28, (function)
- [column-length], page 35, (generic function)
- [column-length], page 35, (method)
- [copy-bit-variable-summary], page 28, (function)
- [copy-factor-variable-summary], page 28, (function)
- [copy-generic-variable-summary], page 28, (function)
- [copy-real-variable-summary], page 28, (function)
- [copy-variable-summary%], page 28, (function)
- [distinct], page 28, (function)
- [ensure-not-ratio], page 29, (function)
- [factor-variable-summary-desc], page 29, (function)
- [factor-variable-summary-element-count-alist], page 29, (function)
- [factor-variable-summary-length], page 29, (function)
- [factor-variable-summary-missing], page 29, (function)
- [factor-variable-summary-name], page 29, (function)
- [factor-variable-summary-p], page 29, (function)
- [generic-variable-summary-desc], page 29, (function)
- [generic-variable-summary-element-count-alist], page 29, (function)
- [generic-variable-summary-length], page 30, (function)

- [generic-variable-summary-missing], page 30, (function)
- [generic-variable-summary-name], page 30, (function)
- [generic-variable-summary-p], page 30, (function)
- [generic-variable-summary-quantiles], page 30, (function)
- [make-bit-variable-summary], page 31, (function)
- [make-factor-variable-summary], page 31, (function)
- [make-generic-variable-summary], page 31, (function)
- [make-real-variable-summary], page 31, (function)
- [make-variable-summary%], page 31, (function)
- [monotonicp], page 32, (function)
- [print-count-and-percentage], page 32, (function)
- [real-variable-summary-desc], page 33, (function)
- [real-variable-summary-length], page 33, (function)
- [real-variable-summary-max], page 33, (function)
- [real-variable-summary-mean], page 33, (function)
- [real-variable-summary-min], page 33, (function)
- [real-variable-summary-missing], page 33, (function)
- [real-variable-summary-name], page 33, (function)
- [real-variable-summary-p], page 33, (function)
- [real-variable-summary-q25], page 33, (function)
- [real-variable-summary-q50], page 33, (function)
- [real-variable-summary-q75], page 33, (function)
- [summarize-factor-variable], page 34, (function)
- [summarize-generic-variable], page 34, (function)
- [summarize-real-variable], page 34, (function)
- [variable-summary%], page 36, (structure)
- [variable-summary%-desc], page 35, (function)
- [variable-summary%-length], page 35, (function)
- [variable-summary%-missing], page 35, (function)
- [variable-summary%-name], page 35, (function)
- [variable-summary%-p], page 35, (function)

2.1.8 data-frame/defdf.lisp

Dependency

[summary.lisp], page 6, (file)

Parent

[data-frame], page 1, (system)

Location defdf.lisp

Exported Definitions

- [defdf], page 15, (macro)
- [define-column-names], page 17, (function)
- [replace-key!], page 15, (macro)
- [show-data-frames], page 20, (function)
- [undef], page 21, (function)

Internal Definitions

- [`*ask-on-redefine*`], page 26, (special variable)
- [`*data-frames*`], page 26, (special variable)
- [`show-symbols`], page 34, (function)
- [`undef-column-names`], page 34, (function)

2.1.9 data-frame/properties.lisp**Dependency**

[`defdf.lisp`], page 7, (file)

Parent [`data-frame`], page 1, (system)

Location `properties.lisp`

Exported Definitions

- [`heuristicate-types`], page 18, (function)
- [`set-properties`], page 20, (function)

Internal Definitions

- [`show-properties`], page 34, (function)
- [`sym-mac`], page 34, (function)
- [`var-name`], page 34, (function)

2.1.10 data-frame/missing.lisp**Dependency**

[`properties.lisp`], page 8, (file)

Parent [`data-frame`], page 1, (system)

Location `missing.lisp`

Exported Definitions

- [`drop-missing`], page 21, (method)
- [`missingp`], page 21, (generic function)
- [`missingp`], page 21, (method)
- [`missingp`], page 21, (method)
- [`missingp`], page 21, (method)
- [`missingp`], page 21, (method)
- [`missingp`], page 21, (method)
- [`missingp`], page 21, (method)
- [`missingp`], page 21, (method)
- [`replace-missing`], page 22, (method)

Internal Definitions

[`drop-na`], page 28, (function)

3 Packages

Packages are listed by definition order.

3.1 data-frame

Source [pkgdcl.lisp], page 3, (file)

Nickname df

Use List

- alexandria+
- select-dev
- select
- let-plus
- anaphora
- alexandria
- common-lisp

Used By List

- lisp-stat
- dfio

Exported Definitions

- [*distinct-maximum*], page 15, (special variable)
- [*distinct-threshold*], page 15, (special variable)
- [*quantile-threshold*], page 15, (special variable)
- [*summary-minimum-length*], page 15, (special variable)
- [add-column!], page 15, (function)
- [add-columns], page 16, (function)
- [add-columns!], page 16, (function)
- [alist-df], page 16, (function)
- [alist-dv], page 16, (function)
- [bit-variable-summary], page 23, (structure)
- [column], page 16, (function)
- [(setf column)], page 16, (function)
- [column-names], page 16, (function)
- [column-type], page 16, (function)
- [columns], page 16, (function)
- [copy], page 17, (function)
- [count-rows], page 17, (function)
- [data-frame], page 25, (class)
- [data-vector], page 26, (class)
- [defdf], page 15, (macro)
- [define-column-names], page 17, (function)
- [df], page 17, (function)
- [df-print], page 17, (function)

- `[df-remove-duplicates]`, page 17, (function)
- `[do-rows]`, page 17, (function)
- `[doc-string]`, page 21, (generic function)
- `[doc-string]`, page 21, (method)
- `[(setf doc-string)]`, page 21, (method)
- `[(setf doc-string)]`, page 21, (generic function)
- `[drop-missing]`, page 21, (generic function)
- `[drop-missing]`, page 21, (method)
- `[duplicate-key]`, page 22, (condition)
- `[dv]`, page 17, (function)
- `[factor-variable-summary]`, page 23, (structure)
- `[generic-variable-summary]`, page 24, (structure)
- `[get-summaries]`, page 17, (function)
- `[head]`, page 21, (generic function)
- `[head]`, page 21, (method)
- `[heuristic-types]`, page 18, (function)
- `[key-not-found]`, page 23, (condition)
- `[keys]`, page 18, (function)
- `[make-df]`, page 18, (function)
- `[make-dv]`, page 18, (function)
- `[map-columns]`, page 18, (function)
- `[map-df]`, page 18, (function)
- `[map-rows]`, page 18, (function)
- `[mask-rows]`, page 18, (function)
- `[matrix-df]`, page 19, (function)
- `[missingp]`, page 21, (generic function)
- `[missingp]`, page 21, (method)
- `[missingp]`, page 21, (method)
- `[missingp]`, page 21, (method)
- `[missingp]`, page 21, (method)
- `[missingp]`, page 21, (method)
- `[missingp]`, page 21, (method)
- `[missingp]`, page 21, (method)
- `[name]`, page 22, (generic function)
- `[name]`, page 22, (method)
- `[(setf name)]`, page 22, (method)
- `[(setf name)]`, page 22, (generic function)
- `[plist-df]`, page 19, (function)
- `[plist-dv]`, page 19, (function)
- `[pprint-array]`, page 19, (function)
- `[pprint-data-frame]`, page 19, (function)
- `[pprint-markdown]`, page 19, (function)
- `[real-variable-summary]`, page 24, (structure)

- [remove-columns], page 19, (function)
- [replace-column], page 19, (function)
- [replace-column!], page 20, (function)
- [replace-key!], page 15, (macro)
- [replace-missing], page 22, (generic function)
- [replace-missing], page 22, (method)
- [rows], page 20, (function)
- [set-properties], page 20, (function)
- [show-data-frames], page 20, (function)
- [substitute-key!], page 20, (function)
- [summarize-column], page 20, (function)
- [summary], page 22, (generic function)
- [summary], page 22, (method)
- [tail], page 22, (generic function)
- [tail], page 22, (method)
- [undef], page 21, (function)

Internal Definitions

- [*ask-on-redefine*], page 26, (special variable)
- [*data-frames*], page 26, (special variable)
- [*max-digits*], page 26, (special variable)
- [*row-numbers-p*], page 26, (special variable)
- [2d-array-to-list], page 27, (function)
- [add-key!], page 27, (function)
- [add-keys], page 27, (function)
- [aesthetic-string], page 27, (function)
- [alist-data], page 27, (function)
- [bit-variable-summary-count], page 27, (function)
- [bit-variable-summary-desc], page 27, (function)
- [bit-variable-summary-length], page 27, (function)
- [bit-variable-summary-missing], page 27, (function)
- [bit-variable-summary-name], page 27, (function)
- [bit-variable-summary-p], page 28, (function)
- [check-column-compatibility], page 35, (generic function)
- [check-column-compatibility], page 35, (method)
- [check-column-compatibility], page 35, (method)
- [column-length], page 35, (generic function)
- [column-length], page 35, (method)
- [column-type-format], page 28, (function)
- [copy-bit-variable-summary], page 28, (function)
- [copy-factor-variable-summary], page 28, (function)
- [copy-generic-variable-summary], page 28, (function)
- [copy-ordered-keys], page 28, (function)
- [copy-real-variable-summary], page 28, (function)

- [copy-variable-summary%], page 28, (function)
- [data], page 37, (class)
- [default-column-formats], page 35, (generic function)
- [default-column-formats], page 36, (method)
- [define-data-subclass], page 26, (macro)
- [distinct], page 28, (function)
- [drop-na], page 28, (function)
- [ensure-arguments-alist], page 29, (function)
- [ensure-not-ratio], page 29, (function)
- [factor-variable-summary-desc], page 29, (function)
- [factor-variable-summary-element-count-alist], page 29, (function)
- [factor-variable-summary-length], page 29, (function)
- [factor-variable-summary-missing], page 29, (function)
- [factor-variable-summary-name], page 29, (function)
- [factor-variable-summary-p], page 29, (function)
- [generic-variable-summary-desc], page 29, (function)
- [generic-variable-summary-element-count-alist], page 29, (function)
- [generic-variable-summary-length], page 30, (function)
- [generic-variable-summary-missing], page 30, (function)
- [generic-variable-summary-name], page 30, (function)
- [generic-variable-summary-p], page 30, (function)
- [generic-variable-summary-quantiles], page 30, (function)
- [get-type], page 30, (function)
- [guess-alist?], page 30, (function)
- [key-index], page 30, (function)
- [keys-count], page 30, (function)
- [keys-vector], page 30, (function)
- [make-bit-variable-summary], page 31, (function)
- [make-data], page 31, (function)
- [make-factor-variable-summary], page 31, (function)
- [make-generic-variable-summary], page 31, (function)
- [make-ordered-keys], page 31, (function)
- [make-real-variable-summary], page 31, (function)
- [make-variable-summary%], page 31, (function)
- [max-decimal], page 31, (function)
- [max-width], page 31, (function)
- [monotonicp], page 32, (function)
- [ordered-keys], page 32, (function)
- [ordered-keys], page 36, (structure)
- [ordered-keys-p], page 32, (function)
- [ordered-keys-table], page 32, (function)
- [plist-data], page 32, (function)
- [print-count-and-percentage], page 32, (function)

- `[print-table]`, page 32, (function)
- `[printer-status]`, page 32, (function)
- `[real-variable-summary-desc]`, page 33, (function)
- `[real-variable-summary-length]`, page 33, (function)
- `[real-variable-summary-max]`, page 33, (function)
- `[real-variable-summary-mean]`, page 33, (function)
- `[real-variable-summary-min]`, page 33, (function)
- `[real-variable-summary-missing]`, page 33, (function)
- `[real-variable-summary-name]`, page 33, (function)
- `[real-variable-summary-p]`, page 33, (function)
- `[real-variable-summary-q25]`, page 33, (function)
- `[real-variable-summary-q50]`, page 33, (function)
- `[real-variable-summary-q75]`, page 33, (function)
- `[reverse-df]`, page 33, (function)
- `[show-properties]`, page 34, (function)
- `[show-symbols]`, page 34, (function)
- `[summarize-factor-variable]`, page 34, (function)
- `[summarize-generic-variable]`, page 34, (function)
- `[summarize-real-variable]`, page 34, (function)
- `[sym-mac]`, page 34, (function)
- `[types-in-column]`, page 34, (function)
- `[undef-column-names]`, page 34, (function)
- `[var-name]`, page 34, (function)
- `[variable-summary%]`, page 36, (structure)
- `[variable-summary%-desc]`, page 35, (function)
- `[variable-summary%-length]`, page 35, (function)
- `[variable-summary%-missing]`, page 35, (function)
- `[variable-summary%-name]`, page 35, (function)
- `[variable-summary%-p]`, page 35, (function)
- `[weave]`, page 35, (function)

4 Definitions

Definitions are sorted by export status, category, package, and then by lexicographic order.

4.1 Exported definitions

4.1.1 Special variables

distinct-maximum [Special Variable]

If a string/factor variable has > *distinct-maximum* values, exclude it

Package [data-frame], page 9,

Source [summary.lisp], page 6, (file)

distinct-threshold [Special Variable]

If an integer variable has <= discrete values, consider it a factor

Package [data-frame], page 9,

Source [summary.lisp], page 6, (file)

quantile-threshold [Special Variable]

If the number of unique reals exceeds this threshold, they will be summarized with quantiles, otherwise print frequency table

Package [data-frame], page 9,

Source [summary.lisp], page 6, (file)

summary-minimum-length [Special Variable]

Columns are only summarised when longer than this, otherwise they are returned as is.

Package [data-frame], page 9,

Source [summary.lisp], page 6, (file)

4.1.2 Macros

defdf *DF BODY &optional DOCUMENTATION* [Macro]

Package [data-frame], page 9,

Source [defdf.lisp], page 7, (file)

replace-key! *DF NEW OLD* [Macro]

Replace a key in DF, updating data package symbols Example: (replace-key! mtcars row-name x1)

Package [data-frame], page 9,

Source [defdf.lisp], page 7, (file)

4.1.3 Functions

add-column! *DATA KEY COLUMN* [Function]

Modify DATA (a data-frame or data-vector) by adding COLUMN with KEY. Return DATA.

Package [data-frame], page 9,

Source [data-frame.lisp], page 3, (file)

add-columns *DATA &rest KEYS-AND-COLUMNS* [Function]
 Return a new data-frame or data-vector with keys and columns added. Does not modify *DATA* (see README about accepted argument formats).

Package [data-frame], page 9,

Source [data-frame.lisp], page 3, (file)

add-columns! *DATA &rest KEYS-AND-COLUMNS* [Function]
 Modify *DATA* (a data-frame or data-vector) by adding columns with keys (see README about accepted argument formats).

Package [data-frame], page 9,

Source [data-frame.lisp], page 3, (file)

alist-df *ALIST* [Function]

Package [data-frame], page 9,

Source [data-frame.lisp], page 3, (file)

alist-dv *ALIST* [Function]

Package [data-frame], page 9,

Source [data-frame.lisp], page 3, (file)

column *DATA KEY* [Function]

Return column corresponding to key.

Package [data-frame], page 9,

Source [data-frame.lisp], page 3, (file)

Writer [(setf column)], page 16, (function)

(setf column) *COLUMN DATA KEY* [Function]

Set column corresponding to key.

Package [data-frame], page 9,

Source [data-frame.lisp], page 3, (file)

Reader [column], page 16, (function)

column-names *DF* [Function]

Return a list of column names in *DF*, as strings

Package [data-frame], page 9,

Source [data-frame.lisp], page 3, (file)

column-type *COL* [Function]

Return the most specific type found in *COL*

Package [data-frame], page 9,

Source [utils.lisp], page 3, (file)

columns *DATA &optional SLICE* [Function]

Return the columns of *DATA* as a vector, or a selection if given (keys are resolved).

Package [data-frame], page 9,

Source [data-frame.lisp], page 3, (file)

- copy** *DATA &key KEY* [Function]
 Copy data frame or vector. Keys are copied (and thus can be modified), columns or elements are copied using KEY, making the default give a shallow copy.
Package [data-frame], page 9,
Source [data-frame.lisp], page 3, (file)
- count-rows** *DATA-FRAME KEYS PREDICATE* [Function]
 Count the number of rows for which PREDICATE called on the columns corresponding to KEYS returns non-NIL.
Package [data-frame], page 9,
Source [data-frame.lisp], page 3, (file)
- define-column-names** *DF PACKAGE* [Function]
 Create a symbol macro for each column name in DF
 After running this function, you can refer to a column by its name. This is useful if the column names of a data frame have changed. Example: (define-column-names mtcars)
Package [data-frame], page 9,
Source [defdf.lisp], page 7, (file)
- df &rest** *PLIST-OR-ALIST* [Function]
Package [data-frame], page 9,
Source [data-frame.lisp], page 3, (file)
- df-print** *DF* [Function]
 Print DF to *standard-output* in table format
Package [data-frame], page 9,
Source [formatted-output.lisp], page 5, (file)
- df-remove-duplicates** *DATA* [Function]
 Return a modified copy of DATA from which any element (row, if a DATA-FRAME) that matches another element has been removed
Package [data-frame], page 9,
Source [data-frame.lisp], page 3, (file)
- do-rows** *DATA-FRAME KEYS FUNCTION* [Function]
 Traverse rows from first to last, calling FUNCTION on the columns corresponding to KEYS. Return no values.
Package [data-frame], page 9,
Source [data-frame.lisp], page 3, (file)
- dv &rest** *PLIST-OR-ALIST* [Function]
Package [data-frame], page 9,
Source [data-frame.lisp], page 3, (file)
- get-summaries** *DF* [Function]
 Return a list of summaries of the variables in DF
Package [data-frame], page 9,
Source [summary.lisp], page 6, (file)

heuristicate-types *DF* [Function]

Coerce each element of the column vectors to the most specific type in the column

Often when reading in a data set, the types will be inconsistent in a variable. For example one observation might be 5.1, and another 5. Whilst mathmatically equivalent, we want our variable vectors to have identical types. The `COLUMN-TYPE` function returns the most specific numeric type in the column, then coerce all the vector elements to this type

Package [data-frame], page 9,

Source [properties.lisp], page 8, (file)

keys *DATA* [Function]

Vector of keys.

Package [data-frame], page 9,

Source [data-frame.lisp], page 3, (file)

make-df *KEYS COLUMNS* [Function]

Package [data-frame], page 9,

Source [data-frame.lisp], page 3, (file)

make-dv *KEYS COLUMNS* [Function]

Package [data-frame], page 9,

Source [data-frame.lisp], page 3, (file)

map-columns *DATA FUNCTION &optional RESULT-CLASS* [Function]

Map columns of `DATA-FRAME` or `DATA-VECTOR` using `FUNCTION`. The result is a new `DATA-FRAME` with the same keys.

Package [data-frame], page 9,

Source [data-frame.lisp], page 3, (file)

map-df *DATA-FRAME KEYS FUNCTION RESULT-KEYS* [Function]

Map `DATA-FRAME` to another one by rows. Function is called on the columns corresponding to `KEYS`, and should return a sequence with the same length as `RESULT-KEYS`, which give the keys of the resulting data frame. `RESULT-KETS` should be either symbols, or of the format (symbol &optional (element-type t)).

Package [data-frame], page 9,

Source [data-frame.lisp], page 3, (file)

map-rows *DATA-FRAME KEYS FUNCTION &key ELEMENT-TYPE* [Function]

Map rows using `FUNCTION`, on the columns corresponding to `KEYS`. Return the result with the given `ELEMENT-TYPE`.

Package [data-frame], page 9,

Source [data-frame.lisp], page 3, (file)

mask-rows *DATA-FRAME KEYS PREDICATE* [Function]

Return a bit-vector containing the result of calling `PREDICATE` on rows of the columns corresponding to `KEYS` (0 for `NIL`, 1 otherwise).

Package [data-frame], page 9,

Source [data-frame.lisp], page 3, (file)

- matrix-df** *KEYS MATRIX* [Function]
 Convert a matrix to a data-frame with the given keys.
Package [data-frame], page 9,
Source [data-frame.lisp], page 3, (file)
- plist-df** *PLIST* [Function]
Package [data-frame], page 9,
Source [data-frame.lisp], page 3, (file)
- plist-dv** *PLIST* [Function]
Package [data-frame], page 9,
Source [data-frame.lisp], page 3, (file)
- pprint-array** *ARR &optional STREAM ROW-NUMBERS-P* [Function]
 Print an array to STREAM, defaulting to *standard-output*, in a tabular format. If ROW-NUMBERS-P, print row numbers.
Package [data-frame], page 9,
Source [pprint.lisp], page 5, (file)
- pprint-data-frame** *DATA-FRAME &optional STREAM ROW-NUMBERS-P MAX-DIGITS* [Function]
 Print DATA-FRAME to STREAM using the pretty printer
Package [data-frame], page 9,
Source [pprint.lisp], page 5, (file)
- pprint-markdown** *DF &key STREAM ROW-NUMBERS* [Function]
 Print data frame DF, in markdown format, to STREAM
 If ROW-NUMBERS is true, also print row numbers as the first column
Package [data-frame], page 9,
Source [formatted-output.lisp], page 5, (file)
- remove-columns** *DATA KEYS* [Function]
 ARGS: DATA data frame
 KEYS list of keys (variables) to be removed
 Return a new data-frame or data-vector with keys and columns removed. Does not modify DATA.
Package [data-frame], page 9,
Source [data-frame.lisp], page 3, (file)
- replace-column** *DATA KEY FUNCTION-OR-COLUMN &key ELEMENT-TYPE* [Function]
 Create a new data frame with new column KEY from data-frame DATA by replacing it either with the given column, or applying the function to the current values (ELEMENT-TYPE is used.)
Package [data-frame], page 9,
Source [data-frame.lisp], page 3, (file)

replace-column! *DATA KEY FUNCTION-OR-COLUMN &key* [Function]
ELEMENT-TYPE

Modify column *KEY* of data-frame *DATA* by replacing it either with the given column, or applying the function to the current values (*ELEMENT-TYPE* is used.)

Package [data-frame], page 9,

Source [data-frame.lisp], page 3, (file)

rows *DATA* [Function]

Return the rows of *DATA* as a vector

Package [data-frame], page 9,

Source [data-frame.lisp], page 3, (file)

set-properties *DF PROPERTY PROP-VALUES* [Function]

Set the *PROPERTY* of each variable in *DF* to a value. The value is specified in the plist *PROP-VALUES*. Example:

To give the variables in the *mtcars* dataset a unit, use:

```
(set-properties mtcars :unit '(:mpg m/g
```

```
:cyl :NA
```

```
:disp in3
```

```
:hp hp
```

```
:drat :NA
```

```
:wt lb
```

```
:qsec s
```

```
:vs :NA
```

```
:am :NA
```

```
:gear :NA
```

```
:carb :NA))
```

Package [data-frame], page 9,

Source [properties.lisp], page 8, (file)

show-data-frames *&key HEAD STREAM* [Function]

Print all data frames in the current environment in reverse order of creation, i.e. most recently created first. if *HEAD* is not *NIL*, print the first six rows, similar to the (*head*) function

Package [data-frame], page 9,

Source [defdf.lisp], page 7, (file)

substitute-key! *DF NEW OLD* [Function]

Substitute *NEW* key, a *SYMBOL*, for *OLD* in a data-frame.

Useful when reading data files that have an empty or generated column name.

Example: (*substitute-key* *cars* :name :| |) to replace an empty symbol with *:name*

Package [data-frame], page 9,

Source [data-frame.lisp], page 3, (file)

summarize-column *COLUMN* [Function]

Return a summary struct for *COLUMN*

Package [data-frame], page 9,

Source [summary.lisp], page 6, (file)

undef *DF* [Function]

If *DF* is the symbol of a defined data-frame it is unbound and removed from the list of data-frames. If *DF* is a list of data-frame names each is unbound and removed. Returns *DF*.

Example: (undef 'mtcars)

Package [data-frame], page 9,

Source [defdf.lisp], page 7, (file)

4.1.4 Generic functions

doc-string *OBJECT* [Generic Function]

(setf doc-string) *NEW-VALUE OBJECT* [Generic Function]

Package [data-frame], page 9,

Methods

doc-string (*DATA data*) [Method]

automatically generated reader method

Source [data-frame.lisp], page 3, (file)

(setf doc-string) *NEW-VALUE (DATA data)* [Method]

automatically generated writer method

Source [data-frame.lisp], page 3, (file)

drop-missing *DF &optional PREDICATE* [Generic Function]

Package [data-frame], page 9,

Methods

drop-missing (*DF data-frame*) **&optional** *PREDICATE* [Method]

Remove all rows from *DF* that are missing values according to *PREDICATE*

Source [missing.lisp], page 8, (file)

head *DF &optional N* [Generic Function]

Package [data-frame], page 9,

Methods

head (*DF data-frame*) **&optional** *N* [Method]

Return the first *N* rows of *DF*; *N* defaults to 6

Source [pprint.lisp], page 5, (file)

missingp *DATA* [Generic Function]

Package [data-frame], page 9,

Source [missing.lisp], page 8, (file)

Methods

missingp *DATA* [Method]

missingp (*DATA* (eq1 na)) [Method]

missingp (*DATA* (eq1 missing)) [Method]

missingp (*DATA* string) [Method]

missingp (*DATA* sequence) [Method]

missingp (*DATA* array) [Method]

missingp (*DATA* data-frame) [Method]

<code>name</code>	<i>OBJECT</i>	[Generic Function]
<code>(setf name)</code>	<i>NEW-VALUE OBJECT</i>	[Generic Function]
Package	[data-frame], page 9,	
Methods		
	<code>name (DATA data)</code>	[Method]
	automatically generated reader method	
	Source [data-frame.lisp], page 3, (file)	
	<code>(setf name) NEW-VALUE (DATA data)</code>	[Method]
	automatically generated writer method	
	Source [data-frame.lisp], page 3, (file)	
<code>replace-missing</code>	<i>DF MAP-ALIST</i>	[Generic Function]
Package	[data-frame], page 9,	
Methods		
	<code>replace-missing (DF data-frame) MAP-ALIST</code>	[Method]
	Replace missing values with the values specified	
	The alist consists of a column name in the CAR and the replacement value in the CDR Example: (replace-missing mtcarsm '((mpg . foo)))	
	Source [missing.lisp], page 8, (file)	
<code>summary</code>	<i>DF &optional STREAM</i>	[Generic Function]
Package	[data-frame], page 9,	
Methods		
	<code>summary (DF data-frame) &optional STREAM</code>	[Method]
	Print a summary of DF to STREAM, using heuristics for better formatting	
	Source [summary.lisp], page 6, (file)	
<code>tail</code>	<i>DF &optional N</i>	[Generic Function]
Package	[data-frame], page 9,	
Methods		
	<code>tail (DF data-frame) &optional N</code>	[Method]
	Return the last N rows of DF; N defaults to 6	
	Source [pprint.lisp], page 5, (file)	

4.1.5 Conditions

<code>duplicate-key</code>	()	[Condition]
	Duplicate key.	
Package	[data-frame], page 9,	
Source	[data-frame.lisp], page 3, (file)	
Direct superclasses	error (condition)	
Direct slots		
	<code>key</code>	[Slot]
	Initargs :key	

key-not-found () [Condition]
Key not found.

Package [data-frame], page 9,

Source [data-frame.lisp], page 3, (file)

Direct superclasses
error (condition)

Direct slots

key [Slot]
Initargs :key

keys [Slot]
Initargs :keys

4.1.6 Structures

bit-variable-summary () [Structure]
Summary of a bit vector.

Package [data-frame], page 9,

Source [summary.lisp], page 6, (file)

Direct superclasses
[variable-summary%], page 36, (structure)

Direct methods
print-object (method)

Direct slots

count [Slot]

Type alexandria:array-index

Initform 0

Readers [bit-variable-summary-count], page 27, (function)

Writers (setf bit-variable-summary-count) (function)

factor-variable-summary () [Structure]
Summary for factor variables

Package [data-frame], page 9,

Source [summary.lisp], page 6, (file)

Direct superclasses
[variable-summary%], page 36, (structure)

Direct methods
print-object (method)

Direct slots

element-count-alist [Slot]

Type list

Readers [factor-variable-summary-element-count-alist], page 29, (function)

Writers (setf factor-variable-summary-element-count-alist) (function)

generic-variable-summary () [Structure]

Summary for generic variables, i.e. those with mixed types.

Package [data-frame], page 9,

Source [summary.lisp], page 6, (file)

Direct superclasses

[variable-summary%], page 36, (structure)

Direct methods

print-object (method)

Direct slots

quantiles [Slot]

Type (or null data-frame:real-variable-summary)

Readers [generic-variable-summary-quantiles], page 30, (function)

Writers (setf generic-variable-summary-quantiles) (function)

element-count-alist [Slot]

Type list

Readers [generic-variable-summary-element-count-alist], page 29, (function)

Writers (setf generic-variable-summary-element-count-alist) (function)

real-variable-summary () [Structure]

Summary of a real elements (using quantiles).

Package [data-frame], page 9,

Source [summary.lisp], page 6, (file)

Direct superclasses

[variable-summary%], page 36, (structure)

Direct methods

print-object (method)

Direct slots

min [Slot]

Type real

Initform 0

Readers [real-variable-summary-min], page 33, (function)

Writers (setf real-variable-summary-min) (function)

q25 [Slot]

Type real

Initform 0

Readers [real-variable-summary-q25], page 33, (function)

Writers (setf real-variable-summary-q25) (function)

q50		[Slot]
Type	real	
Initform	0	
Readers	[real-variable-summary-q50], page 33, (function)	
Writers	(setf real-variable-summary-q50) (function)	
mean		[Slot]
Type	real	
Initform	0	
Readers	[real-variable-summary-mean], page 33, (function)	
Writers	(setf real-variable-summary-mean) (function)	
q75		[Slot]
Type	real	
Initform	0	
Readers	[real-variable-summary-q75], page 33, (function)	
Writers	(setf real-variable-summary-q75) (function)	
max		[Slot]
Type	real	
Initform	0	
Readers	[real-variable-summary-max], page 33, (function)	
Writers	(setf real-variable-summary-max) (function)	

4.1.7 Classes

data-frame ()		[Class]
Package	[data-frame], page 9,	
Source	[data-frame.lisp], page 3, (file)	
Direct superclasses	[data], page 37, (class)	
Direct methods		
	<ul style="list-style-type: none"> • [replace-missing], page 22, (method) • [drop-missing], page 21, (method) • [missingp], page 21, (method) • [summary], page 22, (method) • [tail], page 22, (method) • [head], page 21, (method) • describe-object (method) • print-object (method) • select (method) • [check-column-compatibility], page 35, (method) • as-array (method) 	

- `dims` (method)
- `ncol` (method)
- `nrow` (method)
- `initialize-instance` (method)

`data-vector` () [Class]

Package [data-frame], page 9,

Source [data-frame.lisp], page 3, (file)

Direct superclasses
[data], page 37, (class)

Direct methods

- `print-object` (method)
- `select` (method)
- `as-array` (method)
- `dims` (method)

4.2 Internal definitions

4.2.1 Special variables

ask-on-redefine [Special Variable]
If set, the system will ask the user for confirmation before redefining a data frame

Package [data-frame], page 9,

Source [defdf.lisp], page 7, (file)

data-frames [Special Variable]
Global list of all data frames

Package [data-frame], page 9,

Source [defdf.lisp], page 7, (file)

max-digits [Special Variable]

Package [data-frame], page 9,

Source [pprint.lisp], page 5, (file)

row-numbers-p [Special Variable]

Package [data-frame], page 9,

Source [pprint.lisp], page 5, (file)

4.2.2 Macros

`define-data-subclass` *CLASS ABBREVIATION* [Macro]

Package [data-frame], page 9,

Source [data-frame.lisp], page 3, (file)

4.2.3 Functions

2d-array-to-list <i>ARRAY</i>	[Function]
Convert an array to a list of lists	
Package [data-frame], page 9,	
Source [pprint.lisp], page 5, (file)	
add-key! <i>ORDERED-KEYS KEY</i>	[Function]
Modify ORDERED-KEYS by adding KEY.	
Package [data-frame], page 9,	
Source [data-frame.lisp], page 3, (file)	
add-keys <i>ORDERED-KEYS &rest KEYS</i>	[Function]
Package [data-frame], page 9,	
Source [data-frame.lisp], page 3, (file)	
aesthetic-string <i>THING</i>	[Function]
Return the string used to represent ‘thing’ when printing aesthetically.	
Package [data-frame], page 9,	
Source [formatted-output.lisp], page 5, (file)	
alist-data <i>CLASS ALIST</i>	[Function]
Create an object of CLASS (subclass of DATA) from ALIST which contains key-column pairs.	
Package [data-frame], page 9,	
Source [data-frame.lisp], page 3, (file)	
bit-variable-summary-count <i>INSTANCE</i>	[Function]
Package [data-frame], page 9,	
Source [summary.lisp], page 6, (file)	
bit-variable-summary-desc <i>INSTANCE</i>	[Function]
Package [data-frame], page 9,	
Source [summary.lisp], page 6, (file)	
bit-variable-summary-length <i>INSTANCE</i>	[Function]
Package [data-frame], page 9,	
Source [summary.lisp], page 6, (file)	
bit-variable-summary-missing <i>INSTANCE</i>	[Function]
Package [data-frame], page 9,	
Source [summary.lisp], page 6, (file)	
bit-variable-summary-name <i>INSTANCE</i>	[Function]
Package [data-frame], page 9,	
Source [summary.lisp], page 6, (file)	

- bit-variable-summary-p** *OBJECT* [Function]
Package [data-frame], page 9,
Source [summary.lisp], page 6, (file)
- column-type-format** *SEQUENCE* [Function]
 Return a format string for the most specific type found in sequence Use this for sequences of type T to determine how to format the column.
Package [data-frame], page 9,
Source [pprint.lisp], page 5, (file)
- copy-bit-variable-summary** *INSTANCE* [Function]
Package [data-frame], page 9,
Source [summary.lisp], page 6, (file)
- copy-factor-variable-summary** *INSTANCE* [Function]
Package [data-frame], page 9,
Source [summary.lisp], page 6, (file)
- copy-generic-variable-summary** *INSTANCE* [Function]
Package [data-frame], page 9,
Source [summary.lisp], page 6, (file)
- copy-ordered-keys** *ORDERED-KEYS* [Function]
Package [data-frame], page 9,
Source [data-frame.lisp], page 3, (file)
- copy-real-variable-summary** *INSTANCE* [Function]
Package [data-frame], page 9,
Source [summary.lisp], page 6, (file)
- copy-variable-summary%** *INSTANCE* [Function]
Package [data-frame], page 9,
Source [summary.lisp], page 6, (file)
- distinct** *COLUMN* [Function]
 Returns the number of distinct elements in COLUMN Useful for formatting columns for human output
Package [data-frame], page 9,
Source [summary.lisp], page 6, (file)
- drop-na** *DF* [Function]
 Remove all rows from DF that are missing values. Convenience R-like function.
Package [data-frame], page 9,
Source [missing.lisp], page 8, (file)

- ensure-arguments-alist** *REST* [Function]
Recognizes the following and converts them to an alist:
plist
alist
(plist)
(alist)
(data-frame)
Package [data-frame], page 9,
Source [data-frame.lisp], page 3, (file)
- ensure-not-ratio** *REAL* [Function]
When REAL is a RATIO, convert it to a float, otherwise return as is. Used for printing.
Package [data-frame], page 9,
Source [summary.lisp], page 6, (file)
- factor-variable-summary-desc** *INSTANCE* [Function]
Package [data-frame], page 9,
Source [summary.lisp], page 6, (file)
- factor-variable-summary-element-count-alist** *INSTANCE* [Function]
Package [data-frame], page 9,
Source [summary.lisp], page 6, (file)
- factor-variable-summary-length** *INSTANCE* [Function]
Package [data-frame], page 9,
Source [summary.lisp], page 6, (file)
- factor-variable-summary-missing** *INSTANCE* [Function]
Package [data-frame], page 9,
Source [summary.lisp], page 6, (file)
- factor-variable-summary-name** *INSTANCE* [Function]
Package [data-frame], page 9,
Source [summary.lisp], page 6, (file)
- factor-variable-summary-p** *OBJECT* [Function]
Package [data-frame], page 9,
Source [summary.lisp], page 6, (file)
- generic-variable-summary-desc** *INSTANCE* [Function]
Package [data-frame], page 9,
Source [summary.lisp], page 6, (file)
- generic-variable-summary-element-count-alist** *INSTANCE* [Function]
Package [data-frame], page 9,
Source [summary.lisp], page 6, (file)

- generic-variable-summary-length** *INSTANCE* [Function]
Package [data-frame], page 9,
Source [summary.lisp], page 6, (file)
- generic-variable-summary-missing** *INSTANCE* [Function]
Package [data-frame], page 9,
Source [summary.lisp], page 6, (file)
- generic-variable-summary-name** *INSTANCE* [Function]
Package [data-frame], page 9,
Source [summary.lisp], page 6, (file)
- generic-variable-summary-p** *OBJECT* [Function]
Package [data-frame], page 9,
Source [summary.lisp], page 6, (file)
- generic-variable-summary-quantiles** *INSTANCE* [Function]
Package [data-frame], page 9,
Source [summary.lisp], page 6, (file)
- get-type** *X* [Function]
Return the most specific type symbol for x
Package [data-frame], page 9,
Source [utils.lisp], page 3, (file)
- guess-alist?** *PLIST-OR-ALIST* [Function]
Test if the argument is an ALIST by checking its first element. Used for deciding which creation function to call.
Package [data-frame], page 9,
Source [data-frame.lisp], page 3, (file)
- key-index** *ORDERED-KEYS KEY* [Function]
Return the index for KEY.
Package [data-frame], page 9,
Source [data-frame.lisp], page 3, (file)
- keys-count** *ORDERED-KEYS* [Function]
Number of keys.
Package [data-frame], page 9,
Source [data-frame.lisp], page 3, (file)
- keys-vector** *ORDERED-KEYS* [Function]
Vector of all keys.
Package [data-frame], page 9,
Source [data-frame.lisp], page 3, (file)

- make-bit-variable-summary** *&key (LENGTH LENGTH) (MISSING MISSING) (NAME NAME) (DESC DESC) (COUNT COUNT)* [Function]
Package [data-frame], page 9,
Source [summary.lisp], page 6, (file)
- make-data** *CLASS KEYS COLUMNS* [Function]
 Create a DATA object from KEYS and COLUMNS. FOR INTERNAL USE. Always creates a copy of COLUMNS in order to ensure that it is an adjustable array with a fill pointer. KEYS are converted to ORDERED-KEYS if necessary.
Package [data-frame], page 9,
Source [data-frame.lisp], page 3, (file)
- make-factor-variable-summary** *&key (LENGTH LENGTH) (MISSING MISSING) (NAME NAME) (DESC DESC) (ELEMENT-COUNT-ALIST ELEMENT-COUNT-ALIST)* [Function]
Package [data-frame], page 9,
Source [summary.lisp], page 6, (file)
- make-generic-variable-summary** *&key (LENGTH LENGTH) (MISSING MISSING) (NAME NAME) (DESC DESC) (QUANTILES QUANTILES) (ELEMENT-COUNT-ALIST ELEMENT-COUNT-ALIST)* [Function]
Package [data-frame], page 9,
Source [summary.lisp], page 6, (file)
- make-ordered-keys** *&key (TABLE TABLE)* [Function]
Package [data-frame], page 9,
Source [data-frame.lisp], page 3, (file)
- make-real-variable-summary** *&key (LENGTH LENGTH) (MISSING MISSING) (NAME NAME) (DESC DESC) (MIN MIN) (Q25 Q25) (Q50 Q50) (MEAN MEAN) (Q75 Q75) (MAX MAX)* [Function]
Package [data-frame], page 9,
Source [summary.lisp], page 6, (file)
- make-variable-summary%** *&key (LENGTH LENGTH) (MISSING MISSING) (NAME NAME) (DESC DESC)* [Function]
Package [data-frame], page 9,
Source [summary.lisp], page 6, (file)
- max-decimal** *SEQUENCE &optional MAX-DIGITS* [Function]
 Return the maximum number of digits to the right of the decimal point in the numbers of SEQUENCE, equal to or less than MAX-DIGITS
Package [data-frame], page 9,
Source [pprint.lisp], page 5, (file)
- max-width** *SEQUENCE &optional MAX-WIDTH* [Function]
 Return the largest printed string size of the elements of SEQUENCE, equal to or less than MAX-WIDTH
Package [data-frame], page 9,
Source [pprint.lisp], page 5, (file)

- monotonincp** *COLUMN* [Function]
 Returns *t* if all elements of *COLUMN* are increasing monotonically Useful for detecting row numbers in imported data
Package [data-frame], page 9,
Source [summary.lisp], page 6, (file)
- ordered-keys** *KEYS* [Function]
 Create an ORDERED-KEYS object from *KEYS* (a sequence).
Package [data-frame], page 9,
Source [data-frame.lisp], page 3, (file)
- ordered-keys-p** *OBJECT* [Function]
Package [data-frame], page 9,
Source [data-frame.lisp], page 3, (file)
- ordered-keys-table** *INSTANCE* [Function]
Package [data-frame], page 9,
Source [data-frame.lisp], page 3, (file)
- plist-data** *CLASS PLIST* [Function]
 Create an object of *CLASS* (subclass of *DATA*) from *PLIST* which contains keys and columns, interleaved.
Package [data-frame], page 9,
Source [data-frame.lisp], page 3, (file)
- print-count-and-percentage** *STREAM COUNT LENGTH* [Function]
 Print *COUNT* as is and also as a rounded percentage of
Package [data-frame], page 9,
Source [summary.lisp], page 6, (file)
- print-table** *ROWS &optional STREAM* [Function]
 Print ‘rows’ as a nicely-formatted table.
 Each row should have the same number of colums.
 Columns will be justified properly to fit the longest item in each one. Example:
 (print-table ‘((1 :red something)
 (2 :green more)))
 =>
 1 | RED | SOMETHING
 2 | GREEN | MORE

Package [data-frame], page 9,
Source [formatted-output.lisp], page 5, (file)
- printer-status** () [Function]
 Print values of all the printer variables
Package [data-frame], page 9,
Source [pprint.lisp], page 5, (file)

<code>real-variable-summary-desc</code>	<i>INSTANCE</i>	[Function]
Package	[data-frame], page 9,	
Source	[summary.lisp], page 6, (file)	
<code>real-variable-summary-length</code>	<i>INSTANCE</i>	[Function]
Package	[data-frame], page 9,	
Source	[summary.lisp], page 6, (file)	
<code>real-variable-summary-max</code>	<i>INSTANCE</i>	[Function]
Package	[data-frame], page 9,	
Source	[summary.lisp], page 6, (file)	
<code>real-variable-summary-mean</code>	<i>INSTANCE</i>	[Function]
Package	[data-frame], page 9,	
Source	[summary.lisp], page 6, (file)	
<code>real-variable-summary-min</code>	<i>INSTANCE</i>	[Function]
Package	[data-frame], page 9,	
Source	[summary.lisp], page 6, (file)	
<code>real-variable-summary-missing</code>	<i>INSTANCE</i>	[Function]
Package	[data-frame], page 9,	
Source	[summary.lisp], page 6, (file)	
<code>real-variable-summary-name</code>	<i>INSTANCE</i>	[Function]
Package	[data-frame], page 9,	
Source	[summary.lisp], page 6, (file)	
<code>real-variable-summary-p</code>	<i>OBJECT</i>	[Function]
Package	[data-frame], page 9,	
Source	[summary.lisp], page 6, (file)	
<code>real-variable-summary-q25</code>	<i>INSTANCE</i>	[Function]
Package	[data-frame], page 9,	
Source	[summary.lisp], page 6, (file)	
<code>real-variable-summary-q50</code>	<i>INSTANCE</i>	[Function]
Package	[data-frame], page 9,	
Source	[summary.lisp], page 6, (file)	
<code>real-variable-summary-q75</code>	<i>INSTANCE</i>	[Function]
Package	[data-frame], page 9,	
Source	[summary.lisp], page 6, (file)	
<code>reverse-df</code>	<i>DF</i>	[Function]
Return DF with columns in reverse order		
Package	[data-frame], page 9,	
Source	[pprint.lisp], page 5, (file)	

- show-properties** *DF* [Function]
 Show the standard properties of the variables of the data frame *DF* Standard properties are 'label', 'type' and 'unit'
- Package** [data-frame], page 9,
Source [properties.lisp], page 8, (file)
- show-symbols** *PKG* [Function]
 Print all symbols in *PKG* Example: (show-symbols 'mtcars)
- Package** [data-frame], page 9,
Source [defdf.lisp], page 7, (file)
- summarize-factor-variable** *COLUMN* [Function]
 Return an alist of factor/count pairs
- Package** [data-frame], page 9,
Source [summary.lisp], page 6, (file)
- summarize-generic-variable** *COLUMN* [Function]
 Return an object that summarizes *COLUMN* of a DATA-FRAME. Primarily intended for printing, not analysis, returned values should print nicely. This function can be used on any type of column, even one with mixed types
- Package** [data-frame], page 9,
Source [summary.lisp], page 6, (file)
- summarize-real-variable** *COLUMN* [Function]
 Return a summary for a float variable
- Package** [data-frame], page 9,
Source [summary.lisp], page 6, (file)
- sym-mac** *DF VAR* [Function]
 Return the symbol macro for *VAR* in the DATA-FRAME *DF*
- Package** [data-frame], page 9,
Source [properties.lisp], page 8, (file)
- types-in-column** *SEQ* [Function]
 Return a list of the types found in *SEQ*
- Package** [data-frame], page 9,
Source [utils.lisp], page 3, (file)
- undef-column-names** *DF* [Function]
 Remove symbol macro for each column name in *DF*
- Package** [data-frame], page 9,
Source [defdf.lisp], page 7, (file)
- var-name** *VAR* [Function]
 Return the name of the variable without the symbol-macro prefix Example: (var-name mtcars\$mpg) returns 'mpg'
- Package** [data-frame], page 9,
Source [properties.lisp], page 8, (file)

<code>variable-summary%-desc</code>	<i>INSTANCE</i>	[Function]
Package	[data-frame], page 9,	
Source	[summary.lisp], page 6, (file)	
<code>variable-summary%-length</code>	<i>INSTANCE</i>	[Function]
Package	[data-frame], page 9,	
Source	[summary.lisp], page 6, (file)	
<code>variable-summary%-missing</code>	<i>INSTANCE</i>	[Function]
Package	[data-frame], page 9,	
Source	[summary.lisp], page 6, (file)	
<code>variable-summary%-name</code>	<i>INSTANCE</i>	[Function]
Package	[data-frame], page 9,	
Source	[summary.lisp], page 6, (file)	
<code>variable-summary%-p</code>	<i>OBJECT</i>	[Function]
Package	[data-frame], page 9,	
Source	[summary.lisp], page 6, (file)	
<code>weave &rest</code>	<i>LISTS</i>	[Function]
Return a list whose elements alternate between each of the lists ‘lists’. Weaving stops when any of the lists has been exhausted.		
Package	[data-frame], page 9,	
Source	[formatted-output.lisp], page 5, (file)	

4.2.4 Generic functions

<code>check-column-compatibility</code>	<i>DATA COLUMN</i>	[Generic Function]
Check if COLUMN is compatible with DATA.		
Package	[data-frame], page 9,	
Source	[data-frame.lisp], page 3, (file)	
Methods		
	<code>check-column-compatibility (DATA data-frame)</code>	[Method]
	<i>COLUMN</i>	
	<code>check-column-compatibility (DATA data) COLUMN</code>	[Method]
<code>column-length</code>	<i>COLUMN</i>	[Generic Function]
Return the length of column.		
Package	[data-frame], page 9,	
Source	[summary.lisp], page 6, (file)	
Methods		
	<code>column-length (COLUMN vector)</code>	[Method]
<code>default-column-formats</code>	<i>ARRAY</i>	[Generic Function]
Package	[data-frame], page 9,	
Methods		

default-column-formats (*ARRAY* simple-array) [Method]
 Return a list of formatting strings for *ARRAY*
 The method returns a set of default formatting strings using heuristics.
Source [pprint.lisp], page 5, (file)

4.2.5 Structures

ordered-keys () [Structure]
 Representation of ordered keys.

TABLE maps keys to indexes, starting from zero.

Package [data-frame], page 9,
Source [data-frame.lisp], page 3, (file)

Direct superclasses
 structure-object (structure)

Direct methods

- print-object (method)
- select (method)
- canonical-representation (method)
- axis-dimension (method)

Direct slots

table	[Slot]
Type	hash-table
Initform	(make-hash-table :test (function eq))
Readers	[ordered-keys-table], page 32, (function)
Writers	(setf ordered-keys-table) (function)

variable-summary% () [Structure]
 Base class for summarizing variables. Not exported.

Package [data-frame], page 9,
Source [summary.lisp], page 6, (file)

Direct superclasses
 structure-object (structure)

Direct subclasses

- [bit-variable-summary], page 23, (structure)
- [real-variable-summary], page 24, (structure)
- [factor-variable-summary], page 23, (structure)
- [generic-variable-summary], page 24, (structure)

Direct slots

length	[Slot]
Type	alexandria:array-index
Initform	0
Readers	[variable-summary%-length], page 35, (function)
Writers	(setf variable-summary%-length) (function)

missing		[Slot]
Type	fixnum	
Initform	0	
Readers	[variable-summary%-missing], page 35, (function)	
Writers	(setf variable-summary%-missing) (function)	
name		[Slot]
Type	string	
Initform	""	
Readers	[variable-summary%-name], page 35, (function)	
Writers	(setf variable-summary%-name) (function)	
desc		[Slot]
Type	string	
Initform	""	
Readers	[variable-summary%-desc], page 35, (function)	
Writers	(setf variable-summary%-desc) (function)	

4.2.6 Classes

data () [Class]

This class is used for implementing both data-vector and data-matrix, and represents an ordered collection of key-column pairs. Columns are not assumed to have any specific attributes. This class is not exported.

Package [data-frame], page 9,

Source [data-frame.lisp], page 3, (file)

Direct superclasses

standard-object (class)

Direct subclasses

- [data-vector], page 26, (class)
- [data-frame], page 25, (class)

Direct methods

- as-alist (method)
- [check-column-compatibility], page 35, (method)
- element-type (method)
- doc-string (method)
- [doc-string], page 21, (method)
- name (method)
- [name], page 22, (method)

Direct slots

name		[Slot]
Type	string	
Initargs	nil	
Readers	[name], page 22, (generic function)	
Writers	[(setf name)], page 22, (generic function)	

<code>ordered-keys</code>		[Slot]
Type	<code>data-frame::ordered-keys</code>	
Initargs	<code>:ordered-keys</code>	
<code>columns</code>		[Slot]
Type	<code>vector</code>	
Initargs	<code>:columns</code>	
<code>doc-string</code>		[Slot]
Type	<code>string</code>	
Initargs	<code>:nil</code>	
Readers	<code>[doc-string]</code> , page 21, (generic function)	
Writers	<code>[(setf doc-string)]</code> , page 21, (generic function)	

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