

Package ‘restful’

June 16, 2022

Type Package

Title R Interface to RESTful Web Services

Version 0.0.15

Author Michael Lawrence

Maintainer Michael Lawrence <michafla@gene.com>

Description Models a RESTful service as if it were a nested R list.

License Artistic-2.0

Imports XML, RCurl, rjson, S4Vectors (>= 0.13.15), yaml

Depends R (>= 3.4.0), methods

Suggests getPass, rsolr, RUnit

Collate CRUDProtocol-class.R CacheInfo-class.R Credentials-class.R
HTTP-class.R Media-class.R MediaCache-class.R RestUri-class.R
RestContainer-class.R test_restful_package.R utils.R

NeedsCompilation yes

Repository CRAN

Date/Publication 2022-06-16 09:30:02 UTC

R topics documented:

Credentials-class	2
CRUDProtocol-class	2
Media-class	2
MediaCache-class	3
RestContainer-class	4
RestUri-class	5

Index	7
--------------	----------

Credentials-class *Credentials*

Description

`Credentials` stores authentication credentials (username and password). Note that it is easy to retrieve the password from this object. There is no encryption or other security.

Accessors

- `username`: get the username as a string.
- `password`: get the password as a plain text string.

Author(s)

Michael Lawrence

CRUDProtocol-class *CRUDProtocol*

Description

`CRUDProtocol` is a base class for implementing the communication protocol for performing Create, Read, Update and Delete (CRUD) operations on a resource identified by a [RestUri](#). Only HTTP is implemented by this package, and it should serve as useful example for other implementations.

Author(s)

Michael Lawrence

Media-class *Media*

Description

The `Media` object represents a value identified by a URI. There is a `Media` subclass for each media type, such as “text/csv” or “application/xml”. Coercion methods (see [setAs](#)) define mappings between `Media` subclasses and `R` objects. The user does not usually need to access this functionality directly.

Type conversion

Each `Media` subclass may be converted to/from one or more `R` types. The mappings are established by [setAs](#).

The following bi-directional mappings are built into the package:

application/xml, text/html	XMLAbstractNode
application/json	list
text/csv	data.frame
text/*	character

But call `mediaCoercionTable` to see what is defined in the current session.

The `as` function is the canonical interface to converting media to R objects. It (usefully) requires that the user specify the target R type. For convenience, the `mediaTarget` generic returns the default R type for a given Media object.

To support a new media type, one should define a Media subclass with the same name as the media type (`application/xml`), a corresponding `mediaTarget` method, and all relevant coerce methods. See the Media class hierarchy to determine where the new type fits.

Helpers

- `mediaCoercionTable()`: Returns a character matrix with columns “from” and “to”, indicating the available coercions of media types to/from R objects.

Author(s)

Michael Lawrence

Examples

```
txt <- '{"json":{"rocks":true}}'
json <- as(txt, "application/json")
as(json, mediaTarget(json))
```

MediaCache-class

MediaCache

Description

MediaCache is just an environment that restricts the types of its elements to [Media](#). Construct an instance by calling `MediaCache`. The shared default for all REST clients is returned by `globalRestClientCache`.

Author(s)

Michael Lawrence

RestContainer-class *RestContainer*

Description

The `RestContainer` object wraps a collection of resources with a list-like interface. Values are stored and retrieved using familiar accessors like `[]` and `[]<-`. Coercion between external media and R objects is based on the [Media](#) framework.

Data access

The `RestContainer` object maps familiar R list accessors to CRUD operations on [RestUri](#).

- `x[] <- value`: Creates resources for the objects in `value` at `x`. This is the [create](#)/POST operation. Unlike an R list, the resources are added to the collection without removing any existing resources. This inconsistency is unfortunate, so we might change this behavior in the future.
- `x$name`, `x[[i]]`: Reads the named element. This is the [read](#)/GET operation.
- `x[i]`: Reads the named elements, which are returned in a list. This is the vectorized [read](#)/GET operation. Unlike an R list, this is not an endomorphism, in that the return value is dropped to a list and is no longer attached to the REST interface.
- `x$name <- value`, `x[[i]] <- value`: Updates the named resource with `value`. This is the [update](#)/PUT operation.
- `x[i] <- value`: Updates resources at `x` with the objects in `value`, a list. This is the vectorized [update](#)/PUT operation.
- `x$name <- NULL`, `x[[i]] <- NULL`: Deletes the named resource. This is the [delete](#)/DELETE operation.

Constructor

- `RestContainer(...)`: Constructs an instance based on [RestUri\(...\)](#).

Author(s)

Michael Lawrence

See Also

[RestUri](#), which is a lower-level but perhaps more sensible interface.

Examples

```
apache <- RestContainer("http://wiki.apache.org")
apache$solr
```

RestUri-class	<i>RestUri</i>
---------------	----------------

Description

The `RestUri` object represents a resource accessible via a RESTful interface. It extends `character` with a protocol, used for accessing the data, as well as a cache. R objects are converted to/from external media via the [Media](#) framework.

CRUD interface

There are four canonical, abstract types of REST operations: create, read, update, delete (CRUD). The CRUD model was borrowed from traditional databases. The `restful` package maps those four operations to R functions of the same name. The functions are generic, and there are methods for `RestUri` and `character` (taken to be a URI), described below.

- `create(x, value, ..., returnResponse=FALSE)`: Creates a resource at `x` by converting `value` to a supported media type. The `...` become query parameters on `x`. If `returnResponse` is `TRUE`, convert and return any response sent from the endpoint. By default, `x` is returned, to support chaining. This corresponds to an HTTP POST.
- `read(x, ...)`: Reads the resource at `x`, coerces it to an R object, and returns the object. The `...` become query parameters on `x`. This corresponds to an HTTP GET.
- `update(object, value, ...)`: Updates the resource at `x` by converting `value` to a supported media type. The `...` become query parameters on `x`. This corresponds to an HTTP PUT.
- `delete(x, ...)`: Deletes the resource at `x`. This corresponds to an HTTP DELETE.

Constructor

- `RestUri(base.uri, protocol = CRUDProtocol(base.uri, ...), cache = globalRestClientCache(), ...)`: Constructs a `RestUri` object, pointing to `base.uri`, a string representation of the URI. The `protocol` (a `CRUDProtocol` instance) is automatically determined from the scheme of the URI. By default, all instances share the same global cache, a [MediaCache](#) instance.
- `x$name`: Extends the path of `x` by appending `name`. This is a convenient way to narrow a URI and is intuitive if one thinks of a tree of resources as a nested list.
- `x[[i]]`: Extends the path of `x` by appending `i`.
- `x[...]`: Named arguments in `...` become query parameters on `x`.

Container support

- `container(x)`: Gets a [RestContainer](#) object for treating `x` as a list-like container.

Authentication

RestUri currently supports basic HTTP authentication. Call `authenticate(x)` to add credentials to the RestUri `x`. Retrieve the Credentials object with the `credentials` accessor.

Once a set of credentials has been entered, it is recorded for the URI in `$(HOME)/.local/config/restfulr/credentials`. The path prefix can be changed via the `XDG_CONFIG_DIR` environment variable, according to the XDG standard. The credential cache is checked during authentication, so that a user does not need to reenter credentials for the same URI.

If the **getPass** package is installed, we use it for password entry. Otherwise, we rely on an implementation that shows the password as it is entered, unless the user is in a terminal, where we can hide input.

Utilities

- `embedCredentials(x)`: Embeds the internal credential information into the URL itself, for interfacing with other tools, like `utils::download.file`.

Author(s)

Michael Lawrence

Examples

```
apache <- RestUri("http://wiki.apache.org")
read(apache$solr)
```

Index

* classes

- Credentials-class, 2
- CRUDProtocol-class, 2
- Media-class, 2
- MediaCache-class, 3
- RestContainer-class, 4
- RestUri-class, 5

* methods

- Credentials-class, 2
- CRUDProtocol-class, 2
- Media-class, 2
- MediaCache-class, 3
- RestContainer-class, 4
- RestUri-class, 5

- [, RestContainer-method (RestContainer-class), 4
- [, RestUri-method (RestUri-class), 5
- [<-, RestContainer-method (RestContainer-class), 4
- [[, RestContainer-method (RestContainer-class), 4
- [[, RestUri-method (RestUri-class), 5
- [[<-, MediaCache-method (MediaCache-class), 3
- [[<-, RestContainer-method (RestContainer-class), 4
- [[<-, RestUri-method (RestUri-class), 5
- \$, RestContainer-method (RestContainer-class), 4
- \$, RestUri-method (RestUri-class), 5
- \$<-, MediaCache-method (MediaCache-class), 3
- \$<-, RestContainer-method (RestContainer-class), 4
- \$<-, RestUri-method (RestUri-class), 5
- application/*-class (Media-class), 2
- application/json-class (Media-class), 2
- application/xml-class (Media-class), 2
- as, 3

- audio/*-class (Media-class), 2
- authenticate (RestUri-class), 5
- authenticate, RestUri-method (RestUri-class), 5
- class:application/* (Media-class), 2
- class:application/json (Media-class), 2
- class:application/xml (Media-class), 2
- class:audio/* (Media-class), 2
- class:Credentials (Credentials-class), 2
- class:CRUDProtocol (CRUDProtocol-class), 2
- class:image/* (Media-class), 2
- class:Media (Media-class), 2
- class:MediaCache (MediaCache-class), 3
- class:message/* (Media-class), 2
- class:model/* (Media-class), 2
- class:multipart/* (Media-class), 2
- class:RestContainer (RestContainer-class), 4
- class:RestUri (RestUri-class), 5
- class:text/* (Media-class), 2
- class:text/csv (Media-class), 2
- class:text/html (Media-class), 2
- class:text/plain (Media-class), 2
- class:video/* (Media-class), 2
- coerce, ANY, Media-method (Media-class), 2
- coerce, application/json, list-method (Media-class), 2
- coerce, application/xml, XMLAbstractNode-method (Media-class), 2
- coerce, data.frame, Media-method (Media-class), 2
- coerce, data.frame, text/csv-method (Media-class), 2
- coerce, list, application/json-method (Media-class), 2
- coerce, text/csv, data.frame-method (Media-class), 2
- container (RestUri-class), 5

- container, RestUri-method (RestUri-class), 5
- container<- (RestUri-class), 5
- container<-, RestUri-method (RestUri-class), 5
- create, 4
- create (RestUri-class), 5
- create, character-method (RestUri-class), 5
- create, RestUri-method (RestUri-class), 5
- credentials (Credentials-class), 2
- credentials, RestUri-method (RestUri-class), 5
- Credentials-class, 2
- CRUDProtocol, 5
- CRUDProtocol-class, 2
- delete, 4
- delete (RestUri-class), 5
- delete, character-method (RestUri-class), 5
- delete, RestUri-method (RestUri-class), 5
- embedCredentials (RestUri-class), 5
- globalRestClientCache (MediaCache-class), 3
- image/*-class (Media-class), 2
- length, NullMedia-method (Media-class), 2
- Media, 3–5
- Media-class, 2
- MediaCache, 5
- MediaCache (MediaCache-class), 3
- MediaCache-class, 3
- mediaCoercionTable (Media-class), 2
- mediaTarget (Media-class), 2
- mediaTarget, application/json-method (Media-class), 2
- mediaTarget, application/xml-method (Media-class), 2
- mediaTarget, NullMedia-method (Media-class), 2
- mediaTarget, text/*-method (Media-class), 2
- mediaTarget, text/csv-method (Media-class), 2
- mediaTarget, text/html-method (Media-class), 2
- message/*-class (Media-class), 2
- model/*-class (Media-class), 2
- multipart/*-class (Media-class), 2
- password (Credentials-class), 2
- password, Credentials-method (Credentials-class), 2
- purgeCache (RestUri-class), 5
- purgeCache, RestUri-method (RestUri-class), 5
- read, 4
- read (RestUri-class), 5
- read, character-method (RestUri-class), 5
- read, RestUri-method (RestUri-class), 5
- RestContainer, 5
- RestContainer (RestContainer-class), 4
- RestContainer-class, 4
- RestUri, 2, 4
- RestUri (RestUri-class), 5
- RestUri-class, 5
- setAs, 2
- show, Media-method (Media-class), 2
- show, RestContainer-method (RestContainer-class), 4
- show, RestUri-method (RestUri-class), 5
- text/*-class (Media-class), 2
- text/csv-class (Media-class), 2
- text/html-class (Media-class), 2
- text/plain-class (Media-class), 2
- update, 4
- update (RestUri-class), 5
- update, character-method (RestUri-class), 5
- update, RestUri-method (RestUri-class), 5
- username (Credentials-class), 2
- username, Credentials-method (Credentials-class), 2
- video/*-class (Media-class), 2
- XMLAbstractNode, 3