

Package ‘ResultModelManager’

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Title Result Model Manager

Version 0.6.1

Description Database data model management utilities for R packages in the Observational Health Data Sciences and Informatics programme. 'ResultModelManager' provides utility functions to allow package maintainers to migrate existing SQL database models, export and import results in consistent patterns.

URL <https://github.com/OHDSI/ResultModelManager>,
<https://ohdsi.github.io/ResultModelManager/>

BugReports <https://github.com/OHDSI/ResultModelManager/issues>

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ConnectionHandler	<i>ConnectionHandler</i>
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Description

Class for handling DatabaseConnector:connection objects with consistent R6 interfaces for pooled and non-pooled connections. Allows a connection to cleanly be opened and closed and stored within class/object variables

Value

- DatabaseConnector Connection instance close Connection
- boolean TRUE if connection is valid close Connection
- boolean TRUE if connection is valid executeSql

Public fields

- connectionDetails DatabaseConnector connectionDetails object
- con DatabaseConnector connection object
- isActive Is connection active or not#'
- snakeCaseToCamelCase (Optional) Boolean. return the results columns in camel case (default)

Methods**Public methods:**

- `ConnectionHandler$new()`
- `ConnectionHandler$dbms()`
- `ConnectionHandler$tbl()`
- `ConnectionHandler$renderTranslateSql()`
- `ConnectionHandler$initConnection()`
- `ConnectionHandler$getConnection()`
- `ConnectionHandler$closeConnection()`
- `ConnectionHandler$dbIsValid()`
- `ConnectionHandler$finalize()`
- `ConnectionHandler$queryDb()`
- `ConnectionHandler$executeSql()`
- `ConnectionHandler$queryFunction()`
- `ConnectionHandler$executeFunction()`
- `ConnectionHandler$clone()`

Method `new()`:*Usage:*

```
ConnectionHandler$new(
  connectionDetails,
  loadConnection = TRUE,
  snakeCaseToCamelCase = TRUE
)
```

Arguments:

`connectionDetails` DatabaseConnector::connectionDetails class
`loadConnection` Boolean option to load connection right away
`snakeCaseToCamelCase` (Optional) Boolean. return the results columns in camel case (default)
`get dbms`

Method `dbms()`: Get the dbms type of the connection get table*Usage:*

```
ConnectionHandler$dbms()
```

Method `tbl()`: get a dplyr table object (i.e. lazy loaded)*Usage:*

```
ConnectionHandler$tbl(table, databaseSchema = NULL)
```

Arguments:

`table` table name
`databaseSchema` databaseSchema to which table belongs Render Translate Sql.

Method `renderTranslateSql()`: Masked call to SqlRender*Usage:*

```
ConnectionHandler$renderTranslateSql(sql, ...)
```

Arguments:

sql Sql query string

... Elipsis initConnection

Method initConnection(): Load connection Get Connection

Usage:

```
ConnectionHandler$initConnection()
```

Method getConnection(): Returns connection for use with standard DatabaseConnector calls. Connects automatically if it isn't yet loaded

Usage:

```
ConnectionHandler$getConnection()
```

Method closeConnection(): Closes connection (if active) db Is Valid

Usage:

```
ConnectionHandler$closeConnection()
```

Method dbIsValid(): Masks call to DBI::dbIsValid. Returns False if connection is NULL

Usage:

```
ConnectionHandler$dbIsValid()
```

Method finalize(): Closes connection (if active) queryDb

Usage:

```
ConnectionHandler$finalize()
```

Method queryDb(): query database and return the resulting data.frame

If environment variable LIMIT_ROW_COUNT is set Returned rows are limited to this value (no default) Limit row count is intended for web applications that may cause a denial of service if they consume too many resources.

Usage:

```
ConnectionHandler$queryDb(
  sql,
  snakeCaseToCamelCase = self$snakeCaseToCamelCase,
  overrideRowLimit = FALSE,
  ...
)
```

Arguments:

sql sql query string

snakeCaseToCamelCase (Optional) Boolean. return the results columns in camel case (default)

overrideRowLimit (Optional) Boolean. In some cases, where row limit is enforced on the system You may wish to ignore it.

... Additional query parameters

Method executeSql(): execute set of database queries

Usage:

```
ConnectionHandler$executeSql(sql, ...)
```

Arguments:

```
sql  sql query string
...  Additional query parameters query Function
```

Method queryFunction(): queryFunction that can be overridden with subclasses (e.g. use different base function or intercept query) Does not translate or render sql.

Usage:

```
ConnectionHandler$queryFunction(
  sql,
  snakeCaseToCamelCase = self$snakeCaseToCamelCase,
  connection = self$getConnection()
)
```

Arguments:

```
sql  sql query string
snakeCaseToCamelCase (Optional) Boolean. return the results columns in camel case (default)
connection (Optional) connection object execute Function
```

Method executeFunction(): exec query Function that can be overridden with subclasses (e.g. use different base function or intercept query) Does not translate or render sql.

Usage:

```
ConnectionHandler$executeFunction(sql, connection = self$getConnection())
```

Arguments:

```
sql  sql query string
connection connection object
```

Method clone(): The objects of this class are cloneable with this method.

Usage:

```
ConnectionHandler$clone(deep = FALSE)
```

Arguments:

```
deep Whether to make a deep clone.
```

createQueryNamespace *Create query namespace*

Description

Create a QueryNamespace instance from either a connection handler or a connectionDetails object
Allows construction with various options not handled by QueryNamespace\$new

Note - currently not supported is having multiple table prefixes for multiple table namespaces

Usage

```

createQueryNamespace(
    connectionDetails = NULL,
    connectionHandler = NULL,
    usePooledConnection = FALSE,
    tableSpecification = NULL,
    resultModelSpecificationPath = NULL,
    tablePrefix = "",
    snakeCaseToCamelCase = TRUE,
    ...
)

```

Arguments

connectionDetails	An object of type connectionDetails as created using the createConnectionDetails function in the DatabaseConnector package.
connectionHandler	ResultModelManager ConnectionHandler or PooledConnectionHandler instance
usePooledConnection	Use Pooled database connection instead of standard DatabaseConnector single connection.
tableSpecification	Table specification data.frame
resultModelSpecificationPath	(optional) csv file or files for tableSpecifications - must conform to table spec format.
tablePrefix	String to prefix table names with - default is empty string
snakeCaseToCamelCase	convert snakecase results to camelCase field names (TRUE by default)
...	Elipsis - use for any additional string keys to replace

```
createResultExportManager
```

Create Result Export Manager

Description

For a give table specification file, create an export manager instance for creating results data sets that conform to the data model.

This checks that, at export time, internal validity is assured for the data (e.g. primary keys are valid, data types are compatible)

In addition this utility will create a manifest object that can be used to maintain the validity of data.

If an instance of a DataMigrationManager is present and available a packageVersion reference (where applicable) and migration set will be referenced. Allowing data to be imported into a database schema at a specific version.

Usage

```
createResultExportManager(
  tableSpecification,
  exportDir,
  minCellCount = getOption("ohdsi.minCellCount", default = 5),
  databaseId = NULL
)
```

Arguments

tableSpecification	Table specification data.frame
exportDir	Directory files are being exported to
minCellCount	Minimum cell count - recommended that you set with options("ohdsi.minCellCount" = count) in all R projects. Default is 5
databaseId	database identifier - required when exporting according to many specs

DataMigrationManager *DataMigrationManager (DMM)*

Description

R6 class for management of database migration

Value

data frame all migrations, including file name, order and execution status Get connection handler

Public fields

migrationPath Path migrations exist in
 databaseSchema Path migrations exist in
 packageName packageName, can be null
 tablePrefix tablePrefix, can be empty character vector
 packageTablePrefix packageTablePrefix, can be empty character vector

Methods**Public methods:**

- `DataMigrationManager$new()`
- `DataMigrationManager$migrationTableExists()`
- `DataMigrationManager$getMigrationsPath()`
- `DataMigrationManager$getStatus()`
- `DataMigrationManager$getConnectionHandler()`

- `DataMigrationManager$check()`
- `DataMigrationManager$executeMigrations()`
- `DataMigrationManager$closeConnection()`
- `DataMigrationManager$isPackage()`
- `DataMigrationManager$finalize()`
- `DataMigrationManager$clone()`

Method new():

Usage:

```
DataMigrationManager$new(
  connectionDetails,
  databaseSchema,
  tablePrefix = "",
  packageTablePrefix = "",
  migrationPath,
  packageName = NULL,
  migrationRegexp = .defaultMigrationRegexp
)
```

Arguments:

`connectionDetails` DatabaseConnector connection details object

`databaseSchema` Database Schema to execute on

`tablePrefix` Optional table prefix for all tables (e.g. plp, cm, cd etc)

`packageTablePrefix` A table prefix when used in conjunction with other package results schema, e.g. "cd_", "scs_", "plp_", "cm_"

`migrationPath` Path to location of migration sql files. If in package mode, this should just be a folder (e.g. "migrations") that lives in the location "sql/sql_server" (and) other database platforms. If in folder model, the folder must include "sql_server" in the relative path, (e.g if `migrationPath` = 'migrations' then the folder 'migrations/sql_server' should exists)

`packageName` If in package mode, the name of the R package

`migrationRegexp` (Optional) regular expression pattern default is `(Migration_([0-9]+))-(.+).sql`
Migration table exists

Method migrationTableExists(): Check if migration table is present in schema

Usage:

```
DataMigrationManager$migrationTableExists()
```

Returns: boolean Get path of migrations

Method getMigrationsPath(): Get path to sql migration files

Usage:

```
DataMigrationManager$getMigrationsPath(dbms = "sql_server")
```

Arguments:

`dbms` Optionally specify the dbms that the migration fits under Get status of result model

Method getStatus(): Get status of all migrations (executed or not)

Usage:

DataMigrationManager\$getStatus()

Method getConnectionHandler(): Return connection handler instance

Usage:

DataMigrationManager\$getConnectionHandler()

Returns: ConnectionHandler instance Check migrations in folder

Method check(): Check if file names are valid for migrations Execute Migrations

Usage:

DataMigrationManager\$check()

Method executeMigrations(): Execute any unexecuted migrations

Usage:

DataMigrationManager\$executeMigrations(stopMigrationVersion = NULL)

Arguments:

stopMigrationVersion (Optional) Migrate to a specific migration number closeConnection

Method closeConnection(): close connection, if active isPackage

Usage:

DataMigrationManager\$closeConnection()

Method isPackage(): is a package folder structure or not finalize

Usage:

DataMigrationManager\$isPackage()

Method finalize(): Deprecated call, will be removed in a future version

Usage:

DataMigrationManager\$finalize()

Method clone(): The objects of this class are cloneable with this method.

Usage:

DataMigrationManager\$clone(deep = FALSE)

Arguments:

deep Whether to make a deep clone.

See Also

[ConnectionHandler](#) for information on returned class

deleteAllRowsForDatabaseId

Delete all rows for database id

Description

Delete all rows for database id

Usage

```
deleteAllRowsForDatabaseId(  
    connection,  
    schema,  
    tableName,  
    databaseId,  
    idIsInt = TRUE  
)
```

Arguments

connection	DatabaseConnector connection instance
schema	The schema on the postgres server where the results table exists
tableName	Database table name
databaseId	Results source database identifier
idIsInt	Identified is a numeric type? If not character is used

Details

Only PostgreSQL servers are supported.

deleteAllRowsForPrimaryKey

Delete results rows for primary key values from database server tables

Description

Delete results rows for primary key values from database server tables

Usage

```
deleteAllRowsForPrimaryKey(connection, schema, tableName, keyValues)
```

Arguments

connection	DatabaseConnector connection instance
schema	The schema on the postgres server where the results table exists
tableName	Database table name
keyValues	Key values of results rows to be deleted

Details

Only PostgreSQL servers are supported.

disablePythonUploads	<i>Disable python uploads</i>
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Description

This will stop the use of python in uploadResults - not that this will only work for this R session. If you have set RMM_USE_PYTHON_UPLOADS in your .Renviron this will reset the next time you start your R session.

Usage

```
disablePythonUploads()
```

enablePythonUploads	<i>Enable Python Postgres Uploads</i>
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Description

Step by step install to enable python uploads

Usage

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

Arguments

... parameters to pass to py_install

generateSqlSchema	<i>Schema generator</i>
-------------------	-------------------------

Description

Take a csv schema definition and create a basic sql script with it. returns string containing the sql for the table

Usage

```
generateSqlSchema(
  csvFilepath = NULL,
  schemaDefinition = NULL,
  sqlOutputPath = NULL,
  overwrite = FALSE
)
```

Arguments

csvFilepath	Path to schema file. Csv file must have the columns: "table_name", "column_name", "data_type", "primary_key"
schemaDefinition	A schemaDefintiion data.frame' with the columns: tableName, columnName, dataType, isRequired, primaryKey
sqlOutputPath	File to write sql to.
overwrite	Boolean - overwrite existing file?

grantTablePermissions	<i>Grant Table Permissions</i>
-----------------------	--------------------------------

Description

Grant a given permission for all tables on a given tableSpecification

Very useful if you're hosting studies on data.ohdsi.org or other postgresql instances

NOTE: only tested on postgresql, users' of other platforms may have Sql translation issues

Usage

```
grantTablePermissions(
  connectionDetails = NULL,
  connection = NULL,
  tableSpecification,
  databaseSchema,
  tablePrefix = "",
```

```

        permissions = "SELECT",
        user
    )

```

Arguments

connectionDetails	An object of type connectionDetails as created using the createConnectionDetails function in the DatabaseConnector package.
connection	DatabaseConnector connection instance
tableSpecification	data.frame conforming to table spec (must contain tableName field)
databaseSchema	database schema to run this on
tablePrefix	String to prefix table names with - default is empty string
permissions	permissions to generate must be one of SELECT, INSERT, DELETE or UPDATE
user	database user to grant permissions to

install_psycpg2	<i>install psycpg2</i>
-----------------	------------------------

Description

Install psycpg2-binary python package into the specified python virtualenv

Usage

```

install_psycpg2(
  envname = Sys.getenv("RMM_PYTHON_ENV", unset = "rmm-uploads"),
  method = "auto",
  ...
)

```

Arguments

envname	python virtual environment name. Can be set with system environment variable "RMM_PYTHON_ENV", default is rmm-uploads
method	method paramter for reticulate::py_install (default is auto)
...	Extra parameters for reticulate::py_install

```
loadResultsDataModelSpecifications
```

Get specifications from a given file path

Description

Get specifications from a given file path

Usage

```
loadResultsDataModelSpecifications(filePath)
```

Arguments

filePath path to a valid csv file

Value

A tibble data frame object with specifications

```
PooledConnectionHandler
```

Pooled Connection Handler

Description

Transparently works the same way as a standard connection handler but stores pooled connections. Useful for long running applications that serve multiple concurrent requests. Note that a side effect of using this is that each call to this increments the .GlobalEnv attribute RMMPooledHandlerCount

Value

boolean TRUE if connection is valid executeSql

Super class

```
ResultModelManager::ConnectionHandler -> PooledConnectionHandler
```

Methods

Public methods:

- `PooledConnectionHandler$new()`
- `PooledConnectionHandler$initConnection()`
- `PooledConnectionHandler$getCheckedOutConnectionPath()`
- `PooledConnectionHandler$getConnection()`

- `PooledConnectionHandler$dbms()`
- `PooledConnectionHandler$closeConnection()`
- `PooledConnectionHandler$queryDb()`
- `PooledConnectionHandler$executeSql()`
- `PooledConnectionHandler$queryFunction()`
- `PooledConnectionHandler$executeFunction()`
- `PooledConnectionHandler$clone()`

Method new():*Usage:*

```
PooledConnectionHandler$new(
  connectionDetails = NULL,
  snakeCaseToCamelCase = TRUE,
  loadConnection = TRUE,
  dbConnectArgs = NULL,
  forceJdbcConnection = TRUE
)
```

Arguments:

`connectionDetails` DatabaseConnector::connectionDetails class

`snakeCaseToCamelCase` (Optional) Boolean. return the results columns in camel case (default)

`loadConnection` Boolean option to load connection right away

`dbConnectArgs` Optional arguments to call pool::dbPool overrides default usage of connectionDetails

`forceJdbcConnection` Force JDBC connection (requires using DatabaseConnector ConnectionDetails) initialize pooled db connection

Method initConnection(): Overrides ConnectionHandler Call Used for getting a checked out connection from a given environment (if one exists)

Usage:

```
PooledConnectionHandler$initConnection()
```

Method getCheckedOutConnectionPath():*Usage:*

```
PooledConnectionHandler$getCheckedOutConnectionPath()
```

Arguments:

`.deferredFrame` defaults to the parent frame of the calling block. Get Connection

Method getConnection(): Returns a connection from the pool When the desired frame exits, the connection will be returned to the pool As a side effect, the connection is stored as an attribute within the calling frame (e.g. the same function) to prevent multiple connections being spawned, which limits performance.

If you call this somewhere you need to think about returning the object or you may create a connection that is never returned to the pool.

Usage:

```
PooledConnectionHandler$getConnection(.deferredFrame = parent.frame(n = 2))
```

Arguments:

.deferredFrame defaults to the parent frame of the calling block. get dbms

Method dbms(): Get the dbms type of the connection Close Connection

Usage:

```
PooledConnectionHandler$dbms()
```

Method closeConnection(): Overrides ConnectionHandler Call - closes all active connections called with getConnection queryDb

Usage:

```
PooledConnectionHandler$closeConnection()
```

Method queryDb(): query database and return the resulting data.frame

If environment variable LIMIT_ROW_COUNT is set Returned rows are limited to this value (no default) Limit row count is intended for web applications that may cause a denial of service if they consume too many resources.

Usage:

```
PooledConnectionHandler$queryDb(
  sql,
  snakeCaseToCamelCase = self$snakeCaseToCamelCase,
  overrideRowLimit = FALSE,
  ...
)
```

Arguments:

sql sql query string

snakeCaseToCamelCase (Optional) Boolean. return the results columns in camel case (default)

overrideRowLimit (Optional) Boolean. In some cases, where row limit is enforced on the system You may wish to ignore it.

... Additional query parameters

Method executeSql(): execute set of database queries

Usage:

```
PooledConnectionHandler$executeSql(sql, ...)
```

Arguments:

sql sql query string

... Additional query parameters query Function

Method queryFunction(): Overrides ConnectionHandler Call. Does not translate or render sql.

Usage:

```
PooledConnectionHandler$queryFunction(
  sql,
  snakeCaseToCamelCase = self$snakeCaseToCamelCase,
  connection
)
```


Arguments:

sql sql query string

snakeCaseToCamelCase (Optional) Boolean. return the results columns in camel case (default)
query Function

connection db connection assumes pooling is handled outside of call

Method executeFunction(): Overrides ConnectionHandler Call. Does not translate or render sql.*Usage:*

PooledConnectionHandler\$executeFunction(sql, connection)

Arguments:

sql sql query string

connection DatabaseConnector connection. Assumes pooling is handled outside of call

Method clone(): The objects of this class are cloneable with this method.*Usage:*

PooledConnectionHandler\$clone(deep = FALSE)

Arguments:

deep Whether to make a deep clone.

pyPgUploadEnabled	<i>are python postgresql uploads enabled?</i>
-------------------	---

Description

are python postgresql uploads enabled?

Usage

pyPgUploadEnabled()

pyUploadCsv	<i>Py Upload CSV</i>
-------------	----------------------

Description

Wrapper to python function to upload a csv using Postgres Copy functionality

Usage

pyUploadCsv(connection, table, filepath, schema, disableConstraints = FALSE)

Arguments

connection	DatabaseConnector connection instance
table	Table in database
filepath	path to csv
schema	database schema containing table reference
disableConstraints	(not recommended) disable constraints prior to upload to speed up process

Examples

```
## Not run:
connection <- DatabaseConnector::connect(
  dbms = "postgresql",
  server = "myserver.com",
  port = 5432,
  password = "s",
  user = "me",
  database = "some_db"
)
ResultModelManager::pyUploadCsv(connection,
  table = "my_table",
  filepath = "my_massive_csv.csv",
  schema = "my_schema"
)

## End(Not run)
```

pyUploadDataFrame	<i>Py Upload data.frame</i>
-------------------	-----------------------------

Description

Wrapper to python function to upload a data.frame using Postgres Copy functionality

Usage

```
pyUploadDataFrame(data, connection, table, schema)
```

Arguments

data	data.frame
connection	DatabaseConnector connection instance
table	Table in database
schema	database schema containing table reference

Examples

```
## Not run:
connection <- DatabaseConnector::connect(
  dbms = "postgresql",
  server = "myserver.com",
  port = 5432,
  password = "s",
  user = "me",
  database = "some_db"
)

ResultModelManager::pyUploadDataFrame(connection,
  table = "my_table",
  data.frame(id = 1:100, value = "some_value"),
  schema = "my_schema"
)

## End(Not run)
```

QueryNamespace

QueryNamespace

Description

Given a results specification and ConnectionHandler instance - this class allow queries to be namespaced within any tables specified within a list of pre-determined tables. This allows the encapsulation of queries, using specific table names in a consistent manner that is straightforward to maintain over time.

Public fields

tablePrefix tablePrefix to use

Methods**Public methods:**

- [QueryNamespace\\$new\(\)](#)
- [QueryNamespace\\$setConnectionHandler\(\)](#)
- [QueryNamespace\\$getConnectionHandler\(\)](#)
- [QueryNamespace\\$addReplacementVariable\(\)](#)
- [QueryNamespace\\$addTableSpecification\(\)](#)
- [QueryNamespace\\$render\(\)](#)
- [QueryNamespace\\$queryDb\(\)](#)
- [QueryNamespace\\$executeSql\(\)](#)
- [QueryNamespace\\$getVars\(\)](#)
- [QueryNamespace\\$closeConnection\(\)](#)

- [QueryNamespace\\$clone\(\)](#)

Method `new()`: initialize class

Usage:

```
QueryNamespace$new(
  connectionHandler = NULL,
  tableSpecification = NULL,
  tablePrefix = "",
  ...
)
```

Arguments:

`connectionHandler` ConnectionHandler instance @seealso [ConnectionHandler](#)
`tableSpecification` tableSpecification data.frame
`tablePrefix` constant string to prefix all tables with
... additional replacement variables e.g. `database_schema`, `vocabulary_schema` etc Set Connection Handler

Method `setConnectionHandler()`: set connection handler object for object

Usage:

```
QueryNamespace$setConnectionHandler(connectionHandler)
```

Arguments:

`connectionHandler` ConnectionHandler instance Get connection handler

Method `getConnectionHandler()`: get connection handler object or throw error if not set

Usage:

```
QueryNamespace$getConnectionHandler()
```

Method `addReplacementVariable()`: add a variable to automatically be replaced in query strings (e.g. `@database_schema.@table_name` becomes `'database_schema.table_1'`)

Usage:

```
QueryNamespace$addReplacementVariable(key, value, replace = FALSE)
```

Arguments:

`key` variable name string (without @) to be replaced, eg. `"table_name"`
`value` atomic value for replacement
`replace` if a variable of the same key is found, overwrite it add table specification

Method `addTableSpecification()`: add a variable to automatically be replaced in query strings (e.g. `@database_schema.@table_name` becomes `'database_schema.table_1'`)

Usage:

```
QueryNamespace$addTableSpecification(
  tableSpecification,
  useTablePrefix = TRUE,
  tablePrefix = self$tablePrefix,
  replace = TRUE
)
```

Arguments:

tableSpecification table specification data.frame conforming to column names tableName, columnName, dataType and primaryKey
 useTablePrefix prefix the results with the tablePrefix (TRUE)
 tablePrefix prefix string - defaults to class variable set during initialization
 replace replace existing variables of the same name Render

Method render(): Call to SqlRender::render replacing names stored in this class

Usage:

QueryNamespace\$render(sql, ...)

Arguments:

sql query string
 ... additional variables to be passed to SqlRender::render - will overwrite anything in namespace query Sql

Method queryDb(): Call to

Usage:

QueryNamespace\$queryDb(sql, ...)

Arguments:

sql query string
 ... additional variables to send to SqlRender::render execute Sql

Method executeSql(): Call to execute sql within namespaced queries

Usage:

QueryNamespace\$executeSql(sql, ...)

Arguments:

sql query string
 ... additional variables to send to SqlRender::render get vars

Method getVars(): returns full list of variables that will be replaced closeConnection

Usage:

QueryNamespace\$getVars()

Method closeConnection(): close connection, if active

Usage:

QueryNamespace\$closeConnection()

Method clone(): The objects of this class are cloneable with this method.

Usage:

QueryNamespace\$clone(deep = FALSE)

Arguments:

deep Whether to make a deep clone.

Examples

```

library(ResultModelManager)

# Create some junk test data
connectionDetails <-
  DatabaseConnector::createConnectionDetails(
    server = "test_db.sqlite",
    dbms = "sqlite"
  )

conn <- DatabaseConnector::connect(connectionDetails)
DatabaseConnector::insertTable(
  connection = conn,
  tableName = "cd_cohort",
  data = data.frame(
    cohort_id = c(1, 2, 3),
    cohort_name = c("cohort one", "cohort two", "cohort three"),
    json = "{}",
    sql = "SELECT 1"
  )
)
DatabaseConnector::disconnect(conn)

connectionHandler <- ConnectionHandler$new(connectionDetails = connectionDetails)
tableSpecification <- data.frame(
  tableName = "cohort",
  columnName = c(
    "cohort_id",
    "cohort_name",
    "json",
    "sql"
  ),
  primaryKey = c(TRUE, FALSE, FALSE, FALSE),
  dataType = c("int", "varchar", "varchar", "varchar")
)

cohortNamespace <- QueryNamespace$new(
  connectionHandler = connectionHandler,
  tableSpecification = tableSpecification,
  result_schema = "main",
  tablePrefix = "cd_"
)
sql <- "SELECT * FROM @result_schema.@cohort WHERE cohort_id = @cohort_id"
# Returns : "SELECT * FROM main.cd_cohort WHERE cohort_id = @cohort_id"
print(cohortNamespace$render(sql))
# Returns query result
result <- cohortNamespace$queryDb(sql, cohort_id = 1)
# cleanup test data
unlink("test_db.sqlite")

```

ResultExportManager	<i>Result Set Export Manager</i>
---------------------	----------------------------------

Description

EXPERIMENTAL - this feature is still in design stage and it is not recommended that you implement this for your package at this stage. Utility for simplifying export of results to files from sql queries

Note that this utility is not strictly thread safe though separate processes can export separate tables without issue. When exporting a the same table across multiple threads primary key checks may create issues.

Public fields

exportDir directory path to export files to Init

Methods

Public methods:

- `ResultExportManager$new()`
- `ResultExportManager$getTableSpec()`
- `ResultExportManager$getMinColValues()`
- `ResultExportManager$checkRowTypes()`
- `ResultExportManager$listTables()`
- `ResultExportManager$checkPrimaryKeys()`
- `ResultExportManager$exportDataFrame()`
- `ResultExportManager$exportQuery()`
- `ResultExportManager$getManifestList()`
- `ResultExportManager$writeManifest()`
- `ResultExportManager$clone()`

Method new(): Create a class for exporting results from a study in a standard, consistent manner

Usage:

```
ResultExportManager$new(
  tableSpecification,
  exportDir,
  minCellCount = getOption("ohdsi.minCellCount", default = 5),
  validateTypes = FALSE,
  usePrimaryKeyCheck = FALSE,
  databaseId = NULL
)
```

Arguments:

tableSpecification Table specification data.frame
 exportDir Directory files are being exported to

minCellCount Minimum cell count - recommended that you set with options("ohdsi.minCellCount" = count) in all R projects. Default is 5

validateTypes Test if row values strictly conform to types - optional, not currently recommended outside of development

usePrimaryKeyCheck Test if primary key fields are violated at export step. - optional, not currently recommended outside of development

get table spec

databaseId database identifier - required when exporting according to many specs

Method getTableSpec(): Get specification of table

Usage:

```
ResultExportManager$getTableSpec(exportTableName)
```

Arguments:

exportTableName table name Get min col values

Method getMinColValues(): Columns to convert to minimum for a given table name

Usage:

```
ResultExportManager$getMinColValues(rows, exportTableName)
```

Arguments:

rows data.frame of rows

exportTableName string table name - must be defined in spec Check row types

Method checkRowTypes(): Check types of rows before exporting

Usage:

```
ResultExportManager$checkRowTypes(rows, exportTableName)
```

Arguments:

rows data.frame of rows to export

exportTableName table name List tables

Method listTables(): list all tables in schema Check primary keys of exported data

Usage:

```
ResultExportManager$listTables()
```

Method checkPrimaryKeys(): Checks to see if the rows conform to the valid primary keys If the same table has already been checked in the life of this object set "invalidateCache" to TRUE as the keys will be cached in a temporary file on disk.

Usage:

```
ResultExportManager$checkPrimaryKeys(
  rows,
  exportTableName,
  invalidateCache = FALSE
)
```

Arguments:

rows data.frame to export

exportTableName Table name (must be in spec)

invalidateCache logical - if starting a fresh export use this to delete cache of primary keys
Export data frame

Method exportDataFrame(): This method is intended for use where exporting a data.frame and not a query from a rdbms table For example, if you perform a transformation in R this method will check primary keys, min cell counts and data types before writing the file to according to the table spec

Usage:

```
ResultExportManager$exportDataFrame(rows, exportTableName, append = FALSE)
```

Arguments:

rows Rows to export

exportTableName Table name

append logical - if true will append the result to a file, otherwise the file will be overwritten
Export Data table with sql query

Method exportQuery(): Writes files in batch to stop overflowing system memory Checks primary keys on write Checks minimum cell count

Usage:

```
ResultExportManager$exportQuery(
  connection,
  sql,
  exportTableName,
  transformFunction = NULL,
  transformFunctionArgs = list(),
  append = FALSE,
  ...
)
```

Arguments:

connection DatabaseConnector connection instance

sql OHDSI sql string to export tables

exportTableName Name of table to export (in snake_case format)

transformFunction (optional) transformation of the data set callback. must take two paramters
- rows and pos

Following this transformation callback, results will be verified against data model,
Primary keys will be checked and minCellValue rules will be enforced

transformFunctionArgs arguments to be passed to the transformation function

append Logical add results to existing file, if FALSE (default) creates a new file and removes
primary key validation cache

... extra parameters passed to sql get manifest list

Method getManifestList(): Create a meta data set for each collection of result files with sha256 has for all files

Usage:

```
ResultExportManager$getManifestList(  
  packageName = NULL,  
  packageVersion = NULL,  
  migrationsPath = NULL,  
  migrationRegexp = .defaultMigrationRegexp  
)
```

Arguments:
packageName if an R analysis package, specify the name
packageVersion if an analysis package, specify the version
migrationsPath path to sql migrations (use top level folder (e.g. sql/sql_server/migrations)
migrationRegexp (optional) regular expression to search for sql files. It is not recommended to change the default. Write manifest

Method writeManifest(): Write manifest json

Usage:
ResultExportManager\$writeManifest(...)
Arguments:
... @seealso getManifestList

Method clone(): The objects of this class are cloneable with this method.

Usage:
ResultExportManager\$clone(deep = FALSE)
Arguments:
deep Whether to make a deep clone.

unzipResults	<i>Unzips a results.zip file and enforces standards required by uploadResults</i>
--------------	---

Description

This function will unzip the zipFile to the resultsFolder and assert that the file resultsDataModel-Specification.csv exists in the resultsFolder to ensure that it will work with uploadResults

Usage

```
unzipResults(zipFile, resultsFolder)
```

Arguments

- zipFile The location of the .zip file that holds the results to upload
- resultsFolder The folder to use when unzipping the .zip file. If this folder does not exist, this function will attempt to create the folder.

uploadResults	<i>Upload results to the database server.</i>
---------------	---

Description

Requires the results data model tables have been created using following the specifications, generateSqlSchema function.

Results files should be in the snake_case format for table headers and not camelCase

Set the POSTGRES_PATH environmental variable to the path to the folder containing the psql executable to enable bulk upload (recommended).

Usage

```
uploadResults(
  connection = NULL,
  connectionDetails = NULL,
  schema,
  resultsFolder,
  tablePrefix = "",
  forceOverWriteOfSpecifications = FALSE,
  purgeSiteDataBeforeUploading = TRUE,
  databaseIdentifierFile = "cdm_source_info.csv",
  runCheckAndFixCommands = FALSE,
  warnOnMissingTable = TRUE,
  purgeDataModel = FALSE,
  specifications
)
```

Arguments

connection	An object of type connection as created using the connect function in the DatabaseConnector package. Can be left NULL if connectionDetails is provided, in which case a new connection will be opened at the start of the function, and closed when the function finishes.
connectionDetails	An object of type connectionDetails as created using the createConnectionDetails function in the DatabaseConnector package.
schema	The schema on the postgres server where the tables have been created.
resultsFolder	The path to the folder containing the results to upload. See unzipResults for more information.
tablePrefix	String to prefix table names with - default is empty string
forceOverWriteOfSpecifications	If TRUE, specifications of the phenotypes, cohort definitions, and analysis will be overwritten if they already exist on the database. Only use this if these specifications have changed since the last upload.

<code>purgeSiteDataBeforeUploading</code>	If TRUE, before inserting data for a specific <code>databaseId</code> all the data for that site will be dropped. This assumes the results folder contains the full data for that data site.
<code>databaseIdentifierFile</code>	File contained that references <code>databaseId</code> field (used when <code>purgeSiteDataBeforeUploading == TRUE</code>). You may specify a relative path for the <code>cdmSourceFile</code> and the function will assume it resides in the <code>resultsFolder</code> . Alternatively, you can provide a path outside of the <code>resultsFolder</code> for this file.
<code>runCheckAndFixCommands</code>	If TRUE, the upload code will attempt to fix column names, data types and duplicate rows. This parameter is kept for legacy reasons - it is strongly recommended that you correct errors in your results where those results are assembled instead of relying on this option to try and fix it during upload.
<code>warnOnMissingTable</code>	Boolean, print a warning if a table file is missing.
<code>purgeDataModel</code>	This function will purge all data from the tables in the specification prior to upload. Use with care. If interactive this will require further input.
<code>specifications</code>	A tibble data frame object with specifications.

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