

Package ‘beachmat.tiledb’

January 17, 2025

Version 0.99.1

Date 2024-12-16

Title beachmat bindings for TileDB-backed matrices

Description Extends beachmat to initialize tatami matrices from TileDB-backed arrays. This allows C++ code in downstream packages to directly call the TileDB C/C++ library to access array data, without the need for block processing via DelayedArray. Developers only need to import this package to automatically extend the capabilities of beachmat::initializeCpp to TileDBArray instances.

Imports methods, beachmat, tiledb, TileDBArray, DelayedArray, Rcpp

Suggests testthat, BiocStyle, knitr, rmarkdown, Matrix

LinkingTo Rcpp, assorthead, beachmat

biocViews DataRepresentation, DataImport, Infrastructure

License GPL-3

NeedsCompilation yes

VignetteBuilder knitr

SystemRequirements C++17

URL <https://github.com/tatami-inc/beachmat.tiledb>

BugReports <https://github.com/tatami-inc/beachmat.tiledb/issues>

RoxygenNote 7.3.2

Encoding UTF-8

git_url <https://git.bioconductor.org/packages/beachmat.tiledb>

git_branch devel

git_last_commit ddcfd81

git_last_commit_date 2024-12-17

Repository Bioconductor 3.21

Date/Publication 2025-01-17

Author Aaron Lun [aut, cre]

Maintainer Aaron Lun <infinite.monkeys.with.keyboards@gmail.com>

Contents

initializeCpp	2
initializeOptions	3
loadIntoMemory	4
Index	6

initializeCpp	<i>Initialize TileDB-backed matrices</i>
---------------	------------------------------------------

Description

Initialize C++ representations of TileDB-backed matrices based on their **TileDBArray** representations.

Usage

```
## S4 method for signature 'TileDBArraySeed'
initializeCpp(
  x,
  tiledb.cache.size = getAutoBlockSize(),
  tiledb.realize = initializeOptions("realize"),
  tiledb.realize.num.threads = initializeOptions("realize.num.threads"),
  tiledb.concurrency.level = initializeOptions("concurrency.level"),
  ...
)
```

Arguments

x	A TileDBArray seed object.
tiledb.cache.size	Integer scalar specifying the size of the cache in bytes during data extraction from a TileDB matrix. Larger values reduce disk I/O during random access to the matrix, at the cost of increased memory usage.
tiledb.realize	See the realize option in initializeOptions .
tiledb.realize.num.threads	See the realize.num.threads option in initializeOptions .
tiledb.concurrency.level	See the concurrency.level option in initializeOptions .
...	Further arguments, ignored.

Value

An external pointer that can be used in any **tatami**-compatible function.

Author(s)

Aaron Lun

Examples

```
library(TileDBArray)
y <- matrix(runif(1000), ncol=20, nrow=50)
z <- as(y, "TileDBArray")
ptr <- initializeCpp(z)
```

initializeOptions *Options for TileDB matrices*

Description

Options for initializing TileDB matrices in [initializeCpp](#).

Usage

```
initializeOptions(option, value)
```

Arguments

option	String specifying the name of the option.
value	Value of the option.

Details

The following options are supported:

- `realize`, a logical scalar specifying whether to load the matrix data from TileDB into memory with [loadIntoMemory](#), and then cache it for future calls with [checkMemoryCache](#). This avoids time-consuming disk I/O when performing multiple passes through the matrix, at the expense of increased memory usage.
- `realize.num.threads`, an integer scalar specifying the number of threads that can be used by [loadIntoMemory](#) outside of TileDB calls. This is only relevant when `realize=TRUE`.
- `concurrency.level`, an integer scalar specifying the number of threads that can be used by the TileDB library. Alternatively NULL, in which case TileDB's default (i.e., all available cores on the machine) are used. Greater performance may be achieved when the product of `realize.num.threads` and `concurrency.level` does not exceed the number of available cores.

Value

If `value` is missing, the current setting of `option` is returned.

If `value` is supplied, it is used to set the option, and the previous value of the option is invisibly returned.

Author(s)

Aaron Lun

Examples

```
initializeOptions("realize")
old <- initializeOptions("realize", TRUE) # setting to a new value
initializeOptions("realize") # new option takes affect
initializeOptions("realize", old) # setting it back
```

loadIntoMemory	<i>Load a TileDB matrix into memory</i>
----------------	-----------------------------------------

Description

Load a TileDB-backed matrix into memory as an external pointer to a **tatami**-compatible representation. This differs from the (default) behavior of `initializeCpp`, which only loads slices of the matrix on request.

Usage

```
loadIntoMemory(
  x,
  cache.size = getAutoBlockSize(),
  num.threads = 1,
  concurrency.level = NULL
)
```

Arguments

<code>x</code>	A TileDBArray -derived matrix or seed object.
<code>cache.size</code>	Integer scalar specifying the size of the cache in bytes during data extraction from a TileDB matrix.
<code>num.threads</code>	Integer scalar specifying the number of threads to use outside of the TileDB library.
<code>concurrency.level</code>	Integer scalar specifying the number of threads that can be used by the TileDB library. See the option of the same name in <code>initializeOptions</code> for details.

Value

An external pointer that can be used in **tatami**-based functions.

Author(s)

Aaron Lun

Examples

```
library(TileDBArray)
y <- matrix(runif(1000), ncol=20, nrow=50)
z <- as(y, "TileDBArray")
ptr <- loadIntoMemory(z)
```

Index

checkMemoryCache, [3](#)

initializeCpp, [2](#), [3](#), [4](#)

initializeCpp,TileDBArraySeed-method
(initializeCpp), [2](#)

initializeOptions, [2](#), [3](#), [4](#)

loadIntoMemory, [3](#), [4](#)