Committed Datatype Copying

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# Committed Datatype Copying

Committed datatypes can be a powerful feature in HDF5. They can be used to share a single datatype description among multiple datasets, saving space, and to assign a name to that datatype within the HDF5 group structure. However, problems can occur when a committed datatype or a dataset using a committed datatype is copied to another file using the object copy API (H5Ocopy).

When copying a dataset that uses a committed datatype between files, by default the library does not look for a matching committed datatype in the destination file. The library simply creates a new committed datatype in the destination file without any links to it (an anonymous committed datatype). This means that, when copying multiple datasets in separate calls to H5Ocopy, a new committed datatype is created for each H5Ocopy call. While it is possible to have all of the copied datasets share the same committed datatype by copying them in a single call to H5Ocopy, this is not always attainable.

For example, imagine that a user has an application that automatically creates many data files, each with many datasets that all use a single committed datatype. At the end of a project, the user wants to merge all of these files into a single file. There is currently no way to have all of the datasets in the combined file use the same committed datatype short of manually recreating each dataset in the combined file.

The solution to this problem is to set the H5O\_COPY\_MERGE\_COMMITTED\_DTYPE\_FLAG flag with the H5Pset\_copy\_object property list API routine. When the flag is set, it causes H5Ocopy to first search for a matching committed datatype in the destination file before creating a new anonymous committed datatype. If a matching committed datatype is found, then it will be used by the copied dataset. The next few paragraphs describe in more detail the process that H5Ocopy goes through.

When the H5O\_COPY\_MERGE\_COMMITTED\_DTYPE\_FLAG flag is set, H5Ocopy will search the destination file for committed datatypes and build a temporary list in memory of all the committed datatypes it found. It will then check that list to see if it contains a datatype equal to the datatype of the source object. If it finds an equal datatype, it will modify the copied object so that it uses the found committed datatype as its datatype. When later datasets and attributes using committed datatypes are encountered, the library will again check to see if the list contains a matching datatype. It will also update the list if a new committed datatype is created in the destination file as a result of the copy.

To determine if two committed datatypes are equal, the library will compare their descriptions in a manner similar to H5Tequal. In addition, if either committed datatype has one or more attributes, then all attributes must be present in both committed datatypes, and the attributes must all be identical. Each attribute’s datatype description, dataspace, and raw data must be identical. However, if an attribute uses a committed datatype, then the attributes of the attribute’s committed datatype will *not* be compared.

When the library encounters a committed datatype in the source file, it will similarly search for a matching committed datatype in the destination file. If a match is found, the library will simply create a hard link in the destination file to the found datatype. If a match is not found, the library will copy the committed datatype normally and add it to the temporary list of committed datatypes in the destination file.

By default, H5Ocopy will search the entire destination file for a matching committed datatype. It is possible to focus where H5Ocopy will search. This focusing should result in a faster search. If there are locations in the destination file where a matching committed datatype might be found, then those locations can be specified with the H5Padd\_merge\_committed\_dtype\_path property.

The example below shows how to enable the feature described above for use with H5Ocopy.

|  |
| --- |
| hid\_t ocpypl\_id;ocpypl\_id = H5Pcreate(H5P\_OBJECT\_COPY);status = H5Pset\_copy\_object(ocpypl\_id, H5O\_COPY\_MERGE\_COMMITTED\_DT\_FLAG);status = H5Ocopy(file1\_id, src\_name, file2\_id, dst\_name, ocpypl\_id, H5P\_DEFAULT); |
| Example 1. Setting the object copy property list |

## Function Summary

Functions used in committed datatype copying operations are listed below.

| Function Listing 1. Committed datatype copying related functions |
| --- |
| C FunctionFortran | Purpose |
| H5Ocopy(none) | Allows an application to copy an object within an HDF5 file or to another HDF5 file. |
| H5Pset\_copy\_objecth5pset\_copy\_object\_f | Allows an application to set properties to be used when an object is copied.  |
| H5Padd\_merge\_committed\_dtype\_path(none) | Allows an application to add a path to the list of paths that will be searched in the destination file for a matching committed datatype.  |
| H5Pfree\_merge\_committed\_dtype\_paths(none) | Allows an application to clear the list of paths stored in the object copy property list ocpypl\_id.  |
| H5Pset\_mcdt\_search\_cb(none) | Allows an application to set the callback function that H5Ocopy will invoke before searching the entire destination file for a matching committed datatype.  |
| H5Pget\_mcdt\_search\_cb(none) | Allows an application to retrieve the callback function from the specified object copy property list.  |
| H5O\_mcdt\_search\_cb\_t(none) | Provides the mechanism by which a user application may set an action for H5Ocopy to take after checking all suggested paths for a matching committed datatype but before starting the global search of the destination file.  |

## Resources

See the following for more information.

See the “HDF5 Datatypes” chapter in the *HDF5 User’s Guide*.

See these entries in the *HDF5 Reference Manual*:

* H5Ocopy
* H5Pset\_copy\_object
* H5Padd\_merge\_committed\_dtype\_path
* H5Pfree\_merge\_committed\_dtype\_paths
* H5Pset\_mcdt\_search\_cb
* H5Pget\_mcdt\_search\_cb