Package 'DSOpal'

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Type Package

Title 'DataSHIELD' Implementation for 'Opal'

Version 1.4.0

Depends R (>= 3.5), opalr (>= 3.0), DSI (>= 1.5), methods

Description 'DataSHIELD' is an infrastructure and series of R packages that enables the remote and 'non-disclosive' analysis of sensitive research data. This package is the 'DataSHIELD' interface implementation for 'Opal', which is the data integration application for biobanks by 'OBiBa'. Participant data, once collected from any data source, must be integrated and stored in a central data repository under a uniform model. 'Opal' is such a central repository. It can import, process, validate, query, analyze, report, and export data. 'Opal' is the reference implementation of the 'DataSHIELD' infrastructure.

License LGPL (>= 2.1)

URL https://github.com/datashield/DSOpal/, https://datashield.github.io/DSOpal/, https://www.obiba.org, https://www.obiba.org/pages/products/opal/, https://www.datashield.org, https://academic.oup.com/ije/article/43/6/1929/707730, https://journals.plos.org/ploscompbiol/article?id=10.1371/journal.pcbi.1008880

BugReports https://github.com/datashield/DSOpal/issues/

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R topics documented:

`dsAggregate,OpalConnection-method`
Aggregate data

Description

Aggregate some data from the DataSHIELD R session using a valid R expression. The aggregation expression must satisfy the data repository's DataSHIELD configuration.

Usage

```
## S4 method for signature 'OpalConnection'
dsAggregate(conn, expr, async = TRUE)
```

Arguments

conn	OpalConnection-class object.
expr	Expression to evaluate.
async	Whether the result of the call should be retrieved asynchronously. When TRUE (default) the calls are parallelized over the connections, when the connection supports that feature, with an extra overhead of requests.

Examples

```
## Not run:
con <- dbConnect(DSOpal::Opal(), "username", "password", "https://opal.example.org")
dsAssignTable(con, "D", "test.CNSIM")
dsAggregate(con, as.symbol("meanDS(D$WEIGHT)"))
dsDisconnect(con)

## End(Not run)
```

---

dsAssignExpr,OpalConnection-method

Assign the result of an expression

Description

Assign a result of the execution of an expression in the DataSHIELD R session.

Usage

```
## S4 method for signature 'OpalConnection'
dsAssignExpr(conn, symbol, expr, async = TRUE)
```

Arguments

conn	OpalConnection-class object.
symbol	Name of the R symbol.
expr	A R expression with allowed assign functions calls.
async	Whether the result of the call should be retrieved asynchronously. When TRUE (default) the calls are parallelized over the connections, when the connection supports that feature, with an extra overhead of requests.

Value

A OpalResult-class object.

Examples

```
## Not run:
con <- dbConnect(DSOpal::Opal(), "server1",
  "username", "password", "https://opal.example.org")
dsAssignExpr(con, "C", as.symbol("c(1, 2, 3)"))
dsDisconnect(con)

## End(Not run)
```

---

dsAssignResource,OpalConnection-method

Assign a resource

Description

Assign a Opal resource in the DataSHIELD R session.

Usage

```
## S4 method for signature 'OpalConnection'
dsAssignResource(conn, symbol, resource, async = TRUE)
```

Arguments

conn	OpalConnection-class object.
symbol	Name of the R symbol.
resource	Fully qualified name of a resource in Opal.
async	Whether the result of the call should be retrieved asynchronously. When TRUE (default) the calls are parallelized over the connections, when the connection supports that feature, with an extra overhead of requests.

Value

A OpalResult-class object.

Examples

```
## Not run:
con <- dbConnect(DSOpal::Opal(), "server1",
  "username", "password", "https://opal.example.org")
dsAssignResource(con, "D", "test.CNSIM")
dsDisconnect(con)

## End(Not run)
```

`dsAssignTable,OpalConnection-method`
Assign a table

Description

Assign a Opal table in the DataSHIELD R session.

Usage

```
## S4 method for signature 'OpalConnection'
dsAssignTable(
  conn,
  symbol,
  table,
  variables = NULL,
  missings = FALSE,
  identifiers = NULL,
  id.name = NULL,
  async = TRUE
)
```

Arguments

`conn`	`OpalConnection-class` object.
`symbol`	Name of the R symbol.
`table`	Fully qualified name of a table in Opal.
`variables`	List of variable names or Javascript expression that selects the variables of a table (ignored if value does not refere to a table). See javascript documentation: https://opaldoc.obiba.org/en/latest/magma-user-guide/methods.html
`missings`	If TRUE, missing values will be pushed from Opal to R, default is FALSE. Ignored if value is an R expression.
`identifiers`	Name of the identifiers mapping to use when assigning entities to R (from Opal 2.0).

id.name	Name of the column that will contain the entity identifiers. If not specified, the identifiers will be the data frame row names. When specified this column can be used to perform joins between data frames.
async	Whether the result of the call should be retrieved asynchronously. When TRUE (default) the calls are parallelized over the connections, when the connection supports that feature, with an extra overhead of requests.

Value

A OpalResult-class object.

Examples

```
## Not run:
con <- dbConnect(DSOpal::Opal(), "server1",
  "username", "password", "https://opal.example.org")
dsAssignTable(con, "D", "test.CNSIM")
dsDisconnect(con)

## End(Not run)
```

---

dsConnect,OpalDriver-method

Connect to a Opal server

Description

Connect to a Opal server, with provided credentials. Does not create a DataSHIELD R session, only retrieves user profile.

Usage

```
## S4 method for signature 'OpalDriver'
dsConnect(
  drv,
  name,
  restore = NULL,
  username = NULL,
  password = NULL,
  token = NULL,
  url = NULL,
  opts = list(),
  profile = NULL,
  ...
)
```

Arguments

drv	OpalDriver-class class object.
name	Name of the connection, which must be unique among all the DataSHIELD connections.
restore	Workspace name to be restored in the newly created DataSHIELD R session.
username	User name in opal(s).
password	User password in opal(s).
token	Personal access token (since opal 2.15, ignored if username is specified).
url	Opal url or list of opal urls. Can be provided by "opal.url" option.
opts	Curl options as described by httr (call httr::httr_options() for details). Can be provided by "opal.opts" option.
profile	The DataSHIELD R server profile (affects the R packages available and the applied configuration). If not provided or not supported, default profile will be applied.
...	Unused, needed for compatibility with generic.

Value

A OpalConnection-class object.

Examples

```
## Not run:
con <- dsConnect(DSOpal::Opal(), "server1", "username", "password", "https://opal.example.org")
con
dsDisconnect(con)

## End(Not run)
```

---

dsDisconnect,OpalConnection-method

Disconnect from a Opal server

Description

Disconnect from a Opal server and release all R resources. If a workspace ID is provided, the DataSHIELD R session will be saved before being destroyed.

Usage

```
## S4 method for signature 'OpalConnection'
dsDisconnect(conn, save = NULL)
```

Arguments

conn	OpalConnection-class class object
save	Save the DataSHIELD R session with provided ID (must be a character string).

Examples

```
## Not run:
con <- dsConnect(DSOpal::Opal(), "server1", "username", "password", "https://opal.example.org")
con
dsDisconnect(con)

## End(Not run)
```

---

dsFetch,OpalResult-method

Fetch the result

Description

Fetch the DataSHIELD operation result.

Usage

```
## S4 method for signature 'OpalResult'
dsFetch(res)
```

Arguments

res	OpalResult-class object.

Value

TRUE if table exists.

Examples

```
## Not run:
con <- dbConnect(DSOpal::Opal(), "server1",
  "username", "password", "https://opal.example.org")
dsAssignExpr(con, "C", as.symbol("c(1, 2, 3)"))
res <- dsAggregate(con, as.symbol("length(C)"))
length <- dsFetch(res)
dsDisconnect(con)

## End(Not run)
```

dsGetInfo,OpalResult-method
Get result info

Description

Get the information about a command (if still available).

Usage

```
## S4 method for signature 'OpalResult'
dsGetInfo(dsObj, ...)
```

Arguments

dsObj	OpalResult-class class object
...	Unused, needed for compatibility with generic.

Value

The result information, including its status.

Examples

```
## Not run:
con <- dbConnect(DSOpal::Opal(), "server1",
  "username", "password", "https://opal.example.org")
dsAssignExpr(con, "C", as.symbol("c(1, 2, 3)"))
res <- dsAggregate(con, as.symbol("length(C)"))
dsGetInfo(res)
dsDisconnect(con)

## End(Not run)
```

dsHasResource,OpalConnection-method
Verify Opal resource

Description

Verify Opal resource exist and can be accessible for performing DataSHIELD operations.

Usage

```
## S4 method for signature 'OpalConnection'
dsHasResource(conn, resource)
```

Arguments

conn	OpalConnection-class class object.
resource	The fully qualified name of the resource.

Value

TRUE if the resource exists.

Examples

```
## Not run:
con <- dbConnect(DSOpal::Opal(), "server1",
  "username", "password", "https://opal.example.org")
dsHasResource(con, "test.CNSIM")
dsDisconnect(con)

## End(Not run)
```

---

dsHasTable,OpalConnection-method
Verify Opal table

Description

Verify Opal table exist and can be accessible for performing DataSHIELD operations.

Usage

```
## S4 method for signature 'OpalConnection'
dsHasTable(conn, table)
```

Arguments

conn	OpalConnection-class class object.
table	The fully qualified name of the table.

Value

TRUE if table exists.

Examples

```
## Not run:
con <- dbConnect(DSOpal::Opal(), "server1",
  "username", "password", "https://opal.example.org")
dsHasTable(con, "test.CNSIM")
dsDisconnect(con)

## End(Not run)
```

`dsIsAsync,OpalConnection-method`
Opal asynchronous support

Description

List that Opal supports asynchronicity on all DataSHIELD operations.

Usage

```
## S4 method for signature 'OpalConnection'
dsIsAsync(conn)
```

Arguments

conn	`OpalConnection-class` class object

Value

The named list of logicals detailing the asynchronicity support.

Examples

```
## Not run:
con <- dbConnect(DSOpal::Opal(), "server1",
  "username", "password", "https://opal.example.org")
dsIsAsync(con)
dsDisconnect(con)

## End(Not run)
```

`dsIsCompleted,OpalResult-method`

Get whether the operation is completed

Description

Get the information about a command (if still available) and return TRUE if the command was completed successfully or not. Always TRUE for synchronous operations.

Usage

```
## S4 method for signature 'OpalResult'
dsIsCompleted(res)
```

Arguments

`res`	`OpalResult-class` object.

Value

A logical indicating the command completion.

Examples

```
## Not run:
con <- dbConnect(DSOpal::Opal(), "server1",
  "username", "password", "https://opal.example.org")
dsAssignExpr(con, "C", as.symbol("c(1, 2, 3)"))
res <- dsAggregate(con, as.symbol("length(C)"))
dsIsCompleted(res)
dsDisconnect(con)

## End(Not run)
```

`dsKeepAlive,OpalConnection-method`

Keep connection with a Opal server alive

Description

Makes a dummy web service request.

Usage

```
## S4 method for signature 'OpalConnection'
dsKeepAlive(conn)
```

Arguments

conn	OpalConnection-class class object

Examples

```
## Not run:
con <- dsConnect(DSOpal::Opal(), "server1", "username", "password", "https://opal.example.org")
dsKeepAlive(con)
dsDisconnect(con)

## End(Not run)
```

---

dsListMethods,OpalConnection-method
List methods

Description

List methods defined in the DataSHIELD configuration.

Usage

```
## S4 method for signature 'OpalConnection'
dsListMethods(conn, type = "aggregate")
```

Arguments

conn	OpalConnection-class class object
type	Type of the method: "aggregate" (default) or "assign".

Value

A data frame with columns: name, type ('aggregate' or 'assign'), class ('function' or 'script'), value, package, version.

Examples

```
## Not run:
con <- dbConnect(DSOpal::Opal(), "server1",
  "username", "password", "https://opal.example.org")
dsListMethods(con)
dsDisconnect(con)

## End(Not run)
```

dsListPackages,OpalConnection-method
List packages

Description

List packages defined in the DataSHIELD configuration.

Usage

```
## S4 method for signature 'OpalConnection'
dsListPackages(conn)
```

Arguments

conn	OpalConnection-class class object

Value

A data frame with columns: name, version.

Examples

```
## Not run:
con <- dbConnect(DSOpal::Opal(), "server1",
  "username", "password", "https://opal.example.org")
dsListPackages(con)
dsDisconnect(con)

## End(Not run)
```

dsListProfiles,OpalConnection-method
List profiles

Description

List profiles defined in the DataSHIELD configuration.

Usage

```
## S4 method for signature 'OpalConnection'
dsListProfiles(conn)
```

Arguments

conn	OpalConnection-class class object

Value

A list containing the "available" character vector of profile names and the "current" profile (in case a default one was assigned).

Examples

```
## Not run:
con <- dbConnect(DSOpal::Opal(), "server1",
  "username", "password", "https://opal.example.org")
dsListProfiles(con)
dsDisconnect(con)

## End(Not run)
```

---

dsListResources,OpalConnection-method

List Opal resources

Description

List Opal resources that may be accessible for performing DataSHIELD operations.

Usage

```
## S4 method for signature 'OpalConnection'
dsListResources(conn)
```

Arguments

conn	OpalConnection-class class object

Value

The fully qualified names of the resources.

Examples

```
## Not run:
con <- dbConnect(DSOpal::Opal(), "server1",
  "username", "password", "https://opal.example.org")
dsListResources(con)
dsDisconnect(con)

## End(Not run)
```

dsListSymbols,OpalConnection-method
List R symbols

Description

List symbols living in the DataSHIELD R session.

Usage

```
## S4 method for signature 'OpalConnection'
dsListSymbols(conn)
```

Arguments

conn	OpalConnection-class class object

Value

A character vector.

Examples

```
## Not run:
con <- dbConnect(DSOpal::Opal(), "server1",
  "username", "password", "https://opal.example.org")
dsAssignTable(con, "D", "test.CNSIM")
dsListSymbols(con)
dsDisconnect(con)

## End(Not run)
```

dsListTables,OpalConnection-method
List Opal tables

Description

List Opal tables that may be accessible for performing DataSHIELD operations.

Usage

```
## S4 method for signature 'OpalConnection'
dsListTables(conn)
```

Arguments

conn	OpalConnection-class class object

Value

The fully qualified names of the tables.

Examples

```
## Not run:
con <- dbConnect(DSOpal::Opal(), "server1",
  "username", "password", "https://opal.example.org")
dsListTables(con)
dsDisconnect(con)

## End(Not run)
```

---

dsListWorkspaces,OpalConnection-method

List workspaces

Description

List workspaces saved in the data repository.

Usage

```
## S4 method for signature 'OpalConnection'
dsListWorkspaces(conn)
```

Arguments

conn	OpalConnection-class class object

Value

A data frame with columns: name, lastAccessDate, size.

Examples

```
## Not run:
con <- dbConnect(DSOpal::Opal(), "server1",
  "username", "password", "https://opal.example.org")
dsListWorkspaces(con)
dsDisconnect(con)

## End(Not run)
```

dsRestoreWorkspace,OpalConnection-method
Restore workspace

Description

Restore workspace from the data repository.

Usage

```
## S4 method for signature 'OpalConnection'
dsRestoreWorkspace(conn, name)
```

Arguments

conn	OpalConnection-class class object
name	Name of the workspace.

Examples

```
## Not run:
con <- dbConnect(DSOpal::Opal(), "server1",
  "username", "password", "https://opal.example.org")
dsListWorkspaces(con)
dsRestoreWorkspace(con, "foo")
dsDisconnect(con)

## End(Not run)
```

dsRmSymbol,OpalConnection-method
Remove a R symbol

Description

Remoe a symbol living in the DataSHIELD R session.

Usage

```
## S4 method for signature 'OpalConnection'
dsRmSymbol(conn, symbol)
```

Arguments

conn	OpalConnection-class class object
symbol	Name of the R symbol.

Examples

```
## Not run:
con <- dbConnect(DSOpal::Opal(), "server1",
  "username", "password", "https://opal.example.org")
dsAssignTable(con, "D", "test.CNSIM")
dsRmSymbol(con, "D")
dsDisconnect(con)

## End(Not run)
```

---

dsRmWorkspace,OpalConnection-method

Remove a workspace

Description

Remove a workspace on the data repository.

Usage

```
## S4 method for signature 'OpalConnection'
dsRmWorkspace(conn, name)
```

Arguments

conn	OpalConnection-class class object
name	Name of the workspace.

Examples

```
## Not run:
con <- dbConnect(DSOpal::Opal(), "server1",
  "username", "password", "https://opal.example.org")
dsSaveWorkspace(con, "foo")
dsListWorkspaces(con)
dsRmWorkspace(con, "foo")
dsListWorkspaces(con)
dsDisconnect(con)

## End(Not run)
```

dsSaveWorkspace,OpalConnection-method *Save workspace*

Description

Save workspace on the data repository.

Usage

```
## S4 method for signature 'OpalConnection'
dsSaveWorkspace(conn, name)
```

Arguments

conn	OpalConnection-class class object
name	Name of the workspace.

Examples

```
## Not run:
con <- dbConnect(DSOpal::Opal(), "server1",
  "username", "password", "https://opal.example.org")
dsSaveWorkspace(con, "foo")
dsListWorkspaces(con)
dsDisconnect(con)

## End(Not run)
```

logindata.opal.demo *DataSHIELD login data file*

Description

DataSHIELD login data file based on Opal demo server, with CNSIM simulated data. The CNSIM datasets contain synthetic data based on a model derived from the participants of the 1958 Birth Cohort, as part of the obesity methodological development project. These datasets do contain some NA values. Note that the Opal demo server is rebuilt every day and is possibly not accessible.

Details

Field	Description	Type	Note
server	Server/study name	char	
url	Server/study URL	char	Opal demo URL
user	User name	char	
password	User password	char	
table	Table unique name	char	CNSIM tables
driver	Connection driver	char	OpalDriver

References

https://opal-demo.obiba.org

`Opal` *Create a Opal driver*

Description

Convenient function for creating a OpalDriver object.

Usage

```
Opal()
```

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