Package ‘dm’

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Title  Relational Data Models
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Description  Provides tools for working with multiple related tables, stored as data frames or in a relational database. Multiple tables (data and metadata) are stored in a compound object, which can then be manipulated with a pipe-friendly syntax.
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BugReports  https://github.com/cynkra/dm/issues
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check_key

Description

check_key() accepts a data frame and, optionally, columns. It throws an error if the specified columns are NOT a unique key of the data frame. If the columns given in the ellipsis ARE a key, the data frame itself is returned silently, so that it can be used for piping.
Usage

check_key(x, ..., .data = deprecated())

Arguments

x              The data frame whose columns should be tested for key properties.
...
                   The names of the columns to be checked, processed with dplyr::select(). If omitted, all columns will be checked.
.data          Deprecated.

Value

Returns x, invisibly, if the check is passed. Otherwise an error is thrown and the reason for it is explained.

Examples

data <- tibble(a = c(1, 2, 1), b = c(1, 4, 1), c = c(5, 6, 7))
# this is failing:
try(check_key(data, a, b))

# this is passing:
check_key(data, a, c)
check_key(data)

check_set_equality  Check column values for set equality

Description

check_set_equality() is a wrapper of check_subset().

It tests if one table is a subset of another and vice versa, i.e., if both sets are the same. If not, it throws an error.

Usage

check_set_equality(
  x,
  y,
  ...,          
  x_select = NULL,
  y_select = NULL,
  by_position = NULL
)
check_subset

Arguments

x, y  A data frame or lazy table.
...  These dots are for future extensions and must be empty.
x_select, y_select  Key columns to restrict the check, processed with `dplyr::select()`.
by_position  Set to `TRUE` to ignore column names and match by position instead. The default means matching by name, use `x_select` and/or `y_select` to align the names.

Value

Returns `x`, invisibly, if the check is passed. Otherwise an error is thrown and the reason for it is explained.

Examples

data_1 <- tibble::tibble(a = c(1, 2, 1), b = c(1, 4, 1), c = c(5, 6, 7))
data_2 <- tibble::tibble(a = c(1, 2, 3), b = c(4, 5, 6), c = c(7, 8, 9))
# this is failing:
try(check_set_equality(data_1, data_2, x_select = a, y_select = a))

data_3 <- tibble::tibble(a = c(2, 1, 2), b = c(4, 5, 6), c = c(7, 8, 9))
# this is passing:
check_set_equality(data_1, data_3, x_select = a, y_select = a)
# this is still failing:
try(check_set_equality(data_2, data_3))

check_subset  Check column values for subset

Description

`check_subset()` tests if `x` is a subset of `y`. For convenience, the `x_select` and `y_select` arguments allow restricting the check to a set of key columns without affecting the return value.

Usage

`check_subset(x, y, ..., x_select = NULL, y_select = NULL, by_position = NULL)`

Arguments

x, y  A data frame or lazy table.
...  These dots are for future extensions and must be empty.
x_select, y_select  Key columns to restrict the check, processed with `dplyr::select()`.
by_position  Set to `TRUE` to ignore column names and match by position instead. The default means matching by name, use `x_select` and/or `y_select` to align the names.
Value

Returns `x`, invisibly, if the check is passed. Otherwise an error is thrown and the reason for it is explained.

Examples

data_1 <- tibble::tibble(a = c(1, 2, 1), b = c(1, 4, 1), c = c(5, 6, 7))
data_2 <- tibble::tibble(a = c(1, 2, 3), b = c(4, 5, 6), c = c(7, 8, 9))
# this is passing:
check_subset(data_1, data_2, x_select = a, y_select = a)

# this is failing:
try(check_subset(data_2, data_1))

copy_dm_to

Copy data model to data source

Description

copy_dm_to() takes a `dplyr::src_dbi` object or a `DBI::DBIConnection` object as its first argument and a `dm` object as its second argument. The latter is copied to the former. The default is to create temporary tables, set `temporary = FALSE` to create permanent tables. Unless `set_key_constraints` is `FALSE`, primary key constraints are set on all databases, and in addition foreign key constraints are set on MSSQL and Postgres databases.

Usage

copy_dm_to(
  dest,
  dm,
  ..., 
  types = NULL,
  overwrite = NULL,
  indexes = NULL,
  unique_indexes = NULL,
  set_key_constraints = TRUE,
  unique_table_names = NULL,
  table_names = NULL,
  temporary = TRUE,
  schema = NULL,
  progress = NA,
  copy_to = NULL
)
Arguments

**dest**
An object of class "src" or "DBIConnection".

**dm**
A dm object.

... Passed on to dplyr::copy_to() or to the function specified by the copy_to argument.

**overwrite, types, indexes, unique_indexes**
Must remain NULL.

**set_key_constraints**
If TRUE will mirror dm primary and foreign key constraints on a database and create unique indexes. Set to FALSE if your data model currently does not satisfy primary or foreign key constraints.

**unique_table_names**
Deprecated.

**table_names**
Desired names for the tables on dest; the names within the dm remain unchanged. Can be NULL, a named character vector, a function or a one-sided formula.

If left NULL (default), the names will be determined automatically depending on the temporary argument:

1. temporary = TRUE (default): unique table names based on the names of the tables in the dm are created.
2. temporary = FALSE: the table names in the dm are used as names for the tables on dest.

If a function or one-sided formula, table_names is converted to a function using \texttt{rlang::as_function()}. This function is called with the unquoted table names of the dm object as the only argument. The output of this function is processed by \texttt{DBI::dbQuoteIdentifier()}, that result should be a vector of identifiers of the same length as the original table names.

Use a variant of \texttt{table_names = ~ DBI::SQL(paste0("schema_name", ", ", .x))} to specify the same schema for all tables. Use \texttt{table_names = identity} with \texttt{temporary = TRUE} to avoid giving temporary tables unique names.

If a named character vector, the names of this vector need to correspond to the table names in the dm, and its values are the desired names on dest. The value is processed by \texttt{DBI::dbQuoteIdentifier()}, that result should be a vector of identifiers of the same length as the original table names.

Use qualified names corresponding to your database's syntax to specify e.g. database and schema for your tables.

**temporary**
If TRUE, only temporary tables will be created. These tables will vanish when disconnecting from the database.

**schema**
Name of schema to copy the dm to. If schema is provided, an error will be thrown if \texttt{temporary = FALSE} or \texttt{table_names} is not NULL.

Not all DBMS are supported.

**progress**
Whether to display a progress bar, if \texttt{NA} (the default) hide in non-interactive mode, show in interactive mode. Requires the 'progress' package.
copy_to

By default, `dplyr::copy_to()` is called to upload the individual tables to the target data source. This argument allows overriding the standard behavior in cases when the default does not work as expected, such as spatial data frames or other tables with special data types. If not `NULL`, this argument is processed with `rlang::as_function()`.

Details

No tables will be overwritten; passing `overwrite = TRUE` to the function will give an error. Types are determined separately for each table, setting the `types` argument will also throw an error. The arguments are included in the signature to avoid passing them via the `...` ellipsis.

Value

A `dm` object on the given `src` with the same table names as the input `dm`.

Examples

```r
con <- DBI::dbConnect(RSQLite::SQLite())

# Copy to temporary tables, unique table names by default:
temp_dm <- copy_dm_to(
  con,
  dm_nycflights13(),
  set_key_constraints = FALSE
)

# Persist, explicitly specify table names:
persistent_dm <- copy_dm_to(
  con,
  dm_nycflights13(),
  temporary = FALSE,
  table_names = ~ paste0("flights_", .x)
)
dbplyr::remote_name(persistent_dm$planes)

DBI::dbDisconnect(con)
```

---

db_schema_create

Create a schema on a database

Description

[Experimental]

db_schema_create() creates a schema on the database.
Usage

db_schema_create(con, schema, ...)

Arguments

con An object of class "src" or "DBIConnection".
schema Class character or SQL (cf. Details), name of the schema
... Passed on to the individual methods.

Details

Methods are not available for all DBMS.
An error is thrown if a schema of that name already exists.
The argument schema (and dbname for MSSQL) can be provided as SQL objects. Keep in mind, that in this case it is assumed that they are already correctly quoted as identifiers using DBI::dbQuoteIdentifier(). Additional arguments are:

• dbname: supported for MSSQL. Create a schema in a different database on the connected MSSQL-server; default: database addressed by con.

Value

NULL invisibly.

See Also

Other schema handling functions: db_schema_drop(), db_schema_exists(), db_schema_list()

---

**db_schema_drop**

Remove a schema from a database

Description

[Experimental]

db_schema_drop() deletes a schema from the database. For certain DBMS it is possible to force the removal of a non-empty schema, see below.

Usage

db_schema_drop(con, schema, force = FALSE, ...)

**Arguments**

- **con**: An object of class "src" or "DBIConnection".
- **schema**: Class character or SQL (cf. Details), name of the schema
- **force**: Boolean, default FALSE. Set to TRUE to drop a schema and all objects it contains at once. Currently only supported for Postgres.
- ... Passed on to the individual methods.

**Details**

Methods are not available for all DBMS.
An error is thrown if no schema of that name exists.
The argument schema (and dbname for MSSQL) can be provided as SQL objects. Keep in mind, that in this case it is assumed that they are already correctly quoted as identifiers.
Additional arguments are:

- **dbname**: supported for MSSQL. Remove a schema from a different database on the connected MSSQL-server; default: database addressed by con.

**Value**

NULL invisibly.

**See Also**

Other schema handling functions: `db_schema_create()`, `db_schema_exists()`, `db_schema_list()`

---

**db_schema_exists**  
Check for existence of a schema on a database

**Description**

[Experimental]

`db_schema_exists()` checks, if a schema exists on the database.

**Usage**

`db_schema_exists(con, schema, ...)`

**Arguments**

- **con**: An object of class "src" or "DBIConnection".
- **schema**: Class character or SQL, name of the schema
- ... Passed on to the individual methods.
**db_schema_list**

**Description**

[Experimental]

db_schema_list() lists the available schemas on the database.

**Usage**

```
db_schema_list(con, include_default = TRUE, ...)
```

**Arguments**

- **con**: An object of class "src" or "DBIConnection".
- **include_default**: Boolean, if TRUE (default), also the default schema on the database is included in the result.
- **...**: Passed on to the individual methods.

**Details**

Methods are not available for all DBMS.

Additional arguments are:

- **dbname**: supported for MSSQL. List schemas on a different database on the connected MSSQL-server; default: database addressed by con.
decompose_table

Value
A tibble with the following columns:

- `schema_name`: the names of the schemas,
- `schema_owner`: the schema owner names.

See Also
Other schema handling functions: `db_schema_create()`, `db_schema_drop()`, `db_schema_exists()`

---

**decompose_table**  
Decompose a table into two linked tables

Description

*Experimental*
Perform table surgery by extracting a 'parent table' from a table, linking the original table and the new table by a key, and returning both tables.

decompose_table() accepts a data frame, a name for the 'ID column' that will be newly created, and the names of the columns that will be extracted into the new data frame.

It creates a 'parent table', which consists of the columns specified in the ellipsis, and a new 'ID column'. Then it removes those columns from the original table, which is now called the 'child table, and adds the 'ID column'.

Usage

decompose_table(.data, new_id_column, ...)

Arguments

- **.data**: Data frame from which columns ... are to be extracted.
- **new_id_column**: Name of the identifier column (primary key column) for the parent table. A column of this name is also added in 'child table'.
- **...**: The columns to be extracted from the .data.

One or more unquoted expressions separated by commas. You can treat variable names as if they were positions, so you can use expressions like x:y to select ranges of variables.

The arguments in ... are automatically quoted and evaluated in a context where column names represent column positions. They also support unquoting and splicing. See vignette("programming") for an introduction to those concepts.

See select helpers for more details, and the examples about tidyselect helpers, such as starts_with(), everything(), ...
Value

A named list of length two:

- entry "child_table": the child table with column new_id_column referring to the same column in parent_table,
- entry "parent_table": the "lookup table" for child_table.

Life cycle

This function is marked "experimental" because it seems more useful when applied to a table in a dm object. Changing the interface later seems harmless because these functions are most likely used interactively.

See Also

Other table surgery functions: reunite_parent_child()

Examples

decomposed_table <- decompose_table(mtcars, new_id, am, gear, carb)
decomposed_table$child_table
decomposed_table$parent_table
Usage

```r
dm(
  ..., .name_repair = c("check_unique", "unique", "universal", "minimal"),
  .quiet = FALSE
)
```

```r
new_dm(tables = list())
```

```r
is_dm(x)
```

```r
as_dm(x, ...)
```

Arguments

... Tables or existing `dm` objects to add to the `dm` object. Unnamed tables are automatically named, `dm` objects must not be named.

```r
.name_repair, .quiet
```

Options for name repair. Forwarded as `repair` and `quiet` to `vctrs::vec_as_names()`.

```r
tables
```

A named list of the tables (tibble-objects, not names), to be included in the `dm` object.

```r
x
```

An object.

Value

For `dm()`, `new_dm()`, `as_dm()`: A `dm` object.

For `is_dm()`: A scalar logical, `TRUE` if is this object is a `dm`.

See Also

- `dm_from_con()` for connecting to all tables in a database and importing the primary and foreign keys
- `dm_get_tables()` for returning a list of tables
- `dm_add_pk()` and `dm_add_fk()` for adding primary and foreign keys
- `copy_dm_to()` for DB interaction
- `dm_draw()` for visualization
- `dm_flatten_to_tbl()` for flattening
- `dm_filter()` for filtering
- `dm_select_tbl()` for creating a `dm` with only a subset of the tables
- `dm_nycflights13()` for creating an example `dm` object
- `decompose_table()` for table surgery
- `check_key()` and `check_subset()` for checking for key properties
- `examine_cardinality()` for checking the cardinality of the relation between two tables
Examples

```r
dm(trees, mtcars)
new_dm(list(trees = trees, mtcars = mtcars))
as_dm(list(trees = trees, mtcars = mtcars))

is_dm(dm_nycflights13())
dm_nycflights13()$airports
dm_nycflights13()["airports"]
dm_nycflights13()[["airports"]]
dm_nycflights13() %>% names()

library(dm)
library(nycflights13)

# using `data.frame` objects
new_dm(tibble::lst(weather, airports))

# using `dm_keyed_tbl` objects
dm <- dm_nycflights13()
y1 <- dm$planes %>%
    mutate() %>%
    select(everything())
y2 <- dm$flights %>%
    left_join(dm$airlines, by = "carrier")

new_dm(list("tbl1" = y1, "tbl2" = y2))
```

---

`dm_add_fk`  

*Add foreign keys*

**Description**

`dm_add_fk()` marks the specified columns as the foreign key of table `table` with respect to a key of table `ref_table`. Usually the referenced columns are a primary key in `ref_table`, it is also possible to specify other columns via the `ref_columns` argument. If `check == TRUE`, then it will first check if the values in columns are a subset of the values of the key in table `ref_table`.

**Usage**

```r
dm_add_fk(
    dm,
```
Table, columns, ref_table, ref_columns = NULL, ...
check = FALSE, on_delete = c("no_action", "cascade")
)

Arguments

dm
A dm object.
table
A table in the dm.
columns
The columns of table which are to become the foreign key columns that reference ref_table. To define a compound key, use c(col1, col2).
ref_table
The table which table will be referencing.
ref_columns
The column(s) of table which are to become the referenced column(s) in ref_table. By default, the primary key is used. To define a compound key, use c(col1, col2).
...
These dots are for future extensions and must be empty.
check
Boolean, if TRUE, a check will be performed to determine if the values of columns are a subset of the values of the key column(s) of ref_table.
on_delete
[Experimental]
Defines behavior if a row in the parent table is deleted. - "no_action", the default, means that no action is taken and the operation is aborted if child rows exist - "cascade" means that the child row is also deleted. This setting is picked up by copy_dm_to() with set_key_constraints = TRUE, and might be considered by dm_rows_delete() in a future version.

Value
An updated dm with an additional foreign key relation.

See Also
Other foreign key functions: dm_enum_fk_candidates(), dm_get_all_fks(), dm_rm_fk()

Examples

nycflights_dm <- dm(
  planes = nycflights13::planes,
  flights = nycflights13::flights,
  weather = nycflights13::weather
)
nycflights_dm %>%
  dm_draw()
# Create foreign keys:
```
nycflights_dm %>%
  dm_add_pk(planes, tailnum) %>%
  dm_add_fk(flights, tailnum, planes) %>%
  dm_add_pk(weather, c(origin, time_hour)) %>%
  dm_add_fk(flights, c(origin, time_hour), weather) %>%
  dm_draw()
```

# Keys can be checked during creation:
```
try(
  nycflights_dm %>%
  dm_add_pk(planes, tailnum) %>%
  dm_add_fk(flights, tailnum, planes, check = TRUE)
)
```

---

**dm_add_pk**

Add a primary key

**Description**

`dm_add_pk()` marks the specified columns as the primary key of the specified table. If `check` == `TRUE`, then it will first check if the given combination of columns is a unique key of the table. If `force` == `TRUE`, the function will replace an already set key, without altering foreign keys previously pointing to that primary key.

**Usage**

```
dm_addPk(dm, table, columns, ..., check = FALSE, force = FALSE)
```

**Arguments**

- `dm`: A `dm` object.
- `table`: A table in the `dm`.
- `columns`: Table columns, unquoted. To define a compound key, use `c(col1, col2)`.
- `...`: These dots are for future extensions and must be empty.
- `check`: Boolean, if `TRUE`, a check is made if the combination of columns is a unique key of the table.
- `force`: Boolean, if `FALSE` (default), an error will be thrown if there is already a primary key set for this table. If `TRUE`, a potential old `pk` is deleted before setting a new one.

**Value**

An updated `dm` with an additional primary key.
See Also

Other primary key functions: `dm_get_all_pks()`, `dm_has_pk()`, `dm_rm_pk()`, `enum_pk_candidates()`

Examples

```r
nycflights_dm <- dm(
  planes = nycflights13::planes,
  airports = nycflights13::airports,
  weather = nycflights13::weather
)

nycflights_dm %>%
  dm_draw()

# Create primary keys:
  nycflights_dm %>%
    dm_add_pk(planes, tailnum) %>%
    dm_add_pk(airports, faa, check = TRUE) %>%
    dm_add_pk(weather, c(origin, time_hour)) %>%
    dm_draw()

# Keys can be checked during creation:
try(
  nycflights_dm %>%
    dm_add_pk(planes, manufacturer, check = TRUE)
)
```

---

**dm_deconstruct**

Create code to deconstruct a dm object

---

**Description**

[Experimental]

Emits code that assigns each table in the dm to a variable, using `pull_tbl()` with `keyed = TRUE`. These tables retain information about primary and foreign keys, even after data transformations, and can be converted back to a dm object with `dm()`.

**Usage**

```r
dm_deconstruct(dm, dm_name = NULL)
```

**Arguments**

- `dm` A dm object.
- `dm_name` The code to use to access the dm object, by default the expression passed to this function.
dm_disambiguate_cols

Value

This function is called for its side effect of printing generated code.

Examples

dm <- dm_nycflights13()
dm_deconstruct(dm)
airlines <- pull_tbl(dm, "airlines", keyed = TRUE)
airports <- pull_tbl(dm, "airports", keyed = TRUE)
flights <- pull_tbl(dm, "flights", keyed = TRUE)
planes <- pull_tbl(dm, "planes", keyed = TRUE)
weather <- pull_tbl(dm, "weather", keyed = TRUE)
by_origin <-
  flights %>%
  group_by(origin) %>%
  summarize(mean_arr_delay = mean(arr_delay, na.rm = TRUE)) %>%
  ungroup()
by_origin
dm(airlines, airports, flights, planes, weather, by_origin) %>%
dm_draw()

dm_disambiguate_cols  Resolve column name ambiguities

Description

This function ensures that all columns in a dm have unique names.

Usage

dm_disambiguate_cols(
  dm,
  .sep = ".",
  ..., 
  .quiet = FALSE, 
  .position = c("suffix", "prefix") 
)

Arguments

dm  A dm object.
.sep  The character variable that separates the names of the table and the names of the ambiguous columns.
...  These dots are for future extensions and must be empty.
.quiet  Boolean. By default, this function lists the renamed columns in a message, pass TRUE to suppress this message.
By default, table names are appended to the column names to resolve conflicts. Prepending table names was the default for versions before 1.0.0, use "prefix" to achieve this behavior.

Details

The function first checks if there are any column names that are not unique. If there are, those columns will be assigned new, unique, names by prefixing their existing name with the name of their table and a separator. Columns that act as primary or foreign keys will not be renamed because only the foreign key column will remain when two tables are joined, making that column name "unique" as well.

Value

A dm whose column names are unambiguous.

Examples

```r
dm_nycflights13() %>%
  dm_disambiguate_cols()
```

Description

`dm_draw()` draws a diagram, a visual representation of the data model.

Usage

```r
dm_draw(
  dm,
  rankdir = "LR",
  ...
)
```

```r
``
Arguments

**dm**
A **dm** object.

**rankdir**
Graph attribute for direction (e.g., 'BT' = bottom -> top).

**...**
These dots are for future extensions and must be empty.

**col_attr**
Deprecated, use **column_types** instead.

**view_type**
Can be "keys_only" (default), "all" or "title_only". It defines the level of details for rendering tables (only primary and foreign keys, all columns, or no columns).

**columnArrows**
Edges from columns to columns (default: TRUE).

**graph_attrs**
Additional graph attributes.

**node_attrs**
Additional node attributes.

**edge_attrs**
Additional edge attributes.

**focus**
A list of parameters for rendering (table filter).

**graph_name**
The name of the graph.

**column_types**
Set to TRUE to show column types.

**backend**
Currently, only the default "DiagrammeR" is accepted. Pass this value explicitly if your code not only uses this function to display a data model but relies on the type of the return value.

Details

Currently, **dm** uses **DiagrammeR** to draw diagrams. Use **DiagrammeRsvg::export_svg()** to convert the diagram to an SVG file.

The backend for drawing the diagrams might change in the future. If you rely on DiagrammeR, pass an explicit value for the **backend** argument.

Value

An object with a **print()** method, which, when printed, produces the output seen in the viewer as a side effect. Currently, this is an object of class **grViz** (see also **DiagrammeR::grViz()**), but this is subject to change.

See Also

- **dm_set_colors()** for defining the table colors.

Examples

```r

dm_nycflights13() %>%
dm_draw()

dm_nycflights13(cycle = TRUE) %>%
dm_draw(view_type = "title_only")

head(dm_get_available_colors())
```
length(dm_get_available_colors())

dm_nycflights13() %>%
  dm_get_colors()

---

**dm_enum_fk_candidates**  *Foreign key candidates*

**Description**

[Experimental]

Determine which columns would be good candidates to be used as foreign keys of a table, to reference the primary key column of another table of the dm object.

**Usage**

```r
dm_enum_fk_candidates(dm, table, ref_table, ...)
enum_fk_candidates(dm_zoomed, ref_table, ...)
```

**Arguments**

<table>
<thead>
<tr>
<th>dm</th>
<th>A dm object.</th>
</tr>
</thead>
<tbody>
<tr>
<td>table</td>
<td>The table whose columns should be tested for suitability as foreign keys.</td>
</tr>
<tr>
<td>ref_table</td>
<td>A table with a primary key.</td>
</tr>
<tr>
<td>...</td>
<td>These dots are for future extensions and must be empty.</td>
</tr>
<tr>
<td>dm_zoomed</td>
<td>A dm with a zoomed table.</td>
</tr>
</tbody>
</table>

**Details**

`dm_enum_fk_candidates()` first checks if `ref_table` has a primary key set, if not, an error is thrown.

If `ref_table` does have a primary key, then a join operation will be tried using that key as the by argument of `join()` to match it to each column of `table`. Attempting to join incompatible columns triggers an error.

The outcome of the join operation determines the value of the `why` column in the result:

- an empty value for a column of `table` that is a suitable foreign key candidate
- the count and percentage of missing matches for a column that is not suitable
- the error message triggered for unsuitable candidates that may include the types of mismatched columns

`enum_fk_candidates()` works like `dm_enum_fk_candidates()` with the zoomed table as `table`. 
**Value**

A tibble with the following columns:

- columns: columns of table,
- candidate: boolean: are these columns a candidate for a foreign key,
- why: if not a candidate for a foreign key, explanation for this.

**Life cycle**

These functions are marked "experimental" because we are not yet sure about the interface, in particular if we need both `dm_enum...()` and `enum...()` variants. Changing the interface later seems harmless because these functions are most likely used interactively.

**See Also**

Other foreign key functions: `dm_add_fk()`, `dm_get_all_fks()`, `dm_rm_fk()`

**Examples**

```r
dm_nycflights13() %>%
  dm_enum_fk_candidates(flights, airports)

dm_nycflights13() %>%
  dm_zoom_to(flights) %>%
  enum_fk_candidates(airports)
```

**Description**

[Experimental]

This function returns a tibble with information about the cardinality of the FK constraints. The printing for this object is special, use `as_tibble()` to print as a regular tibble.

**Usage**

```r
dm_examine_cardinalities(
  .dm,
  ..., 
  .progress = NA,
  dm = deprecated(),
  progress = deprecated()
)
```
dm_examine_constraints

Arguments

.dm
A dm object.

... These dots are for future extensions and must be empty.

.progress Whether to display a progress bar, if NA (the default) hide in non-interactive mode, show in interactive mode. Requires the 'progress' package.

dm, progress [Deprecated]

Details

Uses examine_cardinality() on each foreign key that is defined in the dm.

Value

A tibble with the following columns:

  child_table  child table,
  child_fk_cols foreign key column(s) in child table as list of character vectors,
  parent_table  parent table,
  parent_key_cols key column(s) in parent table as list of character vectors,
  cardinality  the nature of cardinality along the foreign key.

See Also

Other cardinality functions: examine_cardinality()

Examples

```r
  dm_nycflights13() %>%
  dm_examine_cardinalities()
```

---

Description

This function returns a tibble with information about which key constraints are met (is_key = TRUE) or violated (FALSE). The printing for this object is special, use as_tibble() to print as a regular tibble.
Usage

dm_examine_constraints(
  .dm,
  ..., 
  .progress = NA,
  dm = deprecated(),
  progress = deprecated()
)

Arguments

.dm A dm object.

... These dots are for future extensions and must be empty.

.progress Whether to display a progress bar, if NA (the default) hide in non-interactive mode, show in interactive mode. Requires the 'progress' package.

Value

A tibble with the following columns:

table the table in the dm,
kind "PK" or "FK",
columns the table columns that define the key,
ref_table for foreign keys, the referenced table,
is_key logical,
problem if is_key = FALSE, the reason for that.

Examples

dm_nycflights13() %>%
dm_examine_constraints()
dm_filter

Filtering a table of a dm object may affect other tables that are connected to it directly or indirectly via foreign key relations.

dm_filter() can be used to define filter conditions for tables using syntax that is similar to dplyr::filter(). The filters work across related tables: The resulting dm object only contains rows that are related (directly or indirectly) to rows that remain after applying the filters on all tables.

Usage

dm_filter(.dm, ...)

Arguments

Arguments

- **.dm**: A dm object.
- **...**: Named logical predicates. The names correspond to tables in the dm object. The predicates are defined in terms of the variables in the corresponding table, they are passed on to dplyr::filter(). Multiple conditions are combined with &. Only the rows where the condition evaluates to TRUE are kept.

Details

As of dm 1.0.0, these conditions are no longer stored in the dm object, instead they are applied to all tables during the call to dm_filter(). Calling dm_apply_filters() or dm_apply_filters_to_tbl() is no longer necessary.

Use dm_zoom_to() and dplyr::filter() to filter rows without affecting related tables.

Value

An updated dm object with filters executed across all tables.

Examples

dm_nyc <- dm_nycflights13()
dm_nyc %>%
  dm_nrow()

dm_nyc_filtered <-
  dm_nycflights13() %>%
  dm_filter(airports = (name == "John F Kennedy Intl"))
dm_nyc_filtered %>%
  dm_nrow()

# If you want to keep only those rows in the parent tables
# whose primary key values appear as foreign key values in
# `flights`, you can set a `TRUE` filter in `flights`:
  dm_nyc %>%
  dm_filter(flights = (1 == 1)) %>%
  dm_nrow()

# note that in this example, the only affected table is
# `airports` because the departure airports in `flights` are
# only the three New York airports.

---

**dm_financial**

*Creates a dm object for the Financial data*

**Description**

`dm_financial()` creates an example `dm` object from the tables at https://relational.fit.cvut.cz/dataset/Financial. The connection is established once per session, subsequent calls return the same connection.

`dm_financial_sqlite()` copies the data to a temporary SQLite database. The data is downloaded once per session, subsequent calls return the same database. The `trans` table is excluded due to its size.

**Usage**

```r
  dm_financial()
```

```r
  dm_financial_sqlite()
```

**Value**

A `dm` object.

**Examples**

```r
  dm_financial() %>%
  dm_draw()
```
dm_flatten_to_tbl

Flatten a part of a dm into a wide table

Description

dm_flatten_to_tbl() gathers all information of interest in one place in a wide table. It performs a disambiguation of column names and a cascade of joins.

Usage

dm_flatten_to_tbl(dm, .start, ..., .recursive = FALSE, .join = left_join)

Arguments

dm A dm object.

.start The table from which all outgoing foreign key relations are considered when establishing a processing order for the joins. An interesting choice could be for example a fact table in a star schema.

... [Experimental] Unquoted names of the tables to be included in addition to the .start table. The order of the tables here determines the order of the joins. If the argument is empty, all tables that can be reached will be included. tidyselect is supported, see dplyr::select() for details on the semantics.

.recursive Logical, defaults to FALSE. Should not only parent tables be joined to .start, but also their ancestors?

.join The type of join to be performed, see dplyr::join().

Details

With ... left empty, this function will join together all the tables of your dm object that can be reached from the .start table, in the direction of the foreign key relations (pointing from the child tables to the parent tables), using the foreign key relations to determine the argument for the necessary joins. The result is one table with unique column names. Use the ... argument if you would like to control which tables should be joined to the .start table.

Mind that calling dm_flatten_to_tbl() with .join = right_join and no table order determined in the ... argument will not lead to a well-defined result if two or more foreign tables are to be joined to .start. The resulting table would depend on the order the tables that are listed in the dm. Therefore, trying this will result in a warning.

Since .join = nest_join does not make sense in this direction (LHS = child table, RHS = parent table: for valid key constraints each nested column entry would be a tibble of one row), an error will be thrown if this method is chosen.

The difference between .recursive = FALSE and .recursive = TRUE is the following (see the examples):

- .recursive = FALSE allows only one level of hierarchy (i.e., direct neighbors to table .start), while
\* .recursive = TRUE will go through all levels of hierarchy while joining.

Additionally, these functions differ from \texttt{dm\_wrap\_tbl()}, which always returns a dm object.

\textbf{Value}

A single table that results from consecutively joining all affected tables to the .start table.

\textbf{Examples}

\begin{verbatim}
> dmf <- dm_financial() %>%
>     dm_select_tbl(-loans) %>%
>     dm_flatten_to_tbl(.start = cards)

> dmf <- dm_financial() %>%
>     dm_select_tbl(-loans) %>%
>     dm_flatten_to_tbl(.start = cards, .recursive = TRUE)
\end{verbatim}

\textbf{dm\_from\_con} \hspace{1cm} \textit{Load a dm from a remote data source}

\textbf{Description}

\texttt{dm\_from\_con()} creates a dm from some or all tables in a src (a database or an environment) or which are accessible via a DBI-Connection. For Postgres and SQL Server databases, primary and foreign keys are imported from the database.

\textbf{Usage}

\begin{verbatim}
> dm_from_con(con = NULL, table_names = NULL, learn_keys = NULL, ...)
\end{verbatim}

\textbf{Arguments}

\begin{itemize}
  \item \texttt{con} \hspace{1cm} A \texttt{DBI::DBIConnection} or a Pool object.
  \item \texttt{table_names} \hspace{1cm} A character vector of the names of the tables to include.
  \item \texttt{learn_keys} \hspace{1cm} [Experimental]
    Set to \texttt{TRUE} to query the definition of primary and foreign keys from the database. Currently works only for Postgres and SQL Server databases. The default attempts to query and issues an informative message.
  \item \ldots \hspace{1cm} [Experimental]
    Additional parameters for the schema learning query.
  \item \texttt{schema} \hspace{1cm} supported for MSSQL (default: \"dbo\"), Postgres (default: \"public\"), and MariaDB/MySQL (default: current database). Learn the tables in a specific schema (or database for MariaDB/MySQL).
\end{itemize}
- **dbname**: supported for MSSQL. Access different databases on the connected MSSQL-server; default: active database.
- **table_type**: supported for Postgres (default: "BASE TABLE"). Specify the table type. Options are:
  1. "BASE TABLE" for a persistent table (normal table type)
  2. "VIEW" for a view
  3. "FOREIGN TABLE" for a foreign table
  4. "LOCAL TEMPORARY" for a temporary table

**Value**

A `dm` object.

**Examples**

```r
con <- dm_get_con(dm_financial())

dm_from_src(con)

# Avoid DBI::dbDisconnect() here, because we don't own the connection
```

**dm_get_all_fks**  
*Get foreign key constraints*

**Description**

Get a summary of all foreign key relations in a `dm`.

**Usage**

`dm_get_all_fks(dm, parent_table = NULL, ...)`

**Arguments**

- **dm**: A `dm` object.
- **parent_table**: One or more table names, as character vector, to return foreign key information for. The default `NULL` returns information for all tables.
- **...**: These dots are for future extensions and must be empty.


**Value**

A tibble with the following columns:

- child_table: child table,
- child_fk_cols: foreign key column(s) in child table as list of character vectors,
- parent_table: parent table,
- parent_key_cols: key column(s) in parent table as list of character vectors.
- on_delete: behavior on deletion of rows in the parent table.

**See Also**

Other foreign key functions: `dm_add_fk()`, `dm_enum_fk_candidates()`, `dm_rm_fk()`

**Examples**

```r
   dm_nycflights13() %>%
     dm_get_all_fks()
```

---

**Description**

`dm_get_all_pks()` checks the `dm` object for set primary keys and returns the tables, the respective primary key columns and their classes.

**Usage**

`dm_get_all_pks(dm, table = NULL, ...)`

**Arguments**

- `dm`: A `dm` object.
- `table`: One or more table names, as character vector, to return primary key information for. The default `NULL` returns information for all tables.
- `...`: These dots are for future extensions and must be empty.

**Value**

A tibble with the following columns:

- `table`: table name,
- `pk_col`: column name(s) of primary key, as list of character vectors.
See Also

Other primary key functions: `dm_add_pk()`, `dm_has_pk()`, `dm_rm_pk()`, `enum_pk_candidates()`

Examples

```r
  dm_nycflights13() %>%
  dm_get_all_pks()
```

---

**Description**

`dm_get_con()` returns the DBI connection for a `dm` object. This works only if the tables are stored on a database, otherwise an error is thrown.

**Usage**

```r
dm_get_con(dm)
```

**Arguments**

- `dm`  A `dm` object.

**Details**

All lazy tables in a `dm` object must be stored on the same database server and accessed through the same connection, because a large part of the package’s functionality relies on efficient joins.

**Value**

The `DBI::DBIConnection` object for a `dm` object.

**Examples**

```r
  dm_financial() %>%
  dm_get_con()
```
dm_get_tables

Get tables

Description

\texttt{dm_get_tables()} returns a named list of \texttt{dplyr tbl} objects of a \texttt{dm} object.

Usage

\texttt{dm_get_tables(x, ..., keyed = FALSE)}

Arguments

- \texttt{x} A \texttt{dm} object.
- \texttt{...} These dots are for future extensions and must be empty.
- \texttt{keyed} \textbf{[Experimental]} Set to \texttt{TRUE} to return objects of the internal class "\texttt{dm_keyed_tbl}" that will contain information on primary and foreign keys in the individual table objects. This allows using \texttt{dplyr} workflows on those tables and later reconstruct them into a \texttt{dm} object. See \texttt{dm_deconstruct()} for a function that generates corresponding code for an existing \texttt{dm} object, and \texttt{vignette("tech-dm-keyed")} for details.

Value

A named list with the tables (data frames or lazy tables) constituting the \texttt{dm}.

See Also

\texttt{dm()} and \texttt{new_dm()} for constructing a \texttt{dm} object from tables.

Examples

\begin{verbatim}
  dm_nycflights13() %>%
  dm_get_tables()

  dm_nycflights13() %>%
  dm_get_tables(keyed = TRUE)

  dm_nycflights13() %>%
  dm_get_tables(keyed = TRUE) %>%
  new_dm()
\end{verbatim}
Description

[Experimental]
This function starts a Shiny application that allows to define dm objects from a database or from local data frames. The application generates R code that can be inserted or copy-pasted into an R script or function.

Usage

dm_gui(..., dm = NULL, select_tables = TRUE, debug = FALSE)

Arguments

... These dots are for future extensions and must be empty.
dm An initial dm object, currently required.
select_tables Show selectize input to select tables?
debug Set to TRUE to simplify debugging of the app.

Details

In a future release, the app will also allow composing dm objects directly from database connections or data frames.

The signature of this function is subject to change without notice. This should not pose too many problems, because it will usually be run interactively.

Examples

## Not run:
dm <- dm_nycflights13(cycle = TRUE)
dm_gui(dm = dm)

## End(Not run)
**dm_has_pk**

---

### Description

`dm_has_pk()` checks if a given table has columns marked as its primary key.

### Usage

```r
dm_has_pk(dm, table, ...)
```

### Arguments

- **dm**: A `dm` object.
- **table**: A table in the `dm`.
- **...**: These dots are for future extensions and must be empty.

### Value

A logical value: `TRUE` if the given table has a primary key, `FALSE` otherwise.

### See Also

Other primary key functions: `dm_add_pk()`, `dm_get_all_pks()`, `dm_rm_pk()`, `enum_pk_candidates()`

### Examples

```r
dm_nycflights13() %>%
dm_has_pk(flights)
dm_nycflights13() %>%
dm_has_pk(planes)
```

---

**dm_mutate_tbl**

---

### Description

[Experimental] Updates one or more existing tables in a `dm`. For now, the column names must be identical. This restriction may be levied optionally in the future.

### Usage

```r
dm_mutate_tbl(dm, ...)
```
Arguments

- `dm`: A `dm` object.
- `child_table`: One or more tables to update in the `dm`. Must be named.

See Also

- `dm()`, `dm_select_tbl()`

Examples

```r
dm_nycflights13() `%>%`
  dm_mutate_tbl(flights = nycflights13::flights[1:3, ])
```

---

`dm_nest_tbl`  
Nest a table inside its `dm`

Description

[Experimental]

`dm_nest_tbl()` converts a child table to a nested column in its parent table. The child table should not have children itself (i.e. it needs to be a terminal child table).

Usage

`dm_nest_tbl(dm, child_table, into = NULL)`

Arguments

- `dm`: A `dm`.
- `child_table`: A terminal table with one parent table.
- `into`: The table to nest child_tables into, optional as it can be guessed from the foreign keys unambiguously but useful to be explicit.

See Also

- `dm_wrap_tbl()`, `dm_unwrap_tbl()`, `dm_pack_tbl()`

Examples

```r
nested_dm <-
  dm_nycflights13() `%>%`
  dm_select_tbl(airlines, flights) `%>%`
  dm_nest_tbl(flights)

nested_dm

nested_dm$airlines
```
**dm_nrow**

Number of rows

---

**Description**

Returns a named vector with the number of rows for each table.

**Usage**

```r
dm_nrow(dm)
```

**Arguments**

- `dm` A `dm` object.

**Value**

A named vector with the number of rows for each table.

**Examples**

```r
dm_nycflights13() %>%
dm_filter(airports = (faa %in% c("EWR", "LGA"))) %>%
dm_nrow()
```

---

**dm_nycflights13**

*Creates a dm object for the nycflights13 data*

---

**Description**

Creates an example `dm` object from the tables in `nycflights13`, along with the references. See `nycflights13::flights` for a description of the data. As described in `nycflights13::planes`, the relationship between the `flights` table and the `planes` tables is "weak", it does not satisfy data integrity constraints.

**Usage**

```r
dm_nycflights13(
  ..., cycle = FALSE,
  color = TRUE,
  subset = TRUE,
  compound = TRUE
)
```
Arguments

... These dots are for future extensions and must be empty.

- **cycle**
  - Boolean. If `FALSE` (default), only one foreign key relation (from `flights$origin` to `airports$faa`) between the `flights` table and the `airports` table is established. If `TRUE`, a `dm` object with a double reference between those tables will be produced.

- **color**
  - Boolean, if `TRUE` (default), the resulting `dm` object will have colors assigned to different tables for visualization with `dm_draw()`.

- **subset**
  - Boolean, if `TRUE` (default), the `flights` table is reduced to flights with column `day` equal to 10.

- **compound**
  - Boolean, if `FALSE`, no link will be established between tables `flights` and `weather`, because this requires compound keys.

Value

A `dm` object consisting of `nycflights13` tables, complete with primary and foreign keys and optionally colored.

Examples

```r
dm_nycflights13() %>%
dm_draw()
```

Description

[Experimental]

`dm_pack_tbl()` converts a parent table to a packed column in its child table. The parent table should not have parent tables itself (i.e. it needs to be a `terminal parent table`).

Usage

```r
dm_pack_tbl(dm, parent_table, into = NULL)
```

Arguments

- **dm**
  - A `dm`.

- **parent_table**
  - A terminal table with one child table.

- **into**
  - The table to pack `parent_tables` into, optional as it can be guessed from the foreign keys unambiguously but useful to be explicit.
See Also

`dm_wrap_tbl()`, `dm_unwrap_tbl()`, `dm_nest_tbl()`.

Examples

```r
# Create R code for a dm object

dm_paste <-
  dm_nycflights13() %>%
  dm_pack_tbl(planes)

dm_packed

dm_packed$flights

dm_packed$flights$planes
```

Description

`dm_paste()` takes an existing `dm` and emits the code necessary for its creation.

Usage

```r
dm_paste(dm, select = NULL, ..., tab_width = 2, options = NULL, path = NULL)
```

Arguments

- `dm`: A `dm` object.
- `select`: Deprecated, see "select" in the options argument.
- `...`: Must be empty.
- `tab_width`: Indentation width for code from the second line onwards.
- `options`: Formatting options. A character vector containing some of:
  - "tables": `tibble()` calls for empty table definitions derived from `dm_ptype()`, overrides "select".
  - "select": `dm_select()` statements for columns that are part of the `dm`.
  - "keys": `dm_add_pk()` and `dm_add_fk()` statements for adding keys.
  - "color": `dm_set_colors()` statements to set color.
  - "all": All options above except "select"

- `path`: Output file, if NULL the code is printed to the console.

Details

The code emitted by the function reproduces the structure of the `dm` object. The options argument controls the level of detail: keys, colors, table definitions. Data in the tables is never included, see `dm_ptype()` for the underlying logic.
Value

Code for producing the prototype of the given dm.

Examples

```r
dm() %>%
  dm_paste()

dm_nycflights13() %>%
  dm_paste()

dm_nycflights13() %>%
  dm_paste(options = "select")
```

---

**dm_pixarfilms**

Creates a dm object for the **pixarfilms** data

Description

Creates an example dm object from the tables in **pixarfilms**, along with the references.

Usage

```r
dm_pixarfilms(..., color = TRUE, consistent = FALSE)
```

Arguments

- `...`: These dots are for future extensions and must be empty.
- `color`: Boolean, if TRUE (default), the resulting dm object will have colors assigned to different tables for visualization with `dm_draw()`.
- `consistent`: Boolean, in the original dm the film column in pixar_films contains missing values so cannot be made a proper primary key. Set to TRUE to remove those records.

Value

A dm object consisting of pixarfilms tables, complete with primary and foreign keys and optionally colored.

Examples

```r
dm_pixarfilms()

dm_pixarfilms() %>%
  dm_draw()
```
**dm_pType**

**Prototype for a dm object**

**Description**

The prototype contains all tables, all primary and foreign keys, but no data. All tables are truncated and converted to zero-row tibbles, also for remote data models. Column names retain their type. This is useful for performing creation and population of a database in separate steps.

**Usage**

```r
dm_pType(dm)
```

**Arguments**

- **dm**
  - A `dm` object.

**Examples**

```r
dm_financial() %>%
  dm_pType()
```

**dm_rename**

**Rename columns**

**Description**

Rename the columns of your `dm` using syntax that is similar to `dplyr::rename()`.

**Usage**

```r
dm_rename(dm, table, ...)
```

**Arguments**

- **dm**
  - A `dm` object.
- **table**
  - A table in the `dm`. 
One or more unquoted expressions separated by commas. You can treat variable
names as if they were positions, and use expressions like x:y to select the ranges
of variables.
Use named arguments, e.g. new_name = old_name, to rename the selected vari-
ables.
The arguments in ... are automatically quoted and evaluated in a context where
column names represent column positions. They also support unquoting and
splicing. See vignette("programming", package = "dplyr") for an intro-
duction to those concepts.
See select helpers for more details, and the examples about tidyselect helpers,
such as starts_with(), everything(), ...

Details

If key columns are renamed, then the meta-information of the dm is updated accordingly.

Value

An updated dm with the columns of table renamed.

Examples

dm_nycflights13() %>%
dm_rename(airports, code = faa, altitude = alt)

Description

dm_rm_fk() can remove either one reference between two tables, or multiple references at once
(with a message). An error is thrown if no matching foreign key is found.

Usage

dm_rm_fk(
  dm,
  table = NULL,
  columns = NULL,
  ref_table = NULL,
  ref_columns = NULL,
  ...
)

Remove foreign keys
dm_rm_pk

Arguments

**dm**
A `dm` object.

**table**
A table in the `dm`. Pass `NULL` to remove all matching keys.

**columns**
Table columns, unquoted. To refer to a compound key, use `c(col1, col2)`. Pass `NULL` (the default) to remove all matching keys.

**ref_table**
The table referenced by the `table` argument. Pass `NULL` to remove all matching keys.

**ref_columns**
The columns of `table` that should no longer be referencing the primary key of `ref_table`. To refer to a compound key, use `c(col1, col2)`.

... These dots are for future extensions and must be empty.

Value

An updated `dm` without the matching foreign key relation(s).

See Also

Other foreign key functions: `dm_add_fk()`, `dm_enum_fk_candidates()`, `dm_get_all_fks()`

Examples

```r
dm_nycflights13(cycle = TRUE) %>%
dm_rm_fk(flights, dest, airports) %>%
dm_draw()
```

---

**dm_rm_pk**

*Remove a primary key*

Description

`dm_rm_pk()` removes one or more primary keys from a table and leaves the `dm` object otherwise unaltered. An error is thrown if no private key matches the selection criteria. If the selection criteria are ambiguous, a message with unambiguous replacement code is shown. Foreign keys are never removed.

Usage

```r
dm_rm_pk(dm, table = NULL, columns = NULL, ..., fail_fk = TRUE)
```
Arguments

- **dm**: A `dm` object.
- **table**: A table in the `dm`. Pass `NULL` to remove all matching keys.
- **columns**: Table columns, unquoted. To refer to a compound key, use `c(col1, col2)`. Pass `NULL` (the default) to remove all matching keys.
- **...**: These dots are for future extensions and must be empty.
- **fail_fk**: Boolean: if TRUE (default), will throw an error if there are foreign keys addressing the primary key that is to be removed.

Value

An updated `dm` without the indicated primary key(s).

See Also

Other primary key functions: `dm_add_pk()`, `dm_get_all_pks()`, `dm_has_pk()`, `enum_pk_candidates()`

Examples

```r
dm_nycflights13() %>%
  dm_rm_pk(airports, fail_fk = FALSE) %>%
  dm_draw()
```

Description

Select columns of your `dm` using syntax that is similar to `dplyr::select()`.

Usage

```r
dm_select(dm, table, ...)
```

Arguments

- **dm**: A `dm` object.
- **table**: A table in the `dm`.
- **...**: One or more unquoted expressions separated by commas. You can treat variable names as if they were positions, and use expressions like `x:y` to select the ranges of variables. Use named arguments, e.g. `new_name = old_name`, to rename the selected variables.
The arguments in ... are automatically quoted and evaluated in a context where column names represent column positions. They also support unquoting and splicing. See vignette("programming", package = "dplyr") for an introduction to those concepts. See select helpers for more details, and the examples about tidyselect helpers, such as starts_with(), everything(), ...

**Details**

If key columns are renamed, then the meta-information of the dm is updated accordingly. If key columns are removed, then all related relations are dropped as well.

**Value**

An updated dm with the columns of table reduced and/or renamed.

**Examples**

```r
dm_nycflights13() %>%
dm_select(airports, code = faa, altitude = alt)
```

---

**Description**

`dm_select_tbl()` keeps the selected tables and their relationships, optionally renaming them. `dm_rename_tbl()` renames tables.

**Usage**

```r
dm_select_tbl(dm, ...)
dm_rename_tbl(dm, ...)
```

**Arguments**

- `dm` A `dm` object.
- `...` One or more table names of the tables of the `dm` object. tidyselect is supported, see `dplyr::select()` for details on the semantics.

**Value**

The input `dm` with tables renamed or removed.
dm_set_colors

Examples

```r
# Examples

dm_nycflights13() %>%
  dm_select_tbl(airports, fl = flights)

dm_nycflights13() %>%
  dm_rename_tbl(ap = airports, fl = flights)
```

---

**dm_set_colors**

*Color in database diagrams*

**Description**

`dm_set_colors()` allows to define the colors that will be used to display the tables of the data model with `dm_draw()`. The colors can either be either specified with hex color codes or using the names of the built-in R colors. An overview of the colors corresponding to the standard color names can be found at the bottom of [http://rpubs.com/krlmlr/colors](http://rpubs.com/krlmlr/colors).

`dm_get_colors()` returns the colors defined for a data model.

`dm_get_available_colors()` returns an overview of the names of the available colors. These are the standard colors also returned by `grDevices::colors()` plus a default table color with the name "default".

**Usage**

```r
# Usage

dm_set_colors(dm, ...)
dm_get_colors(dm)
dm_get_available_colors()
```

**Arguments**

- **dm**
  - A `dm` object.

- **...**
  - Colors to set in the form `color = table`. Allowed colors are all hex coded colors (quoted) and the color names from `dm_get_available_colors()`. `tidyselect` is supported, see `dplyr::select()` for details on the semantics.

**Value**

For `dm_set_colors()`, the updated data model.

For `dm_get_colors()`, a named character vector of table names with the colors in the names. This allows calling `dm_set_colors(!!!dm_get_colors(...))`. Use `tibble::enframe()` to convert this to a tibble.

For `dm_get_available_colors()`, a vector with the available colors.
dm_unnest_tbl

Unnest columns from a wrapped table

**Examples**

```r
dm_nycflights13(color = FALSE) %>%
dm_set_colors(
  darkblue = starts_with("air"),
  "#5986C4" = flights
) %>%
dm_draw()

# Splicing is supported:

dm_nycflights13() %>%
dm_get_colors()
nyc_cols

nyc_cols <-
  dm_nycflights13() %>%
  dm_set_colors()
nyc_cols

dm_nycflights13(color = FALSE) %>%
  dm_set_colors(!!!nyc_cols) %>%
dm_draw()
```

**Description**

*[Experimental]*

dm_unnest_tbl() target a specific column to unnest from the given table in a given dm. A ptype or a set of keys should be given, not both.

**Usage**

dm_unnest_tbl(dm, parent_table, col, ptype)

**Arguments**

- `dm`: A dm.
- `parent_table`: A table in the dm with nested columns.
- `col`: The column to unnest (unquoted).
- `ptype`: A dm, only used to query names of primary and foreign keys.

**Details**

dm_nest_tbl() is an inverse operation to dm_unnest_tbl() if differences in row and column order are ignored. The opposite is true if referential constraints between both tables are satisfied.

**Value**

A dm.
See Also

dm_unwrap_tbl(), dm_unpack_tbl(), dm_nest_tbl(), dm_pack_tbl(), dm_wrap_tbl(), dm_examine_constraints(), dm_examine_cardinalities(), dm_ptype().

Examples

```r
airlines_wrapped <-
  dm_nycflights13() %>%
  dm_wrap_tbl(airlines)

  # The ptype is required for reconstruction.
  # It can be an empty dm, only primary and foreign keys are considered.
  ptype <- dm_ptype(dm_nycflights13())

airlines_wrapped %>%
  dm_unnest_tbl(airlines, flights, ptype)
```

---

dm_unpack_tbl

Unpack columns from a wrapped table

Description

```r
# @description [Experimental]
```

Usage

```r
dm_unpack_tbl(dm, child_table, col, ptype)
```

Arguments

- **dm**: A dm.
- **child_table**: A table in the dm with packed columns.
- **col**: The column to unpack (unquoted).
- **ptype**: A dm, only used to query names of primary and foreign keys.

Details

`dm_unpack_tbl()` targets a specific column to unpack from the given table in a given dm. A ptype or a set of keys should be given, not both.

`dm_pack_tbl()` is an inverse operation to `dm_unpack_tbl()` if differences in row and column order are ignored. The opposite is true if referential constraints between both tables are satisfied and if all rows in the parent table have at least one child row, i.e. if the relationship is of cardinality 1:n or 1:1.

See Also

dm_unwrap_tbl(), dm_unnest_tbl(), dm_nest_tbl(), dm_pack_tbl(), dm_wrap_tbl(), dm_examine_constraints(), dm_examine_cardinalities(), dm_ptype().
Examples

```r
flights_wrapped <-
  dm_nycflights13() %>%
  dm_wrap_tbl(flights)

# The ptype is required for reconstruction.
# It can be an empty dm, only primary and foreign keys are considered.
ptype <- dm_ptype(dm_nycflights13())

flights_wrapped %>%
  dm_unpack_tbl(flights, airlines, ptype)
```

---

**dm_unwrap_tbl**

Unwrap a single table dm

---

**Description**

[Experimental]

`dm_unwrap_tbl()` unwraps all tables in a dm object so that the resulting dm matches a given ptype dm. It runs a sequence of `dm_unnest_tbl()` and `dm_unpack_tbl()` operations on the dm.

**Usage**

`dm_unwrap_tbl(dm, ptype)`

**Arguments**

- `dm` A dm.
- `ptype` A dm, only used to query names of primary and foreign keys.

**Value**

A dm.

**See Also**

`dm_wrap_tbl()`, `dm_unnest_tbl()`, `dm_examine_constraints()`, `dm_examine_cardinalities()`, `dm_ptype()`.

**Examples**

```r
roundtrip <-
  dm_nycflights13() %>%
  dm_wrap_tbl(root = flights) %>%
  dm_unwrap_tbl(ptype = dm_ptype(dm_nycflights13()))
roundtrip
```
dm_validate

# The roundtrip has the same structure but fewer rows:
dm_nrow(dm_nycflights13())
dm_nrow(roundtrip)

---

<table>
<thead>
<tr>
<th>dm_validate</th>
<th>Validator</th>
</tr>
</thead>
</table>

**Description**

dm_validate() checks the internal consistency of a dm object.

**Usage**

```r
dm_validate(x)
```

**Arguments**

- `x` An object.

**Details**

In theory, with the exception of `new_dm()`, all dm objects created or modified by functions in this package should be valid, and this function should not be needed. Please file an issue if any dm operation creates an invalid object.

**Value**

Returns the dm, invisibly, after finishing all checks.

**Examples**

```r
dm_validate(dm())
bad_dm <- structure(list(bad = "dm"), class = "dm")
try(dm_validate(bad_dm))
```
**dm_wrap_tbl**

Wrap dm into a single tibble dm

---

### Description

[Eperimental]

`dm_wrap_tbl()` creates a single tibble dm containing the root table enhanced with all the data related to it through the relationships stored in the dm. It runs a sequence of `dm_nest_tbl()` and `dm_pack_tbl()` operations on the dm.

### Usage

```r
dm_wrap_tbl(dm, root, strict = TRUE)
```

### Arguments

- **dm**: A cycle free dm object.
- **root**: Table to wrap the dm into (unquoted).
- **strict**: Whether to fail for cyclic dms that cannot be wrapped into a single table, if FALSE a partially wrapped dm will be returned.

### Details

`dm_wrap_tbl()` is an inverse to `dm_unwrap_tbl()`, i.e., wrapping after unwrapping returns the same information (disregarding row and column order). The opposite is not generally true: since `dm_wrap_tbl()` keeps only rows related directly or indirectly to rows in the root table. Even if all referential constraints are satisfied, unwrapping after wrapping loses rows in parent tables that don't have a corresponding row in the child table.

This function differs from `dm_flatten_to_tbl()` and `dm_squash_to_tbl()`, which always return a single table, and not a dm object.

### Value

A dm object.

### See Also

`dm_unwrap_tbl()`, `dm_nest_tbl()`, `dm_examine_constraints()`, `dm_examine_cardinalities()`.

### Examples

```r
dm_nycflights13() %>%
dm_wrap_tbl(root = airlines)
```
**Description**

Zooming to a table of a `dm` allows for the use of many `dplyr`-verbs directly on this table, while retaining the context of the `dm` object.

- `dm_zoom_to()` zooms to the given table.
- `dm_update_zoomed()` overwrites the originally zoomed table with the manipulated table. The filter conditions for the zoomed table are added to the original filter conditions.
- `dm_insert_zoomed()` adds a new table to the `dm`.
- `dm_discard_zoomed()` discards the zoomed table and returns the `dm` as it was before zooming.

Please refer to vignette("tech-db-zoom", package = "dm") for a more detailed introduction.

**Usage**

```r
dm_zoom_to(dm, table)

dm_insert_zoomed(dm, new_tbl_name = NULL, repair = "unique", quiet = FALSE)

dm_update_zoomed(dm)

dm_discard_zoomed(dm)
```

**Arguments**

- `dm`: A `dm` object.
- `table`: A table in the `dm`.
- `new_tbl_name`: Name of the new table.
- `repair`: Either a string or a function. If a string, it must be one of "check_unique", "minimal", "unique", or "universal". If a function, it is invoked with a vector of minimal names and must return minimal names, otherwise an error is thrown.
  - Minimal names are never `NULL` or `NA`. When an element doesn’t have a name, its minimal name is an empty string.
  - Unique names are unique. A suffix is appended to duplicate names to make them unique.
  - Universal names are unique and syntactic, meaning that you can safely use the names as variables without causing a syntax error.
  The "check_unique" option doesn’t perform any name repair. Instead, an error is raised if the names don’t suit the "unique" criteria.
- `quiet`: By default, the user is informed of any renaming caused by repairing the names. This only concerns unique and universal repairing. Set `quiet` to `TRUE` to silence the messages.

Users can silence the name repair messages by setting the "rlib_name_repair_verbosity" global option to "quiet".
**Details**

Whenever possible, the key relations of the original table are transferred to the resulting table when using `dm_insert_zoomed()` or `dm_update_zoomed()`.

Functions from `dplyr` that are supported for a `dm_zoomed`: `group_by()`, `summarise()`, `mutate()`, `transmute()`, `filter()`, `select()`, `rename()` and `ungroup()`. You can use these functions just like you would with a normal table.

Calling `filter()` on a zoomed `dm` is different from calling `dm_filter()`: only with the latter, the filter expression is added to the list of table filters stored in the `dm`.

Furthermore, different `join()`-variants from `dplyr` are also supported, e.g. `left_join()` and `semi_join()`. (Support for `nest_join()` is planned.) The join-methods for `dm_zoomed` infer the columns to join by from the primary and foreign keys, and have an extra argument `select` that allows choosing the columns of the RHS table.

And – last but not least – also the tidyr-functions `unite()` and `separate()` are supported for `dm_zoomed`.

**Value**

For `dm_zoom_to()`: A `dm_zoomed` object.

For `dm_insert_zoomed()`, `dm_update_zoomed()` and `dm_discard_zoomed()`: A `dm` object.

**Examples**

```r
generate_zoomed <- dm_zoom_to(dm_nycflights13(), flights)

generate_zoomed

generate_zoomed_transformed <-
generate_zoomed %>%
  mutate(am_pm_dep = ifelse(dep_time < 1200, "am", "pm")) %>%
# `by`-argument of `left_join()` can be explicitly given
# otherwise the key-relation is used
  left_join(airports) %>%
  select(year:dep_time, am_pm_dep, everything())

generate_zoomed_transformed

# replace table `flights` with the zoomed table
generate_zoomed_transformed %>%
  dm_update_zoomed()

# insert the zoomed table as a new table
generate_zoomed_transformed %>%
  dm_insert_zoomed("extended_flights") %>%
  dm_draw()

# discard the zoomed table
generate_zoomed_transformed %>%
  dm_discard_zoomed()
```
**dplyr_join**

**dplyr join methods for zoomed dm objects**

**Description**

Use these methods without the `.dm_zoomed` suffix (see examples).

**Usage**

```r
## S3 method for class 'dm_zoomed'
left_join(x, y, by = NULL, copy = NULL, suffix = NULL, select = NULL, ...)

## S3 method for class 'dm_keyed_tbl'
left_join(x, y, by = NULL, copy = NULL, suffix = NULL, ..., keep = FALSE)

## S3 method for class 'dm_zoomed'
inner_join(x, y, by = NULL, copy = NULL, suffix = NULL, select = NULL, ...)

## S3 method for class 'dm_keyed_tbl'
inner_join(x, y, by = NULL, copy = NULL, suffix = NULL, ..., keep = FALSE)

## S3 method for class 'dm_zoomed'
full_join(x, y, by = NULL, copy = NULL, suffix = NULL, select = NULL, ...)

## S3 method for class 'dm_keyed_tbl'
full_join(x, y, by = NULL, copy = NULL, suffix = NULL, ..., keep = FALSE)

## S3 method for class 'dm_zoomed'
right_join(x, y, by = NULL, copy = NULL, suffix = NULL, select = NULL, ...)

## S3 method for class 'dm_keyed_tbl'
right_join(x, y, by = NULL, copy = NULL, suffix = NULL, ..., keep = FALSE)

## S3 method for class 'dm_zoomed'
semi_join(x, y, by = NULL, copy = NULL, suffix = NULL, select = NULL, ...)

## S3 method for class 'dm_keyed_tbl'
semi_join(x, y, by = NULL, copy = NULL, ...)

## S3 method for class 'dm_zoomed'
anti_join(x, y, by = NULL, copy = NULL, suffix = NULL, select = NULL, ...)

## S3 method for class 'dm_keyed_tbl'
anti_join(x, y, by = NULL, copy = NULL, ...)
```
## S3 method for class 'dm_zoomed'

`nest_join(x, y, by = NULL, copy = FALSE, keep = FALSE, name = NULL, ...)`

### Arguments

- **x**, **y**: tbls to join. `x` is the `dm_zoomed` and `y` is another table in the `dm`.
- **by**: If left NULL (default), the join will be performed by via the foreign key relation that exists between the originally zoomed table (now `x`) and the other table (`y`). If you provide a value (for the syntax see `dplyr::join`), you can also join tables that are not connected in the `dm`.
- **copy**: Disabled, since all tables in a `dm` are by definition on the same `src`.
- **suffix**: Disabled, since columns are disambiguated automatically if necessary, changing the column names to `table_name.column_name`.
- **select**: Select a subset of the RHS-table's columns, the syntax being `select = c(col_1, col_2, col_3)` (unquoted or quoted). This argument is specific for the `join`-methods for `dm_zoomed`. The table’s by column(s) are automatically added if missing in the selection.
- **...**: see `dplyr::join`
- **keep**: Should the join keys from both `x` and `y` be preserved in the output?
- **name**: The name of the list column nesting joins create. If NULL the name of `y` is used.

### Examples

```r
flights_dm <- dm_nycflights13()
dm_zoom_to(flights_dm, flights) %>%
  left_join(airports, select = c(faa, name))

# this should illustrate that tables don't necessarily need to be connected
dm_zoom_to(flights_dm, airports) %>%
  semi_join(airlines, by = "name")
```

---

**Description**

Use these methods without the `.dm_zoomed` suffix (see examples).
Usage

## S3 method for class 'dm_zoomed'
filter(.data, ...)

## S3 method for class 'dm_zoomed'
mutate(.data, ...)

## S3 method for class 'dm_zoomed'
transmute(.data, ...)

## S3 method for class 'dm_zoomed'
select(.data, ...)

## S3 method for class 'dm_zoomed'
relocate(.data, ..., .before = NULL, .after = NULL)

## S3 method for class 'dm_zoomed'
rename(.data, ...)

## S3 method for class 'dm_zoomed'
distinct(.data, ..., .keep_all = FALSE)

## S3 method for class 'dm_zoomed'
arrange(.data, ...)

## S3 method for class 'dm_zoomed'
slice(.data, ..., .keep_pk = NULL)

## S3 method for class 'dm_zoomed'
group_by(.data, ...)

## S3 method for class 'dm_keyed_tbl'
group_by(.data, ...)

## S3 method for class 'dm_zoomed'
ungroup(x, ...)

## S3 method for class 'dm_zoomed'
summarise(.data, ...)

## S3 method for class 'dm_keyed_tbl'
summarise(.data, ...)

## S3 method for class 'dm_zoomed'
count(
  x,
  ..., 
  wt = NULL,
## Arguments

- `.data` object of class `dm_zoomed`
- `...` see corresponding function in package `dplyr` or `tidyr`
- `.before, .after` `<tidy-select>` Destination of columns selected by `...`. Supplying neither will move columns to the left-hand side; specifying both is an error.
- `.keep_all` For `distinct.dm_zoomed()`: see `dplyr::distinct()`
- `.keep_pk` For `slice.dm_zoomed()`: Logical, if `TRUE`, the primary key will be retained during this transformation. If `FALSE`, it will be dropped. By default, the value is `NULL`, which causes the function to issue a message in case a primary key is available for the zoomed table. This argument is specific for the `slice.dm_zoomed()` method.
- `x` For `ungroup.dm_zoomed()`: object of class `dm_zoomed`
- `wt` `<data-masking>` Frequency weights. Can be `NULL` or a variable:
  - If `NULL` (the default), counts the number of rows in each group.
  - If a variable, computes `sum(wt)` for each group.
- `sort` If `TRUE`, will show the largest groups at the top.
- `name` The name of the new column in the output.
- If omitted, it will default to `n`. If there’s already a column called `n`, it will error, and require you to specify the name.
- `.drop` For `count()`: if `FALSE` will include counts for empty groups (i.e. for levels of factors that don’t exist in the data). Deprecated in `add_count()` since it didn’t actually affect the output.
- `var` A variable specified as:
  - a literal variable name
  - a positive integer, giving the position counting from the left
  - a negative integer, giving the position counting from the right.

The default returns the last column (on the assumption that’s the column you’ve created most recently).

This argument is taken by expression and supports `quasiquotation` (you can unquote column names and column locations).
Examples

```r
zoomed <- dm_nycflights13() %>%
  dm_zoom_to(flights) %>%
  group_by(month) %>%
  arrange(desc(day)) %>%
  summarize(avg_air_time = mean(air_time, na.rm = TRUE))
zoomed
dm_insert_zoomed(zoomed, new_tbl_name = "avg_air_time_per_month")
```

---

**enum_pk_candidates**

**Primary key candidate**

### Description

[Experimental]

enum_pk_candidates() checks for each column of a table if the column contains only unique values, and is thus a suitable candidate for a primary key of the table.

dm_enum_pk_candidates() performs these checks for a table in a dm object.

### Usage

```r
enum_pk_candidates(table, ...)
dm_enum_pk_candidates(dm, table, ...)
```

### Arguments

- **table**  
  A table in the dm.
- **...**  
  These dots are for future extensions and must be empty.
- **dm**  
  A dm object.

### Value

A tibble with the following columns:

- **columns**  
  columns of table.
- **candidate**  
  boolean: are these columns a candidate for a primary key.
- **why**  
  if not a candidate for a primary key column, explanation for this.

### Life cycle

These functions are marked "experimental" because we are not yet sure about the interface, in particular if we need both dm_enum...() and enum...() variants. Changing the interface later seems harmless because these functions are most likely used interactively.
**examine_cardinality**

**See Also**

Other primary key functions: `dm_add_pk()`, `dm_get_all_pks()`, `dm_has_pk()`, `dm_rm_pk()`

**Examples**

```r
nycflights13::flights %>%
  enum_pk_candidates()
```

```r
dm_nycflights13() %>%
dm_enum_pk_candidates(airports)
```

---

**Description**

All `check_cardinality_...()` functions test the following conditions:

1. Are all rows in `x` unique?
2. Are the rows in `y` a subset of the rows in `x`?
3. Does the relation between `x` and `y` meet the cardinality requirements? One row from `x` must correspond to the requested number of rows in `y`, e.g. `_0_1` means that there must be zero or one rows in `y` for each row in `x`.

`examine_cardinality()` also checks the first two points and subsequently determines the type of cardinality.

For convenience, the `x_select` and `y_select` arguments allow restricting the check to a set of key columns without affecting the return value.

**Usage**

```r
check_cardinality_0_n(
  x,
  y,
  ..., 
  x_select = NULL,
  y_select = NULL,
  by_position = NULL
)
```

```r
check_cardinality_1_n(
  x,
  y,
```
 Arguments

x | Parent table, data frame or lazy table.
y | Child table, data frame or lazy table.
... | These dots are for future extensions and must be empty.
x_select, y_select | Key columns to restrict the check, processed with dplyr::select().
by_position | Set to TRUE to ignore column names and match by position instead. The default means matching by name, use x_select and/or y_select to align the names.

 Details

All cardinality functions accept a parent and a child table (x and y). All rows in x must be unique, and all rows in y must be a subset of the rows in x. The x_select and y_select arguments allow...
examine_cardinality

restricting the check to a set of key columns without affecting the return value. If given, both arguments must refer to the same number of key columns.

The cardinality specifications "0_n", "1_n", "0_1", "1_1" refer to the expected relation that the child table has with the parent table. "0", "1" and "n" refer to the occurrences of value combinations in y that correspond to each combination in the columns of the parent table. "n" means "more than one" in this context, with no upper limit.

"0_n": no restrictions, each row in x has at least 0 and at most n corresponding occurrences in y.
"1_n": each row in x has at least 1 and at most n corresponding occurrences in y. This means that there is a "surjective" mapping from the child table to the parent table, i.e. each parent table row exists at least once in the child table.
"0_1": each row in x has at least 0 and at most 1 corresponding occurrence in y. This means that there is a "injective" mapping from the child table to the parent table, i.e. no combination of values in the parent table columns is addressed multiple times. But not all parent table rows have to be referred to.
"1_1": each row in x occurs exactly once in y. This means that there is a "bijective" ("injective" AND "surjective") mapping between the child table and the parent table, i.e. the sets of rows are identical.

Finally, examine_cardinality() tests for and returns the nature of the relationship (injective, surjective, bijective, or none of these) between the two given sets of columns. If either x is not unique or there are rows in y that are missing from x, the requirements for a cardinality test is not fulfilled. No error will be thrown, but the result will contain the information which prerequisite was violated.

Value

check_cardinality_...() return x, invisibly, if the check is passed, to support pipes. Otherwise an error is thrown and the reason for it is explained.

examine_cardinality() returns a character variable specifying the type of relationship between the two columns.

See Also

Other cardinality functions: dm_examine_cardinalities()

Examples

d1 <- tibble::tibble(a = 1:5)
d2 <- tibble::tibble(a = c(1:4, 4L))
d3 <- tibble::tibble(c = c(1:5, 5L), d = 0)
# This does not pass, 'a' is not unique key of d2:
try(check_cardinality_0_n(d2, d1))

# Columns are matched by name by default:
try(check_cardinality_0_n(d1, d3))

# This passes, multiple values in d3$c are allowed:
check_cardinality_0_n(d1, d2)
# This does not pass, injectivity is violated:
try(check_cardinality_1_1(d1, d3, y_select = c(a = c)))
try(check_cardinality_0_1(d1, d3, x_select = c(c = a)))

# What kind of cardinality is it?
examine_cardinality(d1, d3, x_select = c(c = a))
examine_cardinality(d1, d2)

---

glimpse.dm 
Get a glimpse of your dm object

description

glimpse() provides an overview (dimensions, column data types, primary keys, etc.) of all tables included in the dm object. It will additionally print details about outgoing foreign keys for the child table.

glimpse() is provided by the pillar package, and re-exported by dm. See pillar::glimpse() for more details.

usage

## S3 method for class 'dm'
glimpse(x, width = NULL, ...)

## S3 method for class 'dm_zoomed'
glimpse(x, width = NULL, ...)

arguments

x = A dm object.
width = Controls the maximum number of columns on a line used in printing. If NULL, 
getOption("width") will be consulted.
... = Passed to pillar::glimpse().

examples

dm_nycflights13() %>% glimpse()

dm_nycflights13() %>%
dm_zoom_to(flights) %>%
glimpse()
Description

Extract the first or last rows from a table. Use these methods without the `.dm_zoomed` suffix (see examples). The methods for regular `dm` objects extract the first or last tables.

Usage

```r
## S3 method for class 'dm_zoomed'
head(x, n = 6L, ...)

## S3 method for class 'dm_zoomed'
tail(x, n = 6L, ...)
```

Arguments

- `x`: object of class `dm_zoomed`
- `n`: an integer vector of length up to `dim(x)` (or 1, for non-dimensioned objects). Values specify the indices to be selected in the corresponding dimension (or along the length) of the object. A positive value of `n[i]` includes the first/last `n[i]` indices in that dimension, while a negative value excludes the last/first `abs(n[i])`, including all remaining indices. `NA` or non-specified values (when `length(n) < length(dim(x))`) select all indices in that dimension. Must contain at least one non-missing value.
- `...`: arguments to be passed to or from other methods.

Details

see manual for the corresponding functions in `utils`.

Value

A `dm_zoomed` object.

Examples

```r
zoomed <- dm_nycflights13() %>%
  dm_zoom_to(flights) %>%
  head(4)
zoomed
dm_insert_zoomed(zoomed, new_tbl_name = "head_flights")
```
Description

[Experimental]
A wrapper around `tidyr::nest()` which stores the nested data into JSON columns.

Usage

```r
json_nest(.data, ..., .names_sep = NULL)
```

Arguments

- `.data` A data frame, a data frame extension (e.g. a tibble), or a lazy data frame (e.g. from dbplyr or dtplyr).
- `...` `<tidy-select>` Columns to pack, specified using name-variable pairs of the form `new_col = c(col1, col2, col3)`. The right hand side can be any valid tidy select expression.
- `.names_sep` If NULL, the default, the names will be left as is.

See Also

`tidyr::nest()`, `json_nest_join()`

Examples

```r
df <- tibble::tibble(x = c(1, 1, 1, 2, 2, 3), y = 1:6, z = 6:1)
nested <- json_nest(df, data = c(y, z))
nested
```

Description

[Experimental]
A wrapper around `dplyr::nest_join()` which stores the joined data into a JSON column. `json_nest_join()` returns all rows and columns in `x` with a new JSON column that contains all nested matches from `y`.

Usage

```r
json_nest_join(x, y, by = NULL, ..., copy = FALSE, keep = FALSE, name = NULL)
```
Arguments

- **x**, **y**: A pair of data frames or data frame extensions (e.g. a tibble).
- **by**: A character vector of variables to join by.
  
  If NULL, the default, `*_join()` will perform a natural join, using all variables in common across `x` and `y`. A message lists the variables so that you can check they’re correct; suppress the message by supplying by explicitly.
  
  To join by different variables on `x` and `y`, use a named vector. For example, `by = c("a" = "b")` will match `x$a` to `y$b`.
  
  To join by multiple variables, use a vector with length > 1. For example, `by = c("a", "b")` will match `x$a` to `y$a` and `x$b` to `y$b`. Use a named vector to match different variables in `x` and `y`. For example, `by = c("a" = "b", "c" = "d")` will match `x$a` to `y$b` and `x$c` to `y$d`.
  
  To perform a cross-join, generating all combinations of `x` and `y`, use `by = character()`. Other parameters passed onto methods.

- **copy**: If `x` and `y` are not from the same data source, and `copy` is TRUE, then `y` will be copied into the same src as `x`. This allows you to join tables across srcs, but it is a potentially expensive operation so you must opt into it.

- **keep**: Should the join keys from both `x` and `y` be preserved in the output?

- **name**: The name of the list column nesting joins create. If NULL the name of `y` is used.

See Also

- `dplyr::nest_join()`, `json_pack_join()`

Examples

```r
df1 <- tibble::tibble(x = 1:3)
df2 <- tibble::tibble(x = c(1, 1, 2), y = c("first", "second", "third"))
df3 <- json_nest_join(df1, df2)
df3
df3$df2
```

---

**json_pack**  

**JSON pack**

Description

[Experimental]

A wrapper around `tidyr::pack()` which stores the packed data into JSON columns.

Usage

```r
json_pack(.data, ..., .names_sep = NULL)
```
Arguments

.data  A data frame, a data frame extension (e.g., a tibble), or a lazy data frame (e.g., from dbplyr or dtplyr).

< tidy-select > Columns to pack, specified using name-variable pairs of the form new_col = c(col1, col2, col3). The right hand side can be any valid tidy select expression.

.names_sep  If NULL, the default, the names will be left as is.

See Also

tidyr::pack(), json_pack_join()

Examples

df <- tibble::tibble(x1 = 1:3, x2 = 4:6, x3 = 7:9, y = 1:3)
packed <- json_pack(df, x = c(x1, x2, x3), y = y)
packed

Description

[Experimental]

A wrapper around pack_join() which stores the joined data into a JSON column. json_pack_join() returns all rows and columns in x with a new JSON columns that contains all packed matches from y.

Usage

json_pack_join(x, y, by = NULL, ..., copy = FALSE, keep = FALSE, name = NULL)

Arguments

x, y  A pair of data frames or data frame extensions (e.g. a tibble).

by  A character vector of variables to join by.

If NULL, the default, _join() will perform a natural join, using all variables in common across x and y. A message lists the variables so that you can check they’re correct; suppress the message by supplying by explicitly.

To join by different variables on x and y, use a named vector. For example, by = c("a" = "b") will match x$a to y$b.

To join by multiple variables, use a vector with length > 1. For example, by = c("a", "b") will match x$a to y$a and x$b to y$b. Use a named vector to match different variables in x and y. For example, by = c("a" = "b", "c" = "d") will match x$a to y$b and x$c to y$d.

To perform a cross-join, generating all combinations of x and y, use by = character().
materialize

... Other parameters passed onto methods.
copy If x and y are not from the same data source, and copy is TRUE, then y will be copied into the same src as x. This allows you to join tables across srcs, but it is a potentially expensive operation so you must opt into it.
keep Should the join keys from both x and y be preserved in the output?
name The name of the list column nesting joins create. If NULL the name of y is used.

See Also

pack_join(), json_nest_join()

Examples

df1 <- tibble::tibble(x = 1:3)
df2 <- tibble::tibble(x = c(1, 1, 2), y = c("first", "second", "third"))
df3 <- json_pack_join(df1, df2)
df3
df3$df2

---

materialize Materialize

Description

compute() materializes all tables in a dm to new (temporary or permanent) tables on the database. collect() downloads the tables in a dm object as local tibbles.

Usage

## S3 method for class 'dm'
compute(x, ...)

## S3 method for class 'dm'
collect(x, ..., progress = NA)

Arguments

x A dm object.
... Passed on to compute().
progress Whether to display a progress bar, if NA (the default) hide in non-interactive mode, show in interactive mode. Requires the 'progress' package.

Details

Called on a dm object, these methods create a copy of all tables in the dm. Depending on the size of your data this may take a long time.
pack_join

Value

A dm object of the same structure as the input.

Examples

```r
financial <- dm_financial_sqlite()

financial %>%
  pull_tbl(districts) %>%
  dbplyr::remote_name()

# compute() copies the data to new tables:
financial %>%
  compute() %>%
  pull_tbl(districts) %>%
  dbplyr::remote_name()

# collect() returns a local dm:
financial %>%
  collect() %>%
  pull_tbl(districts) %>%
  class()
```

pack_join  Pack Join

Description

[Experimental]
pack_join() returns all rows and columns in x with a new packed column that contains all matches from y.

Usage

```r
pack_join(x, y, by = NULL, ..., copy = FALSE, keep = FALSE, name = NULL)
```

## S3 method for class 'dm_zoomed'
pack_join(x, y, by = NULL, ..., copy = FALSE, keep = FALSE, name = NULL)

Arguments

- **x, y**  A pair of data frames or data frame extensions (e.g. a tibble).
- **by**  A character vector of variables to join by.
  If NULL, the default, *_join() will perform a natural join, using all variables in common across x and y. A message lists the variables so that you can check they're correct; suppress the message by supplying by explicitly.
To join by different variables on \(x\) and \(y\), use a named vector. For example, by = c("a" = "b") will match \(x\$a\) to \(y\$b\).

To join by multiple variables, use a vector with length > 1. For example, by = c("a", "b") will match \(x\$a\) to \(y\$a\) and \(x\$b\) to \(y\$b\). Use a named vector to match different variables in \(x\) and \(y\). For example, by = c("a" = "b", "c" = "d") will match \(x\$a\) to \(y\$b\) and \(x\$c\) to \(y\$d\).

To perform a cross-join, generating all combinations of \(x\) and \(y\), use by = character().

Other parameters passed onto methods.

- **copy**: If \(x\) and \(y\) are not from the same data source, and copy is TRUE, then \(y\) will be copied into the same src as \(x\). This allows you to join tables across srcs, but it is a potentially expensive operation so you must opt into it.

- **keep**: Should the join keys from both \(x\) and \(y\) be preserved in the output?

- **name**: The name of the list column nesting joins create. If NULL the name of \(y\) is used.

See Also
dplyr::nest_join(), tidyr::pack()

Examples

```r
df1 <- tibble::tibble(x = 1:3)
df2 <- tibble::tibble(x = c(1, 1, 2), y = c("first", "second", "third"))
pack_join(df1, df2)
```

---

### Description

This generic has methods for both `dm` classes:

1. With `pull_tbl.dm()` you can choose which table of the `dm` you want to retrieve.
2. With `pull_tbl.dm_zoomed()` you will retrieve the zoomed table in the current state.

#### Usage

```r
pull_tbl(dm, table, ..., keyed = FALSE)
```

#### Arguments

- **dm**: A `dm` object.
- **table**: One unquoted table name for `pull_tbl.dm()`, ignored for `pull_tbl.dm_zoomed()`.
- **...**: These dots are for future extensions and must be empty.
keyed

[Experimental] Set to TRUE to return objects of the internal class "dm_keyed_tbl" that will contain information on primary and foreign keys in the individual table objects. This allows using dplyr workflows on those tables and later reconstruct them into a dm object. See `dm_deconstruct()` for a function that generates corresponding code for an existing dm object, and vignette("tech-dm-keyed") for details.

Value

The requested table.

See Also

`dm_deconstruct()` to generate code of the form `pull_tbl(..., keyed = TRUE)` from an existing dm object.

Examples

```
# For an unzoomed dm you need to specify the table to pull:
dm_nycflights13() %>%
pull_tbl(airports)

# If zoomed, pulling detaches the zoomed table from the dm:
dm_nycflights13() %>%
dm_zoom_to(airports) %>%
pull_tbl()
```

Description

[Experimental]
Perform table fusion by combining two tables by a common (key) column, and then removing this column.

`reunite_parent_child()`: After joining the two tables by the column `id_column`, this column will be removed. The transformation is roughly the inverse of what `decompose_table()` does.

`reunite_parent_child_from_list()`: After joining the two tables by the column `id_column`, `id_column` is removed.

This function is almost exactly the inverse of `decompose_table()` (the order of the columns is not retained, and the original row names are lost).

Usage

```
reunite_parent_child(child_table, parent_table, id_column)

reunite_parent_child_from_list(list_of_parent_child_tables, id_column)
```
Arguments

- **child_table**: Table (possibly created by `decompose_table()`) that references `parent_table`.
- **parent_table**: Table (possibly created by `decompose_table()`).
- **id_column**: Identical name of referencing/referenced column in `child_table`/`parent_table`.
- **list_of_parent_child_tables**: Cf arguments `child_table` and `parent_table` from `reunite_parent_child()`, but both in a named list (as created by `decompose_table()`).

Value

A wide table produced by joining the two given tables.

Life cycle

These functions are marked "experimental" because they seem more useful when applied to a table in a `dm` object. Changing the interface later seems harmless because these functions are most likely used interactively.

See Also

Other table surgery functions: `decompose_table()`

Examples

```r
decomposed_table <- decompose_table(mtcars, new_id, am, gear, carb)
ct <- decomposed_table$child_table
pt <- decomposed_table$parent_table

reunite_parent_child(ct, pt, new_id)
reunite_parent_child_from_list(decomposed_table, new_id)
```

Description

[Experimental]

These functions provide a framework for updating data in existing tables. Unlike `compute()`, `copy_to()` or `copy_dm_to()`, no new tables are created on the database. All operations expect that both existing and new data are presented in two compatible `dm` objects on the same data source.

The functions make sure that the tables in the target `dm` are processed in topological order so that parent (dimension) tables receive insertions before child (fact) tables.

These operations, in contrast to all other operations, may lead to irreversible changes to the underlying database. Therefore, in-place operation must be requested explicitly with `in_place = TRUE`. By default, an informative message is given.
dm_rows_insert() adds new records via rows_insert() with conflict = "ignore". Duplicate records will be silently discarded. This operation requires primary keys on all tables, use dm_rows_append() to insert unconditionally.

dm_rows_append() adds new records via rows_append(). The primary keys must differ from existing records. This must be ensured by the caller and might be checked by the underlying database. Use in_place = FALSE and apply dm_examine_constraints() to check beforehand.

dm_rows_update() updates existing records via rows_update(). Primary keys must match for all records to be updated.

dm_rows_patch() updates missing values in existing records via rows_patch(). Primary keys must match for all records to be patched.

dm_rows_upsert() updates existing records and adds new records, based on the primary key, via rows_upsert().

dm_rows_delete() removes matching records via rows_delete(), based on the primary key. The order in which the tables are processed is reversed.

Usage

dm_rows_insert(x, y, ..., in_place = NULL, progress = NA)

dm_rows_append(x, y, ..., in_place = NULL, progress = NA)

dm_rows_update(x, y, ..., in_place = NULL, progress = NA)

dm_rows_patch(x, y, ..., in_place = NULL, progress = NA)

dm_rows_upsert(x, y, ..., in_place = NULL, progress = NA)

dm_rows_delete(x, y, ..., in_place = NULL, progress = NA)

Arguments

- **x** Target dm object.
- **y** dm object with new data.
- **...** These dots are for future extensions and must be empty.
- **in_place** Should x be modified in place? This argument is only relevant for mutable backends (e.g. databases, data.tables). When TRUE, a modified version of x is returned invisibly; when FALSE, a new object representing the resulting changes is returned.
- **progress** Whether to display a progress bar, if NA (the default) hide in non-interactive mode, show in interactive mode. Requires the 'progress' package.

Value

A dm object of the same dm_ptype() as x. If in_place = TRUE, the underlying data is updated as a side effect, and x is returned, invisibly.
Examples

# Establish database connection:
sqlite <- DBI::dbConnect(RSQLite::SQLite())

# Entire dataset with all dimension tables populated
# with flights and weather data truncated:
flights_init <-
  dm_nycflights13() %>%
  dm_zoom_to(flights) %>%
  filter(FALSE) %>%
  dm_update_zoomed() %>%
  dm_zoom_to(weather) %>%
  filter(FALSE) %>%
  dm_update_zoomed()

# Target database:
flights_sqlite <- copy_dm_to(sqlite, flights_init, temporary = FALSE)
print(dm_nrow(flights_sqlite))

# First update:
flights_jan <-
  dm_nycflights13() %>%
  dm_select_tbl(flights, weather) %>%
  dm_zoom_to(flights) %>%
  filter(month == 1) %>%
  dm_update_zoomed() %>%
  dm_zoom_to(weather) %>%
  filter(month == 1) %>%
  dm_update_zoomed()
print(dm_nrow(flights_jan))

# Copy to temporary tables on the target database:
flights_jan_sqlite <- copy_dm_to(sqlite, flights_jan)

# Dry run by default:
dm_rows_append(flights_sqlite, flights_jan_sqlite)
print(dm_nrow(flights_sqlite))

# Explicitly request persistence:
dm_rows_append(flights_sqlite, flights_jan_sqlite, in_place = TRUE)
print(dm_nrow(flights_sqlite))

# Second update:
flights_feb <-
  dm_nycflights13() %>%
  dm_select_tbl(flights, weather) %>%
  dm_zoom_to(flights) %>%
  filter(month == 2) %>%
  dm_update_zoomed() %>%
  dm_zoom_to(weather) %>%
  filter(month == 2) %>%
dm_update_zoomed()

# Copy to temporary tables on the target database:
flights_feb_sqlite <- copy_dm_to(sqlite, flights_feb)

# Explicit dry run:
flights_new <- dm_rows_append(
  flights_sqlite,
  flights_feb_sqlite,
  in_place = FALSE
)
print(dm_nrow(flights_new))
print(dm_nrow(flights_sqlite))

# Check for consistency before applying:
flights_new %>%
  dm_examine_constraints()

# Apply:
dm_rows_append(flights_sqlite, flights_feb_sqlite, in_place = TRUE)
print(dm_nrow(flights_sqlite))

DBI::dbDisconnect(sqlite)

tidyr_table_manipulation

**tidyr** table manipulation methods for zoomed dm objects

### Description

Use these methods without the '.dm_zoomed' suffix (see examples).

### Usage

```r
## S3 method for class 'dm_zoomed'
unite(data, col, ..., sep = "_", remove = TRUE, na.rm = FALSE)

## S3 method for class 'dm_keyed_tbl'
unite(data, ...)

## S3 method for class 'dm_zoomed'
separate(data, col, into, sep = "^[[:alnum:]]*", remove = TRUE, ...)

## S3 method for class 'dm_keyed_tbl'
separate(data, ...)
```
Arguments

- **data**: object of class `dm_zoomed`
- **col**: For `unite.dm_zoomed`: see `tidyr::unite()`
  For `separate.dm_zoomed`: see `tidyr::separate()`
- **...**: For `unite.dm_zoomed`: see `tidyr::unite()`
  For `separate.dm_zoomed`: see `tidyr::separate()`
- **sep**: For `unite.dm_zoomed`: see `tidyr::unite()`
  For `separate.dm_zoomed`: see `tidyr::separate()`
- **remove**: For `unite.dm_zoomed`: see `tidyr::unite()`
  For `separate.dm_zoomed`: see `tidyr::separate()`
- **na.rm**: see `tidyr::unite()`
- **into**: see `tidyr::separate()`

Examples

```
zoom_united <- dm_nycflights13() %>%
  dm_zoom_to(flights) %>%
  select(year, month, day) %>%
  unite("month_day", month, day)
zoom_united %>%
  separate(month_day, c("month", "day"))
```
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