

Package ‘jrc’

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Description An 'httpuv' based bridge between R and 'JavaScript'. Provides an easy way to exchange commands and data between a web page and a currently running R session.

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Imports httpuv, jsonlite, utils, stringr, stringi, mime, R6, R.utils

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allowDirectories	<i>Allow server to access files in the directory</i>
------------------	--

Description

This function adds paths to existing directories to the list of allowed directories, which can be accessed from the server. To any request for files from outside of the allowed directories the server will response with 403 Forbidden error. `rootDirectory` (see [openPage](#)) can always be accessed. By default, when the app is initialized, current working directory is added to the list of allowed directories. Further changes of the working directory will not have any affect on this list or files accessibility.

Usage

```
allowDirectories(dirs = NULL)
```

Arguments

<code>dirs</code>	Vector of paths to existing directories. Can be absolute paths, or paths relative to the current working directory. If the specified directory doesn't exist, it will be ignored and a warning will be produced. If <code>NULL</code> , returns absolute paths to all currently allowed directories.
-------------------	--

Details

This function is a wrapper around `allowDirectories` method of class [App](#).

Value

Absolute paths to all currently allowed directories, if `dirs = NULL`.

See Also

[openPage](#) (check arguments rootDirectory and allowedDirectories).

Examples

```
## Not run:
openPage()
# The directories must exist
allowDirectories(c("~/directory1", "../anotherDirectory"))
dirs <- allowDirectories()
closePage()
## End(Not run)
```

allowFunctions	<i>Allow function calls without authorization</i>
----------------	---

Description

Adds R function names to the list of functions, that can be called from a web page without manual confirmation on the R side.

Usage

```
allowFunctions(funs = NULL)
```

Arguments

funs	Vector of function names to be added to the list. If NULL, returns names of all currently allowed R functions.
------	--

Details

This function is a wrapper around allowFunctions method of class [App](#).

Value

Names of all currently allowed functions if funs = NULL.

See Also

[allowVariables](#), [authorize](#), [openPage](#) (check argument allowedFunctions), [callFunction](#).

Examples

```
openPage()
allowFunctions(c("myFunction1", "print", "someObject$method"))
funs <- allowFunctions()
closePage()
```

allowVariables	<i>Allow variable assignment without authorization</i>
----------------	--

Description

This function adds variable names to the list of variables, that can be modified from a web page without manual confirmation on the R side.

Usage

```
allowVariables(vars = NULL)
```

Arguments

vars	Vector of variable names to be added to the list. If NULL, returns names of all currently allowed variables.
------	--

Details

This function is a wrapper around `allowVariables` method of class [App](#).

Value

Names of all currently allowed variables if `vars = NULL`.

See Also

[allowFunctions](#), [authorize](#), [openPage](#) (check argument `allowedVariables`), [sendData](#).

Examples

```
openPage()  
allowVariables(c("myVariable", "anotherOne"))  
vars <- allowVariables()  
closePage()
```

App

App class

Description

Object of this class represents the entire jrc-based app. It stores all the active connections, client-specific variables and all the global app settings.

You can create interactive apps by initializing new instances of this class and manage the apps with the methods that are described below. There are no limitations on the number of apps that can run simultaneously in one R session.

A wrapper function is also exported for almost each method (see links in the Methods section). These functions allow you to gain full control over the app without ever dealing with this class. However, in this case only a single app can run per R session. Attempt to create a new app (with [openPage](#) function) will force the existing one (if any) to stop. You can always get the App object for the currently running app with [getPage](#) function.

Methods

`new(rootDirectory = NULL, startPage = NULL, onStart = NULL, connectionNumber = Inf, allowedFunctions = c())`
Creates a new instance of class App. Check [openPage](#) man page for information about arguments.

`startServer(port = NULL)` Starts a local server that listens to a given port. If `port = NULL`, picks a random available port. See also [openPage](#).

`stopServer()` Closes all active sessions and stops a running server. See also [closePage](#).

`openPage(useViewer = TRUE, browser = NULL)` Opens a new web page either in a browser, or in the R Studio viewer. If `useViewer = FALSE` and browser is not selected, a default installed browser is used. If browser is specified, `useViewer` is ignored. This method returns a new [Session](#) object, which should correspond to the page that has been just opened. However, if someone would start a new connection at the moment when `openPage` method is called, it may return a wrong session. See also [openPage](#).

`getSession(sessionId = NULL)` Returns a session with the given ID or NULL if session with this ID doesn't exist. If `sessionId = NULL` and there is only one active session, returns it. See also [getSession](#).

`closeSession(sessionId = NULL, inactive = NULL, old = NULL)` Closes websocket connection of one or multiple sessions and removes all the related data from the app. For more information on the arguments, please, check [closeSession](#) man page.

`getSessionIds()` Returns IDs of all currently active sessions. See also [getSessionIds](#).

`setEnvironment(envir)` Specifies the outer environment of the app, in which all the messages from the web pages will be evaluated. For more information, please, check [setEnvironment](#).

`allowFunctions(funs = NULL)` Adds function names to a list of allowed R functions. These functions can be called from a web page without authorization on the R side. If `funs = NULL`, returns a list of all currently allowed functions. For more information, please, check [allowFunctions](#).

`allowVariables(vars = NULL)` Adds variable names to the list of allowed variables. These variables can be changed from a web page without authorization on the R side. If `vars = NULL`, then returns a vector of names of all currently allowed variables. For more information, please, check [allowVariables](#).

`allowDirectories(dir = NULL)` Allows app to serve files from an existing directory. Files from the `rootDirectory` can always be accessed by the app. By default, the current working directory is added to the list of the allowed directories, when the app is initialized. All the subdirectories of the allowed directories can also be accessed. Attempt to request file from outside allowed directory will produce 403 Forbidden error. If `dirs = NULL`, then returns a vector of names of all currently allowed directories. Also see [allowDirectories](#).

`startPage(path = NULL)` Sets path to a starting web page of the app. Path can be full, relative to the app's root directory or relative to the current R working directory. If `path = NULL`, returns current path to the starting page.

`rootDirectory(path = NULL)` Sets path to the root directory for the server. Any file, requested by the server, will be looked for in this directory. Can be a full path or a path relative to the current R working directory. If `path = NULL`, returns path to the current root directory.

`numberOfConnections(maxCon = NULL)` Sets maximum number of connections that can be active simultaneously. If `maxCon = NULL`, returns current value of maximum allowed number of connections. Default value is `Inf`.

authorize

Authorize further message processing

Description

`jrc` library allows one to get full control over the currently running R session from a web page. Therefore for security reasons one should manually authorize function calls, variable assignments or expression evaluations. All the received messages that are not processed automatically are given an ID and stored. This function allows a message with the given ID to be evaluated. It can also show a short description of the message and give user a choice between running it or discarding.

Usage

```
authorize(sessionId = NULL, messageId = NULL, show = FALSE)
```

Arguments

<code>sessionId</code>	ID of the session that received the message. If there is only one active session, this argument becomes optional.
<code>messageId</code>	ID of the message to be processed. If the session has only one stored message, this argument becomes optional.
<code>show</code>	If <code>TRUE</code> information about the message will be shown first. After that user gets a choice to go on with evaluation, to ignore the message (meaning it will be removed from memory) or to do nothing.

Details

Expressions has to be always authorized before evaluation. One can specify a list of variables that can be changed automatically and functions that can be called without authorization.

This function is a wrapper around `authorize` method of class `Session`.

See Also

[allowFunctions](#), [allowVariables](#), [limitStorage](#), [getSessionIds](#), [getMessageIds](#).

Examples

```
openPage()

callFunction("jrc.sendCommand", list("k <<- 10"), wait = 1)
allowVariables("x")
callFunction("jrc.sendData", list("x", 15), wait = 1)
callFunction("jrc.sendData", list("y", 20), wait = 1)
msgId <- getMessageIds()
authorize(messageId = msgId[1])
#run that to first see some information about the message
#authorize(messageId = msgId[2], show = TRUE)

closePage()
```

callFunction

Trigger a function call

Description

Calls a function in a web page by its name. It can also pass a list of arguments for the function and save the returned result to a variable.

Usage

```
callFunction(
  name,
  arguments = NULL,
  assignTo = NULL,
  wait = 0,
  sessionId = NULL,
  thisArg = NULL,
  ...
)
```

Arguments

name	Name of the function. If the function is a method of some object its name must contain the full chain of calls (e.g. <code>myArray.sort</code> or <code>Math.rand</code>).
arguments	List of arguments for the function. Note that in JavaScript arguments must be given in a fixed order, naming is not necessary and will be ignored.
assignTo	Name of a variable to which will be assigned the returned value of the called function.
wait	If <code>wait > 0</code> , after sending the message, R will wait for a reply for a given number of seconds. For this time (or until the reply is received), execution of other commands will be halted. Any incoming message from the session will be considered as a reply.
sessionId	An ID of the session to which the function call should be sent. Can also be a vector of multiple session IDs. If NULL, the function call will be sent to all currently active sessions.
thisArg	JavaScript functions (methods) can belong to some object, which is referred to as <code>this</code> inside the function (e.g. in <code>someObject.myFunction()</code> function <code>myFunction</code> is a method of <code>someObject</code>). <code>thisArg</code> specifies object that will be known as <code>this</code> inside the function. If NULL, the function will be applied to the global object (window).
...	further arguments passed to <code>sendData</code> . It is used to send arguments to the web page.

Details

JavaScript counterpart is `jrc.callFunction(name, arguments, assignTo, package, internal)`. Its arguments are:

- `name` Name of an R function. If function name hasn't been previously added to the list of allowed functions (see [allowFunctions](#) or `allowedFunctions` argument of [openPage](#)), attempt to call it from a web page will require manual authorization on the R side.
- `arguments` (**optional**) arguments for the function. This should be an Array (for unnamed arguments) or an Object with argument names as keys (for named arguments).
- `assignTo` (**optional**) Name of the variable to which the returned value of the function will be assigned in the R session. If the variable name hasn't been previously added to the list of allowed variables (see [allowVariables](#) or `allowedVariables` argument of [openPage](#)), attempt to assign it from a web page will require manual authorization on the R side.
- `package` (**optional**) If the function needs to be imported from an installed package, name of this package.
- `internal` (**optional**) Whether assignment of the function returned value should happen internally or not. If `true`, result will be stored in the session environment and can be accessed from the outside with [getSessionVariable](#) function. If `false`, result will be saved to the outer environment of the app (see [setEnvironment](#)). By default, uses `true` for variables that already exist in the session environment (see [setSessionVariables](#) or `sessionVariables` argument of the [openPage](#) function) and `false` otherwise.

This function is a wrapper around `callFunction` method of class [Session](#).

See Also

[authorize](#), [allowFunctions](#), [allowVariables](#), [setEnvironment](#), [getSessionIds](#).

Examples

```
openPage()
callFunction("alert", list("Some alertText"))
callFunction("Math.random", assignTo = "randomNumber")
sendCommand("alert(randomNumber)")
closePage()
```

closePage

Stop server

Description

Stops the server and closes all currently opened pages (if any). This function is a wrapper of stopServer method of class [App](#).

Usage

```
closePage()
```

See Also

[openPage](#)

closeSession

Close one or several client sessions

Description

Closes websocket connections for the selected client sessions and removes all the related information from memory. If no arguments are provided and there is only one active session, closes it. This function is a wrapper around method closeSession of class [App](#).

Usage

```
closeSession(sessionId = NULL, inactive = NULL, old = NULL)
```

Arguments

sessionId	IDs of the sessions to close. Can be a vector of multiple IDs.
inactive	All sessions that were inactive (didn't receive any messages) for the specified amount of time (in seconds) will be closed.
old	All sessions that were opened for at least specified amount of time (in seconds) will be closed.

Examples

```

start <- Sys.time()
openPage()

app <- getPage()
time <- Sys.time()

app$openPage(FALSE)
app$openPage(FALSE)

print(getSessionIds())

# No sessions will be closed
closeSession(old = Sys.time() - start)
print(getSessionIds())

# One session (the one that has been opened first) will be closed
closeSession(old = Sys.time() - time)
print(getSessionIds())

time <- Sys.time()
sendCommand("jrc.sendCommand('print(\"Hi!\")')", sessionId = getSessionIds()[1], wait = 3)

# this will close all sessions except for the one, that has just send a command to R session
closeSession(inactive = Sys.time() - time)

# if there is only one active session, sessionId becomes an optional argument
closeSession()

closePage()

```

getMessageIds

Get IDs of all stored messages

Description

Returns IDs of all currently stored messages.

Usage

```
getMessageIds(sessionId = NULL, simplify = TRUE)
```

Arguments

sessionId	ID of the session for which to return message IDs. Can also be a vector of multiple session IDs. If NULL, returns message IDs for all currently active sessions.
simplify	If TRUE and only one session ID is provided (or there is only one active session), returns a vector of message IDs. Otherwise returns a named list with one vector for each requested session.

Details

For security reasons, most of the messages that are received from web pages require manual authorization in the R session with [authorize](#) function. Until that happens, messages are given randomly generated IDs and are stored in memory.

This function is a wrapper around method `getMessageIds` of class [Session](#).

Value

Either a named list or a vector with message IDs.

See Also

[authorize](#), [getSessionIds](#).

getPage

Get the currently running app

Description

`jrc` offers two ways to control an interactive app. One is by using methods of classes [App](#) and [Session](#). This allows one to have any number of apps within one R session, but requires some understanding of object oriented programming. Another way is to use provided wrapper functions that are exported by the package. These functions internally work with the [App](#) object, which is stored in the package namespace upon initialization with [openPage](#) function. `getPage` returns this object if any.

Usage

```
getPage()
```

Value

Object of class [App](#) or NULL if there is no active app.

getSession	<i>Get a session</i>
------------	----------------------

Description

Returns [Session](#) by its ID. This function is a wrapper around method `getSession` of class [App](#).

Usage

```
getSession(sessionId = NULL)
```

Arguments

sessionId	ID of the session. If there is only one active session, this argument becomes optional.
-----------	---

Value

Object of class [Session](#).

getSessionIds	<i>Get IDs of all active sessions</i>
---------------	---------------------------------------

Description

Returns IDs of all currently active sessions. An ID is a randomly generated combination of 6 letters and numbers that is assigned to each session upon opening. This function is a wrapper around method `getSessionIds` of class [App](#).

Usage

```
getSessionIds()
```

Value

Vector of session IDs.

getSessionVariable *Get a variable from a client session environment*

Description

This function returns a variable, how it is seen from a session, e.g. for all the received function calls and commands. It searches for the variable in the session environment first, and then, if variable is not found, checks enclosing frames of the environment, starting from the outer environment of the app (see [setEnvironment](#)). If the variable doesn't exist, throws an error.

Usage

```
getSessionVariable(varName, sessionId = NULL)
```

Arguments

varName	Name of the variable to search for. Must be a character.
sessionId	ID of the session. If there is only one active session, this argument becomes optional.

Details

This function is a wrapper around method `sessionVariables` of the class [Session](#).

Value

Requested variable

See Also

[setSessionVariables](#)

Examples

```
f <- function(x) {x * 3}
openPage(allowedFunctions = "f", allowedVariables = "k", sessionVars = list(k = 0))
k <- getSessionVariable("k")
getPage()$openPage(FALSE)
id1 <- getSessionIds()[1]
id2 <- getSessionIds()[2]
sendCommand("jrc.callFunction('f', [10], 'k')", sessionId = id1, wait = 3)
sendCommand("jrc.callFunction('f', [20], 'k')", sessionId = id2, wait = 3)
k1 <- getSessionVariable("k", id1)
k2 <- getSessionVariable("k", id2)

closePage()
```

limitStorage	<i>Change size of the message storage</i>
--------------	---

Description

This function allows to change number or total size of the messages that are received via the web-socket and are stored in memory.

Usage

```
limitStorage(n = NULL, size = NULL, sessionId = NULL)
```

Arguments

n	Maximum number of messages that can be stored simultaneously.
size	Maximum total size of all stored messages in bytes.
sessionId	ID of the session, for which the storage size should be changed. Can also be a vector of session IDs to change storage size for multiple sessions at once. If NULL, changes will be applied to all currently active sessions.

Details

For security reasons, control of the currently running R session is limited to calling and changing only some user specified functions and variables. All other messages are stored in memory and can be later processed by calling [authorize](#) function. To prevent overuse of memory, one can limit size of the storage by number of messages or by their total size estimated by [object.size](#). If the storage grows above these limits, older messages are removed. The last received message will not be removed even if it takes more memory than is allowed. If any of the size parameters are set to zero, no messages will be stored. In this case, any message that requires authorization will be automatically discarded.

One can also directly change public fields `maxN` and `maxSize` of any object of class [Session](#) (see also [getSession](#)).

See Also

[authorize](#), [allowFunctions](#), [allowVariables](#).

Examples

```
openPage()
limitStorage(n = 10)
limitStorage(size = 10 * 1024^2)
closePage()
```

openPage	<i>Create a server</i>
----------	------------------------

Description

openPage starts a server and opens a new page with a websocket connection between it and the current R session. After that, messages can be exchanged between R session and the web page to generate content on the web page and to trigger calculations in R as a response to user activity on the page.

Usage

```
openPage(  
  useViewer = TRUE,  
  rootDirectory = NULL,  
  startPage = NULL,  
  port = NULL,  
  browser = NULL,  
  allowedFunctions = NULL,  
  allowedVariables = NULL,  
  allowedDirectories = getwd(),  
  connectionNumber = Inf,  
  sessionVars = NULL,  
  onStart = NULL  
)
```

Arguments

useViewer	If TRUE, the new web page will be opened in the RStudio Viewer. If FALSE, a default web browser will be used (if other is not specified with the browser argument).
rootDirectory	A path to the root directory for the server. Any file, requested by the server will be searched for in this directory. If rootDirectory is not defined, the http_root in the package directory will be used as a root directory.
startPage	A path to an HTML file that should be used as a starting page of the app. It can be an absolute path to a local file, or it can be relative to the rootDirectory or to the current R working directory. If startPage is not defined, an empty page will be used. The file must have <i>.html</i> extension.
port	Defines which TCP port the server will listen to. If not defined, random available port will be used (see randomPort).
browser	A browser in which to open a new web page. If not defined, default browser will be used. For more information check browseURL . If this argument is specified, useViewer will be ignored.
allowedFunctions	List of functions that can be called from a web page without any additional actions on the R side. All other functions will require authorization in the current

	R session before they are called. This argument should be a vector of R function names. Check authorize and allowFunctions for more information.
allowedVariables	List of variables that can be modified from a web page without any additional actions on the R side. All other variable reassignments must be confirmed in the current R session. This argument should be a vector of variable names. Check authorize and allowVariables for more information.
allowedDirectories	List of directories that can be accessed by the server. This argument should be a vector of paths (absolute or relative to the current working directory) to existing directories. Check allowDirectories for more information.
connectionNumber	Maximum number of connections that is allowed to be active simultaneously.
sessionVars	Named list of variables, that will be declared for each session, when a new connection is opened. Any changes to these variables will affect only a certain session. Thus they can be used, for instance, to store a state of each session. For more information, please, check setSessionVariables .
onStart	A callback function that will be executed when a new connection is opened. This function gets a single argument, which is an object of class Session . General purpose of the function is to populate each new web page with some default content.

Details

jrc supports four types of messages:

- Commands are pieces of R or JavaScript code that will be evaluated on the receiving side. Note, that any command from a web page must be authorized in the R session for security reasons. A message with information about how to do that is printed in the console each time a command is received. For more information, please, check [sendCommand](#).
- Data is any variable that is sent to or from the R session. It must always come with a name of the variable to which it should be assigned on the receiving side. For more information, please, check [sendData](#).
- Function calls can be triggered on each side of the websocket connection. Alongside the function name, one can also send a list of arguments and name of a variable to which the returned value of the function will be assigned. For more information, please, check [callFunction](#).
- Unlike other types of messages, HTML code can be sent only from the R session to a web page. This code will be added to the body of the page.

openPage function is a wrapper around several methods of class [App](#). First, it creates an instance of this class. Then it starts a server that listens to the given port. And finally, it attempts to open a new web page. It also stores a new app object in the package namespace, which allows other wrapper functions to access it.

Value

Object of class [App](#).

See Also

[closePage](#), [setEnvironment](#), [limitStorage](#), [allowVariables](#), [allowFunctions](#), [setSessionVariables](#).

removeMessage	<i>Removes a stored message</i>
---------------	---------------------------------

Description

Removes a message from the storage of a session. This function is a wrapper around method `removeMessage` of class [Session](#).

Usage

```
removeMessage(sessionId = NULL, messageId = NULL)
```

Arguments

sessionId	ID of the session from where to remove a message. If there is only one active session, this argument becomes optional.
messageId	ID of the message to remove. If there is only one stored message, this argument becomes optional.

See Also

[authorize](#), [getMessageIds](#).

removeSessionVariables	<i>Remove variables from a client session environment</i>
------------------------	---

Description

This function removes variables from the environment of a client session. It allows, for instance, to unmask a variable with the same name from the outer app environment (see [setEnvironment](#)) for the session (check the example below). This function is a wrapper around method `sessionVariables` of the class [Session](#).

Usage

```
removeSessionVariables(varNames, sessionId = NULL)
```

Arguments

varNames	Names of variables to remove.
sessionId	ID of the session. If there is only one active session, this argument becomes optional.

See Also

[setSessionVariables](#)

Examples

```
openPage(allowedVariables = "k", sessionVars = list(k = 10))

k <- -1
getPage()$openPage(FALSE)
id1 <- getSessionIds()[1]
id2 <- getSessionIds()[2]
removeSessionVariables("k", id1)
#this changes global 'k', since the variable is no longer masked
sendCommand("jrc.sendData('k', 1)", sessionId = id1, wait = 3)
#this doesn't affect global 'k'
sendCommand("jrc.sendData('k', 5)", sessionId = id2, wait = 3)
local_k <- getSessionVariable("k", id2)

closePage()
```

sendCommand

Send a command to a web page

Description

sendCommand sends JavaScript code through the selected websocket connection and evaluates it on the specified web page. Use JavaScript function `jrc.sendCommand` to send R code from the web page and evaluate it in the current R session. All commands sent to R from the server will be evaluated only after authorization in the currently running R session (see [authorize](#)).

Usage

```
sendCommand(command, sessionId = NULL, wait = 0)
```

Arguments

command	A line (or several lines separated by <code>\n</code>) of JavaScript code. This code will be directly evaluated on the web page. No R-side syntax check is performed.
sessionId	An ID of the session to which the command should be sent. Can also be a vector of multiple session IDs. If <code>NULL</code> , the command will be sent to all currently active sessions.
wait	If <code>wait > 0</code> , after sending the message, R will wait for a reply for a given number of seconds. For this time (or until the reply is received), execution of other commands will be halted. Any incoming message from the session will be considered as a reply.

Details

Each opened page gets its own environment, where all the commands are evaluated. Any changes made with the usual assignment operator `<-` will be limited to this page-specific environment. The changes are still saved, but can be accessed only with `getSessionVariable` function. To make changes outside of the page-specific environment use `<<-` instead.

In JavaScript one should use `windows.variableName = "SomeValue"` instead of `variableName = "SomeValue"`, in order to make the variable accessible outside of the current `sendCommand` call.

This function is a wrapper around `sendCommand` method of class `Session`.

See Also

[authorize](#), [sendData](#), [sendHTML](#), [callFunction](#), [openPage](#), [getSessionIds](#).

Examples

```
k <- 0
openPage()
sendCommand(paste0("button = document.createElement('input');",
  "button.type = 'button';",
  "button.addEventListener('click', function() {jrc.sendCommand('k <<- k + 1')});",
  "button.value = '+1';",
  "document.body.appendChild(button);", collapse = "\n"))
closePage()
```

sendData

Send data to a web page

Description

Sends a variable to a web page, where it is saved under a specified name. This function is a wrapper around `sendData` method of class `Session`.

Usage

```
sendData(
  variableName,
  variable,
  keepAsVector = FALSE,
  rowwise = TRUE,
  sessionId = NULL,
  wait = 0
)
```

Arguments

<code>variableName</code>	Name that the variable will have on the web page.
<code>variable</code>	Variable to send.
<code>keepAsVector</code>	If TRUE, variables with length 1 will be saved as arrays on the web page, otherwise they will be converted to atomic types.
<code>rowwise</code>	If TRUE, matrices and data.frames will be transformed into JavaScript objects or arrays row wise (e.g. a matrix will become an Array of its rows).
<code>sessionId</code>	An ID of the session to which the data should be sent. Can also be a vector of multiple session IDs. If NULL, the data will be sent to all currently active sessions.
<code>wait</code>	If <code>wait > 0</code> , after sending the message, R will wait for a reply for a given number of seconds. For this time (or until the reply is received), execution of other commands will be halted. Any incoming message from the session will be considered as a reply.

Details

To send data back from the web page to the current R session one should use `jrc.sendData(variableName, variable, internal)`. Its arguments are:

`variableName` Name that the variable will have in the R session. If variable name hasn't been previously added to the list of allowed variables (see [allowVariables](#) or `allowedVariables` argument of the [openPage](#) function), attempt to assign it from a web page will require manual authorization on the R side.

`variable` Variable to send.

`internal` (**optional**) Whether this variable should be used only by the session that sent it. If `true`, variable will be stored in the session-specific environment and can be accessed from the outside with [getSessionVariable](#) function. If `false`, variable will be saved to the outer environment of the app (see [setEnvironment](#)). By default, uses `true` for variables that already exist in the session specific environment (see [setSessionVariables](#) or `sessionVariables` argument of the [openPage](#) function.) and `false` otherwise.

See Also

[authorize](#), [allowVariables](#), [sendCommand](#), [callFunction](#), [sendHTML](#), [openPage](#), [getSessionIds](#).

Examples

```
openPage()
x <- 1:100
sendData("x", x)
sendCommand("console.log(x);")
sendCommand("jrc.sendData('x', x.filter(function(e) {return e % 2 == 0}))")
closePage()
```

sendHTML	<i>Send HTML to a web page</i>
----------	--------------------------------

Description

Sends a piece of HTML code to a web page and adds it at the end of the body element. This function is a wrapper around sendHTML method of class [Session](#).

Usage

```
sendHTML(html = "", sessionId = NULL, wait = 0)
```

Arguments

html	HTML code that will be added to the web page.
sessionId	An ID of the session to which the HTML should be sent. Can also be a vector of multiple session IDs. If NULL, the HTML will be sent to all currently active sessions.
wait	If wait > 0, after sending the message, R will wait for a reply for a given number of seconds. For this time (or until the reply is received), execution of other commands will be halted. Any incoming message from the session will be considered as a reply.

See Also

[sendData](#), [sendCommand](#), [callFunction](#), [openPage](#).

Examples

```
openPage(FALSE)

sendHTML("Test...")
sendHTML("This is <b>bold</b>")
sendHTML("<table><tr><td>1</td><td>2</td></tr><tr><td>3</td><td>4</td></tr></table>")
```

Session	<i>Session class</i>
---------	----------------------

Description

Objects of this class handle all the incoming and outgoing messages for one active connection. Please, avoid creating instances of this class manually. Each `Session` object is created, when a websocket is opened, and serves as a wrapper around it. Manually created object will not have a websocket connection and thus are not functional.

All sessions are stored within an object of class `App` and cannot exist and function without it. One can manipulate a session directly, using its methods that are described below, via methods of the corresponding `App` object, or using provided wrapper function (links to them can be found in the `Methods` section).

Fields

- `id` Automatically generated ID for this session. ID is a random combination of 6 letters or numbers. Please, do not change the value of this field.
- `lastActive` Time of the last received message from the session's websocket. The time stamp is generated by `Sys.time` function.
- `startTime` Time when this session has been started (generated by `Sys.time` function).
- `maxN` Maximum number of messages that can be simultaneously stored for this session. Must be a single number. If `maxN = 0`, any message that requires authorization will be immediately discarded. If message storage is full, the oldest stored message will be removed, when a new one comes in. Default value is `Inf`.
- `maxSize` Maximum allowed size of the message storage in bytes. Must be a single number. If `maxSize = 0`, any message that requires authorization will be immediately discarded. If message storage is full, older messages will be removed, until either the allowed storage size is reached, or only one message remains. Default value is `Inf`.

Methods

- `getMessageIds()` Returns IDs of all currently stored messages. ID is combination of 6 random letters and numbers, which is generated, when the message is stored. See also `getMessageIds`.
- `authorize(messageId = NULL, show = FALSE)` Authorizes evaluation of the message. Check `authorize` for more information.
- `removeMessage(messageId = NULL)` Removes a stored message. This can also be done with `authorize` function (set `show = TRUE` and then select to ignore message). See also `removeMessage`.
- `sendCommand(command, wait = 0)` Sends a JavaScript command to be evaluated on the web page. Check `sendCommand` for more information.
- `callFunction(name, arguments = NULL, assignTo = NULL, wait = 0, thisArg = NULL, ...)` Calls an existing JavaScript function on the web page. Check `callFunction` for more information.
- `sendData(variableName, variable, wait = 0, keepAsVector = FALSE, rowwise = TRUE)` Sends data and assigns it to a variable on the web page. Check `sendData` for more information.
- `sendHTML(html, wait = 0)` Sends HTML code that will be appended to the web page. Check `sendHTML` for more information.
- `sessionVariables(vars = NULL, varName = NULL, remove = NULL)` Sets or returns variables that are used (read or modified) only by this session. If both arguments are `NULL`, returns environment for this session. If `vars` is a named list, adds this variables to the session environment. If `varName` is a character, returns a variable with this name how it is seen from the

session. If the variable doesn't exist, throws an error. If remove is a vector of characters, removes variables with these names from the session environment. One can add variables to the session environment, get one back and remove variables with a single function call. Check [setSessionVariables](#), [getSessionVariable](#), [removeSessionVariables](#) for more information.

Note, that Session class has some other public methods that are not mentioned in this list. These methods are intended to be used only by other functions of jrc package and therefore are not documented.

setEnvironment	<i>Set Environment</i>
----------------	------------------------

Description

Defines the outer environment of the app. Outer environment is a parent for all session environments. It is used to store variables that are common for all the client sessions. The only way to make changes outside of the outer environment is to use the global assignment operator <<- if and only if changes are made to the variable that does not exist in the outer environment.

Usage

```
setEnvironment(envir)
```

Arguments

envir Environment to be used as outer environment.

Details

By default, an environment where app was initialized (via [openPage](#) function or with `App$new()` call) is used.

This function is a wrapper around `setEnvironment` method of class [App](#).

Examples

```
openPage()
e <- new.env()
setEnvironment(e)

sendCommand("jrc.sendData('x', 10)", wait = 3)
print(e$x)
closePage()
```

setSessionVariables *Adds variables to a session environment*

Description

Each client session in jrc, gets its own environment that can be accessed only by this session (or from the outside with the [getSessionVariable](#) function). General purpose of these environments is to store some session-specific information such as state of the app for each user. It can also be used to mask variables from the user: if there are two variables with the same name in the session environment and outside of it, user will not be able to see the latter one. This function adds new variables to a session environment or changes values of some existing ones.

Usage

```
setSessionVariables(vars, sessionId = NULL, makeDefault = FALSE)
```

Arguments

vars	Named list of variables to be added to a session environment. Names are required and will be used as variable names.
sessionId	ID of the session to which variables should be added. Can also be a vector of multiple session IDs. If NULL, then variables will be added to all currently active sessions.
makeDefault	If TRUE then, in addition, the specified variables will be added to each new opened session as default ones.

Details

This function is a wrapper around method `sessionVariables` of class [Session](#). If `makeDefault = TRUE`, it is also a wrapper around method `sessionVariables` of class [App](#). The first one changes the current state of the session environment, while the second specifies default variables for each new session.

See Also

[getSessionVariable](#).

Examples

```
openPage(allowedFunctions = "f", allowedVariables = "res")

m <- 1
f <- function() {v * m}
setSessionVariables(list(v = 1:10, m = 2))

sendCommand("jrc.callFunction('f', [], 'res')", wait = 1)
print(res)
```


`closePage()`

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