Exercises: Using the EUMDAC (EUMETSAT Data Access Client) from command-line

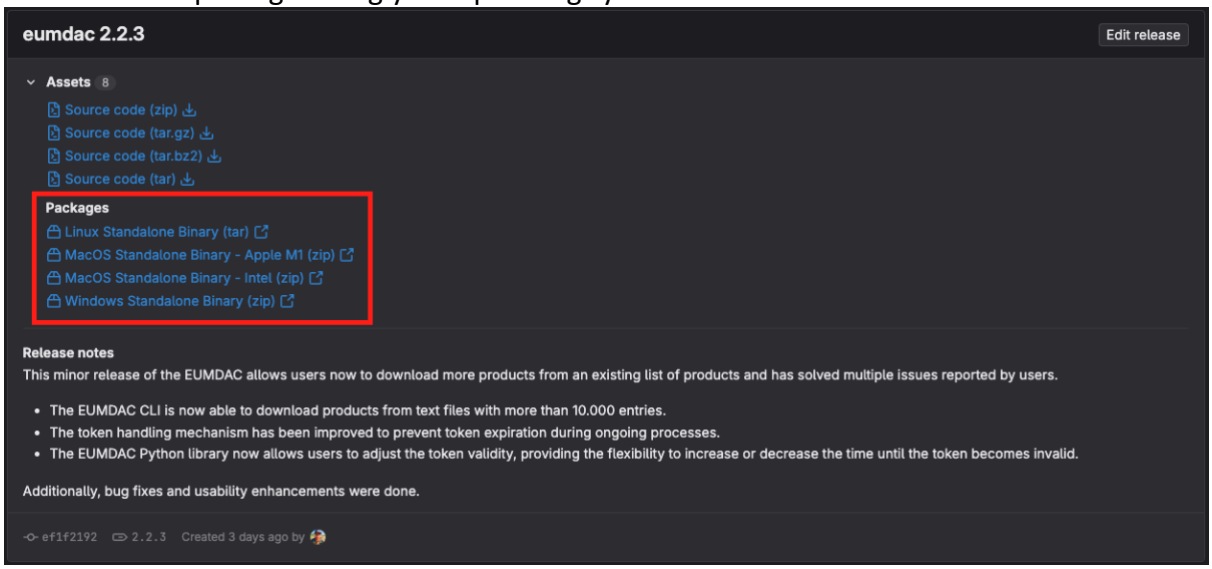
EUMDAC is the EUMETSAT Data Access Client. It provides access to EUMETSAT data which has various satellite missions. As a Python library, it comes with many methods and functions to use EUMETSAT APIs (Application Programming Interfaces), like Data Store and the Data Tailor. It also provides a variety of useful command-line utilities for data search, download, and customizing.

In our exercises we will be focusing on EUMDAC usage on command-line interface (CLI) on both MacOS and Windows OS.
EXTRA: EUMDAC User Guide: https://user.eumetsat.int/resources/user-guides/eumetsat-data-access-client-eumdac-guide

Exercise 1: Get EUMDAC running (approx. 12 min)

In our exercises, we will be using standalone binaries. This solution is regarded as a simple but effective one.

1. Get the latest version of the EUMDAC binary under the following link: https://gitlab.eumetsat.int/eumetlab/data-services/eumdac/-/releases/2.2.3
   Download the package fitting your operating system and run it for the first time.



2. After downloading and uncompressing it you will see a file named “eumdac”.
3. Open a terminal page, go to your downloaded binary location, and run the binary for the first time.

Windows:

```
$ eumdac.exe
```

```
(base) C:\Users\Altintas\Downloads\eumdac-win>eumdac.exe
usage: eumdac.exe [-h] [-v] [--version] [-y] [--debug] {set-credentials,token,describe,search,download,tailor,local-tailor,order} ...

EUMETSAT Data Access Client

positional arguments:
  {set-credentials,token,describe,search,download,tailor,local-tailor,order}
    set-credentials     permanently set consumer key and secret, see https://api.eumetsat.int/api-key
    token               generate an access token
    describe            describe a collection or product
    search              search for products
    download            download products, with optional customisation
    tailor              manage Data Tailor resources
    local-tailor        manage local Data Tailor instances
    order               manage orders

optional arguments:
  -h, --help            show this help message and exit
  -v, --verbose         increase output verbosity (can be provided multiple times)
  --version             show program's version number and exit
  -y, --yes             set any confirmation value to 'yes' automatically
  --debug               show additional debugging info and traces for errors
```

MacOS & Linux:

```
$ ./eumdac
```

```
~/D/arm64 $ ./eumdac
usage: eumdac [-h] [-v] [--version] [-y] [--debug]
              {set-credentials,token,describe,search,download,tailor,local-tailor,order} ...

EUMETSAT Data Access Client

positional arguments:
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  -h, --help            show this help message and exit
  -v, --verbose         increase output verbosity (can be provided multiple times)
  --version             show program's version number and exit
  -y, --yes             set any confirmation value to 'yes' automatically
  --debug               show additional debugging info and traces for errors
~/D/arm64 $
```

EXTRA: We have many other ways to start with EUMDAC (installing with pip, conda, from source etc.). You can look at this link: https://user.eumetsat.int/resources/user-guides/eumetsat-data-access-client-eumdac-guide#ID-Get-EUMDAC

Exercise 2: Set your credentials with EUMDAC to interact with EUMETSAT APIs (approx. 10 min)

1. Find your CONSUMER-KEY and CONSUMER-SECRET from https://api.eumetsat.int/api-key/ . You will need an EOPortal account for this. If you do not have an account in Earth Observation Portal at EUMETSAT, please create one in https://eoportal.eumetsat.int/.
2. Prepare an EUMDAC command with your own CONSUMER credentials:

Windows:

```
eumdac.exe set-credentials CONSUMER-KEY CONSUMER-SECRET
```

MacOS & Linux:

```
./eumdac set-credentials CONSUMER-KEY CONSUMER-SECRET
```

EXTRA: Try adding "-vv" flag at the end of the eumdac set-credentials command and see what API (Application Programming Interfaces) calls EUMDAC is querying in the background. This applies to all EUMDAC commands! Meaning you can always use "-vv" flag with any API call EUMDAC commands.

Windows:

```
eumdac.exe set-credentials CONSUMER-KEY CONSUMER-SECRET -vv
```

MacOS & Linux:

```
./eumdac set-credentials CONSUMER-KEY CONSUMER-SECRET -vv
```

Exercise 3: Check what collections the Data Store has (approx. 10 min)

1. Use describe command to see all the available collections in the Data Store.

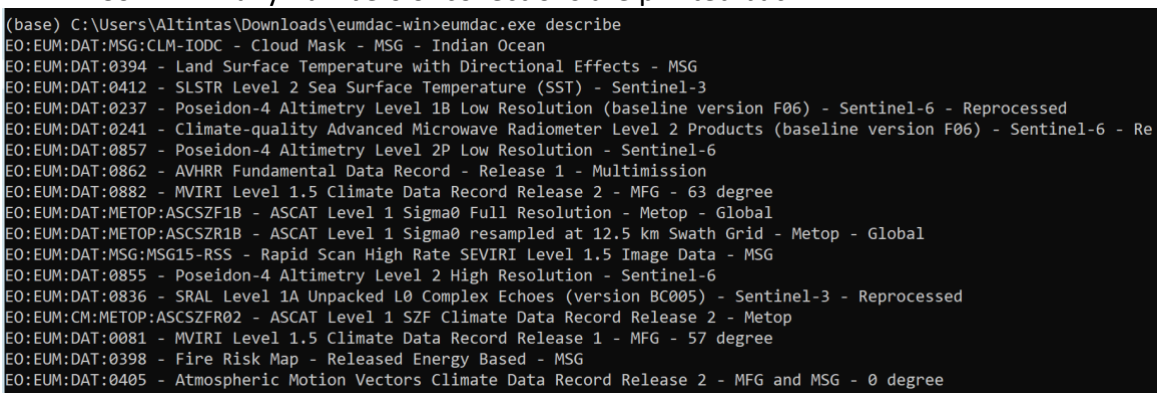
   Windows:

   ```
   eumdac.exe describe
   ```

   MacOS & Linux:

   ```
   ./eumdac describe
   ```

   Confirm many numbers of collections are printed back.



2. Now you can copy any of the collection ID's and get more information. "-c" used in the command is "collection". You can also use "--collection" in place of it.

   Windows:

   eumdac.exe describe -c EO:EUM:DAT:0412

   MacOS & Linux:

   ./eumdac describe -c EO:EUM:DAT:0412

```
(base) C:\Users\Altintas\Downloads\eumdac-win>eumdac.exe describe -c EO:EUM:DAT:0412
EO:EUM:DAT:0412 - SLSTR Level 2 Sea Surface Temperature (SST) - Sentinel-3
Date: 2017-07-05 - now
SLSTR SST has a spatial resolution of 1km at nadir. Skin Sea Surface Temperature following the GHRSST L2P GDS2 format spe
able at pick-up point in less than 3h - All Sentinel-3 Non Time Critical (NTC) products are available at pick-up point in
the umbrella of the EU Copernicus programme.
Licence: Copernicus
Search options:
bbox            - Inventory which has a spatial extent overlapping this bounding box, in CLI --bbox
geo             - Inventory which has a spatial extent overlapping this Well Known Text geometry, in CLI --geometry
title           - Can be used to define a wildcard search on the product title (product identifier), use set notation as
sat             - Mission / Satellite, accepts: ['Sentinel-3A', 'Sentinel-3B'], in CLI --satellite
type            - Product Type, accepts: ['SL_2_WST___'], in CLI --product-type, --acronym
dtstart         - Temporal Start, in CLI -s, --start
dtend           - Temporal End, in CLI -e, --end
publication     - publication date, in CLI --publication-after, --publication-before
zone            - Equi7grid main continental zone, accepts: ['NA', 'AN', 'OC', 'AS', 'SA', 'EU', 'AF']
t6              - Equi7grid 600km tile
timeliness      - Timeliness, accepts: ['NT', 'NR'], in CLI --timeliness
orbit           - Orbit Number, must be a positive integer, in CLI --orbit
relorbit        - Relative Orbit Number, must be a positive integer, in CLI --relorbit
orbitdir        - Orbit Direction, accepts: ['DESCENDING', 'ASCENDING']
cycle           - Cycle Number, must be a positive integer, in CLI --cycle
sort            - SRU sort keys, see OpenSearch Extension for EO for details, accepts: ['publicationDate', 'start,time']
set             - element set to return for each hit, default is full, accepts: ['full', 'brief']
```

EXTRA: You can also get information from the products themselves by passing the "-p" flag and inserting the name of the product.

Windows:

```
eumdac.exe describe -c EO:EUM:DAT:0412 -p
S3A_SL_2_WST____20240709T075743_20240709T080043_20240709T084709_01
79_114_235_0540_MAR_O_NR_003.SEN3
```

MacOS & Linux:

```
./eumdac describe -c EO:EUM:DAT:0412 -p
S3A_SL_2_WST____20240709T075743_20240709T080043_20240709T084709_01
79_114_235_0540_MAR_O_NR_003.SEN3
```

Exercise 4: Search for products in collections using Data Sore (approx. 8 min)

1. Search for a collection with eumdac search. "--limit 5" is used for limiting the number of results of the command.

   Windows:

   ```
   eumdac.exe search -c EO:EUM:DAT:MSG:HRSEVIRI --limit 5
   ```

   MacOS & Linux:

   ```
   ./eumdac search -c EO:EUM:DAT:MSG:HRSEVIRI --limit 5
   ```

2. Confirm that the latest 5 HRSEVIRI products available are returned.

```
(base) C:\Users\Altintas\Downloads\eumdac-win>eumdac.exe search -c EO:EUM:DAT:MSG:HRSEVIRI --limit 5
MSG3-SEVI-MSG15-0100-NA-20240709094242.237000000Z-NA
MSG3-SEVI-MSG15-0100-NA-20240709092742.280000000Z-NA
MSG3-SEVI-MSG15-0100-NA-20240709091242.324000000Z-NA
MSG3-SEVI-MSG15-0100-NA-20240709085742.367000000Z-NA
MSG3-SEVI-MSG15-0100-NA-20240709084242.410000000Z-NA
```

EXTRA: You can use many other filtering options for further searching. "--satellite" is clarifying which satellite you will be using.

Windows:

```
eumdac.exe search -c EO:EUM:DAT:MSG:HRSEVIRI --start 2024-06-
14T19:30 --end 2024-06-14T22:30 --satellite MSG3 --limit 4
```

MacOS & Linux:

```
./eumdac search -c EO:EUM:DAT:MSG:HRSEVIRI --start 2024-06-14T19:30 --end 2024-06-14T22:30 --satellite MSG3 --limit 4
```

Exercise 4: Download products in collections using Data Store (approx. 8 min)

1. With eumdac you can easily download products. After searching for your products, you can simply replace "search" with "download".

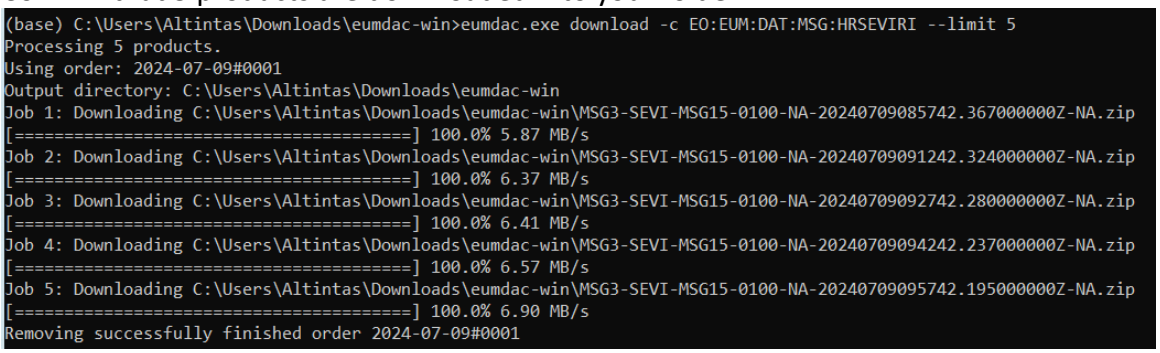
Windows:

```
eumdac.exe download -c EO:EUM:DAT:MSG:HRSEVIRI --limit 5
```

MacOS & Linux:

```
./eumdac download -c EO:EUM:DAT:MSG:HRSEVIRI --limit 5
```

2. Confirm that 5 products are downloaded into your folder.



EXTRA: You can download individual files in a product with just an additional flag "--entry".

Windows:

```
eumdac.exe download -c EO:EUM:DAT:MSG:HRSEVIRI --start 2024-06-14T19:30 --end 2024-06-14T22:30 --limit 2 --entry "manifest.xml"
```

MacOS & Linux:

```
./eumdac download -c EO:EUM:DAT:MSG:HRSEVIRI --start 2024-06-14T19:30 --end 2024-06-14T22:30 --limit 2 --entry "manifest.xml"
```

Exercise 5: Tailor products in collections using the Data Tailor Web Services (DTWS) (approx. 15 min)

1. You can use EUMDAC to interact with the DTWS (Data Tailor Web Services) to customize products before downloading them. After finding your products, just add "--tailor" flag in your eumdac command with a chain configuration. Eg

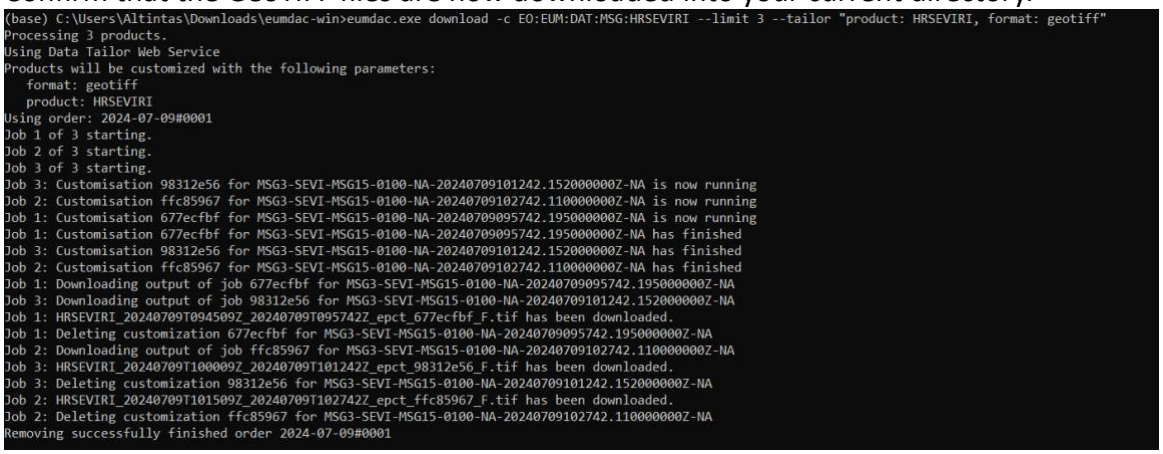
Windows:

```
eumdac.exe download -c EO:EUM:DAT:MSG:HRSEVIRI --limit 3 --tailor "product: HRSEVIRI, format: geotiff"
```

MacOS & Linux:

```
./eumdac download -c EO:EUM:DAT:MSG:HRSEVIRI --limit 3 --tailor "product: HRSEVIRI, format: geotiff"
```

2. Confirm that the GeoTIFF files are now downloaded into your current directory.



EXTRA: You can further populate the chain configuration. For example, you can add filter, projection, and ROI (Region of Interest), also change the format into an image format. You can also put "--entry" flag to download only "*.png" files and no metadata files.

Windows:

```
eumdac.exe download -c EO:EUM:DAT:MSG:HRSEVIRI --limit 3 --tailor
"product: HRSEVIRI, format: png_rgb, filter:
hrseviri_natural_color, roi: western_europe, projection:
geographic" --entry "*.png"
```

MacOS & Linux:

```
./eumdac download -c EO:EUM:DAT:MSG:HRSEVIRI --limit 3 --tailor
"product: HRSEVIRI, format: png_rgb, filter:
hrseviri_natural_color, roi: western_europe, projection:
geographic" --entry "*.png"
```

Tasks: Using the EUMDAC (EUMETSAT Data Access Client) from command-line

Feel free to check the above exercises or our documentation pages if you are stuck in one of the tasks.

Data Store Guide: https://user.eumetsat.int/resources/user-guides/data-store-detailed-guide

EUMETSAT Data Access Client (EUMDAC) guide: https://user.eumetsat.int/resources/user-guides/eumetsat-data-access-client-eumdac-guide

Data Tailor Standalone Guide: https://user.eumetsat.int/resources/user-guides/data-tailor-standalone-guide

DTWS Section in Data Store Guide: https://user.eumetsat.int/resources/user-guides/data-store-detailed-guide#ID-Customising-products-with-the-Data-Tailor

Task 1: Use "eumdac describe" to describe an MSG High Rate SEVIRI (HRSEVIRI) collection. Look at its available dates, its description, and its search options. (approx. 10 min)

Task 2: Use "eumdac describe" to describe a product of MSG HRSEVIRI collection. Look at its platform, instrument, sensing start-end times and SIP (Submission Information Package) entries (files that are inside the product). (Tip: Use eumdac search-c COLLETION-ID--limit 3 to find a product ID) (approx. 10 min)

Task 3: Use "eumdac search" with a time filter (--start DATETIME –end DATETIME) and search for products from a METOP collection. The dates should be 2023-11-25T19:30 and 2023-11-26T19:30. Note the number of products returned. (approx. 10 min)

Task 4: Use "eumdac search" with a time and satellite filter (--satellite) on a Sentinel-3 collection. The dates should be 2023-11-25T19:30 and 2023-11-26T19:30 and satellite should be set as Sentinel-3B (approx. 10 min)

Task 5: Use "eumdac download" to download latest 5 products in an MSG collection (EO:EUM:DAT:MSG:HRSEVIRI- High Rate SEVIRI Level 1.5 Image Data- MSG- 0 degree). (Tip: Remember to use --limit) (approx. 10 min)

Task 6: Use "eumdac download" to download a file named "enhanced_measurement.nc" inside the products from a Sentinel-3 collection (EO:EUM:DAT:0415- SRAL Level 2 Altimetry Global- Sentinel-3). Products should be filtered with a sensing time of 2023-11-25T19:30 and 2023-11-26T19:30. (Tio: Remember to use--entry) (approx. 10 min)

Task 7: Use DTWS to customize six MSG HRSEVIRI products into GeoTIFF format with geographic projection. (See Data Store Detailed Guide for variables inside the chain configuration, under Customising products with the Data Tailor section) (approx. 10 min)

Task 8: Use DTWS to customize three METOP products into NetCDF4 format with layer filtering and ROI as West Africa. (See Data Store Detailed Guide for variables inside the chain configuration, under Customising products with the Data Tailor section) (approx. 10 min)

Task 9: Use DTWS to customize one Sentinel-3 product into a jpeg image file with geographic projection. (See Data Store Detailed Guide for variables inside the chain configuration, under Customising products with the Data Tailor section) (approx. 10 min)

Task 10: Use DTWS to customize single AVHRRL1 product from 2022 into a RGB Jpeg image file with geographic projection and set filter as Natural Color. (approx. 10 min) (See Data Store Detailed Guide for variables inside the chain configuration, under Customising products with the Data Tailor section)