HDF5 DAOS VOL Connector User’s Guide

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This document aims to be a helpful guide on how to install the HDF5 DAOS VOL connector and use it to leverage the capabilities of the DAOS object storage system within an HDF5 application.

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1. Introduction

The HDF5 DAOS VOL connector is a connector for HDF5 designed with the goal of allowing HDF5 applications to utilize the DAOS object storage system by translating HDF5 API calls into DAOS calls, as defined by the DAOS API. The DAOS VOL connector is currently built as a dynamically-loaded library that is external to HDF5 and is treated similar to dynamically-loaded HDF5 filter plugins.

For the latest instructions on installation and usage of the HDF5 DAOS VOL connector, please refer to the README file in the connector’s source code repository[[1]](#footnote-1); the instructions are listed here for convenience.

1. Installation

TBD

1. Usage
   1. Using the DAOS VOL connector with an HDF5 application

TBD

* 1. HDF5 API call behavior differences

The following sections serve to illustrate the differences between the expected behavior of an HDF5 API call versus the actual behavior as implemented by the DAOS VOL connector.

* + 1. H5A interface

|  |  |
| --- | --- |
| **API call** | **Notes** |
| H5Aopen\_by\_idx | Currently unsupported |
| H5Aopen\_idx | Currently unsupported |
| H5Aexists(\_by\_name) | Currently unsupported |
| H5Arename(\_by\_name) | Currently unsupported |
| H5Aiterate(2) | * Restarting iteration from an index is currently unsupported * Only H5\_ITER\_NATIVE is supported for the iteration order |
| H5Adelete(\_by\_name/\_by\_idx) | Currently unsupported |
| H5Aget\_info(\_by\_name/\_by\_idx) | Currently unsupported |
| H5Aget\_num\_attrs | Unsupported |
| H5Aget\_name\_by\_idx | Currently unsupported |
| H5Aget\_storage\_size | Currently unsupported |

* + 1. H5D interface

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| --- | --- |
| **API call** | **Notes** |
| H5Dflush | Currently unsupported |
| H5Drefresh | Currently unsupported |
| H5Dextend | Currently unsupported |
| H5Dset\_extent | Currently unsupported |
| H5Dget\_storage\_size | Currently unsupported |
| H5Dget\_space\_status | Space status is currently always set to H5D\_SPACE\_STATUS\_NOT\_ALLOCATED |
| H5Dget\_offset | Currently unsupported |

* + 1. H5F interface

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| --- | --- |
| **API call** | **Notes** |
| H5Fget\_file\_image | Unsupported |
| H5Freopen | Currently unsupported |
| H5Fflush | Currently is a no-op |
| H5Fis\_hdf5 | Currently unsupported |
| H5Fmount/H5Funmount | Currently unsupported |
| H5Fget\_vfd\_handle | Unsupported |
| H5Fget\_filesize | Unsupported |
| H5Fget\_create\_plist | Currently unsupported |
| H5Fget\_access\_plist | Currently unsupported |
| H5Fget\_info(2) | Unsupported |
| H5Fget\_intent | Currently unsupported |
| H5Fget\_name | Currently unsupported |
| H5Fget\_obj\_count | Currently unsupported |
| H5Fget\_obj\_ids | Currently unsupported |
| H5Fget\_free\_sections | Unsupported |
| H5Fget\_freespace | Unsupported |
| H5Fclear\_elink\_file\_cache | Unsupported |
| H5Fset\_mdc\_config/H5Fget\_mdc\_config | Unsupported |
| H5Fget\_mdc\_hit\_rate | Unsupported |
| H5Freset\_mdc\_hit\_rate\_stats | Unsupported |
| H5Fget\_mdc\_image\_info | Unsupported |
| H5Fget\_mdc\_size | Unsupported |
| H5Fget\_metadata\_read\_retry\_info | Unsupported |
| H5Fstart\_mdc\_logging/ H5Fstop\_mdc\_logging | Unsupported |
| H5Fget\_mdc\_logging\_status | Unsupported |
| H5Fget\_dset\_no\_attrs\_hint/ H5Fset\_dset\_no\_attrs\_hint | Unsupported |
| H5Fget\_eoa | Unsupported |
| H5Fget\_page\_buffering\_stats | Unsupported |
| H5Freset\_page\_buffering\_stats | Unsupported |
| H5Fincrement\_filesize | Unsupported |
| H5Fset\_latest\_format | Unsupported |
| H5Fset\_libver\_bounds | Unsupported |
| H5Fstart\_swmr\_write | Unsupported |

* + 1. H5G interface

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| --- | --- |
| **API call** | **Notes** |
| H5Gget\_info(\_by\_name/\_by\_idx) | Of the four fields in the H5G\_info\_t struct:   * storage\_type is always set to H5G\_STORAGE\_TYPE\_UNKNOWN * nlinks is set appropriately * max\_corder is currently always set to 0 * mounted is currently always set to FALSE   H5Gget\_info\_by\_idx is currently unsupported |
| H5Gflush | Currently is a no-op |
| H5Grefresh | Currently unsupported |
| H5Gmove(2) | Currently unsupported |
| H5Glink(2) | Only soft link creation is currently supported |
| H5Gunlink | Currently unsupported |
| H5Gset\_comment/H5Gget\_comment | Currently unsupported |
| H5Gget\_objinfo | Unsupported |
| H5Gget\_linkval | Currently unsupported |
| H5Giterate | Unsupported |
| H5Gget\_objname\_by\_idx | Currently unsupported |
| H5Gget\_objtype\_by\_idx | Unsupported |

* + 1. H5L interface

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| --- | --- |
| **API call** | **Notes** |
| H5Lcopy | Currently unsupported |
| H5Lmove | Currently unsupported |
| H5Lcreate\_external | Currently unsupported |
| H5Lcreate\_hard | Currently unsupported |
| H5Lcreate\_ud | Currently unsupported |
| H5Ldelete(\_by\_idx) | Currently unsupported |
| H5Lget\_info(\_by\_idx) | Currently unsupported |
| H5Lget\_name\_by\_idx | Currently unsupported |
| H5Lget\_val(\_by\_idx) | Currently unsupported |
| H5Literate(\_by\_name) | * Restarting iteration from an index is currently unsupported * Only H5\_ITER\_NATIVE is supported for the iteration order |
| H5Lvisit(\_by\_name) | Currently unsupported |

* + 1. H5O interface

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| --- | --- |
| **API call** | **Notes** |
| H5Ocopy | Currently unsupported |
| H5Oopen\_by\_idx | Currently unsupported |
| H5Oare\_mdc\_flushes\_disabled | Unsupported |
| H5Oincr\_refcount/H5Odecr\_refcount | Currently unsupported |
| H5Oenable\_mdc\_flushes/H5Odisable\_mdc\_flushes | Unsupported |
| H5Oexists\_by\_name | Currently unsupported |
| H5Oflush | Currently unsupported |
| H5Oset\_comment(\_by\_name)/H5Oget\_comment(\_by\_name) | Unsupported |
| H5Oget\_info(\_by\_name/\_by\_idx) | Unsupported – will need to find a way to retrieve the number of attributes attached to an object |
| H5Olink | Currently unsupported |
| H5Orefresh | Currently unsupported |
| H5Ovisit(\_by\_name) | Currently unsupported |

* + 1. H5R interface

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| --- | --- |
| **API call** | **Notes** |
| H5Rcreate | Currently unsupported |
| H5Rdereference(2) | Currently unsupported; causes an assertion failure |
| H5Rget\_name | Currently unsupported |
| H5Rget\_obj\_type(2) | Currently unsupported |
| H5Rget\_region | Currently unsupported |

* + 1. H5T interface

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| --- | --- |
| **API call** | **Notes** |
| H5Tflush | Currently unsupported |
| H5Trefresh | Currently unsupported |

1. Testing
   1. HDF5 and dynamically-loaded VOL connectors

HDF5 has the capability to dynamically load and use a VOL connector for running tests with. While several HDF5 tests have been updated to take advantage of this capability, please be aware that many of these tests are likely to fail or crash due to their native HDF5-specific nature.

In order to choose a particular VOL connector to use for testing, two initial steps must be taken. First, one must help HDF5 locate the connector library by pointing to the directory which contains the built library. This can be accomplished by setting the environment variable HDF5\_PLUGIN\_PATH to this directory. Next, HDF5 needs to know the name of which library to use, which is configured by setting the environment variable HDF5\_VOL\_CONNECTOR to the name of the connector.

In order to use the DAOS VOL connector, the aforementioned environment variables should be set as:



Having completed this step, HDF5 will be setup to load the DAOS VOL connector and use it for testing.

* 1. Generic VOL connector test suite

In order to test VOL connectors to make sure that they are functioning as expected, a suite of tests which only use the public HDF5 API has been written. If the DAOS VOL connector was built using the HDF5 source code included in the main repository, this suite of tests will be available under the path:



Currently, this test suite does not have the capability to query what kind of functionality a VOL connector supports and therefore a test will fail if it uses an HDF5 API call which is not implemented, or which is specifically unsupported, in a given VOL connector.

1. Revision History

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| --- | --- |
| *February 28, 2019:* | First Draft |
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1. <https://bitbucket.hdfgroup.org/projects/HDF5VOL/repos/daos-vol/browse/README.md> [↑](#footnote-ref-1)