Package ‘LinkedMatrix’

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Description A class that links matrix-like objects (nodes) by rows or by
columns while behaving similarly to a base R matrix. Very large matrices
are supported if the nodes are file-backed matrices.
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as.ColumnLinkedMatrix

Description

A class that links matrix-like objects (nodes) by rows or by columns while behaving similarly to a base R matrix. Very large matrices are supported if the nodes are file-backed matrices.

See Also

ColumnLinkedMatrix-class, RowLinkedMatrix-class, and LinkedMatrix-class for more information on the ColumnLinkedMatrix, RowLinkedMatrix, and LinkedMatrix classes.

as.ColumnLinkedMatrix  Converts an Object to a LinkedMatrix Object

Description

Converts an Object to a LinkedMatrix Object.

Usage

as.ColumnLinkedMatrix(x, ...)  
## S3 method for class 'list'
as.ColumnLinkedMatrix(x, ...)  
as.RowLinkedMatrix(x, ...)  
## S3 method for class 'list'
as.RowLinkedMatrix(x, ...)

Arguments

x  An object to convert to a LinkedMatrix object.
...  Additional arguments.

Value

A LinkedMatrix object.
as.matrix.LinkedMatrix

See Also

ColumnLinkedMatrix-class, RowLinkedMatrix-class, and LinkedMatrix-class for more information on the ColumnLinkedMatrix, RowLinkedMatrix, and LinkedMatrix classes.

Examples

```r
m1 <- ff::ff(initdata = rnorm(50), dim = c(5, 10))
m2 <- bigmemory::big.matrix(init = rnorm(50), nrow = 5, ncol = 10)
m3 <- matrix(data = rnorm(50), nrow = 5, ncol = 10)

myList <- list(m1, m2, m3)

m <- as.ColumnLinkedMatrix(myList)
```

---

as.matrix.LinkedMatrix

Converts a LinkedMatrix Instance to a Matrix (if Small Enough)

Description

Converts a LinkedMatrix Instance to a Matrix (if Small Enough).

Usage

```r
## S3 method for class 'LinkedMatrix'
as.matrix(x, ...)
```

Arguments

- `x` Either a ColumnLinkedMatrix or a RowLinkedMatrix object.
- `...` Additional arguments (unused).

Value

A matrix.

See Also

ColumnLinkedMatrix-class, RowLinkedMatrix-class, and LinkedMatrix-class for more information on the ColumnLinkedMatrix, RowLinkedMatrix, and LinkedMatrix classes.
cbind.ColumnLinkedMatrix

Description

Compared to the ColumnLinkedMatrix and RowLinkedMatrix constructor functions, nested LinkedMatrix objects that are passed via ... will not be treated as matrix-like objects, but their nodes will be extracted and merged with the new ColumnLinkedMatrix (for cbind.ColumnLinkedMatrix) or RowLinkedMatrix (for rbind.RowLinkedMatrix) object for a more compact representation.

Usage

## S3 method for class 'ColumnLinkedMatrix'
cbind(..., deparse.level = 0L)

## S3 method for class 'RowLinkedMatrix'
rbind(..., deparse.level = 1L)

Arguments

... Matrix-like objects to be combined by columns.

deparse.level Currently unused, defaults to 0.

Details

cbind.ColumnLinkedMatrix currently only works for ColumnLinkedMatrix objects, rbind.RowLinkedMatrix only for RowLinkedMatrix.

See Also

ColumnLinkedMatrix-class, RowLinkedMatrix-class, and LinkedMatrix-class for more information on the ColumnLinkedMatrix, RowLinkedMatrix, and LinkedMatrix classes.

ColumnLinkedMatrix Create a LinkedMatrix Object

Description

This function constructs a new ColumnLinkedMatrix or RowLinkedMatrix object from a list of matrix-like objects.

Usage

ColumnLinkedMatrix(...) RowLinkedMatrix(...)
Arguments

... A sequence of matrix-like objects of the same row-dimension (for ColumnLinkedMatrix) or column-dimension (for RowLinkedMatrix).

Details

A matrix-like object is one that has two dimensions and implements at least \texttt{dim} and \texttt{[}. Each object needs to have the same number of rows (for ColumnLinkedMatrix) or columns (for RowLinkedMatrix) to be linked together. If no matrix-like objects are given, a single 1x1 node of type matrix filled with NA is returned. LinkedMatrix objects can be nested as long as they are conformable.

Value

Either a ColumnLinkedMatrix or a RowLinkedMatrix object.

See Also

LinkedMatrix to create an empty, prespecified LinkedMatrix object.

Examples

# Create various matrix-like objects that correspond in dimensions
m1 <- ff::ff(initdata = rnorm(50), dim = c(5, 10))
m2 <- bigmemory::big.matrix(init = rnorm(50), nrow = 5, ncol = 10)
m3 <- matrix(data = rnorm(50), nrow = 5, ncol = 10)

# Create a ColumnLinkedMatrix object
cm <- ColumnLinkedMatrix(m1, m2, m3)

# To specify the matrix-like objects as a list, use the \texttt{\textasciigrave Var do.call\textasciigrave Var} function
rm <- do.call(RowLinkedMatrix, list(m1, m2, m3))

Description

This class treats a list of matrix-like objects that are linked together by columns (ColumnLinkedMatrix) or rows (RowLinkedMatrix) and have the same number of rows similarly to a regular matrix by implementing key methods such as \texttt{[} and \texttt{[<-} for extracting and replacing matrix elements, \texttt{dim} to retrieve dimensions, and \texttt{dimnames} and \texttt{dimnames<-} to retrieve and set dimnames. Each list element is called a node and can be extracted or replaced using \texttt{[} and \texttt{[<-}. A matrix-like object is one that has two dimensions and implements at least \texttt{dim} and \texttt{[}.
Details

Internally, this class is an S4 class that contains list. Each node can be accessed using the [[ operator. lapply is also possible. ColumnLinkedMatrix and RowLinkedMatrix form a class union called LinkedMatrix.

Methods

• [
• [<- 
• dim
• dimnames
• dimnames<-
• as.matrix
• is.matrix
• length
• print
• str
• cbind (for ColumnLinkedMatrix)
• rbind (for RowLinkedMatrix)

See Also

ColumnLinkedMatrix and RowLinkedMatrix to create a ColumnLinkedMatrix and RowLinkedMatrix objects from scratch. as.ColumnLinkedMatrix and as.RowLinkedMatrix to create a ColumnLinkedMatrix and RowLinkedMatrix objects from other objects. LinkedMatrix to create an empty, prespecified LinkedMatrix object. nNodes to get the number of nodes of a LinkedMatrix object.

Examples

# Create various matrix-like objects that correspond in dimensions
m1 <- ff::ff(initdata = rnorm(50), dim = c(5, 10))
m2 <- bigmemory::big.matrix(init = rnorm(50), nrow = 5, ncol = 10)
m3 <- matrix(data = rnorm(50), nrow = 5, ncol = 10)

# Link random matrices by columns
cm <- ColumnLinkedMatrix(m1, m2, m3)
dim(cm)

# Link random matrices by rows
rm <- RowLinkedMatrix(m1, m2, m3)
dim(rm)

# Get the number of nodes of each linked matrix
nNodes(cm)
nNodes(rm)

# Extract specific rows of linked matrix
index

Maps Each Column or Row Index of a Linked Matrix to the Column or Row Index of Its Corresponding Node

Description

If \( j \) for ColumnLinkedMatrix or \( i \) for RowLinkedMatrix is passed, it will only generate entries for the given indices. \( \text{sort} \), which is set by default, determines whether \( j \) or \( i \) should be sorted before building the index.

Usage

index(x, ...)

Arguments

x Either a ColumnLinkedMatrix or a RowLinkedMatrix object.
...

Additional arguments (see Details).

Value

A matrix.
LinkedMatrix

Create an Empty, Prespecified LinkedMatrix Object

Description

This function creates an empty LinkedMatrix object of a certain size, a certain number of nodes, and certain types of nodes.

Usage

LinkedMatrix(nrow, ncol, nNodes, linkedBy, nodeInitializer, ...)

Arguments

nrow The number of rows of the whole matrix.
ncol The number of columns of the whole matrix.
nNodes The number of nodes.
linkedBy Whether the matrix is linked by columns or rows.
nodeInitializer The name of a function or a function (nodeIndex, nrow, ncol, ...) where nodeIndex is the index of the node, nrow is a partition of the total number of rows, ncol is a partition of the total number of columns, and ... are additional parameters passed into the function. The function is expected to return a matrix-like object of dimensions nrow and ncol. Pre-defined node initializers include matrixNodeInitializer to initialize matrices and ffNodeInitializer to initialize ff objects.

... Additional arguments passed into the nodeInitializer function.

Value

A ColumnLinkedMatrix object if linkedBy is columns or a RowLinkedMatrix object if linkedBy is rows.

See Also

ColumnLinkedMatrix-class, RowLinkedMatrix-class, and LinkedMatrix-class for more information on the ColumnLinkedMatrix, RowLinkedMatrix, and LinkedMatrix classes.

ColumnLinkedMatrix and RowLinkedMatrix to create ColumnLinkedMatrix and RowLinkedMatrix objects from a list of matrix-like objects.
Examples

```r
# Create an empty 15x10 RowLinkedMatrix with 3 matrix nodes
m1 <- LinkedMatrix(nrow = 15, ncol = 10, nNodes = 3, linkedBy = "rows",
                   nodeInitializer = "matrixNodeInitializer")
dim(m1)
nNodes(m1)
all(sapply(m1, inherits, "matrix"))

# Create an empty 15x10 RowLinkedMatrix with 3 ff nodes
m2 <- LinkedMatrix(nrow = 15, ncol = 10, nNodes = 3, linkedBy = "rows",
                   nodeInitializer = "ffNodeInitializer", vmode = "byte")
dim(m2)
nNodes(m2)
all(sapply(m2, inherits, "ff_matrix"))

# Create an empty 15x10 RowLinkedMatrix with 3 big.matrix nodes
m3 <- LinkedMatrix(nrow = 15, ncol = 10, nNodes = 3, linkedBy = "rows",
                   nodeInitializer = function(nodeIndex, nrow, ncol, ...) {
                       bigmemory::big.matrix(nrow = nrow, ncol = ncol)
                   })
dim(m3)
nNodes(m3)
all(sapply(m3, inherits, "big.matrix"))
```

LinkedMatrix-class  

A Class Union of ColumnLinkedMatrix and RowLinkedMatrix

Description

This class is abstract and no objects can be created from it. It can be used to check whether an object is either of type ColumnLinkedMatrix or of type RowLinkedMatrix using `is(x, "LinkedMatrix")` and to assign methods for both ColumnLinkedMatrix and RowLinkedMatrix classes, e.g. `show`.

Methods

- length
- as.matrix
- show
- initialize

See Also

ColumnLinkedMatrix-class and RowLinkedMatrix-class for implementations of column-linked and row-linked matrices.
nNodes

Returns the Number of Nodes

Description

Returns the number of nodes.

Usage

nNodes(x)

Arguments

x

Either a ColumnLinkedMatrix or a RowLinkedMatrix object.

Value

The number of nodes.

See Also

ColumnLinkedMatrix-class, RowLinkedMatrix-class, and LinkedMatrix-class for more information on the ColumnLinkedMatrix, RowLinkedMatrix, and LinkedMatrix classes.

Examples

# Create an example RowLinkedMatrix from various matrix-like objects that
# correspond in dimensions
m <- RowLinkedMatrix(
  ff::ff(initdata = rnorm(50), dim = c(5, 10)),
  bigmemory::big.matrix(init = rnorm(50), nrow = 5, ncol = 10),
  matrix(data = rnorm(50), nrow = 5, ncol = 10)
)

# Get the number of nodes of the RowLinkedMatrix
nNodes(m)
nodes

| nodes | Returns the Column or Row Indexes at Which Each Node Starts and Ends |

Description

Returns the column or row indexes at which each node starts and ends.

Usage

```
nodes(x)
```

Arguments

- `x` Either a `ColumnLinkedMatrix` or a `RowLinkedMatrix` object.

Value

A matrix.

See Also

`ColumnLinkedMatrix-class`, `RowLinkedMatrix-class`, and `LinkedMatrix-class` for more information on the `ColumnLinkedMatrix`, `RowLinkedMatrix`, and `LinkedMatrix` classes.
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