

# Package ‘RestRserve’

June 14, 2020

**Type** Package

**Title** A Framework for Building HTTP API

**Description** Allows to easily create high-performance full featured HTTP APIs from R functions. Provides high-level classes such as 'Request', 'Response', 'Application', 'Middleware' in order to streamline server side application development. Out of the box allows to serve requests using 'Rserve' package, but flexible enough to integrate with other HTTP servers such as 'httpuv'.

**Version** 0.3.0

**URL** <http://restrserve.org>, <https://github.com/rexyai/RestRserve>

**BugReports** <https://github.com/rexyai/RestRserve/issues>

**License** GPL (>= 2)

**Depends** R (>= 3.6.0)

**Imports** methods, Rserve (>= 1.7.3), Rcpp (>= 1.0.3), R6 (>= 2.4.0), uuid (>= 0.1-2), checkmate (>= 1.9.4), mime (>= 0.7), jsonlite (>= 1.6)

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**Encoding** UTF-8

**LazyData** true

**RoxygenNote** 7.1.0

**VignetteBuilder** knitr

**NeedsCompilation** yes

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Application	<i>Creates application - RestRserve usage starts from here</i>
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### Description

Creates Application object. Application provides an interface for building high-performance REST API by registering R functions as handlers http requests.

### Public fields

`logger` Logger object which records events during request processing. Alternatively user can use loggers from `lgr` package as a drop-in replacement - Logger methods and loggers created by `lgr` share function signatures.

`content_type` Default response body content type.

`HTTPError` Class which raises HTTP errors. Global [HTTPError](#) is used by default. In theory user can replace it with his own class (see `RestRserve:::HTTPErrorFactory`). However we believe in the majority of the cases using [HTTPError](#) will be enough.

### Active bindings

`endpoints` Prints all the registered routes with allowed methods.

**Methods****Public methods:**

- `Application$new()`
- `Application$add_route()`
- `Application$add_get()`
- `Application$add_post()`
- `Application$add_static()`
- `Application$add_openapi()`
- `Application$add_swagger_ui()`
- `Application$append_middleware()`
- `Application$process_request()`
- `Application$print()`
- `Application$clone()`

**Method** `new()`: Creates Application object.

*Usage:*

```
Application$new(
  middleware = list(EncodeDecodeMiddleware$new()),
  content_type = "text/plain",
  ...
)
```

*Arguments:*

`middleware` List of [Middleware](#) objects.

`content_type` Default response body content (media) type. "text/plain" by default.

... Not used at the moment.

**Method** `add_route()`: Adds endpoint and register user-supplied R function as a handler.

*Usage:*

```
Application$add_route(
  path,
  method,
  FUN,
  match = c("exact", "partial", "regex"),
  ...
)
```

*Arguments:*

`path` Endpoint path.

`method` HTTP method. Allowed methods at the moment: GET, HEAD, POST, PUT, DELETE, OPTIONS, PATCH.

`FUN` User function to handle requests. `FUN` **must** take two arguments: first is request ([Request](#)) and second is response ([Response](#)).

The goal of the user function is to **modify** response or throw exception (call `raise()` or `stop()`).

Both response and request objects modified in-place and internally passed further to RestRserve execution pipeline.

`match` Defines how route will be processed. Allowed values:

- `exact` - match route as is. Returns 404 if route is not matched.
- `partial` - match route as prefix. Returns 404 if prefix are not matched.
- `regex` - match route as template. Returns 404 if template pattern not matched.

... Not used.

**Method** `add_get()`: Shorthand to `Application$add_route()` with GET method.

*Usage:*

```
Application$add_get(
  path,
  FUN,
  match = c("exact", "partial", "regex"),
  ...,
  add_head = TRUE
)
```

*Arguments:*

`path` Endpoint path.

`FUN` User function to handle requests. `FUN` **must** take two arguments: first is request ([Request](#)) and second is response ([Response](#)).

The goal of the user function is to **modify** response or throw exception (call [raise\(\)](#) or [stop\(\)](#)).

Both response and request objects modified in-place and internally passed further to `RestRserve` execution pipeline.

`match` Defines how route will be processed. Allowed values:

- `exact` - match route as is. Returns 404 if route is not matched.
- `partial` - match route as prefix. Returns 404 if prefix are not matched.
- `regex` - match route as template. Returns 404 if template pattern not matched.

... Not used.

`add_head` Adds HEAD method.

**Method** `add_post()`: Shorthand to `Application$add_route()` with POST method.

*Usage:*

```
Application$add_post(path, FUN, match = c("exact", "partial", "regex"), ...)
```

*Arguments:*

`path` Endpoint path.

`FUN` User function to handle requests. `FUN` **must** take two arguments: first is request ([Request](#)) and second is response ([Response](#)).

The goal of the user function is to **modify** response or throw exception (call [raise\(\)](#) or [stop\(\)](#)).

Both response and request objects modified in-place and internally passed further to `RestRserve` execution pipeline.

`match` Defines how route will be processed. Allowed values:

- `exact` - match route as is. Returns 404 if route is not matched.
- `partial` - match route as prefix. Returns 404 if prefix are not matched.

- `regex` - match route as template. Returns 404 if template pattern not matched.
- ... Not used.

**Method** `add_static()`: Adds GET method to serve file or directory at `file_path`.

*Usage:*

```
Application$add_static(path, file_path, content_type = NULL, ...)
```

*Arguments:*

`path` Endpoint path.

`file_path` Path file or directory.

`content_type` MIME-type for the content.

If `content_type = NULL` then MIME code `content_type` will be inferred automatically (from file extension).

If it will be impossible to guess about file type then `content_type` will be set to `application/octet-stream`.

... Not used.

**Method** `add_openapi()`: Adds endpoint to serve **OpenAPI** description of available methods.

*Usage:*

```
Application$add_openapi(path = "/openapi.yaml", file_path = "openapi.yaml")
```

*Arguments:*

`path` path Endpoint path.

`file_path` Path to the OpenAPI specification file.

**Method** `add_swagger_ui()`: Adds endpoint to show **Swagger UI**.

*Usage:*

```
Application$add_swagger_ui(
  path = "/swagger",
  path_openapi = "/openapi.yaml",
  use_cdn = TRUE,
  path_swagger_assets = "/__swagger__/",
  file_path = "swagger-ui.html"
)
```

*Arguments:*

`path` path Endpoint path.

`path_openapi` Path to the OpenAPI specification file.

`use_cdn` Use CDN to load Swagger UI libraries.

`path_swagger_assets` Swagger UI assets endpoint.

`file_path` Path to Swagger UI HTML file.

**Method** `append_middleware()`: Appends middleware to handlers pipeline.

*Usage:*

```
Application$append_middleware(mw)
```

*Arguments:*

`mw` [Middleware](#) object.

**Method** `process_request()`: Process incoming request and generate [Response](#) object.

*Usage:*

```
Application$process_request(request = NULL)
```

*Arguments:*

request [Request](#) object.

Useful for tests your handlers before deploy application.

**Method** `print()`: Prints application details.

*Usage:*

```
Application$print()
```

**Method** `clone()`: The objects of this class are cloneable with this method.

*Usage:*

```
Application$clone(deep = FALSE)
```

*Arguments:*

deep Whether to make a deep clone.

## See Also

[HTTPError Middleware Request Response](#)

## Examples

```
# init logger
app_logger = Logger$new()
# set log level for the middleware
app_logger$set_log_level("debug")
# set logger name
app_logger$set_name("MW Logger")
# init middleware to logging
mw = Middleware$new(
  process_request = function(rq, rs) {
    app_logger$info(sprintf("Incomming request (id %s): %s", rq$id, rq$path))
  },
  process_response = function(rq, rs) {
    app_logger$info(sprintf("Outgoing response (id %s): %s", rq$id, rs$status))
  },
  id = "awesome-app-logger"
)

# init application
app = Application$new(middleware = list(mw))

# set internal log level
app$logger$set_log_level("error")

# define simply request handler
status_handler = function(rq, rs) {
  rs$set_body("OK")
}
```

```
    rs$set_content_type("text/plain")
    rs$set_status_code(200L)
  }
# add route
app$add_get("/status", status_handler, "exact")

# add static file handler
desc_file = system.file("DESCRIPTION", package = "RestRserve")
# add route
app$add_static("/desc", desc_file, "text/plain")

# define say message handler
say_handler = function(rq, rs) {
  who = rq$parameters_path[["user"]]
  msg = rq$parameters_query[["message"]]
  if (is.null(msg)) msg <- "Hello"
  rs$set_body(paste(who, "say", dQuote(msg)))
  rs$set_content_type("text/plain")
  rs$set_status_code(200L)
}
# add route
app$add_get("/say/{user}", say_handler, "regex")

# print application info
app

# test app
# simulate requests
not_found_rq = Request$new(path = "/no")
status_rq = Request$new(path = "/status")
desc_rq = Request$new(path = "/desc")
say_rq = Request$new(path = "/say/anonym", parameters_query = list("message" = "Hola"))
# process prepared requests
app$process_request(not_found_rq)
app$process_request(status_rq)
app$process_request(desc_rq)
app$process_request(say_rq)

# run app
backend = BackendRserve$new()

if(interactive()) {
  backend$start(app, 8080)
}
```

**Description**

Creates ApplicationProcess to hold PID of the running applicaiton.

**Public fields**

pid Process identificator.

**Methods****Public methods:**

- [ApplicationProcess\\$new\(\)](#)
- [ApplicationProcess\\$kill\(\)](#)
- [ApplicationProcess\\$clone\(\)](#)

**Method new():** Creates ApplicationProcess object

*Usage:*

ApplicationProcess\$new(pid)

*Arguments:*

pid Process identificator.

**Method kill():** Send signal to process.

*Usage:*

ApplicationProcess\$kill(signal = 15L)

*Arguments:*

signal Singal code.

**Method clone():** The objects of this class are cloneable with this method.

*Usage:*

ApplicationProcess\$clone(deep = FALSE)

*Arguments:*

deep Whether to make a deep clone.

---

AuthBackendBasic

*Basic authorization backend*

---

**Description**

Creates AuthBackendBasic class object.

**Super class**

[RestRserve::AuthBackend](#) -> AuthBackendBasic



## Methods

### Public methods:

- [AuthBackendBasic\\$new\(\)](#)
- [AuthBackendBasic\\$authenticate\(\)](#)
- [AuthBackendBasic\\$clone\(\)](#)

**Method** `new()`: Creates AuthBackendBasic class object.

*Usage:*

```
AuthBackendBasic$new(FUN)
```

*Arguments:*

FUN Function to perform authentication which takes two arguments - user and password. Returns boolean - whether access is allowed for a requested user or not.

**Method** `authenticate()`: Provide authentication for the given request.

*Usage:*

```
AuthBackendBasic$authenticate(request, response)
```

*Arguments:*

request [Request](#) object.

response [Response](#) object.

*Returns:* Boolean - whether access is allowed for a requested user or not.

**Method** `clone()`: The objects of this class are cloneable with this method.

*Usage:*

```
AuthBackendBasic$clone(deep = FALSE)
```

*Arguments:*

deep Whether to make a deep clone.

## References

[RFC7617 Wikipedia](#)

## See Also

[AuthMiddleware Request Response](#)

Other AuthBackend: [AuthBackendBearer](#), [AuthBackend](#), [AuthMiddleware](#)

## Examples

```
# init users database
user_db = list(
  "user-1" = "password-1",
  "user-2" = "password-2"
)
# define authentication handler
auth_fun = function(user, password) {
```

```

    if (is.null(user_db[[user]])) return(FALSE) # not found
    if (!identical(user_db[[user]], password)) return(FALSE) # incorrect
    return(TRUE)
}
# init backend
auth_backend = AuthBackendBasic$new(FUN = auth_fun)

# test backend
# define credentials (see RFC)
creds = jsonlite::base64_enc("user-1:password-1")
# generate request headers
h = list("Authorization" = sprintf("Basic %s", creds))
# simulate request
rq = Request$new(path = "/", headers = h)
# init response object
rs = Response$new()
# perform authentication
auth_backend$authenticate(rq, rs) # TRUE

```

---

AuthBackendBearer      *Bearer token authorization backend*

---

## Description

Creates AuthBackendBearer class object.

## Super class

[RestRserve::AuthBackend](#) -> AuthBackendBearer

## Methods

### Public methods:

- [AuthBackendBearer\\$new\(\)](#)
- [AuthBackendBearer\\$authenticate\(\)](#)
- [AuthBackendBearer\\$clone\(\)](#)

**Method** `new()`: Creates AuthBackendBearer class object.

*Usage:*

```
AuthBackendBearer$new(FUN)
```

*Arguments:*

FUN Function to perform authentication which takes one arguments - token. Returns boolean - whether access is allowed for a requested token or not.

**Method** `authenticate()`: Provide authentication for the given request.

*Usage:*

```
AuthBackendBearer$authenticate(request, response)
```

*Arguments:*

request [Request](#) object.

response [Response](#) object.

*Returns:* Boolean - whether access is allowed for a requested user or not.

**Method** clone(): The objects of this class are cloneable with this method.

*Usage:*

```
AuthBackendBearer$clone(deep = FALSE)
```

*Arguments:*

deep Whether to make a deep clone.

## References

[RFC6750 Specification](#)

## See Also

[AuthMiddleware Request Response](#)

Other AuthBackend: [AuthBackendBasic](#), [AuthBackend](#), [AuthMiddleware](#)

## Examples

```
token_db = list(
  "valid-token" = as.POSIXct("2099-12-31", tz = "GMT"),
  "expired-token" = as.POSIXct("1900-01-01", tz = "GMT")
)
auth_fun = function(token) {
  if (is.null(token_db[[token]])) return(FALSE) # not found
  if (Sys.time() > token_db[[token]]) return(FALSE) # expired
  return(TRUE)
}
# init backend
auth_backend = AuthBackendBearer$new(FUN = auth_fun)

# test backend
# define credentials (see RFC)
token = "valid-token"
# generate request headers
h = list("Authorization" = sprintf("Bearer %s", token))
# simulate request
rq = Request$new(path = "/", headers = h)
# init response object
rs = Response$new()
# perform authentication
auth_backend$authenticate(rq, rs) # TRUE
```

---

AuthMiddleware	<i>Creates authorization middleware object</i>
----------------	--

---

## Description

Adds various authorizations to [Application](#).

## Super class

[RestRserve::Middleware](#) -> AuthMiddleware

## Methods

### Public methods:

- [AuthMiddleware\\$new\(\)](#)
- [AuthMiddleware\\$clone\(\)](#)

**Method** `new()`: Creates AuthMiddleware object.

*Usage:*

```
AuthMiddleware$new(  
  auth_backend,  
  routes,  
  match = "exact",  
  id = "AuthMiddleware"  
)
```

*Arguments:*

`auth_backend` Authentication backend.

`routes` Routes paths to protect.

`match` How routes will be matched: "exact" or "partial" (as prefix).

`id` Middleware id.

**Method** `clone()`: The objects of this class are cloneable with this method.

*Usage:*

```
AuthMiddleware$clone(deep = FALSE)
```

*Arguments:*

`deep` Whether to make a deep clone.

## See Also

[Middleware Application](#)

Other AuthBackend: [AuthBackendBasic](#), [AuthBackendBearer](#), [AuthBackend](#)

---

BackendRserve	<i>Creates Rserve backend for processing HTTP requests</i>
---------------	--

---

**Description**

Creates BackendRserve object which can start [Application](#) using Rserve backend.

**Super class**

[RestRserve::Backend](#) -> BackendRserve

**Methods****Public methods:**

- [BackendRserve\\$new\(\)](#)
- [BackendRserve\\$start\(\)](#)
- [BackendRserve\\$set\\_request\(\)](#)
- [BackendRserve\\$convert\\_response\(\)](#)
- [BackendRserve\\$clone\(\)](#)

**Method** [new\(\)](#): Creates BackendRserve object.

*Usage:*

```
BackendRserve$new(..., jit_level = 0L, precompile = TRUE)
```

*Arguments:*

... Not used at the moment.

`jit_level` changes R's byte compiler level to this value before app start.

`precompile` try to use R's byte compiler to pre-compile

**Method** [start\(\)](#): Starts RestRserve application from current R session.

*Usage:*

```
BackendRserve$start(app, http_port = 8080, ..., background = FALSE)
```

*Arguments:*

app [Application](#) object.

`http_port` HTTP port for application. Negative values (such as -1) means not to expose plain http.

... Key-value pairs of the Rserve configuration. If contains "http.port" then `http_port` will be silently replaced with its value.

`background` Whether to try to launch in background process on UNIX.

*Returns:* [ApplicationProcess](#) object when `background = TRUE`.

**Method** [set\\_request\(\)](#): Parse request and set to it fields.

*Usage:*

```
BackendRserve$set_request(
  request,
  path = "/",
  parameters_query = NULL,
  headers = NULL,
  body = NULL
)
```

*Arguments:*

request [Request](#) object.

path Character with requested path. Always starts with /.

parameters\_query A named character vector with URL decoded query parameters.

headers Request HTTP headers.

body Request body. Can be NULL, raw vector or named character vector for the URL encoded form (like a parameters\_query parameter).

*Returns:* request modified object.

**Method** `convert_response()`: Convert self object to Rserve compatible structure.

*Usage:*

```
BackendRserve$convert_response(response)
```

*Arguments:*

response [Response](#) object.

*Returns:* List with the following structure:

- `body`: can be a character vector of length one or a raw vector. if the character vector is named "file" then the content of a file of that name is the body. If the character vector is named "tmpfile" then the content of a temporary file of that name is the body.
- `content-type`: must be a character vector of length one or NULL (if present, else default is "text/plain").
- `headers`: must be a character vector - the elements will have CRLF appended and neither `Content-type` nor `Content-length` may be used.
- `status-code`: must be an integer if present (default is 200).

**Method** `clone()`: The objects of this class are cloneable with this method.

*Usage:*

```
BackendRserve$clone(deep = FALSE)
```

*Arguments:*

deep Whether to make a deep clone.

**References**

See [http.c](#) in [Rserve](#)

---

CORSMiddleware	<i>Creates CORS middleware object</i>
----------------	---------------------------------------

---

### Description

Adds CORS to [Application](#). CORS Middleware out of the box in RestRserve to turn on/off the CORS Headers on preflight validation from the browser.

Cross Origin Resource Sharing is an additional security check done by modern browsers to avoid request between different domains. To allow it RestRserve has easy way to enable your CORS policies. By default CORS policies are disabled. So if any request is coming from a different domain will be blocked by the browser as default because RestRserve will not send the headers required by the browser to allow cross site resource sharing. You can change this easily just by providing CORSMiddleware as middleware to the [Application](#).

### Super class

[RestRserve::Middleware](#) -> CORSMiddleware

### Methods

#### Public methods:

- [CORSMiddleware\\$new\(\)](#)
- [CORSMiddleware\\$clone\(\)](#)

**Method** `new()`: Creates CORS middleware object

*Usage:*

```
CORSMiddleware$new(routes = "/", match = "partial", id = "CORSMiddleware")
```

*Arguments:*

routes Routes paths to protect.

match How routes will be matched: exact or partial (as prefix).

id Middleware id.

**Method** `clone()`: The objects of this class are cloneable with this method.

*Usage:*

```
CORSMiddleware$clone(deep = FALSE)
```

*Arguments:*

deep Whether to make a deep clone.

### References

[MDN](#)

**See Also**

[Middleware Application](#)

**Examples**

```
app = Application$new(middleware = list(CORSMiddleware$new()))
app$add_post(path = "/hello", FUN = function(req, res) {
  res$set_body("Hello from RestRserve!")
})
app$add_route("/hello", method = "OPTIONS", FUN = function(req, res) {
  res$set_header("Allow", "POST, OPTIONS")
})
req = Request$new(
  path = "/hello",
  headers = list("Access-Control-Request-Method" = "POST"),
  method = "OPTIONS"
)
app$process_request(req)
```

---

EncodeDecodeMiddleware

*Creates EncodeDecodeMiddleware middleware object*

---

**Description**

Controls how RestRserve encodes and decodes different content types. **This middleware is passed by default to the [Application](#) constructor.**

**Super class**

[RestRserve::Middleware](#) -> EncodeDecodeMiddleware

**Public fields**

`ContentHandlers` Class which controls how RestRserve encodes and decodes different content types. See [ContentHandlers](#) for documentation. User can add new encoding and decoding methods for new content types using `set_encode` and `set_decode` methods. In theory user can replace it with his own class (see `RestRserve:::ContentHandlersFactory`). However we believe that in the majority of the cases using [ContentHandlers](#) will be enough.

**Methods****Public methods:**

- [EncodeDecodeMiddleware\\$new\(\)](#)
- [EncodeDecodeMiddleware\\$clone\(\)](#)

**Method** `new()`: Creates EncodeDecodeMiddleware middleware object.



*Usage:*

```
EncodeDecodeMiddleware$new(id = "EncodeDecodeMiddleware")
```

*Arguments:*

id Middleware id.

**Method** clone(): The objects of this class are cloneable with this method.

*Usage:*

```
EncodeDecodeMiddleware$clone(deep = FALSE)
```

*Arguments:*

deep Whether to make a deep clone.

**See Also**

[Middleware Application ContentHandlers](#)

---

HTTPDate-class

*HTTP Date class*

---

**Description**

Conversions between POSIXct to HTTP Date objects.

**Arguments**

from numeric, POSIXct or HTTPDate object.

**References**

[RFC7231 MDN](#)

**Examples**

```
# convert POSIXct to HTTP date string
as(0, "HTTPDate") # Thu, 01 Jan 1970 00:00:00 GMT
as(Sys.time(), "HTTPDate")
# parse HTTP date string to POSIXct
dt = "Thu, 01 Jan 1970 00:00:00 GMT"
class(dt) = "HTTPDate"
as(dt, "POSIXct")
```

---

Logger

*Simple logging utility*

---

## Description

Creates Logger object which can be used for logging with different level of verbosity. Log messages are in JSON format.

## Methods

### Public methods:

- [Logger\\$new\(\)](#)
- [Logger\\$set\\_name\(\)](#)
- [Logger\\$set\\_log\\_level\(\)](#)
- [Logger\\$set\\_printer\(\)](#)
- [Logger\\$trace\(\)](#)
- [Logger\\$debug\(\)](#)
- [Logger\\$info\(\)](#)
- [Logger\\$warn\(\)](#)
- [Logger\\$error\(\)](#)
- [Logger\\$fatal\(\)](#)
- [Logger\\$clone\(\)](#)

**Method new():** Creates Logger object.

*Usage:*

```
Logger$new(  
  level = c("info", "fatal", "error", "warn", "debug", "trace", "off", "all"),  
  name = "ROOT",  
  printer = NULL  
)
```

*Arguments:*

level Log level. Allowed values: info, fatal, error, warn, debug, trace, off, all.

name Logger name.

printer Logger with sink defined by printer function. It should have signature function(timestamp, level, logger\_name, pid, message). By default when printer = NULL logger writes message in JSON format to stdout.

**Method set\_name():** Sets logger name.

*Usage:*

```
Logger$set_name(name = "ROOT")
```

*Arguments:*

name Logger name.

**Method** `set_log_level()`: Sets log level.

*Usage:*

```
Logger$set_log_level(  
  level = c("info", "fatal", "error", "warn", "debug", "trace", "off", "all")  
)
```

*Arguments:*

level Log level. Allowed values: info, fatal, error, warn, debug, trace, off, all.

**Method** `set_printer()`: Sets function which defines how to print logs.

*Usage:*

```
Logger$set_printer(FUN = NULL)
```

*Arguments:*

FUN Printer function. Should be a function with 6 formal arguments: timestamp, level, logger\_name, pid, message.

**Method** `trace()`: Write trace message.

*Usage:*

```
Logger$trace(msg, ...)
```

*Arguments:*

msg Log message.

... Additional params.

**Method** `debug()`: Write debug message.

*Usage:*

```
Logger$debug(msg, ...)
```

*Arguments:*

msg Log message.

... Additional params.

**Method** `info()`: Write information message.

*Usage:*

```
Logger$info(msg, ...)
```

*Arguments:*

msg Log message.

... Additional params.

**Method** `warn()`: Write warning message.

*Usage:*

```
Logger$warn(msg, ...)
```

*Arguments:*

msg Log message.

... Additional params.

**Method** `error()`: Write error message.

*Usage:*

```
Logger$error(msg, ...)
```

*Arguments:*

`msg` Log message.

... Additional params.

**Method** `fatal()`: Write fatal error message.

*Usage:*

```
Logger$fatal(msg, ...)
```

*Arguments:*

`msg` Log message.

... Additional params.

**Method** `clone()`: The objects of this class are cloneable with this method.

*Usage:*

```
Logger$clone(deep = FALSE)
```

*Arguments:*

`deep` Whether to make a deep clone.

## See Also

[lgr::Logger](#)

## Examples

```
# init logger
logger = Logger$new("info")
# write info message
logger$info("hello world")
# write extended log entry
logger$info("", context = list(message = "hello world", code = 0L))
```

---

Middleware

*Creates middleware object*

---

## Description

Creates Middleware object.

Middleware is a very useful concept which allows to perform preprocessing of requests and post-processing of responses. Middleware has an access to both request and response objects and can modify them. This way each request can be checked/modified before passing handler and response can be post processed (for example this way we developer can set up custom error messages).

**Public fields**

`process_request` Function which takes 2 arguments - request and response objects (class [Request](#) and [Response](#) correspondingly) and modify request and response or throw exception using [HTTPError](#) helper.

Function is called before request is routed to handler.

Usually `process_request` is used to perform logging, check authorization, etc.

`process_response` Function which takes 2 arguments - request and response objects (class [Request](#) and [Response](#) correspondingly) and modify request and response or throw exception using [HTTPError](#) helper.

Function is called after request is processed by handler. Usually `process_response` is used to perform logging, custom error handling, etc.

`id` Middleware id.

**Methods****Public methods:**

- [Middleware\\$new\(\)](#)
- [Middleware\\$clone\(\)](#)

**Method** `new()`: Creates middleware object

*Usage:*

```
Middleware$new(  
  process_request = function(request, response) TRUE,  
  process_response = function(request, response) TRUE,  
  id = "Middleware"  
)
```

*Arguments:*

`process_request` Modify request or response objects or throw exception using [[HTTPError](#)] helper. This function evaluate before router handler called.

`process_response` Modify request or response objects or throw exception using [[HTTPError](#)] helper. This function evaluate after router handler called.

`id` Middleware id.

**Method** `clone()`: The objects of this class are cloneable with this method.

*Usage:*

```
Middleware$clone(deep = FALSE)
```

*Arguments:*

`deep` Whether to make a deep clone.

**See Also**

[Request Response Application](#)

---

raise	<i>Interrupts request processing</i>
-------	--------------------------------------

---

**Description**

Interrupts request processing and signals RestRserve to return HTTPError

**Usage**

```
raise(x)
```

**Arguments**

x instance of [Response](#). Can be created using [HTTPError](#). see examples.

**Value**

None - stops execution of the current expression and executes an error action.

**See Also**

[HTTPError Application](#)

**Examples**

```
# catch exception
res = try(raise(HTTPError$bad_request()), silent = TRUE)
cond = attr(res, "condition")
# response is a valid Response instace
identical(cond$response$body$error, "400 Bad Request")
```

---

Request	<i>Creates Request object</i>
---------	-------------------------------

---

**Description**

Called internally for handling incoming requests from Rserve side. Also useful for testing.

**Public fields**

- path Request path.
- method Request HTTP method.
- headers Request headers.
- cookies Request cookies.
- context Environment to store any data. Can be used in middlewares.
- content\_type Request body content type.
- body Request body.
- parameters\_query Request query parameters.
- parameters\_body Request body parameters.
- parameters\_path List of parameters extracted from templated path after routing. For example if we have some handler listening at `/job/{job_id}` and we are receiving request at `/job/1` then `parameters_path` will be `list(job_id = "1")`.  
It is important to understand that `parameters_path` will be available (not empty) only after request will reach handler.  
This effectively means that `parameters_path` can be used inside handler and response middleware (but not request middleware!).
- files Structure which contains positions and lengths of files for the multipart body.
- decode Function to decode body for the specific content type.

**Active bindings**

- id Automatically generated UUID for each request. Read only.
- date Request Date header converted to POSIXct.
- accept Splitted Accept request header.
- accept\_json Request accepts JSON response.
- accept\_xml Request accepts XML response.

**Methods****Public methods:**

- `Request$new()`
- `Request$set_id()`
- `Request$reset()`
- `Request$get_header()`
- `Request$get_param_query()`
- `Request$get_param_body()`
- `Request$get_param_path()`
- `Request$get_file()`
- `Request$print()`
- `Request$clone()`

**Method** `new()`: Creates Request object

*Usage:*

```
Request$new(
  path = "/",
  method = c("GET", "HEAD", "POST", "PUT", "DELETE", "CONNECT", "OPTIONS", "TRACE",
    "PATCH"),
  parameters_query = list(),
  parameters_body = list(),
  headers = list(),
  body = NULL,
  cookies = list(),
  content_type = NULL,
  decode = NULL,
  ...
)
```

*Arguments:*

`path` Character with requested path. Always starts with `/`.

`method` Request HTTP method.

`parameters_query` A named list with URL decoded query parameters.

`parameters_body` A named list with URL decoded body parameters. This field is helpful when request is a urlencoded form or a multipart form.

`headers` Request HTTP headers represented as named list.

`body` Request body. Can be anything and in conjunction with `content_type` defines how HTTP body will be represented.

`cookies` Cookies represented as named list. **Note** that cookies should be provided explicitly - they won't be derived from headers.

`content_type` HTTP content type. **Note** that `content_type` should be provided explicitly - it won't be derived from headers.

`decode` Function to decode body for the specific content type.

... Not used at this moment.

**Method** `set_id()`: Set request id.

*Usage:*

```
Request$set_id(id = uuid::UUIDgenerate(TRUE))
```

*Arguments:*

`id` Request id.

**Method** `reset()`: Resets request object. This is not useful for end user, but useful for RestRserve internals - resetting R6 class is much faster than initialize it.

*Usage:*

```
Request$reset()
```

**Method** `get_header()`: Get HTTP response header value. If requested header is empty returns default.

*Usage:*

```
Request$get_header(name, default = NULL)
```



*Arguments:*

name Header field name.

default Default value if header does not exists.

*Returns:* Header field values (character string).

**Method** `get_param_query()`: Get request query parameter by name.

*Usage:*

```
Request$get_param_query(name)
```

*Arguments:*

name Query parameter name.

*Returns:* Query parameter value (character string).

**Method** `get_param_body()`: Get request body parameter by name.

*Usage:*

```
Request$get_param_body(name)
```

*Arguments:*

name Body field name.

*Returns:* Body field value.

**Method** `get_param_path()`: Get templated path parameter by name.

*Usage:*

```
Request$get_param_path(name)
```

*Arguments:*

name Path parameter name.

*Returns:* Path parameter value.

**Method** `get_file()`: Extract specific file from multipart body.

*Usage:*

```
Request$get_file(name)
```

*Arguments:*

name Body file name.

*Returns:* Raw vector with `filename` and `content-type` attributes.

**Method** `print()`: Print method.

*Usage:*

```
Request$print()
```

**Method** `clone()`: The objects of this class are cloneable with this method.

*Usage:*

```
Request$clone(deep = FALSE)
```

*Arguments:*

deep Whether to make a deep clone.

**See Also**

[Response Application](#)

**Examples**

```
# init simply request
rq = Request$new(
  path = "/",
  parameters_query = list(
    "param1" = "value1",
    "param2" = "value2"
  ),
  headers = list(
    "Content-encoding" = "identity",
    "Custom-field" = "value"
  ),
  cookies = list(
    "sessionId" = "1"
  )
)
# get request UUID
rq$id
# get content accept
rq$accept
# get request content type
rq$content_type
# get header by name (lower case)
rq$get_header("custom-field")
# get query param by name
rq$get_param_query("param1")
# print request
rq
```

---

Response

*Creates Response object*

---

**Description**

Creates response object.

**Public fields**

body Response body.

If it is a named character with a name `file` or `tmpfile` then the value is considered as a path to a file and content of this file is served as body. The latter will be deleted once served.

content\_type Response body content (media) type. Will be translated to Content-type header.

headers Response headers.

`status_code` Response HTTP status code.  
`cookies` Response cookies. Will be translated to Set-Cookie headers.  
`context` Environment to store any data. Can be used in middlewares.  
`encode` Function to encode body for specific content.

### Active bindings

`status` Paste together status code and description.

### Methods

#### Public methods:

- `Response$new()`
- `Response$reset()`
- `Response$set_content_type()`
- `Response$set_status_code()`
- `Response$has_header()`
- `Response$get_header()`
- `Response$set_header()`
- `Response$delete_header()`
- `Response$append_header()`
- `Response$set_date()`
- `Response$unset_date()`
- `Response$set_cookie()`
- `Response$unset_cookie()`
- `Response$set_body()`
- `Response$set_response()`
- `Response$print()`
- `Response$clone()`

**Method** `new()`: Creates Response object

*Usage:*

```
Response$new(  
  body = NULL,  
  content_type = "text/plain",  
  headers = list(Server = getOption("RestRserve.headers.server")),  
  status_code = 200L,  
  encode = NULL,  
  ...  
)
```

*Arguments:*

`body` Response body.  
`content_type` Response body content (media) type.  
`headers` Response headers.

`status_code` Response status code.  
`encode` Function to encode body for specific content.  
... Not used at this moment.

**Method** `reset()`: Resets response object. This is not useful for end user, but useful for RestRserve internals - resetting R6 class is much faster then initialize it.

*Usage:*

```
Response$reset()
```

**Method** `set_content_type()`: Set content type for response body.

*Usage:*

```
Response$set_content_type(content_type = "text/plain")
```

*Arguments:*

`content_type` Response body content (media) type.

**Method** `set_status_code()`: Set HTTP status code for response. See [docs on MDN](#).

*Usage:*

```
Response$set_status_code(code)
```

*Arguments:*

`code` Status code as integer number.

**Method** `has_header()`: Determine whether or not the response header exists.

*Usage:*

```
Response$has_header(name)
```

*Arguments:*

`name` Header field name.

*Returns:* Logical value.

**Method** `get_header()`: Get HTTP response header value. If requested header is empty returns default.

*Usage:*

```
Response$get_header(name, default = NULL)
```

*Arguments:*

`name` Header field name.

`default` Default value if header does not exists.

*Returns:* Header field values (character string).

**Method** `set_header()`: Set HTTP response header. Content-type and Content-length headers not allowed (use `content_type` field instead).

*Usage:*

```
Response$set_header(name, value)
```

*Arguments:*

`name` Header field name.

value Header field value.

**Method** `delete_header()`: Unset HTTP response header.

*Usage:*

```
Response$delete_header(name)
```

*Arguments:*

name Header field name.

*Returns:* Logical value.

**Method** `append_header()`: Append HTTP response header. If header exists , separator will be used. Don't use this method to set cookie (use `set_cookie` method instead).

*Usage:*

```
Response$append_header(name, value)
```

*Arguments:*

name Header field name.

value Header field value.

**Method** `set_date()`: Set Date HTTP header. See [docs on MDN](#).

*Usage:*

```
Response$set_date(dtm = Sys.time())
```

*Arguments:*

dtm POSIXct value.

**Method** `unset_date()`: Unset Date HTTP header.

*Usage:*

```
Response$unset_date()
```

*Returns:* Logical value.

**Method** `set_cookie()`: Set cookie. See [docs on MDN](#).

*Usage:*

```
Response$set_cookie(  
  name,  
  value,  
  expires = NULL,  
  max_age = NULL,  
  domain = NULL,  
  path = NULL,  
  secure = NULL,  
  http_only = NULL  
)
```

*Arguments:*

name Cookie name.

value Cookie value.

expires Cookie expires date and time (POSIXct).

max\_age Max cookie age (integer).  
domain Cookie domain.  
path Cookie path.  
secure Cookie secure flag.  
http\_only Cookie HTTP only flag.

**Method** unset\_cookie(): Unset cookie with given name.

*Usage:*

```
Response$unset_cookie(name)
```

*Arguments:*

name Cookie name.

*Returns:* Logical value.

**Method** set\_body(): Set response body.

*Usage:*

```
Response$set_body(body)
```

*Arguments:*

body Response body.

**Method** set\_response(): Set response fields.

*Usage:*

```
Response$set_response(  
  status_code,  
  body = NULL,  
  content_type = self$content_type  
)
```

*Arguments:*

status\_code Response HTTP status code.

body Response body.

content\_type content\_type Response body content (media) type.

**Method** print(): Print method.

*Usage:*

```
Response$print()
```

**Method** clone(): The objects of this class are cloneable with this method.

*Usage:*

```
Response$clone(deep = FALSE)
```

*Arguments:*

deep Whether to make a deep clone.

## See Also

[Request Application](#)

**Examples**

```

# init response
rs = Response$new()
# set body media type
rs$set_content_type("text/plain")
# set body content
rs$set_body("OK")
# set response status code
rs$set_status_code(200L)
# print response
rs

# init response
rs = Response$new()
# static file path
file_path = system.file("DESCRIPTION", package = "RestRserve")
# get last file modification timestamp
file_mtime = file.mtime(file_path)
# set body
rs$set_body(c("file" = file_path))
# set content type
rs$set_content_type("text/plain")
# set current timestamp
rs$set_date()
# set 'last-modified' header
rs$set_header("Last-Modified", as(file_mtime, "HTTPDate"))
# print response
rs

```

---

to\_json

*Simple JSON encoder*


---

**Description**

Encode R objects as JSON. Wrapper around `jsonlite::toJSON` with default parameters set to following values: `dataframe = 'columns'`, `auto_unbox = unbox`, `null = 'null'`, `na = 'null'`.

**Usage**

```
to_json(x, unbox = TRUE)
```

**Arguments**

<code>x</code>	the object to be encoded
<code>unbox</code>	TRUE by default. Whether to unbox (simplify) arrays consists of a single element

**Value**

JSON string

**Examples**

```
to_json(NULL)
to_json(list(name = "value"))
```



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