Package 'RPostgres'

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Title C++ Interface to PostgreSQL

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Description Fully DBI-compliant C++-backed interface to PostgreSQL <https://www.postgresql.org/>, an open-source relational database.

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URL https://rpostgres.r-dbi.org, https://github.com/r-dbi/RPostgres

BugReports https://github.com/r-dbi/RPostgres/issues

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SystemRequirements libpq >= 9.0: libpq-dev (deb) or postgresql-devel (rpm)

Collate 'PqDriver.R' 'PqConnection.R' 'PqResult.R' 'RPostgres-pkg.R' 'Redshift.R' 'cpp11.R' 'dbAppendTable_PqConnection.R' 'dbBegin_PqConnection.R' 'dbBind_PqResult.R' 'dbClearResult_PqResult.R' 'dbColumnInfo_PqResult.R'

'dbCommit_PqConnection.R' 'dbConnect_PqDriver.R'
'dbConnect_RedshiftDriver.R' 'dbDataType_PqConnection.R'
'dbDataType_PqDriver.R' 'dbDisconnect_PqConnection.R'
'dbExistsTable_PqConnection_Id.R'
'dbExistsTable_PqConnection_character.R' 'dbFetch_PqResult.R'
'dbGetInfo_PqConnection.R' 'dbGetInfo_PqDriver.R'
'dbGetRowCount_PqResult.R' 'dbGetRowsAffected_PqResult.R'
'dbGetStatement_PqResult.R' 'dbHasCompleted_PqResult.R'
'dbIsValid_PqConnection.R' 'dbIsValid_PqDriver.R'
'dbIsValid_PqResult.R' 'dbListFields_PqConnection_Id.R'
'dbListFields_PqConnection_character.R'
'dbListObjects_PqConnection_ANY.R'
'dbListTables_PqConnection.R'
'dbQuoteIdentifier_PqConnection_Id.R'
'dbQuoteIdentifier_PqConnection_SQL.R'
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'dbQuoteString_PqConnection_character.R'
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'dbRollback_PqConnection.R' 'dbSendQuery_PqConnection.R'
'dbUnloadDriver_PqDriver.R'
'dbUnquoteIdentifier_PqConnection_SQL.R'
'dbWriteTable_PqConnection_character_data.frame.R' 'default.R'
'export.R' 'quote.R' 'show_PqConnection.R'
'sqlData_PqConnection.R' 'tables.R' 'transactions.R' 'utils.R'

NeedsCompilation yes

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`RPostgres-package` *RPostgres: C++ Interface to PostgreSQL*

Description

Fully DBI-compliant C++-backed interface to PostgreSQL https://www.postgresql.org/, an open-source relational database.

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See Also

Useful links:

- https://rpostgres.r-dbi.org
- https://github.com/r-dbi/RPostgres
- Report bugs at https://github.com/r-dbi/RPostgres/issues

Postgres *Postgres driver*

Description

DBI::dbConnect() establishes a connection to a database. Set drv = Postgres() to connect to a PostgreSQL(-ish) database. Use drv = Redshift() instead to connect to an AWS Redshift cluster.

Manually disconnecting a connection is not necessary with **RPostgres**, but still recommended; if you delete the object containing the connection, it will be automatically disconnected during the next GC with a warning.

Usage

```
Postgres()

## S4 method for signature 'PqDriver'
dbConnect(
  drv,
  dbname = NULL,
  host = NULL,
  port = NULL,
  password = NULL,
  user = NULL,
  service = NULL,
  ...,
  bigint = c("integer64", "integer", "numeric", "character"),
  check_interrupts = FALSE,
  timezone = "UTC",
  timezone_out = NULL
)

## S4 method for signature 'PqConnection'
dbDisconnect(conn, ...)
```

Arguments

drv	DBI::DBIDriver. Use Postgres() to connect to a PostgreSQL(-ish) database or Redshift() to connect to an AWS Redshift cluster. Use an existing DBI::DBIConnection object to clone an existing connection.
dbname	Database name. If NULL, defaults to the user name. Note that this argument can only contain the database name, it will not be parsed as a connection string (internally, expand_dbname is set to false in the call to PQconnectdbParams()).
host, port	Host and port. If NULL, will be retrieved from PGHOST and PGPORT env vars.
user, password	User name and password. If NULL, will be retrieved from PGUSER and PGPASSWORD envvars, or from the appropriate line in ~/.pgpass. See https://www.postgresql.org/docs/current/libpq-pgpass.html for more details.

service — Name of service to connect as. If NULL, will be ignored. Otherwise, connection parameters will be loaded from the pg_service.conf file and used. See https://www.postgresql.org/docs/current/libpq-pgservice.html for details on this file and syntax.

... — Other name-value pairs that describe additional connection options as described at https://www.postgresql.org/docs/current/libpq-connect.html#LIBPQ-PARAMKEYWORDS

bigint — The R type that 64-bit integer types should be mapped to, default is bit64::integer64, which allows the full range of 64 bit integers.

check_interrupts — Should user interrupts be checked during the query execution (before first row of data is available)? Setting to TRUE allows interruption of queries running too long.

timezone — Sets the timezone for the connection. The default is "UTC". If NULL then no timezone is set, which defaults to the server's time zone.

timezone_out — The time zone returned to R, defaults to timezone. If you want to display datetime values in the local timezone, set to Sys.timezone() or "". This setting does not change the time values returned, only their display.

conn — Connection to disconnect.

Examples

```
library(DBI)
# Pass more arguments as necessary to dbConnect()
con <- dbConnect(RPostgres::Postgres())
dbDisconnect(con)
```

---

postgres-query *Execute a SQL statement on a database connection*

Description

To retrieve results a chunk at a time, use dbSendQuery(), dbFetch(), then dbClearResult(). Alternatively, if you want all the results (and they'll fit in memory) use dbGetQuery() which sends, fetches and clears for you.

Usage

```
## S4 method for signature 'PqResult'
dbBind(res, params, ...)

## S4 method for signature 'PqResult'
dbClearResult(res, ...)

## S4 method for signature 'PqResult'
dbFetch(res, n = -1, ..., row.names = FALSE)
```

```
## S4 method for signature 'PqResult'
dbHasCompleted(res, ...)

## S4 method for signature 'PqConnection'
dbSendQuery(conn, statement, params = NULL, ..., immediate = FALSE)
```

Arguments

res	Code a PqResult produced by DBI::dbSendQuery().
params	A list of query parameters to be substituted into a parameterised query. Query parameters are sent as strings, and the correct type is imputed by PostgreSQL. If this fails, you can manually cast the parameter with e.g. "$1::bigint".
...	Other arguments needed for compatibility with generic (currently ignored).
n	Number of rows to return. If less than zero returns all rows.
row.names	Either TRUE, FALSE, NA or a string. If TRUE, always translate row names to a column called "row_names". If FALSE, never translate row names. If NA, translate rownames only if they're a character vector. A string is equivalent to TRUE, but allows you to override the default name. For backward compatibility, NULL is equivalent to FALSE.
conn	A PqConnection created by DBI::dbConnect().
statement	An SQL string to execute.
immediate	If TRUE, uses the PGsendQuery() API instead of PGprepare(). This allows to pass multiple statements and turns off the ability to pass parameters.

Multiple queries and statements

With immediate = TRUE, it is possible to pass multiple queries or statements, separated by semicolons. For multiple statements, the resulting value of DBI::dbGetRowsAffected() corresponds to the total number of affected rows. If multiple queries are used, all queries must return data with the same column names and types. Queries and statements can be mixed.

Examples

```
library(DBI)
db <- dbConnect(RPostgres::Postgres())
dbWriteTable(db, "usarrests", datasets::USArrests, temporary = TRUE)

# Run query to get results as dataframe
dbGetQuery(db, "SELECT * FROM usarrests LIMIT 3")

# Send query to pull requests in batches
res <- dbSendQuery(db, "SELECT * FROM usarrests")
dbFetch(res, n = 2)
dbFetch(res, n = 2)
dbHasCompleted(res)
dbClearResult(res)
```

```
dbRemoveTable(db, "usarrests")

dbDisconnect(db)
```

---

postgres-tables *Convenience functions for reading/writing DBMS tables*

Description

DBI::dbAppendTable() is overridden because **RPostgres** uses placeholders of the form $1, $2 etc. instead of ?.

DBI::dbWriteTable() executes several SQL statements that create/overwrite a table and fill it with values. **RPostgres** does not use parameterised queries to insert rows because benchmarks revealed that this was considerably slower than using a single SQL string.

Usage

```
## S4 method for signature 'PqConnection'
dbAppendTable(conn, name, value, copy = NULL, ..., row.names = NULL)

## S4 method for signature 'PqConnection,Id'
dbExistsTable(conn, name, ...)

## S4 method for signature 'PqConnection,character'
dbExistsTable(conn, name, ...)

## S4 method for signature 'PqConnection,Id'
dbListFields(conn, name, ...)

## S4 method for signature 'PqConnection,character'
dbListFields(conn, name, ...)

## S4 method for signature 'PqConnection'
dbListObjects(conn, prefix = NULL, ...)

## S4 method for signature 'PqConnection'
dbListTables(conn, ...)

## S4 method for signature 'PqConnection,character'
dbReadTable(conn, name, ..., check.names = TRUE, row.names = FALSE)

## S4 method for signature 'PqConnection,character'
dbRemoveTable(conn, name, ..., temporary = FALSE, fail_if_missing = TRUE)

## S4 method for signature 'PqConnection,character,data.frame'
```

```
dbWriteTable(
  conn,
  name,
  value,
  ...,
  row.names = FALSE,
  overwrite = FALSE,
  append = FALSE,
  field.types = NULL,
  temporary = FALSE,
  copy = NULL
)

## S4 method for signature 'PqConnection'
sqlData(con, value, row.names = FALSE, ...)
```

Arguments

conn	a PqConnection object, produced by DBI::dbConnect()
name	a character string specifying a table name. Names will be automatically quoted so you can use any sequence of characters, not just any valid bare table name. Alternatively, pass a name quoted with DBI::dbQuoteIdentifier(), an Id() object, or a string escaped with DBI::SQL().
value	A data.frame to write to the database.
copy	If TRUE, serializes the data frame to a single string and uses COPY name FROM stdin. This is fast, but not supported by all postgres servers (e.g. Amazon's Redshift). If FALSE, generates a single SQL string. This is slower, but always supported. The default maps to TRUE on connections established via Postgres() and to FALSE on connections established via Redshift().
...	Ignored.
row.names	Either TRUE, FALSE, NA or a string. If TRUE, always translate row names to a column called "row_names". If FALSE, never translate row names. If NA, translate rownames only if they're a character vector. A string is equivalent to TRUE, but allows you to override the default name. For backward compatibility, NULL is equivalent to FALSE.
prefix	A fully qualified path in the database's namespace, or NULL. This argument will be processed with dbUnquoteIdentifier(). If given the method will return all objects accessible through this prefix.
check.names	If TRUE, the default, column names will be converted to valid R identifiers.
temporary	If TRUE, only temporary tables are considered.
fail_if_missing	If FALSE, dbRemoveTable() succeeds if the table doesn't exist.
overwrite	a logical specifying whether to overwrite an existing table or not. Its default is FALSE.

append	a logical specifying whether to append to an existing table in the DBMS. Its default is FALSE.
field.types	character vector of named SQL field types where the names are the names of new table's columns. If missing, types are inferred with DBI::dbDataType(). The types can only be specified with append = FALSE.
con	A database connection.

Schemas, catalogs, tablespaces

Pass an identifier created with Id() as the name argument to specify the schema or catalog, e.g. name = Id(catalog = "my_catalog", schema = "my_schema", table = "my_table") . To specify the tablespace, use dbExecute(conn, "SET default_tablespace TO my_tablespace") before creating the table.

Examples

```
library(DBI)
con <- dbConnect(RPostgres::Postgres())
dbListTables(con)
dbWriteTable(con, "mtcars", mtcars, temporary = TRUE)
dbReadTable(con, "mtcars")

dbListTables(con)
dbExistsTable(con, "mtcars")

# A zero row data frame just creates a table definition.
dbWriteTable(con, "mtcars2", mtcars[0, ], temporary = TRUE)
dbReadTable(con, "mtcars2")

dbDisconnect(con)
```

---

postgres-transactions *Transaction management.*

Description

dbBegin() starts a transaction. dbCommit() and dbRollback() end the transaction by either committing or rolling back the changes.

Usage

```
## S4 method for signature 'PqConnection'
dbBegin(conn, ..., name = NULL)

## S4 method for signature 'PqConnection'
dbCommit(conn, ..., name = NULL)

## S4 method for signature 'PqConnection'
dbRollback(conn, ..., name = NULL)
```

Arguments

conn	a PqConnection object, produced by DBI::dbConnect()
...	Unused, for extensibility.
name	If provided, uses the SAVEPOINT SQL syntax to establish, remove (commit) or undo a ßsavepoint.

Value

A boolean, indicating success or failure.

Examples

```
library(DBI)
con <- dbConnect(RPostgres::Postgres())
dbWriteTable(con, "USarrests", datasets::USArrests, temporary = TRUE)
dbGetQuery(con, 'SELECT count(*) from "USarrests"')

dbBegin(con)
dbExecute(con, 'DELETE from "USarrests" WHERE "Murder" > 1')
dbGetQuery(con, 'SELECT count(*) from "USarrests"')
dbRollback(con)

# Rolling back changes leads to original count
dbGetQuery(con, 'SELECT count(*) from "USarrests"')

dbRemoveTable(con, "USarrests")
dbDisconnect(con)
```

---

postgresExportLargeObject

Exports a large object to file

Description

Exports a large object from the database to a file on disk. This function uses PostgreSQL's lo_export() function which efficiently streams the data directly to disk without loading it into memory, making it suitable for very large objects (GB+) that would cause memory issues with lo_get(). This function must be called within a transaction.

Usage

```
postgresExportLargeObject(conn, oid, filepath)
```

Arguments

conn	a PqConnection object, produced by DBI::dbConnect()
oid	the object identifier (Oid) of the large object to export
filepath	a path where the large object should be exported

Value

invisible NULL on success, or stops with an error

Examples

```
## Not run:
con <- postgresDefault()
filepath <- 'your_image.png'
dbWithTransaction(con, {
  oid <- postgresImportLargeObject(con, filepath)
})
# Later, export the large object back to a file
dbWithTransaction(con, {
  postgresExportLargeObject(con, oid, 'exported_image.png')
})

## End(Not run)
```

`postgresHasDefault` *Check if default database is available.*

Description

RPostgres examples and tests connect to a default database via `dbConnect(Postgres())`. This function checks if that database is available, and if not, displays an informative message.

`postgresDefault()` works similarly but returns a connection on success and throws a testthat skip condition on failure, making it suitable for use in tests.

Usage

```
postgresHasDefault(...)

postgresDefault(...)
```

Arguments

`...`	Additional arguments passed on to `DBI::dbConnect()`

Examples

```
if (postgresHasDefault()) {
  db <- postgresDefault()
  print(dbListTables(db))
  dbDisconnect(db)
} else {
  message("No database connection.")
}
```

postgresImportLargeObject *Imports a large object from file*

Description

Returns an object identifier (Oid) for the imported large object. This function must be called within a transaction.

Usage

```
postgresImportLargeObject(conn, filepath = NULL, oid = 0)
```

Arguments

conn	a PqConnection object, produced by DBI::dbConnect()
filepath	a path to the large object to import
oid	the oid to write to. Defaults to 0 which assigns an unused oid

Value

the identifier of the large object, an integer

Examples

```
## Not run:
con <- postgresDefault()
filepath <- 'your_image.png'
dbWithTransaction(con, {
  oid <- postgresImportLargeObject(con, filepath)
})

## End(Not run)
```

postgresIsTransacting *Return whether a transaction is ongoing*

Description

Detect whether the transaction is active for the given connection. A transaction might be started with DBI::dbBegin() or wrapped within DBI::dbWithTransaction().

Usage

```
postgresIsTransacting(conn)
```

Arguments

conn	a PqConnection object, produced by DBI::dbConnect()

Value

A boolean, indicating if a transaction is ongoing.

---

postgresWaitForNotify *Wait for and return any notifications that return within timeout*

Description

Once you subscribe to notifications with LISTEN, use this to wait for responses on each channel.

Usage

```
postgresWaitForNotify(conn, timeout = 1)
```

Arguments

conn	a PqConnection object, produced by DBI::dbConnect()
timeout	How long to wait, in seconds. Default 1

Value

If a notification was available, a list of:

channel Name of channel

pid PID of notifying server process

payload Content of notification

If no notifications are available, return NULL

Examples

```
library(DBI)
library(callr)

# listen for messages on the grapevine
db_listen <- dbConnect(RPostgres::Postgres())
dbExecute(db_listen, "LISTEN grapevine")

# Start another process, which sends a message after a delay
rp <- r_bg(function() {
  library(DBI)
  Sys.sleep(0.3)
  db_notify <- dbConnect(RPostgres::Postgres())
  dbExecute(db_notify, "NOTIFY grapevine, 'psst'")
```

```
  dbDisconnect(db_notify)
})

# Sleep until we get the message
n <- NULL
while (is.null(n)) {
  n <- RPostgres::postgresWaitForNotify(db_listen, 60)
}
stopifnot(n$payload == 'psst')

# Tidy up
rp$wait()
dbDisconnect(db_listen)
```

---

quote *Quote postgres strings, identifiers, and literals*

Description

If an object of class Id is used for `dbQuoteIdentifier()`, it needs at most one `table` component and at most one `schema` component.

Usage

```
## S4 method for signature 'PqConnection,Id'
dbQuoteIdentifier(conn, x, ...)

## S4 method for signature 'PqConnection,SQL'
dbQuoteIdentifier(conn, x, ...)

## S4 method for signature 'PqConnection,character'
dbQuoteIdentifier(conn, x, ...)

## S4 method for signature 'PqConnection'
dbQuoteLiteral(conn, x, ...)

## S4 method for signature 'PqConnection,SQL'
dbQuoteString(conn, x, ...)

## S4 method for signature 'PqConnection,character'
dbQuoteString(conn, x, ...)

## S4 method for signature 'PqConnection,SQL'
dbUnquoteIdentifier(conn, x, ...)
```

Arguments

conn	A PqConnection created by dbConnect()
x	A character vector to be quoted.
...	Other arguments needed for compatibility with generic (currently ignored).

Examples

```
library(DBI)
con <- dbConnect(RPostgres::Postgres())

x <- c("a", "b c", "d'e", "\\f")
dbQuoteString(con, x)
dbQuoteIdentifier(con, x)
dbDisconnect(con)
```

Redshift *Redshift driver/connection*

Description

Use drv = Redshift() instead of drv = Postgres() to connect to an AWS Redshift cluster. All methods in **RPostgres** and downstream packages can be called on such connections. Some have different behavior for Redshift connections, to ensure better interoperability.

Usage

```
Redshift()

## S4 method for signature 'RedshiftDriver'
dbConnect(
  drv,
  dbname = NULL,
  host = NULL,
  port = NULL,
  password = NULL,
  user = NULL,
  service = NULL,
  ...,
  bigint = c("integer64", "integer", "numeric", "character"),
  check_interrupts = FALSE,
  timezone = "UTC"
)
```

Arguments

drv	DBI::DBIDriver. Use `Postgres()` to connect to a PostgreSQL(-ish) database or `Redshift()` to connect to an AWS Redshift cluster. Use an existing DBI::DBIConnection object to clone an existing connection.
dbname	Database name. If `NULL`, defaults to the user name. Note that this argument can only contain the database name, it will not be parsed as a connection string (internally, `expand_dbname` is set to `false` in the call to `PQconnectdbParams()`).
host, port	Host and port. If `NULL`, will be retrieved from `PGHOST` and `PGPORT` env vars.
user, password	User name and password. If `NULL`, will be retrieved from `PGUSER` and `PGPASSWORD` envvars, or from the appropriate line in `~/.pgpass`. See https://www.postgresql.org/docs/current/libpq-pgpass.html for more details.
service	Name of service to connect as. If `NULL`, will be ignored. Otherwise, connection parameters will be loaded from the pg_service.conf file and used. See https://www.postgresql.org/docs/current/libpq-pgservice.html for details on this file and syntax.
...	Other name-value pairs that describe additional connection options as described at https://www.postgresql.org/docs/current/libpq-connect.html#LIBPQ-PARAMKEYWORDS
bigint	The R type that 64-bit integer types should be mapped to, default is bit64::integer64, which allows the full range of 64 bit integers.
check_interrupts	Should user interrupts be checked during the query execution (before first row of data is available)? Setting to `TRUE` allows interruption of queries running too long.
timezone	Sets the timezone for the connection. The default is `"UTC"`. If `NULL` then no timezone is set, which defaults to the server's time zone.

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