

# Package ‘DBI’

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**Title** R Database Interface

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**Depends** R (>= 2.3.0), methods

**Imports** methods

**Description** A database interface (DBI) definition for communication between R and relational database management systems. All classes in this package are virtual and need to be extended by the various R/DBMS implementations.

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dbCallProc	<i>Call an SQL stored procedure</i>
------------	-------------------------------------

---

### Description

Calls a stored procedure on a remote RDBMS

### Usage

```
dbCallProc(conn, ...)
```

### Arguments

conn	a <code>DBIConnection</code> object.
...	additional arguments are passed to the implementing method.

### Details

Not yet implemented.

### References

See the Database Interface definition document `DBI.pdf` in the base directory of this package or <http://developer.r-project.org/db>.

---

dbCommit	<i>DBMS Transaction Management</i>
----------	------------------------------------

---

### Description

Commit/rollback SQL transactions

### Usage

```
dbCommit(conn, ...)
dbRollback(conn, ...)
```

**Arguments**

`conn` a `DBIConnection` object, as produced by the function `dbConnect`.  
`...` any database-specific arguments.

**Details**

Not all database engines implement transaction management, older versions of MySQL, for instance.

**Value**

a logical indicating whether the operation succeeded or not.

**Side Effects**

The current transaction on the connections `con` is committed or rolled back.

**References**

See the Database Interface definition document `DBI.pdf` in the base directory of this package or <http://developer.r-project.org/db>.

**See Also**

[dbConnect](#) [dbSendQuery](#) [dbGetQuery](#) [fetch](#) [dbCommit](#) [dbGetInfo](#) [dbReadTable](#)

**Examples**

```
## Not run:
ora <- dbDriver("Oracle")
con <- dbConnect(ora)
rs <- dbSendQuery(con,
  "delete * from PURGE as p where p.wavelength<0.03")
if(dbGetInfo(rs, what = "rowsAffected") > 250){
  warning("dubious deletion -- rolling back transaction")
  dbRollback(con)
}

## End(Not run)
```

---

`dbConnect`*Create a connection to a DBMS*

---

**Description**

Connect to a DBMS going through the appropriate authorization procedure.

## Usage

```
dbConnect (drv, ...)  
dbDisconnect (conn, ...)
```

## Arguments

drv	an object that inherits from <code>DBIDriver</code> , a character string specifying the DBMS driver, e.g., "RPostgreSQL", "ROracle", "Informix", or possibly another <code>dbConnect</code> object.
conn	a connection object as produced by <code>dbConnect</code> .
...	authorization arguments needed by the DBMS instance; these typically include <code>user</code> , <code>password</code> , <code>dbname</code> , <code>host</code> , <code>port</code> , etc. For details see the appropriate <code>DBIDriver</code> .

## Details

Some implementations may allow you to have multiple connections open, so you may invoke this function repeatedly assigning its output to different objects.

The authorization mechanism is left unspecified, so check the documentation of individual drivers for details.

## Value

An object that extends `DBIConnection` in a database-specific manner. For instance `dbConnect ("MySQL")` produces an object of class `MySQLConnection`. This object is used to direct commands to the database engine.

`dbDisconnect` returns a logical value indicating whether the operation succeeded or not.

## Side Effects

A connection between R/Splus and the database server is established, and the R/Splus program becomes a client of the database engine. Typically the connections is through the TCP/IP protocol, but this will depend on vendor-specific details.

## notes

Make sure you close the connection using `dbDisconnect (conn)` when it is no longer needed.

## References

See the Database Interface definition document `DBI.pdf` in the base directory of this package or <http://developer.r-project.org/db>.

## See Also

[dbConnect](#) [dbSendQuery](#) [dbGetQuery](#) [fetch](#) [dbCommit](#) [dbGetInfo](#) [dbReadTable](#)

**Examples**

```
## Not run:
# create an RODBDC instance and create one connection.
m <- dbDriver("RODBC")

# open the connection using user, password, etc., as
# specified in the file \file{$HOME/.my.cnf}
con <- dbConnect(m, dsn="data.source", uid="user", pwd="password")

# Run an SQL statement by creating first a resultSet object
rs <- dbSendQuery(con, statement = paste(
  "SELECT w.laser_id, w.wavelength, p.cut_off",
  "FROM WL w, PURGE P",
  "WHERE w.laser_id = p.laser_id",
  "SORT BY w.laser_id")
# we now fetch records from the resultSet into a data.frame
data <- fetch(rs, n = -1) # extract all rows
dim(data)

## End(Not run)
```

---

dbDataType

*Determine the SQL Data Type of an S object*


---

**Description**

Determine an (approximately) appropriate SQL data type for an S object.

**Usage**

```
dbDataType(dbObj, obj, ...)
```

**Arguments**

dbObj	a DBIDriver object, e.g., ODBCdriver, OracleDriver.
obj	R/Splus object whose SQL type we want to determine.
...	any other parameters that individual methods may need.

**Details**

This is a generic function. The default method determines the SQL type of an R/Splus object according to the SQL 92 specification, which may serve as a starting point for driver implementations.

**Value**

A character string specifying the SQL data type for obj.

## References

See the Database Interface definition document `DBI.pdf` in the base directory of this package or <http://developer.r-project.org/db>.

## See Also

`isSQLKeyword` `make.db.names`

## Examples

```
## Not run:
ora <- dbDriver("Oracle")
sql.type <- dbDataType(ora, x)

## End(Not run)
```

---

dbDriver

*Database Interface (DBI) Classes and drivers*

---

## Description

These *virtual* classes and their methods define the interface to database management systems (DBMS). They are extended by packages or drivers that implement the methods in the context of specific DBMS (e.g., Berkeley DB, MySQL, Oracle, ODBC, PostgreSQL, SQLite).

## Usage

```
dbDriver(drvName, ...)
dbUnloadDriver(drv, ...)    ## free up all resources
```

## Arguments

<code>drvName</code>	character name of the driver to instantiate.
<code>drv</code>	an object that inherits from <code>DBIDriver</code> as created by <code>dbDriver</code> .
<code>...</code>	any other arguments are passed to the driver <code>drvName</code> .

## Details

The virtual class `DBIDriver` defines the operations for creating connections and defining data type mappings. Actual driver classes, for instance `RPgSQL`, `RMySQL`, etc. implement these operations in a DBMS-specific manner.

More generally, the DBI defines a very small set of classes and methods that allows users and applications access DBMS with a common interface. The virtual classes are `DBIDriver` that individual drivers extend, `DBIConnection` that represent instances of DBMS connections, and `DBIResult` that represent the result of a DBMS statement. These three classes extend the basic class of `DBIObject`, which serves as the root or parent of the class hierarchy.

**Value**

In the case of `dbDriver`, an driver object whose class extends `DBIDriver`. This object may be used to create connections to the actual DBMS engine.

In the case of `dbUnloadDriver`, a logical indicating whether the operation succeeded or not.

**Side Effects**

The client part of the database communication is initialized (typically dynamically loading C code, etc.) but note that connecting to the database engine itself needs to be done through calls to `dbConnect`.

**References**

See the Database Interface definition document `DBI.pdf` in the base directory of this package or <http://developer.r-project.org/db>.

**See Also**

[dbConnect](#), [dbSendQuery](#), [dbGetQuery](#), [fetch](#), [dbCommit](#), [dbGetInfo](#), [dbListTables](#), [dbReadTable](#).

**Examples**

```
## Not run:
# create a MySQL instance for capacity of up to 25 simultaneous
# connections.
m <- dbDriver("MySQL", max.con = 25)
p <- dbDriver("PgSQL")

# open the connection using user, password, etc., as
con <- dbConnect(m, user="ip", password = "traffic", dbname="iptraffic")
rs <- dbSubmitQuery(con,
  "select * from HTTP_ACCESS where IP_ADDRESS = '127.0.0.1'")
df <- fetch(rs, n = 50)
df2 <- fetch(rs, n = -1)
dbClearResult(rs)

pcon <- dbConnect(p, "user", "password", "dbname")
dbListTables(pcon)

## End(Not run)
```

---

`dbGetInfo`*Database interface meta-data*

---

**Description**

Extract meta-data associated with various objects

**Usage**

```

dbGetInfo(dbObj, ...)      # meta-data for any DBIObject
dbGetDBIVersion()         # DBI version
dbGetStatement(res, ...)  # statement that produced result "res"
dbGetRowCount(res, ...)   # number of rows fetched so far
dbGetRowsAffected(res, ...) # number of affected rows (e.g., DELETE)
dbColumnInfo(res, ...)    # result set data types
dbHasCompleted(res, ...) # are there more rows to fetch on "res"?

```

**Arguments**

dbObj	any object that implements some functionality in the R/Splus interface to databases (a driver, a connection or a result set).
res	refers to a DBIResult object.
...	any driver-specific arguments.

**Details**

These functions implement a minimal set of meta-data describing the most important aspects of the R/Splus to DBMS interface.

The `dbGetInfo` works very similarly to the function `options` in that it attempts to extract what the user may request, possibly NULL if it can't locate the specific piece of meta-data.

**Value**

`dbGetDBIVersion` returns a character string with the version of the database interface API.

`dbGetInfo` produces either a character vector or a named list of (name, value) pairs.

`dbGetStatement` returns a character string with the statement associated with the result set `res`.

`dbGetRowCount` returns the number of rows fetched so far.

`dbGetRowsAffected` returns the number of affected rows (e.g., how many rows were deleted, inserted). Some drivers may set this to the total number of rows a query produces.

`dbColumnInfo` returns a data.frame with one row per output field in `res`. The columns should report field name, field data type, scale and precision (as understood by the DBMS engine), whether the field can store NULL values, and possibly other DBMS-specific information.

`dbHasCompleted` a logical describing whether the operations has been completed by the DBMS or not.

**Note**

Meta-data associated with a driver should include the version of the package, plus the version of the underlying client library. Connection objects should report the version of the DBMS engine, database name, user, possibly password, etc. Results should include the statement being executed, how many rows have been fetched so far (in the case of queries), how many rows were affected (deleted, inserted, changed, or total number of records to be fetched).

## References

See the Database Interface definition document `DBI.pdf` in the base directory of this package or <http://developer.r-project.org/db>.

## See Also

`dbDriver`, `dbConnect`, `dbSendQuery`, `dbGetQuery`, `fetch`, `dbCommit`, `dbGetInfo`, `dbListTables`, `dbReadTable`.

## Examples

```
## Not run:
drv <- dbDriver("SQLite")
con <- dbConnect(drv)

dbListTables(con)

rs <- dbSendQuery(con, query.sql)
dbGetStatement(rs)
dbHasCompleted(rs)

info <- dbGetInfo(rs)
names(dbGetInfo(drv))

# DBIConnection info
names(dbGetInfo(con))

# DBIResult info
names(dbGetInfo(rs))

## End(Not run)
```

---

DBIConnection-class

*Class DBIConnection*

---

## Description

Base class for all DBMS connection classes. Individual drivers (ODBC, Oracle, PostgreSQL, MySQL, etc.) extend this class in a database-specific manner.

## Objects from the Class

A virtual Class: No objects may be created from it.

## Extends

Class "DBIObject", directly.

**Generator**

The main generator is `dbConnect`.

**Methods**

The following methods take objects from classes derived from `DBIConnection`:

Create and close connections:

**dbConnect** signature(`drv = "DBIConnection"`): ...

**dbDisconnect** signature(`conn = "DBIConnection"`): ...

Execute SQL commands:

**dbSendQuery** signature(`conn = "DBIConnection"`, `statement = "character"`): ...

...

**dbGetQuery** signature(`conn = "DBIConnection"`, `statement = "character"`): ...

...

**dbCallProc** signature(`conn = "DBIConnection"`): ...

Transaction management:

**dbCommit** signature(`conn = "DBIConnection"`): ...

**dbRollback** signature(`conn = "DBIConnection"`): ...

Meta-data:

**dbListResults** signature(`conn = "DBIConnection"`): ...

**dbGetInfo** signature(`dbObj = "DBIConnection"`): ...

**summary** signature(`object = "DBIConnection"`): ...

Exceptions:

**dbGetException** signature(`conn = "DBIConnection"`): ...

**dbListFields** signature(`conn = "DBIConnection"`, `name = "character"`): ...

Convenience functions:

**dbListTables** signature(`conn = "DBIConnection"`): ...

**dbReadTable** signature(`conn = "DBIConnection"`, `name = "character"`): ...

**dbExistsTable** signature(`conn = "DBIConnection"`, `name = "character"`): ...

**dbRemoveTable** signature(`conn = "DBIConnection"`, `name = "character"`): ...

**dbWriteTable** signature(`conn = "DBIConnection"`, `name = "character"`, `value = "data.frame"`): ...

**Author(s)**

R-SIG-DB

**References**

See the Database Interface definition document `DBI.pdf` in the base directory of this package or <http://developer.r-project.org/db>.

**See Also**

DBI classes: [DBIObject-class](#) [DBIDriver-class](#) [DBIConnection-class](#) [DBIResult-class](#)

**Examples**

```
## Not run:
ora <- dbDriver("Oracle")
con <- dbConnect(ora, "user/password@dbname")

pg <- dbDriver("PostgreSQL")
con <- dbConnect(pg, "user", "password")

## End(Not run)
```

---

DBIDriver-class      *Class DBIDriver*

---

**Description**

Base class for all DBMS drivers (e.g., ODBC, Oracle, MySQL, PostgreSQL).

**Objects from the Class**

A virtual Class: No objects may be created from it.

**Extends**

Class "DBIObject", directly.

**Generator**

The generator for classes that extend DBIDriver is [dbDriver](#).

**Methods**

The following methods are defined for classes that extend DBIDriver:

**dbUnloadDriver** signature(drv = "DBIDriver"):...

**dbConnect** signature(drv = "DBIDriver"):...

**dbGetInfo** signature(dbObj = "DBIDriver"):...

**dbListConnections** signature(drv = "DBIDriver"):...

**summary** signature(object = "DBIDriver"):...

**Author(s)**

R-SIG-DB

**References**

See the Database Interface definition document `DBI.pdf` in the base directory of this package or <http://developer.r-project.org/db>.

**See Also**

DBI classes: [DBIObject-class](#) [DBIDriver-class](#) [DBIConnection-class](#) [DBIResult-class](#)

The function `dbConnect` is the main generator.

In addition see the help of the methods above.

**Examples**

```
## Not run:
drv <- dbDriver("ODBC")
summary(drv)
dbListConnections(drv)

## End(Not run)
```

---

DBIObject-class      *Class DBIObject*

---

**Description**

Base class for all other DBI classes (e.g., drivers, connections).

**Objects from the Class**

A virtual Class: No objects may be created from it.

**Methods**

Methods defined for classes that extend `DBIObject`:

**dbDataType** signature(`dbObj` = "DBIObject"): ...  
**isSQLKeyword** signature(`dbObj` = "DBIObject"): ...  
**make.db.names** signature(`dbObj` = "DBIObject"): ...  
**SQLKeywords** signature(`dbObj` = "DBIObject"): ...  
**summary** signature(`object` = "DBIObject"): ...

Plus many other specific to the other DBI classes.

**Author(s)**

R-SIG-DB

**References**

See the Database Interface definition document `DBI.pdf` in the base directory of this package or <http://developer.r-project.org/db>.

**See Also**

DBI classes: [DBIObject-class](#) [DBIDriver-class](#) [DBIConnection-class](#) [DBIResult-class](#)

**Examples**

```
## Not run:
drv <- dbDriver("MySQL")
con <- dbConnect(drv, group = "rs-dbi")
res <- dbSendQuery(con, "select * from vitalSuite")
is(drv, "DBIObject") ## True
is(con, "DBIObject") ## True
is(res, "DBIObject")

## End(Not run)
```

---

DBIResult-class      *Class DBIResult*

---

**Description**

Base class for all DBMS-specific result objects.

**Objects from the Class**

A virtual Class: No objects may be created from it.

**Extends**

Class "DBIObject", directly.

**Generator**

The main generator is [dbSendQuery](#).

**Methods**

Fetching methods:

`signature(res = "DBIResult", n = "numeric"):...`

**`fetch`** `signature(res = "DBIResult", n = "missing"):...` Close result set:

**`dbClearResult`** `signature(res = "DBIResult"):...`

Meta-data:

```
dbColumnInfo signature(res = "DBIResult"):...  
dbGetException signature(conn = "DBIResult"):...  
dbGetInfo signature(dbObj = "DBIResult"):...  
dbGetRowCount signature(res = "DBIResult"):...  
dbGetRowsAffected signature(res = "DBIResult"):...  
dbGetStatement signature(res = "DBIResult"):...  
dbHasCompleted signature(res = "DBIResult"):...  
dbListFields signature(conn = "DBIResult", name = "missing"):...  
summary signature(object = "DBIResult"):...  
coerce signature(from = "DBIConnection", to = "DBIResult"):...
```

### Author(s)

R-SIG-DB

### References

See the Database Interface definition document `DBI.pdf` in the base directory of this package or <http://developer.r-project.org/db>.

### See Also

DBI classes: [DBIObject-class](#) [DBIDriver-class](#) [DBIConnection-class](#) [DBIResult-class](#)

### Examples

```
## Not run:  
drv <- dbDriver("Oracle")  
con <- dbConnect(drv, "user/password@dbname")  
res <- dbSendQuery(con, "select * from LASERS where prdata > '2002-05-01'")  
summary(res)  
while(dbHasCompleted(res)){  
  chunk <- fetch(res, n = 1000)  
  process(chunk)  
}  
  
## End(Not run)
```

---

dbListTables	<i>List items from a remote DBMS and from objects that implement the database interface DBI.</i>
--------------	--

---

### Description

List remote tables, fields of a remote table, opened connections and pending statements in a connection.

### Usage

```
dbListTables(conn, ...)  
dbListFields(conn, name, ...)  
dbListConnections(drv, ...)  
dbListResults(conn, ...)
```

### Arguments

drv	a driver object (e.g., ODBC, Oracle)
conn	a connection object
name	a character string with the name of the remote table.
...	optional arguments for the actual driver implementation.

### Value

`dbListTables` returns a character vector with the names of the tables in the remote database associated with the connection in `conn` object.

`dbListFields` returns a character vector with the names of the fields of the `res` result object (it must be a query statement).

`dbListConnections` returns a list of all currently open connections on driver `drv`. Drivers that implement single connections would return the one single connection object.

`dbListResults` returns a list of objects for all pending results (statements) on the `conn` connection.

### References

See the Database Interface definition document `DBI.pdf` in the base directory of this package or <http://developer.r-project.org/db>.

### See Also

[dbGetInfo](#), [dbColumnInfo](#), [dbDriver](#), [dbConnect](#), [dbSendQuery](#)

**Examples**

```
## Not run:
odbc <- dbDriver("ODBC")
# after working awhile...
for(con in dbListConnections(odbc)){
  dbGetStatement(dbListResults(con))
}

## End(Not run)
```

---

dbReadTable

*Convenience functions for Importing/Exporting DBMS tables*


---

**Description**

These functions mimic their R/Splus counterpart `get`, `assign`, `exists`, `remove`, and `objects`, except that they generate code that gets remotely executed in a database engine.

**Usage**

```
dbReadTable(conn, name, ...)
dbWriteTable(conn, name, value, ...)
dbExistsTable(conn, name, ...)
dbRemoveTable(conn, name, ...)
```

**Usage**

```
dbReadTable(conn, name, row.names = "row_names", ...)
dbWriteTable(conn, name, value, row.names = T, ...,
             overwrite = F, append = F)
dbExistsTable(conn, name, ...)
dbRemoveTable(conn, name, ...)
```

**Arguments**

<code>conn</code>	a database connection object.
<code>name</code>	a character string specifying a DBMS table name.
<code>value</code>	a <code>data.frame</code> (or coercible to <code>data.frame</code> ).
<code>row.names</code>	in the case of <code>dbReadTable</code> , this argument can be a string or an index specifying the column in the DBMS table to be used as <code>row.names</code> in the output <code>data.frame</code> (a <code>NULL</code> , <code>"</code> , or <code>0</code> specifies that no column should be used as <code>row.names</code> in the output). In the case of <code>dbWriteTable</code> , this argument should be a logical specifying whether the <code>row.names</code> should be output to the output DBMS table; if <code>TRUE</code> , the extra field name will be whatever the S identifier <code>"row.names"</code> maps to the DBMS (see <code>make.db.names</code> ).

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.
...	any optional arguments that the underlying database driver supports.

**Value**

dbReadTable returns a data.frame; all other functions return TRUE or FALSE denoting whether the operation was successful or not.

**Side Effects**

A DBMS statement is generated and remotely executed on a database engine; the result set it produces is fetched in its entirety. These operations may failed if the underlying database driver runs out of available connections and/or result sets, or the operation violates DBMS integrity constraints (e.g., attempting to write duplicate values on a field that's defined as a primary key).

The semantics of assign are slightly extended to allow overwriting or appending to an existing table.

**Note**

The translation of identifiers between R/Splus and SQL is done through calls to `make.names` and `make.db.names`, but we cannot guarantee that the conversion is reversible. For details see `make.db.names`.

**References**

See the Database Interface definition document `DBI.pdf` in the base directory of this package or <http://developer.r-project.org/db>.

**See Also**

`dbDriver`, `dbConnect`, `dbSendQuery`, `dbGetQuery`, `fetch`, `dbCommit`, `dbGetInfo`, `dbListTables`, `dbReadTable`.

**Examples**

```
## Not run:
conn <- dbConnect("MySQL", group = "vitalAnalysis")
con2 <- dbConnect("ODBC", "dsn", "user", "pwd")
if(dbExistsTable(con2, "fuel_frame"){
  fuel.frame <- dbReadTable(con2, "fuel_frame")
  dbRemoveTable(conn, "fuel_frame")
  dbWriteTable(conn, "fuel_frame", fuel.frame)
}
if(dbExistsTable(conn, "RESULTS"){
  dbWriteTable(conn, "RESULTS", results2000, append = T)
else
  dbWriteTable(conn, "RESULTS", results2000)
```

```

}
## End (Not run)

```

---

dbSendQuery

*Execute a statement on a given database connection*


---

## Description

Submits and executes an arbitrary SQL statement on a specific connection. Also, clears (closes) a result set.

## Usage

```

dbSendQuery(conn, statement, ...)
dbGetQuery(conn, statement, ...)
dbClearResult(res, ...)
dbGetException(conn, ...)

```

## Arguments

conn	a connection object.
statement	a character vector of length 1 with the SQL statement.
res	a result set object (i.e., the value of dbSendQuery).
...	database-specific parameters may be specified.

## Details

The function `dbSendQuery` only submits and synchronously executes the SQL statement to the database engine. It does *not* extract any records — for that you need to use the function `fetch` (make sure you invoke `dbClearResult` when you finish fetching the records you need).

The function `dbGetQuery` does all these in one operation (submits the statement, fetches all output records, and clears the result set).

`dbClearResult` frees all resources (local and remote) associated with a result set. In some cases (e.g., very large result sets) this can be a critical step to avoid exhausting resources (memory, file descriptors, etc.)

## Value

`dbSendQuery` returns a result set object, i.e., an object that inherits from `DBIResult`; if the statement generates output (e.g., a `SELECT` statement) the result set can be used with `fetch` to extract records.

`dbGetQuery` returns a `data.frame` with the output (if any) of the query.

`dbClearResult` returns a logical indicating whether clearing the result set was successful or not.

`dbGetException` returns a list with elements `errNum` (an integer error number) and `errMsg` (a character string) describing the last error in the connection `conn`.

### Side Effects

The statement is submitted for synchronous execution to the server connected through the `conn` object. The DBMS executes the statement, possibly generating vast amounts of data. Where these data reside is driver-specific: some drivers may choose to leave the output on the server and transfer them piecemeal to R/Splus, others may transfer all the data to the client – but not necessarily to the memory that R/Splus manages. See the individual drivers' `dbSendQuery` method for implementation details.

### References

See the Database Interface definition document `DBI.pdf` in the base directory of this package or <http://developer.r-project.org/db>.

### See Also

[dbDriver](#) [dbConnect](#) [fetch](#) [dbCommit](#) [dbGetInfo](#) [dbReadTable](#)

### Examples

```
## Not run:
drv <- dbDriver("MySQL")
con <- dbConnect(drv)
res <- dbSendQuery(con, "SELECT * from liv25")
data <- fetch(res, n = -1)

## End(Not run)
```

---

`dbSetDataMappings` *Set data mappings between an DBMS and R/Splus*

---

### Description

Sets one or more conversion functions to handle the translation of DBMS data types to R/Splus objects. This is only needed for non-primitive data, since all DBI drivers handle the common base types (integers, numeric, strings, etc.)

### Usage

```
dbSetDataMappings(res, flds, ...)
```

### Arguments

<code>res</code>	a <code>DBIResult</code> object as returned by <code>dbSendQuery</code> .
<code>flds</code>	a field description object as returned by <code>dbColumnInfo</code> .
<code>...</code>	any additional arguments are passed to the implementing method.

**Details**

The details on conversion functions (e.g., arguments, whether they can invoke initializers and/or destructors) have not been specified.

**Value**

a logical specifying whether the conversion functions were successfully installed or not.

**Side Effects**

Conversion functions are set up to be invoked for each element of the corresponding fields in the result set.

**Note**

No driver has yet implemented this functionality.

**References**

See the Database Interface definition document `DBI.pdf` in the base directory of this package or <http://developer.r-project.org/db>.

**See Also**

`dbSendQuery`, `fetch`, `dbColumnInfo`.

**Examples**

```
## Not run:
makeImage <- function(x) {
  .C("make_Image", as.integer(x), length(x))
}

res <- dbSendQuery(con, statement)
flds <- dbColumnInfo(res)
flds[3, "Sclass"] <- makeImage

dbSetDataMappings(rs, flds)

im <- fetch(rs, n = -1)

## End(Not run)
```

---

fetch	<i>Fetch records from a previously executed query</i>
-------	---

---

**Description**

Fetch records from a previously executed query.

**Usage**

```
fetch(res, n, ...)
```

**Arguments**

<code>res</code>	a result set object (one whose class extends <code>DBIResult</code> ). This object needs to be the result of a statement that produces output, such as SQL's <code>SELECT</code> or <code>SELECT</code> -like statement, this object <code>res</code> is typically produced by a call to <code>dbSendQuery</code> .
<code>n</code>	maximum number of records to retrieve per fetch. Use <code>n = -1</code> to retrieve all pending records. Some implementations may recognize other special values.
<code>...</code>	any other database-engine specific arguments.

**Details**

See the notes for the various database server implementations.

**Value**

a `data.frame` with as many rows as records were fetched and as many columns as fields in the result set.

**Side Effects**

As the R/Splus client fetches records the remote database server updates its cursor accordingly.

**Note**

Make sure you close the result set with `dbClearResult` as soon as you finish retrieving the records you want.

**References**

See the Database Interface definition document `DBI.pdf` in the base directory of this package or <http://developer.r-project.org/db>.

**See Also**

`dbConnect`, `dbSendQuery`, `dbGetQuery`, `dbClearResult`, `dbCommit`, `dbGetInfo`, `dbReadTable`.

**Examples**

```
## Not run:
# Run an SQL statement by creating first a resultSet object
drv <- dbDriver("ODBC")
con <- dbConnect(drv, ...)
res <- dbSendQuery(con, statement = paste(
  "SELECT w.laser_id, w.wavelength, p.cut_off",
  "FROM WL w, PURGE P",
  "WHERE w.laser_id = p.laser_id",
  "ORDER BY w.laser_id"))
# we now fetch the first 100 records from the resultSet into a data.frame
data1 <- fetch(res, n = 100)
dim(data1)

dbHasCompleted(res)

# let's get all remaining records
data2 <- fetch(res, n = -1)

## End(Not run)
```

---

make.db.names

---

*Make R/Splus identifiers into legal SQL identifiers*


---

**Description**

Produce legal SQL identifiers from a character vector.

**Usage**

```
make.db.names(dbObj, snames, keywords, unique=TRUE, allow.keywords=TRUE, ...)
SQLKeywords(dbObj, ...)
isSQLKeyword(dbObj, name, keywords=.SQL92Keywords,
             case=c("lower", "upper", "any")[3], ...)
```

**Arguments**

dbObj	any DBI object (e.g., DBIDriver).
snames	a character vector of R/Splus identifiers (symbols) from which we need to make SQL identifiers.
name	a character vector with database identifier candidates we need to determine whether they are legal SQL identifiers or not.
unique	logical describing whether the resulting set of SQL names should be unique. Its default is TRUE. Following the SQL 92 standard, uniqueness of SQL identifiers is determined regardless of whether letters are upper or lower case.
allow.keywords	logical describing whether SQL keywords should be allowed in the resulting set of SQL names. Its default is TRUE

keywords	a character vector with SQL keywords, by default it's <code>.SQL92Keywords</code> defined by the DBI.
case	a character string specifying whether to make the comparison as lower case, upper case, or any of the two. it defaults to <code>any</code> .
...	any other argument are passed to the driver implementation.

### Details

The algorithm in `make.db.names` first invokes `make.names` and then replaces each occurrence of a dot "." by an underscore "\_". If `allow.keywords` is `FALSE` and identifiers collide with SQL keywords, a small integer is appended to the identifier in the form of "\_n".

The set of SQL keywords is stored in the character vector `.SQL92Keywords` and reflects the SQL ANSI/ISO standard as documented in "X/Open SQL and RDA", 1994, ISBN 1-872630-68-8. Users can easily override or update this vector.

### Value

`make.db.names` returns a character vector of legal SQL identifiers corresponding to its `snames` argument.

`SQLKeywords` returns a character vector of all known keywords for the database-engine associated with `dbObj`.

`isSQLKeyword` returns a logical vector parallel to `name`.

### Bugs

The current mapping is not guaranteed to be fully reversible: some SQL identifiers that get mapped into S identifiers with `make.names` and then back to SQL with `make.db.names` will not be equal to the original SQL identifiers (e.g., compound SQL identifiers of the form `username.tablename` will lose the dot ".").

### References

The set of SQL keywords is stored in the character vector `.SQL92Keywords` and reflects the SQL ANSI/ISO standard as documented in "X/Open SQL and RDA", 1994, ISBN 1-872630-68-8. Users can easily override or update this vector.

See the Database Interface definition document `DBI.pdf` in the base directory of this package or <http://developer.r-project.org/db>.

### See Also

`dbReadTable`, `dbWriteTable`, `dbExistsTable`, `dbRemoveTable`, `dbListTables`.

### Examples

```
## Not run:
# This example shows how we could export a bunch of data.frames
# into tables on a remote database.
```

```
con <- dbConnect("Oracle", user="iptraffic", pass = pwd)

export <- c("trantime.email", "trantime.print", "round.trip.time.email")
tabs <- make.db.names(export, unique = T, allow.keywords = T)

for(i in seq(along = export) )
  dbWriteTable(con, name = tabs[i], get(export[i]))

# Oracle's extensions to SQL keywords
oracle.keywords <- c("CLUSTER", "COLUMN", "MINUS", "DBNAME")
isSQLKeyword(nam, c(.SQL92Keywords, oracle.keywords))
[1] T T T F

## End(Not run)
```

---

`print.list.pairs`    *Support functions*

---

### **Description**

Some of these functions are conditionally elevated to generic functions (e.g., `print`, `summary`). Others are low-level support functions.

### **Usage**

```
print.list.pairs(x, ...)
```

### **Arguments**

<code>x</code>	a list of key, value pairs
<code>...</code>	additional arguments to be passed to <code>cat</code>

### **Value**

the (invisible) value of `x`.

### **References**

See the Database Interface definition document `DBI.pdf` in the base directory of this package or <http://developer.r-project.org/db>.

### **See Also**

[print.default](#), [summary.default](#), [cat](#).

**Examples**

```
## Not run:  
print.list.pairs(list(a =1, b = 2))  
  
## End(Not run)
```

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