

Advanced API – Elastic Node Server (ENS) Software User Guide

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1. Introduction

1.1. Purpose of this document

The present document provides examples of **ENS usage with python scripts**.

1.2. Acronyms

Table 1 – Acronyms and Abbreviations

Acronym	Definition
DRB	Data Request Broker
ENS	Elastic Node Server

1.3. Overview

The **Elastic Node Server (ENS)** is an Open Source software providing a simple and scalable front-end to one or more Data Storages for use with client Computing Instances.

The Elastic Node Server (ENS) extends traditional File or Object Storages by exposing not only standard Directories and Files but breaking them down further in a logical tree of Nodes up to the tiniest piece of information.

The **ENS Nodes** can be located, queried and accessed semantically via their names disregarding their physical formats and locations.

The usage of the **ENS Performance Meter (EPM)** Tool, available to ONDA users to measure ENS performances, is also described.

2. How to mount/unmount

NFS support files / tools should be installed (package **nfs-common** on debian, **nfs-utils** on centos/fedora).

A local directory should be created on system **/local_path**.

Accessing ENS filesystem is possible after having mounted it and used the following command:

```
sudo mount -t nfs4 -o nfsvers=4.1 ens.onda-dias.eu:/ /local_path
```

Where:

1. **-t nfs4**: the mount type is NFS version 4
2. **-o nfsvers=4.1**: to force the use of NFS version 4.1 (recommended)
3. **/local_path**: the local mount directory path

All data are then available under **/local_path**.

The end user can execute all basic commands supported by a classic filesystem on **/local_path**, as **ls**, **cp**, **cat**.

To unmount the ENS filesystem, type the following command:

```
sudo umount /local_path
```

3. Path to products

ONDA DIAS archive contains millions of products. It cannot be possible to display the entire list of products to the end user via ENS interface into a unique directory.

The solution is to spread products into directories hierarchy based on the anticipated usages of the end-users:

- Multi-temporal usage,
- Geographical Area monitoring,
- Image processing
- Meteorological processing
- ...

At the ingestion time, ENS extracts a set of metadata from products. These metadata are used to organise the ENS directory tree.

The hierarchy tries to define some systematic mechanisms. A “What/When/Where” organisation has been defined, where the first set of directories and sub directories concern *what* kind of data is exposed, the second set of sub directories regard *when* data are acquired and the last set matches *where* data are located.

Each level is optional, but the order is always abided by the system.

The names of the metadata defined here are compliant with the OGC/HMA standardised naming conventions.

All the “pseudo-paths” are described per product type on Gael System website:

- <https://www.gael-systems.com/ens-pseudo-paths-sentinel-1/>
- <https://www.gael-systems.com/ens-pseudo-paths-sentinel-2/>
- <https://www.gael-systems.com/ens-pseudo-paths-sentinel-3/>
- <https://www.gael-systems.com/ens-pseudo-paths-envisat/>
- <https://www.gael-systems.com/ens-pseudo-paths-landsat-8-geotiff/>

The pseudo-path for the land & marine Copernicus Services are the following :

productMainClass/title (+WHEN optional)

productMainClass = "COPERNICUS-MARINE" or "COPERNICUS-LAND"

The title will depend on the product.

4. Inside ENS node description

Nodes built by ENS are accessible as files in a NFS share, from whatever application, graphical or not, written in whatever language and using standard file system commands and operations.

Nodes mapping is summarized by the following table:

Table 2 – ENS Node to File System Mapping Summary

ENS Nodes	File System Mapping	Note
Node	File or Directory	Selection of File or Directory type depends on the nature of the Node. Files are leaf ENS Nodes usually with content. Directories are ENS Nodes that have children.
Content/Value	File named ".value"	This ".value" File is put inside the Directory representing the ENS Node containing its Content/Value.

5. ENS Performance Meter (EPM) Tool

In order to provide users with a mean to assess current level of performance, the ENS Performance Meter (EPM) tool is made available.

It can be downloaded from the following link: <https://www.onda-dias.eu/cms/dias-ens-tools/>

The following parameters have been defined to characterise ENS performances:

- Data browsing performance value (sec): time needed for the execution of a "ls" command.
 - To be evaluated outside and inside products
- Data Access Performance value (sec): time needed for the execution of a "cat" command on a full manifest.safe file in Sentinels products
- Data Access Rate (Mbytes/s): Average data rate, in the case of a full product transfer.
- Data Access TIFF Rate (Mbytes/s): Average data rate, accessing a full TIFF file within a S1 Level-1 product.
- Data Access jp2 Rate (Mbytes/s): Average data rate, accessing a full jp2 file within a S-2 product.

Executing the EPM Tool from any ONDA VM, the above performance parameters are measured and are reported in the output file of the script, separately per each Sentinel mission.

For each Sentinel mission, the following is computed, when applicable:

- Average of 3 Data browsing performance value (sec) checks, performed in random folders listing products.
- Average of 3 Data browsing performance value (sec) checks, performed within random products.
- Average of 3 Data Access Performance value (sec) checks, measured on random products.
- Average of 3 Data Access Rate (Mbytes/s) checks, measured on random products.
- Average of 3 Data Access TIFF/jp2 Rate (Mbytes/s) checks, measured on random products

Instructions for the usage of EPM Tool are given here below:

```
usage: epm.py [-h] -m M [-l L] [-o O]
```

optional arguments:

```
-h, --help  show this help message and exit
-m M        Specify the path of the ENS mount point
-l L        Specify the log file (i.e. path/logfile)
-o O        Specify the output file (i.e. path/outputfile)
```

Sample Output Report:

```

{
  "Description": "E.P.M. ENS Performance Meter",
  "S1": {
    "Data Browsing Performance value (Outside Product)": "0.003908 s",
    "Data Browsing Performance value (Inside Product)": "7.663316 s",
    "Data Access Performance value": "7.542791 s",
    "Data Access Rate (Full Product)": "12.66 Mbyte/s",
    "Data Access Rate (TIFF)": "3.67 Mbyte/s"
  },
  "S2": {
    "Data Browsing Performance value (Outside Product)": "0.016149 s",
    "Data Browsing Performance value (Inside Product)": "0.166107 s",
    "Data Access Performance value": "7.963299 s",
    "Data Access Rate (Full Product)": "14.68 Mbyte/s",
    "Data Access Rate (JP2)": "3.02 Mbyte/s"
  },
  "S3": {
    "Data Browsing Performance value (Outside Product)": "0.003219 s",
    "Data Browsing Performance value (Inside Product)": "40.007842 s",
    "Data Access Performance value": "4.057969 s",
    "Data Access Rate (Full Product)": "16.40 Mbyte/s"
  }
}

```

As a reference for users' evaluation of the resulting ENS performances, the following table provides typical values for each performance parameter.

Performance parameter	Description	Values
Data browsing performance value (sec)	Time needed for the execution of a "ls" command	5-100 ms (outside products) 100-5000 ms (within products)
Data Access Performance value (sec)	Time needed for the execution of a "cat" command on a full manifest.safe file included in Sentinels products.	300-5000 ms
Data Access Rate (Mbytes/s)	Average data rate, in the case of a full product transfer.	10-50 Mbytes/s
Data Access TIFF Rate (Mbytes/s)	Average data rate, when transferring a full TIFF file from within a Sentinel-1 Level-1 product.	3-5 Mbytes/s
Data Access jp2 Rate (Mbytes/s)	Average data rate, when transferring a full jp2 file from within a Sentinel-2 product.	1-10 Mbytes/s