

Package ‘ecmwfr’

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Title Interface to 'ECMWF' and 'CDS' Data Web Services

Version 1.4.0

Description Programmatic interface to the European Centre for Medium-Range Weather Forecasts dataset web services (ECMWF; <<https://www.ecmwf.int/>>) and Copernicus's Climate Data Store (CDS; <<https://cds.climate.copernicus.eu>>). Allows for easy downloads of weather forecasts and climate reanalysis data in R.

URL <https://github.com/bluegreen-labs/ecmwfr>

BugReports <https://github.com/bluegreen-labs/ecmwfr/issues>

Depends R (>= 3.6)

Imports httr, keyring, memoise, getPass, curl, R6

License AGPL-3

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R topics documented:

wf_archetype	2
wf_check_request	3

wf_datasets	4
wf_delete	5
wf_get_key	6
wf_product_info	7
wf_request	8
wf_services	9
wf_set_key	10
wf_transfer	11
wf_user_info	13

Index	14
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wf_archetype	<i>Creates an archetype function</i>
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Description

Creates a universal MARS / CDS formatting function, in ways similar to `wf_modify_request()` but the added advantage that you could code for the use of dynamic changes in the parameters provided to the resulting custom function.

Usage

```
wf_archetype(request, dynamic_fields)
```

Arguments

`request` a MARS or CDS request as an R list object.
`dynamic_fields` character vector of fields that could be changed.

Details

Contrary to a simple replacement as in `wf_modify_request()` the generated functions are considered custom user written. Given the potential for complex formulations and formatting commands NO SUPPORT for the resulting functions can be provided. Only the generation of a valid function will be guaranteed and tested for.

Value

a function that takes ‘dynamic_fields’ as arguments and returns a request as an R list object.

Examples

```
## Not run:
# format an archetype function
ERA1 <- wf_archetype(
  request = list(stream = "oper",
                 levtype = "sfc",
                 param = "165.128/166.128/167.128",
```

```

        dataset = "interim",
        step = "0",
        grid = "0.75/0.75",
        time = "00/06/12/18",
        date = "2014-07-01/to/2014-07-31",
        type = "an",
        class = "ei",
        area = "73.5/-27/33/45",
        format = "netcdf",
        target = "tmp.nc"),
    dynamic_fields = c("date", "time")
)

# print output of the function with below parameters
str(ERA_interim("20100101", 3, 200))

## End(Not run)

```

wf_check_request *check ECMWF / CDS data requests*

Description

Check the validity of a data request, and login credentials.

Usage

```
wf_check_request(user, request)
```

Arguments

user	user (email address) used to sign up for the ECMWF data service, used to retrieve the token set by wf_set_key
request	nested list with query parameters following the layout as specified on the ECMWF API page

Value

a data frame with the determined service and url service endpoint

Author(s)

Koen Hufkens

See Also

[wf_set_key](#) [wf_transfer](#), [wf_request](#)

`wf_datasets`*ECMWF dataset list*

Description

Returns a list of datasets

Usage

```
wf_datasets(user, service = "webapi", simplify = TRUE)
```

Arguments

<code>user</code>	user (email address) used to sign up for the ECMWF data service, used to retrieve the token set by wf_set_key
<code>service</code>	which service to use, one of webapi, cds or ads (default = webapi)
<code>simplify</code>	simplify the output, logical (default = TRUE)

Value

returns a nested list or data frame with the ECMWF datasets

Author(s)

Koen Hufkens

See Also

[wf_set_key](#) [wf_transfer](#) [wf_request](#)

Examples

```
## Not run:  
# set key  
wf_set_key(email = "test@mail.com", key = "123")  
  
# get a list of services  
wf_services("test@mail.com")  
  
# get a list of datasets  
wf_datasets("test@mail.com")  
  
## End(Not run)
```

wf_delete	<i>delete ECMWF request</i>
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Description

Deletes a staged download from the queue

Usage

```
wf_delete(url, user, service = "webapi", verbose = TRUE)
```

Arguments

url	url to query
user	user (email address) used to sign up for the ECMWF data service, used to retrieve the token set by wf_set_key
service	which service to use, one of webapi, cds or ads (default = webapi)
verbose	show feedback on processing

Author(s)

Koen Hufkens

See Also

[wf_set_key](#) [wf_transfer](#) [wf_request](#)

Examples

```
## Not run:  
# set key  
wf_set_key(email = "test@mail.com", key = "123")  
  
# get key  
wf_get_key(email = "test@mail.com")  
  
## End(Not run)
```

wf_get_key	<i>Get secret ECMWF / CDS token</i>
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Description

Returns you token set by [wf_set_key](#)

Usage

```
wf_get_key(user, service = "webapi")
```

Arguments

user	user (email address) used to sign up for the ECMWF data service
service	which service to use, one of webapi, cds or ads (default = webapi)

Value

the key set using [wf_set_key](#) saved in the keychain

Author(s)

Koen Kufkens

See Also

[wf_set_key](#)

Examples

```
## Not run:  
# set key  
wf_set_key(user = "test@mail.com", key = "123")  
  
# get key  
wf_get_key(user = "test@mail.com")  
  
## End(Not run)
```

wf_product_info	<i>Renders product lists for a given dataset and data service</i>
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Description

Shows and returns detailed product information about a specific data set (see [wf_datasets](#)).

Usage

```
wf_product_info(dataset, user, service = "webapi", simplify = TRUE)
```

Arguments

dataset	character, name of the data set for which the product information should be loaded.
user	string, user ID used to sign up for the CDS / ADS data service, used to retrieve the token set by wf_set_key .
service	which service to use, one of webapi, cds or ads (default = webapi)
simplify	boolean, default TRUE. If TRUE the description will be returned as tidy data instead of a nested list.

Value

Downloads a tidy data frame with product descriptions from CDS. If `simplify = FALSE` a list with product details will be returned.

Author(s)

Reto Stauffer, Koen Hufkens

See Also

[wf_datasets](#).

Examples

```
## Not run:  
# Open description in browser  
wf_product_info(NULL, "reanalysis-era5-single-levels")  
  
# Return information  
info <- wf_product_info(NULL,  
  "reanalysis-era5-single-levels", show = FALSE)  
names(info)  
  
## End(Not run)
```

wf_request

*ECMWF data request and download***Description**

Stage a data request, and optionally download the data to disk. Alternatively you can only stage requests, logging the request URLs to submit download queries later on using [wf_transfer](#). Note that the function will do some basic checks on the request input to identify possible problems.

Usage

```

wf_request(
  request,
  user,
  transfer = TRUE,
  path = tempdir(),
  time_out = 3600,
  job_name,
  verbose = TRUE
)

wf_request_batch(
  request_list,
  workers = 2,
  user,
  path = tempdir(),
  time_out = 3600,
  total_timeout = length(request_list) * time_out/workers
)

```

Arguments

request	nested list with query parameters following the layout as specified on the ECMWF APIs page
user	user (email address) used to sign up for the ECMWF data service, used to retrieve the token set by wf_set_key
transfer	logical, download data TRUE or FALSE (default = TRUE)
path	path were to store the downloaded data
time_out	how long to wait on a download to start (default = 3*3600 seconds).
job_name	optional name to use as an RStudio job and as output variable name. It has to be a syntactically valid name.
verbose	show feedback on processing
request_list	a list of requests that will be processed in parallel.
workers	maximum number of simultaneous request that will be submitted to the service. Most ECMWF services are limited to 20 concurrent requests (default = 2).
total_timeout	overall timeout limit for all the requests in seconds.

Value

the path of the downloaded (requested file) or the an R6 object with download/transfer information

Author(s)

Koen Hufkens

See Also

[wf_set_key](#) [wf_transfer](#)

Examples

```
## Not run:
# set key
wf_set_key(user = "test@mail.com", key = "123")

request <- list(stream = "oper",
  levtype = "sfc",
  param = "167.128",
  dataset = "interim",
  step = "0",
  grid = "0.75/0.75",
  time = "00",
  date = "2014-07-01/to/2014-07-02",
  type = "an",
  class = "ei",
  area = "50/10/51/11",
  format = "netcdf",
  target = "tmp.nc")

# demo query
wf_request(request = request, user = "test@mail.com")

# Run as an RStudio Job. When finished, will create a
# variable named "test" in your environment with the path to
# the downloaded file.
wf_request(request = request, user = "test@mail.com", job_name = "test")

## End(Not run)
```

wf_services

ECMWF services list

Description

Returns a list of services

Usage

```
wf_services(user, simplify = TRUE)
```

Arguments

user	user (email address) used to sign up for the ECMWF data service, used to retrieve the token set by wf_set_key
simplify	simplify the output, logical (default = TRUE)

Value

returns a nested list or data frame with the ECMWF services

See Also

[wf_set_key](#) [wf_transfer](#) [wf_request](#)

Examples

```
## Not run:
# set key
wf_set_key(user = "test@mail.com", key = "123")

# get a list of services
wf_services("test@mail.com")

# get a list of datasets
wf_services("test@mail.com")

## End(Not run)
```

wf_set_key

Set secret ECMWF token

Description

Saves the token to your local keychain under a service called "ecmwfr".

Usage

```
wf_set_key(user, key, service)
```

Arguments

user	user (email address) used to sign up for the ECMWF data service
key	token provided by ECMWF
service	which service to use, one of webapi, cds or ads

Details

In systems without keychain management set the option `keyring_backend` to 'file' (i.e. `options(keyring_backend = "file")`) in order to write the keychain entry to an encrypted file. This mostly pertains to headless Linux systems. The keychain files can be found in `~/config/r-keyring`.

Value

It invisibly returns the user.

Author(s)

Koen Hufkens

See Also

[wf_get_key](#)

Examples

```
## Not run:  
# set key  
wf_set_key(user = "test@mail.com", key = "123")  
  
# get key  
wf_get_key(user = "test@mail.com")  
  
# leave user and key empty to open a browser window to the service's website  
# and type the key interactively  
wf_get_key()  
  
## End(Not run)
```

wf_transfer

ECMWF data transfer function

Description

Returns the contents of the requested url as a NetCDF file downloaded to disk or the current status of the requested transfer.

Usage

```
wf_transfer(  
  url,  
  user,  
  service = "webapi",
```

```

    path = tempdir(),
    filename = tempfile("ecmwfr_", tmpdir = ""),
    verbose = TRUE
  )

```

Arguments

url	R6 wf_request) query output
user	user (email address) used to sign up for the ECMWF data service, used to retrieve the token set by wf_set_key .
service	which service to use, one of webapi, cds or ads (default = webapi)
path	path were to store the downloaded data
filename	filename to use for the downloaded data
verbose	show feedback on data transfers

Value

a netCDF of data on disk as specified by a [wf_request](#)

Author(s)

Koen Hufkens

See Also

[wf_set_key](#) [wf_request](#)

Examples

```

## Not run:
# set key
wf_set_key(user = "test@email.com", key = "123")

# request data and grab url and try a transfer
r <- wf_request(request, "test@email.com", transfer = FALSE)

# check transfer, will download if available
wf_transfer(r$get_url(), "test@email.com")

## End(Not run)

```

wf_user_info	<i>ECMWF WebAPI user info query</i>
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Description

Returns user info for the ECMWF WebAPI

Usage

```
wf_user_info(user)
```

Arguments

user	user (email address) used to sign up for the ECMWF data service, used to retrieve the token set by wf_set_key
------	---

Value

returns a data frame with user info

See Also

[wf_set_key](#) [wf_services](#) [wf_datasets](#)

Examples

```
## Not run:  
# set key  
wf_set_key(user = "test@mail.com", key = "123")  
  
# get user info  
wf_user_info("test@mail.com")  
  
## End(Not run)
```

Index

`wf_archetype`, [2](#)
`wf_check_request`, [3](#)
`wf_datasets`, [4](#), [7](#), [13](#)
`wf_delete`, [5](#)
`wf_get_key`, [6](#), [11](#)
`wf_product_info`, [7](#)
`wf_request`, [3–5](#), [8](#), [10](#), [12](#)
`wf_request_batch` (`wf_request`), [8](#)
`wf_services`, [9](#), [13](#)
`wf_set_key`, [3–10](#), [10](#), [12](#), [13](#)
`wf_transfer`, [3–5](#), [8–10](#), [11](#)
`wf_user_info`, [13](#)