Package ‘ParallelLogger’

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Type Package

Title Support for Parallel Computation, Logging, and Function Automation

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Maintainer Martijn Schuemie <schuemie@ohdsi.org>

Description Support for parallel computation with progress bar, and option to stop or proceed on errors. Also provides logging to console and disk, and the logging persists in the parallel threads. Additional functions support function call automation with delayed execution (e.g. for executing functions in parallel).

License Apache License 2.0

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Author Martijn Schuemie [aut, cre],
Marc Suchard [aut],
Observational Health Data Science and Informatics [cph]

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```
addDefaultConsoleLogger

Add the default console logger

Description
Add the default console logger

Usage
addDefaultConsoleLogger(name = "DEFAULT_CONSOLE_LOGGER")

Arguments
name A name for the logger.

Details
Creates a logger that writes to the console using the "INFO" threshold and the layoutSimple layout.

Examples
logger <- addDefaultConsoleLogger()
logTrace("This event is below the threshold (INFO)")
logInfo("Hello world")
unregisterLogger(logger)

addDefaultEmailLogger Add the default e-mail logger

Description
Add the default e-mail logger

Usage
addDefaultEmailLogger(
    mailSettings,
    label = Sys.info()["nodename"],
    name = "DEFAULT_EMAIL_LOGGER",
    test = FALSE
)
addDefaultErrorReportLogger

Add the default error report logger

Description

Add the default error report logger
Usage

addDefaultErrorReportLogger(
  fileName = file.path(getwd(), "errorReportR.txt"),
  name = "DEFAULT_ERRORREPORT_LOGGER"
)

Arguments

filename  The name of the file to write to.
name      A name for the logger.

Details

Creates a logger that writes to a file using the "FATAL" threshold and the layoutErrorReport
layout. The file will be overwritten if it is older than 60 seconds. The user will be notified that the
error report has been created, and where to find it.

Description

Add the default error report logger

Usage

addDefaultFileLogger(fileName, name = "DEFAULT_FILE_LOGGER")

Arguments

fileName  The name of the file to write to.
name      A name for the logger.

Details

Creates a logger that writes to a file using the "TRACE" threshold and the layoutParallel layout.
The output can be viewed with the built-in log viewer that can be started using launchLogViewer.

Description

Remove all registered loggers

Usage

clearLoggers()
clusterApply

Apply a function to a list using the cluster

Description

Apply a function to a list using the cluster

Usage

clusterApply(cluster, x, fun, ..., stopOnError = FALSE, progressBar = TRUE)

Arguments

cluster The cluster of threads to run the function.

x The list on which the function will be applied.

fun The function to apply. Note that the context in which the function is specified matters (see details).

... Additional parameters for the function.

stopOnError Stop when one of the threads reports an error? If FALSE, all errors will be reported at the end.

progressBar Show a progress bar?

Details

The function will be executed on each element of x in the threads of the cluster. If there are more elements than threads, the elements will be queued. The progress bar will show the number of elements that have been completed. It can sometimes be important to realize that the context in which a function is created is also transmitted to the worker node. If a function is defined inside another function, and that outer function is called with a large argument, that argument will be transmitted to the worker node each time the function is executed. It can therefore make sense to define the function to be called at the package level rather than inside a function, to save overhead.

Value

A list with the result of the function on each item in x.

Examples

fun <- function(x) {
  return (x^2)
}

cluster <- makeCluster(numberOfThreads = 3)
clusterApply(cluster, 1:10, fun)
stopCluster(cluster)
clusterRequire

**Require a package in the cluster**

**Description**

Calls the `require` function in each node of the cluster.

**Usage**

```r
clusterRequire(cluster, package)
```

**Arguments**

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<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>cluster</td>
<td>The cluster object.</td>
</tr>
<tr>
<td>package</td>
<td>The name of the package to load in all nodes.</td>
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convertJsonToSettings

**Converts a JSON string to a settings object**

**Description**

Converts a JSON string to a settings object

**Usage**

```r
convertJsonToSettings(json)
```

**Arguments**

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<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>json</td>
<td>A JSON string.</td>
</tr>
</tbody>
</table>

**Details**

Converts a JSON string generated using the `convertSettingsToJson` function to a settings object, restoring object classes and attributes.

**Value**

An R object as specified by the JSON.
convertSettingsToJson  Convert a settings object to a JSON string

Description

Convert a settings object to a JSON string

Usage

convertSettingsToJson(object)

Arguments

object  R object to be converted.

Details

Convert a settings object to a JSON string, using pretty formatting and preserving object classes and attributes.

Value

A JSON string representing the R object.

createArgFunction  Create an argument function

Description

Create an argument function

Usage

createArgFunction(
  functionName,
  excludeArgs = c(),
  includeArgs = NULL,
  addArgs = list(),
  rCode = c(),
  newName
)

createConsoleAppender

Arguments

functionName  The name of the function for which we want to create an args function.
excludeArgs  Exclude these arguments from appearing in the args function.
includeArgs  Include these arguments in the args function.
addArgs  Add these arguments to the args functions. Defined as a list with format name = default.
rCode  A character vector representing the R code where the new function should be appended to.
newName  The name of the new function. If not specified, the new name will be automatically derived from the old name.

Details

This function can be used to create a function that has (almost) the same interface as the specified function, and the output of this function will be a list of argument values.

Value

A character vector with the R code including the new function.

Examples

createArgFunction("read.csv", addArgs = list(exposureId = "exposureId"))

createConsoleAppender

Create console appender

Description

Create console appender

Usage

createConsoleAppender(layout = layoutSimple)

Arguments

layout  The layout to be used by the appender.

Details

Creates an appender that will write to the console.
createEmailAppender

Example

```r
appender <- createConsoleAppender(layout = layoutTimestamp)
logger <- createLogger(name = "SIMPLE",
                      threshold = "INFO",
                      appenders = list(appender))
registerLogger(logger)
logTrace("This event is below the threshold (INFO)")
logInfo("Hello world")
unregisterLogger("SIMPLE")
```

Description

Create e-mail appender

Usage

```r
createEmailAppender(
    layout = layoutEmail,
    mailSettings,
    label = Sys.info()
    test = FALSE
)
```

Arguments

- `layout`: The layout to be used by the appender.
- `mailSettings`: Arguments to be passed to the send.mail function in the mailR package (except subject and body).
- `label`: A label to be used in the e-mail subject to identify a run. By default the name of the computer is used.
- `test`: If TRUE, a message will be displayed on the console instead of sending an e-mail.

Details

Creates an appender that will send log events to an e-mail address using the mailR package. Please make sure your settings are correct by using the mailR package before using those settings here. ParallelLogger will not display any messages if something goes wrong when sending the e-mail.
**createFileAppender**

**Create file appender**

**Description**

Create file appender

**Usage**

```r
createFileAppender(
  layout = layoutParallel,
  fileName,
  overwrite = FALSE,
  expirationTime = 60
)
```

**Arguments**

- `layout` The layout to be used by the appender.
- `fileName` The name of the file to write to.
createLogger

Overwrite the file if it is older than the expiration time?

expirationTime    Expiration time in seconds

Details

Creates an appender that will write to a file.

createLogger    Create a logger

Description

Create a logger

Usage

createLogger(
    name = "SIMPLE",
    threshold = "INFO",
    appenders = list(createConsoleAppender())
)

Arguments

name           A name for the logger.
threshold      The threshold to be used for reporting.
appenders      A list of one or more appenders as created for example using the createConsoleAppender or createFileAppender function.

Details

Creates a logger that will log messages to its appenders. The logger will only log messages at a level equal to or higher than its threshold. For example, if the threshold is "INFO" then messages marked "INFO" will be logged, but messages marked "TRACE" will not. The order of levels is "TRACE", "DEBUG", "INFO", "WARN", "ERROR", "and FATAL".

Value

An object of type Logger, to be used with the registerLogger function.
Examples

```r
appender <- createConsoleAppender(layout = layoutTimestamp)

logger <- createLogger(name = "SIMPLE",
                        threshold = "INFO",
                        appenders = list(appender))
registerLogger(logger)
logTrace("This event is below the threshold (INFO)")
logInfo("Hello world")
unregisterLogger("SIMPLE")
```

---

**excludeFromList**

*Exclude variables from a list of objects of the same type*

**Description**

Exclude variables from a list of objects of the same type

**Usage**

```r
excludeFromList(x, exclude)
```

**Arguments**

- **x**: A list of objects of the same type.
- **exclude**: A character vector of names of variables to exclude.

---

**getLoggers**

*Get all registered loggers*

**Description**

Get all registered loggers

**Usage**

```r
getLoggers()
```

**Value**

Returns all registered loggers.
launchLogViewer | Launch the log viewer Shiny app

Description
Launch the log viewer Shiny app

Usage
launchLogViewer(logFileName)

Arguments
logFileName Name of the log file to view.

Details
Launches a Shiny app that allows the user to view a log file created using the default file logger. Use addDefaultFileLogger to start the default file logger.

Examples
# Create a log file:
logFile <- file.path(tempdir(), "log.txt")
addDefaultFileLogger(logFile)
logInfo("Hello world")

# Launch the log file viewer (only if in interactive mode):
if (interactive()) {
  launchLogViewer(logFile)
}

# Delete the log file:
unlink(logFile)

layoutEmail | Logging layout for e-mail

Description
A layout function to be used with an e-mail appender. This layout creates a short summary e-mail message on the event, including stack trace.

Usage
layoutEmail(level, message)
**layoutErrorReport**

**Arguments**

- **level**
  The level of the message (e.g. "INFO")
- **message**
  The message to layout.

**Description**

A layout function to be used with an appender. This layout creates a more elaborate error message, for sharing with the developer. If an error occurs in the main thread a summary of the system info will be included.

**Usage**

`layoutErrorReport(level, message)`

**Arguments**

- **level**
  The level of the message (e.g. "INFO")
- **message**
  The message to layout.

**layoutParallel**

**Logging layout for parallel computing**

**Description**

A layout function to be used with an appender. This layout adds the time, thread, level, package name, and function name to the message.

**Usage**

`layoutParallel(level, message)`

**Arguments**

- **level**
  The level of the message (e.g. "INFO")
- **message**
  The message to layout.
### layoutSimple

**Simple logging layout**

**Description**

A layout function to be used with an appender. This layout simply includes the message itself.

**Usage**

```python
layoutSimple(level, message)
```

**Arguments**

- **level**
  - The level of the message (e.g. "INFO")
- **message**
  - The message to layout.

---

### layoutStackTrace

**Logging layout with stack trace**

**Description**

A layout function to be used with an appender. This layout adds the stack trace to the message.

**Usage**

```python
layoutStackTrace(level, message)
```

**Arguments**

- **level**
  - The level of the message (e.g. "INFO")
- **message**
  - The message to layout.
**layoutTimestamp**

Logging layout with timestamp

**Description**
A layout function to be used with an appender. This layout adds the time to the message.

**Usage**

```r
layoutTimestamp(level, message)
```

**Arguments**

- **level**
  - The level of the message (e.g. "INFO")
- **message**
  - The message to layout.

**Examples**

```r
appender <- createConsoleAppender(layout = layoutTimestamp)
logger <- createLogger(name = "SIMPLE",
 threshold = "INFO",
 appenders = list(appender))
registerLogger(logger)
logTrace("This event is below the threshold (INFO)")
logInfo("Hello world")
unregisterLogger("SIMPLE")
```

**loadSettingsFromJson**

Load a settings object from a JSON file

**Description**

Load a settings object from a JSON file

**Usage**

```r
loadSettingsFromJson(fileName)
```

**Arguments**

- **fileName**
  - Name of the JSON file to load.

**Details**

Load a settings object from a JSON file, restoring object classes and attributes.
Value
An R object as specified by the JSON.

logDebug

Description
Log a message at the DEBUG level

Usage
logDebug(...)

Arguments

... Zero or more objects which can be coerced to character (and which are pasted together with no separator).

Details
Log a message at the specified level. The message will be sent to all the registered loggers.

logError

Description
Log a message at the ERROR level

Usage
logError(...)

Arguments

... Zero or more objects which can be coerced to character (and which are pasted together with no separator).

Details
Log a message at the specified level. The message will be sent to all the registered loggers.
**logFatal**  
*Log a message at the FATAL level*

**Description**

Log a message at the FATAL level

**Usage**

`logFatal(...)`

**Arguments**

...  
Zero or more objects which can be coerced to character (and which are pasted together with no separator).

**Details**

Log a message at the specified level. The message will be sent to all the registered loggers. This function is be automatically called when an error occurs, and should not be called directly. Use `stop()` instead.

**logInfo**  
*Log a message at the INFO level*

**Description**

Log a message at the INFO level

**Usage**

`logInfo(...)`

**Arguments**

...  
Zero or more objects which can be coerced to character (and which are pasted together with no separator).

**Details**

Log a message at the specified level. The message will be sent to all the registered loggers. This is equivalent to calling R’s native `message()` function.
Examples

```r
appender <- createConsoleAppender(layout = layoutTimestamp)

logger <- createLogger(name = "SIMPLE",
                          threshold = "INFO",
                          appenders = list(appender))
registerLogger(logger)
logTrace("This event is below the threshold (INFO)")
logInfo("Hello world")
unregisterLogger("SIMPLE")
```

---

logTrace  
*Log a message at the TRACE level*

Description

Log a message at the TRACE level

Usage

```r
logTrace(...)  
```

Arguments

```r
...  
Zero or more objects which can be coerced to character (and which are pasted together with no separator).
```

Details

Log a message at the specified level. The message will be sent to all the registered loggers.

Examples

```r
appender <- createConsoleAppender(layout = layoutTimestamp)

logger <- createLogger(name = "SIMPLE",
                          threshold = "INFO",
                          appenders = list(appender))
registerLogger(logger)
logTrace("This event is below the threshold (INFO)")
logInfo("Hello world")
unregisterLogger("SIMPLE")
```

logWarn

Log a message at the WARN level

Description
Log a message at the WARN level

Usage
logWarn(...)

Arguments
... Zero or more objects which can be coerced to character (and which are pasted together with no separator).

Details
Log a message at the specified level. The message will be sent to all the registered loggers. This function is automatically called when a warning is thrown, and should not be called directly. Use warning() instead.

makeCluster
Create a cluster of nodes for parallel computation

Description
Create a cluster of nodes for parallel computation

Usage
makeCluster(
  numberOfThreads,
  singleThreadToMain = TRUE,
  setAndromedaTempFolder = TRUE
)

Arguments
numberOfThreads
  Number of parallel threads.

singleThreadToMain
  If numberOfThreads is 1, should we fall back to running the process in the main thread?

setAndromedaTempFolder
  When TRUE, the andromedaTempFolder option will be copied to each thread.
Value

An object representing the cluster.

Examples

fun <- function(x) {
  return (x^2)
}

cluster <- makeCluster(numberOfThreads = 3)
clusterApply(cluster, 1:10, fun)
stopCluster(cluster)

matchInList

In a list of object of the same type, find those that match the input

Description

In a list of object of the same type, find those that match the input

Usage

matchInList(x, toMatch)

Arguments

x A list of objects of the same type.
toMatch The object to match.

Details

Typically, toMatch will contain a subset of the variables that are in the objects in the list. Any object matching all variables in toMatch will be included in the result.

Value

A list of objects that match the toMatch object.

Examples

x <- list(
  a = list(name = "John", age = 25, gender = "M"),
  b = list(name = "Mary", age = 24, gender = "F")
)

matchInList(x, list(name = "Mary"))

# $a
registerLogger

# $a$name
# [1] "John"
#
# $a$age
# [1] 25
#
#
# $b
# $b$name
# [1] "Mary"
#
# $b$age
# [1] 24

registerLogger Register a logger

Description
Register a logger

Usage
registerLogger(logger)

Arguments
logger An object of type Logger as created using the createLogger function.

Details
Registers a logger as created using the createLogger function to the logging system.

Examples
appender <- createConsoleAppender(layout = layoutTimestamp)

logger <- createLogger(name = "SIMPLE",
                      threshold = "INFO",
                      appenders = list(appender))

registerLogger(logger)
logTrace("This event is below the threshold (INFO)")
logInfo("Hello world")
unregisterLogger("SIMPLE")
saveSettingsToJson  
Save a settings object as JSON file

Description
Save a settings object as JSON file

Usage
saveSettingsToJson(object, fileName)

Arguments

object  
R object to be saved.

fileName  
File name where the object should be saved.

Details
Save a setting object as a JSON file, using pretty formatting and preserving object classes and attributes.

selectFromList  
Select variables from a list of objects of the same type

Description
Select variables from a list of objects of the same type

Usage
selectFromList(x, select)

Arguments

x  
A list of objects of the same type.

select  
A character vector of names of variables to select.
Examples

```r
x <- list(
    a = list(name = "John", age = 25, gender = "M"),
    b = list(name = "Mary", age = 24, gender = "F")
)
selectFromList(x, c("name", "age"))
```

```
# $a
# $a$name
# [1] "John"
# # $a$age
# [1] 25
# #
# # $b
# $b$name
# [1] "Mary"
# # $b$age
# [1] 24
```

---

stopCluster  Stop the cluster

Description

Stop the cluster

Usage

```r
stopCluster(cluster)
```

Arguments

```
cluster  The cluster to stop
```

Examples

```r
fun <- function(x) {
    return (x^2)
}
```

```
cluster <- makeCluster(numberOfThreads = 3)
clusterApply(cluster, 1:10, fun)
stopCluster(cluster)
```
unregisterLogger  Unregister a logger

Description
Unregister a logger

Usage
unregisterLogger(x, silent = FALSE)

Arguments
x
Can either be an integer (e.g. 2 to remove the second logger), the name of the
logger, or the logger object itself.
silent
If TRUE, no warning will be issued if the logger is not found.

Details
Unregisters a logger from the logging system.

Value
Returns TRUE if the logger was removed.

Examples
appender <- createConsoleAppender(layout = layoutTimestamp)

logger <- createLogger(name = "SIMPLE",
threshold = "INFO",
appenders = list(appender))
registerLogger(logger)
logTrace("This event is below the threshold (INFO)")
logInfo("Hello world")
unregisterLogger("SIMPLE")
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