

# Long Term Archive Howto

This is a short manual on how to search for and retrieve data from the LOFAR Long Term Archive.

To access the LTA, go to: [lta.lofar.eu](https://lta.lofar.eu)

For background information and in case of problems, please refer to the [Frequently Asked Questions](#) page.

## Release Notes

| Release   | Description  |
|-----------|--|
| July 2018 | <p>1) All data is now searchable, not only released data or data of projects you're a member of. Note that for downloading data (staging) the proprietary restrictions still apply.</p> <p>2) All projects can now be selected by all users, not only by project members. This provides the means to filter data based on project.</p> <p>3) Cone search algorithm implemented based on the Haversine formula for angular distance calculation. The calculated angular distance to the reference coordinates is now displayed in the search results.</p> <p>4) Search keys: added "time resolution", "Frequency resolution" and "nr. of subbands per subband group", removed "sky model database" and strategy name"</p> |

## User Access

### I forgot my password

Please visit <https://webportal.astron.nl/pwm/public/ForgottenPassword> to request a new one.

### Searching / retrieving data

The LTA catalogue can be searched directly without needing any account. Access to all projects and search queries will return results of the entire catalogue because metadata are public for all LTA content.

Staging and subsequent downloading of **public** data always requires an account with LTA user access privileges. This automatically happens if you were a member of the original project proposal in Northstar/MoM. If you do not have an account yet, you can register with "[Create account](#)". LTA access privileges will need to be granted by Science Data Centre Operations (SDCO). Please, once you have created your account, submit a support request to the [ASTRON helpdesk](#) asking for LTA privileges stating clearly your username.

To stage and retrieve project-related data in the LTA which are **proprietary** you need to have an account in [MoM](#) that is enabled for the archive and coupled with the projects of interest. To this aim you can request SDCO to be added to the list of co-authors of the project. When you send such a

request, you must add the project's PI in cc. After SDCO adds you to the project, you might get an email asking you to set a new password in [ASTRON Web Applications Password Self Service](#). Please note that this will set a new password not just for the LTA *but for MoM (LOFAR/WSRT) and Northstar as well*.

Please read the [LOFAR Data Policy](#) for more information about *proprietary vs public* data.

## Step-by-step guide to search and retrieve data

### Basic search:

- log in to <https://lta.lofar.eu/>
- click SEARCH DATA in the top menu
- specify the data product types of interest and a target name or coordinated
- click on “Search” button at the bottom
- from the screen that follows, you should be able to stage the data products

### Advanced search:

- log in to <https://lta.lofar.eu/>
- click SEARCH DATA in the top menu
- click on the side Advanced Search drop-down list
- specify the data product types of interest from the drop down list
- select products features and specify a target name or coordinated
- click on “Search” button at the bottom
- from the screen that follows, you should be able to stage the data products

### Project search (to restrict all data searches to that project only):

- log in to <https://lta.lofar.eu/>
- click BROWSE PROJECTS in the top menu
- at this level membership can be checked, with the first column showing if you are a member of the project or for finding public projects. Available options are:
  - click on the project name to view the project details
  - use the 'search' button to select the project and go to the search page
  - use the 'show data' button to select the project and to show all data in it
- from the screen that follows, you should be able to either search / select / stage the data products

## How to find data in the archive

Once your account is set up, or as anonymous user you can navigate the catalogue. In the former case you can login by clicking on the top right LOGIN button shown below.

### Page navigation

The LTA menu, as shown below, gives access to the main functionality.



A search in the LTA catalogue can be initiated by clicking on the SEARCH DATA button on the menu. At this point a default basic search is setup, where users can select the data product type of interest and perform a cone search. An advanced search mode, with more advanced parameters per data type, can also be selected by clicking on the drop menu on the left side.

A “project” can be selected by clicking on the BROWSE PROJECTS button on the menu. This is particularly useful for project related searches, as well as for checking either public projects or user's co-author membership. At this stage several actions are allowed

- Click on the project name to view the project details and eventually select it.
- Use the 'search' button to select the project and go to the search page. Subsequent searches will then be done within that project.
- Use the 'show data' button to select the project and to show all data in it.

## Finding Data

HOME

SEARCH DATA

BROWSE PROJECTS

HELP

Observation (total 16) ▾

edit columns

stage selected

show dataproducts

show pipelines

| #  | <input type="checkbox"/> | Distance [degrees] | Project | Release Date | SAS Id | Antenna Set    | Instrument Filter | Channel Width [MHz] | Number Of SubArray Pointings | Nr Stations Core | Nr Stations Remote | Nr Stations International | Number Of Stations | Number Of Correlated DataProducts | Number Of BeamFormed DataProducts |
|----|--------------------------|--------------------|---------|--------------|--------|----------------|-------------------|---------------------|------------------------------|------------------|--------------------|---------------------------|--------------------|-----------------------------------|-----------------------------------|
| 1  | <input type="checkbox"/> | 0.0000             | LC9_017 |              | 639269 | LBA Outer      | 30-90 MHz         | 0.000000            | 29                           | 24               | 14                 | 0                         | 38                 | 464                               | 0                                 |
| 2  | <input type="checkbox"/> | 0.0000             | LC9_017 |              | 645811 | LBA Outer      | 30-90 MHz         | 0.000000            | 30                           | 24               | 14                 | 12                        | 50                 | 480                               | 0                                 |
| 3  | <input type="checkbox"/> | 0.0000             | LC9_017 |              | 639453 | LBA Outer      | 30-90 MHz         | 0.000000            | 30                           | 24               | 14                 | 0                         | 38                 | 480                               | 0                                 |
| 4  | <input type="checkbox"/> | 0.0000             | LC9_017 |              | 639391 | LBA Outer      | 30-90 MHz         | 0.000000            | 30                           | 24               | 14                 | 0                         | 38                 | 480                               | 0                                 |
| 5  | <input type="checkbox"/> | 0.0000             | LC9_017 |              | 639515 | LBA Outer      | 30-90 MHz         | 0.000000            | 30                           | 24               | 14                 | 0                         | 38                 | 480                               | 0                                 |
| 6  | <input type="checkbox"/> | 0.0001             | LC6_006 | 2017-11-15   | 546815 | HBA Dual Inner | 110-190 MHz       | 0.000000            | 31                           | 24               | 14                 | 11                        | 49                 | 480 / 481                         | 0                                 |
| 7  | <input type="checkbox"/> | 0.0001             | LC6_006 | 2017-11-15   | 547351 | HBA Dual Inner | 110-190 MHz       | 0.000000            | 2                            | 24               | 14                 | 12                        | 50                 | 480                               | 0                                 |
| 8  | <input type="checkbox"/> | 0.0001             | LC6_006 | 2017-11-15   | 547369 | HBA Dual Inner | 110-190 MHz       | 0.000000            | 2                            | 24               | 14                 | 12                        | 50                 | 480                               | 0                                 |
| 9  | <input type="checkbox"/> | 0.0001             | LC6_006 | 2017-11-15   | 547333 | HBA Dual Inner | 110-190 MHz       | 0.000000            | 2                            | 24               | 14                 | 12                        | 50                 | 480                               | 0                                 |
| 10 | <input type="checkbox"/> | 0.0001             | LC6_006 | 2017-11-15   | 547405 | HBA Dual Inner | 110-190 MHz       | 0.000000            | 2                            | 24               | 14                 | 12                        | 50                 | 480                               | 0                                 |
| 11 | <input type="checkbox"/> | 0.0001             | LC6_006 | 2017-11-15   | 547315 | HBA Dual Inner | 110-190 MHz       | 0.000000            | 2                            | 24               | 14                 | 12                        | 50                 | 480                               | 0                                 |
| 12 | <input type="checkbox"/> | 0.0001             | LC6_006 | 2017-11-15   | 547387 | HBA Dual Inner | 110-190 MHz       | 0.000000            | 2                            | 24               | 14                 | 12                        | 50                 | 480                               | 0                                 |
| 13 | <input type="checkbox"/> | 0.4613             | LT5_004 | 2018-11-10   | 600873 | HBA Dual       | 110-190 MHz       | 0.000000            | 3                            | 6                | 0                  | 0                         | 6                  | 0                                 | 222                               |
| 14 | <input type="checkbox"/> | 0.6416             | LC3_007 | 2016-05-15   | 452730 | HBA Dual Inner | 110-190 MHz       | 0.000000            | 30                           | 24               | 14                 | 8                         | 46                 | 1440                              | 0                                 |

Depending on the search parameters, e.g., which data products were requested (observation, pipeline), lists of observations and/or pipelines will be returned (see observations example above). From this point there are several options:

1. select observations/pipelines and stage (prepare for download) all data related to the selection
2. select observations and “show pipelines” related to the observations, then select pipelines and stage
3. select observations/pipelines, “show dataproducts” related to the selection, possibly filter the data products (to have smaller selections) and then select and stage the data products

Note that observations often have no raw data in the archive, but the metadata is visible because subsequent pipelines have processed the raw data further. To get to the pipelines related to observations, use “Show Pipelines”.

To see whether observations or pipelines have data products in the LTA, look for the “Number of Correlated/BeamFormed DataProducts” column. These columns, as also a few others, can also be used to navigate to the relevant dataproducts.

Once you have a list of dataproducts on your screen, the “Release Date” will tell you when the data are available for public download. If data is public, or you are a member of the project you are looking in, the “checkbox” column will be selectable and staging can proceed. You can also hover with your mouse over the checkbox and get more information, like the size, location and checksums.

There is a separate page with [more detailed information](#) and advanced tricks to help you find and download your data. You will find examples of how to **browse the archive with your own python script**.

## Unspecified Data/Process

Some data has had problems somewhere in the automation and control part of the LOFAR software during observation or processing. Sometimes a few subbands might be affected, sometimes an entire observation. Science Data Centre Operations will check the data, (re)run things manually or fix things if needed and then archive the data. This does mean that the automation and control sometimes loses track of the files and the archiving process has no information beyond the Observation ID and filename itself. In such cases a few subbands or an entire observation might end up under “Unspecified Process”. We do attempt to fix things at a later date, but that is not always feasible. If the files were archived, the data itself is usable. What is missing is the information that the LTA needs to properly label and query the data.

If an Observation is missing, or is missing subbands, please check if it ended up under Unspecified.

## Staging data (Prepare for download)

Once you have a list of dataproducts, observations or pipelines, you can use the check boxes to select which files you want to download. The first check box can be used to select or deselect all files or observations on a page.

| Interferometric Data (total 488) * |   |              |                        |             |                           |                       |                         |                    |                      |                          |                     |              |                              |         |                 |          |              |
|------------------------------------|---|--------------|------------------------|-------------|---------------------------|-----------------------|-------------------------|--------------------|----------------------|--------------------------|---------------------|--------------|------------------------------|---------|-----------------|----------|--------------|
|                                    |   |              | edit columns           |             | stage selected            |                       | filter dataproducts     |                    |                      |                          |                     |              |                              |         |                 |          |              |
| #                                  | Project                                     | Release Date | DataProduct Identifier | Target Name | Right Ascension [degrees] | Declination [degrees] | Central Frequency [MHz] | Channel Width [Hz] | Channels Per Subband | Integration Interval [s] | Start Time          | Duration [s] | SubArray Pointing Identifier | Subband | Station Subband | Stations | Observations |
| 1                                  | <input type="checkbox"/> LC0_043            | 2015-05-02   | 9081684                | M33         | 23.4620                   | 30.6602               | 116.0156                | 3051.757812        | 64                   | 2.01327                  | 2013-10-26 18:00:00 | 35999.0      | 314913                       | 0       | 82              | show     | 1            |
| 2                                  | <input type="checkbox"/> LC0_043            | 2015-05-02   | 9081928                | 3C48        | 24.4221                   | 33.1598               | 116.0156                | 3051.757812        | 64                   | 2.01327                  | 2013-10-26 18:00:00 | 35999.0      | 314914                       | 244     | 82              | show     | 1            |
| 3                                  | <input checked="" type="checkbox"/> LC0_043 | 2015-05-02   | 9081685                | M33         | 23.4620                   | 30.6602               | 116.2109                | 3051.757812        | 64                   | 2.01327                  | 2013-10-26 18:00:00 | 35999.0      | 314913                       | 1       | 83              | show     | 1            |
| 4                                  | <input checked="" type="checkbox"/> LC0_043 | 2015-05-02   | 9081929                | 3C48        | 24.4221                   | 33.1598               | 116.2109                | 3051.757812        | 64                   | 2.01327                  | 2013-10-26 18:00:00 | 35999.0      | 314914                       | 245     | 83              | show     | 1            |
| 5                                  | <input checked="" type="checkbox"/> LC0_043 | 2015-05-02   | 9081686                | M33         | 23.4620                   | 30.6602               | 116.4062                | 3051.757812        | 64                   | 2.01327                  | 2013-10-26 18:00:00 | 35999.0      | 314913                       | 2       | 84              | show     | 1            |
| 6                                  | <input checked="" type="checkbox"/> LC0_043 | 2015-05-02   | 9081930                | 3C48        | 24.4221                   | 33.1598               | 116.4062                | 3051.757812        | 64                   | 2.01327                  | 2013-10-26 18:00:00 | 35999.0      | 314914                       | 246     | 84              | show     | 1            |
| 7                                  | <input checked="" type="checkbox"/> LC0_043 | 2015-05-02   | 9081687                | M33         | 23.4620                   | 30.6602               | 116.6016                | 3051.757812        | 64                   | 2.01327                  | 2013-10-26 18:00:00 | 35999.0      | 314913                       | 3       | 85              | show     | 1            |
| 8                                  | <input type="checkbox"/> LC0_043            | 2015-05-02   | 9081931                | 3C48        | 24.4221                   | 33.1598               | 116.6016                | 3051.757812        | 64                   | 2.01327                  | 2013-10-26 18:00:00 | 35999.0      | 314914                       | 247     | 85              | show     | 1            |
| 9                                  | <input type="checkbox"/> LC0_043            | 2015-05-02   | 9081688                | M33         | 23.4620                   | 30.6602               | 116.7969                | 3051.757812        | 64                   | 2.01327                  | 2013-10-26 18:00:00 | 35999.0      | 314913                       | 4       | 86              | show     | 1            |
| 10                                 | <input type="checkbox"/> LC0_043            | 2015-05-02   | 9081932                | 3C48        | 24.4221                   | 33.1598               | 116.7969                | 3051.757812        | 64                   | 2.01327                  | 2013-10-26 18:00:00 | 35999.0      | 314914                       | 248     | 86              | show     | 1            |

The LOFAR Archive stores data on magnetic tape. This means that it cannot be downloaded right away, but has to be copied from tape to disk first. This process is called 'staging'.

When you have made your selection of files, click on *stage*. This shows you the following message. It means that a request has been sent to the LTA staging service to start retrieving the requested files from the tape and make them available on disk. You will get a confirmation e-mail, to acknowledge that your staging request was received and the process was queued. When the files are staged, you will get a notification email informing you that your data are ready for retrieval.

Staging Service

The following 1 file(s) will be requested for download, with a total size of 6.4 GB.

Cancel

Submit

| Size   | MD5 checksum                   | Filename                              |
|--------|--------------------------------|---------------------------------------|
| 6.4 GB | 19f325d171c99e23930a961b196875 | L182807_SB243_uv.dppp.MS_01124373.tar |
| 6.4 GB | Total filesize                 |                                       |

The e-mail that you get when the staging on disk is complete gives you a list of files and has several attachments. Amongst them are two files `html.txt` and `srm.txt`:

Your data retrieval request with id 25 has been staged and is ready for retrieval.

List of files:  
srm://lofar-srm.fz-juelich.de:8443/pnfs/fz-juelich.de/data/lofar/ops/projects/commissionin\_04d3730c.tar

The attached files can be used to retrieve the staged files.  
For more information visit [http://www.lofar.org/wiki/doku.php?id=public:lta\\_howto](http://www.lofar.org/wiki/doku.php?id=public:lta_howto)

This mail has been automatically generated by the ASTRON/LOFAR LTA staging service.  
Do not reply to this message. If you have any questions or remarks, please contact [sciencesupport@astron.nl](mailto:sciencesupport@astron.nl) and provide the id of the request in your message.

| Name     | Size      | Type               |
|----------|-----------|--------------------|
| Message  | 4KB       | Message Attachment |
| html.txt | 214 Bytes | File Attachment    |
| srm.txt  | 189 Bytes | File Attachment    |

There are two different ways to download your files with these attachments: [http](#) and [srm](#)

We also attach plain lists of the files/SURLs that were scheduled for staging (in the confirmation mail), those that were successfully staged, and (if any) those that could not be staged (in the success /

partial success notifications).

## Please take note of the following

1. Unless you have an extremely fast connection (10 Gbit/s or more), **it is in general advisable to stage no more than 5 TB at a time** (see also point 4). At maximum efficiency a 1 Gbit/s connection will already take 12 hours to retrieve 5 TB of data, in practice it will often take quite a bit more.
2. On a 1 Gbit/s connection as a general rule of thumb, you should be able to retrieve data at about 100-500 GB/hour, especially if you try to retrieve 4-8 files concurrently. If you see speeds much lower than this, you might have some kind of network problem and should in general contact your IT staff.
3. Staging the data from tape to disk might take quite a bit of time. In the large data centres that the LTA uses, the tape drives are shared with all users and requests are queued. This is not just users of LOFAR but large data other projects like the LHC. This might mean that it takes anywhere from a few hours to a day or more to stage a copy of your data from tape to disk.
4. The amount of space available for staging data is limited although quite large. This space is however shared between all LOFAR LTA users. This includes LTA operations for buffering data from CEP to the LTA before it gets moved to tape. If many users are staging data at the same time, and/or SDCO operations is transferring large amounts of data, the system might temporarily run low on disk space. You might then get a message that your request was only partially successful. In general the request will still finish 1-2 days later and we do monitor if requests don't get stuck and restart if needed.
5. We strive to keep a copy of data that was staged on disk for 1-2 weeks so you have some time to download it. After that it might get removed to make space for more recent requests. The copy of the data on tape is only read and will still be available if you need to access the data again at a later stage but you might need to stage a copy to disk again.
6. We are continuously trying to improve the reliability and speed of the available services. Please contact SDCO if you have any problems or suggestions for improvement.
7. The data centres the LTA uses also have maintenance or small outages sometimes. SDCO can advice you if this is the case and when it is planned to end, if you are having trouble accessing data. In general this will not be at the same dates as the LOFAR stop days.

## Staging Transient Buffer Board (TBB) data

TBB data needs to be staged by hand. Please send a request at <https://support.astron.nl/rohelpdesk> to stage the data for you, specifying the filenames to be staged. To download the data, please follow the instruction under Download Data for proper authentication. Data will then be available for download using

```
wget --no-check-certificate
https://lofar-download.grid.surfsara.nl/lofigrid/SRMFifoGet.py?url=<filename> .
```

The filename should start or be prepended with srm://

You will need a valid LTA account to access this data. If the filename is very short, you can view (e.g. cat) it to view errors that have occurred.



## Download data

You can download your requested data with the files from your e-mail notification. There are different possibilities and tools to do this. If you're unsure, which one to use, please refer to the according [FAQ Answer](#).

### HTTP download

If you open `html.txt` this file contains a list of http links that you can feed to a unix commandline tool like `wget` or `curl` or even use in a browser.

For `wget` you can use the following command line:

```
wget -i html.txt
```

This will download the files in `html.txt` to the current directory (option `-i` reads the urls from the specified file).

Preferrably, especially when downloading large files, you should also use option `-c`. This will continue unfinished earlier downloads instead of starting a fresh download of the whole file. (Make sure to first delete existing files that contain error messages instead of data, if you use this option):

```
wget -ci html.txt
```

Do not set the username and password on the `wget` command line because this allows other users on the system to view them in the process list. Instead you should create a file `~/.wgetrc` with two lines according to the following example:

```
user=lofaruser  
password=secret
```

Note: This is only an example, you have to edit the file and enter your own personal user name and password!

Set access authorizations of the `.wgetrc` file to user only so that the credentials are not exposed to anybody else, e.g.:

```
chmod 600 .wgetrc
```

There is no easy way to have `wget` rename the files as part of the command directly. It does not accept the `-O` flag inside a file it gets with `-i`. You can either rename files afterward, e.g. using the following command:

```
find . -name "SRMFifoGet*" | awk -F %2F '{system("mv "$0" "$NF)}'
```

or add the `-O` option to each line in `html.txt` but then feed each line to `wget` separately like this: `cat html.txt | xargs wget`. By default the `html.txt` file does not contain such options.

The following Python script will take care of renaming and untarring the downloaded files:

```
#M.C. Toribio
#toribio@astron.nl
#
#Script to untar data retrieved from the LTA by using wget
#It will DELETE the .tar file after extracting it.
#
#Notes:
#When using wget, the files are named, as an example:
#SRMFifoGet.py?url=srm:%2F%2Frm.grid.sara.nl:8443%2Fpnfs%2Fgrid.sara.nl%2F
data%2Flofar%2Fops%2Fprojects%2Flofarschool%2F246403%2FL246403_SAP000_SB000_
uv.MS_7d4aa18f.tar
# This scripts will rename those files as the string after the last '%'
# If you want to change that behaviour, modify line
# outname=filename.split("%")[-1]
#
# Version:
# 2014/11/12: M.C. Toribio

import os
import glob

for filename in glob.glob("*SB*.tar*"):
    outname=filename.split("%")[-1]
    os.rename(filename, outname)
    os.system('tar -xvf '+outname)
    os.system('rm -r '+outname )

    print outname+' untarred.'
```

Another Python script for renaming the downloaded (and previously untarred) files. It removes the random part of the filename before the .tar extension:

```
import os
import sys
import glob

# AUTHOR: J.B.R. OONK (ASTRON/LEIDEN UNIV. 2015)
# - changes LTA retrieval filename to standard filename
# - run in the directory where LTA files are located

# FILE DIRECTORY
path = "./" #DIRECTORY

filelist = glob.glob(path+'*.tar')
print 'LIST:', filelist

#FILE STRING SEPARATORS
spld='%'
```



```

sp2d='2F'
extn='.MS'
extt='.tar'

#LOOP
print '##### STARTING THE LOOP #####'
for infile_orig in filelist:

    #GET FILE
    infiletar = os.path.basename(infile_orig)
    infile    = infiletar
    print 'doing file: ', infile

    spl1=infile.split(sp1d)[11]
    spl2=spl1.split(sp2d)[1]
    spl3=spl2.split(extn)[0]
    newname = spl3+extn+extt

    # SPECIFY FILE MV COMMAND
    command='mv ' + infile + ' ' +newname
    print command

    # CARRY OUT FILENAME CHANGE !!!
    # - COMMENT FOR TESTING OUTPUT
    # - UNCOMMENT TO PERFORM FILE MV COMMAND
    #os.system(command)

    print 'finished rename of: ', newname

```

Note that wget does not overwrite existing files. If you use the continue option ('-c') it will append any missing parts to the existing file. If you don't use the continue option and there is a file present (e.g. from a stopped earlier download), wget creates a new file by appending a number (e.g., '.1') to the filename.

There are some small example links if you browse to <https://lofar-download.grid.sara.nl/> where you can test with for example the file1M (which is 1 MB) if your setup is correct.

## SRM download

If you open the file srm.txt this file contains a list of srm locations which you would feed to srmcp. SRM is a GRID specific protocol that is currently supported for data at the SARA and Jülich locations. It is faster, especially if you have significantly more than 1 Gbit/s bandwidth. It requires a valid [GRID certificate](#) and installation of the [GRID srm software](#). NB There is an [alternative installation that does not require root privileges](#). Contact Science Operations and Support if you think you might need a GRID account but it can not be provided by your own institute. An example command line would be:

```
srmcp -server_mode=passive -copyjobfile=srm.txt
```

to retrieve all requested files contained in srm.txt or e.g.

```
srncp -server_mode=passive srm://lofar-srm.juelich.de:8443/pnfs/fz-  
jeulich.de/data/lofar/ops/projects/commissioning2012/file.tar  
file://///data/files/file.tar
```

to retrieve a single file. You need `--server_mode=passive` if you are behind a firewall or on an internal network. Omitting this option may result in improved transfer speed as it will attempt to use multiple streams when retrieving a file. An alternative strategy to improve the overall transfer speed is to run multiple `srncp` requests in parallel, e.g. by splitting the provided `srm.txt` file and feeding the partial lists to separate `srncp` commands.

If you do experience insufficient transfer speeds with `srncp`, you may want to look into using `srncp` with a [globus-url-copy](#) copy script.

## Troubleshooting

- There is a [LTA FAQ page](#) that should help with the common difficulties.

From:

<https://www.astron.nl/lofarwiki/> - **LOFAR Wiki**

Permanent link:

[https://www.astron.nl/lofarwiki/doku.php?id=public:lta\\_howto&rev=1604503101](https://www.astron.nl/lofarwiki/doku.php?id=public:lta_howto&rev=1604503101)

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