HighFive

2.7.1

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Chapter 1

HighFive - HDF5 header-only C++ Library

Documentation: https://bluebrain.github.io/HighFive/

Brief

HighFive is a modern header-only C++11 friendly interface for libhdf5.

HighFive supports STL vector/string, Boost::UBLAS, Boost::Multi-array, Eigen and Xtensor. It handles C++ from/to HDF5 with automatic type mapping. HighFive does not require additional libraries (see dependencies) and supports both HDF5 thread safety and Parallel HDF5 (contrary to the official hdf5 cpp)

It integrates nicely with other CMake projects by defining (and exporting) a HighFive target.

Design

- Simple C++-ish minimalist interface
- No other dependency than libhdf5
- Zero overhead
- Support C++11

Feature support

- create/read/write files, datasets, attributes, groups, dataspaces.
- automatic memory management / ref counting
- automatic conversion of `std::vector` and nested `std::vector` from/to any dataset with basic types
- automatic conversion of `std::string` to/from variable length string dataset
- selection() / slice support
- parallel Read/Write operations from several nodes with Parallel HDF5
- Advanced types: Compound, Enum, Arrays of Fixed-length strings, References
- half-precision (16-bit) floating-point datasets
- `std::byte` in C++17 mode (with `-DCMAKE_CXX_STANDARD=17` or higher)
- etc... (see ChangeLog)

Dependencies

- hdf5 (dev)
- hdf5-mpi (optional, opt-in with -D*HIGHFIVE_PARALLEL_HDF5*=ON)
- boost >= 1.41 (recommended, opt-out with -D*HIGHFIVE_USE_BOOST*=OFF)
- eigen3 (optional, opt-in with -D*HIGHFIVE_USE_EIGEN*=ON)
- xtensor (optional, opt-in with -D*HIGHFIVE_USE_XTENSOR*=ON)
- half (optional, opt-in with -D*HIGHFIVE_USE_HALF_FLOAT*=ON)

Examples

Write a std::vector<int> to 1D HDF5 dataset and read it back

```
 ++
#include <highfive/H5File.hpp>

using namespace HighFive;

std::string filename = "/tmp/new_file.h5";

{
    // We create an empty HDF55 file, by truncating an existing
    // file if required:
    File file(filename, File::Truncate);

    std::vector<int> data(50, 1);
    file.createDataSet("grp/data", data);
}

{
    // We open the file as read-only:
    File file(filename, File::ReadOnly);
    auto dataset = file.getDataSet("grp/data");

    // Read back, with allocating:
    auto data = dataset.read<std::vector<int»();

    // Because `data` has the correct size, this will
    // not cause `data` to be reallocated:
    dataset.read(data);
}
```

Note: `H5File.hpp` is the top-level header of HighFive core which should be always included.

Note: For advanced usecases the dataset can be created without immediately writing to it. This is common in MPI-IO related patterns, or when growing a dataset over the course of a simulation.

Write a 2 dimensional C double float array to a 2D HDF5 dataset

See `create_dataset_double.cpp`

Write and read a matrix of double float (boost::ublas) to a 2D HDF5 dataset

See `boost_ublas_double.cpp`

Write and read a subset of a 2D double dataset

See `select_partial_dataset_cpp11.cpp`

Create, write and list HDF5 attributes

See create_attribute_string_integer.cpp

And others

See src/examples/ subdirectory for more info.

Compiling with HighFive

```
c++ -o program -I/path/to/highfive/include source.cpp  -lhdf5
```

H5Easy

For several 'standard' use cases the highfive/H5Easy.hpp interface is available. It allows:

- Reading/writing in a single line of:
  - scalars (to/from an extendible DataSet),
  - strings,
  - vectors (of standard types),
  - Eigen::Matrix (optional, enable CMake option HIGHFIVE_USE_EIGEN),
  - xt::xarray and xt::xtensor (optional, enable CMake option HIGHFIVE_USE_XTENSOR).
  - cv::Mat_ (optional, enable CMake option HIGHFIVE_USE_OPENCV).
- Getting in a single line:
  - the size of a DataSet,
  - the shape of a DataSet.

Example

```
#include <highfive/H5Easy.hpp>

int main() {
    H5Easy::File file("example.h5", H5Easy::File::Overwrite);

    int A = ...;
    H5Easy::dump(file, "/path/to/A", A);

    A = H5Easy::load<int>(file, "/path/to/A");
}
```

whereby the int type of this example can be replaced by any of the above types. See easy_load_dump.cpp for more details.

Note: Classes such as H5Easy::File are just short for the regular HighFive classes (in this case HighFive::File). They can thus be used interchangeably.

CMake integration

HighFive can easily be used by other C++ CMake projects.

You may use HighFive from a folder in your project (typically a git submodule).

```
cmake_minimum_required(VERSION 3.1 FATAL_ERROR)
project(foo)
set(CMAKE_CXX_STANDARD 11)

add_subdirectory(highfive_folder)
add_executable(bar bar.cpp)
target_link_libraries(bar HighFive)
```

Alternativelly you can install HighFive once and use it in several projects via `find_package()`.

A HighFive target will bring the compilation settings to find HighFive headers and all chosen dependencies.

```
# ...
find_package(HighFive REQUIRED)
add_executable(bar bar.cpp)
target_link_libraries(bar HighFive)
```

Note: Like with other libraries you may need to provide CMake the location to find highfive: `CMAKE_PREFIX_PATH=<highfive_install_dir>`

Note: `find_package(HighFive)` will search dependencies as well (e.g. Boost if requested). In order to use the same dependencies found at HighFive install time (e.g. for system deployments) you may set `HIGHFIVE_USE_INSTALL_DEPS=YES`

Installing

When installing via CMake, besides the headers, a HighFiveConfig.cmake is generated which provides the HighFive target, as seen before. Note: You may need to set `CMAKE_INSTALL_PREFIX`:

```
mkdir build && cd build
# Look up HighFive CMake options, consider inspecting with `ccmake`
cmake .. -DHIGHFIVE_EXAMPLES=OFF -DCMAKE_INSTALL_PREFIX="<highfive_install_dir>"
make install
```

Test Compilation

As a header-only library, HighFive doesn't require compilation. You may however build tests and examples.

```
mkdir build && cd build
cmake ../
make  # build tests and examples
make test  # build and run unit tests
```

Note: Unit tests require Boost. In case it's unavailable you may use `-DHIGHFIVE_USE_BOOST=OFF`. HighFive with disable support for Boost types as well as unit tests (though most examples will build).

Code formatting

If you want to propose pull requests to this project, do not forget to format code with clang-format version 12. The .clang-format is at the root of the git repository.

Questions?

Do you have questions on how to use HighFive? Would you like to share an interesting example or discuss HighFive features? Head over to the `Discussions` forum and join the community.

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Chapter 2

Version 2.7.1 - 2023-04-04

Bug Fix

- Revert removing `#include ¨H5FileDriver.hpp¨` from `H5File.hpp` (#711).
- Change relative import to ¨../H5Utility.hpp¨ (#726).
- Fix nameclash with macros on Windows (#717 #722 #723).
- Add workaround for MSVC bug (#728).
- Don't downgrade the requested C++ standard (#729).

Version 2.7.0 - 2023-03-31

New Features

- Properties can now be read (#684).
- Adding a property for LinkCreationOrder (#683).
- Adding a logging infrastructure (#690).
- Support of bool in the way of h5py (#654).
- Support `std::bool` in C++17 mode (#698).

Improvements

- Catch2 move to v3 (#655).

Bug Fix

- To avoid build failure in certain circumstances, user can not set `Boost_NO_BOOST_CMAKE` (#687).
- Fix leak when reading variable length strings (#660).
- Use `H5free_memory` instead of `free` in error handler (#665). Thanks to Moritz Koenemann.
- Fix a bug with old GCC due to templated friend classes (#688).
- Fix regression in broadcasting support (#697).
- Fix bug related to zero-length datasets (#702).

Version 2.6.2 - 2022-11-10

Bug Fix

- Allow CMake to use Config mode to find HDF5.

Version 2.6.1 - 2022-11-08

Bug Fix

- Version bump in `CMakeLists.txt`.

Version 2.6.0 - 2022-11-08

New Features

- Enable page buffered reading (#639).

Improvements

- Warn when detecting lossy reads or write of floating point data (#636).

Version 2.5.1 - 2022-11-07

Bug Fix

- Fix missing `inline` for collective metadata properties.

Version 2.5.0 - 2022-11-03

New Features

- Enable collective MPI IO using the Data Transfer Property (#623). Thanks to Rob Latham.
- Add a support for half-precision (16-bit) floating-point based on the Half library (http://half.↩ sourceforge.net) (#587). Thanks to Sergio Botelh.
- Enable choosing the allocation time of datasets (#627).
- Add possibility to get and set file space strategy. For page allocated files wrap the API to set/retrieve the page size (#618).
- Add API for getting Access and Create property lists of HighFive objects (#629).
- Let users configure metadata reads and writes at file level (#624). Thanks to Rob Latham.

Improvements

- MPIOFileDriver is now deprecated. Use FileAccessProps (#622).
- Support of block argument in API (#584).
- Serialization of types is now automagic and so recursive (#586).
- Add an argument to specific File Create Properties in File class construtor (#626).

Bug Fixes

- Padding of Compound Types (#581).
- Compilation with Visual Studio with C++17 or later (#578). Thanks to Mark Bicknell.
- Avoid leaking when printing stack for error (#583).

Version 2.4.1 - 2022-05-11

New Features

- Support `std::complex`. Thanks to Philipp.

Improvements

- Improve EnumType/CompoundType
- Revert quirky behaviour of `select(const HyperSlab&)`.
- All `get_name` functions takes `size_t` and not `hsize_t`.
- Remove nix recipes.

Bug Fixes

- Computation of padding.
- Related to `0` being an invalid hid but not equal to `H5I_INVALID_HID`.

Version 2.4.0 - 2022-04-05

New Features

- Construct a compound type from an already existing hid (#469). Thanks to Maximilian Nöthe.
- Add support for long double (#494)
- Add support for H5Pset_libver_bounds and H5Pset_meta_block_size support (#500)
- New interface to select complex hyperslabs, irregular hyperslabs are limited to/from 1D array (#538 and #545)

Improvements

- Use inline where it is needed, otherwise some code can lead to ¨multiple definition¨ (#516). Thanks to Chris Byrohl.
- Use Catch2 instead of boost for tests, reduces dependencies (#521)
- CI reworked to test external libraries more thoroughly (boost, eigen, xtensor) (#536)

Bug Fixes

- Better support of const types (#460). Thanks to Philip Deegan.
- Vector of size zero was previously lead to UB (#502). Thanks to Haoran Ni.
- Use H5T_NATIVE_SCHAR instead of H5T_NATIVE_CHAR for ¨signed char¨ (#518)

Version 2.3.1 - 2021-08-04

Improvements

- Clean cmake files from old code (#465)
- Adding path to type warning message (#471)
- Adding compound types example, w dataset and attr (#467)

Bug Fixes

- Resolve an issue where padding of nested compound types were being calculated incorrectly (#461) (#468)
- GHA: drop previous runs (#462)

Version 2.3 - 2021-05-07

New Features:

- Add SZIP support (#435)
- Add option *parents* to createDataSet (#425)
- Implementing getting the filename dynamically (#424)
- Ability to create soft and external links (#421)
- Generalizing getPath and adding getFile as PathTraits (#417)

Improvements:

- Unified reading/writing attributes and datasets (#450)
- Old compilers have been removed from docker image (#430)
- Cleaning up and improving property lists (#429)
- An example using hdf5 references (#396) (#397)
- Add all property lists alias for completeness (#427)
- Add property CreateIntermediateGroup (#423)
- Add code coverage through codecov.io (#420)
- Introducing GitHub Actions CI (#416)
- Create issue and PR templates (#412)
- Initialize SilenceHDF5 to true in _exist (#411)
- Generalizing xtensor API (#407)
- Minor doc updates (#409)
- Fixing minor error in GH Action (#408)
- Uploading docs to gh-pages using GitHub Actions (#403)
- Various minor documentation updates (#405)
- optional documentation building in cmake (#377)
- From can be automatic now (#384)
- get_dim_vector in inspector (#383)
- Put type_of_array in inspector (#382)
- Move array_dims in the future manipulator (#381)
- Unify interface of H5Attribute with H5Slice_traits (#378)
- Use std::move in NRVO depending of version of GCC (#375)
- Fixed typo '-DD' to '-D' in 'Dependencies'. (#371)
- Changing date format (#364)

Bug fixes:

- Fix use before initialization (#414)
- Adding CMake include guard (#389)

Version 2.2.2 - 2020-07-30

New Features:

- [H5Easy] Adding OpenCV support (#343)
- [H5Easy] Enabling compression & Adding attributes (#337)
- Adding missing function to H5Attribute (#337)
- Add methods to retrieve Node paths or Dataset names and rename objects (#346)
- Add a file with the current version number of HighFive (#349)

Improvements

- [H5Easy] Updating error message dump (#335)
- [H5Easy] Switching implementation to partial specialization based on static dispatch (#327)
- Simplifying imports, new policy (#324)

Version 2.2.1 - 2020-04-28

Improvements

- Add a mechanism to not include target HighFive several times (#336)
- Fix SilenceHDF5 initialization for NodeTraits (#333)

Version 2.2 - 2020-03-23

New Features:

- Compound Types: API to register and read/write structs (#78). Thanks to Richard Shaw.
- Fixed-length strings. API via char[] and `FixedLenStringArray`(#277)
- Enum data types (#297)
- Datasets of HDF5 References. Support to dereference groups and datasets (#306)
- Objects (hard/soft link) can now be deleted with `unlink` (#284). Thanks to Tom Vander Aa.
- Attributes can be deleted with `deleteAttribute` (#239)

Improvements:

- `Attribute`s (metadata) now support additional types (#298)
- H5Easy: Reworked for compatibility with `Eigen::ref` and `Eigen::Map` (#291, #293)
- Hdf5 1.12 compatibility: working `Object::getInfo` and marking getAddress deprecated (#311)
- Strict compatibility with CMake 3.1 and C++11 (#304)
- CMake: Dependencies may be re-detected on FindPackage, fixed export targets and added integration tests (#255, #304, #312, #317)
- Support for array of `Eigen::Matrix` (#258)
- Selection: `ElementSet` working for N-dimensions (#247)

Bug Fixes:

- Shortcut syntax with c arrays (#273)
- Compatibility with in MSVC (Exception messages #263 and avoid throwing in `exist` check #308)

Version 2.1 - 2019-10-30

New Features:

- Inspection: API to get the type of links/objects and datasets data-types (#221)
- H5Easy: API for simple import/export to Eigen and xtensor (#141)
- Support for chunk and deflate configuration at dataset creation/open (#125). Added generic RawProperty↩ Lists. (#157)
- Recursive `createGroup` and `exist` (#152)
- Shortcut syntax: ability to create a filled dataset in a single line (#130)
- DataSet now accepts `std::complex` and `std::array`'s (#128, #129)

Improvements:

- Improved compat with MSVC and ICC compilers
- CMake build system: modernized, create exported targets, better messages, etc.
- Building and publishing documentation: `https://bluebrain.github.io/HighFive/`
- Several other. See #231

Bug Fixes:

- Fixed header dependencies. They are now all include-able (#225)
- Fixed read/write of N-Dimensional data as nested vectors (#191)
- Fixed data broadcasting for reading (#136)

Version 2.0 - 2018-07-19

- First version with C++11 enforcement
- Support for property list
- Support for Chunking
- Support for Compression / Deflate
- Fix: missing move constructor for properties
- Fix: typo in MPI IO driver
- Fix: several typo fixes
- Fix: Add missing include

Version 1.5 - 2018-01-06

- SliceTraits::read split in two overloads, the first one for plain C arrays and the second one for other types.
- Add support for complex number
- Add exist() method to the API
- Will be last release before 2.0 and enforcement of C++11

Version 1.4 - 2017-08-25

- Support id selection for the `select` function
- Suport STL containers of const elements
- Support scalar values and strings management
- Fix attribute assignment issue #40
- Fix Object assignment operator missing unref (possible memory leak)
- Introduce SilenceHDF5 for HDF5 error report
- Fix a unit test issue with SilenceHDF5

Version 1.3 - 2017-06-21

- Minor fixes

Version 1.2 - 2017-04-03

- Add Attribute support for Dataset
- Extend testing of Attribute support
- Fix issue related to multiple definitions in default driver
- Add more examples about attribute support

Version 1.1 - 2017-03-23

- Add support and examples for Parallel HDF5
- Initial implementation for H5 Properties
- Support for Attributes
- Improve documentation
- Add example for boost.Ublas matrix support

Version 1.0 - Init

- Initial release

Chapter 3

Deprecated List

Member HighFive::DataSet::DataSet ()=default

Default constructor creates unsafe uninitialized objects

Class HighFive::FileDriver

Use FileAccessProps directly

Member HighFive::Group::Group ()=default

Default constructor creates unsafe uninitialized objects

Class HighFive::MPIOFileDriver

Add MPIOFileAccess directly to FileAccessProps

Member HighFive::ObjectInfo::getAddress () const noexcept

Deprecated since HighFive 2.2. Soon supporting VOL tokens

Chapter 4

Namespace Index

4.1 Namespace List

Here is a list of all namespaces with brief descriptions:

Chapter 5

Hierarchical Index

5.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

Chapter 6

Class Index

6.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

Chapter 7

File Index

7.1 File List

Here is a list of all files with brief descriptions:

Chapter 8

Namespace Documentation

8.1 H5Easy Namespace Reference

Read/dump DataSets or Attribute using a minimalistic syntax. To this end, the functions are templated, and accept:

Classes

- class Compression

  Signal to set compression level for written DataSets.
- class DumpOptions

  Define options for dumping data.

Enumerations

- enum class DumpMode { Create = 0 , Overwrite = 1 }

  Write mode for DataSets.
- enum class Flush { False = 0 , True = 1 }

  Signal to enable/disable automatic flushing after write operations.

Functions

- size_t getSize (const File &file, const std::string &path)

  Get the size of an existing DataSet in an open HDF5 file.
- std::vector< size_t > getShape (const File &file, const std::string &path)

  Get the shape of an existing DataSet in an readable file.
- template<class T >
  DataSet dump (File &file, const std::string &path, const T &data, DumpMode mode=DumpMode::Create)

  Write object (templated) to a (new) DataSet in an open HDF5 file.
- template<class T >
  DataSet dump (File &file, const std::string &path, const T &data, const DumpOptions &options)

  Write object (templated) to a (new) DataSet in an open HDF5 file.
- template<class T >
  DataSet dump (File &file, const std::string &path, const T &data, const std::vector< size_t > &idx)

  Write a scalar to a (new, extendible) DataSet in an open HDF5 file.

- template<class T >
  DataSet dump (File &file, const std::string &path, const T &data, const std::initializer_list< size_t > &idx)

  Write a scalar to a (new, extendable) DataSet in an open HDF5 file.
- template<class T >
  DataSet dump (File &file, const std::string &path, const T &data, const std::vector< size_t > &idx, const DumpOptions &options)

  Write a scalar to a (new, extendible) DataSet in an open HDF5 file.
- template<class T >
  DataSet dump (File &file, const std::string &path, const T &data, const std::initializer_list< size_t > &idx, const DumpOptions &options)

  Write a scalar to a (new, extendible) DataSet in an open HDF5 file.
- template<class T >
  T load (const File &file, const std::string &path, const std::vector< size_t > &idx)

  Load entry `{i, j, ...}` from a DataSet in an open HDF5 file to a scalar.
- template<class T >
  T load (const File &file, const std::string &path)

  Load a DataSet in an open HDF5 file to an object (templated).
- template<class T >
  Attribute dumpAttribute (File &file, const std::string &path, const std::string &key, const T &data, DumpMode mode=DumpMode::Create)

  Write object (templated) to a (new) Attribute in an open HDF5 file.
- template<class T >
  Attribute dumpAttribute (File &file, const std::string &path, const std::string &key, const T &data, const DumpOptions &options)

  Write object (templated) to a (new) Attribute in an open HDF5 file.
- template<class T >
  T loadAttribute (const File &file, const std::string &path, const std::string &key)

  Load a Attribute in an open HDF5 file to an object (templated).

8.1.1 Detailed Description

Read/dump DataSets or Attribute using a minimalistic syntax. To this end, the functions are templated, and accept:

- Any type accepted by HighFive
- Eigen objects
- xtensor objects
- OpenCV objects

8.1.2 Enumeration Type Documentation

8.1.2.1 DumpMode

```
enum class H5Easy::DumpMode  [strong]
```

Write mode for DataSets.

Enumerator

Create	Dump only if DataSet does not exist, otherwise throw.
Overwrite	Create or overwrite if DataSet of correct shape exists, otherwise throw.

8.1.2.2 Flush

```
enum class H5Easy::Flush  [strong]
```

Signal to enable/disable automatic flushing after write operations.

Enumerator

False	No automatic flushing.
True	Automatic flushing.

8.1.3 Function Documentation

8.1.3.1 dump() [1/6]

```
template<class T >
DataSet H5Easy::dump (
            File & file,
            const std::string & path,
            const T & data,
            const DumpOptions & options )  [inline]
```

Write object (templated) to a (new) DataSet in an open HDF5 file.

Parameters

file	opened file (has to be writeable)
path	path of the DataSet
data	the data to write (any supported type)
options	dump options

Returns

The newly created DataSet

8.1.3.2 dump() [2/6]

```
template<class T >
DataSet H5Easy::dump (
            File & file,
            const std::string & path,
            const T & data,
            const std::initializer_list< size_t > & idx )  [inline]
```

Write a scalar to a (new, extendable) DataSet in an open HDF5 file.

Parameters

file	open File (has to be writeable)
path	path of the DataSet
data	the data to write (any supported type)
idx	the indices to which to write

Returns

The newly created DataSet

8.1.3.3 dump() [3/6]

```
template<class T >
DataSet H5Easy::dump (
            File & file,
            const std::string & path,
            const T & data,
            const std::initializer_list< size_t > & idx,
            const DumpOptions & options )  [inline]
```

Write a scalar to a (new, extendible) DataSet in an open HDF5 file.

Parameters

file	opened file (has to be writeable)
path	path of the DataSet
data	the data to write (any supported type)
idx	the indices to which to write
options	dump options

Returns

The newly created DataSet

8.1.3.4 dump() [4/6]

```
template<class T >
DataSet H5Easy::dump (
            File & file,
            const std::string & path,
            const T & data,
            const std::vector< size_t > & idx )  [inline]
```

Write a scalar to a (new, extendible) DataSet in an open HDF5 file.

Parameters

file	opened file (has to be writeable)
path	path of the DataSet
data	the data to write (any supported type)
idx	the indices to which to write

Returns

The newly created DataSet

8.1.3.5 dump() [5/6]

```
template<class T >
DataSet H5Easy::dump (
            File & file,
            const std::string & path,
            const T & data,
            const std::vector< size_t > & idx,
            const DumpOptions & options )  [inline]
```

Write a scalar to a (new, extendible) DataSet in an open HDF5 file.

Parameters

file	opened file (has to be writeable)
path	path of the DataSet
data	the data to write (any supported type)
idx	the indices to which to write
options	dump options

Returns

The newly created DataSet

8.1.3.6 dump() [6/6]

```
template<class T >
DataSet H5Easy::dump (
            File & file,
            const std::string & path,
            const T & data,
            DumpMode mode = DumpMode::Create )  [inline]
```

Write object (templated) to a (new) DataSet in an open HDF5 file.

Parameters

file	opened file (has to be writeable)
path	path of the DataSet
data	the data to write (any supported type)
mode	write mode

Returns

The newly created DataSet

8.1.3.7 dumpAttribute() [1/2]

```
template<class T >
Attribute H5Easy::dumpAttribute (
```

```
            File & file,
            const std::string & path,
            const std::string & key,
            const T & data,
            const DumpOptions & options )  [inline]
```

Write object (templated) to a (new) Attribute in an open HDF5 file.

Parameters

file	opened file (has to be writeable)
path	path of the DataSet
key	name of the attribute
data	the data to write (any supported type)
options	dump options

Returns

The newly created DataSet

8.1.3.8 dumpAttribute() [2/2]

```
template<class T >
Attribute H5Easy::dumpAttribute (
            File & file,
            const std::string & path,
            const std::string & key,
            const T & data,
            DumpMode mode = DumpMode::Create )  [inline]
```

Write object (templated) to a (new) Attribute in an open HDF5 file.

Parameters

file	opened file (has to be writeable)
path	path of the DataSet
key	name of the attribute
data	the data to write (any supported type)
mode	write mode

Returns

The newly created DataSet

8.1.3.9 getShape()

```
std::vector< size_t > H5Easy::getShape (
            const File & file,
            const std::string & path )  [inline]
```

Get the shape of an existing DataSet in an readable file.

Parameters

file	opened file (has to be readable)
path	Path of the DataSet

Returns

the shape of the DataSet

8.1.3.10 getSize()

```
size_t H5Easy::getSize (
            const File & file,
            const std::string & path )  [inline]
```

Get the size of an existing DataSet in an open HDF5 file.

Parameters

file	opened file (has to be readable)
path	path of the DataSet

Returns

Size of the DataSet

8.1.3.11 load() [1/2]

```
template<class T >
T H5Easy::load (
            const File & file,
            const std::string & path )  [inline]
```

Load a DataSet in an open HDF5 file to an object (templated).

Parameters

file	opened file (has to be writeable)
path	path of the DataSet

Returns

The read data

8.1.3.12 load() [2/2]

```
template<class T >
T H5Easy::load (
```

```
            const File & file,
            const std::string & path,
            const std::vector< size_t > & idx )  [inline]
```

Load entry `{i, j, ...}` from a DataSet in an open HDF5 file to a scalar.

Parameters

file	opened file (has to be writeable)
idx	the indices to load
path	path of the DataSet

Returns

The read data

8.1.3.13 loadAttribute()

```
template<class T >
T H5Easy::loadAttribute (
            const File & file,
            const std::string & path,
            const std::string & key )  [inline]
```

Load a Attribute in an open HDF5 file to an object (templated).

Parameters

file	opened file (has to be writeable)
path	path of the DataSet
key	name of the attribute

Returns

The read data

8.2 HighFive Namespace Reference

Classes

- class AllocationTime

  When are datasets allocated?
- class AnnotateTraits
- class AtomicType

  create an HDF5 DataType from a C++ type
- class AtomicType< char[StrLen]>
- class AtomicType< FixedLenStringArray< StrLen > >
- class AtomicType< std::complex< T > >

- class Attribute

  Class representing an attribute of a dataset or group.
- class AttributeException

  Exception specific to HighFive Attribute interface.
- class Caching
- class Chunking
- class CompoundType

  Create a compound HDF5 datatype.
- class CreateIntermediateGroup
- struct CreationOrder
- class DataSet

  Class representing a dataset.
- class DataSetException

  Exception specific to HighFive DataSet interface.
- class DataSpace

  Class representing the space (dimensions) of a dataset.
- class DataSpaceException

  Exception specific to HighFive DataSpace interface.
- class DataType

  HDF5 Data Type.
- class DataTypeException

  Exception specific to HighFive DataType interface.
- class Deflate
- class ElementSet
- class EnumType

  Create a enum HDF5 datatype.
- class EstimatedLinkInfo

  Set hints as to how many links to expect and their average length.
- class Exception

  Basic HighFive Exception class.
- class File

  File class.
- class FileDriver

  file driver base concept
- class FileException

  Exception specific to HighFive File interface.
- class FileVersionBounds

  Configure the version bounds for the file.
- class FixedLenStringArray

  A structure representing a set of fixed-length strings.
- class Group

  Represents an hdf5 group.
- class GroupException

  Exception specific to HighFive Group interface.
- struct HDF5ErrMapper
- class HyperSlab
- class LinkCreationOrder

  Track and index creation order time.
- class Logger

  A logger with supporting basic functionality.
- class MetadataBlockSize

Configure the metadata block size to use writing to files.

- class MPIOCollectiveMetadata

  Use collective MPI-IO for metadata read and write.
- class MPIOCollectiveMetadataRead

  Use collective MPI-IO for metadata read?
- class MPIOCollectiveMetadataWrite

  Use collective MPI-IO for metadata write?
- class MPIOFileAccess

  Configure MPI access for the file.
- class MPIOFileDriver

  MPIIO Driver for Parallel HDF5.
- class MpioNoCollectiveCause

  The cause for non-collective I/O.
- class NodeTraits

  NodeTraits: Base class for Group and File.
- class Object
- class ObjectException

  Exception specific to HighFive Object interface.
- class ObjectInfo

  A class for accessing hdf5 objects info.
- class PathTraits
- class PropertyException

  Exception specific to HighFive Property interface.
- class PropertyList

  HDF5 property Lists.
- class PropertyListBase

  Base Class for Property lists, providing global default.
- class RawPropertyList
- class Reference

  An HDF5 (object) reference type.
- class ReferenceException

  Exception specific to HighFive Reference interface.
- struct RegularHyperSlab
- class Selection

  Selection: represent a view on a slice/part of a dataset.
- class Shuffle
- class SilenceHDF5

  Utility class to disable HDF5 stack printing inside a scope.
- class SliceTraits
- class Szip
- class UseCollectiveIO

Typedefs

- template<typename T >
  using unqualified_t = typename std::remove_const< typename std::remove_reference< T >::type >::type
- using float16_t = half_float::half
- using ObjectCreateProps = PropertyList< PropertyType::OBJECT_CREATE >
- using FileCreateProps = PropertyList< PropertyType::FILE_CREATE >
- using FileAccessProps = PropertyList< PropertyType::FILE_ACCESS >
- using DataSetCreateProps = PropertyList< PropertyType::DATASET_CREATE >

- using DataSetAccessProps = PropertyList< PropertyType::DATASET_ACCESS >
- using DataTransferProps = PropertyList< PropertyType::DATASET_XFER >
- using GroupCreateProps = PropertyList< PropertyType::GROUP_CREATE >
- using GroupAccessProps = PropertyList< PropertyType::GROUP_ACCESS >
- using DataTypeCreateProps = PropertyList< PropertyType::DATATYPE_CREATE >
- using DataTypeAccessProps = PropertyList< PropertyType::DATATYPE_ACCESS >
- using StringCreateProps = PropertyList< PropertyType::STRING_CREATE >
- using AttributeCreateProps = PropertyList< PropertyType::ATTRIBUTE_CREATE >
- using ObjectCopyProps = PropertyList< PropertyType::OBJECT_COPY >
- using LinkCreateProps = PropertyList< PropertyType::LINK_CREATE >
- using LinkAccessProps = PropertyList< PropertyType::LINK_ACCESS >

Enumerations

- enum class IndexType : std::underlying_type< H5_index_t >::type { NAME = H5_INDEX_NAME , CRT_ORDER = H5_INDEX_CRT_ORDER }
- enum class LinkType { Hard , Soft , External , Other }

  The possible types of group entries (link concept)
- enum class DataTypeClass {
  Time = 1 << 1 , Integer = 1 << 2 , Float = 1 << 3 , String = 1 << 4 ,
  BitField = 1 << 5 , Opaque = 1 << 6 , Compound = 1 << 7 , Reference = 1 << 8 ,
  Enum = 1 << 9 , VarLen = 1 << 10 , Array = 1 << 11 , Invalid = 0 }

  Enum of Fundamental data classes.
- enum class ObjectType {
  File , Group , UserDataType , DataSpace ,
  Dataset , Attribute , Other }

  Enum of the types of objects (H5O api)
- enum class PropertyType : int {
  OBJECT_CREATE , FILE_CREATE , FILE_ACCESS , DATASET_CREATE ,
  DATASET_ACCESS , DATASET_XFER , GROUP_CREATE , GROUP_ACCESS ,
  DATATYPE_CREATE , DATATYPE_ACCESS , STRING_CREATE , ATTRIBUTE_CREATE ,
  OBJECT_COPY , LINK_CREATE , LINK_ACCESS }

  Types of property lists.
- enum class LogSeverity { Debug = HIGHFIVE_LOG_LEVEL_DEBUG , Info = HIGHFIVE_LOG_LEVEL_INFO , Warn = HIGHFIVE_LOG_LEVEL_WARN , Error = HIGHFIVE_LOG_LEVEL_ERROR }

Functions

- size_t compute_total_size (const std::vector< size_t > &dims)
- EnumType< details::Boolean > create_enum_boolean ()
- size_t find_first_atomic_member_size (hid_t hid)
- template<typename T >
  DataType create_datatype ()

  Create a DataType instance representing type T.
- template<typename T >
  DataType create_and_check_datatype ()

  Create a DataType instance representing type T and perform a sanity check on its size.
- std::vector< hsize_t > toHDF5SizeVector (const std::vector< size_t > &from)
- std::vector< size_t > toSTLSizeVector (const std::vector< hsize_t > &from)
- DataTypeClass operator| (DataTypeClass lhs, DataTypeClass rhs)
- DataTypeClass operator& (DataTypeClass lhs, DataTypeClass rhs)
- std::string to_string (LogSeverity severity)

- void default_logging_callback (LogSeverity severity, const std::string &message, const std::string &file, int line)
- Logger & get_global_logger ()

  Obtain a reference to the logger used by HighFive.
- void register_logging_callback (Logger::callback_type cb)

  Sets the callback that's used by the logger.

8.2.1 Typedef Documentation

8.2.1.1 AttributeCreateProps

```
using HighFive::AttributeCreateProps = typedef PropertyList<PropertyType::ATTRIBUTE_CREATE>
```

8.2.1.2 DataSetAccessProps

```
using HighFive::DataSetAccessProps = typedef PropertyList<PropertyType::DATASET_ACCESS>
```

8.2.1.3 DataSetCreateProps

```
using HighFive::DataSetCreateProps = typedef PropertyList<PropertyType::DATASET_CREATE>
```

8.2.1.4 DataTransferProps

```
using HighFive::DataTransferProps = typedef PropertyList<PropertyType::DATASET_XFER>
```

8.2.1.5 DataTypeAccessProps

```
using HighFive::DataTypeAccessProps = typedef PropertyList<PropertyType::DATATYPE_ACCESS>
```

8.2.1.6 DataTypeCreateProps

```
using HighFive::DataTypeCreateProps = typedef PropertyList<PropertyType::DATATYPE_CREATE>
```

8.2.1.7 FileAccessProps

```
using HighFive::FileAccessProps = typedef PropertyList<PropertyType::FILE_ACCESS>
```

8.2.1.8 FileCreateProps

```
using HighFive::FileCreateProps = typedef PropertyList<PropertyType::FILE_CREATE>
```

8.2.1.9 float16_t

```
using HighFive::float16_t = typedef half_float::half
```

8.2.1.10 GroupAccessProps

```
using HighFive::GroupAccessProps = typedef PropertyList<PropertyType::GROUP_ACCESS>
```

8.2.1.11 GroupCreateProps

```
using HighFive::GroupCreateProps = typedef PropertyList<PropertyType::GROUP_CREATE>
```

8.2.1.12 LinkAccessProps

```
using HighFive::LinkAccessProps = typedef PropertyList<PropertyType::LINK_ACCESS>
```

8.2.1.13 LinkCreateProps

```
using HighFive::LinkCreateProps = typedef PropertyList<PropertyType::LINK_CREATE>
```

8.2.1.14 ObjectCopyProps

```
using HighFive::ObjectCopyProps = typedef PropertyList<PropertyType::OBJECT_COPY>
```

8.2.1.15 ObjectCreateProps

```
using HighFive::ObjectCreateProps = typedef PropertyList<PropertyType::OBJECT_CREATE>
```

8.2.1.16 StringCreateProps

```
using HighFive::StringCreateProps = typedef PropertyList<PropertyType::STRING_CREATE>
```

8.2.1.17 unqualified_t

```
template<typename T >
using HighFive::unqualified_t = typedef typename std::remove_const<typename std::remove_↩
reference<T>::type>::type
```

8.2.2 Enumeration Type Documentation

8.2.2.1 DataTypeClass

```
enum class HighFive::DataTypeClass  [strong]
```

Enum of Fundamental data classes.

Enumerator

Time	
Integer	
Float	
String	
BitField	
Opaque	
Compound	
Reference	
Enum	
VarLen	
Array	
Invalid	

8.2.2.2 IndexType

```
enum class HighFive::IndexType :  std::underlying_type< H5_index_t >::type  [strong]
```

Enumerator

NAME	
CRT_ORDER	

8.2.2.3 LinkType

```
enum class HighFive::LinkType  [strong]
```

The possible types of group entries (link concept)

Enumerator

Hard	
Soft	
External	
Other	

8.2.2.4 LogSeverity

```
enum class HighFive::LogSeverity  [strong]
```

Enumerator

Debug	
Info	
Warn	
Error	

8.2.2.5 ObjectType

```
enum class HighFive::ObjectType  [strong]
```

Enum of the types of objects (H5O api)

Enumerator

File	
Group	
UserDataType	
DataSpace	
Dataset	
Attribute	
Other	

8.2.2.6 PropertyType

```
enum class HighFive::PropertyType :  int  [strong]
```

Types of property lists.

Enumerator

OBJECT_CREATE	
FILE_CREATE	
FILE_ACCESS	
DATASET_CREATE	
DATASET_ACCESS	
DATASET_XFER	
GROUP_CREATE	
GROUP_ACCESS	
DATATYPE_CREATE	
DATATYPE_ACCESS	
STRING_CREATE	
ATTRIBUTE_CREATE	
OBJECT_COPY	
LINK_CREATE	
LINK_ACCESS	

8.2.3 Function Documentation

8.2.3.1 compute_total_size()

```
size_t HighFive::compute_total_size (
            const std::vector< size_t > & dims )  [inline]
```

8.2.3.2 create_and_check_datatype()

```
template<typename T >
DataType HighFive::create_and_check_datatype ( )  [inline]
```

Create a DataType instance representing type T and perform a sanity check on its size.

8.2.3.3 create_datatype()

```
template<typename T >
DataType HighFive::create_datatype ( )  [inline]
```

Create a DataType instance representing type T.

8.2.3.4 create_enum_boolean()

```
EnumType< details::Boolean > HighFive::create_enum_boolean ( )  [inline]
```

8.2.3.5 default_logging_callback()

```
void HighFive::default_logging_callback (
            LogSeverity severity,
            const std::string & message,
            const std::string & file,
            int line )  [inline]
```

8.2.3.6 find_first_atomic_member_size()

```
size_t HighFive::find_first_atomic_member_size (
            hid_t hid )  [inline]
```

8.2.3.7 get_global_logger()

```
Logger & HighFive::get_global_logger ( )  [inline]
```

Obtain a reference to the logger used by HighFive.

This uses a Meyers singleton, to ensure that the global logger is initialized with a safe default logger, before it is used.

Note: You probably don't need to call this function explicitly.

8.2.3.8 operator&()

```
DataTypeClass HighFive::operator& (
            DataTypeClass lhs,
            DataTypeClass rhs )  [inline]
```

8.2.3.9 operator" | ()

```
DataTypeClass HighFive::operator| (
            DataTypeClass lhs,
            DataTypeClass rhs )  [inline]
```

8.2.3.10 register_logging_callback()

```
void HighFive::register_logging_callback (
            Logger::callback_type cb )  [inline]
```

Sets the callback that's used by the logger.

8.2.3.11 to_string()

```
std::string HighFive::to_string (
            LogSeverity severity )  [inline]
```

8.2.3.12 toHDF5SizeVector()

```
std::vector< hsize_t > HighFive::toHDF5SizeVector (
            const std::vector< size_t > & from )  [inline]
```

8.2.3.13 toSTLSizeVector()

```
std::vector< size_t > HighFive::toSTLSizeVector (
            const std::vector< hsize_t > & from )  [inline]
```

Chapter 9

Class Documentation

9.1 HighFive::AllocationTime Class Reference

When are datasets allocated?

`#include <H5PropertyList.hpp>`

Public Member Functions

- AllocationTime (H5D_alloc_time_t alloc_time)
- AllocationTime (const DataSetCreateProps &dcpl)
- H5D_alloc_time_t getAllocationTime ()

9.1.1 Detailed Description

When are datasets allocated?

The precise time of when HDF5 requests space to store the dataset can be configured. Please, consider the upstream documentation for `H5Pset_alloc_time`.

9.1.2 Constructor & Destructor Documentation

9.1.2.1 AllocationTime() [1/2]

```
HighFive::AllocationTime::AllocationTime (
            H5D_alloc_time_t alloc_time )  [inline], [explicit]
```

9.1.2.2 AllocationTime() [2/2]

```
HighFive::AllocationTime::AllocationTime (
            const DataSetCreateProps & dcpl )  [inline], [explicit]
```

9.1.3 Member Function Documentation

9.1.3.1 getAllocationTime()

```
H5D_alloc_time_t HighFive::AllocationTime::getAllocationTime ( )  [inline]
```

The documentation for this class was generated from the following files:

- highfive/H5PropertyList.hpp
- highfive/bits/H5PropertyList_misc.hpp

9.2 HighFive::AnnotateTraits< Derivate > Class Template Reference

```
#include <H5Annotate_traits.hpp>
```

Public Member Functions

- Attribute createAttribute (const std::string &attribute_name, const DataSpace &space, const DataType &type)
  create a new attribute with the name attribute_name
- template<typename Type >
  Attribute createAttribute (const std::string &attribute_name, const DataSpace &space)
  createAttribute create a new attribute on the current dataset with size specified by space
- template<typename T >
  Attribute createAttribute (const std::string &attribute_name, const T &data)
  createAttribute create a new attribute on the current dataset and write to it, inferring the DataSpace from data.
- void deleteAttribute (const std::string &attribute_name)
  deleteAttribute let you delete an attribute by its name.
- Attribute getAttribute (const std::string &attribute_name) const
  open an existing attribute with the name attribute_name
- size_t getNumberAttributes () const
  return the number of attributes of the node / group
- std::vector< std::string > listAttributeNames () const
  list all attribute name of the node / group
- bool hasAttribute (const std::string &attr_name) const
  checks an attribute exists

9.2.1 Member Function Documentation

9.2.1.1 createAttribute() [1/3]

```
template<typename Derivate >
template<typename Type >
Attribute HighFive::AnnotateTraits< Derivate >::createAttribute (
            const std::string & attribute_name,
            const DataSpace & space )  [inline]
```

createAttribute create a new attribute on the current dataset with size specified by space

Parameters

attribute_name	identifier of the attribute
space	Associated DataSpace informations

Returns

Attribute Object

9.2.1.2 createAttribute() [2/3]

```
template<typename Derivate >
Attribute HighFive::AnnotateTraits< Derivate >::createAttribute (
            const std::string & attribute_name,
            const DataSpace & space,
            const DataType & type )  [inline]
```

create a new attribute with the name attribute_name

Parameters

attribute_name	identifier of the attribute
space	Associated DataSpace
type	

Returns

the attribute object

9.2.1.3 createAttribute() [3/3]

```
template<typename Derivate >
template<typename T >
Attribute HighFive::AnnotateTraits< Derivate >::createAttribute (
            const std::string & attribute_name,
            const T & data )  [inline]
```

createAttribute create a new attribute on the current dataset and write to it, inferring the DataSpace from data.

Parameters

attribute_name	identifier of the attribute
data	Associated data to write, must support DataSpace::From, see DataSpace for more information

Returns

Attribute Object

9.2.1.4 deleteAttribute()

```
template<typename Derivate >
void HighFive::AnnotateTraits< Derivate >::deleteAttribute (
            const std::string & attribute_name )  [inline]
```

deleteAttribute let you delete an attribute by its name.

Parameters

attribute_name	identifier of the attribute

9.2.1.5 getAttribute()

```
template<typename Derivate >
Attribute HighFive::AnnotateTraits< Derivate >::getAttribute (
            const std::string & attribute_name ) const  [inline]
```

open an existing attribute with the name attribute_name

Parameters

attribute_name	identifier of the attribute

Returns

the attribute object

9.2.1.6 getNumberAttributes()

```
template<typename Derivate >
size_t HighFive::AnnotateTraits< Derivate >::getNumberAttributes  [inline]
```

return the number of attributes of the node / group

Returns

number of attributes

9.2.1.7 hasAttribute()

```
template<typename Derivate >
bool HighFive::AnnotateTraits< Derivate >::hasAttribute (
            const std::string & attr_name ) const  [inline]
```

checks an attribute exists

Returns

number of attributes

9.2.1.8 listAttributeNames()

```
template<typename Derivate >
std::vector< std::string > HighFive::AnnotateTraits< Derivate >::listAttributeNames  [inline]
```

list all attribute name of the node / group

Returns

number of attributes

The documentation for this class was generated from the following files:

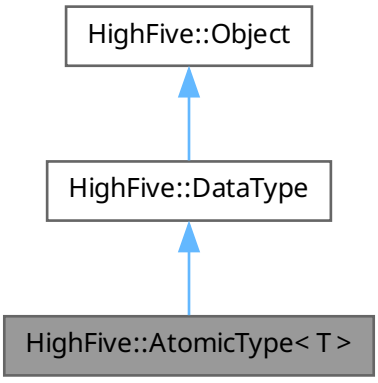
- highfive/bits/H5_definitions.hpp
- highfive/bits/H5Annotate_traits.hpp
- highfive/bits/H5Annotate_traits_misc.hpp

9.3 HighFive::AtomicType< T > Class Template Reference

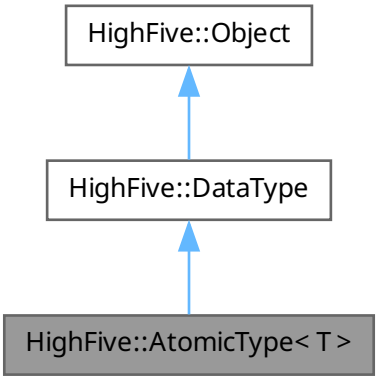
create an HDF5 DataType from a C++ type

```
#include <H5DataType.hpp>
```

Inheritance diagram for HighFive::AtomicType< T >:



Collaboration diagram for HighFive::AtomicType< T >:



Public Types

- using basic_type = T

Public Member Functions

- AtomicType ()
- AtomicType ()
- AtomicType ()
- AtomicType ()
- AtomicType ()
- AtomicType ()
- AtomicType ()
- AtomicType ()
- AtomicType ()
- AtomicType ()
- AtomicType ()
- AtomicType ()
- AtomicType ()
- AtomicType ()
- AtomicType ()
- AtomicType ()
- AtomicType ()
- AtomicType ()
- AtomicType ()

Public Member Functions inherited from HighFive::DataType

- bool operator== (const DataType &other) const
- bool operator!= (const DataType &other) const
- DataTypeClass getClass () const

  Return the fundamental type.
- size_t getSize () const

  Returns the length (in bytes) of this type elements.
- std::string string () const

  Returns a friendly description of the type (e.g. Float32)
- bool isVariableStr () const

  Returns whether the type is a variable-length string.
- bool isFixedLenStr () const

  Returns whether the type is a fixed-length string.
- bool empty () const noexcept

  Check the DataType was default constructed. Such value might represent auto-detection of the datatype from a buffer.
- bool isReference () const

  Returns whether the type is a Reference.
- DataTypeCreateProps getCreatePropertyList () const

  Get the list of properties for creation of this DataType.

Public Member Functions inherited from HighFive::Object

- Object (Object &&other) noexcept
- ~Object ()
- bool isValid () const noexcept

  isValid
- hid_t getId () const noexcept

  getId
- ObjectInfo getInfo () const

  Retrieve several infos about the current object (address, dates, etc)
- ObjectType getType () const

  Gets the fundamental type of the object (dataset, group, etc)
- bool operator== (const Object &other) const noexcept

Additional Inherited Members

Protected Member Functions inherited from HighFive::DataType

- Object (Object &&other) noexcept
- Object ()
- Object (const Object &other)
- Object (hid_t)

Protected Member Functions inherited from HighFive::Object

- Object ()
- Object (const Object &other)
- Object (hid_t)
- Object & operator= (const Object &other)

Protected Attributes inherited from HighFive::Object

- hid_t _hid

9.3.1 Detailed Description

template<typename T>
class HighFive::AtomicType< T >

create an HDF5 DataType from a C++ type

Support only basic data type

9.3.2 Member Typedef Documentation

9.3.2.1 basic_type

```
template<typename T >
using HighFive::AtomicType< T >::basic_type = T
```

9.3.3 Constructor & Destructor Documentation

9.3.3.1 AtomicType() [1/18]

```
template<typename T >
HighFive::AtomicType< T >::AtomicType
```

9.3.3.2 AtomicType() [2/18]

```
HighFive::AtomicType< char >::AtomicType ( )  [inline]
```

9.3.3.3 AtomicType() [3/18]

```
HighFive::AtomicType< signedchar >::AtomicType ( )  [inline]
```

9.3.3.4 AtomicType() [4/18]

```
HighFive::AtomicType< unsignedchar >::AtomicType ( )  [inline]
```

9.3.3.5 AtomicType() [5/18]

```
HighFive::AtomicType< short >::AtomicType ( )  [inline]
```

9.3.3.6 AtomicType() [6/18]

HighFive::AtomicType< unsignedshort >::AtomicType ( ) [inline]

9.3.3.7 AtomicType() [7/18]

HighFive::AtomicType< int >::AtomicType ( ) [inline]

9.3.3.8 AtomicType() [8/18]

HighFive::AtomicType< unsigned >::AtomicType ( ) [inline]

9.3.3.9 AtomicType() [9/18]

HighFive::AtomicType< long >::AtomicType ( ) [inline]

9.3.3.10 AtomicType() [10/18]

HighFive::AtomicType< unsignedlong >::AtomicType ( ) [inline]

9.3.3.11 AtomicType() [11/18]

HighFive::AtomicType< longlong >::AtomicType ( ) [inline]

9.3.3.12 AtomicType() [12/18]

HighFive::AtomicType< unsignedlonglong >::AtomicType ( ) [inline]

9.3.3.13 AtomicType() [13/18]

HighFive::AtomicType< float16_t >::AtomicType ( ) [inline]

9.3.3.14 AtomicType() [14/18]

HighFive::AtomicType< float >::AtomicType ( ) [inline]

9.3.3.15 AtomicType() [15/18]

HighFive::AtomicType< double >::AtomicType ( ) [inline]

9.3.3.16 AtomicType() [16/18]

```
HighFive::AtomicType< longdouble >::AtomicType ( )  [inline]
```

9.3.3.17 AtomicType() [17/18]

```
HighFive::AtomicType< std::string >::AtomicType ( )  [inline]
```

9.3.3.18 AtomicType() [18/18]

```
HighFive::AtomicType< Reference >::AtomicType ( )  [inline]
```

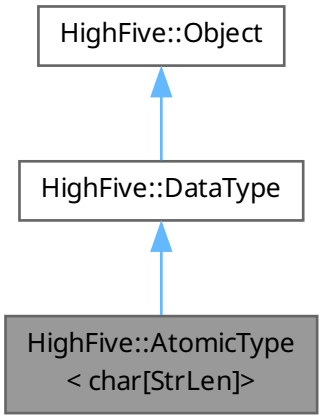
The documentation for this class was generated from the following files:

- highfive/bits/H5_definitions.hpp
- highfive/H5DataType.hpp
- highfive/bits/H5DataType_misc.hpp

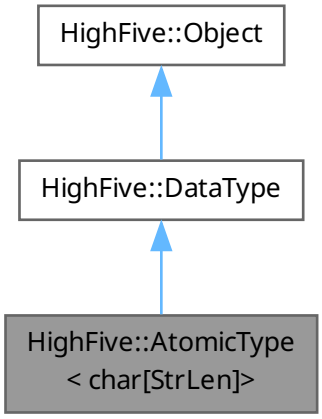
9.4 HighFive::AtomicType< char[StrLen]> Class Template Reference

```
#include <H5DataType_misc.hpp>
```

Inheritance diagram for HighFive::AtomicType< char[StrLen]>:



Collaboration diagram for HighFive::AtomicType< char[StrLen]>:



Public Member Functions

- AtomicType ()

Public Member Functions inherited from HighFive::DataType

- bool operator== (const DataType &other) const
- bool operator!= (const DataType &other) const
- DataTypeClass getClass () const

  Return the fundamental type.
- size_t getSize () const

  Returns the length (in bytes) of this type elements.
- std::string string () const

  Returns a friendly description of the type (e.g. Float32)
- bool isVariableStr () const

  Returns whether the type is a variable-length string.
- bool isFixedLenStr () const

  Returns whether the type is a fixed-length string.
- bool empty () const noexcept

  Check the DataType was default constructed. Such value might represent auto-detection of the datatype from a buffer.
- bool isReference () const

  Returns whether the type is a Reference.
- DataTypeCreateProps getCreatePropertyList () const

  Get the list of properties for creation of this DataType.

Public Member Functions inherited from HighFive::Object

- Object (Object &&other) noexcept
- ~Object ()
- bool isValid () const noexcept

  isValid
- hid_t getId () const noexcept

  getId
- ObjectInfo getInfo () const

  Retrieve several infos about the current object (address, dates, etc)
- ObjectType getType () const

  Gets the fundamental type of the object (dataset, group, etc)
- bool operator== (const Object &other) const noexcept

Additional Inherited Members

Protected Member Functions inherited from HighFive::DataType

- Object (Object &&other) noexcept
- Object ()
- Object (const Object &other)
- Object (hid_t)

Protected Member Functions inherited from HighFive::Object

- Object ()
- Object (const Object &other)
- Object (hid_t)
- Object & operator= (const Object &other)

Protected Attributes inherited from HighFive::Object

- hid_t _hid

9.4.1 Constructor & Destructor Documentation

9.4.1.1 AtomicType()

```
template<size_t StrLen>
HighFive::AtomicType< char[StrLen]>::AtomicType ( )  [inline]
```

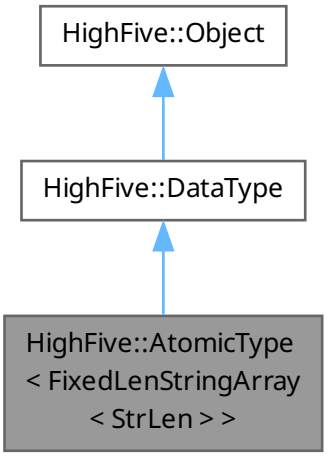
The documentation for this class was generated from the following file:

- highfive/bits/H5DataType_misc.hpp

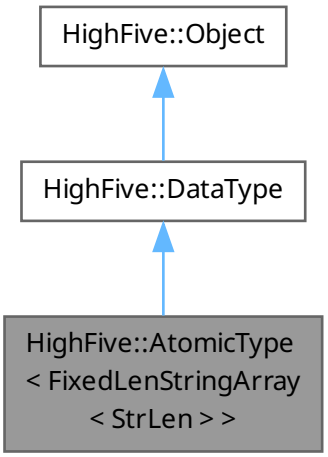
9.5 HighFive::AtomicType< FixedLenStringArray< StrLen > > Class Template Reference

`#include <H5DataType_misc.hpp>`

Inheritance diagram for HighFive::AtomicType< FixedLenStringArray< StrLen > >:



Collaboration diagram for HighFive::AtomicType< FixedLenStringArray< StrLen > >:



Public Member Functions

- AtomicType ()

Public Member Functions inherited from HighFive::DataType

- bool operator== (const DataType &other) const
- bool operator!= (const DataType &other) const
- DataTypeClass getClass () const

  Return the fundamental type.
- size_t getSize () const

  Returns the length (in bytes) of this type elements.
- std::string string () const

  Returns a friendly description of the type (e.g. Float32)
- bool isVariableStr () const

  Returns whether the type is a variable-length string.
- bool isFixedLenStr () const

  Returns whether the type is a fixed-length string.
- bool empty () const noexcept

  Check the DataType was default constructed. Such value might represent auto-detection of the datatype from a buffer.
- bool isReference () const

  Returns whether the type is a Reference.
- DataTypeCreateProps getCreatePropertyList () const

  Get the list of properties for creation of this DataType.

Public Member Functions inherited from HighFive::Object

- Object (Object &&other) noexcept
- ~Object ()
- bool isValid () const noexcept

  isValid
- hid_t getId () const noexcept

  getId
- ObjectInfo getInfo () const

  Retrieve several infos about the current object (address, dates, etc)
- ObjectType getType () const

  Gets the fundamental type of the object (dataset, group, etc)
- bool operator== (const Object &other) const noexcept

Additional Inherited Members

Protected Member Functions inherited from HighFive::DataType

- Object (Object &&other) noexcept
- Object ()
- Object (const Object &other)
- Object (hid_t)

Protected Member Functions inherited from HighFive::Object

- Object ()
- Object (const Object &other)
- Object (hid_t)
- Object & operator= (const Object &other)

Protected Attributes inherited from HighFive::Object

- hid_t _hid

9.5.1 Constructor & Destructor Documentation

9.5.1.1 AtomicType()

```
template<size_t StrLen>
HighFive::AtomicType< FixedLenStringArray< StrLen > >::AtomicType ( )  [inline]
```

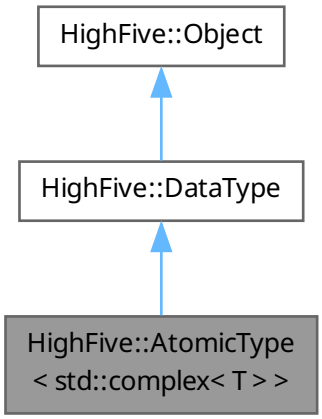
The documentation for this class was generated from the following file:

- highfive/bits/H5DataType_misc.hpp

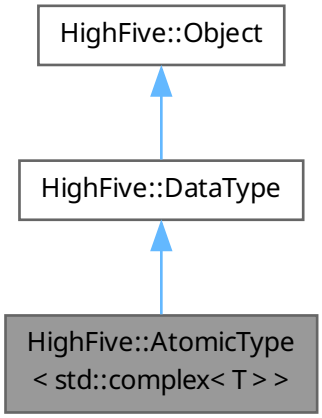
9.6 HighFive::AtomicType< std::complex< T > > Class Template Reference

```
#include <H5DataType_misc.hpp>
```

Inheritance diagram for HighFive::AtomicType< std::complex< T > >:



Collaboration diagram for HighFive::AtomicType< std::complex< T > >:



Public Member Functions

- AtomicType ()

Public Member Functions inherited from HighFive::DataType

- bool operator== (const DataType &other) const
- bool operator!= (const DataType &other) const
- DataTypeClass getClass () const

  Return the fundamental type.
- size_t getSize () const

  Returns the length (in bytes) of this type elements.
- std::string string () const

  Returns a friendly description of the type (e.g. Float32)
- bool isVariableStr () const

  Returns whether the type is a variable-length string.
- bool isFixedLenStr () const

  Returns whether the type is a fixed-length string.
- bool empty () const noexcept

  Check the DataType was default constructed. Such value might represent auto-detection of the datatype from a buffer.
- bool isReference () const

  Returns whether the type is a Reference.
- DataTypeCreateProps getCreatePropertyList () const

  Get the list of properties for creation of this DataType.

Public Member Functions inherited from HighFive::Object

- Object (Object &&other) noexcept
- ~Object ()
- bool isValid () const noexcept

  isValid
- hid_t getId () const noexcept

  getId
- ObjectInfo getInfo () const

  Retrieve several infos about the current object (address, dates, etc)
- ObjectType getType () const

  Gets the fundamental type of the object (dataset, group, etc)
- bool operator== (const Object &other) const noexcept

Additional Inherited Members

Protected Member Functions inherited from HighFive::DataType

- Object (Object &&other) noexcept
- Object ()
- Object (const Object &other)
- Object (hid_t)

Protected Member Functions inherited from HighFive::Object

- Object ()
- Object (const Object &other)
- Object (hid_t)
- Object & operator= (const Object &other)

Protected Attributes inherited from HighFive::Object

- hid_t _hid

9.6.1 Constructor & Destructor Documentation

9.6.1.1 AtomicType()

```
template<typename T >
HighFive::AtomicType< std::complex< T > >::AtomicType ( )  [inline]
```

The documentation for this class was generated from the following file:

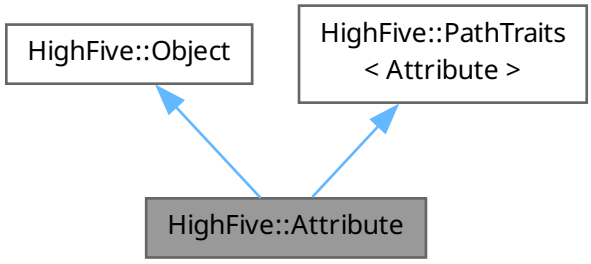
- highfive/bits/H5DataType_misc.hpp

9.7 HighFive::Attribute Class Reference

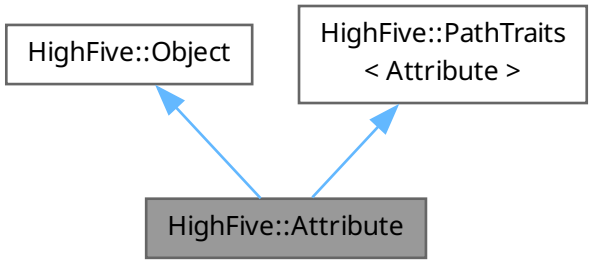
Class representing an attribute of a dataset or group.

`#include <H5Attribute.hpp>`

Inheritance diagram for HighFive::Attribute:



Collaboration diagram for HighFive::Attribute:



Public Member Functions

- std::string getName () const
  return the name of the current attribute
- size_t getStorageSize () const
- DataType getDataType () const
  getDataType
- DataSpace getSpace () const
  getSpace
- DataSpace getMemSpace () const
  getMemSpace

- template<typename T >
  T read () const

  Return the attribute.
- template<typename T >
  void read (T &array) const
- template<typename T >
  void read (T *array, const DataType &dtype={}) const

  Read the attribute into a buffer.
- template<typename T >
  void write (const T &buffer)
- template<typename T >
  void write_raw (const T *buffer, const DataType &dtype={})

  Write a buffer to this attribute.
- AttributeCreateProps getCreatePropertyList () const

  Get the list of properties for creation of this attribute.
- Attribute ()=delete

Public Member Functions inherited from HighFive::Object

- Object (Object &&other) noexcept
- ~Object ()
- bool isValid () const noexcept

  isValid
- hid_t getId () const noexcept

  getId
- ObjectInfo getInfo () const

  Retrieve several infos about the current object (address, dates, etc)
- ObjectType getType () const

  Gets the fundamental type of the object (dataset, group, etc)
- bool operator== (const Object &other) const noexcept

Public Member Functions inherited from HighFive::PathTraits< Attribute >

- PathTraits ()
- std::string getPath () const

  return the path to the current object
- File & getFile () const noexcept

  Return a reference to the File object this object belongs.

Static Public Attributes

- static const ObjectType type = ObjectType::Attribute

Protected Member Functions

- Object (Object &&other) noexcept
- Object ()
- Object (const Object &other)
- Object (hid_t)

Protected Member Functions inherited from HighFive::Object

- Object ()
- Object (const Object &other)
- Object (hid_t)
- Object & operator= (const Object &other)

Additional Inherited Members

Protected Attributes inherited from HighFive::Object

- hid_t _hid

Protected Attributes inherited from HighFive::PathTraits< Attribute >

- std::shared_ptr< File > _file_obj

9.7.1 Detailed Description

Class representing an attribute of a dataset or group.

9.7.2 Constructor & Destructor Documentation

9.7.2.1 Attribute()

```
HighFive::Attribute::Attribute ( )  [delete]
```

9.7.3 Member Function Documentation

9.7.3.1 getCreatePropertyList()

```
AttributeCreateProps HighFive::Attribute::getCreatePropertyList ( ) const  [inline]
```

Get the list of properties for creation of this attribute.

9.7.3.2 getDataType()

```
DataType HighFive::Attribute::getDataType ( ) const  [inline]
```

getDataType

Returns

return the datatype associated with this dataset

9.7.3.3 getMemSpace()

```
DataSpace HighFive::Attribute::getMemSpace ( ) const  [inline]
```

getMemSpace

Returns

same than getSpace for DataSet, compatibility with Selection class

9.7.3.4 getName()

```
std::string HighFive::Attribute::getName ( ) const  [inline]
```

return the name of the current attribute

Returns

the name of the attribute

9.7.3.5 getSpace()

```
DataSpace HighFive::Attribute::getSpace ( ) const  [inline]
```

getSpace

Returns

return the dataspace associated with this dataset

9.7.3.6 getStorageSize()

```
size_t HighFive::Attribute::getStorageSize ( ) const  [inline]
```

9.7.3.7 Object() [1/4]

```
HighFive::Object::Object ( )  [inline], [protected]
```

9.7.3.8 Object() [2/4]

```
HighFive::Object::Object (
            const Object & other )  [inline], [protected]
```

9.7.3.9 Object() [3/4]

```
HighFive::Object::Object (
            hid_t hid )  [inline], [explicit], [protected]
```

9.7.3.10 Object() [4/4]

```
HighFive::Object::Object (
            Object && other )  [inline], [protected], [noexcept]
```

9.7.3.11 read() [1/3]

```
template<typename T >
T HighFive::Attribute::read  [inline]
```

Return the attribute.

9.7.3.12 read() [2/3]

```
template<typename T >
void HighFive::Attribute::read (
            T & array ) const  [inline]
```

Read the attribute into a buffer An exception is raised if the numbers of dimension of the buffer and of the attribute are different

The array type can be a N-pointer or a N-vector (e.g int** integer two dimensional array)

9.7.3.13 read() [3/3]

```
template<typename T >
void HighFive::Attribute::read (
            T * array,
            const DataType & dtype = {} ) const  [inline]
```

Read the attribute into a buffer.

9.7.3.14 write()

```
template<typename T >
void HighFive::Attribute::write (
            const T & buffer )  [inline]
```

Write the integrality N-dimension buffer to this attribute An exception is raised if the numbers of dimension of the buffer and of the attribute are different

The array type can be a N-pointer or a N-vector (e.g int** integer two dimensional array)

9.7.3.15 write_raw()

```
template<typename T >
void HighFive::Attribute::write_raw (
            const T * buffer,
            const DataType & dtype = {} )  [inline]
```

Write a buffer to this attribute.

9.7.4 Member Data Documentation

9.7.4.1 type

```
const ObjectType HighFive::Attribute::type = ObjectType::Attribute  [static]
```

The documentation for this class was generated from the following files:

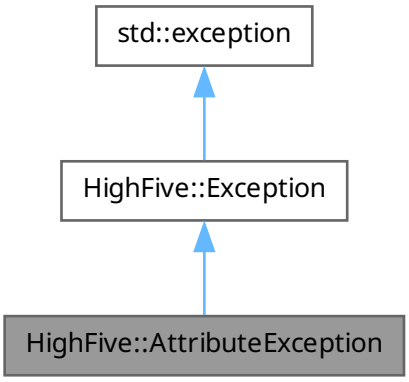
- highfive/H5Attribute.hpp
- highfive/bits/H5Attribute_misc.hpp

9.8 HighFive::AttributeException Class Reference

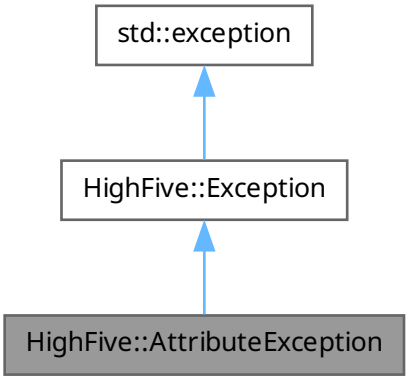
Exception specific to HighFive Attribute interface.

```
#include <H5Exception.hpp>
```

Inheritance diagram for HighFive::AttributeException:



Collaboration diagram for HighFive::AttributeException:



Public Member Functions

- AttributeException (const std::string &err_msg)

Public Member Functions inherited from HighFive::Exception

- Exception (const std::string &err_msg)
- virtual ~Exception () throw ()
- const char * what () const override throw ()

  get the current exception error message
- virtual void setErrorMsg (const std::string &errmsg)

  define the error message
- Exception * nextException () const

  nextException
- hid_t getErrMajor () const

  HDF5 library error mapper.
- hid_t getErrMinor () const

  HDF5 library error mapper.

Additional Inherited Members

Protected Attributes inherited from HighFive::Exception

- std::string _errmsg
- std::shared_ptr< Exception > _next
- hid_t _err_major
- hid_t _err_minor

9.8.1 Detailed Description

Exception specific to HighFive Attribute interface.

9.8.2 Constructor & Destructor Documentation

9.8.2.1 AttributeException()

```
HighFive::AttributeException::AttributeException (
            const std::string & err_msg )  [inline]
```

The documentation for this class was generated from the following file:

- highfive/H5Exception.hpp

9.9 HighFive::Caching Class Reference

```
#include <H5PropertyList.hpp>
```

Public Member Functions

- Caching (const size_t numSlots, const size_t cacheSize, const double w0=static_cast< double >(H5D_↩ CHUNK_CACHE_W0_DEFAULT))
- Caching (const DataSetCreateProps &dcpl)
- size_t getNumSlots () const
- size_t getCacheSize () const
- double getW0 () const

9.9.1 Detailed Description

Dataset access property to control chunk cache configuration. Do not confuse with the similar file access property for H5Pset_cache

9.9.2 Constructor & Destructor Documentation

9.9.2.1 Caching() [1/2]

```
HighFive::Caching::Caching (
            const size_t numSlots,
            const size_t cacheSize,
            const double w0 = static_cast<double>(H5D_CHUNK_CACHE_W0_DEFAULT) )  [inline]
```

https://support.hdfgroup.org/HDF5/doc/RM/H5P/H5Pset_chunk_cache.html for details.

9.9.2.2 Caching() [2/2]

```
HighFive::Caching::Caching (
            const DataSetCreateProps & dcpl )  [inline], [explicit]
```

9.9.3 Member Function Documentation

9.9.3.1 getCacheSize()

```
size_t HighFive::Caching::getCacheSize ( ) const  [inline]
```

9.9.3.2 getNumSlots()

```
size_t HighFive::Caching::getNumSlots ( ) const  [inline]
```

9.9.3.3 getW0()

```
double HighFive::Caching::getW0 ( ) const  [inline]
```

The documentation for this class was generated from the following files:

- highfive/H5PropertyList.hpp
- highfive/bits/H5PropertyList_misc.hpp

9.10 HighFive::Chunking Class Reference

```
#include <H5PropertyList.hpp>
```

Public Member Functions

- Chunking (const std::vector< hsize_t > &dims)
- Chunking (const std::initializer_list< hsize_t > &items)
- template<typename... Args>
  Chunking (hsize_t item, Args... args)
- Chunking (DataSetCreateProps &plist, size_t max_dims=32)
- const std::vector< hsize_t > & getDimensions () const noexcept

9.10.1 Constructor & Destructor Documentation

9.10.1.1 Chunking() [1/4]

```
HighFive::Chunking::Chunking (
            const std::vector< hsize_t > & dims )  [inline], [explicit]
```

9.10.1.2 Chunking() [2/4]

```
HighFive::Chunking::Chunking (
            const std::initializer_list< hsize_t > & items )  [inline]
```

9.10.1.3 Chunking() [3/4]

```
template<typename...  Args>
HighFive::Chunking::Chunking (
            hsize_t item,
            Args...  args )  [inline], [explicit]
```

9.10.1.4 Chunking() [4/4]

```
HighFive::Chunking::Chunking (
            DataSetCreateProps & plist,
            size_t max_dims = 32 )  [inline], [explicit]
```

9.10.2 Member Function Documentation

9.10.2.1 getDimensions()

```
const std::vector< hsize_t > & HighFive::Chunking::getDimensions ( ) const  [inline], [noexcept]
```

The documentation for this class was generated from the following files:

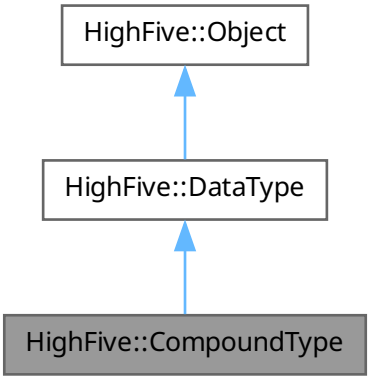
- highfive/H5PropertyList.hpp
- highfive/bits/H5PropertyList_misc.hpp

9.11 HighFive::CompoundType Class Reference

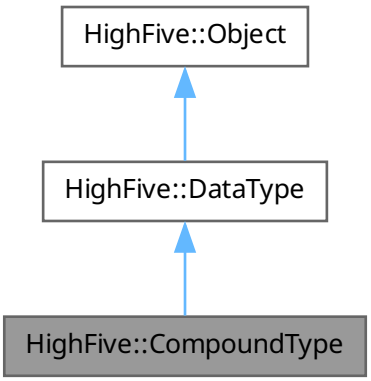
Create a compound HDF5 datatype.

`#include <H5DataType.hpp>`

Inheritance diagram for HighFive::CompoundType:



Collaboration diagram for HighFive::CompoundType:



Classes

- struct member_def

  Use for defining a sub-type of compound type.

Public Member Functions

- CompoundType (const CompoundType &other)=default
- CompoundType (const std::vector< member_def > &t_members, size_t size=0)

  Initializes a compound type from a vector of member definitions.
- CompoundType (std::vector< member_def > &&t_members, size_t size=0)
- CompoundType (const std::initializer_list< member_def > &t_members, size_t size=0)
- CompoundType (DataType &&type)

  Initializes a compound type from a DataType.
- void commit (const Object &object, const std::string &name) const

  Commit datatype into the given Object.
- const std::vector< member_def > & getMembers () const noexcept

  Get read access to the CompoundType members.

Public Member Functions inherited from HighFive::DataType

- bool operator== (const DataType &other) const
- bool operator!= (const DataType &other) const
- DataTypeClass getClass () const

  Return the fundamental type.
- size_t getSize () const

  Returns the length (in bytes) of this type elements.
- std::string string () const

  Returns a friendly description of the type (e.g. Float32)
- bool isVariableStr () const

Returns whether the type is a variable-length string.

- bool isFixedLenStr () const

  Returns whether the type is a fixed-length string.

- bool empty () const noexcept

  Check the DataType was default constructed. Such value might represent auto-detection of the datatype from a buffer.

- bool isReference () const

  Returns whether the type is a Reference.

- DataTypeCreateProps getCreatePropertyList () const

  Get the list of properties for creation of this DataType.

Public Member Functions inherited from HighFive::Object

- Object (Object &&other) noexcept
- ~Object ()
- bool isValid () const noexcept

  isValid

- hid_t getId () const noexcept

  getId

- ObjectInfo getInfo () const

  Retrieve several infos about the current object (address, dates, etc)

- ObjectType getType () const

  Gets the fundamental type of the object (dataset, group, etc)

- bool operator== (const Object &other) const noexcept

Additional Inherited Members

Protected Member Functions inherited from HighFive::DataType

- Object (Object &&other) noexcept
- Object ()
- Object (const Object &other)
- Object (hid_t)

Protected Member Functions inherited from HighFive::Object

- Object ()
- Object (const Object &other)
- Object (hid_t)
- Object & operator= (const Object &other)

Protected Attributes inherited from HighFive::Object

- hid_t _hid

9.11.1 Detailed Description

Create a compound HDF5 datatype.

9.11.2 Constructor & Destructor Documentation

9.11.2.1 CompoundType() [1/5]

```
HighFive::CompoundType::CompoundType (
            const CompoundType & other )  [default]
```

9.11.2.2 CompoundType() [2/5]

```
HighFive::CompoundType::CompoundType (
            const std::vector< member_def > & t_members,
            size_t size = 0 )  [inline]
```

Initializes a compound type from a vector of member definitions.

Parameters

t_members	
size	

9.11.2.3 CompoundType() [3/5]

```
HighFive::CompoundType::CompoundType (
            std::vector< member_def > && t_members,
            size_t size = 0 )  [inline]
```

9.11.2.4 CompoundType() [4/5]

```
HighFive::CompoundType::CompoundType (
            const std::initializer_list< member_def > & t_members,
            size_t size = 0 )  [inline]
```

9.11.2.5 CompoundType() [5/5]

```
HighFive::CompoundType::CompoundType (
            DataType && type )  [inline]
```

Initializes a compound type from a DataType.

Parameters

type	

9.11.3 Member Function Documentation

9.11.3.1 commit()

```
void HighFive::CompoundType::commit (
            const Object & object,
            const std::string & name ) const  [inline]
```

Commit datatype into the given Object.

Parameters

object	Location to commit object into
name	Name to give the datatype

9.11.3.2 getMembers()

```
const std::vector< member_def > & HighFive::CompoundType::getMembers ( ) const  [inline],
[noexcept]
```

Get read access to the CompoundType members.

The documentation for this class was generated from the following files:

- highfive/H5DataType.hpp
- highfive/bits/H5DataType_misc.hpp

9.12 H5Easy::Compression Class Reference

Signal to set compression level for written DataSets.

```
#include <H5Easy.hpp>
```

Public Member Functions

- Compression (bool enable=true)

  Enable compression with the highest compression level (9). or disable compression (set compression level to 0).
- template<class T >
  Compression (T level)

  Set compression level.
- unsigned get () const

  Return compression level.

9.12.1 Detailed Description

Signal to set compression level for written DataSets.

9.12.2 Constructor & Destructor Documentation

9.12.2.1 Compression() [1/2]

```
H5Easy::Compression::Compression (
            bool enable = true )  [inline], [explicit]
```

Enable compression with the highest compression level (9). or disable compression (set compression level to 0).

Parameters

enable	`true` to enable with highest compression level

9.12.2.2 Compression() [2/2]

```
template<class T >
H5Easy::Compression::Compression (
            T level )  [inline]
```

Set compression level.

Parameters

level	the compression level

9.12.3 Member Function Documentation

9.12.3.1 get()

```
unsigned H5Easy::Compression::get ( ) const  [inline]
```

Return compression level.

The documentation for this class was generated from the following files:

- highfive/H5Easy.hpp
- highfive/h5easy_bits/H5Easy_public.hpp

9.13 HighFive::CreateIntermediateGroup Class Reference

```
#include <H5PropertyList.hpp>
```

Public Member Functions

- CreateIntermediateGroup (bool create=true)
- CreateIntermediateGroup (const ObjectCreateProps &ocpl)
- CreateIntermediateGroup (const LinkCreateProps &lcpl)
- bool isSet () const

Protected Member Functions

- void fromPropertyList (hid_t hid)

9.13.1 Constructor & Destructor Documentation

9.13.1.1 CreateIntermediateGroup() [1/3]

```
HighFive::CreateIntermediateGroup::CreateIntermediateGroup (
            bool create = true )  [inline], [explicit]
```

9.13.1.2 CreateIntermediateGroup() [2/3]

```
HighFive::CreateIntermediateGroup::CreateIntermediateGroup (
            const ObjectCreateProps & ocpl )  [inline], [explicit]
```

9.13.1.3 CreateIntermediateGroup() [3/3]

```
HighFive::CreateIntermediateGroup::CreateIntermediateGroup (
            const LinkCreateProps & lcpl )  [explicit]
```

9.13.2 Member Function Documentation

9.13.2.1 fromPropertyList()

```
void HighFive::CreateIntermediateGroup::fromPropertyList (
            hid_t hid )  [inline], [protected]
```

9.13.2.2 isSet()

```
bool HighFive::CreateIntermediateGroup::isSet ( ) const  [inline]
```

The documentation for this class was generated from the following files:

- highfive/H5PropertyList.hpp
- highfive/bits/H5PropertyList_misc.hpp

9.14 HighFive::CreationOrder Struct Reference

```
#include <H5PropertyList.hpp>
```

Public Types

- enum _CreationOrder { Tracked = H5P_CRT_ORDER_TRACKED , Indexed = H5P_CRT_ORDER_INDEXED }

9.14.1 Member Enumeration Documentation

9.14.1.1 _CreationOrder

```
enum HighFive::CreationOrder::_CreationOrder
```

Enumerator

Tracked	
Indexed	

The documentation for this struct was generated from the following file:

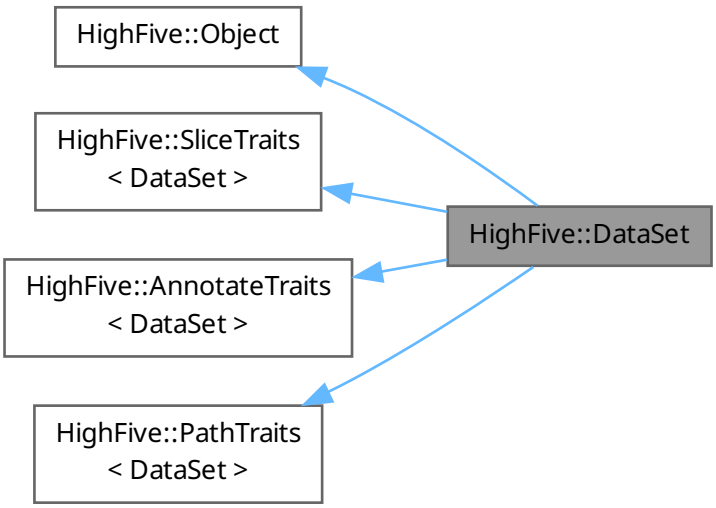
- highfive/H5PropertyList.hpp

9.15 HighFive::DataSet Class Reference

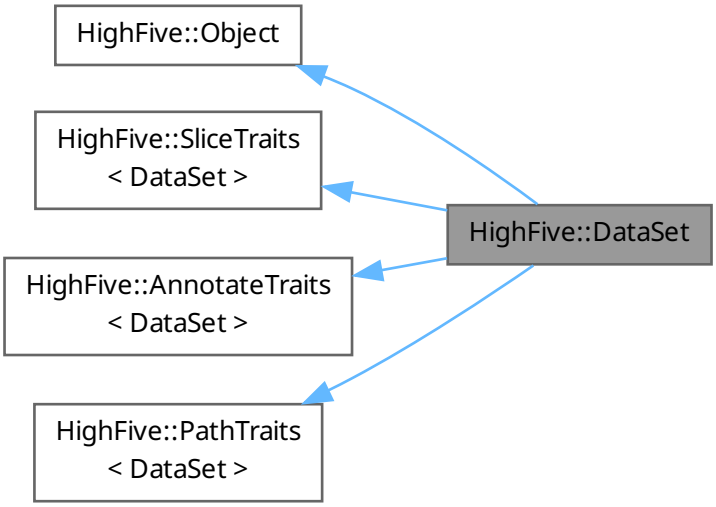
Class representing a dataset.

`#include <H5DataSet.hpp>`

Inheritance diagram for HighFive::DataSet:



Collaboration diagram for HighFive::DataSet:



Public Member Functions

- uint64_t getStorageSize () const

  getStorageSize
- uint64_t getOffset () const

  getOffset
- DataType getDataType () const

  getDataType
- DataSpace getSpace () const

  getSpace
- DataSpace getMemSpace () const

  getMemSpace
- void resize (const std::vector< size_t > &dims)

  Change the size of the dataset.
- std::vector< size_t > getDimensions () const

  Get the dimensions of the whole DataSet. This is a shorthand for getSpace().getDimensions()
- size_t getElementCount () const

  Get the total number of elements in the current dataset. E.g. 2x2x2 matrix has size 8. This is a shorthand for getSpace().getTotalCount()
- DataSetCreateProps getCreatePropertyList () const

  Get the list of properties for creation of this dataset.
- DataSetAccessProps getAccessPropertyList () const

  Get the list of properties for accession of this dataset.
- DataSet ()=default

Public Member Functions inherited from HighFive::Object

- Object (Object &&other) noexcept
- ~Object ()
- bool isValid () const noexcept

  isValid
- hid_t getId () const noexcept

  getId
- ObjectInfo getInfo () const

  Retrieve several infos about the current object (address, dates, etc)
- ObjectType getType () const

  Gets the fundamental type of the object (dataset, group, etc)
- bool operator== (const Object &other) const noexcept

Public Member Functions inherited from HighFive::SliceTraits< DataSet >

- Selection select (const HyperSlab &hyperslab) const

  Select an `hyperslab` in the current Slice/Dataset.
- Selection select (const std::vector< size_t > &offset, const std::vector< size_t > &count, const std::vector< size_t > &stride={}, const std::vector< size_t > &block={}) const

  Select a region in the current Slice/Dataset of `count` points at `offset` separated by `stride`. If strides are not provided they will default to 1 in all dimensions.
- Selection select (const std::vector< size_t > &columns) const

  Select a set of columns in the last dimension of this dataset.
- Selection select (const ElementSet &elements) const

  Select a region in the current Slice/Dataset out of a list of elements.
- T read (const DataTransferProps &xfer_props=DataTransferProps()) const
- void read (T &array, const DataTransferProps &xfer_props=DataTransferProps()) const
- void read (T *array, const DataType &dtype=DataType(), const DataTransferProps &xfer_props=DataTransferProps()) const
- void write (const T &buffer, const DataTransferProps &xfer_props=DataTransferProps())
- void write_raw (const T *buffer, const DataType &dtype=DataType(), const DataTransferProps &xfer_↩ props=DataTransferProps())

Public Member Functions inherited from HighFive::AnnotateTraits< DataSet >

- Attribute createAttribute (const std::string &attribute_name, const DataSpace &space, const DataType &type)

  create a new attribute with the name attribute_name
- Attribute createAttribute (const std::string &attribute_name, const DataSpace &space)

  createAttribute create a new attribute on the current dataset with size specified by space
- Attribute createAttribute (const std::string &attribute_name, const T &data)

  createAttribute create a new attribute on the current dataset and write to it, inferring the DataSpace from data.
- void deleteAttribute (const std::string &attribute_name)

  deleteAttribute let you delete an attribute by its name.
- Attribute getAttribute (const std::string &attribute_name) const

  open an existing attribute with the name attribute_name
- size_t getNumberAttributes () const

  return the number of attributes of the node / group
- std::vector< std::string > listAttributeNames () const

  list all attribute name of the node / group
- bool hasAttribute (const std::string &attr_name) const

  checks an attribute exists

Public Member Functions inherited from HighFive::PathTraits< DataSet >

- PathTraits ()
- std::string getPath () const

  return the path to the current object
- File & getFile () const noexcept

  Return a reference to the File object this object belongs.

Static Public Attributes

- static const ObjectType type = ObjectType::Dataset

Protected Member Functions

- DataSet (Object &&o) noexcept
- Object (Object &&other) noexcept
- Object ()
- Object (const Object &other)
- Object (hid_t)

Protected Member Functions inherited from HighFive::Object

- Object ()
- Object (const Object &other)
- Object (hid_t)
- Object & operator= (const Object &other)

Protected Member Functions inherited from HighFive::SliceTraits< DataSet >

- Selection select_impl (const HyperSlab &hyperslab, const DataSpace &memspace) const

Friends

- class Reference
- template<typename Derivate >
  class NodeTraits

Additional Inherited Members

Protected Attributes inherited from HighFive::Object

- hid_t _hid

Protected Attributes inherited from HighFive::PathTraits< DataSet >

- std::shared_ptr< File > _file_obj

9.15.1 Detailed Description

Class representing a dataset.

9.15.2 Constructor & Destructor Documentation

9.15.2.1 DataSet() [1/2]

```
HighFive::DataSet::DataSet ( )  [default]
```

Deprecated Default constructor creates unsafe uninitialized objects

9.15.2.2 DataSet() [2/2]

```
HighFive::DataSet::DataSet (
            Object && o )  [inline], [protected], [noexcept]
```

9.15.3 Member Function Documentation

9.15.3.1 getAccessPropertyList()

```
DataSetAccessProps HighFive::DataSet::getAccessPropertyList ( ) const  [inline]
```

Get the list of properties for accession of this dataset.

9.15.3.2 getCreatePropertyList()

```
DataSetCreateProps HighFive::DataSet::getCreatePropertyList ( ) const  [inline]
```

Get the list of properties for creation of this dataset.

9.15.3.3 getDataType()

```
DataType HighFive::DataSet::getDataType ( ) const  [inline]
```

getDataType

Returns

return the datatype associated with this dataset

9.15.3.4 getDimensions()

```
std::vector< size_t > HighFive::DataSet::getDimensions ( ) const  [inline]
```

Get the dimensions of the whole DataSet. This is a shorthand for getSpace().getDimensions()

Returns

The shape of the current HighFive::DataSet

9.15.3.5 getElementCount()

```
size_t HighFive::DataSet::getElementCount ( ) const  [inline]
```

Get the total number of elements in the current dataset. E.g. 2x2x2 matrix has size 8. This is a shorthand for getSpace().getTotalCount()

Returns

The shape of the current HighFive::DataSet

9.15.3.6 getMemSpace()

```
DataSpace HighFive::DataSet::getMemSpace ( ) const  [inline]
```

getMemSpace

Returns

same than getSpace for DataSet, compatibility with Selection class

9.15.3.7 getOffset()

```
uint64_t HighFive::DataSet::getOffset ( ) const  [inline]
```

getOffset

Returns

returns DataSet address in file

9.15.3.8 getSpace()

```
DataSpace HighFive::DataSet::getSpace ( ) const  [inline]
```

getSpace

Returns

return the dataspace associated with this dataset

9.15.3.9 getStorageSize()

```
uint64_t HighFive::DataSet::getStorageSize ( ) const  [inline]
```

getStorageSize

Returns

returns the amount of storage allocated for a dataset.

9.15.3.10 Object() [1/4]

```
HighFive::Object::Object ( )  [inline], [protected]
```

9.15.3.11 Object() [2/4]

```
HighFive::Object::Object (
            const Object & other )  [inline], [protected]
```

9.15.3.12 Object() [3/4]

```
HighFive::Object::Object (
            hid_t hid )  [inline], [explicit], [protected]
```

9.15.3.13 Object() [4/4]

```
HighFive::Object::Object (
            Object && other )  [inline], [protected], [noexcept]
```

9.15.3.14 resize()

```
void HighFive::DataSet::resize (
            const std::vector< size_t > & dims )  [inline]
```

Change the size of the dataset.

This requires that the dataset was created with chunking, and you would generally want to have set a larger maxdims setting

Parameters

dims	New size of the dataset

9.15.4 Friends And Related Symbol Documentation

9.15.4.1 NodeTraits

```
template<typename Derivate >
friend class NodeTraits  [friend]
```

9.15.4.2 Reference

```
friend class Reference  [friend]
```

9.15.5 Member Data Documentation

9.15.5.1 type

```
const ObjectType HighFive::DataSet::type = ObjectType::Dataset  [static]
```

The documentation for this class was generated from the following files:

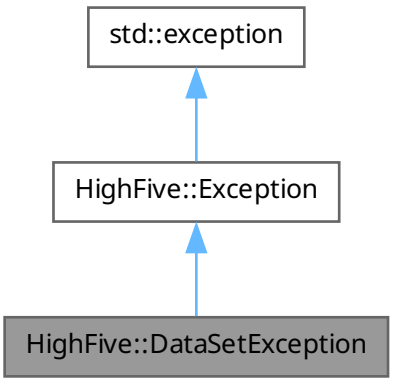
- highfive/H5DataSet.hpp
- highfive/bits/H5DataSet_misc.hpp

9.16 HighFive::DataSetException Class Reference

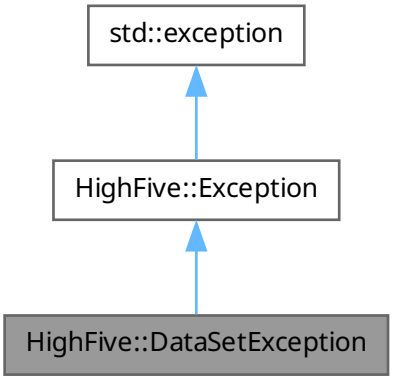
Exception specific to HighFive DataSet interface.

```
#include <H5Exception.hpp>
```

Inheritance diagram for HighFive::DataSetException:



Collaboration diagram for HighFive::DataSetException:



Public Member Functions

- DataSetException (const std::string &err_msg)

Public Member Functions inherited from HighFive::Exception

- Exception (const std::string &err_msg)
- virtual ~Exception () throw ()
- const char * what () const override throw ()

  get the current exception error message
- virtual void setErrorMsg (const std::string &errmsg)

  define the error message
- Exception * nextException () const

  nextException
- hid_t getErrMajor () const

  HDF5 library error mapper.
- hid_t getErrMinor () const

  HDF5 library error mapper.

Additional Inherited Members

Protected Attributes inherited from HighFive::Exception

- std::string _errmsg
- std::shared_ptr< Exception > _next
- hid_t _err_major
- hid_t _err_minor

9.16.1 Detailed Description

Exception specific to HighFive DataSet interface.

9.16.2 Constructor & Destructor Documentation

9.16.2.1 DataSetException()

```
HighFive::DataSetException::DataSetException (
            const std::string & err_msg )  [inline]
```

The documentation for this class was generated from the following file:

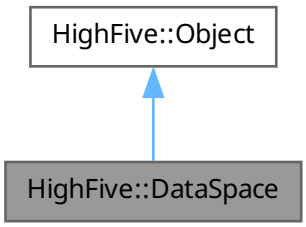
- highfive/H5Exception.hpp

9.17 HighFive::DataSpace Class Reference

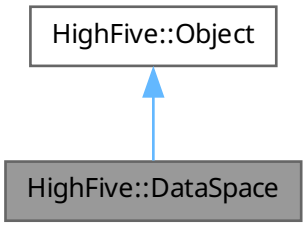
Class representing the space (dimensions) of a dataset.

`#include <H5DataSpace.hpp>`

Inheritance diagram for HighFive::DataSpace:



Collaboration diagram for HighFive::DataSpace:



Public Types

- enum DataspaceType { dataspace_scalar , dataspace_null }

  dataspace type

Public Member Functions

- DataSpace (const std::vector< size_t > &dims)
- template<size_t N>
  DataSpace (const std::array< size_t, N > &dims)
- DataSpace (const std::initializer_list< size_t > &items)
- template<typename... Args>
  DataSpace (size_t dim1, Args... dims)
- template<typename IT , typename = typename std::enable_if<!std::is_integral<IT>::value, IT>::type>
  DataSpace (const IT begin, const IT end)
- DataSpace (const std::vector< size_t > &dims, const std::vector< size_t > &maxdims)

  Create a resizable N-dimensional dataspace.
- DataSpace (DataspaceType dtype)

  DataSpace create a scalar dataspace or a null dataset.
- DataSpace clone () const
- size_t getNumberDimensions () const

  getNumberDimensions
- std::vector< size_t > getDimensions () const

  getDimensions
- size_t getElementCount () const

  getElementCount
- std::vector< size_t > getMaxDimensions () const

  getMaxDimensions

Public Member Functions inherited from HighFive::Object

- Object (Object &&other) noexcept
- ~Object ()
- bool isValid () const noexcept

  isValid
- hid_t getId () const noexcept

  getId
- ObjectInfo getInfo () const

  Retrieve several infos about the current object (address, dates, etc)
- ObjectType getType () const

  Gets the fundamental type of the object (dataset, group, etc)
- bool operator== (const Object &other) const noexcept

Static Public Member Functions

- template<typename T >
  static DataSpace From (const T &value)

  Create a dataspace matching a type accepted by details::inspector.
- template<std::size_t N, std::size_t Width>
  static DataSpace FromCharArrayStrings (const char(&)[N][Width])

Static Public Attributes

- static const ObjectType type = ObjectType::DataSpace
- static const size_t UNLIMITED = SIZE_MAX

Protected Member Functions

- DataSpace ()=default

Protected Member Functions inherited from HighFive::Object

- Object ()
- Object (const Object &other)
- Object (hid_t)
- Object & operator= (const Object &other)

Friends

- class Attribute
- class File
- class DataSet

Additional Inherited Members

Protected Attributes inherited from HighFive::Object

- hid_t _hid

9.17.1 Detailed Description

Class representing the space (dimensions) of a dataset.

9.17.2 Member Enumeration Documentation

9.17.2.1 DataspaceType

```
enum HighFive::DataSpace::DataspaceType
```

dataspace type

Enumerator

dataspace_scalar	
dataspace_null	

9.17.3 Constructor & Destructor Documentation

9.17.3.1 DataSpace() [1/8]

```
HighFive::DataSpace::DataSpace (
            const std::vector< size_t > & dims )  [inline], [explicit]
```

create a dataspace of N-dimensions Each dimension is configured this way size(dim1) = vec[0] size(dim2) = vec[1] etc...

9.17.3.2 DataSpace() [2/8]

```
template<size_t N>
HighFive::DataSpace::DataSpace (
            const std::array< size_t, N > & dims )  [inline], [explicit]
```

9.17.3.3 DataSpace() [3/8]

```
HighFive::DataSpace::DataSpace (
            const std::initializer_list< size_t > & items )  [inline]
```

Make sure that DataSpace({1,2,3}) works on GCC. This is the shortcut form of the vector initializer, but one some compilers (gcc) this does not resolve correctly without this constructor.

9.17.3.4 DataSpace() [4/8]

```
template<typename...  Args>
HighFive::DataSpace::DataSpace (
            size_t dim1,
            Args...  dims )  [inline], [explicit]
```

Allow directly listing 1 or more dimensions to initialize, that is, DataSpace(1,2) means DataSpace(std::vector<size_t>{1,2}).

9.17.3.5 DataSpace() [5/8]

```
template<class IT , typename >
HighFive::DataSpace::DataSpace (
            const IT begin,
            const IT end )  [inline]
```

Create a dataspace from an iterator pair

Explicitly disable DataSpace(int_like, int_like) from trying to use this constructor

9.17.3.6 DataSpace() [6/8]

```
HighFive::DataSpace::DataSpace (
            const std::vector< size_t > & dims,
            const std::vector< size_t > & maxdims )  [inline], [explicit]
```

Create a resizable N-dimensional dataspace.

Parameters

dims	Initial size of dataspace
maxdims	Maximum size of the dataspace

9.17.3.7 DataSpace() [7/8]

```
HighFive::DataSpace::DataSpace (
            DataSpace::DataspaceType dtype )  [inline], [explicit]
```

DataSpace create a scalar dataspace or a null dataset.

9.17.3.8 DataSpace() [8/8]

```
HighFive::DataSpace::DataSpace ( )  [protected], [default]
```

9.17.4 Member Function Documentation

9.17.4.1 clone()

```
DataSpace HighFive::DataSpace::clone ( ) const  [inline]
```

Create a new DataSpace with a different id available for modifications

9.17.4.2 From()

```
template<typename T >
DataSpace HighFive::DataSpace::From (
            const T & value )  [inline], [static]
```

Create a dataspace matching a type accepted by details::inspector.

9.17.4.3 FromCharArrayStrings()

```
template<std::size_t N, std::size_t Width>
DataSpace HighFive::DataSpace::FromCharArrayStrings (
            const  char(&)[N][Width] )  [inline], [static]
```

9.17.4.4 getDimensions()

```
std::vector< size_t > HighFive::DataSpace::getDimensions ( ) const  [inline]
```

getDimensions

Returns

return a vector of N-element, each element is the size of the associated dataset dimension

9.17.4.5 getElementCount()

```
size_t HighFive::DataSpace::getElementCount ( ) const  [inline]
```

getElementCount

Returns

the total number of elements in the dataspace

9.17.4.6 getMaxDimensions()

```
std::vector< size_t > HighFive::DataSpace::getMaxDimensions ( ) const  [inline]
```

getMaxDimensions

Returns

return a vector of N-element, each element is the size of the associated dataset maximum dimension

9.17.4.7 getNumberDimensions()

```
size_t HighFive::DataSpace::getNumberDimensions ( ) const  [inline]
```

getNumberDimensions

Returns

the number of dimensions in the current dataspace

9.17.5 Friends And Related Symbol Documentation

9.17.5.1 Attribute

```
friend class Attribute  [friend]
```

9.17.5.2 DataSet

```
friend class DataSet  [friend]
```

9.17.5.3 File

```
friend class File  [friend]
```

9.17.6 Member Data Documentation

9.17.6.1 type

```
const ObjectType HighFive::DataSpace::type = ObjectType::DataSpace  [static]
```

9.17.6.2 UNLIMITED

```
const size_t HighFive::DataSpace::UNLIMITED = SIZE_MAX  [static]
```

The documentation for this class was generated from the following files:

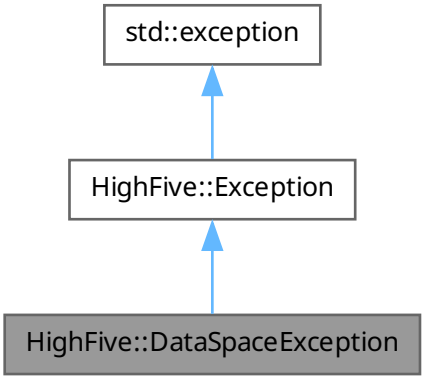
- highfive/H5DataSpace.hpp
- highfive/bits/H5Dataspace_misc.hpp

9.18 HighFive::DataSpaceException Class Reference

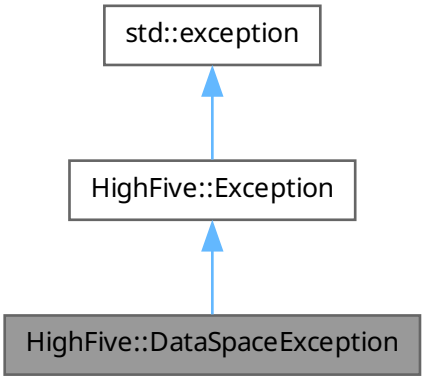
Exception specific to HighFive DataSpace interface.

```
#include <H5Exception.hpp>
```

Inheritance diagram for HighFive::DataSpaceException:



Collaboration diagram for HighFive::DataSpaceException:



Public Member Functions

- DataSpaceException (const std::string &err_msg)

Public Member Functions inherited from HighFive::Exception

- Exception (const std::string &err_msg)
- virtual ~Exception () throw ()
- const char * what () const override throw ()

  get the current exception error message
- virtual void setErrorMsg (const std::string &errmsg)

  define the error message
- Exception * nextException () const

  nextException
- hid_t getErrMajor () const

  HDF5 library error mapper.
- hid_t getErrMinor () const

  HDF5 library error mapper.

Additional Inherited Members

Protected Attributes inherited from HighFive::Exception

- std::string _errmsg
- std::shared_ptr< Exception > _next
- hid_t _err_major
- hid_t _err_minor

9.18.1 Detailed Description

Exception specific to HighFive DataSpace interface.

9.18.2 Constructor & Destructor Documentation

9.18.2.1 DataSpaceException()

```
HighFive::DataSpaceException::DataSpaceException (
            const std::string & err_msg )  [inline]
```

The documentation for this class was generated from the following file:

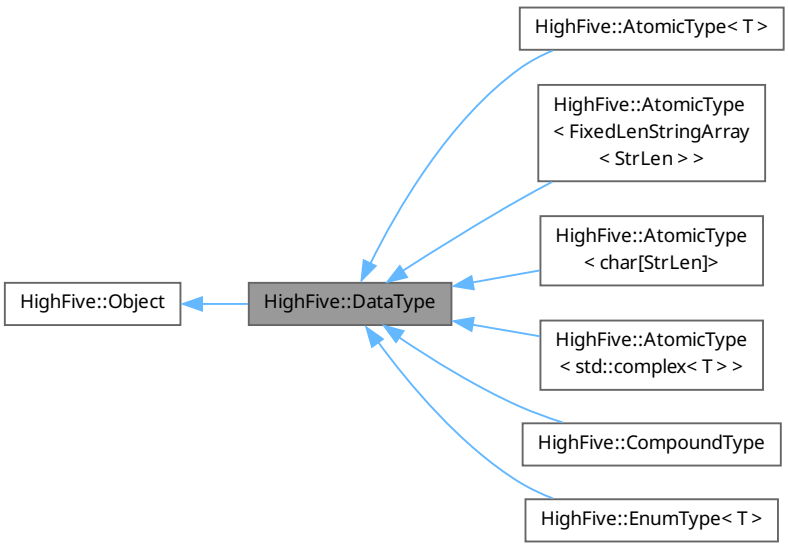
- highfive/H5Exception.hpp

9.19 HighFive::DataType Class Reference

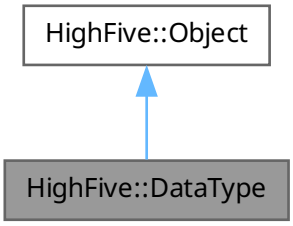
HDF5 Data Type.

```
#include <H5DataType.hpp>
```

Inheritance diagram for HighFive::DataType:



Collaboration diagram for HighFive::DataType:



Public Member Functions

- bool operator== (const DataType &other) const
- bool operator!= (const DataType &other) const
- DataTypeClass getClass () const

  Return the fundamental type.
- size_t getSize () const

  Returns the length (in bytes) of this type elements.
- std::string string () const

  Returns a friendly description of the type (e.g. Float32)
- bool isVariableStr () const

  Returns whether the type is a variable-length string.
- bool isFixedLenStr () const

  Returns whether the type is a fixed-length string.
- bool empty () const noexcept

  Check the DataType was default constructed. Such value might represent auto-detection of the datatype from a buffer.
- bool isReference () const

  Returns whether the type is a Reference.
- DataTypeCreateProps getCreatePropertyList () const

  Get the list of properties for creation of this DataType.

Public Member Functions inherited from HighFive::Object

- Object (Object &&other) noexcept
- ~Object ()
- bool isValid () const noexcept

  isValid
- hid_t getId () const noexcept

  getId
- ObjectInfo getInfo () const

  Retrieve several infos about the current object (address, dates, etc)
- ObjectType getType () const

  Gets the fundamental type of the object (dataset, group, etc)
- bool operator== (const Object &other) const noexcept

Protected Member Functions

- Object (Object &&other) noexcept
- Object ()
- Object (const Object &other)
- Object (hid_t)

Protected Member Functions inherited from HighFive::Object

- Object ()
- Object (const Object &other)
- Object (hid_t)
- Object & operator= (const Object &other)

Friends

- class Attribute
- class File
- class DataSet
- class CompoundType

Additional Inherited Members

Protected Attributes inherited from HighFive::Object

- hid_t _hid

9.19.1 Detailed Description

HDF5 Data Type.

9.19.2 Member Function Documentation

9.19.2.1 empty()

```
bool HighFive::DataType::empty ( ) const  [inline], [noexcept]
```

Check the DataType was default constructed. Such value might represent auto-detection of the datatype from a buffer.

9.19.2.2 getClass()

```
DataTypeClass HighFive::DataType::getClass ( ) const  [inline]
```

Return the fundamental type.

9.19.2.3 getCreatePropertyList()

```
DataTypeCreateProps HighFive::DataType::getCreatePropertyList ( ) const  [inline]
```

Get the list of properties for creation of this DataType.

9.19.2.4 getSize()

```
size_t HighFive::DataType::getSize ( ) const  [inline]
```

Returns the length (in bytes) of this type elements.

Notice that the size of variable length sequences may have limited applicability given that it refers to the size of the control structure. For info see https://support.hdfgroup.org/HDF5/doc/RM/RM_H5T.html#Datatype-GetSize

9.19.2.5 isFixedLenStr()

```
bool HighFive::DataType::isFixedLenStr ( ) const  [inline]
```

Returns whether the type is a fixed-length string.

9.19.2.6 isReference()

```
bool HighFive::DataType::isReference ( ) const  [inline]
```

Returns whether the type is a Reference.

9.19.2.7 isVariableStr()

```
bool HighFive::DataType::isVariableStr ( ) const  [inline]
```

Returns whether the type is a variable-length string.

9.19.2.8 Object() [1/4]

```
HighFive::Object::Object ( )  [inline], [protected]
```

9.19.2.9 Object() [2/4]

```
HighFive::Object::Object (
            const Object & other )  [inline], [protected]
```

9.19.2.10 Object() [3/4]

```
HighFive::Object::Object (
            hid_t hid )  [inline], [explicit], [protected]
```

9.19.2.11 Object() [4/4]

```
HighFive::Object::Object (
            Object && other )  [inline], [protected], [noexcept]
```

9.19.2.12 operator"!=()

```
bool HighFive::DataType::operator!= (
            const DataType & other ) const  [inline]
```

9.19.2.13 operator==()

```
bool HighFive::DataType::operator== (
            const DataType & other ) const  [inline]
```

9.19.2.14 string()

```
std::string HighFive::DataType::string ( ) const  [inline]
```

Returns a friendly description of the type (e.g. Float32)

9.19.3 Friends And Related Symbol Documentation

9.19.3.1 Attribute

```
friend class Attribute  [friend]
```

9.19.3.2 CompoundType

```
friend class CompoundType  [friend]
```

9.19.3.3 DataSet

```
friend class DataSet  [friend]
```

9.19.3.4 File

```
friend class File  [friend]
```

The documentation for this class was generated from the following files:

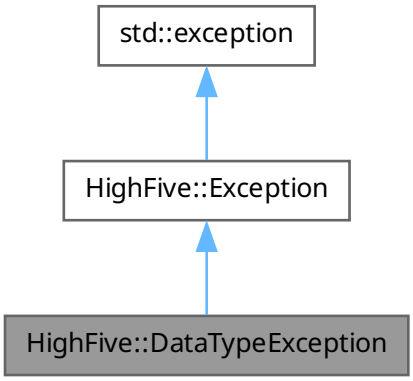
- highfive/H5DataType.hpp
- highfive/bits/H5DataType_misc.hpp

9.20 HighFive::DataTypeException Class Reference

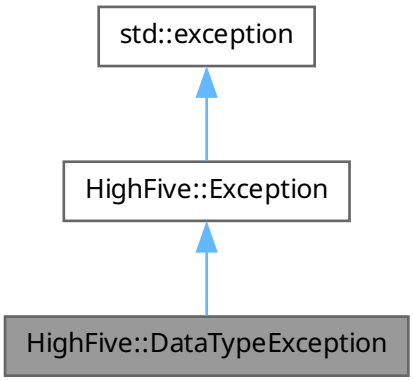
Exception specific to HighFive DataType interface.

`#include <H5Exception.hpp>`

Inheritance diagram for HighFive::DataTypeException:



Collaboration diagram for HighFive::DataTypeException:



Public Member Functions

- DataTypeException (const std::string &err_msg)

Public Member Functions inherited from HighFive::Exception

- Exception (const std::string &err_msg)
- virtual ~Exception () throw ()
- const char * what () const override throw ()

  get the current exception error message
- virtual void setErrorMsg (const std::string &errmsg)

  define the error message
- Exception * nextException () const

  nextException
- hid_t getErrMajor () const

  HDF5 library error mapper.
- hid_t getErrMinor () const

  HDF5 library error mapper.

Additional Inherited Members

Protected Attributes inherited from HighFive::Exception

- std::string _errmsg
- std::shared_ptr< Exception > _next
- hid_t _err_major
- hid_t _err_minor

9.20.1 Detailed Description

Exception specific to HighFive DataType interface.

9.20.2 Constructor & Destructor Documentation

9.20.2.1 DataTypeException()

```
HighFive::DataTypeException::DataTypeException (
            const std::string & err_msg )  [inline]
```

The documentation for this class was generated from the following file:

- highfive/H5Exception.hpp

9.21 HighFive::Deflate Class Reference

```
#include <H5PropertyList.hpp>
```

Public Member Functions

- Deflate (unsigned level)

9.21.1 Constructor & Destructor Documentation

9.21.1.1 Deflate()

```
HighFive::Deflate::Deflate (
            unsigned level )  [inline], [explicit]
```

The documentation for this class was generated from the following files:

- highfive/H5PropertyList.hpp
- highfive/bits/H5PropertyList_misc.hpp

9.22 H5Easy::DumpOptions Class Reference

Define options for dumping data.

```
#include <H5Easy.hpp>
```

Public Member Functions

- DumpOptions ()=default
  Constructor: accept all default settings.
- template<class... Args>
  DumpOptions (Args... args)
  Constructor: overwrite (some of the) defaults.
- void set (DumpMode mode)
  Overwrite H5Easy::DumpMode setting.
- void set (Flush mode)
  Overwrite H5Easy::Flush setting.
- void set (const Compression &level)
  Overwrite H5Easy::Compression setting.
- template<class T , class... Args>
  void set (T arg, Args... args)
  Overwrite any setting(s).
- template<class T >
  void setChunkSize (const std::vector< T > &shape)
  Set chunk-size. If the input is rank (size) zero, automatic chunking is enabled.
- void setChunkSize (std::initializer_list< size_t > shape)
  Set chunk-size. If the input is rank (size) zero, automatic chunking is enabled.
- bool overwrite () const
  Get overwrite-mode.
- bool flush () const
  Get flush-mode.
- bool compress () const
  Get compress-mode.
- unsigned getCompressionLevel () const
  Get compression level.
- bool isChunked () const
  Get chunking mode: `true` is manually set, `false` if chunk-size should be computed automatically.
- std::vector< hsize_t > getChunkSize () const
  Get chunk size. Use DumpOptions::getChunkSize to check if chunk-size should be automatically computed.

9.22.1 Detailed Description

Define options for dumping data.

By default:

- DumpMode::Create
- Flush::True
- Compression: false
- ChunkSize: automatic

9.22.2 Constructor & Destructor Documentation

9.22.2.1 DumpOptions() [1/2]

```
H5Easy::DumpOptions::DumpOptions ( )  [default]
```

Constructor: accept all default settings.

9.22.2.2 DumpOptions() [2/2]

```
template<class...  Args>
H5Easy::DumpOptions::DumpOptions (
            Args...  args )  [inline]
```

Constructor: overwrite (some of the) defaults.

Parameters

args	any of DumpMode(), Flush(), Compression() in arbitrary number and order.

9.22.3 Member Function Documentation

9.22.3.1 compress()

```
bool H5Easy::DumpOptions::compress ( ) const  [inline]
```

Get compress-mode.

Returns

bool

9.22.3.2 flush()

```
bool H5Easy::DumpOptions::flush ( ) const  [inline]
```

Get flush-mode.

Returns

bool

9.22.3.3 getChunkSize()

```
std::vector< hsize_t > H5Easy::DumpOptions::getChunkSize ( ) const  [inline]
```

Get chunk size. Use DumpOptions::getChunkSize to check if chunk-size should be automatically computed.

9.22.3.4 getCompressionLevel()

```
unsigned H5Easy::DumpOptions::getCompressionLevel ( ) const  [inline]
```

Get compression level.

Returns

[0..9]

9.22.3.5 isChunked()

```
bool H5Easy::DumpOptions::isChunked ( ) const  [inline]
```

Get chunking mode: `true` is manually set, `false` if chunk-size should be computed automatically.

Returns

bool

9.22.3.6 overwrite()

```
bool H5Easy::DumpOptions::overwrite ( ) const  [inline]
```

Get overwrite-mode.

Returns

bool

9.22.3.7 set() [1/4]

```
void H5Easy::DumpOptions::set (
            const Compression & level )  [inline]
```

Overwrite H5Easy::Compression setting.

Parameters

level	Compression.

9.22.3.8 set() [2/4]

```
void H5Easy::DumpOptions::set (
            DumpMode mode )  [inline]
```

Overwrite H5Easy::DumpMode setting.

Parameters

mode	DumpMode.

9.22.3.9 set() [3/4]

```
void H5Easy::DumpOptions::set (
            Flush mode )  [inline]
```

Overwrite H5Easy::Flush setting.

Parameters

mode	Flush.

9.22.3.10 set() [4/4]

```
template<class T , class...  Args>
void H5Easy::DumpOptions::set (
            T arg,
            Args...  args )  [inline]
```

Overwrite any setting(s).

Parameters

arg	any of DumpMode(), Flush(), Compression in arbitrary number and order.
args	any of DumpMode(), Flush(), Compression in arbitrary number and order.

9.22.3.11 setChunkSize() [1/2]

```
template<class T >
void H5Easy::DumpOptions::setChunkSize (
            const std::vector< T > & shape )  [inline]
```

Set chunk-size. If the input is rank (size) zero, automatic chunking is enabled.

Parameters

shape	Chunk size along each dimension.

9.22.3.12 setChunkSize() [2/2]

```
void H5Easy::DumpOptions::setChunkSize (
            std::initializer_list< size_t > shape )  [inline]
```

Set chunk-size. If the input is rank (size) zero, automatic chunking is enabled.

Parameters

shape	Chunk size along each dimension.

The documentation for this class was generated from the following files:

- highfive/H5Easy.hpp
- highfive/h5easy_bits/H5Easy_public.hpp

9.23 HighFive::ElementSet Class Reference

```
#include <H5Slice_traits.hpp>
```

Public Member Functions

- ElementSet (std::initializer_list< std::size_t > list)
  Create a list of points of N-dimension for selection.
- ElementSet (std::initializer_list< std::vector< std::size_t > > list)
  Create a list of points of N-dimension for selection.
- ElementSet (const std::vector< std::size_t > &element_ids)
  Create a list of points of N-dimension for selection.
- ElementSet (const std::vector< std::vector< std::size_t > > &element_ids)
  Create a list of points of N-dimension for selection.

Friends

- template<typename Derivate >
  class SliceTraits

9.23.1 Constructor & Destructor Documentation

9.23.1.1 ElementSet() [1/4]

```
HighFive::ElementSet::ElementSet (
            std::initializer_list< std::size_t > list )  [inline], [explicit]
```

Create a list of points of N-dimension for selection.

Parameters

list	List of continuous coordinates (e.g.: in 2 dimensions space `ElementSet{1, 2, 3 ,4}` creates points `(1, 2)` and `(3, 4)`).

9.23.1.2 ElementSet() [2/4]

```
HighFive::ElementSet::ElementSet (
            std::initializer_list< std::vector< std::size_t > > list )  [inline], [explicit]
```

Create a list of points of N-dimension for selection.

Parameters

list	List of N-dim points.

9.23.1.3 ElementSet() [3/4]

```
HighFive::ElementSet::ElementSet (
            const std::vector< std::size_t > & element_ids )  [inline], [explicit]
```

Create a list of points of N-dimension for selection.

Parameters

element_ids	List of continuous coordinates (e.g.: in 2 dimensions space `ElementSet{1, 2, 3 ,4}` creates points `(1, 2)` and `(3, 4)`).

9.23.1.4 ElementSet() [4/4]

```
HighFive::ElementSet::ElementSet (
            const std::vector< std::vector< std::size_t > > & element_ids )  [inline], [explicit]
```

Create a list of points of N-dimension for selection.

Parameters

element_ids	List of N-dim points.

9.23.2 Friends And Related Symbol Documentation

9.23.2.1 SliceTraits

```
template<typename Derivate >
friend class SliceTraits  [friend]
```

The documentation for this class was generated from the following files:

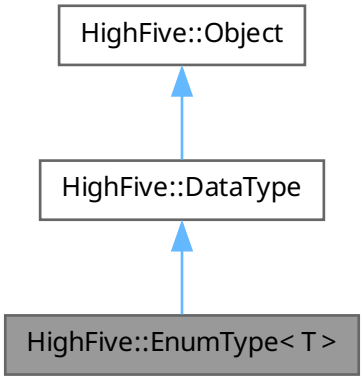
- highfive/bits/H5Slice_traits.hpp
- highfive/bits/H5Slice_traits_misc.hpp

9.24 HighFive::EnumType< T > Class Template Reference

Create a enum HDF5 datatype.

`#include <H5DataType.hpp>`

Inheritance diagram for HighFive::EnumType< T >:



Collaboration diagram for HighFive::EnumType< T >:

Classes

- struct member_def

  Use for defining a member of enum type.

Public Member Functions

- EnumType (const EnumType &other)=default
- EnumType (const std::vector< member_def > &t_members)
- EnumType (std::initializer_list< member_def > t_members)
- void commit (const Object &object, const std::string &name) const

  Commit datatype into the given Object.

Public Member Functions inherited from HighFive::DataType

- bool operator== (const DataType &other) const
- bool operator!= (const DataType &other) const
- DataTypeClass getClass () const

  Return the fundamental type.
- size_t getSize () const

  Returns the length (in bytes) of this type elements.
- std::string string () const

  Returns a friendly description of the type (e.g. Float32)
- bool isVariableStr () const

  Returns whether the type is a variable-length string.
- bool isFixedLenStr () const

  Returns whether the type is a fixed-length string.
- bool empty () const noexcept

  Check the DataType was default constructed. Such value might represent auto-detection of the datatype from a buffer.
- bool isReference () const

  Returns whether the type is a Reference.
- DataTypeCreateProps getCreatePropertyList () const

  Get the list of properties for creation of this DataType.

Public Member Functions inherited from HighFive::Object

- Object (Object &&other) noexcept
- ~Object ()
- bool isValid () const noexcept

  isValid
- hid_t getId () const noexcept

  getId
- ObjectInfo getInfo () const

  Retrieve several infos about the current object (address, dates, etc)
- ObjectType getType () const

  Gets the fundamental type of the object (dataset, group, etc)
- bool operator== (const Object &other) const noexcept

Additional Inherited Members

Protected Member Functions inherited from HighFive::DataType

- Object (Object &&other) noexcept
- Object ()
- Object (const Object &other)
- Object (hid_t)

Protected Member Functions inherited from HighFive::Object

- Object ()
- Object (const Object &other)
- Object (hid_t)
- Object & operator= (const Object &other)

Protected Attributes inherited from HighFive::Object

- hid_t _hid

9.24.1 Detailed Description

template<typename T>
class HighFive::EnumType< T >

Create a enum HDF5 datatype.

```
enum class Position {
    FIRST = 1,
    SECOND = 2,
};

EnumType<Position> create_enum_position() {
    return {{"FIRST", Position::FIRST},
            {"SECOND", Position::SECOND}};
}

// You have to register the type inside HighFive
HIGHFIVE_REGISTER_TYPE(Position, create_enum_position)

void write_first(H5::File& file) {
    auto dataset = file.createDataSet("/foo", Position::FIRST);
}
```

9.24.2 Constructor & Destructor Documentation

9.24.2.1 EnumType() [1/3]

```
template<typename T >
HighFive::EnumType< T >::EnumType (
            const EnumType< T > & other )  [default]
```

9.24.2.2 EnumType() [2/3]

```
template<typename T >
HighFive::EnumType< T >::EnumType (
            const std::vector< member_def > & t_members )  [inline]
```

9.24.2.3 EnumType() [3/3]

```
template<typename T >
HighFive::EnumType< T >::EnumType (
            std::initializer_list< member_def > t_members )  [inline]
```

9.24.3 Member Function Documentation

9.24.3.1 commit()

```
template<typename T >
void HighFive::EnumType< T >::commit (
            const Object & object,
            const std::string & name ) const  [inline]
```

Commit datatype into the given Object.

Parameters

object	Location to commit object into
name	Name to give the datatype

The documentation for this class was generated from the following files:

- highfive/H5DataType.hpp
- highfive/bits/H5DataType_misc.hpp

9.25 HighFive::EstimatedLinkInfo Class Reference

Set hints as to how many links to expect and their average length.

`#include <H5PropertyList.hpp>`

Public Member Functions

- EstimatedLinkInfo (unsigned entries, unsigned length)

  Create a property with the request parameters.
- EstimatedLinkInfo (const GroupCreateProps &gcpl)
- unsigned getEntries () const

  The estimated number of links in a group.
- unsigned getNameLength () const

  The estimated length of the names of links.

9.25.1 Detailed Description

Set hints as to how many links to expect and their average length.

9.25.2 Constructor & Destructor Documentation

9.25.2.1 EstimatedLinkInfo() [1/2]

```
HighFive::EstimatedLinkInfo::EstimatedLinkInfo (
            unsigned entries,
            unsigned length )  [inline], [explicit]
```

Create a property with the request parameters.

Parameters

entries	The estimated number of links in a group.
length	The estimated length of the names of links.

9.25.2.2 EstimatedLinkInfo() [2/2]

```
HighFive::EstimatedLinkInfo::EstimatedLinkInfo (
            const GroupCreateProps & gcpl )  [inline], [explicit]
```

9.25.3 Member Function Documentation

9.25.3.1 getEntries()

```
unsigned HighFive::EstimatedLinkInfo::getEntries ( ) const  [inline]
```

The estimated number of links in a group.

9.25.3.2 getNameLength()

```
unsigned HighFive::EstimatedLinkInfo::getNameLength ( ) const  [inline]
```

The estimated length of the names of links.

The documentation for this class was generated from the following files:

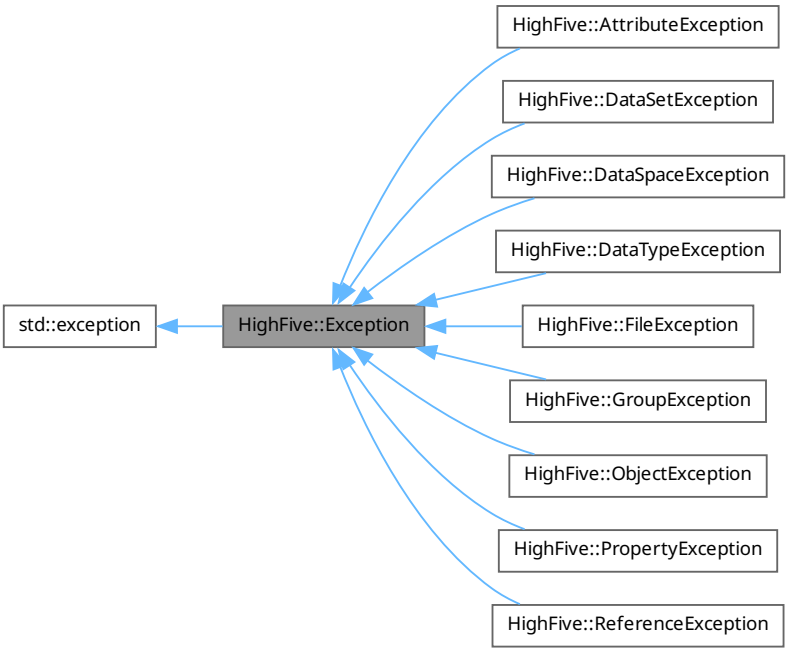
- highfive/H5PropertyList.hpp
- highfive/bits/H5PropertyList_misc.hpp

9.26 HighFive::Exception Class Reference

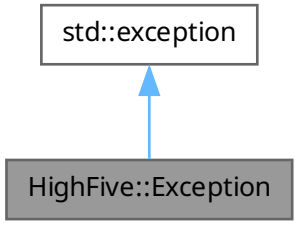
Basic HighFive Exception class.

`#include <H5Exception.hpp>`

Inheritance diagram for HighFive::Exception:



Collaboration diagram for HighFive::Exception:



Public Member Functions

- Exception (const std::string &err_msg)

- virtual ~Exception () throw ()
- const char * what () const override throw ()

  get the current exception error message
- virtual void setErrorMsg (const std::string &errmsg)

  define the error message
- Exception * nextException () const

  nextException
- hid_t getErrMajor () const

  HDF5 library error mapper.
- hid_t getErrMinor () const

  HDF5 library error mapper.

Protected Attributes

- std::string _errmsg
- std::shared_ptr< Exception > _next
- hid_t _err_major
- hid_t _err_minor

Friends

- struct HDF5ErrMapper

9.26.1 Detailed Description

Basic HighFive Exception class.

9.26.2 Constructor & Destructor Documentation

9.26.2.1 Exception()

```
HighFive::Exception::Exception (
            const std::string & err_msg )  [inline]
```

9.26.2.2 ~Exception()

```
virtual HighFive::Exception::~Exception ( ) throw ( )   [inline], [virtual]
```

9.26.3 Member Function Documentation

9.26.3.1 getErrMajor()

```
hid_t HighFive::Exception::getErrMajor ( ) const  [inline]
```

HDF5 library error mapper.

Returns

HDF5 major error number

9.26.3.2 getErrMinor()

```
hid_t HighFive::Exception::getErrMinor ( ) const  [inline]
```

HDF5 library error mapper.

Returns

HDF5 minor error number

9.26.3.3 nextException()

```
Exception * HighFive::Exception::nextException ( ) const  [inline]
```

nextException

Returns

pointer to the next exception in the chain, or NULL if not existing

9.26.3.4 setErrorMsg()

```
virtual void HighFive::Exception::setErrorMsg (
            const std::string & errmsg )  [inline], [virtual]
```

define the error message

Parameters

errmsg	

9.26.3.5 what()

```
const char * HighFive::Exception::what ( ) const throw ( )  [inline], [override]
```

get the current exception error message

Returns

9.26.4 Friends And Related Symbol Documentation

9.26.4.1 HDF5ErrMapper

```
friend struct HDF5ErrMapper  [friend]
```

9.26.5 Member Data Documentation

9.26.5.1 _err_major

```
hid_t HighFive::Exception::_err_major  [protected]
```

9.26.5.2 _err_minor

```
hid_t HighFive::Exception::_err_minor  [protected]
```

9.26.5.3 _errmsg

```
std::string HighFive::Exception::_errmsg  [protected]
```

9.26.5.4 _next

```
std::shared_ptr<Exception> HighFive::Exception::_next  [protected]
```

The documentation for this class was generated from the following file:

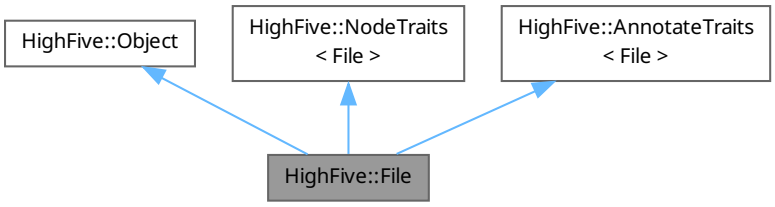
- highfive/H5Exception.hpp

9.27 HighFive::File Class Reference

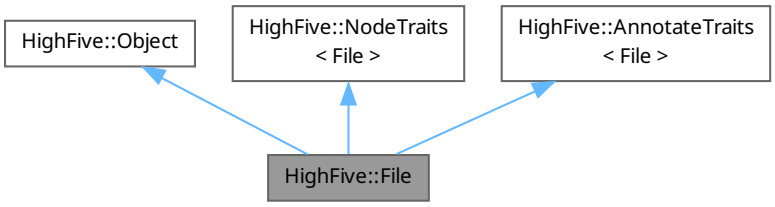
File class.

```
#include <H5File.hpp>
```

Inheritance diagram for HighFive::File:



Collaboration diagram for HighFive::File:



Public Types

- enum : unsigned {
  ReadOnly = 0x00u , ReadWrite = 0x01u , Truncate = 0x02u , Excl = 0x04u ,
  Debug = 0x08u , Create = 0x10u , Overwrite = Truncate , OpenOrCreate = ReadWrite | Create }

Public Member Functions

- File (const std::string &filename, unsigned openFlags=ReadOnly, const FileAccessProps &fileAccessProps=FileAccessProps::Default())

  File.
- File (const std::string &filename, unsigned openFlags, const FileCreateProps &fileCreateProps, const FileAccessProps &fileAccessProps=FileAccessProps::Default())

  File.
- const std::string & getName () const noexcept

  Return the name of the file.
- std::string getPath () const noexcept

  Object path of a File is always "/".
- hsize_t getMetadataBlockSize () const

  Returns the block size for metadata in bytes.
- std::pair< H5F_libver_t, H5F_libver_t > getVersionBounds () const

  Returns the HDF5 version compatibility bounds.
- void flush ()

  flush
- FileCreateProps getCreatePropertyList () const

  Get the list of properties for creation of this file.
- FileAccessProps getAccessPropertyList () const

  Get the list of properties for accession of this file.

Public Member Functions inherited from HighFive::Object

- Object (Object &&other) noexcept
- ~Object ()
- bool isValid () const noexcept

  isValid
- hid_t getId () const noexcept

  getId
- ObjectInfo getInfo () const

  Retrieve several infos about the current object (address, dates, etc)
- ObjectType getType () const

  Gets the fundamental type of the object (dataset, group, etc)
- bool operator== (const Object &other) const noexcept

Public Member Functions inherited from HighFive::NodeTraits< File >

- DataSet createDataSet (const std::string &dataset_name, const DataSpace &space, const DataType &type, const DataSetCreateProps &createProps=DataSetCreateProps::Default(), const DataSetAccessProps &accessProps=DataSetAccessProps::Default(), bool parents=true)

  createDataSet Create a new dataset in the current file of datatype type and of size space
- DataSet createDataSet (const std::string &dataset_name, const DataSpace &space, const DataSetCreateProps &createProps=DataSetCreateProps::Default(), const DataSetAccessProps &accessProps=DataSetAccessProps::Default(), bool parents=true)

  createDataSet create a new dataset in the current file with a size specified by space
- DataSet createDataSet (const std::string &dataset_name, const DataSpace &space, const DataSetCreateProps &createProps=DataSetCreateProps::Default(), const DataSetAccessProps &accessProps=DataSetAccessProps::Default(), bool parents=true)
- DataSet createDataSet (const std::string &dataset_name, const T &data, const DataSetCreateProps &createProps=DataSetCreateProps::Default(), const DataSetAccessProps &accessProps=DataSetAccessProps::Default(), bool parents=true)

  createDataSet create a new dataset in the current file and write to it, inferring the DataSpace from the data.
- DataSet createDataSet (const std::string &dataset_name, const FixedLenStringArray< N > &data, const DataSetCreateProps &createProps=DataSetCreateProps::Default(), const DataSetAccessProps &accessProps=DataSetAccessProps::Default(), bool parents=true)
- DataSet getDataSet (const std::string &dataset_name, const DataSetAccessProps &accessProps=DataSetAccessProps::Default()) const

  get an existing dataset in the current file
- Group createGroup (const std::string &group_name, bool parents=true)

  create a new group, and eventually intermediate groups
- Group createGroup (const std::string &group_name, const GroupCreateProps &createProps, bool parents=true)

  create a new group, and eventually intermediate groups
- Group getGroup (const std::string &group_name) const

  open an existing group with the name group_name
- size_t getNumberObjects () const

  return the number of leaf objects of the node / group
- std::string getObjectName (size_t index) const

  return the name of the object with the given index
- bool rename (const std::string &src_path, const std::string &dest_path, bool parents=true) const

  moves an object and its content within an HDF5 file.
- std::vector< std::string > listObjectNames (IndexType idx_type=IndexType::NAME) const

  list all leaf objects name of the node / group
- bool exist (const std::string &node_name) const

  check a dataset or group exists in the current node / group
- void unlink (const std::string &node_name) const

  unlink the given dataset or group
- LinkType getLinkType (const std::string &node_name) const

  Returns the kind of link of the given name (soft, hard...)
- ObjectType getObjectType (const std::string &node_name) const

  A shorthand to get the kind of object pointed to (group, dataset, type...)
- void createSoftLink (const std::string &linkName, const T &obj)

  A shorthand to create softlink to any object which provides `getPath` The link will be created with default properties along with required parent groups.
- void createSoftLink (const std::string &link_name, const std::string &obj_path, LinkCreateProps linkCreateProps=LinkCreateProps(), const LinkAccessProps &linkAccessProps=LinkAccessProps(), const bool parents=true)

  Creates softlinks.
- void createExternalLink (const std::string &link_name, const std::string &h5_file, const std::string &obj_path, LinkCreateProps linkCreateProps=LinkCreateProps(), const LinkAccessProps &linkAccessProps=LinkAccessProps(), const bool parents=true)

Public Member Functions inherited from HighFive::AnnotateTraits< File >

- Attribute createAttribute (const std::string &attribute_name, const DataSpace &space, const DataType &type)
  create a new attribute with the name attribute_name
- Attribute createAttribute (const std::string &attribute_name, const DataSpace &space)
  createAttribute create a new attribute on the current dataset with size specified by space
- Attribute createAttribute (const std::string &attribute_name, const T &data)
  createAttribute create a new attribute on the current dataset and write to it, inferring the DataSpace from data.
- void deleteAttribute (const std::string &attribute_name)
  deleteAttribute let you delete an attribute by its name.
- Attribute getAttribute (const std::string &attribute_name) const
  open an existing attribute with the name attribute_name
- size_t getNumberAttributes () const
  return the number of attributes of the node / group
- std::vector< std::string > listAttributeNames () const
  list all attribute name of the node / group
- bool hasAttribute (const std::string &attr_name) const
  checks an attribute exists

Static Public Attributes

- static const ObjectType type = ObjectType::File

Protected Member Functions

- File ()=default
- Object (Object &&other) noexcept
- Object ()
- Object (const Object &other)
- Object (hid_t)

Protected Member Functions inherited from HighFive::Object

- Object ()
- Object (const Object &other)
- Object (hid_t)
- Object & operator= (const Object &other)

Friends

- template<typename >
  class PathTraits

Additional Inherited Members

Protected Attributes inherited from HighFive::Object

- hid_t _hid

9.27.1 Detailed Description

File class.

9.27.2 Member Enumeration Documentation

9.27.2.1 anonymous enum

```
anonymous enum :  unsigned
```

Enumerator

ReadOnly	Open flag: Read only access.
ReadWrite	Open flag: Read Write access.
Truncate	Open flag: Truncate a file if already existing.
Excl	Open flag: Open will fail if file already exist.
Debug	Open flag: Open in debug mode.
Create	Open flag: Create non existing file.
Overwrite	Derived open flag: common write mode (=ReadWrite|Create|Truncate)
OpenOrCreate	Derived open flag: Opens RW or exclusively creates.

9.27.3 Constructor & Destructor Documentation

9.27.3.1 File() [1/3]

```
HighFive::File::File (
            const std::string & filename,
            unsigned openFlags = ReadOnly,
            const FileAccessProps & fileAccessProps = FileAccessProps::Default() )  [inline],
[explicit]
```

File.

Parameters

filename	filepath of the HDF5 file
openFlags	Open mode / flags (ReadOnly, ReadWrite)
fileAccessProps	the file access properties

Open or create a new HDF5 file

9.27.3.2 File() [2/3]

```
HighFive::File::File (
            const std::string & filename,
            unsigned openFlags,
```

```
            const FileCreateProps & fileCreateProps,
            const FileAccessProps & fileAccessProps = FileAccessProps::Default() )  [inline]
```

File.

Parameters

filename	filepath of the HDF5 file
openFlags	Open mode / flags (ReadOnly, ReadWrite)
fileCreateProps	the file create properties
fileAccessProps	the file access properties

Open or create a new HDF5 file

9.27.3.3 File() [3/3]

```
HighFive::File::File ( )  [protected], [default]
```

9.27.4 Member Function Documentation

9.27.4.1 flush()

```
void HighFive::File::flush ( )  [inline]
```

flush

Flushes all buffers associated with a file to disk

9.27.4.2 getAccessPropertyList()

```
FileAccessProps HighFive::File::getAccessPropertyList ( ) const  [inline]
```

Get the list of properties for accession of this file.

9.27.4.3 getCreatePropertyList()

```
FileCreateProps HighFive::File::getCreatePropertyList ( ) const  [inline]
```

Get the list of properties for creation of this file.

9.27.4.4 getMetadataBlockSize()

```
hsize_t HighFive::File::getMetadataBlockSize ( ) const  [inline]
```

Returns the block size for metadata in bytes.

9.27.4.5 getName()

```
const std::string & HighFive::File::getName ( ) const  [inline], [noexcept]
```

Return the name of the file.

9.27.4.6 getPath()

```
std::string HighFive::File::getPath ( ) const  [inline], [noexcept]
```

Object path of a File is always "/".

9.27.4.7 getVersionBounds()

```
std::pair< H5F_libver_t, H5F_libver_t > HighFive::File::getVersionBounds ( ) const  [inline]
```

Returns the HDF5 version compatibility bounds.

9.27.4.8 Object() [1/4]

```
HighFive::Object::Object ( )  [inline], [protected]
```

9.27.4.9 Object() [2/4]

```
HighFive::Object::Object (
            const Object & other )  [inline], [protected]
```

9.27.4.10 Object() [3/4]

```
HighFive::Object::Object (
            hid_t hid )  [inline], [explicit], [protected]
```

9.27.4.11 Object() [4/4]

```
HighFive::Object::Object (
            Object && other )  [inline], [protected], [noexcept]
```

9.27.5 Friends And Related Symbol Documentation

9.27.5.1 PathTraits

```
template<typename >
friend class PathTraits  [friend]
```

9.27.6 Member Data Documentation

9.27.6.1 type

```
const ObjectType HighFive::File::type = ObjectType::File  [static]
```

The documentation for this class was generated from the following files:

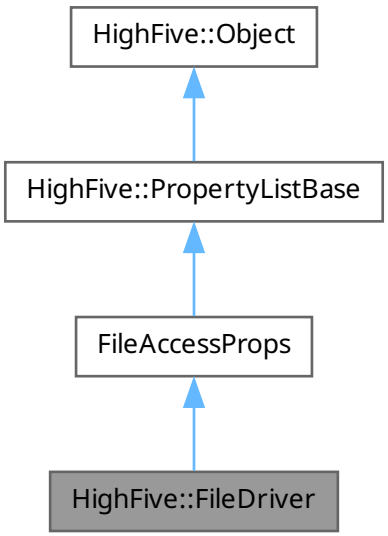
- highfive/H5File.hpp
- highfive/bits/H5File_misc.hpp

9.28 HighFive::FileDriver Class Reference

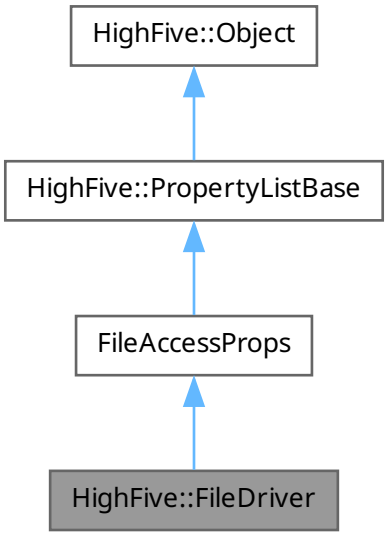
file driver base concept

```
#include <H5FileDriver.hpp>
```

Inheritance diagram for HighFive::FileDriver:



Collaboration diagram for HighFive::FileDriver:



Additional Inherited Members

Public Member Functions inherited from HighFive::PropertyList< T >

- constexpr PropertyType getType () const noexcept
  return the type of this PropertyList
- template<typename P >
  void add (const P &property)

Public Member Functions inherited from HighFive::PropertyListBase

- PropertyListBase () noexcept

Public Member Functions inherited from HighFive::Object

- Object (Object &&other) noexcept
- ~Object ()
- bool isValid () const noexcept
  isValid
- hid_t getId () const noexcept
  getId
- ObjectInfo getInfo () const
  Retrieve several infos about the current object (address, dates, etc)
- ObjectType getType () const
  Gets the fundamental type of the object (dataset, group, etc)
- bool operator== (const Object &other) const noexcept

Static Public Member Functions inherited from HighFive::PropertyList< T >

- static const PropertyList< T > & Default () noexcept

  Return the Default property type object.

Static Public Member Functions inherited from HighFive::PropertyListBase

- static const PropertyListBase & Default () noexcept

Protected Member Functions inherited from HighFive::PropertyList< T >

- void _initializeIfNeeded ()

Protected Member Functions inherited from HighFive::Object

- Object ()
- Object (const Object &other)
- Object (hid_t)
- Object & operator= (const Object &other)

Protected Attributes inherited from HighFive::Object

- hid_t _hid

9.28.1 Detailed Description

file driver base concept

Deprecated Use FileAccessProps directly

The documentation for this class was generated from the following file:

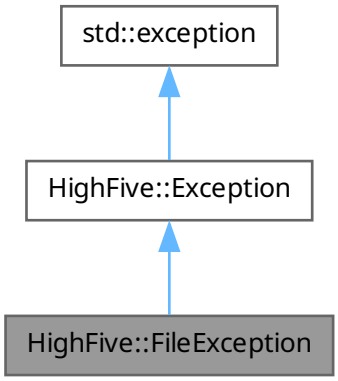
- highfive/H5FileDriver.hpp

9.29 HighFive::FileException Class Reference

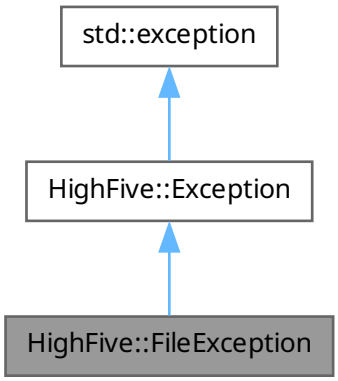
Exception specific to HighFive File interface.

`#include <H5Exception.hpp>`

Inheritance diagram for HighFive::FileException:



Collaboration diagram for HighFive::FileException:



Public Member Functions

- FileException (const std::string &err_msg)

Public Member Functions inherited from HighFive::Exception

- Exception (const std::string &err_msg)
- virtual ~Exception () throw ()
- const char * what () const override throw ()

  get the current exception error message
- virtual void setErrorMsg (const std::string &errmsg)

  define the error message
- Exception * nextException () const

  nextException
- hid_t getErrMajor () const

  HDF5 library error mapper.
- hid_t getErrMinor () const

  HDF5 library error mapper.

Additional Inherited Members

Protected Attributes inherited from HighFive::Exception

- std::string _errmsg
- std::shared_ptr< Exception > _next
- hid_t _err_major
- hid_t _err_minor

9.29.1 Detailed Description

Exception specific to HighFive File interface.

9.29.2 Constructor & Destructor Documentation

9.29.2.1 FileException()

```
HighFive::FileException::FileException (
            const std::string & err_msg )  [inline]
```

The documentation for this class was generated from the following file:

- highfive/H5Exception.hpp

9.30 HighFive::FileVersionBounds Class Reference

Configure the version bounds for the file.

```
#include <H5PropertyList.hpp>
```

Public Member Functions

- FileVersionBounds (H5F_libver_t low, H5F_libver_t high)
- FileVersionBounds (const FileAccessProps &fapl)
- std::pair< H5F_libver_t, H5F_libver_t > getVersion () const

9.30.1 Detailed Description

Configure the version bounds for the file.

Used to define the compatibility of objects created within HDF5 files, and affects the format of groups stored in the file.

See also the documentation of `H5P_SET_LIBVER_BOUNDS` in HDF5.

Possible values for `low` and `high` are:

- `H5F_LIBVER_EARLIEST`
- `H5F_LIBVER_V18`
- `H5F_LIBVER_V110`
- `H5F_LIBVER_NBOUNDS`
- `H5F_LIBVER_LATEST` currently defined as `H5F_LIBVER_V110` within HDF5

9.30.2 Constructor & Destructor Documentation

9.30.2.1 FileVersionBounds() [1/2]

```
HighFive::FileVersionBounds::FileVersionBounds (
            H5F_libver_t low,
            H5F_libver_t high )  [inline]
```

9.30.2.2 FileVersionBounds() [2/2]

```
HighFive::FileVersionBounds::FileVersionBounds (
            const FileAccessProps & fapl )  [inline], [explicit]
```

9.30.3 Member Function Documentation

9.30.3.1 getVersion()

```
std::pair< H5F_libver_t, H5F_libver_t > HighFive::FileVersionBounds::getVersion ( ) const
[inline]
```

The documentation for this class was generated from the following files:

- highfive/H5PropertyList.hpp
- highfive/bits/H5PropertyList_misc.hpp

9.31 HighFive::FixedLenStringArray< N > Class Template Reference

A structure representing a set of fixed-length strings.

`#include <H5DataType.hpp>`

Public Types

- using iterator = typename vector_t::iterator
- using const_iterator = typename vector_t::const_iterator
- using reverse_iterator = typename vector_t::reverse_iterator
- using const_reverse_iterator = typename vector_t::const_reverse_iterator
- using value_type = typename vector_t::value_type

Public Member Functions

- FixedLenStringArray ()=default
- FixedLenStringArray (const char array[ ][N], std::size_t length)

  Create a FixedStringArray from a raw contiguous buffer.
- FixedLenStringArray (const std::vector< std::string > &vec)

  Create a FixedStringArray from a sequence of strings.
- FixedLenStringArray (const std::string *iter_begin, const std::string *iter_end)
- FixedLenStringArray (const std::initializer_list< std::string > &)
- void push_back (const std::string &)

  Append an std::string to the buffer structure.
- void push_back (const std::array< char, N > &)
- std::string getString (std::size_t index) const

  Retrieve a string from the structure as std::string.
- const char * operator[ ] (std::size_t i) const noexcept
- const char * at (std::size_t i) const
- bool empty () const noexcept
- std::size_t size () const noexcept
- void resize (std::size_t n)
- const char * front () const
- const char * back () const
- char * data () noexcept
- const char * data () const noexcept
- iterator begin () noexcept
- iterator end () noexcept
- const_iterator begin () const noexcept
- const_iterator cbegin () const noexcept
- const_iterator end () const noexcept
- const_iterator cend () const noexcept
- reverse_iterator rbegin () noexcept
- reverse_iterator rend () noexcept
- const_reverse_iterator rbegin () const noexcept
- const_reverse_iterator rend () const noexcept

9.31.1 Detailed Description

template<std::size_t N>
class HighFive::FixedLenStringArray< N >

A structure representing a set of fixed-length strings.

Although fixed-len arrays can be created 'raw' without the need for this structure, to retrieve results efficiently it must be used.

9.31.2 Member Typedef Documentation

9.31.2.1 const_iterator

```
template<std::size_t N>
using HighFive::FixedLenStringArray< N >::const_iterator = typename vector_t::const_iterator
```

9.31.2.2 const_reverse_iterator

```
template<std::size_t N>
using HighFive::FixedLenStringArray< N >::const_reverse_iterator = typename vector_t::const_↩
reverse_iterator
```

9.31.2.3 iterator

```
template<std::size_t N>
using HighFive::FixedLenStringArray< N >::iterator = typename vector_t::iterator
```

9.31.2.4 reverse_iterator

```
template<std::size_t N>
using HighFive::FixedLenStringArray< N >::reverse_iterator = typename vector_t::reverse_↩
iterator
```

9.31.2.5 value_type

```
template<std::size_t N>
using HighFive::FixedLenStringArray< N >::value_type = typename vector_t::value_type
```

9.31.3 Constructor & Destructor Documentation

9.31.3.1 FixedLenStringArray() [1/5]

```
template<std::size_t N>
HighFive::FixedLenStringArray< N >::FixedLenStringArray ( )  [default]
```

9.31.3.2 FixedLenStringArray() [2/5]

```
template<std::size_t N>
HighFive::FixedLenStringArray< N >::FixedLenStringArray (
            const char array[][N],
            std::size_t length )  [inline]
```

Create a FixedStringArray from a raw contiguous buffer.

9.31.3.3 FixedLenStringArray() [3/5]

```
template<std::size_t N>
HighFive::FixedLenStringArray< N >::FixedLenStringArray (
            const std::vector< std::string > & vec )  [inline], [explicit]
```

Create a FixedStringArray from a sequence of strings.

Such conversion involves a copy, original vector is not modified

9.31.3.4 FixedLenStringArray() [4/5]

```
template<std::size_t N>
HighFive::FixedLenStringArray< N >::FixedLenStringArray (
            const std::string * iter_begin,
            const std::string * iter_end )  [inline]
```

9.31.3.5 FixedLenStringArray() [5/5]

```
template<std::size_t N>
HighFive::FixedLenStringArray< N >::FixedLenStringArray (
            const std::initializer_list< std::string > & init_list )  [inline]
```

9.31.4 Member Function Documentation

9.31.4.1 at()

```
template<std::size_t N>
const char * HighFive::FixedLenStringArray< N >::at (
            std::size_t i ) const  [inline]
```

9.31.4.2 back()

```
template<std::size_t N>
const char * HighFive::FixedLenStringArray< N >::back ( ) const  [inline]
```

9.31.4.3 begin() [1/2]

```
template<std::size_t N>
const_iterator HighFive::FixedLenStringArray< N >::begin ( ) const  [inline], [noexcept]
```

9.31.4.4 begin() [2/2]

```
template<std::size_t N>
iterator HighFive::FixedLenStringArray< N >::begin ( )  [inline], [noexcept]
```

9.31.4.5 cbegin()

```
template<std::size_t N>
const_iterator HighFive::FixedLenStringArray< N >::cbegin ( ) const  [inline], [noexcept]
```

9.31.4.6 cend()

```
template<std::size_t N>
const_iterator HighFive::FixedLenStringArray< N >::cend ( ) const  [inline], [noexcept]
```

9.31.4.7 data() [1/2]

```
template<std::size_t N>
const char * HighFive::FixedLenStringArray< N >::data ( ) const  [inline], [noexcept]
```

9.31.4.8 data() [2/2]

```
template<std::size_t N>
char * HighFive::FixedLenStringArray< N >::data ( )  [inline], [noexcept]
```

9.31.4.9 empty()

```
template<std::size_t N>
bool HighFive::FixedLenStringArray< N >::empty ( ) const  [inline], [noexcept]
```

9.31.4.10 end() [1/2]

```
template<std::size_t N>
const_iterator HighFive::FixedLenStringArray< N >::end ( ) const  [inline], [noexcept]
```

9.31.4.11 end() [2/2]

```
template<std::size_t N>
iterator HighFive::FixedLenStringArray< N >::end ( )  [inline], [noexcept]
```

9.31.4.12 front()

```
template<std::size_t N>
const char * HighFive::FixedLenStringArray< N >::front ( ) const  [inline]
```

9.31.4.13 getString()

```
template<std::size_t N>
std::string HighFive::FixedLenStringArray< N >::getString (
            std::size_t index ) const  [inline]
```

Retrieve a string from the structure as std::string.

9.31.4.14 operator[]()

```
template<std::size_t N>
const char * HighFive::FixedLenStringArray< N >::operator[] (
            std::size_t i ) const  [inline], [noexcept]
```

9.31.4.15 push_back() [1/2]

```
template<std::size_t N>
void HighFive::FixedLenStringArray< N >::push_back (
            const std::array< char, N > & src )  [inline]
```

9.31.4.16 push_back() [2/2]

```
template<std::size_t N>
void HighFive::FixedLenStringArray< N >::push_back (
            const std::string & src )  [inline]
```

Append an std::string to the buffer structure.

9.31.4.17 rbegin() [1/2]

```
template<std::size_t N>
const_reverse_iterator HighFive::FixedLenStringArray< N >::rbegin ( ) const  [inline], [noexcept]
```

9.31.4.18 rbegin() [2/2]

```
template<std::size_t N>
reverse_iterator HighFive::FixedLenStringArray< N >::rbegin ( )  [inline], [noexcept]
```

9.31.4.19 rend() [1/2]

```
template<std::size_t N>
const_reverse_iterator HighFive::FixedLenStringArray< N >::rend ( ) const  [inline], [noexcept]
```

9.31.4.20 rend() [2/2]

```
template<std::size_t N>
reverse_iterator HighFive::FixedLenStringArray< N >::rend ( )  [inline], [noexcept]
```

9.31.4.21 resize()

```
template<std::size_t N>
void HighFive::FixedLenStringArray< N >::resize (
            std::size_t n )  [inline]
```

9.31.4.22 size()

```
template<std::size_t N>
std::size_t HighFive::FixedLenStringArray< N >::size ( ) const  [inline], [noexcept]
```

The documentation for this class was generated from the following files:

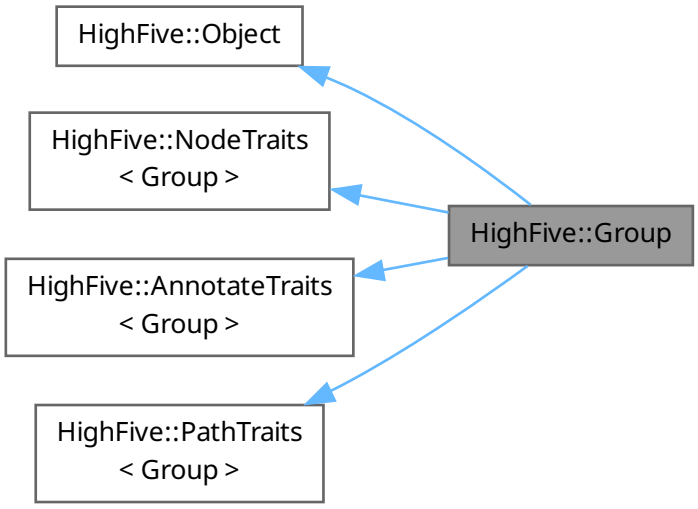
- highfive/bits/H5_definitions.hpp
- highfive/H5DataType.hpp
- highfive/bits/H5DataType_misc.hpp

9.32 HighFive::Group Class Reference

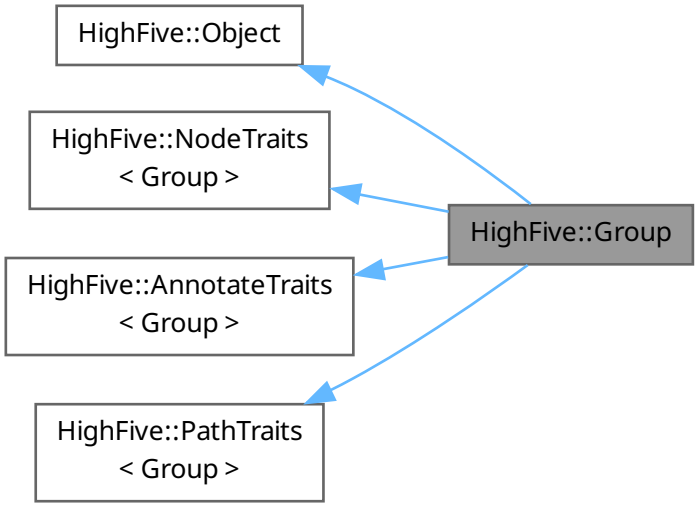
Represents an hdf5 group.

`#include <H5Group.hpp>`

Inheritance diagram for HighFive::Group:



Collaboration diagram for HighFive::Group:



Public Member Functions

- Group ()=default
- std::pair< unsigned int, unsigned int > getEstimatedLinkInfo () const
- GroupCreateProps getCreatePropertyList () const

  Get the list of properties for creation of this group.
- Group (Object &&o) noexcept

Public Member Functions inherited from HighFive::Object

- Object (Object &&other) noexcept
- ~Object ()
- bool isValid () const noexcept

  isValid
- hid_t getId () const noexcept

  getId
- ObjectInfo getInfo () const

  Retrieve several infos about the current object (address, dates, etc)
- ObjectType getType () const

  Gets the fundamental type of the object (dataset, group, etc)
- bool operator== (const Object &other) const noexcept

Public Member Functions inherited from HighFive::NodeTraits< Group >

- DataSet createDataSet (const std::string &dataset_name, const DataSpace &space, const DataType &type, const DataSetCreateProps &createProps=DataSetCreateProps::Default(), const DataSetAccessProps &accessProps=DataSetAccessProps::Default(), bool parents=true)

  createDataSet Create a new dataset in the current file of datatype type and of size space
- DataSet createDataSet (const std::string &dataset_name, const DataSpace &space, const DataSetCreateProps &createProps=DataSetCreateProps::Default(), const DataSetAccessProps &accessProps=DataSetAccessProps::Default(), bool parents=true)

  createDataSet create a new dataset in the current file with a size specified by space
- DataSet createDataSet (const std::string &dataset_name, const DataSpace &space, const DataSetCreateProps &createProps=DataSetCreateProps::Default(), const DataSetAccessProps &accessProps=DataSetAccessProps::Default(), bool parents=true)
- DataSet createDataSet (const std::string &dataset_name, const T &data, const DataSetCreateProps &createProps=DataSetCreateProps::Default(), const DataSetAccessProps &accessProps=DataSetAccessProps::Default(), bool parents=true)

  createDataSet create a new dataset in the current file and write to it, inferring the DataSpace from the data.
- DataSet createDataSet (const std::string &dataset_name, const FixedLenStringArray< N > &data, const DataSetCreateProps &createProps=DataSetCreateProps::Default(), const DataSetAccessProps &accessProps=DataSetAccessProps::Default(), bool parents=true)
- DataSet getDataSet (const std::string &dataset_name, const DataSetAccessProps &accessProps=DataSetAccessProps::Default()) const

  get an existing dataset in the current file
- Group createGroup (const std::string &group_name, bool parents=true)

  create a new group, and eventually intermediate groups
- Group createGroup (const std::string &group_name, const GroupCreateProps &createProps, bool parents=true)

  create a new group, and eventually intermediate groups
- Group getGroup (const std::string &group_name) const

  open an existing group with the name group_name
- size_t getNumberObjects () const

  return the number of leaf objects of the node / group
- std::string getObjectName (size_t index) const

  return the name of the object with the given index
- bool rename (const std::string &src_path, const std::string &dest_path, bool parents=true) const

  moves an object and its content within an HDF5 file.
- std::vector< std::string > listObjectNames (IndexType idx_type=IndexType::NAME) const

  list all leaf objects name of the node / group
- bool exist (const std::string &node_name) const

  check a dataset or group exists in the current node / group
- void unlink (const std::string &node_name) const

  unlink the given dataset or group
- LinkType getLinkType (const std::string &node_name) const

  Returns the kind of link of the given name (soft, hard...)
- ObjectType getObjectType (const std::string &node_name) const

  A shorthand to get the kind of object pointed to (group, dataset, type...)
- void createSoftLink (const std::string &linkName, const T &obj)

  A shorthand to create softlink to any object which provides `getPath` The link will be created with default properties along with required parent groups.
- void createSoftLink (const std::string &link_name, const std::string &obj_path, LinkCreateProps linkCreateProps=LinkCreateProps(), const LinkAccessProps &linkAccessProps=LinkAccessProps(), const bool parents=true)

  Creates softlinks.
- void createExternalLink (const std::string &link_name, const std::string &h5_file, const std::string &obj_path, LinkCreateProps linkCreateProps=LinkCreateProps(), const LinkAccessProps &linkAccessProps=LinkAccessProps(), const bool parents=true)

Public Member Functions inherited from HighFive::AnnotateTraits< Group >

- Attribute createAttribute (const std::string &attribute_name, const DataSpace &space, const DataType &type)

  create a new attribute with the name attribute_name
- Attribute createAttribute (const std::string &attribute_name, const DataSpace &space)

  createAttribute create a new attribute on the current dataset with size specified by space
- Attribute createAttribute (const std::string &attribute_name, const T &data)

  createAttribute create a new attribute on the current dataset and write to it, inferring the DataSpace from data.
- void deleteAttribute (const std::string &attribute_name)

  deleteAttribute let you delete an attribute by its name.
- Attribute getAttribute (const std::string &attribute_name) const

  open an existing attribute with the name attribute_name
- size_t getNumberAttributes () const

  return the number of attributes of the node / group
- std::vector< std::string > listAttributeNames () const

  list all attribute name of the node / group
- bool hasAttribute (const std::string &attr_name) const

  checks an attribute exists

Public Member Functions inherited from HighFive::PathTraits< Group >

- PathTraits ()
- std::string getPath () const

  return the path to the current object
- File & getFile () const noexcept

  Return a reference to the File object this object belongs.

Static Public Attributes

- static const ObjectType type = ObjectType::Group

Protected Member Functions

- Object (Object &&other) noexcept
- Object ()
- Object (const Object &other)
- Object (hid_t)

Protected Member Functions inherited from HighFive::Object

- Object ()
- Object (const Object &other)
- Object (hid_t)
- Object & operator= (const Object &other)

Friends

- class File
- class Reference

Additional Inherited Members

Protected Attributes inherited from HighFive::Object

- hid_t _hid

Protected Attributes inherited from HighFive::PathTraits< Group >

- std::shared_ptr< File > _file_obj

9.32.1 Detailed Description

Represents an hdf5 group.

9.32.2 Constructor & Destructor Documentation

9.32.2.1 Group() [1/2]

```
HighFive::Group::Group ( )  [default]
```

Deprecated Default constructor creates unsafe uninitialized objects

9.32.2.2 Group() [2/2]

```
HighFive::Group::Group (
            Object && o )  [inline], [noexcept]
```

9.32.3 Member Function Documentation

9.32.3.1 getCreatePropertyList()

```
GroupCreateProps HighFive::Group::getCreatePropertyList ( ) const  [inline]
```

Get the list of properties for creation of this group.

9.32.3.2 getEstimatedLinkInfo()

```
std::pair< unsigned int, unsigned int > HighFive::Group::getEstimatedLinkInfo ( ) const  [inline]
```

9.32.3.3 Object() [1/4]

```
HighFive::Object::Object ( )  [inline], [protected]
```

9.32.3.4 Object() [2/4]

```
HighFive::Object::Object (
            const Object & other )  [inline], [protected]
```

9.32.3.5 Object() [3/4]

```
HighFive::Object::Object (
            hid_t hid )  [inline], [explicit], [protected]
```

9.32.3.6 Object() [4/4]

```
HighFive::Object::Object (
            Object && other )  [inline], [protected], [noexcept]
```

9.32.4 Friends And Related Symbol Documentation

9.32.4.1 File

```
friend class File  [friend]
```

9.32.4.2 Reference

```
friend class Reference  [friend]
```

9.32.5 Member Data Documentation

9.32.5.1 type

```
const ObjectType HighFive::Group::type = ObjectType::Group  [static]
```

The documentation for this class was generated from the following file:

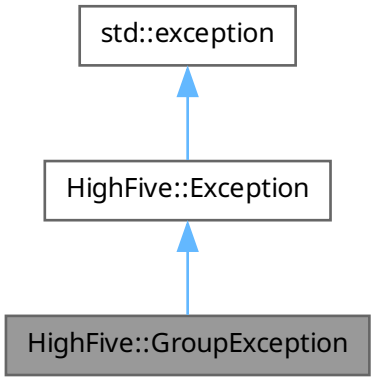
- highfive/H5Group.hpp

9.33 HighFive::GroupException Class Reference

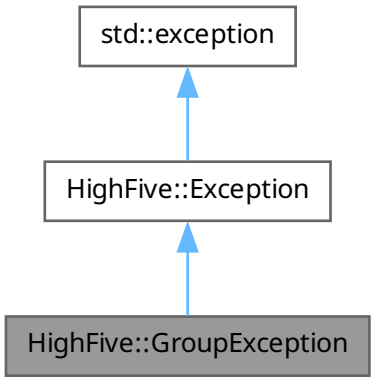
Exception specific to HighFive Group interface.

`#include <H5Exception.hpp>`

Inheritance diagram for HighFive::GroupException:



Collaboration diagram for HighFive::GroupException:



Public Member Functions

- GroupException (const std::string &err_msg)

Public Member Functions inherited from HighFive::Exception

- Exception (const std::string &err_msg)
- virtual ~Exception () throw ()
- const char * what () const override throw ()

  get the current exception error message
- virtual void setErrorMsg (const std::string &errmsg)

  define the error message
- Exception * nextException () const

  nextException
- hid_t getErrMajor () const

  HDF5 library error mapper.
- hid_t getErrMinor () const

  HDF5 library error mapper.

Additional Inherited Members

Protected Attributes inherited from HighFive::Exception

- std::string _errmsg
- std::shared_ptr< Exception > _next
- hid_t _err_major
- hid_t _err_minor

9.33.1 Detailed Description

Exception specific to HighFive Group interface.

9.33.2 Constructor & Destructor Documentation

9.33.2.1 GroupException()

```
HighFive::GroupException::GroupException (
            const std::string & err_msg )  [inline]
```

The documentation for this class was generated from the following file:

- highfive/H5Exception.hpp

9.34 HighFive::HDF5ErrMapper Struct Reference

```
#include <H5Exception_misc.hpp>
```

Static Public Member Functions

- template<typename ExceptionType >
  static herr_t stackWalk (unsigned n, const H5E_error2_t *err_desc, void *client_data)
- template<typename ExceptionType >
  static void ToException (const std::string &prefix_msg)

9.34.1 Member Function Documentation

9.34.1.1 stackWalk()

```
template<typename ExceptionType >
static herr_t HighFive::HDF5ErrMapper::stackWalk (
            unsigned n,
            const H5E_error2_t * err_desc,
            void * client_data )  [inline], [static]
```

9.34.1.2 ToException()

```
template<typename ExceptionType >
static void HighFive::HDF5ErrMapper::ToException (
            const std::string & prefix_msg )  [inline], [static]
```

The documentation for this struct was generated from the following file:

- highfive/bits/H5Exception_misc.hpp

9.35 HighFive::HyperSlab Class Reference

```
#include <H5Slice_traits.hpp>
```

Public Member Functions

- HyperSlab ()
- HyperSlab (const RegularHyperSlab &sel)
- HyperSlab operator| (const RegularHyperSlab &sel) const
- HyperSlab & operator|= (const RegularHyperSlab &sel)
- HyperSlab operator& (const RegularHyperSlab &sel) const
- HyperSlab & operator&= (const RegularHyperSlab &sel)
- HyperSlab operator^ (const RegularHyperSlab &sel) const
- HyperSlab & operator^= (const RegularHyperSlab &sel)
- HyperSlab & notA (const RegularHyperSlab &sel)
- HyperSlab & notB (const RegularHyperSlab &sel)
- DataSpace apply (const DataSpace &space_) const

9.35.1 Constructor & Destructor Documentation

9.35.1.1 HyperSlab() [1/2]

```
HighFive::HyperSlab::HyperSlab ( )  [inline]
```

9.35.1.2 HyperSlab() [2/2]

```
HighFive::HyperSlab::HyperSlab (
            const RegularHyperSlab & sel )  [inline], [explicit]
```

9.35.2 Member Function Documentation

9.35.2.1 apply()

```
DataSpace HighFive::HyperSlab::apply (
            const DataSpace & space_ ) const  [inline]
```

9.35.2.2 notA()

```
HyperSlab & HighFive::HyperSlab::notA (
            const RegularHyperSlab & sel )  [inline]
```

9.35.2.3 notB()

```
HyperSlab & HighFive::HyperSlab::notB (
            const RegularHyperSlab & sel )  [inline]
```

9.35.2.4 operator&()

```
HyperSlab HighFive::HyperSlab::operator& (
            const RegularHyperSlab & sel ) const  [inline]
```

9.35.2.5 operator&=()

```
HyperSlab & HighFive::HyperSlab::operator&= (
            const RegularHyperSlab & sel )  [inline]
```

9.35.2.6 operator^()

```
HyperSlab HighFive::HyperSlab::operator^ (
            const RegularHyperSlab & sel ) const  [inline]
```

9.35.2.7 operator^=()

```
HyperSlab & HighFive::HyperSlab::operator^= (
            const RegularHyperSlab & sel )  [inline]
```

9.35.2.8 operator"|()

```
HyperSlab HighFive::HyperSlab::operator| (
            const RegularHyperSlab & sel ) const  [inline]
```

9.35.2.9 operator"|=()

```
HyperSlab & HighFive::HyperSlab::operator|= (
            const RegularHyperSlab & sel )  [inline]
```

The documentation for this class was generated from the following file:

- highfive/bits/H5Slice_traits.hpp

9.36 HighFive::LinkCreationOrder Class Reference

Track and index creation order time.

`#include <H5PropertyList.hpp>`

Public Member Functions

- LinkCreationOrder (unsigned flags)
  Create the property.
- LinkCreationOrder (const FileCreateProps &fcpl)
- LinkCreationOrder (const GroupCreateProps &gcpl)
- unsigned getFlags () const

Protected Member Functions

- void fromPropertyList (hid_t hid)

9.36.1 Detailed Description

Track and index creation order time.

Let user retrieve objects by creation order time instead of name.

9.36.2 Constructor & Destructor Documentation

9.36.2.1 LinkCreationOrder() [1/3]

```
HighFive::LinkCreationOrder::LinkCreationOrder (
            unsigned flags )  [inline], [explicit]
```

Create the property.

Parameters

flags	Should be a composition of HighFive::CreationOrder.

9.36.2.2 LinkCreationOrder() [2/3]

```
HighFive::LinkCreationOrder::LinkCreationOrder (
            const FileCreateProps & fcpl )  [inline], [explicit]
```

9.36.2.3 LinkCreationOrder() [3/3]

```
HighFive::LinkCreationOrder::LinkCreationOrder (
            const GroupCreateProps & gcpl )  [explicit]
```

9.36.3 Member Function Documentation

9.36.3.1 fromPropertyList()

```
void HighFive::LinkCreationOrder::fromPropertyList (
            hid_t hid )  [inline], [protected]
```

9.36.3.2 getFlags()

```
unsigned HighFive::LinkCreationOrder::getFlags ( ) const  [inline]
```

The documentation for this class was generated from the following files:

- highfive/H5PropertyList.hpp
- highfive/bits/H5PropertyList_misc.hpp

9.37 HighFive::Logger Class Reference

A logger with supporting basic functionality.

```
#include <H5Utility.hpp>
```

Public Types

- using callback_type = std::function< void(LogSeverity, const std::string &, const std::string &, int)>

Public Member Functions

- Logger ()=delete
- Logger (const Logger &)=delete
- Logger (Logger &&)=delete
- Logger (callback_type cb)
- Logger & operator= (const Logger &)=delete
- Logger & operator= (Logger &&)=delete
- void log (LogSeverity severity, const std::string &message, const std::string &file, int line)
- void set_logging_callback (callback_type cb)

9.37.1 Detailed Description

A logger with supporting basic functionality.

This logger delegates the logging task to a callback. This level of indirection enables using the default Python logger from C++; or integrating HighFive into some custom logging solution.

Using this class directly to log is not intended. Rather you should use

- `HIGHFIVE_LOG_DEBUG{,_IF}`
- `HIGHFIVE_LOG_INFO{,_IF}`
- `HIGHFIVE_LOG_WARNING{,_IF}`
- `HIGHFIVE_LOG_ERROR{,_IF}`

This is intended to used as a singleton, via `get_global_logger()`.

9.37.2 Member Typedef Documentation

9.37.2.1 callback_type

```
using HighFive::Logger::callback_type = std::function<void(LogSeverity, const std::string&,
const std::string&, int)>
```

9.37.3 Constructor & Destructor Documentation

9.37.3.1 Logger() [1/4]

```
HighFive::Logger::Logger ( )  [delete]
```

9.37.3.2 Logger() [2/4]

```
HighFive::Logger::Logger (
            const Logger &  )  [delete]
```

9.37.3.3 Logger() [3/4]

```
HighFive::Logger::Logger (
            Logger &&  )  [delete]
```

9.37.3.4 Logger() [4/4]

```
HighFive::Logger::Logger (
            callback_type cb )  [inline], [explicit]
```

9.37.4 Member Function Documentation

9.37.4.1 log()

```
void HighFive::Logger::log (
            LogSeverity severity,
            const std::string & message,
            const std::string & file,
            int line )  [inline]
```

9.37.4.2 operator=() [1/2]

```
Logger & HighFive::Logger::operator= (
            const Logger &  )  [delete]
```

9.37.4.3 operator=() [2/2]

```
Logger & HighFive::Logger::operator= (
            Logger &&  )  [delete]
```

9.37.4.4 set_logging_callback()

```
void HighFive::Logger::set_logging_callback (
            callback_type cb )  [inline]
```

The documentation for this class was generated from the following file:

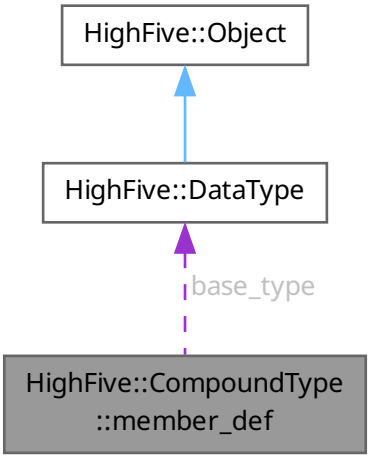
- highfive/H5Utility.hpp

9.38 HighFive::CompoundType::member_def Struct Reference

Use for defining a sub-type of compound type.

`#include <H5DataType.hpp>`

Collaboration diagram for HighFive::CompoundType::member_def:



Public Member Functions

- member_def (std::string t_name, DataType t_base_type, size_t t_offset=0)

Public Attributes

- std::string name
- DataType base_type
- size_t offset

9.38.1 Detailed Description

Use for defining a sub-type of compound type.

9.38.2 Constructor & Destructor Documentation

9.38.2.1 member_def()

```
HighFive::CompoundType::member_def::member_def (
            std::string t_name,
            DataType t_base_type,
            size_t t_offset = 0 )  [inline]
```

9.38.3 Member Data Documentation

9.38.3.1 base_type

```
DataType HighFive::CompoundType::member_def::base_type
```

9.38.3.2 name

```
std::string HighFive::CompoundType::member_def::name
```

9.38.3.3 offset

```
size_t HighFive::CompoundType::member_def::offset
```

The documentation for this struct was generated from the following file:

- highfive/H5DataType.hpp

9.39 HighFive::EnumType< T >::member_def Struct Reference

Use for defining a member of enum type.

```
#include <H5DataType.hpp>
```

Public Member Functions

- member_def (const std::string &t_name, T t_value)

Public Attributes

- std::string name
- T value

9.39.1 Detailed Description

template<typename T>
struct HighFive::EnumType< T >::member_def

Use for defining a member of enum type.

9.39.2 Constructor & Destructor Documentation

9.39.2.1 member_def()

```
template<typename T >
HighFive::EnumType< T >::member_def::member_def (
            const std::string & t_name,
            T t_value )  [inline]
```

9.39.3 Member Data Documentation

9.39.3.1 name

```
template<typename T >
std::string HighFive::EnumType< T >::member_def::name
```

9.39.3.2 value

```
template<typename T >
T HighFive::EnumType< T >::member_def::value
```

The documentation for this struct was generated from the following file:

- highfive/H5DataType.hpp

9.40 HighFive::MetadataBlockSize Class Reference

Configure the metadata block size to use writing to files.

`#include <H5PropertyList.hpp>`

Public Member Functions

- MetadataBlockSize (hsize_t size)
- MetadataBlockSize (const FileAccessProps &fapl)
- hsize_t getSize () const

9.40.1 Detailed Description

Configure the metadata block size to use writing to files.

Parameters

size	Metadata block size in bytes

9.40.2 Constructor & Destructor Documentation

9.40.2.1 MetadataBlockSize() [1/2]

```
HighFive::MetadataBlockSize::MetadataBlockSize (
            hsize_t size )  [inline], [explicit]
```

9.40.2.2 MetadataBlockSize() [2/2]

```
HighFive::MetadataBlockSize::MetadataBlockSize (
            const FileAccessProps & fapl )  [inline], [explicit]
```

9.40.3 Member Function Documentation

9.40.3.1 getSize()

```
hsize_t HighFive::MetadataBlockSize::getSize ( ) const  [inline]
```

The documentation for this class was generated from the following files:

- highfive/H5PropertyList.hpp
- highfive/bits/H5PropertyList_misc.hpp

9.41 HighFive::MPIOCollectiveMetadata Class Reference

Use collective MPI-IO for metadata read and write.

```
#include <H5PropertyList.hpp>
```

Public Member Functions

- MPIOCollectiveMetadata (bool collective=true)
- MPIOCollectiveMetadata (const FileAccessProps &plist)
- bool isCollectiveRead () const
- bool isCollectiveWrite () const

9.41.1 Detailed Description

Use collective MPI-IO for metadata read and write.

See MPIOCollectiveMetadataRead and MPIOCollectiveMetadataWrite.

9.41.2 Constructor & Destructor Documentation

9.41.2.1 MPIOCollectiveMetadata() [1/2]

```
HighFive::MPIOCollectiveMetadata::MPIOCollectiveMetadata (
            bool collective = true )  [inline], [explicit]
```

9.41.2.2 MPIOCollectiveMetadata() [2/2]

```
HighFive::MPIOCollectiveMetadata::MPIOCollectiveMetadata (
            const FileAccessProps & plist )  [inline], [explicit]
```

9.41.3 Member Function Documentation

9.41.3.1 isCollectiveRead()

```
bool HighFive::MPIOCollectiveMetadata::isCollectiveRead ( ) const  [inline]
```

9.41.3.2 isCollectiveWrite()

```
bool HighFive::MPIOCollectiveMetadata::isCollectiveWrite ( ) const  [inline]
```

The documentation for this class was generated from the following files:

- highfive/H5PropertyList.hpp
- highfive/bits/H5PropertyList_misc.hpp

9.42 HighFive::MPIOCollectiveMetadataRead Class Reference

Use collective MPI-IO for metadata read?

```
#include <H5PropertyList.hpp>
```

Public Member Functions

- MPIOCollectiveMetadataRead (bool collective=true)
- MPIOCollectiveMetadataRead (const FileAccessProps &plist)
- bool isCollective () const

9.42.1 Detailed Description

Use collective MPI-IO for metadata read?

Note that when used in a file access property list, this will force all reads of meta data to be collective. HDF5 function may implicitly perform metadata reads. These functions would become collective. A list of functions that perform metadata reads can be found in the HDF5 documentation, e.g. https://docs.hdfgroup.org/hdf5/v1_12/group___g_a_c_p_l.html

In HighFive setting collective read is (currently) only supported on file level.

Please also consult upstream documentation of `H5Pset_all_coll_metadata_ops`.

9.42.2 Constructor & Destructor Documentation

9.42.2.1 MPIOCollectiveMetadataRead() [1/2]

```
HighFive::MPIOCollectiveMetadataRead::MPIOCollectiveMetadataRead (
            bool collective = true )  [inline], [explicit]
```

9.42.2.2 MPIOCollectiveMetadataRead() [2/2]

```
HighFive::MPIOCollectiveMetadataRead::MPIOCollectiveMetadataRead (
            const FileAccessProps & plist )  [inline], [explicit]
```

9.42.3 Member Function Documentation

9.42.3.1 isCollective()

```
bool HighFive::MPIOCollectiveMetadataRead::isCollective ( ) const  [inline]
```

The documentation for this class was generated from the following files:

- highfive/H5PropertyList.hpp
- highfive/bits/H5PropertyList_misc.hpp

9.43 HighFive::MPIOCollectiveMetadataWrite Class Reference

Use collective MPI-IO for metadata write?

`#include <H5PropertyList.hpp>`

Public Member Functions

- MPIOCollectiveMetadataWrite (bool collective=true)
- MPIOCollectiveMetadataWrite (const FileAccessProps &plist)
- bool isCollective () const

9.43.1 Detailed Description

Use collective MPI-IO for metadata write?

In order to keep the in-memory representation of the file structure consistent across MPI ranks, writing meta data is always a collective operation. Meaning all MPI ranks must participate. Passing this setting enables using MPI-IO collective operations for metadata writes.

Please also consult upstream documentation of `H5Pset_coll_metadata_write`.

9.43.2 Constructor & Destructor Documentation

9.43.2.1 MPIOCollectiveMetadataWrite() [1/2]

```
HighFive::MPIOCollectiveMetadataWrite::MPIOCollectiveMetadataWrite (
            bool collective = true )  [inline], [explicit]
```

9.43.2.2 MPIOCollectiveMetadataWrite() [2/2]

```
HighFive::MPIOCollectiveMetadataWrite::MPIOCollectiveMetadataWrite (
            const FileAccessProps & plist )  [inline], [explicit]
```

9.43.3 Member Function Documentation

9.43.3.1 isCollective()

```
bool HighFive::MPIOCollectiveMetadataWrite::isCollective ( ) const  [inline]
```

The documentation for this class was generated from the following files:

- highfive/H5PropertyList.hpp
- highfive/bits/H5PropertyList_misc.hpp

9.44 HighFive::MPIOFileAccess Class Reference

Configure MPI access for the file.

```
#include <H5PropertyList.hpp>
```

Public Member Functions

- MPIOFileAccess (MPI_Comm comm, MPI_Info info)

9.44.1 Detailed Description

Configure MPI access for the file.

All further modifications to the structure of the file will have to be done with collective operations

9.44.2 Constructor & Destructor Documentation

9.44.2.1 MPIOFileAccess()

```
HighFive::MPIOFileAccess::MPIOFileAccess (
            MPI_Comm comm,
            MPI_Info info )  [inline]
```

The documentation for this class was generated from the following files:

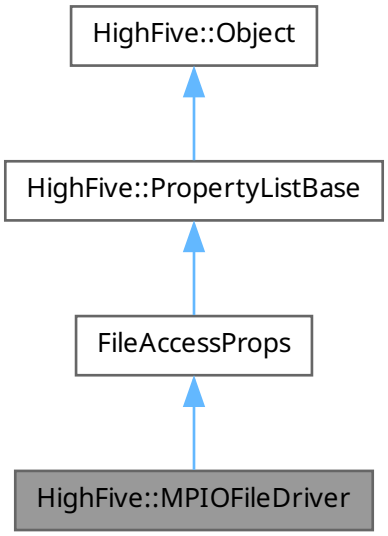
- highfive/H5PropertyList.hpp
- highfive/bits/H5PropertyList_misc.hpp

9.45 HighFive::MPIOFileDriver Class Reference

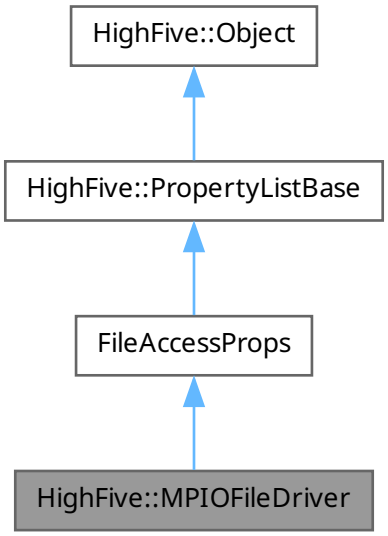
MPIIO Driver for Parallel HDF5.

```
#include <H5FileDriver.hpp>
```

Inheritance diagram for HighFive::MPIOFileDriver:



Collaboration diagram for HighFive::MPIOFileDriver:



Public Member Functions

- MPIOFileDriver (MPI_Comm mpi_comm, MPI_Info mpi_info)

Public Member Functions inherited from HighFive::PropertyList< T >

- constexpr PropertyType getType () const noexcept
  return the type of this PropertyList
- template<typename P >
  void add (const P &property)

Public Member Functions inherited from HighFive::PropertyListBase

- PropertyListBase () noexcept

Public Member Functions inherited from HighFive::Object

- Object (Object &&other) noexcept
- ~Object ()
- bool isValid () const noexcept
  isValid
- hid_t getId () const noexcept
  getId
- ObjectInfo getInfo () const
  Retrieve several infos about the current object (address, dates, etc)
- ObjectType getType () const
  Gets the fundamental type of the object (dataset, group, etc)
- bool operator== (const Object &other) const noexcept

Additional Inherited Members

Static Public Member Functions inherited from HighFive::PropertyList< T >

- static const PropertyList< T > & Default () noexcept
  Return the Default property type object.

Static Public Member Functions inherited from HighFive::PropertyListBase

- static const PropertyListBase & Default () noexcept

Protected Member Functions inherited from HighFive::PropertyList< T >

- void _initializeIfNeeded ()

Protected Member Functions inherited from HighFive::Object

- Object ()
- Object (const Object &other)
- Object (hid_t)
- Object & operator= (const Object &other)

Protected Attributes inherited from HighFive::Object

- hid_t _hid

9.45.1 Detailed Description

MPIIO Driver for Parallel HDF5.

Deprecated Add MPIOFileAccess directly to FileAccessProps

9.45.2 Constructor & Destructor Documentation

9.45.2.1 MPIOFileDriver()

```
HighFive::MPIOFileDriver::MPIOFileDriver (
            MPI_Comm mpi_comm,
            MPI_Info mpi_info )  [inline]
```

The documentation for this class was generated from the following files:

- highfive/H5FileDriver.hpp
- highfive/bits/H5FileDriver_misc.hpp

9.46 HighFive::MpioNoCollectiveCause Class Reference

The cause for non-collective I/O.

`#include <H5PropertyList.hpp>`

Public Member Functions

- MpioNoCollectiveCause (const DataTransferProps &dxpl)
- bool wasCollective () const
  Was the datatransfer collective?
- uint32_t getLocalCause () const
  The local cause for a non-collective I/O.
- uint32_t getGlobalCause () const
  The global cause for a non-collective I/O.
- std::pair< uint32_t, uint32_t > getCause () const
  A pair of the local and global cause for non-collective I/O.

9.46.1 Detailed Description

The cause for non-collective I/O.

The cause refers to the most recent I/O with data transfer property list `dxpl` at time of creation of this object. This object will not update automatically for later data transfers, i.e. `H5Pget_mpio_no_collective_cause` is called in the constructor, and not when fetching a value, such as `wasCollective`.

9.46.2 Constructor & Destructor Documentation

9.46.2.1 MpioNoCollectiveCause()

```
HighFive::MpioNoCollectiveCause::MpioNoCollectiveCause (
            const DataTransferProps & dxpl )  [inline], [explicit]
```

9.46.3 Member Function Documentation

9.46.3.1 getCause()

```
std::pair< uint32_t, uint32_t > HighFive::MpioNoCollectiveCause::getCause ( ) const  [inline]
```

A pair of the local and global cause for non-collective I/O.

9.46.3.2 getGlobalCause()

```
uint32_t HighFive::MpioNoCollectiveCause::getGlobalCause ( ) const  [inline]
```

The global cause for a non-collective I/O.

9.46.3.3 getLocalCause()

```
uint32_t HighFive::MpioNoCollectiveCause::getLocalCause ( ) const  [inline]
```

The local cause for a non-collective I/O.

9.46.3.4 wasCollective()

```
bool HighFive::MpioNoCollectiveCause::wasCollective ( ) const  [inline]
```

Was the datatransfer collective?

The documentation for this class was generated from the following files:

- highfive/H5PropertyList.hpp
- highfive/bits/H5PropertyList_misc.hpp

9.47 HighFive::NodeTraits< Derivate > Class Template Reference

NodeTraits: Base class for Group and File.

```
#include <H5Node_traits.hpp>
```

Public Member Functions

- DataSet createDataSet (const std::string &dataset_name, const DataSpace &space, const DataType &type, const DataSetCreateProps &createProps=DataSetCreateProps::Default(), const DataSetAccessProps &accessProps=DataSetAccessProps::Default(), bool parents=true)

  createDataSet Create a new dataset in the current file of datatype type and of size space
- template<typename T , typename std::enable_if< std::is_same< typename details::inspector< T >::base_type, details::Boolean >::value, int >::type * = nullptr>
  DataSet createDataSet (const std::string &dataset_name, const DataSpace &space, const DataSetCreateProps &createProps=DataSetCreateProps::Default(), const DataSetAccessProps &accessProps=DataSetAccessProps::Default(), bool parents=true)

  createDataSet create a new dataset in the current file with a size specified by space
- template<typename T , typename std::enable_if< !std::is_same< typename details::inspector< T >::base_type, details::Boolean >::value, int >::type * = nullptr>
  DataSet createDataSet (const std::string &dataset_name, const DataSpace &space, const DataSetCreateProps &createProps=DataSetCreateProps::Default(), const DataSetAccessProps &accessProps=DataSetAccessProps::Default(), bool parents=true)
- template<typename T >
  DataSet createDataSet (const std::string &dataset_name, const T &data, const DataSetCreateProps &createProps=DataSetCreateProps::Default(), const DataSetAccessProps &accessProps=DataSetAccessProps::Default(), bool parents=true)

  createDataSet create a new dataset in the current file and write to it, inferring the DataSpace from the data.
- template<std::size_t N>
  DataSet createDataSet (const std::string &dataset_name, const FixedLenStringArray< N > &data, const DataSetCreateProps &createProps=DataSetCreateProps::Default(), const DataSetAccessProps &access↩
  Props=DataSetAccessProps::Default(), bool parents=true)
- DataSet getDataSet (const std::string &dataset_name, const DataSetAccessProps &accessProps=DataSetAccessProps::Defau
  const

get an existing dataset in the current file

- Group createGroup (const std::string &group_name, bool parents=true)

  create a new group, and eventually intermediate groups
- Group createGroup (const std::string &group_name, const GroupCreateProps &createProps, bool parents=true)

  create a new group, and eventually intermediate groups
- Group getGroup (const std::string &group_name) const

  open an existing group with the name group_name
- size_t getNumberObjects () const

  return the number of leaf objects of the node / group
- std::string getObjectName (size_t index) const

  return the name of the object with the given index
- bool rename (const std::string &src_path, const std::string &dest_path, bool parents=true) const

  moves an object and its content within an HDF5 file.
- std::vector< std::string > listObjectNames (IndexType idx_type=IndexType::NAME) const

  list all leaf objects name of the node / group
- bool exist (const std::string &node_name) const

  check a dataset or group exists in the current node / group
- void unlink (const std::string &node_name) const

  unlink the given dataset or group
- LinkType getLinkType (const std::string &node_name) const

  Returns the kind of link of the given name (soft, hard...)
- ObjectType getObjectType (const std::string &node_name) const

  A shorthand to get the kind of object pointed to (group, dataset, type...)
- template<typename T , typename = decltype(&T::getPath)>
  void createSoftLink (const std::string &linkName, const T &obj)

  A shorthand to create softlink to any object which provides `getPath` The link will be created with default properties along with required parent groups.
- void createSoftLink (const std::string &link_name, const std::string &obj_path, LinkCreateProps linkCreate↩ Props=LinkCreateProps(), const LinkAccessProps &linkAccessProps=LinkAccessProps(), const bool parents=true)

  Creates softlinks.
- void createExternalLink (const std::string &link_name, const std::string &h5_file, const std::string &obj↩ _path, LinkCreateProps linkCreateProps=LinkCreateProps(), const LinkAccessProps &linkAccess↩ Props=LinkAccessProps(), const bool parents=true)

9.47.1 Detailed Description

template<typename Derivate>
class HighFive::NodeTraits< Derivate >

NodeTraits: Base class for Group and File.

9.47.2 Member Function Documentation

9.47.2.1 createDataSet() [1/5]

```
template<typename Derivate >
template<typename T , typename std::enable_if< !std::is_same< typename details::inspector< T
>::base_type, details::Boolean >::value, int >::type * >
DataSet HighFive::NodeTraits< Derivate >::createDataSet (
            const std::string & dataset_name,
            const DataSpace & space,
            const DataSetCreateProps & createProps = DataSetCreateProps::Default(),
            const DataSetAccessProps & accessProps = DataSetAccessProps::Default(),
            bool parents = true )  [inline]
```

createDataSet create a new dataset in the current file with a size specified by space

Parameters

dataset_name	identifier of the dataset
space	Associated DataSpace, see DataSpace for more information
createProps	A property list with data set creation properties
accessProps	A property list with data set access properties
parents	Create intermediate groups if needed. Default: true.

Returns

DataSet Object

9.47.2.2 createDataSet() [2/5]

```
template<typename Derivate >
template<typename T , typename std::enable_if< !std::is_same< typename details::inspector< T
>::base_type, details::Boolean >::value, int >::type * = nullptr>
DataSet HighFive::NodeTraits< Derivate >::createDataSet (
            const std::string & dataset_name,
            const DataSpace & space,
            const DataSetCreateProps & createProps = DataSetCreateProps::Default(),
            const DataSetAccessProps & accessProps = DataSetAccessProps::Default(),
            bool parents = true )
```

9.47.2.3 createDataSet() [3/5]

```
template<typename Derivate >
DataSet HighFive::NodeTraits< Derivate >::createDataSet (
            const std::string & dataset_name,
            const DataSpace & space,
            const DataType & type,
            const DataSetCreateProps & createProps = DataSetCreateProps::Default(),
            const DataSetAccessProps & accessProps = DataSetAccessProps::Default(),
            bool parents = true )  [inline]
```

createDataSet Create a new dataset in the current file of datatype type and of size space

Parameters

dataset_name	identifier of the dataset
space	Associated DataSpace, see DataSpace for more information
type	Type of Data
createProps	A property list with data set creation properties
accessProps	A property list with data set access properties
parents	Create intermediate groups if needed. Default: true.

Returns

DataSet Object

9.47.2.4 createDataSet() [4/5]

```
template<typename Derivate >
template<std::size_t N>
DataSet HighFive::NodeTraits< Derivate >::createDataSet (
            const std::string & dataset_name,
            const FixedLenStringArray< N > & data,
            const DataSetCreateProps & createProps = DataSetCreateProps::Default(),
            const DataSetAccessProps & accessProps = DataSetAccessProps::Default(),
            bool parents = true )  [inline]
```

9.47.2.5 createDataSet() [5/5]

```
template<typename Derivate >
template<typename T >
DataSet HighFive::NodeTraits< Derivate >::createDataSet (
            const std::string & dataset_name,
            const T & data,
            const DataSetCreateProps & createProps = DataSetCreateProps::Default(),
            const DataSetAccessProps & accessProps = DataSetAccessProps::Default(),
            bool parents = true )  [inline]
```

createDataSet create a new dataset in the current file and write to it, inferring the DataSpace from the data.

Parameters

dataset_name	identifier of the dataset
data	Associated data, must support DataSpace::From, see DataSpace for more information
createProps	A property list with data set creation properties
accessProps	A property list with data set access properties
parents	Create intermediate groups if needed. Default: true.

Returns

DataSet Object

9.47.2.6 createExternalLink()

```
template<typename Derivate >
void HighFive::NodeTraits< Derivate >::createExternalLink (
            const std::string & link_name,
            const std::string & h5_file,
            const std::string & obj_path,
            LinkCreateProps linkCreateProps = LinkCreateProps(),
            const LinkAccessProps & linkAccessProps = LinkAccessProps(),
            const bool parents = true )  [inline]
```

9.47.2.7 createGroup() [1/2]

```
template<typename Derivate >
Group HighFive::NodeTraits< Derivate >::createGroup (
            const std::string & group_name,
            bool parents = true )  [inline]
```

create a new group, and eventually intermediate groups

Parameters

group_name	
parents	Create intermediate groups if needed. Default: true.

Returns

the group object

9.47.2.8 createGroup() [2/2]

```
template<typename Derivate >
Group HighFive::NodeTraits< Derivate >::createGroup (
            const std::string & group_name,
            const GroupCreateProps & createProps,
            bool parents = true )  [inline]
```

create a new group, and eventually intermediate groups

Parameters

group_name	
createProps	A property list with group creation properties
parents	Create intermediate groups if needed. Default: true.

Returns

the group object

9.47.2.9 createSoftLink() [1/2]

```
template<typename Derivate >
void HighFive::NodeTraits< Derivate >::createSoftLink (
            const std::string & link_name,
            const std::string & obj_path,
            LinkCreateProps linkCreateProps = LinkCreateProps(),
            const LinkAccessProps & linkAccessProps = LinkAccessProps(),
            const bool parents = true )  [inline]
```

Creates softlinks.

Parameters

link_name	The name of the link
obj_path	The target object path
linkCreateProps	A Link_Create property list. Notice ¨parents=true¨ overrides
linkAccessProps	The Link_Access property list
parents	Whether parent groups should be created: Default: true

9.47.2.10 createSoftLink() [2/2]

```
template<typename Derivate >
template<typename T , typename = decltype(&T::getPath)>
void HighFive::NodeTraits< Derivate >::createSoftLink (
            const std::string & linkName,
            const T & obj )  [inline]
```

A shorthand to create softlink to any object which provides `getPath` The link will be created with default properties along with required parent groups.

9.47.2.11 exist()

```
template<typename Derivate >
bool HighFive::NodeTraits< Derivate >::exist (
            const std::string & node_name ) const  [inline]
```

check a dataset or group exists in the current node / group

Parameters

node_name	dataset/group name to check

Returns

true if a dataset/group with the associated name exists, or false

9.47.2.12 getDataSet()

```
template<typename Derivate >
```

```
DataSet HighFive::NodeTraits< Derivate >::getDataSet (
            const std::string & dataset_name,
            const DataSetAccessProps & accessProps = DataSetAccessProps::Default() ) const
[inline]
```

get an existing dataset in the current file

Parameters

dataset_name	
accessProps	property list to configure dataset chunk cache

Returns

return the named dataset, or throw exception if not found

9.47.2.13 getGroup()

```
template<typename Derivate >
Group HighFive::NodeTraits< Derivate >::getGroup (
            const std::string & group_name ) const  [inline]
```

open an existing group with the name group_name

Parameters

group_name	

Returns

the group object

9.47.2.14 getLinkType()

```
template<typename Derivate >
LinkType HighFive::NodeTraits< Derivate >::getLinkType (
            const std::string & node_name ) const  [inline]
```

Returns the kind of link of the given name (soft, hard...)

Parameters

node_name	The entry to check, path relative to the current group

9.47.2.15 getNumberObjects()

```
template<typename Derivate >
size_t HighFive::NodeTraits< Derivate >::getNumberObjects  [inline]
```

return the number of leaf objects of the node / group

Returns

number of leaf objects

9.47.2.16 getObjectName()

```
template<typename Derivate >
std::string HighFive::NodeTraits< Derivate >::getObjectName (
            size_t index ) const  [inline]
```

return the name of the object with the given index

Returns

the name of the object

9.47.2.17 getObjectType()

```
template<typename Derivate >
ObjectType HighFive::NodeTraits< Derivate >::getObjectType (
            const std::string & node_name ) const  [inline]
```

A shorthand to get the kind of object pointed to (group, dataset, type...)

Parameters

node_name	The entry to check, path relative to the current group

9.47.2.18 listObjectNames()

```
template<typename Derivate >
std::vector< std::string > HighFive::NodeTraits< Derivate >::listObjectNames (
            IndexType idx_type = IndexType::NAME ) const  [inline]
```

list all leaf objects name of the node / group

Parameters

idx_type	tell if the list should be ordered by Name or CreationOrderTime. CreationOrderTime can be use only if the file/group has been created with the HighFive::LinkCreationTime property.

Returns

number of leaf objects

9.47.2.19 rename()

```
template<typename Derivate >
bool HighFive::NodeTraits< Derivate >::rename (
             const std::string & src_path,
             const std::string & dest_path,
             bool parents = true ) const  [inline]
```

moves an object and its content within an HDF5 file.

Parameters

src_path	relative path of the object to current File/Group
dest_path	new relative path of the object to current File/Group
parents	Create intermediate groups if needed. Default: true.

Returns

boolean that is true if the move was successful

9.47.2.20 unlink()

```
template<typename Derivate >
void HighFive::NodeTraits< Derivate >::unlink (
             const std::string & node_name ) const  [inline]
```

unlink the given dataset or group

Parameters

node_name	dataset/group name to unlink

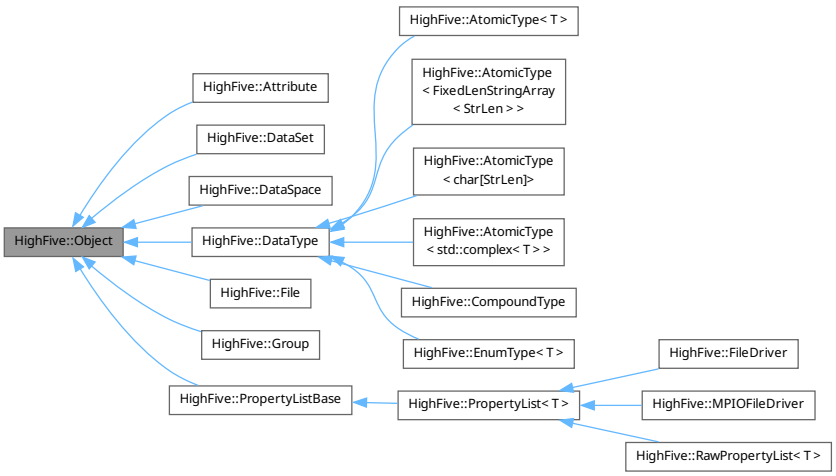
The documentation for this class was generated from the following files:

- highfive/bits/H5_definitions.hpp
- highfive/bits/H5Node_traits.hpp
- highfive/bits/H5Node_traits_misc.hpp

9.48 HighFive::Object Class Reference

```
#include <H5Object.hpp>
```

Inheritance diagram for HighFive::Object:



Public Member Functions

- Object (Object &&other) noexcept
- ~Object ()
- bool isValid () const noexcept

  isValid
- hid_t getId () const noexcept

  getId
- ObjectInfo getInfo () const

  Retrieve several infos about the current object (address, dates, etc)
- ObjectType getType () const

  Gets the fundamental type of the object (dataset, group, etc)
- bool operator== (const Object &other) const noexcept

Protected Member Functions

- Object ()
- Object (const Object &other)
- Object (hid_t)
- Object & operator= (const Object &other)

Protected Attributes

- hid_t _hid

Friends

- class Reference
- class CompoundType

9.48.1 Constructor & Destructor Documentation

9.48.1.1 Object() [1/4]

```
HighFive::Object::Object (
            Object && other )  [inline], [noexcept]
```

9.48.1.2 ~Object()

```
HighFive::Object::~Object ( )  [inline]
```

9.48.1.3 Object() [2/4]

```
HighFive::Object::Object ( )  [inline], [protected]
```

9.48.1.4 Object() [3/4]

```
HighFive::Object::Object (
            const Object & other )  [inline], [protected]
```

9.48.1.5 Object() [4/4]

```
HighFive::Object::Object (
            hid_t hid )  [inline], [explicit], [protected]
```

9.48.2 Member Function Documentation

9.48.2.1 getId()

```
hid_t HighFive::Object::getId ( ) const  [inline], [noexcept]
```

getId

Returns

internal HDF5 id to the object provided for C API compatibility

9.48.2.2 getInfo()

```
ObjectInfo HighFive::Object::getInfo ( ) const  [inline]
```

Retrieve several infos about the current object (address, dates, etc)

9.48.2.3 getType()

```
ObjectType HighFive::Object::getType ( ) const  [inline]
```

Gets the fundamental type of the object (dataset, group, etc)

Exceptions

ObjectException	when the _hid is negative or the type is custom and not registered yet

9.48.2.4 isValid()

```
bool HighFive::Object::isValid ( ) const  [inline], [noexcept]
```

isValid

Returns

true if current Object is a valid HDF5Object

9.48.2.5 operator=()

```
Object & HighFive::Object::operator= (
            const Object & other )  [inline], [protected]
```

9.48.2.6 operator==()

```
bool HighFive::Object::operator== (
            const Object & other ) const  [inline], [noexcept]
```

9.48.3 Friends And Related Symbol Documentation

9.48.3.1 CompoundType

```
friend class CompoundType  [friend]
```

9.48.3.2 Reference

```
friend class Reference  [friend]
```

9.48.4 Member Data Documentation

9.48.4.1 _hid

```
hid_t HighFive::Object::_hid  [protected]
```

The documentation for this class was generated from the following files:

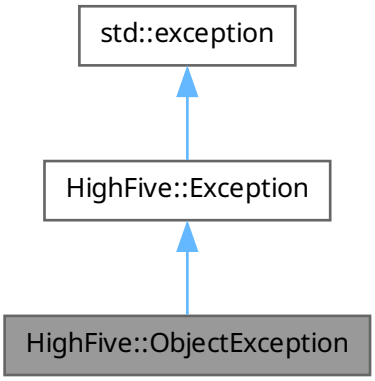
- highfive/H5Object.hpp
- highfive/bits/H5Object_misc.hpp

9.49 HighFive::ObjectException Class Reference

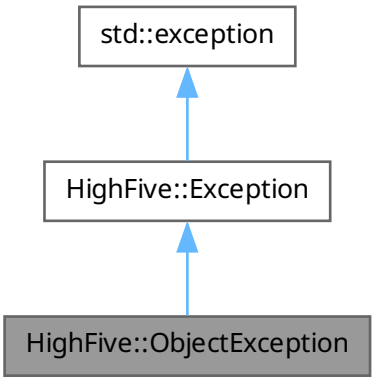
Exception specific to HighFive Object interface.

`#include <H5Exception.hpp>`

Inheritance diagram for HighFive::ObjectException:



Collaboration diagram for HighFive::ObjectException:



Public Member Functions

- ObjectException (const std::string &err_msg)

Public Member Functions inherited from HighFive::Exception

- Exception (const std::string &err_msg)
- virtual ~Exception () throw ()
- const char * what () const override throw ()

  get the current exception error message
- virtual void setErrorMsg (const std::string &errmsg)

  define the error message
- Exception * nextException () const

  nextException
- hid_t getErrMajor () const

  HDF5 library error mapper.
- hid_t getErrMinor () const

  HDF5 library error mapper.

Additional Inherited Members

Protected Attributes inherited from HighFive::Exception

- std::string _errmsg
- std::shared_ptr< Exception > _next
- hid_t _err_major
- hid_t _err_minor

9.49.1 Detailed Description

Exception specific to HighFive Object interface.

9.49.2 Constructor & Destructor Documentation

9.49.2.1 ObjectException()

```
HighFive::ObjectException::ObjectException (
            const std::string & err_msg )  [inline]
```

The documentation for this class was generated from the following file:

- highfive/H5Exception.hpp

9.50 HighFive::ObjectInfo Class Reference

A class for accessing hdf5 objects info.

```
#include <H5Object.hpp>
```

Public Member Functions

- haddr_t getAddress () const noexcept
  Retrieve the address of the object (within its file)
- size_t getRefCount () const noexcept
  Retrieve the number of references to this object.
- time_t getCreationTime () const noexcept
  Retrieve the object's creation time.
- time_t getModificationTime () const noexcept
  Retrieve the object's last modification time.

Protected Attributes

- H5O_info_t raw_info

Friends

- class Object

9.50.1 Detailed Description

A class for accessing hdf5 objects info.

9.50.2 Member Function Documentation

9.50.2.1 getAddress()

```
haddr_t HighFive::ObjectInfo::getAddress ( ) const  [inline], [noexcept]
```

Retrieve the address of the object (within its file)

Deprecated Deprecated since HighFive 2.2. Soon supporting VOL tokens

9.50.2.2 getCreationTime()

```
time_t HighFive::ObjectInfo::getCreationTime ( ) const  [inline], [noexcept]
```

Retrieve the object's creation time.

9.50.2.3 getModificationTime()

```
time_t HighFive::ObjectInfo::getModificationTime ( ) const  [inline], [noexcept]
```

Retrieve the object's last modification time.

9.50.2.4 getRefCount()

```
size_t HighFive::ObjectInfo::getRefCount ( ) const  [inline], [noexcept]
```

Retrieve the number of references to this object.

9.50.3 Friends And Related Symbol Documentation

9.50.3.1 Object

```
friend class Object  [friend]
```

9.50.4 Member Data Documentation

9.50.4.1 raw_info

```
H5O_info_t HighFive::ObjectInfo::raw_info  [protected]
```

The documentation for this class was generated from the following files:

- highfive/H5Object.hpp
- highfive/bits/H5Object_misc.hpp

9.51 HighFive::PathTraits< Derivate > Class Template Reference

```
#include <H5Path_traits.hpp>
```

Public Member Functions

- PathTraits ()
- std::string getPath () const

  return the path to the current object
- File & getFile () const noexcept

  Return a reference to the File object this object belongs.

Protected Attributes

- std::shared_ptr< File > _file_obj

9.51.1 Constructor & Destructor Documentation

9.51.1.1 PathTraits()

```
template<typename Derivate >
HighFive::PathTraits< Derivate >::PathTraits  [inline]
```

9.51.2 Member Function Documentation

9.51.2.1 getFile()

```
template<typename Derivate >
File & HighFive::PathTraits< Derivate >::getFile  [inline], [noexcept]
```

Return a reference to the File object this object belongs.

Returns

the File object ref

9.51.2.2 getPath()

```
template<typename Derivate >
std::string HighFive::PathTraits< Derivate >::getPath  [inline]
```

return the path to the current object

Returns

the path to the object

9.51.3 Member Data Documentation

9.51.3.1 _file_obj

```
template<typename Derivate >
std::shared_ptr<File> HighFive::PathTraits< Derivate >::_file_obj  [protected]
```

The documentation for this class was generated from the following files:

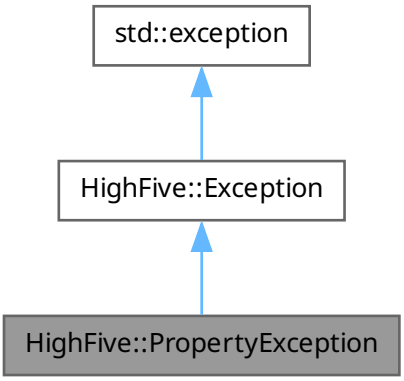
- highfive/bits/H5Path_traits.hpp
- highfive/bits/H5Path_traits_misc.hpp

9.52 HighFive::PropertyException Class Reference

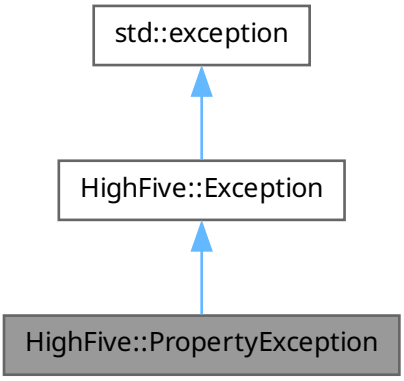
Exception specific to HighFive Property interface.

`#include <H5Exception.hpp>`

Inheritance diagram for HighFive::PropertyException:



Collaboration diagram for HighFive::PropertyException:



Public Member Functions

- PropertyException (const std::string &err_msg)

Public Member Functions inherited from HighFive::Exception

- Exception (const std::string &err_msg)
- virtual ~Exception () throw ()
- const char * what () const override throw ()

  get the current exception error message
- virtual void setErrorMsg (const std::string &errmsg)

  define the error message
- Exception * nextException () const

  nextException
- hid_t getErrMajor () const

  HDF5 library error mapper.
- hid_t getErrMinor () const

  HDF5 library error mapper.

Additional Inherited Members

Protected Attributes inherited from HighFive::Exception

- std::string _errmsg
- std::shared_ptr< Exception > _next
- hid_t _err_major
- hid_t _err_minor

9.52.1 Detailed Description

Exception specific to HighFive Property interface.

9.52.2 Constructor & Destructor Documentation

9.52.2.1 PropertyException()

```
HighFive::PropertyException::PropertyException (
            const std::string & err_msg )  [inline]
```

The documentation for this class was generated from the following file:

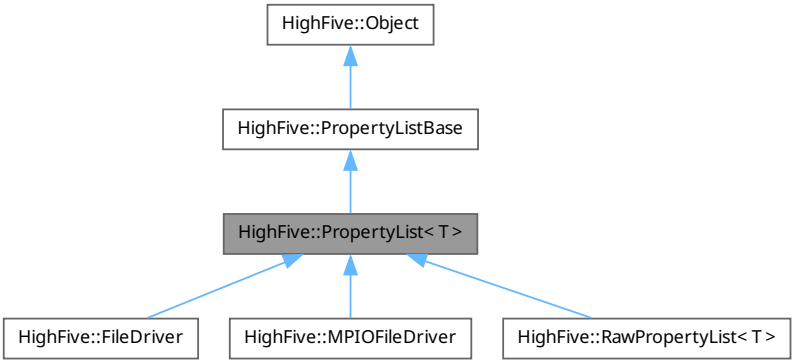
- highfive/H5Exception.hpp

9.53 HighFive::PropertyList< T > Class Template Reference

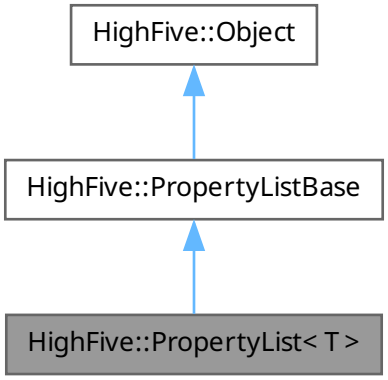
HDF5 property Lists.

`#include <H5PropertyList.hpp>`

Inheritance diagram for HighFive::PropertyList< T >:



Collaboration diagram for HighFive::PropertyList< T >:



Public Member Functions

- constexpr PropertyType getType () const noexcept

  return the type of this PropertyList
- template<typename P >
  void add (const P &property)

Public Member Functions inherited from HighFive::PropertyListBase

- PropertyListBase () noexcept

Public Member Functions inherited from HighFive::Object

- Object (Object &&other) noexcept
- ~Object ()
- bool isValid () const noexcept

  isValid
- hid_t getId () const noexcept

  getId
- ObjectInfo getInfo () const

  Retrieve several infos about the current object (address, dates, etc)
- ObjectType getType () const

  Gets the fundamental type of the object (dataset, group, etc)
- bool operator== (const Object &other) const noexcept

Static Public Member Functions

- static const PropertyList< T > & Default () noexcept

  Return the Default property type object.

Static Public Member Functions inherited from HighFive::PropertyListBase

- static const PropertyListBase & Default () noexcept

Protected Member Functions

- void _initializeIfNeeded ()

Protected Member Functions inherited from HighFive::Object

- Object ()
- Object (const Object &other)
- Object (hid_t)
- Object & operator= (const Object &other)

Additional Inherited Members

Protected Attributes inherited from HighFive::Object

- hid_t _hid

9.53.1 Detailed Description

template<PropertyType T>
class HighFive::PropertyList< T >

HDF5 property Lists.

9.53.2 Member Function Documentation

9.53.2.1 _initializeIfNeeded()

```
template<PropertyType T>
void HighFive::PropertyList< T >::_initializeIfNeeded  [inline], [protected]
```

9.53.2.2 add()

```
template<PropertyType T>
template<typename P >
void HighFive::PropertyList< T >::add (
            const P & property )  [inline]
```

Add a property to this property list. A property is an object which is expected to have a method with the following signature void apply(hid_t hid) const

9.53.2.3 Default()

```
template<PropertyType T>
static const PropertyList< T > & HighFive::PropertyList< T >::Default ( )  [inline], [static],
[noexcept]
```

Return the Default property type object.

9.53.2.4 getType()

```
template<PropertyType T>
constexpr PropertyType HighFive::PropertyList< T >::getType ( ) const  [inline], [constexpr],
[noexcept]
```

return the type of this PropertyList

The documentation for this class was generated from the following files:

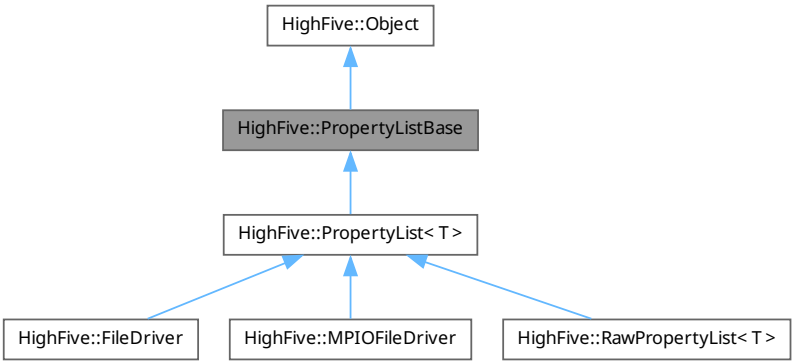
- highfive/bits/H5_definitions.hpp
- highfive/H5PropertyList.hpp
- highfive/bits/H5PropertyList_misc.hpp

9.54 HighFive::PropertyListBase Class Reference

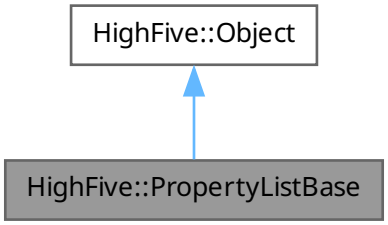
Base Class for Property lists, providing global default.

`#include <H5PropertyList.hpp>`

Inheritance diagram for HighFive::PropertyListBase:



Collaboration diagram for HighFive::PropertyListBase:



Public Member Functions

- PropertyListBase () noexcept

Public Member Functions inherited from HighFive::Object

- Object (Object &&other) noexcept
- ~Object ()
- bool isValid () const noexcept

  isValid

- hid_t getId () const noexcept

  getId
- ObjectInfo getInfo () const

  Retrieve several infos about the current object (address, dates, etc)
- ObjectType getType () const

  Gets the fundamental type of the object (dataset, group, etc)
- bool operator== (const Object &other) const noexcept

Static Public Member Functions

- static const PropertyListBase & Default () noexcept

Additional Inherited Members

Protected Member Functions inherited from HighFive::Object

- Object ()
- Object (const Object &other)
- Object (hid_t)
- Object & operator= (const Object &other)

Protected Attributes inherited from HighFive::Object

- hid_t _hid

9.54.1 Detailed Description

Base Class for Property lists, providing global default.

9.54.2 Constructor & Destructor Documentation

9.54.2.1 PropertyListBase()

```
HighFive::PropertyListBase::PropertyListBase ( )  [inline], [noexcept]
```

9.54.3 Member Function Documentation

9.54.3.1 Default()

```
static const PropertyListBase & HighFive::PropertyListBase::Default ( )  [inline], [static],
[noexcept]
```

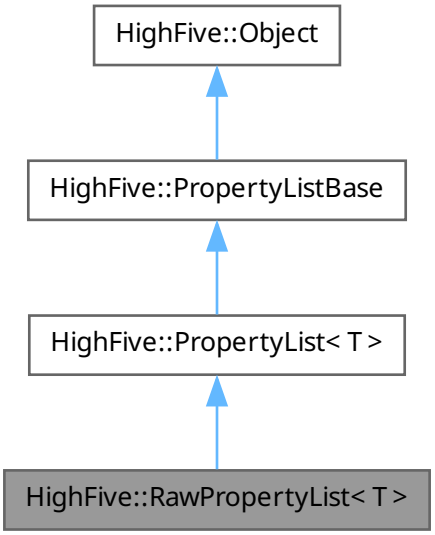
The documentation for this class was generated from the following files:

- highfive/H5PropertyList.hpp
- highfive/bits/H5PropertyList_misc.hpp

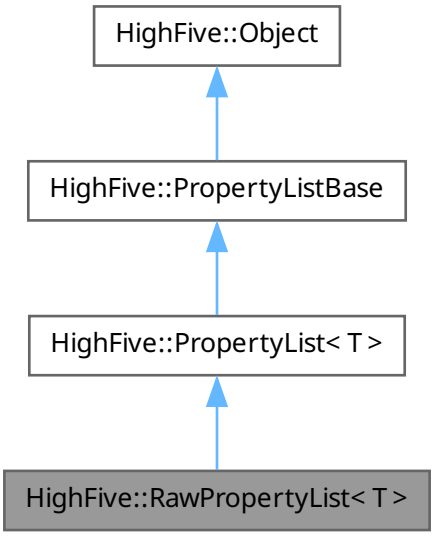
9.55 HighFive::RawPropertyList< T > Class Template Reference

`#include <H5PropertyList.hpp>`

Inheritance diagram for HighFive::RawPropertyList< T >:



Collaboration diagram for HighFive::RawPropertyList< T >:



Public Member Functions

- template<typename F , typename... Args>
  void add (const F &funct, const Args &... args)

Public Member Functions inherited from HighFive::PropertyList< T >

- constexpr PropertyType getType () const noexcept

  return the type of this PropertyList
- template<typename P >
  void add (const P &property)

Public Member Functions inherited from HighFive::PropertyListBase

- PropertyListBase () noexcept

Public Member Functions inherited from HighFive::Object

- Object (Object &&other) noexcept
- ~Object ()
- bool isValid () const noexcept

  isValid
- hid_t getId () const noexcept

  getId
- ObjectInfo getInfo () const

  Retrieve several infos about the current object (address, dates, etc)
- ObjectType getType () const

  Gets the fundamental type of the object (dataset, group, etc)
- bool operator== (const Object &other) const noexcept

Additional Inherited Members

Static Public Member Functions inherited from HighFive::PropertyList< T >

- static const PropertyList< T > & Default () noexcept

  Return the Default property type object.

Static Public Member Functions inherited from HighFive::PropertyListBase

- static const PropertyListBase & Default () noexcept

Protected Member Functions inherited from HighFive::PropertyList< T >

- void _initializeIfNeeded ()

Protected Member Functions inherited from HighFive::Object

- Object ()
- Object (const Object &other)
- Object (hid_t)
- Object & operator= (const Object &other)

Protected Attributes inherited from HighFive::Object

- hid_t _hid

9.55.1 Detailed Description

template<PropertyType T>
class HighFive::RawPropertyList< T >

RawPropertyLists are to be used when advanced H5 properties are desired and are not part of the HighFive API. Therefore this class is mainly for internal use.

9.55.2 Member Function Documentation

9.55.2.1 add()

```
template<PropertyType T>
template<typename F , typename...  Args>
void HighFive::RawPropertyList< T >::add (
            const F & funct,
            const Args &...  args )  [inline]
```

The documentation for this class was generated from the following files:

- highfive/H5PropertyList.hpp
- highfive/bits/H5PropertyList_misc.hpp

9.56 HighFive::Reference Class Reference

An HDF5 (object) reference type.

`#include <H5Reference.hpp>`

Public Member Functions

- Reference ()=default

  Create an empty Reference to be initialized later.
- Reference (const Object &location, const Object &object)

  Create a Reference to an object residing at a given location.
- template<typename T >
  T dereference (const Object &location) const

  Retrieve the Object being referenced by the Reference.
- ObjectType getType (const Object &location) const

  Get only the type of the referenced Object.

Protected Member Functions

- Reference (const hobj_ref_t h5_ref)

  Create a Reference from a low-level HDF5 object reference.
- void create_ref (hobj_ref_t *refptr) const

  Create the low-level reference and store it at refptr.

9.56.1 Detailed Description

An HDF5 (object) reference type.

HDF5 object references allow pointing to groups, datasets (and compound types). They differ from links in their ability to be stored and retrieved as data from the HDF5 file in datasets themselves.

9.56.2 Constructor & Destructor Documentation

9.56.2.1 Reference() [1/3]

```
HighFive::Reference::Reference ( )  [default]
```

Create an empty Reference to be initialized later.

9.56.2.2 Reference() [2/3]

```
HighFive::Reference::Reference (
            const Object & location,
            const Object & object )  [inline]
```

Create a Reference to an object residing at a given location.

Parameters

location	A File or Group where the object being referenced to resides
object	A Dataset or Group to be referenced

9.56.2.3 Reference() [3/3]

```
HighFive::Reference::Reference (
            const hobj_ref_t h5_ref )  [inline], [explicit], [protected]
```

Create a Reference from a low-level HDF5 object reference.

9.56.3 Member Function Documentation

9.56.3.1 create_ref()

```
void HighFive::Reference::create_ref (
            hobj_ref_t * refptr ) const  [inline], [protected]
```

Create the low-level reference and store it at refptr.

Parameters

refptr	Pointer to a memory location where the created HDF5 reference will be stored

9.56.3.2 dereference()

```
template<typename T >
T HighFive::Reference::dereference (
             const Object & location ) const  [inline]
```

Retrieve the Object being referenced by the Reference.

Template Parameters

T	the appropriate HighFive Container (either DataSet or Group)

Parameters

location	the location where the referenced object is to be found (a File)

Returns

the dereferenced Object (either a Group or DataSet)

9.56.3.3 getType()

```
ObjectType HighFive::Reference::getType (
             const Object & location ) const  [inline]
```

Get only the type of the referenced Object.

Parameters

location	the location where the referenced object is to be found (a File)

Returns

the ObjectType of the referenced object

The documentation for this class was generated from the following files:

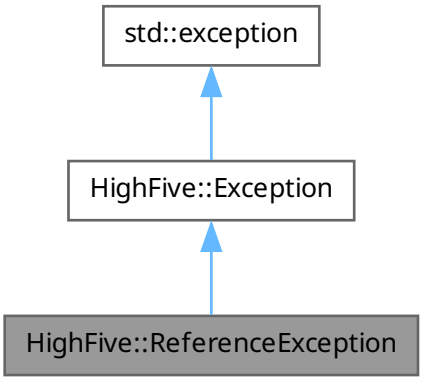
- highfive/H5Reference.hpp
- highfive/bits/H5Reference_misc.hpp

9.57 HighFive::ReferenceException Class Reference

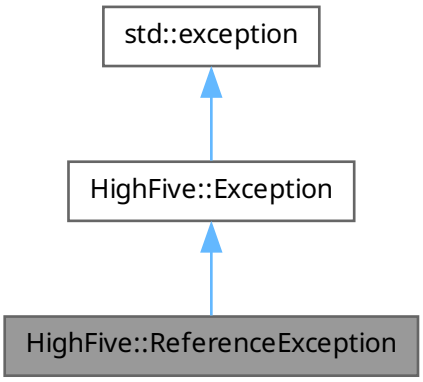
Exception specific to HighFive Reference interface.

`#include <H5Exception.hpp>`

Inheritance diagram for HighFive::ReferenceException:



Collaboration diagram for HighFive::ReferenceException:



Public Member Functions

- ReferenceException (const std::string &err_msg)

Public Member Functions inherited from HighFive::Exception

- Exception (const std::string &err_msg)
- virtual ~Exception () throw ()
- const char * what () const override throw ()

  get the current exception error message
- virtual void setErrorMsg (const std::string &errmsg)

  define the error message
- Exception * nextException () const

  nextException
- hid_t getErrMajor () const

  HDF5 library error mapper.
- hid_t getErrMinor () const

  HDF5 library error mapper.

Additional Inherited Members

Protected Attributes inherited from HighFive::Exception

- std::string _errmsg
- std::shared_ptr< Exception > _next
- hid_t _err_major
- hid_t _err_minor

9.57.1 Detailed Description

Exception specific to HighFive Reference interface.

9.57.2 Constructor & Destructor Documentation

9.57.2.1 ReferenceException()

```
HighFive::ReferenceException::ReferenceException (
            const std::string & err_msg )  [inline]
```

The documentation for this class was generated from the following file:

- highfive/H5Exception.hpp

9.58 HighFive::RegularHyperSlab Struct Reference

```
#include <H5Slice_traits.hpp>
```

Public Member Functions

- RegularHyperSlab ()=default
- RegularHyperSlab (std::vector< size_t > offset_, std::vector< size_t > count_={}, std::vector< size_t > stride_={}, std::vector< size_t > block_={})
- size_t rank () const
- std::vector< size_t > packedDims () const

  Dimensions when all gaps are removed.

Static Public Member Functions

- static RegularHyperSlab fromHDF5Sizes (std::vector< hsize_t > offset_, std::vector< hsize_t > count_={}, std::vector< hsize_t > stride_={}, std::vector< hsize_t > block_={})

Public Attributes

- std::vector< hsize_t > offset
- std::vector< hsize_t > count
- std::vector< hsize_t > stride
- std::vector< hsize_t > block

9.58.1 Constructor & Destructor Documentation

9.58.1.1 RegularHyperSlab() [1/2]

```
HighFive::RegularHyperSlab::RegularHyperSlab ( )  [default]
```

9.58.1.2 RegularHyperSlab() [2/2]

```
HighFive::RegularHyperSlab::RegularHyperSlab (
            std::vector< size_t > offset_,
            std::vector< size_t > count_ = {},
            std::vector< size_t > stride_ = {},
            std::vector< size_t > block_ = {} )  [inline]
```

9.58.2 Member Function Documentation

9.58.2.1 fromHDF5Sizes()

```
static RegularHyperSlab HighFive::RegularHyperSlab::fromHDF5Sizes (
            std::vector< hsize_t > offset_,
            std::vector< hsize_t > count_ = {},
            std::vector< hsize_t > stride_ = {},
            std::vector< hsize_t > block_ = {} )  [inline], [static]
```

9.58.2.2 packedDims()

```
std::vector< size_t > HighFive::RegularHyperSlab::packedDims ( ) const  [inline]
```

Dimensions when all gaps are removed.

9.58.2.3 rank()

```
size_t HighFive::RegularHyperSlab::rank ( ) const  [inline]
```

9.58.3 Member Data Documentation

9.58.3.1 block

```
std::vector<hsize_t> HighFive::RegularHyperSlab::block
```

9.58.3.2 count

```
std::vector<hsize_t> HighFive::RegularHyperSlab::count
```

9.58.3.3 offset

```
std::vector<hsize_t> HighFive::RegularHyperSlab::offset
```

9.58.3.4 stride

```
std::vector<hsize_t> HighFive::RegularHyperSlab::stride
```

The documentation for this struct was generated from the following file:

- highfive/bits/H5Slice_traits.hpp

9.59 HighFive::Selection Class Reference

Selection: represent a view on a slice/part of a dataset.

`#include <H5Selection.hpp>`

Inheritance diagram for HighFive::Selection:

Collaboration diagram for HighFive::Selection:

Public Member Functions

- DataSpace getSpace () const noexcept

  getSpace
- DataSpace getMemSpace () const noexcept

  getMemSpace
- DataSet & getDataset () noexcept

  getDataSet
- const DataSet & getDataset () const noexcept
- const DataType getDataType () const

  return the datatype of the selection

Public Member Functions inherited from HighFive::SliceTraits< Selection >

- Selection select (const HyperSlab &hyperslab) const

  Select an `hyperslab` in the current Slice/Dataset.
- Selection select (const std::vector< size_t > &offset, const std::vector< size_t > &count, const std::vector< size_t > &stride={}, const std::vector< size_t > &block={}) const

  Select a region in the current Slice/Dataset of `count` points at `offset` separated by `stride`. If strides are not provided they will default to 1 in all dimensions.
- Selection select (const std::vector< size_t > &columns) const

  Select a set of columns in the last dimension of this dataset.
- Selection select (const ElementSet &elements) const

  Select a region in the current Slice/Dataset out of a list of elements.
- T read (const DataTransferProps &xfer_props=DataTransferProps()) const
- void read (T &array, const DataTransferProps &xfer_props=DataTransferProps()) const
- void read (T *array, const DataType &dtype=DataType(), const DataTransferProps &xfer_props=DataTransferProps()) const
- void write (const T &buffer, const DataTransferProps &xfer_props=DataTransferProps())
- void write_raw (const T *buffer, const DataType &dtype=DataType(), const DataTransferProps &xfer_↩ props=DataTransferProps())

Protected Member Functions

- Selection (const DataSpace &memspace, const DataSpace &file_space, const DataSet &set)

Protected Member Functions inherited from HighFive::SliceTraits< Selection >

- Selection select_impl (const HyperSlab &hyperslab, const DataSpace &memspace) const

9.59.1 Detailed Description

Selection: represent a view on a slice/part of a dataset.

A Selection is valid only if its parent dataset is valid

9.59.2 Constructor & Destructor Documentation

9.59.2.1 Selection()

```
HighFive::Selection::Selection (
            const DataSpace & memspace,
            const DataSpace & file_space,
            const DataSet & set )  [inline], [protected]
```

9.59.3 Member Function Documentation

9.59.3.1 getDataset() [1/2]

```
const DataSet & HighFive::Selection::getDataset ( ) const  [inline], [noexcept]
```

9.59.3.2 getDataset() [2/2]

```
DataSet & HighFive::Selection::getDataset ( )  [inline], [noexcept]
```

getDataSet

Returns

parent dataset of this selection

9.59.3.3 getDataType()

```
const DataType HighFive::Selection::getDataType ( ) const  [inline]
```

return the datatype of the selection

Returns

return the datatype of the selection

9.59.3.4 getMemSpace()

```
DataSpace HighFive::Selection::getMemSpace ( ) const  [inline], [noexcept]
```

getMemSpace

Returns

Dataspace associated with the memory representation of this selection

9.59.3.5 getSpace()

```
DataSpace HighFive::Selection::getSpace ( ) const  [inline], [noexcept]
```

getSpace

Returns

Dataspace associated with this selection

The documentation for this class was generated from the following files:

- highfive/H5Selection.hpp
- highfive/bits/H5Selection_misc.hpp

9.60 HighFive::Shuffle Class Reference

`#include <H5PropertyList.hpp>`

Public Member Functions

- Shuffle ()=default

9.60.1 Constructor & Destructor Documentation

9.60.1.1 Shuffle()

```
HighFive::Shuffle::Shuffle ( )  [default]
```

The documentation for this class was generated from the following files:

- highfive/H5PropertyList.hpp
- highfive/bits/H5PropertyList_misc.hpp

9.61 HighFive::SilenceHDF5 Class Reference

Utility class to disable HDF5 stack printing inside a scope.

`#include <H5Utility.hpp>`

Public Member Functions

- SilenceHDF5 (bool enable=true)
- ~SilenceHDF5 ()

9.61.1 Detailed Description

Utility class to disable HDF5 stack printing inside a scope.

9.61.2 Constructor & Destructor Documentation

9.61.2.1 SilenceHDF5()

```
HighFive::SilenceHDF5::SilenceHDF5 (
            bool enable = true )  [inline]
```

9.61.2.2 ~SilenceHDF5()

```
HighFive::SilenceHDF5::~SilenceHDF5 ( )  [inline]
```

The documentation for this class was generated from the following file:

- highfive/H5Utility.hpp

9.62 HighFive::SliceTraits< Derivate > Class Template Reference

```
#include <H5Slice_traits.hpp>
```

Public Member Functions

- Selection select (const HyperSlab &hyperslab) const

  Select an `hyperslab` in the current Slice/Dataset.
- Selection select (const std::vector< size_t > &offset, const std::vector< size_t > &count, const std::vector< size_t > &stride={}, const std::vector< size_t > &block={}) const

  Select a region in the current Slice/Dataset of `count` points at `offset` separated by `stride`. If strides are not provided they will default to 1 in all dimensions.
- Selection select (const std::vector< size_t > &columns) const

  Select a set of columns in the last dimension of this dataset.
- Selection select (const ElementSet &elements) const

  Select a region in the current Slice/Dataset out of a list of elements.
- template<typename T >
  T read (const DataTransferProps &xfer_props=DataTransferProps()) const
- template<typename T >
  void read (T &array, const DataTransferProps &xfer_props=DataTransferProps()) const
- template<typename T >
  void read (T *array, const DataType &dtype=DataType(), const DataTransferProps &xfer_props=DataTransferProps()) const
- template<typename T >
  void write (const T &buffer, const DataTransferProps &xfer_props=DataTransferProps())
- template<typename T >
  void write_raw (const T *buffer, const DataType &dtype=DataType(), const DataTransferProps &xfer_↩ props=DataTransferProps())

Protected Member Functions

- Selection select_impl (const HyperSlab &hyperslab, const DataSpace &memspace) const

9.62.1 Member Function Documentation

9.62.1.1 read() [1/3]

```
template<typename Derivate >
template<typename T >
T HighFive::SliceTraits< Derivate >::read (
            const DataTransferProps & xfer_props = DataTransferProps() ) const  [inline]
```

9.62.1.2 read() [2/3]

```
template<typename Derivate >
template<typename T >
void HighFive::SliceTraits< Derivate >::read (
            T & array,
            const DataTransferProps & xfer_props = DataTransferProps() ) const  [inline]
```

Read the entire dataset into a buffer An exception is raised is if the numbers of dimension of the buffer and of the dataset are different.

The array type can be a N-pointer or a N-vector. For plain pointers not dimensionality checking will be performed, it is the user's responsibility to ensure that the right amount of space has been allocated.

9.62.1.3 read() [3/3]

```
template<typename Derivate >
template<typename T >
void HighFive::SliceTraits< Derivate >::read (
            T * array,
            const DataType & dtype = DataType(),
            const DataTransferProps & xfer_props = DataTransferProps() ) const  [inline]
```

Read the entire dataset into a raw buffer

No dimensionality checks will be performed, it is the user's responsibility to ensure that the right amount of space has been allocated.

Parameters

array	A buffer containing enough space for the data
dtype	The type of the data, in case it cannot be automatically guessed
xfer_props	Data Transfer properties

9.62.1.4 select() [1/4]

```
template<typename Derivate >
Selection HighFive::SliceTraits< Derivate >::select (
            const ElementSet & elements ) const  [inline]
```

Select a region in the current Slice/Dataset out of a list of elements.

9.62.1.5 select() [2/4]

```
template<typename Derivate >
Selection HighFive::SliceTraits< Derivate >::select (
            const HyperSlab & hyperslab ) const  [inline]
```

Select an `hyperslab` in the current Slice/Dataset.

HyperSlabs can be either regular or irregular. Irregular hyperslabs are typically generated by taking the union of regular hyperslabs. An irregular hyperslab, in general, does not fit nicely into a multi-dimensional array, but only a subset of such an array.

Therefore, the only memspaces supported for general hyperslabs are one-dimensional arrays.

9.62.1.6 select() [3/4]

```
template<typename Derivate >
Selection HighFive::SliceTraits< Derivate >::select (
            const std::vector< size_t > & columns ) const  [inline]
```

Select a set of columns in the last dimension of this dataset.

The column indices must be smaller than the dimension size.

9.62.1.7 select() [4/4]

```
template<typename Derivate >
Selection HighFive::SliceTraits< Derivate >::select (
            const std::vector< size_t > & offset,
            const std::vector< size_t > & count,
            const std::vector< size_t > & stride = {},
            const std::vector< size_t > & block = {} ) const  [inline]
```

Select a region in the current Slice/Dataset of `count` points at `offset` separated by `stride`. If strides are not provided they will default to 1 in all dimensions.

vector offset and count have to be from the same dimension

9.62.1.8 select_impl()

```
template<typename Derivate >
Selection HighFive::SliceTraits< Derivate >::select_impl (
            const HyperSlab & hyperslab,
            const DataSpace & memspace ) const  [inline], [protected]
```

9.62.1.9 write()

```
template<typename Derivate >
template<typename T >
void HighFive::SliceTraits< Derivate >::write (
            const T & buffer,
            const DataTransferProps & xfer_props = DataTransferProps() )  [inline]
```

Write the integrality N-dimension buffer to this dataset An exception is raised is if the numbers of dimension of the buffer and of the dataset are different

The array type can be a N-pointer or a N-vector (e.g int** integer two dimensional array)

9.62.1.10 write_raw()

```
template<typename Derivate >
template<typename T >
void HighFive::SliceTraits< Derivate >::write_raw (
            const T * buffer,
            const DataType & dtype = DataType(),
            const DataTransferProps & xfer_props = DataTransferProps() )  [inline]
```

Write from a raw buffer into this dataset

No dimensionality checks will be performed, it is the user's responsibility to ensure that the buffer holds the right amount of elements. For n-dimensional matrices the buffer layout follows H5 default conventions.

Parameters

buffer	A buffer containing the data to be written
dtype	The type of the data, in case it cannot be automatically guessed
xfer_props	The HDF5 data transfer properties, e.g. collective MPI-IO.

The documentation for this class was generated from the following files:

- highfive/bits/H5Slice_traits.hpp
- highfive/bits/H5Slice_traits_misc.hpp

9.63 HighFive::Szip Class Reference

`#include <H5PropertyList.hpp>`

Public Member Functions

- Szip (unsigned options_mask=H5_SZIP_EC_OPTION_MASK, unsigned pixels_per_block=H5_SZIP_MAX↩ _PIXELS_PER_BLOCK)
- unsigned getOptionsMask () const
- unsigned getPixelsPerBlock () const

9.63.1 Constructor & Destructor Documentation

9.63.1.1 Szip()

```
HighFive::Szip::Szip (
            unsigned options_mask = H5_SZIP_EC_OPTION_MASK,
            unsigned pixels_per_block = H5_SZIP_MAX_PIXELS_PER_BLOCK )  [inline], [explicit]
```

9.63.2 Member Function Documentation

9.63.2.1 getOptionsMask()

```
unsigned HighFive::Szip::getOptionsMask ( ) const  [inline]
```

9.63.2.2 getPixelsPerBlock()

```
unsigned HighFive::Szip::getPixelsPerBlock ( ) const  [inline]
```

The documentation for this class was generated from the following files:

- highfive/H5PropertyList.hpp
- highfive/bits/H5PropertyList_misc.hpp

9.64 HighFive::UseCollectiveIO Class Reference

`#include <H5PropertyList.hpp>`

Public Member Functions

- UseCollectiveIO (bool enable=true)
- UseCollectiveIO (const DataTransferProps &dxpl)
- bool isCollective () const

  Does the property request collective IO?

9.64.1 Constructor & Destructor Documentation

9.64.1.1 UseCollectiveIO() [1/2]

```
HighFive::UseCollectiveIO::UseCollectiveIO (
            bool enable = true )  [inline], [explicit]
```

9.64.1.2 UseCollectiveIO() [2/2]

```
HighFive::UseCollectiveIO::UseCollectiveIO (
            const DataTransferProps & dxpl )  [inline], [explicit]
```

9.64.2 Member Function Documentation

9.64.2.1 isCollective()

```
bool HighFive::UseCollectiveIO::isCollective ( ) const  [inline]
```

Does the property request collective IO?

The documentation for this class was generated from the following files:

- highfive/H5PropertyList.hpp
- highfive/bits/H5PropertyList_misc.hpp

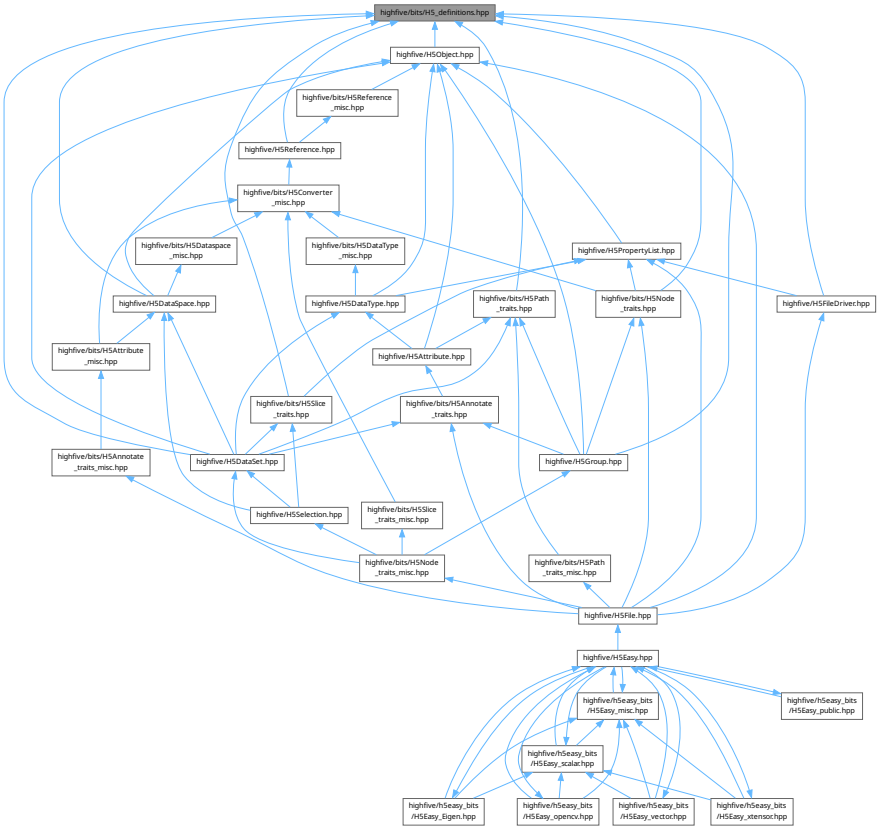
Chapter 10

File Documentation

10.1 /builddir/build/BUILD/HighFive-2.7.1/CHANGELOG.md File Reference

10.2 highfive/bits/H5_definitions.hpp File Reference

This graph shows which files directly or indirectly include this file:



Namespaces

- namespace HighFive

Macros

- #define H5_DEPRECATED(msg)

10.2.1 Macro Definition Documentation

10.2.1.1 H5_DEPRECATED

```
#define H5_DEPRECATED(
              msg )
```

10.3 H5_definitions.hpp

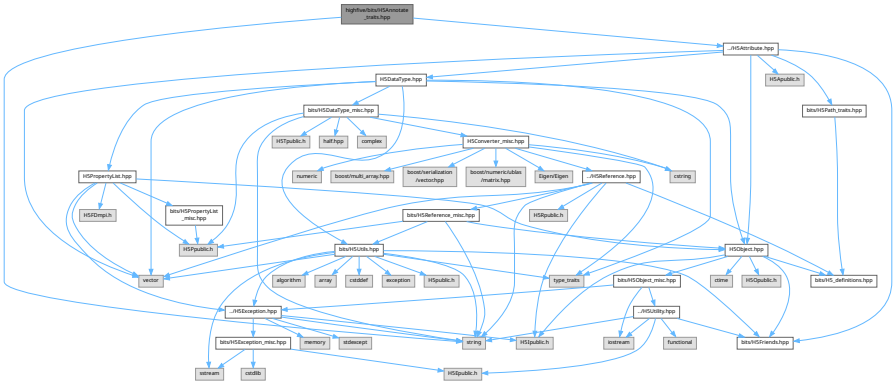
Go to the documentation of this file.

```
00001 #pragma once
00002
00003 #if defined(__GNUC__) || defined(__clang__)
00004 #define H5_DEPRECATED(msg) __attribute__((deprecated(#msg)))
00005 #elif defined(_MSC_VER)
00006 #define H5_DEPRECATED(msg) __declspec(deprecated(#msg))
00007 #else
00008 #pragma message("WARNING: Compiler doesnt support deprecation")
00009 #define H5_DEPRECATED(msg)
00010 #endif
00011
00012
00013 // Forward declarations
00014
00015 namespace HighFive {
00016
00017 enum class LinkType;
00018 enum class ObjectType;
00019 enum class PropertyType;
00020
00021 class Attribute;
00022 class DataSet;
00023 class DataSpace;
00024 class DataType;
00025 class Exception;
00026 class File;
00027 class FileDriver;
00028 class Group;
00029 class Object;
00030 class ObjectInfo;
00031 class Reference;
00032 class Selection;
00033 class SilenceHDF5;
00034
00035 template <typename T>
00036 class AtomicType;
00037
00038 template <typename Derivate>
00039 class AnnotateTraits;
00040
00041 template <std::size_t N>
00042 class FixedLenStringArray;
00043
00044 template <typename Derivate>
00045 class NodeTraits;
00046
00047 template <PropertyType T>
00048 class PropertyList;
00049
00050 }  // namespace HighFive
```

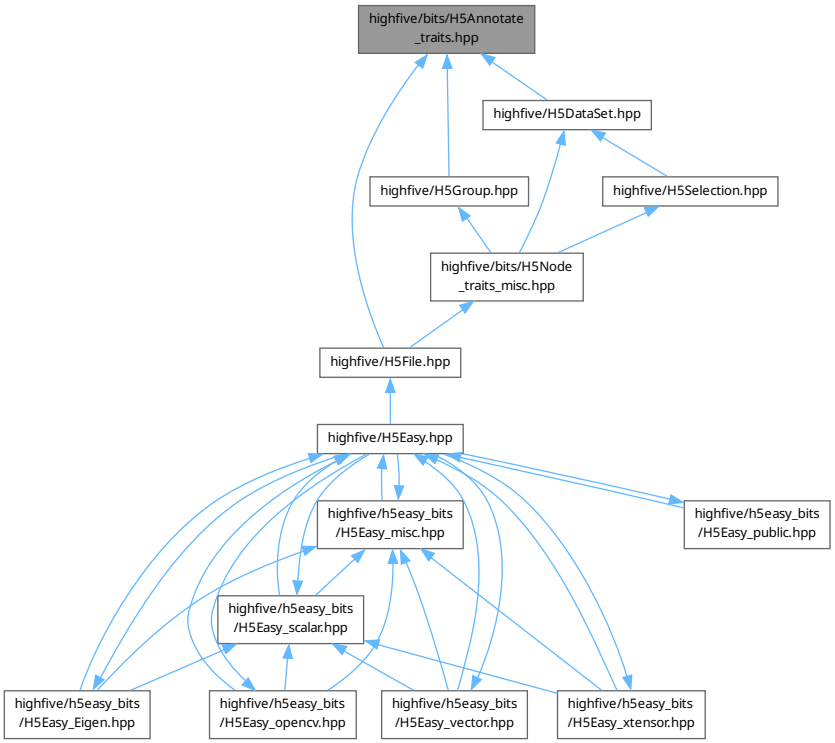
10.4 highfive/bits/H5Annotate_traits.hpp File Reference

```
#include <string>
#include ¨../H5Attribute.hpp¨
```

Include dependency graph for H5Annotate_traits.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class HighFive::AnnotateTraits< Derivate >

Namespaces

- namespace HighFive

10.5 H5Annotate_traits.hpp

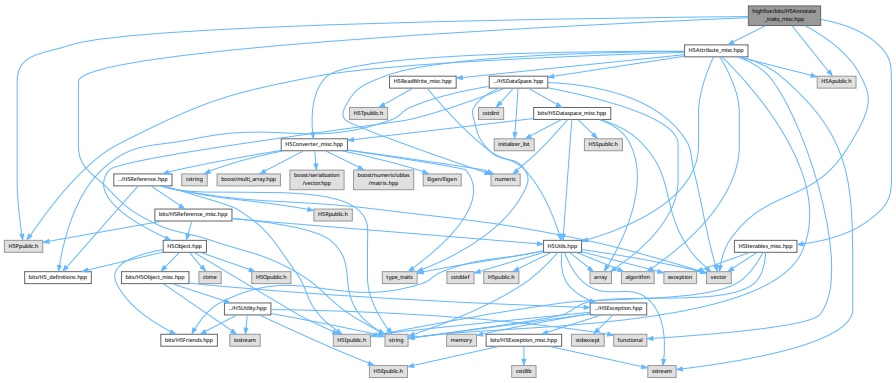
Go to the documentation of this file.

```
00001 /*
00002  *  Copyright (c), 2017, Adrien Devresse <adrien.devresse@epfl.ch>
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
00011 #include <string>
00012
00013 #include "../H5Attribute.hpp"
00014
00015 namespace HighFive {
00016
00017 template <typename Derivate>
00018 class AnnotateTraits {
00019   public:
00027     Attribute createAttribute(const std::string& attribute_name,
00028                               const DataSpace& space,
00029                               const DataType& type);
00030
00038     template <typename Type>
00039     Attribute createAttribute(const std::string& attribute_name, const DataSpace& space);
00040
00049     template <typename T>
00050     Attribute createAttribute(const std::string& attribute_name, const T& data);
00051
00055     void deleteAttribute(const std::string& attribute_name);
00056
00061     Attribute getAttribute(const std::string& attribute_name) const;
00062
00066     size_t getNumberAttributes() const;
00067
00071     std::vector<std::string> listAttributeNames() const;
00072
00076     bool hasAttribute(const std::string& attr_name) const;
00077
00078   private:
00079     using derivate_type = Derivate;
00080 };
00081 }  // namespace HighFive
```

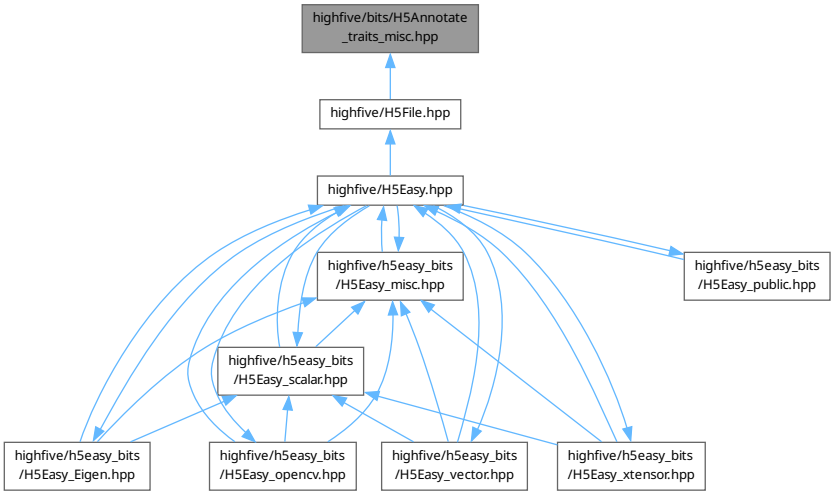
10.6 highfive/bits/H5Annotate_traits_misc.hpp File Reference

```
#include <string>
#include <vector>
#include <H5Apublic.h>
#include <H5Ppublic.h>
#include ¨H5Attribute_misc.hpp¨
#include ¨H5Iterables_misc.hpp¨
```

Include dependency graph for H5Annotate_traits_misc.hpp:



This graph shows which files directly or indirectly include this file:



Namespaces

- namespace HighFive

10.7 H5Annotate_traits_misc.hpp

Go to the documentation of this file.

```
00001 /*
00002  *  Copyright (c), 2017, Adrien Devresse <adrien.devresse@epfl.ch>
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
```

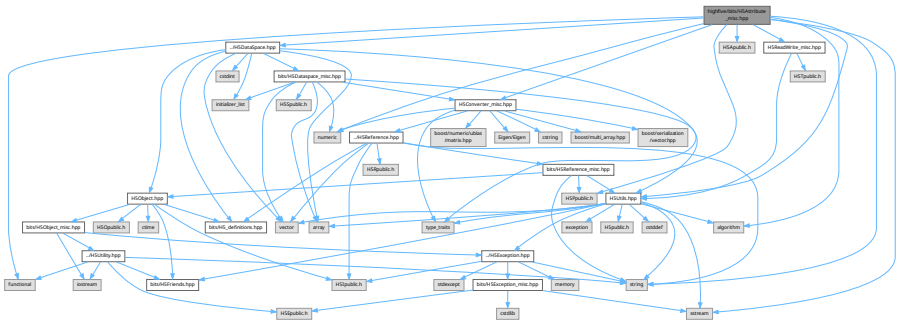
```
00011 #include <string>
00012 #include <vector>
00013
00014 #include <H5Apublic.h>
00015 #include <H5Ppublic.h>
00016
00017 #include "H5Attribute_misc.hpp"
00018 #include "H5Iterables_misc.hpp"
00019
00020 namespace HighFive {
00021
00022 template <typename Derivate>
00023 inline Attribute AnnotateTraits<Derivate>::createAttribute(const std::string& attribute_name,
00024                                                            const DataSpace& space,
00025                                                            const DataType& dtype) {
00026     auto attr_id = H5Acreate2(static_cast<Derivate*>(this)->getId(),
00027                               attribute_name.c_str(),
00028                               dtype.getId(),
00029                               space.getId(),
00030                               H5P_DEFAULT,
00031                               H5P_DEFAULT);
00032     if (attr_id < 0) {
00033         HDF5ErrMapper::ToException<AttributeException>(
00034             std::string("Unable to create the attribute \"") + attribute_name + "\":");
00035     }
00036     return detail::make_attribute(attr_id);
00037 }
00038
00039 template <typename Derivate>
00040 template <typename Type>
00041 inline Attribute AnnotateTraits<Derivate>::createAttribute(const std::string& attribute_name,
00042                                                            const DataSpace& space) {
00043     return createAttribute(attribute_name, space, create_and_check_datatype<Type>());
00044 }
00045
00046 template <typename Derivate>
00047 template <typename T>
00048 inline Attribute AnnotateTraits<Derivate>::createAttribute(const std::string& attribute_name,
00049                                                            const T& data) {
00050     Attribute att =
00051         createAttribute(attribute_name,
00052                         DataSpace::From(data),
00053                         create_and_check_datatype<typename details::inspector<T>::base_type>());
00054     att.write(data);
00055     return att;
00056 }
00057
00058 template <typename Derivate>
00059 inline void AnnotateTraits<Derivate>::deleteAttribute(const std::string& attribute_name) {
00060     if (H5Adelete(static_cast<const Derivate*>(this)->getId(), attribute_name.c_str()) < 0) {
00061         HDF5ErrMapper::ToException<AttributeException>(
00062             std::string("Unable to delete attribute \"") + attribute_name + "\":");
00063     }
00064 }
00065
00066 template <typename Derivate>
00067 inline Attribute AnnotateTraits<Derivate>::getAttribute(const std::string& attribute_name) const {
00068     const auto attr_id =
00069         H5Aopen(static_cast<const Derivate*>(this)->getId(), attribute_name.c_str(), H5P_DEFAULT);
00070     if (attr_id < 0) {
00071         HDF5ErrMapper::ToException<AttributeException>(
00072             std::string("Unable to open the attribute \"") + attribute_name + "\":");
00073     }
00074     return detail::make_attribute(attr_id);
00075 }
00076
00077 template <typename Derivate>
00078 inline size_t AnnotateTraits<Derivate>::getNumberAttributes() const {
00079     int res = H5Aget_num_attrs(static_cast<const Derivate*>(this)->getId());
00080     if (res < 0) {
00081         HDF5ErrMapper::ToException<AttributeException>(
00082             std::string("Unable to count attributes in existing group or file"));
00083     }
00084     return static_cast<size_t>(res);
00085 }
00086
00087 template <typename Derivate>
00088 inline std::vector<std::string> AnnotateTraits<Derivate>::listAttributeNames() const {
00089     std::vector<std::string> names;
00090     details::HighFiveIterateData iterateData(names);
00091
00092     size_t num_objs = getNumberAttributes();
00093     names.reserve(num_objs);
00094
00095     if (H5Aiterate2(static_cast<const Derivate*>(this)->getId(),
00096                     H5_INDEX_NAME,
00097                     H5_ITER_INC,
```

```
00098                     NULL,
00099                     &details::internal_high_five_iterate<H5A_info_t>,
00100                     static_cast<void*>(&iterateData)) < 0) {
00101         HDF5ErrMapper::ToException<AttributeException>(
00102             std::string("Unable to list attributes in group"));
00103     }
00104
00105     return names;
00106 }
00107
00108 template <typename Derivate>
00109 inline bool AnnotateTraits<Derivate>::hasAttribute(const std::string& attr_name) const {
00110     int res = H5Aexists(static_cast<const Derivate*>(this)->getId(), attr_name.c_str());
00111     if (res < 0) {
00112         HDF5ErrMapper::ToException<AttributeException>(
00113             std::string("Unable to check for attribute in group"));
00114     }
00115     return res;
00116 }
00117
00118 }  // namespace HighFive
```

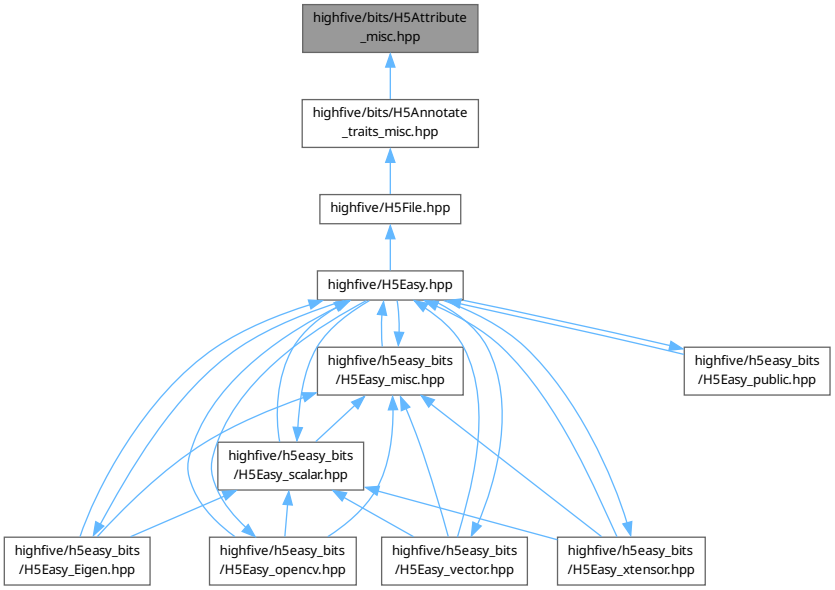
10.8 highfive/bits/H5Attribute_misc.hpp File Reference

```
#include <algorithm>
#include <functional>
#include <numeric>
#include <sstream>
#include <string>
#include <H5Apublic.h>
#include <H5Ppublic.h>
#include "../H5DataSpace.hpp"
#include "H5Converter_misc.hpp"
#include "H5ReadWrite_misc.hpp"
#include "H5Utils.hpp"
```

Include dependency graph for H5Attribute_misc.hpp:



This graph shows which files directly or indirectly include this file:



Namespaces

- namespace HighFive

10.9 H5Attribute_misc.hpp

Go to the documentation of this file.

```
00001 /*
00002  *  Copyright (c), 2017, Ali Can Demiralp <ali.demiralp@rwth-aachen.de>
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
00011 #include <algorithm>
00012 #include <functional>
00013 #include <numeric>
00014 #include <sstream>
00015 #include <string>
00016
00017 #include <H5Apublic.h>
00018 #include <H5Ppublic.h>
00019
00020 #include "../H5DataSpace.hpp"
00021 #include "H5Converter_misc.hpp"
00022 #include "H5ReadWrite_misc.hpp"
00023 #include "H5Utils.hpp"
00024
00025 namespace HighFive {
00026
00027 inline std::string Attribute::getName() const {
00028     return details::get_name(
00029         [&](char* buffer, size_t length) { return H5Aget_name(_hid, length, buffer); });
00030 }
00031
00032 inline size_t Attribute::getStorageSize() const {
00033     return static_cast<size_t>(H5Aget_storage_size(_hid));
```

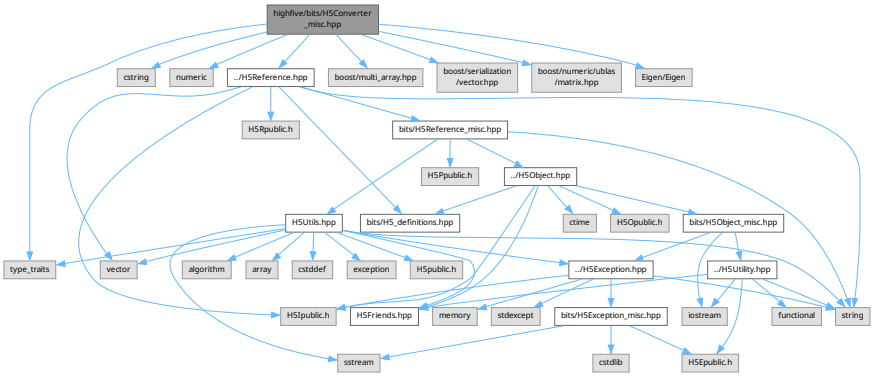
```
00034 }
00035
00036 inline DataType Attribute::getDataType() const {
00037     DataType res;
00038     res._hid = H5Aget_type(_hid);
00039     return res;
00040 }
00041
00042 inline DataSpace Attribute::getSpace() const {
00043     DataSpace space;
00044     if ((space._hid = H5Aget_space(_hid)) < 0) {
00045         HDF5ErrMapper::ToException<AttributeException>("Unable to get DataSpace out of Attribute");
00046     }
00047     return space;
00048 }
00049
00050 inline DataSpace Attribute::getMemSpace() const {
00051     return getSpace();
00052 }
00053
00054 template <typename T>
00055 inline T Attribute::read() const {
00056     T array;
00057     read(array);
00058     return array;
00059 }
00060
00061 template <typename T>
00062 inline void Attribute::read(T& array) const {
00063     const DataSpace& mem_space = getMemSpace();
00064     const details::BufferInfo<T> buffer_info(
00065         getDataType(),
00066         [this]() -> std::string { return this->getName(); },
00067         details::BufferInfo<T>::read);
00068
00069     if (!details::checkDimensions(mem_space, buffer_info.n_dimensions)) {
00070         std::ostringstream ss;
00071         ss « "Impossible to read DataSet of dimensions " « mem_space.getNumberDimensions()
00072            « " into arrays of dimensions " « buffer_info.n_dimensions;
00073         throw DataSpaceException(ss.str());
00074     }
00075     auto dims = mem_space.getDimensions();
00076
00077     if (mem_space.getElementCount() == 0) {
00078         auto effective_dims = details::squeezeDimensions(dims,
00079                                                          details::inspector<T>::recursive_ndim);
00080
00081         details::inspector<T>::prepare(array, effective_dims);
00082         return;
00083     }
00084
00085     auto r = details::data_converter::get_reader<T>(dims, array);
00086     read(r.get_pointer(), buffer_info.data_type);
00087     // re-arrange results
00088     r.unserialize();
00089     auto t = create_datatype<typename details::inspector<T>::base_type>();
00090     auto c = t.getClass();
00091     if (c == DataTypeClass::VarLen || t.isVariableStr()) {
00092 #if H5_VERSION_GE(1, 12, 0)
00093         // This one have been created in 1.12.0
00094         (void) H5Treclaim(t.getId(), mem_space.getId(), H5P_DEFAULT, r.get_pointer());
00095 #else
00096         // This one is deprecated since 1.12.0
00097         (void) H5Dvlen_reclaim(t.getId(), mem_space.getId(), H5P_DEFAULT, r.get_pointer());
00098 #endif
00099     }
00100 }
00101
00102 template <typename T>
00103 inline void Attribute::read(T* array, const DataType& dtype) const {
00104     static_assert(!std::is_const<T>::value,
00105                   "read() requires a non-const structure to read data into");
00106     using element_type = typename details::inspector<T>::base_type;
00107     // Auto-detect mem datatype if not provided
00108     const DataType& mem_datatype = dtype.empty() ? create_and_check_datatype<element_type>()
00109                                                  : dtype;
00110
00111     if (H5Aread(getId(), mem_datatype.getId(), static_cast<void*>(array)) < 0) {
00112         HDF5ErrMapper::ToException<AttributeException>("Error during HDF5 Read: ");
00113     }
00114 }
00115
00116 template <typename T>
00117 inline void Attribute::write(const T& buffer) {
00118     const DataSpace& mem_space = getMemSpace();
00119
00120     if (mem_space.getElementCount() == 0) {
```

```
00121         return;
00122     }
00123
00124     const details::BufferInfo<T> buffer_info(
00125         getDataType(),
00126         [this]() -> std::string { return this->getName(); },
00127         details::BufferInfo<T>::write);
00128
00129     if (!details::checkDimensions(mem_space, buffer_info.n_dimensions)) {
00130         std::ostringstream ss;
00131         ss « "Impossible to write buffer of dimensions " « buffer_info.n_dimensions
00132            « " into dataset of dimensions " « mem_space.getNumberDimensions();
00133         throw DataSpaceException(ss.str());
00134     }
00135     auto w = details::data_converter::serialize<T>(buffer);
00136     write_raw(w.get_pointer(), buffer_info.data_type);
00137 }
00138
00139 template <typename T>
00140 inline void Attribute::write_raw(const T* buffer, const DataType& dtype) {
00141     using element_type = typename details::inspector<T>::base_type;
00142     const auto& mem_datatype = dtype.empty() ? create_and_check_datatype<element_type>() : dtype;
00143
00144     if (H5Awrite(getId(), mem_datatype.getId(), buffer) < 0) {
00145         HDF5ErrMapper::ToException<DataSetException>("Error during HDF5 Write: ");
00146     }
00147 }
00148
00149 }  // namespace HighFive
```

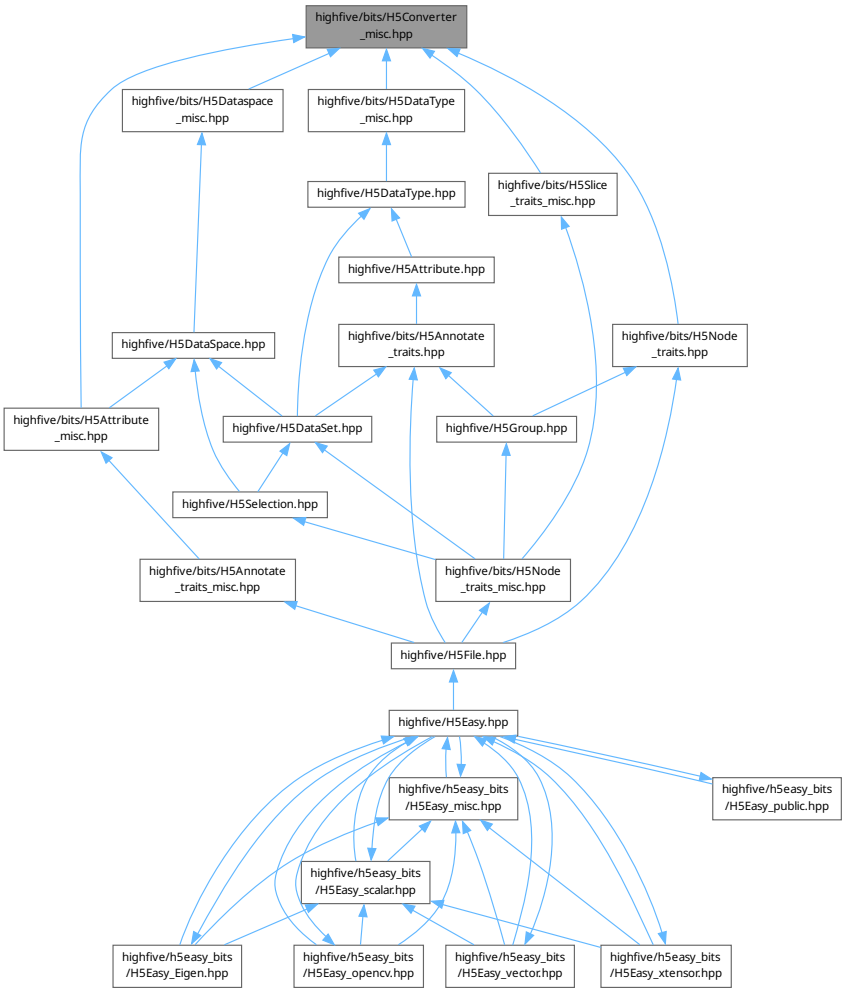
10.10 highfive/bits/H5Converter_misc.hpp File Reference

```
#include <type_traits>
#include <cstring>
#include <numeric>
#include ¨../H5Reference.hpp¨
#include <boost/multi_array.hpp>
#include <boost/serialization/vector.hpp>
#include <boost/numeric/ublas/matrix.hpp>
#include <Eigen/Eigen>
```

Include dependency graph for H5Converter_misc.hpp:



This graph shows which files directly or indirectly include this file:



Namespaces

- namespace HighFive

Typedefs

- template<typename T >
  using HighFive::unqualified_t = typename std::remove_const< typename std::remove_reference< T >::type >::type

Functions

- size_t HighFive::compute_total_size (const std::vector< size_t > &dims)

10.11 H5Converter_misc.hpp

Go to the documentation of this file.

```
00001 /*
00002  *  Copyright (c) 2022 Blue Brain Project
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
00011 #include <type_traits>
00012 #include <cstring>
00013 #include <numeric>
00014
00015 #include "../H5Reference.hpp"
00016 #ifdef H5_USE_BOOST
00017 #include <boost/multi_array.hpp>
00018 // starting Boost 1.64, serialization header must come before ublas
00019 #include <boost/serialization/vector.hpp>
00020 #include <boost/numeric/ublas/matrix.hpp>
00021 #endif
00022 #ifdef H5_USE_EIGEN
00023 #include <Eigen/Eigen>
00024 #endif
00025
00026 namespace HighFive {
00027 namespace details {
00028
00029 inline bool checkDimensions(const std::vector<size_t>& dims, size_t n_dim_requested) {
00030     size_t n_dim_actual = dims.size();
00031
00032     // We should allow reading scalar from shapes like `(1, 1, 1)`.
00033     if (n_dim_requested == 0) {
00034         if (n_dim_actual == 0ul) {
00035             return true;
00036         }
00037
00038         return size_t(std::count(dims.begin(), dims.end(), 1ul)) == n_dim_actual;
00039     }
00040
00041     // For non-scalar datasets, we can squeeze away singleton dimension, but
00042     // we never add any.
00043     if (n_dim_actual < n_dim_requested) {
00044         return false;
00045     }
00046
00047     // Special case for 1-dimensional arrays, which can squeeze `1`s from either
00048     // side simultaneously if needed.
00049     if (n_dim_requested == 1ul) {
00050         return n_dim_actual >= 1ul &&
00051                size_t(std::count(dims.begin(), dims.end(), 1ul)) >= n_dim_actual - 1ul;
00052     }
00053
00054     // All other cases strip front only. This avoid unstable behaviour when
00055     // squeezing singleton dimensions.
00056     size_t n_dim_excess = n_dim_actual - n_dim_requested;
00057
00058     bool squeeze_back = true;
00059     for (size_t i = 1; i <= n_dim_excess; ++i) {
00060         if (dims[n_dim_actual - i] != 1) {
00061             squeeze_back = false;
00062             break;
00063         }
00064     }
00065
00066     return squeeze_back;
00067 }
00068
00069
00070 inline std::vector<size_t> squeezeDimensions(const std::vector<size_t>& dims,
00071                                              size_t n_dim_requested) {
00072     auto format_error_message = [&]() -> std::string {
00073         return "Can't interpret dims = " + format_vector(dims) + " as " +
00074                std::to_string(n_dim_requested) + "-dimensional.";
00075     };
00076
00077     if (n_dim_requested == 0) {
00078         if (!checkDimensions(dims, n_dim_requested)) {
00079             throw std::invalid_argument(format_error_message());
00080         }
00081
00082         return {1ul};
```

```
00083     }
00084
00085     auto n_dim = dims.size();
00086     if (n_dim < n_dim_requested) {
00087         throw std::invalid_argument(format_error_message());
00088     }
00089
00090     if (n_dim_requested == 1ul) {
00091         size_t non_singleton_dim = size_t(-1);
00092         for (size_t i = 0; i < n_dim; ++i) {
00093             if (dims[i] != 1ul) {
00094                 if (non_singleton_dim == size_t(-1)) {
00095                     non_singleton_dim = i;
00096                 } else {
00097                     throw std::invalid_argument(format_error_message());
00098                 }
00099             }
00100         }
00101
00102         return {dims[std::min(non_singleton_dim, n_dim - 1)]};
00103     }
00104
00105     size_t n_dim_excess = dims.size() - n_dim_requested;
00106     for (size_t i = 1; i <= n_dim_excess; ++i) {
00107         if (dims[n_dim - i] != 1) {
00108             throw std::invalid_argument(format_error_message());
00109         }
00110     }
00111
00112     return std::vector<size_t>(dims.begin(),
00113                                dims.end() - static_cast<std::ptrdiff_t>(n_dim_excess));
00114 }
00115 }  // namespace details
00116
00117
00118 inline size_t compute_total_size(const std::vector<size_t>& dims) {
00119     return std::accumulate(dims.begin(), dims.end(), size_t{1u}, std::multiplies<size_t>());
00120 }
00121
00122 template <typename T>
00123 using unqualified_t = typename std::remove_const<typename std::remove_reference<T>::type>::type;
00124
00125 /*****
00126 inspector<T> {
00127     using type = T
00128     // base_type is the base type inside c++ (e.g. std::vector<int> => int)
00129     using base_type
00130     // hdf5_type is the base read by hdf5 (c-type) (e.g. std::vector<std::string> => const char*)
00131     using hdf5_type
00132
00133     // Number of dimensions starting from here
00134     static constexpr size_t recursive_ndim
00135     // Is the inner type trivially copyable for optimisation
00136     // If this value is true: data() is mandatory
00137     // If this value is false: getSizeVal, getSize, serialize, unserialize are mandatory
00138     static constexpr bool is_trivially_copyable
00139
00140     // Reading:
00141     // Allocate the value following dims (should be recursive)
00142     static void prepare(type& val, const std::vector<std::size_t> dims)
00143     // Return the size of the vector pass to/from hdf5 from a vector of dims
00144     static size_t getSize(const std::vector<size_t>& dims)
00145     // Return a pointer of the first value of val (for reading)
00146     static hdf5_type* data(type& val)
00147     // Take a serialized vector 'in', some dims and copy value to val (for reading)
00148     static void unserialize(const hdf5_type* in, const std::vector<size_t>&i, type& val)
00149
00150
00151     // Writing:
00152     // Return the size of the vector pass to/from hdf5 from a value
00153     static size_t getSizeVal(const type& val)
00154     // Return a point of the first value of val
00155     static const hdf5_type* data(const type& val)
00156     // Take a val and serialize it inside 'out'
00157     static void serialize(const type& val, hdf5_type* out)
00158     // Return an array of dimensions of the space needed for writing val
00159     static std::vector<size_t> getDimensions(const type& val)
00160 }
00161 *****/
00162
00163
00164 namespace details {
00165 template <typename T>
00166 struct type_helper {
00167     using type = unqualified_t<T>;
00168     using base_type = unqualified_t<T>;
00169     using hdf5_type = base_type;
```

```
00170
00171     static constexpr size_t ndim = 0;
00172     static constexpr size_t recursive_ndim = ndim;
00173     static constexpr bool is_trivially_copyable = std::is_trivially_copyable<type>::value;
00174
00175     static std::vector<size_t> getDimensions(const type& /* val */) {
00176         return {};
00177     }
00178
00179     static size_t getSizeVal(const type& val) {
00180         return compute_total_size(getDimensions(val));
00181     }
00182
00183     static size_t getSize(const std::vector<size_t>& dims) {
00184         return compute_total_size(dims);
00185     }
00186
00187     static void prepare(type& /* val */, const std::vector<size_t>& /* dims */) {}
00188
00189     static hdf5_type* data(type& val) {
00190         static_assert(is_trivially_copyable, "The type is not trivially copyable");
00191         return &val;
00192     }
00193
00194     static const hdf5_type* data(const type& val) {
00195         static_assert(is_trivially_copyable, "The type is not trivially copyable");
00196         return &val;
00197     }
00198
00199     static void serialize(const type& val, hdf5_type* m) {
00200         static_assert(is_trivially_copyable, "The type is not trivially copyable");
00201         *m = val;
00202     }
00203
00204     static void unserialize(const hdf5_type* vec,
00205                             const std::vector<size_t>& /* dims */,
00206                             type& val) {
00207         static_assert(is_trivially_copyable, "The type is not trivially copyable");
00208         val = vec[0];
00209     }
00210 };
00211
00212 template <typename T>
00213 struct inspector: type_helper<T> {};
00214
00215 enum class Boolean : int8_t {
00216     HighFiveFalse = 0,
00217     HighFiveTrue = 1,
00218 };
00219
00220 template <>
00221 struct inspector<bool>: type_helper<bool> {
00222     using base_type = Boolean;
00223     using hdf5_type = int8_t;
00224
00225     static constexpr bool is_trivially_copyable = false;
00226
00227     static hdf5_type* data(type& /* val */) {
00228         throw DataSpaceException("A boolean cannot be read directly.");
00229     }
00230
00231     static const hdf5_type* data(const type& /* val */) {
00232         throw DataSpaceException("A boolean cannot be written directly.");
00233     }
00234
00235     static void unserialize(const hdf5_type* vec,
00236                             const std::vector<size_t>& /* dims */,
00237                             type& val) {
00238         val = vec[0] != 0 ? true : false;
00239     }
00240
00241     static void serialize(const type& val, hdf5_type* m) {
00242         *m = val ? 1 : 0;
00243     }
00244 };
00245
00246 template <>
00247 struct inspector<std::string>: type_helper<std::string> {
00248     using hdf5_type = const char*;
00249
00250     static hdf5_type* data(type& /* val */) {
00251         throw DataSpaceException("A std::string cannot be read directly.");
00252     }
00253
00254     static const hdf5_type* data(const type& /* val */) {
00255         throw DataSpaceException("A std::string cannot be written directly.");
00256     }
```

```
00257
00258     static void serialize(const type& val, hdf5_type* m) {
00259         *m = val.c_str();
00260     }
00261
00262     static void unserialize(const hdf5_type* vec,
00263                             const std::vector<size_t>& /* dims */,
00264                             type& val) {
00265         val = vec[0];
00266     }
00267 };
00268
00269 template <>
00270 struct inspector<Reference>: type_helper<Reference> {
00271     using hdf5_type = hobj_ref_t;
00272
00273     static constexpr bool is_trivially_copyable = false;
00274
00275     static hdf5_type* data(type& /* val */) {
00276         throw DataSpaceException("A Reference cannot be read directly.");
00277     }
00278
00279     static const hdf5_type* data(const type& /* val */) {
00280         throw DataSpaceException("A Reference cannot be written directly.");
00281     }
00282
00283     static void serialize(const type& val, hdf5_type* m) {
00284         hobj_ref_t ref;
00285         val.create_ref(&ref);
00286         *m = ref;
00287     }
00288
00289     static void unserialize(const hdf5_type* vec,
00290                             const std::vector<size_t>& /* dims */,
00291                             type& val) {
00292         val = type{vec[0]};
00293     }
00294 };
00295
00296 template <size_t N>
00297 struct inspector<FixedLenStringArray<N» {
00298     using type = FixedLenStringArray<N>;
00299     using value_type = char*;
00300     using base_type = FixedLenStringArray<N>;
00301     using hdf5_type = char;
00302
00303     static constexpr size_t ndim = 1;
00304     static constexpr size_t recursive_ndim = ndim;
00305     static constexpr bool is_trivially_copyable = false;
00306
00307     static std::vector<size_t> getDimensions(const type& val) {
00308         return std::vector<size_t>{val.size()};
00309     }
00310
00311     static size_t getSizeVal(const type& val) {
00312         return N * compute_total_size(getDimensions(val));
00313     }
00314
00315     static size_t getSize(const std::vector<size_t>& dims) {
00316         return N * compute_total_size(dims);
00317     }
00318
00319     static void prepare(type& /* val */, const std::vector<size_t>& dims) {
00320         if (dims[0] > N) {
00321             std::ostringstream os;
00322             os « "Size of FixedlenStringArray (" « N « ") is too small for dims (" « dims[0]
00323                « ").";
00324             throw DataSpaceException(os.str());
00325         }
00326     }
00327
00328     static hdf5_type* data(type& val) {
00329         return val.data();
00330     }
00331
00332     static const hdf5_type* data(const type& val) {
00333         return val.data();
00334     }
00335
00336     static void serialize(const type& val, hdf5_type* m) {
00337         for (size_t i = 0; i < val.size(); ++i) {
00338             std::memcpy(m + i * N, val[i], N);
00339         }
00340     }
00341
00342     static void unserialize(const hdf5_type* vec, const std::vector<size_t>& dims, type& val) {
00343         for (size_t i = 0; i < dims[0]; ++i) {
```

```
00344             std::array<char, N> s;
00345             std::memcpy(s.data(), vec + (i * N), N);
00346             val.push_back(s);
00347         }
00348     }
00349 };
00350
00351 template <typename T>
00352 struct inspector<std::vector<T>> {
00353     using type = std::vector<T>;
00354     using value_type = unqualified_t<T>;
00355     using base_type = typename inspector<value_type>::base_type;
00356     using hdf5_type = typename inspector<value_type>::hdf5_type;
00357
00358     static constexpr size_t ndim = 1;
00359     static constexpr size_t recursive_ndim = ndim + inspector<value_type>::recursive_ndim;
00360     static constexpr bool is_trivially_copyable = std::is_trivially_copyable<value_type>::value &&
00361                                                   inspector<value_type>::is_trivially_copyable;
00362
00363     static std::vector<size_t> getDimensions(const type& val) {
00364         std::vector<size_t> sizes(recursive_ndim, 1ul);
00365         sizes[0] = val.size();
00366         if (!val.empty()) {
00367             auto s = inspector<value_type>::getDimensions(val[0]);
00368             std::copy(s.begin(), s.end(), sizes.begin() + 1);
00369         }
00370         return sizes;
00371     }
00372
00373     static size_t getSizeVal(const type& val) {
00374         return compute_total_size(getDimensions(val));
00375     }
00376
00377     static size_t getSize(const std::vector<size_t>& dims) {
00378         return compute_total_size(dims);
00379     }
00380
00381     static void prepare(type& val, const std::vector<size_t>& dims) {
00382         val.resize(dims[0]);
00383         std::vector<size_t> next_dims(dims.begin() + 1, dims.end());
00384         for (auto&& e: val) {
00385             inspector<value_type>::prepare(e, next_dims);
00386         }
00387     }
00388
00389     static hdf5_type* data(type& val) {
00390         return inspector<value_type>::data(val[0]);
00391     }
00392
00393     static const hdf5_type* data(const type& val) {
00394         return inspector<value_type>::data(val[0]);
00395     }
00396
00397     static void serialize(const type& val, hdf5_type* m) {
00398         size_t subsize = inspector<value_type>::getSizeVal(val[0]);
00399         for (auto&& e: val) {
00400             inspector<value_type>::serialize(e, m);
00401             m += subsize;
00402         }
00403     }
00404
00405     static void unserialize(const hdf5_type* vec_align,
00406                             const std::vector<size_t>& dims,
00407                             type& val) {
00408         std::vector<size_t> next_dims(dims.begin() + 1, dims.end());
00409         size_t next_size = compute_total_size(next_dims);
00410         for (size_t i = 0; i < dims[0]; ++i) {
00411             inspector<value_type>::unserialize(vec_align + i * next_size, next_dims, val[i]);
00412         }
00413     }
00414 };
00415
00416 template <>
00417 struct inspector<std::vector<bool>> {
00418     using type = std::vector<bool>;
00419     using value_type = bool;
00420     using base_type = Boolean;
00421     using hdf5_type = uint8_t;
00422
00423     static constexpr size_t ndim = 1;
00424     static constexpr size_t recursive_ndim = ndim;
00425     static constexpr bool is_trivially_copyable = false;
00426
00427     static std::vector<size_t> getDimensions(const type& val) {
00428         std::vector<size_t> sizes{val.size()};
00429         return sizes;
00430     }
```

```
00431
00432     static size_t getSizeVal(const type& val) {
00433         return val.size();
00434     }
00435
00436     static size_t getSize(const std::vector<size_t>& dims) {
00437         if (dims.size() > 1) {
00438             throw DataSpaceException("std::vector<bool> is only 1 dimension.");
00439         }
00440         return dims[0];
00441     }
00442
00443     static void prepare(type& val, const std::vector<size_t>& dims) {
00444         if (dims.size() > 1) {
00445             throw DataSpaceException("std::vector<bool> is only 1 dimension.");
00446         }
00447         val.resize(dims[0]);
00448     }
00449
00450     static hdf5_type* data(type& /* val */) {
00451         throw DataSpaceException("A std::vector<bool> cannot be read directly.");
00452     }
00453
00454     static const hdf5_type* data(const type& /* val */) {
00455         throw DataSpaceException("A std::vector<bool> cannot be written directly.");
00456     }
00457
00458     static void serialize(const type& val, hdf5_type* m) {
00459         for (size_t i = 0; i < val.size(); ++i) {
00460             m[i] = val[i] ? 1 : 0;
00461         }
00462     }
00463
00464     static void unserialize(const hdf5_type* vec_align,
00465                             const std::vector<size_t>& dims,
00466                             type& val) {
00467         for (size_t i = 0; i < dims[0]; ++i) {
00468             val[i] = vec_align[i] != 0 ? true : false;
00469         }
00470     }
00471 };
00472
00473 template <typename T, size_t N>
00474 struct inspector<std::array<T, N» {
00475     using type = std::array<T, N>;
00476     using value_type = unqualified_t<T>;
00477     using base_type = typename inspector<value_type>::base_type;
00478     using hdf5_type = typename inspector<value_type>::hdf5_type;
00479
00480     static constexpr size_t ndim = 1;
00481     static constexpr size_t recursive_ndim = ndim + inspector<value_type>::recursive_ndim;
00482     static constexpr bool is_trivially_copyable = std::is_trivially_copyable<value_type>::value &&
00483                                                   inspector<value_type>::is_trivially_copyable;
00484
00485     static std::vector<size_t> getDimensions(const type& val) {
00486         std::vector<size_t> sizes{N};
00487         if (!val.empty()) {
00488             auto s = inspector<value_type>::getDimensions(val[0]);
00489             sizes.insert(sizes.end(), s.begin(), s.end());
00490         }
00491         return sizes;
00492     }
00493
00494     static size_t getSizeVal(const type& val) {
00495         return compute_total_size(getDimensions(val));
00496     }
00497
00498     static size_t getSize(const std::vector<size_t>& dims) {
00499         return compute_total_size(dims);
00500     }
00501
00502     static void prepare(type& /* val */, const std::vector<size_t>& dims) {
00503         if (dims[0] > N) {
00504             std::ostringstream os;
00505             os « "Size of std::array (" « N « ") is too small for dims (" « dims[0] « ").";
00506             throw DataSpaceException(os.str());
00507         }
00508     }
00509
00510     static hdf5_type* data(type& val) {
00511         return inspector<value_type>::data(val[0]);
00512     }
00513
00514     static const hdf5_type* data(const type& val) {
00515         return inspector<value_type>::data(val[0]);
00516     }
00517
```

```
00518     static void serialize(const type& val, hdf5_type* m) {
00519         size_t subsize = inspector<value_type>::getSizeVal(val[0]);
00520         for (auto& e: val) {
00521             inspector<value_type>::serialize(e, m);
00522             m += subsize;
00523         }
00524     }
00525
00526     static void unserialize(const hdf5_type* vec_align,
00527                             const std::vector<size_t>& dims,
00528                             type& val) {
00529         if (dims[0] != N) {
00530             std::ostringstream os;
00531             os « "Impossible to pair DataSet with " « dims[0] « " elements into an array with "
00532                « N « " elements.";
00533             throw DataSpaceException(os.str());
00534         }
00535         std::vector<size_t> next_dims(dims.begin() + 1, dims.end());
00536         size_t next_size = compute_total_size(next_dims);
00537         for (size_t i = 0; i < dims[0]; ++i) {
00538             inspector<value_type>::unserialize(vec_align + i * next_size, next_dims, val[i]);
00539         }
00540     }
00541 };
00542
00543 // Cannot be use for reading
00544 template <typename T>
00545 struct inspector<T*> {
00546     using type = T*;
00547     using value_type = unqualified_t<T>;
00548     using base_type = typename inspector<value_type>::base_type;
00549     using hdf5_type = typename inspector<value_type>::hdf5_type;
00550
00551     static constexpr size_t ndim = 1;
00552     static constexpr size_t recursive_ndim = ndim + inspector<value_type>::recursive_ndim;
00553     static constexpr bool is_trivially_copyable = std::is_trivially_copyable<value_type>::value &&
00554                                                   inspector<value_type>::is_trivially_copyable;
00555
00556     static size_t getSizeVal(const type& /* val */) {
00557         throw DataSpaceException("Not possible to have size of a T*");
00558     }
00559
00560     static std::vector<size_t> getDimensions(const type& /* val */) {
00561         throw DataSpaceException("Not possible to have size of a T*");
00562     }
00563
00564     static const hdf5_type* data(const type& val) {
00565         return reinterpret_cast<const hdf5_type*>(val);
00566     }
00567
00568     /* it works because there is only T[][][] currently
00569        we will fix it one day */
00570     static void serialize(const type& /* val */, hdf5_type* /* m */) {
00571         throw DataSpaceException("Not possible to serialize a T*");
00572     }
00573 };
00574
00575 // Cannot be use for reading
00576 template <typename T, size_t N>
00577 struct inspector<T[N]> {
00578     using type = T[N];
00579     using value_type = unqualified_t<T>;
00580     using base_type = typename inspector<value_type>::base_type;
00581     using hdf5_type = typename inspector<value_type>::hdf5_type;
00582
00583     static constexpr size_t ndim = 1;
00584     static constexpr size_t recursive_ndim = ndim + inspector<value_type>::recursive_ndim;
00585     static constexpr bool is_trivially_copyable = std::is_trivially_copyable<value_type>::value &&
00586                                                   inspector<value_type>::is_trivially_copyable;
00587
00588     static size_t getSizeVal(const type& val) {
00589         return compute_total_size(getDimensions(val));
00590     }
00591
00592     static std::vector<size_t> getDimensions(const type& val) {
00593         std::vector<size_t> sizes{N};
00594         if (N > 0) {
00595             auto s = inspector<value_type>::getDimensions(val[0]);
00596             sizes.insert(sizes.end(), s.begin(), s.end());
00597         }
00598         return sizes;
00599     }
00600
00601     static const hdf5_type* data(const type& val) {
00602         return inspector<value_type>::data(val[0]);
00603     }
00604
```

```
00605     /* it works because there is only T[][][] currently
00606        we will fix it one day */
00607     static void serialize(const type& val, hdf5_type* m) {
00608         size_t subsize = inspector<value_type>::getSizeVal(val[0]);
00609         for (size_t i = 0; i < N; ++i) {
00610             inspector<value_type>::serialize(val[i], m + i * subsize);
00611         }
00612     }
00613 };
00614
00615 #ifdef H5_USE_EIGEN
00616 template <typename T, int M, int N>
00617 struct inspector<Eigen::Matrix<T, M, N>> {
00618     using type = Eigen::Matrix<T, M, N>;
00619     using value_type = T;
00620     using base_type = typename inspector<value_type>::base_type;
00621     using hdf5_type = base_type;
00622
00623     static constexpr size_t ndim = 2;
00624     static constexpr size_t recursive_ndim = ndim + inspector<value_type>::recursive_ndim;
00625     static constexpr bool is_trivially_copyable = std::is_trivially_copyable<value_type>::value &&
00626                                                   inspector<value_type>::is_trivially_copyable;
00627
00628     static std::vector<size_t> getDimensions(const type& val) {
00629         std::vector<size_t> sizes{static_cast<size_t>(val.rows()), static_cast<size_t>(val.cols())};
00630         auto s = inspector<value_type>::getDimensions(val.data()[0]);
00631         sizes.insert(sizes.end(), s.begin(), s.end());
00632         return sizes;
00633     }
00634
00635     static size_t getSizeVal(const type& val) {
00636         return compute_total_size(getDimensions(val));
00637     }
00638
00639     static size_t getSize(const std::vector<size_t>& dims) {
00640         return compute_total_size(dims);
00641     }
00642
00643     static void prepare(type& val, const std::vector<size_t>& dims) {
00644         if (dims[0] != static_cast<size_t>(val.rows()) ||
00645             dims[1] != static_cast<size_t>(val.cols())) {
00646             val.resize(static_cast<typename type::Index>(dims[0]),
00647                        static_cast<typename type::Index>(dims[1]));
00648         }
00649     }
00650
00651     static hdf5_type* data(type& val) {
00652         return inspector<value_type>::data(*val.data());
00653     }
00654
00655     static const hdf5_type* data(const type& val) {
00656         return inspector<value_type>::data(*val.data());
00657     }
00658
00659     static void serialize(const type& val, hdf5_type* m) {
00660         std::memcpy(m, val.data(), static_cast<size_t>(val.size()) * sizeof(hdf5_type));
00661     }
00662
00663     static void unserialize(const hdf5_type* vec_align,
00664                             const std::vector<size_t>& dims,
00665                             type& val) {
00666         if (dims.size() < 2) {
00667             std::ostringstream os;
00668             os << "Impossible to pair DataSet with " << dims.size()
00669                << " dimensions into an eigen-matrix.";
00670             throw DataSpaceException(os.str());
00671         }
00672         std::memcpy(val.data(), vec_align, compute_total_size(dims) * sizeof(hdf5_type));
00673     }
00674 };
00675 #endif
00676
00677 #ifdef H5_USE_BOOST
00678 template <typename T, size_t Dims>
00679 struct inspector<boost::multi_array<T, Dims>> {
00680     using type = boost::multi_array<T, Dims>;
00681     using value_type = T;
00682     using base_type = typename inspector<value_type>::base_type;
00683     using hdf5_type = typename inspector<value_type>::hdf5_type;
00684
00685     static constexpr size_t ndim = Dims;
00686     static constexpr size_t recursive_ndim = ndim + inspector<value_type>::recursive_ndim;
00687     static constexpr bool is_trivially_copyable = std::is_trivially_copyable<value_type>::value &&
00688                                                   inspector<value_type>::is_trivially_copyable;
00689
00690     static std::vector<size_t> getDimensions(const type& val) {
00691         std::vector<size_t> sizes;
```

```
00692         for (size_t i = 0; i < ndim; ++i) {
00693             sizes.push_back(val.shape()[i]);
00694         }
00695         auto s = inspector<value_type>::getDimensions(val.data()[0]);
00696         sizes.insert(sizes.end(), s.begin(), s.end());
00697         return sizes;
00698     }
00699
00700     static size_t getSizeVal(const type& val) {
00701         return compute_total_size(getDimensions(val));
00702     }
00703
00704     static size_t getSize(const std::vector<size_t>& dims) {
00705         return compute_total_size(dims);
00706     }
00707
00708     static void prepare(type& val, const std::vector<size_t>& dims) {
00709         if (dims.size() < ndim) {
00710             std::ostringstream os;
00711             os « "Only ’" « dims.size() « "’ given but boost::multi_array is of size ’" « ndim
00712                « "’.";
00713             throw DataSpaceException(os.str());
00714         }
00715         boost::array<typename type::index, Dims> ext;
00716         std::copy(dims.begin(), dims.begin() + ndim, ext.begin());
00717         val.resize(ext);
00718         std::vector<size_t> next_dims(dims.begin() + Dims, dims.end());
00719         std::size_t size = std::accumulate(dims.begin(),
00720                                            dims.begin() + Dims,
00721                                            std::size_t{1},
00722                                            std::multiplies<size_t>());
00723         for (size_t i = 0; i < size; ++i) {
00724             inspector<value_type>::prepare(*(val.origin() + i), next_dims);
00725         }
00726     }
00727
00728     static hdf5_type* data(type& val) {
00729         return inspector<value_type>::data(*val.data());
00730     }
00731
00732     static const hdf5_type* data(const type& val) {
00733         return inspector<value_type>::data(*val.data());
00734     }
00735
00736     static void serialize(const type& val, hdf5_type* m) {
00737         size_t size = val.num_elements();
00738         size_t subsize = inspector<value_type>::getSizeVal(*val.origin());
00739         for (size_t i = 0; i < size; ++i) {
00740             inspector<value_type>::serialize(*(val.origin() + i), m + i * subsize);
00741         }
00742     }
00743
00744     static void unserialize(const hdf5_type* vec_align,
00745                             const std::vector<size_t>& dims,
00746                             type& val) {
00747         std::vector<size_t> next_dims(dims.begin() + ndim, dims.end());
00748         size_t subsize = compute_total_size(next_dims);
00749         for (size_t i = 0; i < val.num_elements(); ++i) {
00750             inspector<value_type>::unserialize(vec_align + i * subsize,
00751                                                next_dims,
00752                                                *(val.origin() + i));
00753         }
00754     }
00755 };
00756
00757 template <typename T>
00758 struct inspector<boost::numeric::ublas::matrix<T» {
00759     using type = boost::numeric::ublas::matrix<T>;
00760     using value_type = unqualified_t<T>;
00761     using base_type = typename inspector<value_type>::base_type;
00762     using hdf5_type = typename inspector<value_type>::hdf5_type;
00763
00764     static constexpr size_t ndim = 2;
00765     static constexpr size_t recursive_ndim = ndim + inspector<value_type>::recursive_ndim;
00766     static constexpr bool is_trivially_copyable = std::is_trivially_copyable<value_type>::value &&
00767                                                   inspector<value_type>::is_trivially_copyable;
00768
00769     static std::vector<size_t> getDimensions(const type& val) {
00770         std::vector<size_t> sizes{val.size1(), val.size2()};
00771         auto s = inspector<value_type>::getDimensions(val(0, 0));
00772         sizes.insert(sizes.end(), s.begin(), s.end());
00773         return sizes;
00774     }
00775
00776     static size_t getSizeVal(const type& val) {
00777         return compute_total_size(getDimensions(val));
00778     }
```

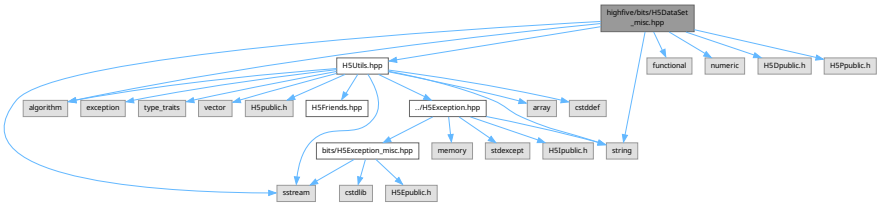
```
00779
00780     static size_t getSize(const std::vector<size_t>& dims) {
00781         return compute_total_size(dims);
00782     }
00783
00784     static void prepare(type& val, const std::vector<size_t>& dims) {
00785         if (dims.size() < ndim) {
00786             std::ostringstream os;
00787             os << "Impossible to pair DataSet with " << dims.size() << " dimensions into a " << ndim
00788                << " boost::numeric::ublas::matrix";
00789             throw DataSpaceException(os.str());
00790         }
00791         val.resize(dims[0], dims[1], false);
00792     }
00793
00794     static hdf5_type* data(type& val) {
00795         return inspector<value_type>::data(val(0, 0));
00796     }
00797
00798     static const hdf5_type* data(const type& val) {
00799         return inspector<value_type>::data(val(0, 0));
00800     }
00801
00802     static void serialize(const type& val, hdf5_type* m) {
00803         size_t size = val.size1() * val.size2();
00804         size_t subsize = inspector<value_type>::getSizeVal(val(0, 0));
00805         for (size_t i = 0; i < size; ++i) {
00806             inspector<value_type>::serialize(*(&val(0, 0) + i), m + i * subsize);
00807         }
00808     }
00809
00810     static void unserialize(const hdf5_type* vec_align,
00811                             const std::vector<size_t>& dims,
00812                             type& val) {
00813         std::vector<size_t> next_dims(dims.begin() + ndim, dims.end());
00814         size_t subsize = compute_total_size(next_dims);
00815         size_t size = val.size1() * val.size2();
00816         for (size_t i = 0; i < size; ++i) {
00817             inspector<value_type>::unserialize(vec_align + i * subsize,
00818                                                next_dims,
00819                                                *(&val(0, 0) + i));
00820         }
00821     }
00822 };
00823 #endif
00824
00825 template <typename T>
00826 struct Writer {
00827     using hdf5_type = typename inspector<T>::hdf5_type;
00828     const hdf5_type* get_pointer() {
00829         if (vec.empty()) {
00830             return ptr;
00831         } else {
00832             return vec.data();
00833         }
00834     }
00835     std::vector<hdf5_type> vec{};
00836     const hdf5_type* ptr{nullptr};
00837 };
00838
00839 template <typename T>
00840 struct Reader {
00841     using type = unqualified_t<T>;
00842     using hdf5_type = typename inspector<type>::hdf5_type;
00843
00844     Reader(const std::vector<size_t>& _dims, type& _val)
00845         : dims(_dims)
00846         , val(_val) {}
00847
00848     hdf5_type* get_pointer() {
00849         if (vec.empty()) {
00850             return inspector<type>::data(val);
00851         } else {
00852             return vec.data();
00853         }
00854     }
00855
00856     void unserialize() {
00857         if (!vec.empty()) {
00858             inspector<type>::unserialize(vec.data(), dims, val);
00859         }
00860     }
00861
00862     std::vector<size_t> dims{};
00863     std::vector<hdf5_type> vec{};
00864     type& val{};
00865 };
```

```
00866
00867 struct data_converter {
00868     template <typename T>
00869     static typename std::enable_if<inspector<T>::is_trivially_copyable, Writer<T>::type serialize(
00870         const typename inspector<T>::type& val) {
00871         Writer<T> w;
00872         w.ptr = inspector<T>::data(val);
00873         return w;
00874     }
00875
00876     template <typename T>
00877     static typename std::enable_if<!inspector<T>::is_trivially_copyable, Writer<T>::type serialize(
00878         const typename inspector<T>::type& val) {
00879         Writer<T> w;
00880         w.vec.resize(inspector<T>::getSizeVal(val));
00881         inspector<T>::serialize(val, w.vec.data());
00882         return w;
00883     }
00884
00885     template <typename T>
00886     static
00887         typename std::enable_if<inspector<unqualified_t<T>::is_trivially_copyable, Reader<T>::type
00888         get_reader(const std::vector<size_t>& dims, T& val) {
00889         auto effective_dims = details::squeezeDimensions(dims, inspector<T>::recursive_ndim);
00890         Reader<T> r(effective_dims, val);
00891         inspector<T>::prepare(r.val, effective_dims);
00892         return r;
00893     }
00894
00895     template <typename T>
00896     static typename std::enable_if<!inspector<unqualified_t<T>::is_trivially_copyable,
00897                                    Reader<T>::type
00898     get_reader(const std::vector<size_t>& dims, T& val) {
00899         auto effective_dims = details::squeezeDimensions(dims, inspector<T>::recursive_ndim);
00900
00901         Reader<T> r(effective_dims, val);
00902         inspector<T>::prepare(r.val, effective_dims);
00903         r.vec.resize(inspector<T>::getSize(effective_dims));
00904         return r;
00905     }
00906 };
00907
00908 }  // namespace details
00909 }  // namespace HighFive
```

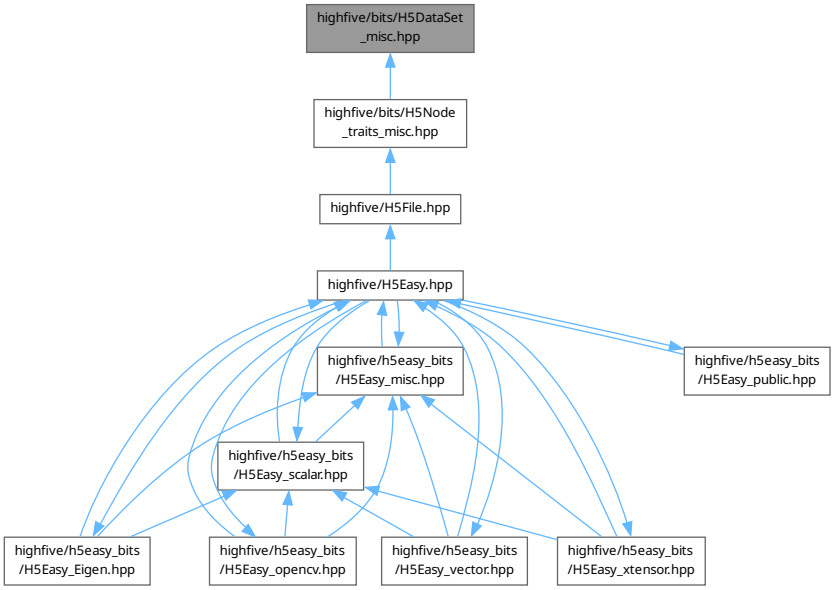
10.12 highfive/bits/H5DataSet_misc.hpp File Reference

```
#include <algorithm>
#include <functional>
#include <numeric>
#include <sstream>
#include <string>
#include <H5Dpublic.h>
#include <H5Ppublic.h>
#include "H5Utils.hpp"
```

Include dependency graph for H5DataSet_misc.hpp:



This graph shows which files directly or indirectly include this file:



Namespaces

- namespace HighFive

10.13 H5DataSet_misc.hpp

Go to the documentation of this file.

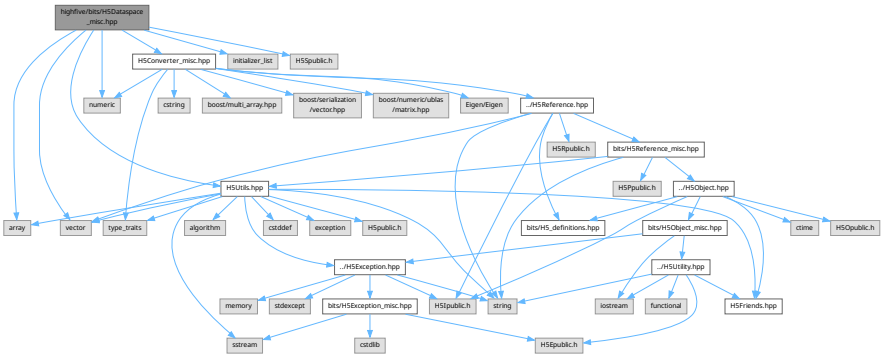
```
00001 /*
00002  *  Copyright (c), 2017, Adrien Devresse <adrien.devresse@epfl.ch>
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
00011 #include <algorithm>
00012 #include <functional>
00013 #include <numeric>
00014 #include <sstream>
00015 #include <string>
00016
00017 #include <H5Dpublic.h>
00018 #include <H5Ppublic.h>
00019
00020 #include "H5Utils.hpp"
00021
00022 namespace HighFive {
00023
00024 inline uint64_t DataSet::getStorageSize() const {
00025     return H5Dget_storage_size(_hid);
00026 }
00027
00028 inline DataType DataSet::getDataType() const {
00029     return DataType(H5Dget_type(_hid));
00030 }
00031
00032 inline DataSpace DataSet::getSpace() const {
00033     DataSpace space;
```

```
00034     if ((space._hid = H5Dget_space(_hid)) < 0) {
00035         HDF5ErrMapper::ToException<DataSetException>("Unable to get DataSpace out of DataSet");
00036     }
00037     return space;
00038 }
00039
00040 inline DataSpace DataSet::getMemSpace() const {
00041     return getSpace();
00042 }
00043
00044 inline uint64_t DataSet::getOffset() const {
00045     uint64_t addr = H5Dget_offset(_hid);
00046     if (addr == HADDR_UNDEF) {
00047         HDF5ErrMapper::ToException<DataSetException>("Cannot get offset of DataSet.");
00048     }
00049     return addr;
00050 }
00051
00052 inline void DataSet::resize(const std::vector<size_t>& dims) {
00053     const size_t numDimensions = getSpace().getDimensions().size();
00054     if (dims.size() != numDimensions) {
00055         HDF5ErrMapper::ToException<DataSetException>("Invalid dataspace dimensions, got " +
00056                                                      std::to_string(dims.size()) + " expected " +
00057                                                      std::to_string(numDimensions));
00058     }
00059
00060     std::vector<hsize_t> real_dims(dims.begin(), dims.end());
00061
00062     if (H5Dset_extent(getId(), real_dims.data()) < 0) {
00063         HDF5ErrMapper::ToException<DataSetException>("Could not resize dataset.");
00064     }
00065 }
00066
00067 }  // namespace HighFive
```

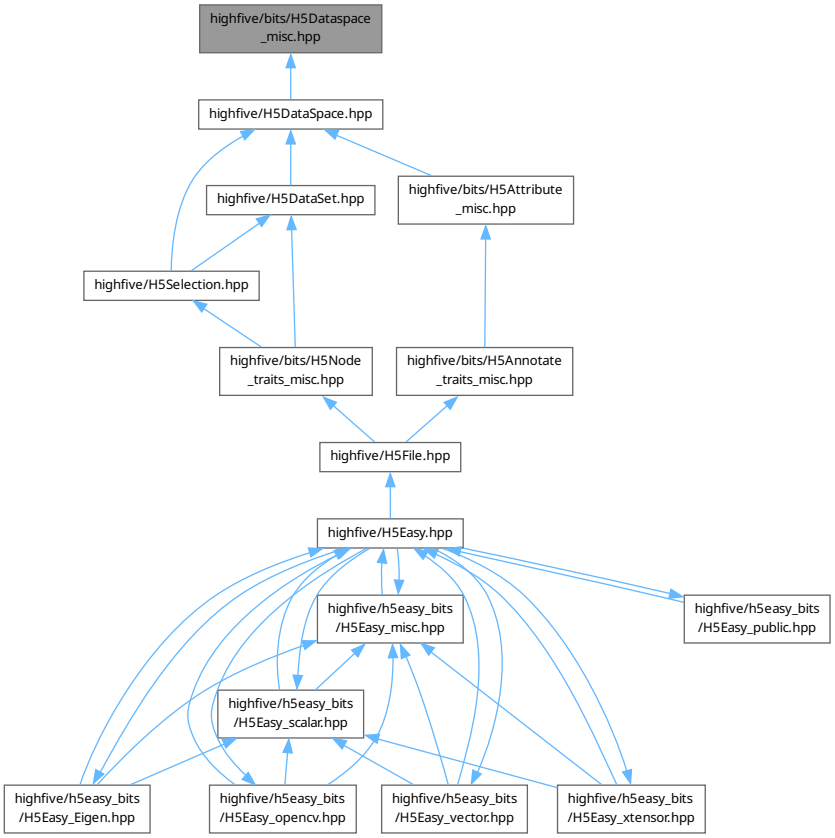
10.14 highfive/bits/H5Dataspace_misc.hpp File Reference

```
#include <array>
#include <initializer_list>
#include <vector>
#include <numeric>
#include <H5Spublic.h>
#include "H5Utils.hpp"
#include "H5Converter_misc.hpp"
```

Include dependency graph for H5Dataspace_misc.hpp:



This graph shows which files directly or indirectly include this file:



Namespaces

- namespace HighFive

10.15 H5Dataspace_misc.hpp

Go to the documentation of this file.

```
00001 /*
00002  *  Copyright (c), 2017, Adrien Devresse <adrien.devresse@epfl.ch>
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
00011 #include <array>
00012 #include <initializer_list>
00013 #include <vector>
00014 #include <numeric>
00015
00016 #include <H5Spublic.h>
00017
00018 #include "H5Utils.hpp"
00019 #include "H5Converter_misc.hpp"
00020
00021 namespace HighFive {
```

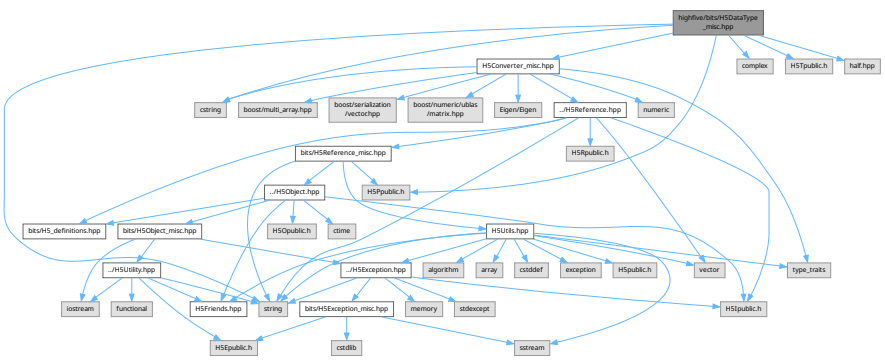
```
00022
00023 inline DataSpace::DataSpace(const std::vector<size_t>& dims)
00024     : DataSpace(dims.begin(), dims.end()) {}
00025
00026 template <size_t N>
00027 inline DataSpace::DataSpace(const std::array<size_t, N>& dims)
00028     : DataSpace(dims.begin(), dims.end()) {}
00029
00030 inline DataSpace::DataSpace(const std::initializer_list<size_t>& items)
00031     : DataSpace(std::vector<size_t>(items)) {}
00032
00033 template <typename... Args>
00034 inline DataSpace::DataSpace(size_t dim1, Args... dims)
00035     : DataSpace(std::vector<size_t>{dim1, static_cast<size_t>(dims)...}) {}
00036
00037 template <class IT, typename>
00038 inline DataSpace::DataSpace(const IT begin, const IT end) {
00039     std::vector<hsize_t> real_dims(begin, end);
00040
00041     if ((_hid = H5Screate_simple(int(real_dims.size()), real_dims.data(), NULL)) < 0) {
00042         throw DataSpaceException("Impossible to create dataspace");
00043     }
00044 }
00045
00046 inline DataSpace::DataSpace(const std::vector<size_t>& dims, const std::vector<size_t>& maxdims) {
00047     if (dims.size() != maxdims.size()) {
00048         throw DataSpaceException("dims and maxdims must be the same length.");
00049     }
00050
00051     std::vector<hsize_t> real_dims(dims.begin(), dims.end());
00052     std::vector<hsize_t> real_maxdims(maxdims.begin(), maxdims.end());
00053
00054     // Replace unlimited flag with actual HDF one
00055     std::replace(real_maxdims.begin(),
00056                  real_maxdims.end(),
00057                  static_cast<hsize_t>(DataSpace::UNLIMITED),
00058                  H5S_UNLIMITED);
00059
00060     if ((_hid = H5Screate_simple(int(dims.size()), real_dims.data(), real_maxdims.data())) < 0) {
00061         throw DataSpaceException("Impossible to create dataspace");
00062     }
00063 }  // namespace HighFive
00064
00065 inline DataSpace::DataSpace(DataSpace::DataspaceType dtype) {
00066     H5S_class_t h5_dataspace_type;
00067     switch (dtype) {
00068     case DataSpace::dataspace_scalar:
00069         h5_dataspace_type = H5S_SCALAR;
00070         break;
00071     case DataSpace::dataspace_null:
00072         h5_dataspace_type = H5S_NULL;
00073         break;
00074     default:
00075         throw DataSpaceException(
00076             "Invalid dataspace type: should be "
00077             "dataspace_scalar or dataspace_null");
00078     }
00079
00080     if ((_hid = H5Screate(h5_dataspace_type)) < 0) {
00081         throw DataSpaceException("Unable to create dataspace");
00082     }
00083 }
00084
00085 inline DataSpace DataSpace::clone() const {
00086     DataSpace res;
00087     if ((res._hid = H5Scopy(_hid)) < 0) {
00088         throw DataSpaceException("Unable to copy dataspace");
00089     }
00090     return res;
00091 }
00092
00093 inline size_t DataSpace::getNumberDimensions() const {
00094     const int ndim = H5Sget_simple_extent_ndims(_hid);
00095     if (ndim < 0) {
00096         HDF5ErrMapper::ToException<DataSetException>(
00097             "Unable to get dataspace number of dimensions");
00098     }
00099     return size_t(ndim);
00100 }
00101
00102 inline std::vector<size_t> DataSpace::getDimensions() const {
00103     std::vector<hsize_t> dims(getNumberDimensions());
00104     if (!dims.empty()) {
00105         if (H5Sget_simple_extent_dims(_hid, dims.data(), NULL) < 0) {
00106             HDF5ErrMapper::ToException<DataSetException>("Unable to get dataspace dimensions");
00107         }
00108     }
```

```
00109     return details::to_vector_size_t(std::move(dims));
00110 }
00111
00112 inline size_t DataSpace::getElementCount() const {
00113     const std::vector<size_t>& dims = getDimensions();
00114     return std::accumulate(dims.begin(), dims.end(), size_t{1u}, std::multiplies<size_t>());
00115 }
00116
00117 inline std::vector<size_t> DataSpace::getMaxDimensions() const {
00118     std::vector<hsize_t> maxdims(getNumberDimensions());
00119     if (H5Sget_simple_extent_dims(_hid, NULL, maxdims.data()) < 0) {
00120         HDF5ErrMapper::ToException<DataSetException>("Unable to get dataspace dimensions");
00121     }
00122
00123     std::replace(maxdims.begin(),
00124                  maxdims.end(),
00125                  H5S_UNLIMITED,
00126                  static_cast<hsize_t>(DataSpace::UNLIMITED));
00127     return details::to_vector_size_t(maxdims);
00128 }
00129
00130 template <typename T>
00131 inline DataSpace DataSpace::From(const T& value) {
00132     auto dims = details::inspector<T>::getDimensions(value);
00133     return DataSpace(dims);
00134 }
00135
00136 template <std::size_t N, std::size_t Width>
00137 inline DataSpace DataSpace::FromCharArrayStrings(const char (&)[N][Width]) {
00138     return DataSpace(N);
00139 }
00140
00141 namespace details {
00142
00144 inline bool checkDimensions(const DataSpace& mem_space, size_t n_dim_requested) {
00145     return checkDimensions(mem_space.getDimensions(), n_dim_requested);
00146 }
00147
00148 }  // namespace details
00149 }  // namespace HighFive
```

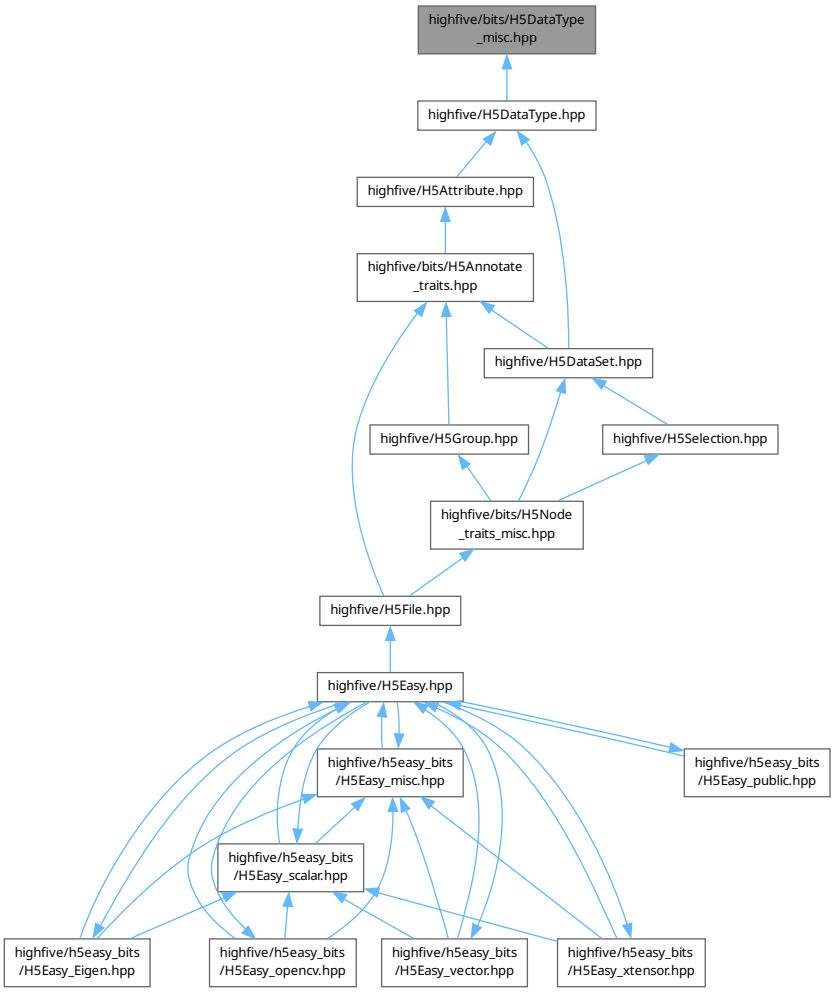
10.16 highfive/bits/H5DataType_misc.hpp File Reference

```
#include <string>
#include <complex>
#include <cstring>
#include <H5Ppublic.h>
#include <H5Tpublic.h>
#include <half.hpp>
#include "H5Converter_misc.hpp"
```

Include dependency graph for H5DataType_misc.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class HighFive::AtomicType< char[StrLen]>
- class HighFive::AtomicType< FixedLenStringArray< StrLen > >
- class HighFive::AtomicType< std::complex< T > >

Namespaces

- namespace HighFive

Macros

- #define _H5_STRUCT_PADDING(current_size, member_size)

Typedefs

- using HighFive::float16_t = half_float::half

Functions

- EnumType< details::Boolean > HighFive::create_enum_boolean ()
- size_t HighFive::find_first_atomic_member_size (hid_t hid)
- template<typename T >
  DataType HighFive::create_datatype ()

  Create a DataType instance representing type T.
- template<typename T >
  DataType HighFive::create_and_check_datatype ()

  Create a DataType instance representing type T and perform a sanity check on its size.

10.16.1 Macro Definition Documentation

10.16.1.1 _H5_STRUCT_PADDING

```
#define _H5_STRUCT_PADDING(
              current_size,
              member_size )
```

Value:

```
    (((member_size) >= (current_size))                                          \
         ? (((member_size) - (current_size)) % (member_size))                   \
         : ((((member_size) - (((current_size) - (member_size)) % (member_size)))) % \
            (member_size)))
```

10.17 H5DataType_misc.hpp

Go to the documentation of this file.

```
00001 /*
00002  *  Copyright (c), 2017, Adrien Devresse <adrien.devresse@epfl.ch>
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
00011 #include <string>
00012 #include <complex>
00013 #include <cstring>
00014 #if HIGHFIVE_CXX_STD >= 17
00015 #include <cstddef>
00016 #endif
00017
00018 #include <H5Ppublic.h>
00019 #include <H5Tpublic.h>
00020
00021 #ifdef H5_USE_HALF_FLOAT
00022 #include <half.hpp>
00023 #endif
00024
00025 #include "H5Converter_misc.hpp"
00026
00027 namespace HighFive {
00028
00029 namespace {  // unnamed
00030 inline DataTypeClass convert_type_class(const H5T_class_t& tclass);
00031 inline std::string type_class_string(DataTypeClass);
00032 inline hid_t create_string(std::size_t length);
00033 }  // namespace
00034
00035 inline bool DataType::empty() const noexcept {
00036     return _hid == H5I_INVALID_HID;
00037 }
00038
00039 inline DataTypeClass DataType::getClass() const {
```

```
00040     return convert_type_class(H5Tget_class(_hid));
00041 }
00042
00043 inline size_t DataType::getSize() const {
00044     return H5Tget_size(_hid);
00045 }
00046
00047 inline bool DataType::operator==(const DataType& other) const {
00048     return (H5Tequal(_hid, other._hid) > 0);
00049 }
00050
00051 inline bool DataType::operator!=(const DataType& other) const {
00052     return !(*this == other);
00053 }
00054
00055 inline bool DataType::isVariableStr() const {
00056     auto var_value = H5Tis_variable_str(_hid);
00057     if (var_value < 0) {
00058         HDF5ErrMapper::ToException<DataTypeException>("Unable to define datatype size to variable");
00059     }
00060     return static_cast<bool>(var_value);
00061 }
00062
00063 inline bool DataType::isFixedLenStr() const {
00064     return getClass() == DataTypeClass::String && !isVariableStr();
00065 }
00066
00067 inline bool DataType::isReference() const {
00068     return H5Tequal(_hid, H5T_STD_REF_OBJ) > 0;
00069 }
00070
00071 inline std::string DataType::string() const {
00072     return type_class_string(getClass()) + std::to_string(getSize() * 8);
00073 }
00074
00075 // char mapping
00076 template <>
00077 inline AtomicType<char>::AtomicType() {
00078     _hid = H5Tcopy(H5T_NATIVE_CHAR);
00079 }
00080
00081 template <>
00082 inline AtomicType<signed char>::AtomicType() {
00083     _hid = H5Tcopy(H5T_NATIVE_SCHAR);
00084 }
00085
00086 template <>
00087 inline AtomicType<unsigned char>::AtomicType() {
00088     _hid = H5Tcopy(H5T_NATIVE_UCHAR);
00089 }
00090
00091 // short mapping
00092 template <>
00093 inline AtomicType<short>::AtomicType() {
00094     _hid = H5Tcopy(H5T_NATIVE_SHORT);
00095 }
00096
00097 template <>
00098 inline AtomicType<unsigned short>::AtomicType() {
00099     _hid = H5Tcopy(H5T_NATIVE_USHORT);
00100 }
00101
00102 // integer mapping
00103 template <>
00104 inline AtomicType<int>::AtomicType() {
00105     _hid = H5Tcopy(H5T_NATIVE_INT);
00106 }
00107
00108 template <>
00109 inline AtomicType<unsigned>::AtomicType() {
00110     _hid = H5Tcopy(H5T_NATIVE_UINT);
00111 }
00112
00113 // long mapping
00114 template <>
00115 inline AtomicType<long>::AtomicType() {
00116     _hid = H5Tcopy(H5T_NATIVE_LONG);
00117 }
00118
00119 template <>
00120 inline AtomicType<unsigned long>::AtomicType() {
00121     _hid = H5Tcopy(H5T_NATIVE_ULONG);
00122 }
00123
00124 // long long mapping
00125 template <>
00126 inline AtomicType<long long>::AtomicType() {
```

```
00127     _hid = H5Tcopy(H5T_NATIVE_LLONG);
00128 }
00129
00130 template <>
00131 inline AtomicType<unsigned long long>::AtomicType() {
00132     _hid = H5Tcopy(H5T_NATIVE_ULLONG);
00133 }
00134
00135 // half-float, float, double and long double mapping
00136 #ifdef H5_USE_HALF_FLOAT
00137 using float16_t = half_float::half;
00138
00139 template <>
00140 inline AtomicType<float16_t>::AtomicType() {
00141     _hid = H5Tcopy(H5T_NATIVE_FLOAT);
00142     // Sign position, exponent position, exponent size, mantissa position, mantissa size
00143     H5Tset_fields(_hid, 15, 10, 5, 0, 10);
00144     // Total datatype size (in bytes)
00145     H5Tset_size(_hid, 2);
00146     // Floating point exponent bias
00147     H5Tset_ebias(_hid, 15);
00148 }
00149 #endif
00150
00151 template <>
00152 inline AtomicType<float>::AtomicType() {
00153     _hid = H5Tcopy(H5T_NATIVE_FLOAT);
00154 }
00155
00156 template <>
00157 inline AtomicType<double>::AtomicType() {
00158     _hid = H5Tcopy(H5T_NATIVE_DOUBLE);
00159 }
00160
00161 template <>
00162 inline AtomicType<long double>::AtomicType() {
00163     _hid = H5Tcopy(H5T_NATIVE_LDOUBLE);
00164 }
00165
00166 // std string
00167 template <>
00168 inline AtomicType<std::string>::AtomicType() {
00169     _hid = create_string(H5T_VARIABLE);
00170 }
00171
00172 #if HIGHFIVE_CXX_STD >= 17
00173 // std byte
00174 template <>
00175 inline AtomicType<std::byte>::AtomicType() {
00176     _hid = H5Tcopy(H5T_NATIVE_B8);
00177 }
00178 #endif
00179
00180 // Fixed-Length strings
00181 // require class specialization templated for the char length
00182 template <size_t StrLen>
00183 class AtomicType<char[StrLen]>: public DataType {
00184   public:
00185     inline AtomicType()
00186         : DataType(create_string(StrLen)) {}
00187 };
00188
00189 template <size_t StrLen>
00190 class AtomicType<FixedLenStringArray<StrLen»: public DataType {
00191   public:
00192     inline AtomicType()
00193         : DataType(create_string(StrLen)) {}
00194 };
00195
00196 template <typename T>
00197 class AtomicType<std::complex<T»: public DataType {
00198   public:
00199     inline AtomicType()
00200         : DataType(
00201               CompoundType({{"r", create_datatype<T>(), 0}, {"i", create_datatype<T>(), sizeof(T)}},
00202                            sizeof(std::complex<T>))) {
00203         static_assert(std::is_floating_point<T>::value,
00204                       "std::complex accepts only floating point numbers.");
00205     }
00206 };
00207
00208 // For boolean we act as h5py
00209 inline EnumType<details::Boolean> create_enum_boolean() {
00210     return {{"FALSE", details::Boolean::HighFiveFalse}, {"TRUE", details::Boolean::HighFiveTrue}};
00211 }
00212
00213 // Other cases not supported. Fail early with a user message
```

```
00214 template <typename T>
00215 AtomicType<T>::AtomicType() {
00216     static_assert(details::inspector<T>::recursive_ndim == 0,
00217                   "Atomic types cant be arrays, except for char[] (fixed-length strings)");
00218     static_assert(details::inspector<T>::recursive_ndim > 0, "Type not supported");
00219 }
00220
00221
00222 // class FixedLenStringArray<N>
00223
00224 template <std::size_t N>
00225 inline FixedLenStringArray<N>::FixedLenStringArray(const char array[][N], std::size_t length) {
00226     datavec.resize(length);
00227     std::memcpy(datavec[0].data(), array[0].data(), N * length);
00228 }
00229
00230 template <std::size_t N>
00231 inline FixedLenStringArray<N>::FixedLenStringArray(const std::string* iter_begin,
00232                                                    const std::string* iter_end) {
00233     datavec.resize(static_cast<std::size_t>(iter_end - iter_begin));
00234     for (auto& dst_array: datavec) {
00235         const char* src = (iter_begin++)->c_str();
00236         const size_t length = std::min(N - 1, std::strlen(src));
00237         std::memcpy(dst_array.data(), src, length);
00238         dst_array[length] = 0;
00239     }
00240 }
00241
00242 template <std::size_t N>
00243 inline FixedLenStringArray<N>::FixedLenStringArray(const std::vector<std::string>& vec)
00244     : FixedLenStringArray(&vec.front(), &vec.back()) {}
00245
00246 template <std::size_t N>
00247 inline FixedLenStringArray<N>::FixedLenStringArray(
00248     const std::initializer_list<std::string>& init_list)
00249     : FixedLenStringArray(init_list.begin(), init_list.end()) {}
00250
00251 template <std::size_t N>
00252 inline void FixedLenStringArray<N>::push_back(const std::string& src) {
00253     datavec.emplace_back();
00254     const size_t length = std::min(N - 1, src.length());
00255     std::memcpy(datavec.back().data(), src.c_str(), length);
00256     datavec.back()[length] = 0;
00257 }
00258
00259 template <std::size_t N>
00260 inline void FixedLenStringArray<N>::push_back(const std::array<char, N>& src) {
00261     datavec.emplace_back();
00262     std::copy(src.begin(), src.end(), datavec.back().data());
00263 }
00264
00265 template <std::size_t N>
00266 inline std::string FixedLenStringArray<N>::getString(std::size_t i) const {
00267     return std::string(datavec[i].data());
00268 }
00269
00270 // Internal
00271 // Reference mapping
00272 template <>
00273 inline AtomicType<Reference>::AtomicType() {
00274     _hid = H5Tcopy(H5T_STD_REF_OBJ);
00275 }
00276
00277 inline size_t find_first_atomic_member_size(hid_t hid) {
00278     // Recursive exit condition
00279     if (H5Tget_class(hid) == H5T_COMPOUND) {
00280         auto number_of_members = H5Tget_nmembers(hid);
00281         if (number_of_members == -1) {
00282             throw DataTypeException("Cannot get members of CompoundType with hid: " +
00283                                     std::to_string(hid));
00284         }
00285         if (number_of_members == 0) {
00286             throw DataTypeException("No members defined for CompoundType with hid: " +
00287                                     std::to_string(hid));
00288         }
00289
00290         auto member_type = H5Tget_member_type(hid, 0);
00291         auto size = find_first_atomic_member_size(member_type);
00292         H5Tclose(member_type);
00293         return size;
00294     } else if (H5Tget_class(hid) == H5T_STRING) {
00295         return 1;
00296     }
00297     return H5Tget_size(hid);
00298 }
00299
00300 // Calculate the padding required to align an element of a struct
```

```
00301 // For padding see explanation here: https://en.cppreference.com/w/cpp/language/object#Alignment
00302 // It is to compute padding following last element inserted inside a struct
00303 // 1) We want to push back an element padded to the structure
00304 // 'current_size' is the size of the structure before adding the new element.
00305 // 'member_size' the size of the element we want to add.
00306 // 2) We want to compute the final padding for the global structure
00307 // 'current_size' is the size of the whole structure without final padding
00308 // 'member_size' is the maximum size of all element of the struct
00309 //
00310 // The basic formula is only to know how much we need to add to 'current_size' to fit
00311 // 'member_size'.
00312 // And at the end, we do another computation because the end padding, should fit the biggest
00313 // element of the struct.
00314 //
00315 // As we are with `size_t' element, we need to compute everything inside R+
00316 #define _H5_STRUCT_PADDING(current_size, member_size)                                \
00317     (((member_size) >= (current_size))                                               \
00318          ? (((member_size) - (current_size)) % (member_size))                        \
00319          : ((((member_size) - (((current_size) - (member_size)) % (member_size)))) % \
00320             (member_size)))
00321
00322 inline void CompoundType::create(size_t size) {
00323     if (size == 0) {
00324         size_t current_size = 0, max_atomic_size = 0;
00325
00326         // Do a first pass to find the total size of the compound datatype
00327         for (auto& member: members) {
00328             size_t member_size = H5Tget_size(member.base_type.getId());
00329
00330             if (member_size == 0) {
00331                 throw DataTypeException("Cannot get size of DataType with hid: " +
00332                                         std::to_string(member.base_type.getId()));
00333             }
00334
00335             size_t first_atomic_size = find_first_atomic_member_size(member.base_type.getId());
00336
00337             // Set the offset of this member within the struct according to the
00338             // standard alignment rules. The c++ standard specifies that:
00339             // > objects have an alignment requirement of which their size is a multiple
00340             member.offset = current_size + _H5_STRUCT_PADDING(current_size, first_atomic_size);
00341
00342             // Set the current size to the end of the new member
00343             current_size = member.offset + member_size;
00344
00345             // Keep track of the highest atomic member size because it's needed
00346             // for the padding of the complete compound type.
00347             max_atomic_size = std::max(max_atomic_size, first_atomic_size);
00348         }
00349
00350         size = current_size + _H5_STRUCT_PADDING(current_size, max_atomic_size);
00351     }
00352
00353     // Create the HDF5 type
00354     if ((_hid = H5Tcreate(H5T_COMPOUND, size)) < 0) {
00355         HDF5ErrMapper::ToException<DataTypeException>("Could not create new compound datatype");
00356     }
00357
00358     // Loop over all the members and insert them into the datatype
00359     for (const auto& member: members) {
00360         if (H5Tinsert(_hid, member.name.c_str(), member.offset, member.base_type.getId()) < 0) {
00361             HDF5ErrMapper::ToException<DataTypeException>("Could not add new member to datatype");
00362         }
00363     }
00364 }
00365
00366 #undef _H5_STRUCT_PADDING
00367
00368 inline void CompoundType::commit(const Object& object, const std::string& name) const {
00369     H5Tcommit2(object.getId(), name.c_str(), getId(), H5P_DEFAULT, H5P_DEFAULT, H5P_DEFAULT);
00370 }
00371
00372 template <typename T>
00373 inline void EnumType<T>::create() {
00374     // Create the HDF5 type
00375     if ((_hid = H5Tenum_create(AtomicType<typename std::underlying_type<T>::type>{}.getId())) < 0) {
00376         HDF5ErrMapper::ToException<DataTypeException>("Could not create new enum datatype");
00377     }
00378
00379     // Loop over all the members and insert them into the datatype
00380     for (const auto& member: members) {
00381         if (H5Tenum_insert(_hid, member.name.c_str(), &(member.value)) < 0) {
00382             HDF5ErrMapper::ToException<DataTypeException>(
00383                 "Could not add new member to this enum datatype");
00384         }
00385     }
00386 }
00387
```

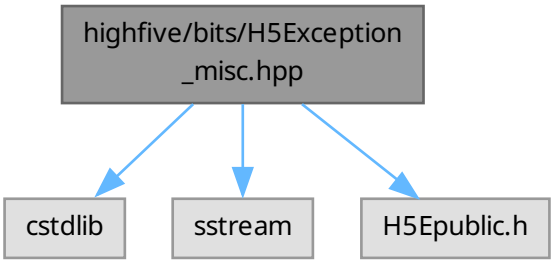
```
00388 template <typename T>
00389 inline void EnumType<T>::commit(const Object& object, const std::string& name) const {
00390     H5Tcommit2(object.getId(), name.c_str(), getId(), H5P_DEFAULT, H5P_DEFAULT, H5P_DEFAULT);
00391 }
00392
00393 namespace {
00394
00395 inline hid_t create_string(size_t length) {
00396     hid_t _hid = H5Tcopy(H5T_C_S1);
00397     if (H5Tset_size(_hid, length) < 0) {
00398         HDF5ErrMapper::ToException<DataTypeException>("Unable to define datatype size to variable");
00399     }
00400     // define encoding to UTF-8 by default
00401     H5Tset_cset(_hid, H5T_CSET_UTF8);
00402     return _hid;
00403 }
00404
00405
00406 inline DataTypeClass convert_type_class(const H5T_class_t& tclass) {
00407     switch (tclass) {
00408     case H5T_TIME:
00409         return DataTypeClass::Time;
00410     case H5T_INTEGER:
00411         return DataTypeClass::Integer;
00412     case H5T_FLOAT:
00413         return DataTypeClass::Float;
00414     case H5T_STRING:
00415         return DataTypeClass::String;
00416     case H5T_BITFIELD:
00417         return DataTypeClass::BitField;
00418     case H5T_OPAQUE:
00419         return DataTypeClass::Opaque;
00420     case H5T_COMPOUND:
00421         return DataTypeClass::Compound;
00422     case H5T_REFERENCE:
00423         return DataTypeClass::Reference;
00424     case H5T_ENUM:
00425         return DataTypeClass::Enum;
00426     case H5T_VLEN:
00427         return DataTypeClass::VarLen;
00428     case H5T_ARRAY:
00429         return DataTypeClass::Array;
00430     case H5T_NO_CLASS:
00431     case H5T_NCLASSES:
00432     default:
00433         return DataTypeClass::Invalid;
00434     }
00435 }
00436
00437
00438 inline std::string type_class_string(DataTypeClass tclass) {
00439     switch (tclass) {
00440     case DataTypeClass::Time:
00441         return "Time";
00442     case DataTypeClass::Integer:
00443         return "Integer";
00444     case DataTypeClass::Float:
00445         return "Float";
00446     case DataTypeClass::String:
00447         return "String";
00448     case DataTypeClass::BitField:
00449         return "BitField";
00450     case DataTypeClass::Opaque:
00451         return "Opaque";
00452     case DataTypeClass::Compound:
00453         return "Compound";
00454     case DataTypeClass::Reference:
00455         return "Reference";
00456     case DataTypeClass::Enum:
00457         return "Enum";
00458     case DataTypeClass::VarLen:
00459         return "Varlen";
00460     case DataTypeClass::Array:
00461         return "Array";
00462     default:
00463         return "(Invalid)";
00464     }
00465 }
00466
00467 }  // unnamed namespace
00468
00469
00471 template <typename T>
00472 inline DataType create_datatype() {
00473     return AtomicType<T>();
00474 }
00475
```

```
00476
00478 template <typename T>
00479 inline DataType create_and_check_datatype() {
00480     DataType t = create_datatype<T>();
00481     if (t.empty()) {
00482         throw DataTypeException("Type given to create_and_check_datatype is not valid");
00483     }
00484
00485     // Skip check if the base type is a variable length string
00486     if (t.isVariableStr()) {
00487         return t;
00488     }
00489
00490     // Check that the size of the template type matches the size that HDF5 is
00491     // expecting.
00492     if (t.isReference() || t.isFixedLenStr()) {
00493         return t;
00494     }
00495     if (sizeof(T) != t.getSize()) {
00496         std::ostringstream ss;
00497         ss « "Size of array type " « sizeof(T) « " != that of memory datatype " « t.getSize()
00498            « std::endl;
00499         throw DataTypeException(ss.str());
00500     }
00501
00502     return t;
00503 }
00504
00505 }  // namespace HighFive
00506 HIGHFIVE_REGISTER_TYPE(HighFive::details::Boolean, HighFive::create_enum_boolean)
```

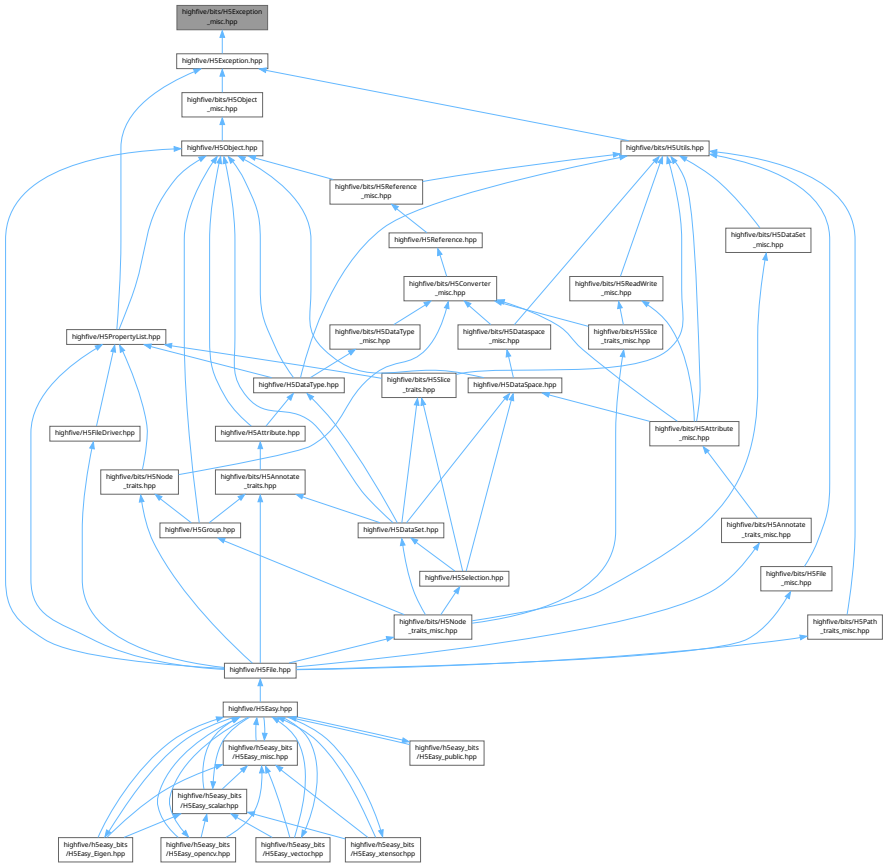
10.18 highfive/bits/H5Exception_misc.hpp File Reference

```
#include <cstdlib>
#include <sstream>
#include <H5Epublic.h>
```

Include dependency graph for H5Exception_misc.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- struct HighFive::HDF5ErrMapper

Namespaces

- namespace HighFive

10.19 H5Exception_misc.hpp

Go to the documentation of this file.

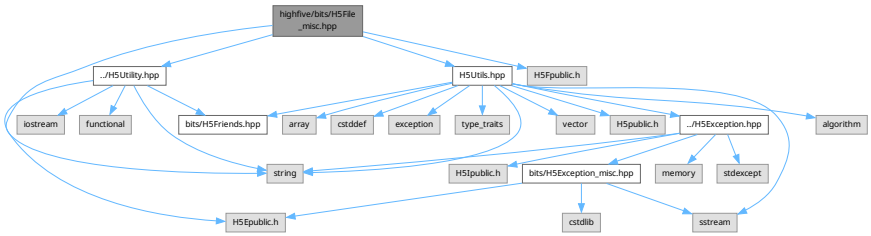
```
00001 /*
00002  *  Copyright (c), 2017, Adrien Devresse <adrien.devresse@epfl.ch>
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
00011 #include <cstdlib>
00012 #include <sstream>
00013
00014 #include <H5Epublic.h>
00015
```

```
00016 namespace HighFive {
00017
00018 struct HDF5ErrMapper {
00019     template <typename ExceptionType>
00020     static inline herr_t stackWalk(unsigned n, const H5E_error2_t* err_desc, void* client_data) {
00021         auto** e_iter = static_cast<ExceptionType**>(client_data);
00022         (void) n;
00023
00024         const char* major_err = H5Eget_major(err_desc->maj_num);
00025         const char* minor_err = H5Eget_minor(err_desc->min_num);
00026
00027         std::ostringstream oss;
00028         oss « '(' « major_err « ") " « minor_err;
00029
00030         H5free_memory((void*) major_err);
00031         H5free_memory((void*) minor_err);
00032
00033         auto* e = new ExceptionType(oss.str());
00034         e->_err_major = err_desc->maj_num;
00035         e->_err_minor = err_desc->min_num;
00036         (*e_iter)->_next.reset(e);
00037         *e_iter = e;
00038         return 0;
00039     }
00040
00041     template <typename ExceptionType>
00042     [[noreturn]] static inline void ToException(const std::string& prefix_msg) {
00043         hid_t err_stack = H5Eget_current_stack();
00044         if (err_stack >= 0) {
00045             ExceptionType e("");
00046             ExceptionType* e_iter = &e;
00047
00048             H5Ewalk2(err_stack, H5E_WALK_UPWARD, &HDF5ErrMapper::stackWalk<ExceptionType>, &e_iter);
00049             H5Eclear2(err_stack);
00050
00051             const char* next_err_msg = (e.nextException() != NULL) ? (e.nextException()->what())
00052                                                                    : ("");
00053
00054             e.setErrorMsg(prefix_msg + " " + next_err_msg);
00055             throw e;
00056         }
00057         // throw generic error, unrecognized error
00058         throw ExceptionType(prefix_msg + ": Unknown HDF5 error");
00059     }
00060 };
00061
00062 }  // namespace HighFive
```

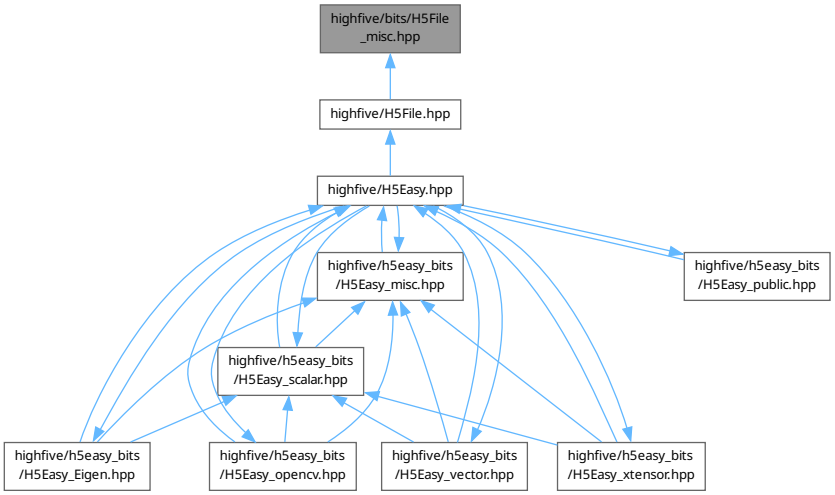
10.20 highfive/bits/H5File_misc.hpp File Reference

```
#include <string>
#include <H5Fpublic.h>
#include ¨../H5Utility.hpp¨
#include ¨H5Utils.hpp¨
```

Include dependency graph for H5File_misc.hpp:



This graph shows which files directly or indirectly include this file:



Namespaces

- namespace HighFive

10.21 H5File_misc.hpp

Go to the documentation of this file.

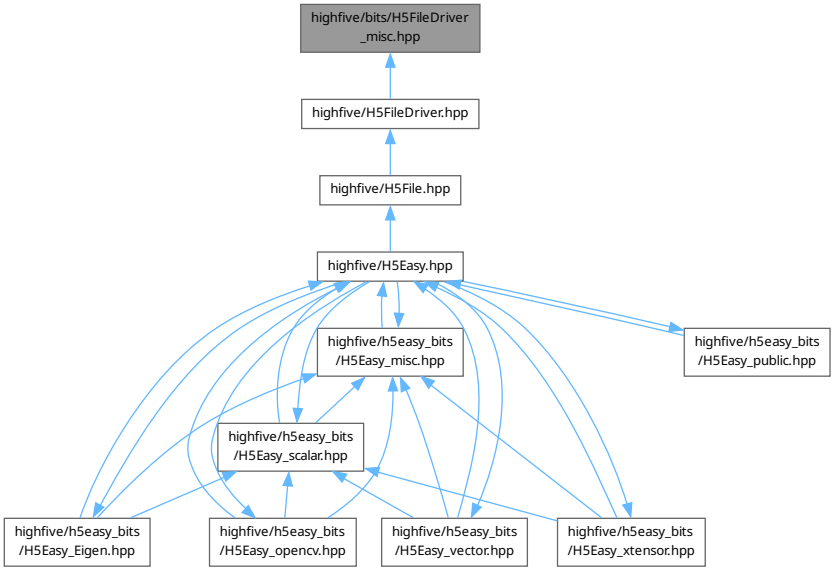
```
00001 /*
00002  *  Copyright (c), 2017, Adrien Devresse <adrien.devresse@epfl.ch>
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
00011 #include <string>
00012
00013 #include <H5Fpublic.h>
00014
00015 #include "../H5Utility.hpp"
00016 #include "H5Utils.hpp"
00017
00018 namespace HighFive {
00019
00020 namespace {  // unnamed
00021
00022 // libhdf5 uses a preprocessor trick on their oflags
00023 // we can not declare them constant without a mapper
00024 inline unsigned convert_open_flag(unsigned openFlags) {
00025     unsigned res_open = 0;
00026     if (openFlags & File::ReadOnly)
00027         res_open |= H5F_ACC_RDONLY;
00028     if (openFlags & File::ReadWrite)
00029         res_open |= H5F_ACC_RDWR;
00030     if (openFlags & File::Create)
00031         res_open |= H5F_ACC_CREAT;
00032     if (openFlags & File::Truncate)
00033         res_open |= H5F_ACC_TRUNC;
00034     if (openFlags & File::Excl)
00035         res_open |= H5F_ACC_EXCL;
00036     return res_open;
00037 }
```

```
00038 }  // namespace
00039
00040 inline File::File(const std::string& filename,
00041                   unsigned openFlags,
00042                   const FileAccessProps& fileAccessProps)
00043     : File(filename, openFlags, FileCreateProps::Default(), fileAccessProps) {}
00044
00045
00046 inline File::File(const std::string& filename,
00047                   unsigned openFlags,
00048                   const FileCreateProps& fileCreateProps,
00049                   const FileAccessProps& fileAccessProps) {
00050     openFlags = convert_open_flag(openFlags);
00051
00052     unsigned createMode = openFlags & (H5F_ACC_TRUNC | H5F_ACC_EXCL);
00053     unsigned openMode = openFlags & (H5F_ACC_RDWR | H5F_ACC_RDONLY);
00054     bool mustCreate = createMode > 0;
00055     bool openOrCreate = (openFlags & H5F_ACC_CREAT) > 0;
00056
00057     // open is default. It's skipped only if flags require creation
00058     // If open fails it will try create() if H5F_ACC_CREAT is set
00059     if (!mustCreate) {
00060         // Silence open errors if create is allowed
00061         std::unique_ptr<SilenceHDF5> silencer;
00062         if (openOrCreate)
00063             silencer.reset(new SilenceHDF5());
00064
00065         _hid = H5Fopen(filename.c_str(), openMode, fileAccessProps.getId());
00066
00067         if (isValid())
00068             return;  // Done
00069
00070         if (openOrCreate) {
00071             // Will attempt to create ensuring wont clobber any file
00072             createMode = H5F_ACC_EXCL;
00073         } else {
00074             HDF5ErrMapper::ToException<FileException>(
00075                 std::string("Unable to open file " + filename));
00076         }
00077     }
00078
00079     auto fcpl = fileCreateProps.getId();
00080     auto fapl = fileAccessProps.getId();
00081     if ((_hid = H5Fcreate(filename.c_str(), createMode, fcpl, fapl)) < 0) {
00082         HDF5ErrMapper::ToException<FileException>(std::string("Unable to create file " + filename));
00083     }
00084 }
00085
00086 inline const std::string& File::getName() const noexcept {
00087     if (_filename.empty()) {
00088         _filename = details::get_name(
00089             [this](char* buffer, size_t length) { return H5Fget_name(getId(), buffer, length); });
00090     }
00091     return _filename;
00092 }
00093
00094 inline hsize_t File::getMetadataBlockSize() const {
00095     auto fapl = getAccessPropertyList();
00096     return MetadataBlockSize(fapl).getSize();
00097 }
00098
00099 inline std::pair<H5F_libver_t, H5F_libver_t> File::getVersionBounds() const {
00100     auto fapl = getAccessPropertyList();
00101     auto fileVer = FileVersionBounds(fapl);
00102     return fileVer.getVersion();
00103 }
00104
00105 #if H5_VERSION_GE(1, 10, 1)
00106 inline H5F_fspace_strategy_t File::getFileSpaceStrategy() const {
00107     auto fcpl = getCreatePropertyList();
00108     FileSpaceStrategy spaceStrategy(fcpl);
00109     return spaceStrategy.getStrategy();
00110 }
00111
00112 inline hsize_t File::getFileSpacePageSize() const {
00113     auto fcpl = getCreatePropertyList();
00114
00115     if (getFileSpaceStrategy() != H5F_FSPACE_STRATEGY_PAGE) {
00116         HDF5ErrMapper::ToException<FileException>(
00117             std::string("Cannot obtain page size as paged allocation is not used."));
00118     }
00119
00120     return FileSpacePageSize(fcpl).getPageSize();
00121 }
00122 #endif
00123
00124 inline void File::flush() {
```

```
00125     if (H5Fflush(_hid, H5F_SCOPE_GLOBAL) < 0) {
00126         HDF5ErrMapper::ToException<FileException>(std::string("Unable to flush file " + getName()));
00127     }
00128 }
00129
00130 }  // namespace HighFive
```

10.22 highfive/bits/H5FileDriver_misc.hpp File Reference

This graph shows which files directly or indirectly include this file:



Namespaces

- namespace HighFive

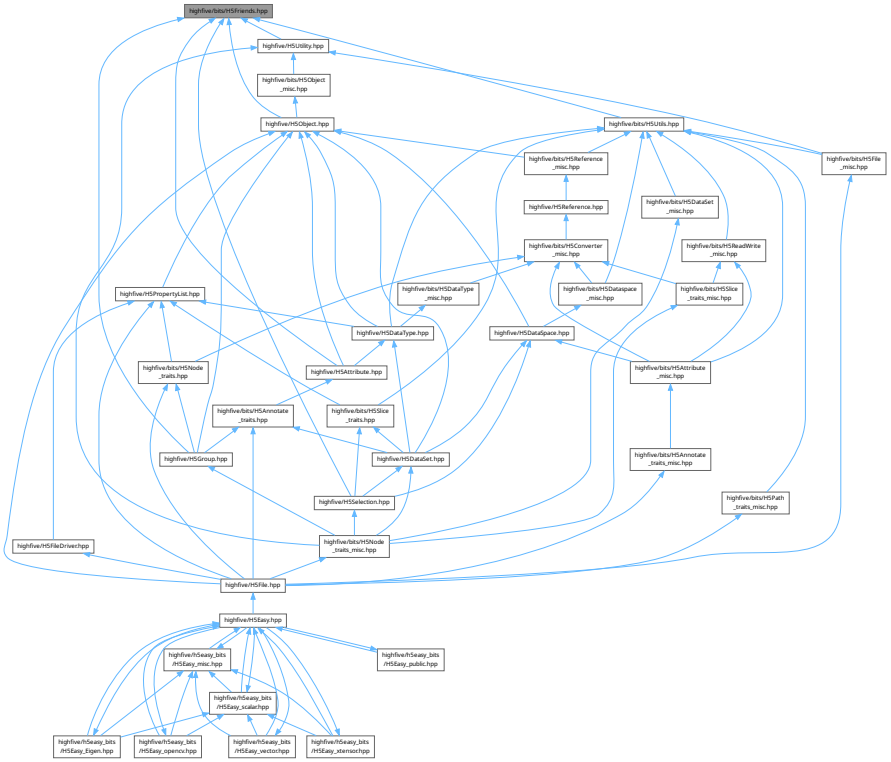
10.23 H5FileDriver_misc.hpp

Go to the documentation of this file.

```
00001 /*
00002  *  Copyright (c), 2017-2018, Adrien Devresse <adrien.devresse@epfl.ch>
00003  *                            Juan Hernando <juan.hernando@epfl.ch>
00004  *
00005  *  Distributed under the Boost Software License, Version 1.0.
00006  *    (See accompanying file LICENSE_1_0.txt or copy at
00007  *          http://www.boost.org/LICENSE_1_0.txt)
00008  *
00009  */
00010 #pragma once
00011
00012 namespace HighFive {
00013
00014 #ifdef H5_HAVE_PARALLEL
00015 inline MPIOFileDriver::MPIOFileDriver(MPI_Comm comm, MPI_Info info) {
00016     add(MPIOFileAccess(comm, info));
00017 }
00018 #endif
00019
00020 }  // namespace HighFive
```

10.24 highfive/bits/H5Friends.hpp File Reference

This graph shows which files directly or indirectly include this file:



10.25 H5Friends.hpp

Go to the documentation of this file.

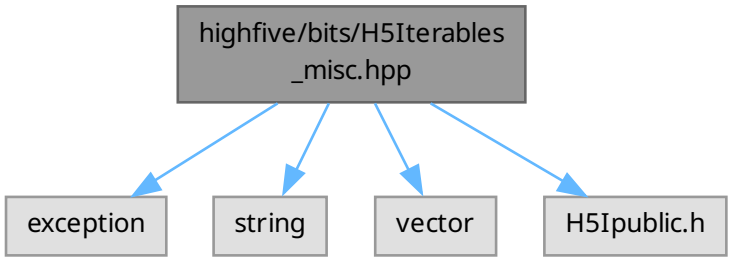
```
00001 #pragma once
00002
00003 #ifndef HIGHFIVE_HAS_FRIEND_DECLARATIONS
00004 #ifdef _MSC_VER
00005 // This prevents a compiler bug on certain versions of MSVC.
00006 // Known to fail: Toolset 141.
00007 // See `CMakeLists.txt` for more information.
00008 #define HIGHFIVE_HAS_FRIEND_DECLARATIONS 1
00009 #endif
00010 #endif
```

10.26 highfive/bits/H5Iterables_misc.hpp File Reference

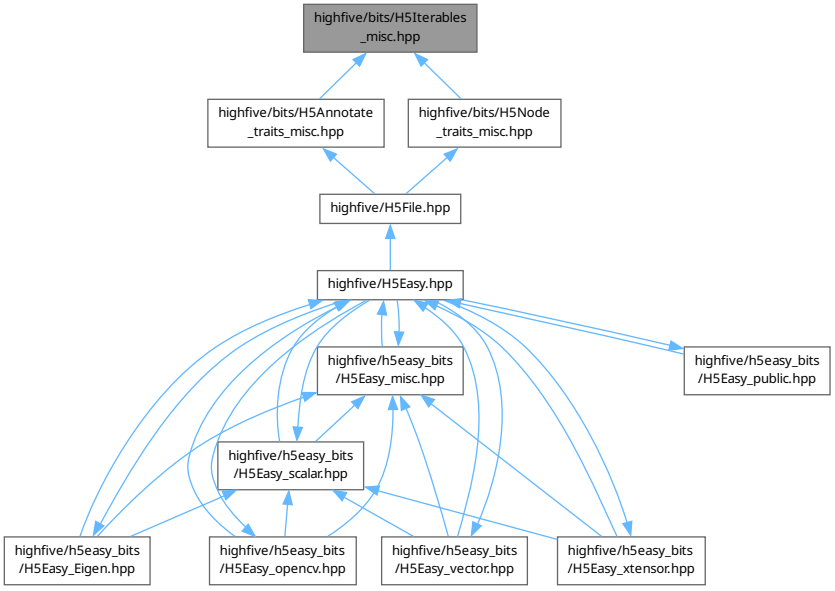
```
#include <exception>
#include <string>
#include <vector>
```

```
#include <H5Ipublic.h>
```

Include dependency graph for H5Iterables_misc.hpp:



This graph shows which files directly or indirectly include this file:



Namespaces

- namespace HighFive

10.27 H5Iterables_misc.hpp

Go to the documentation of this file.

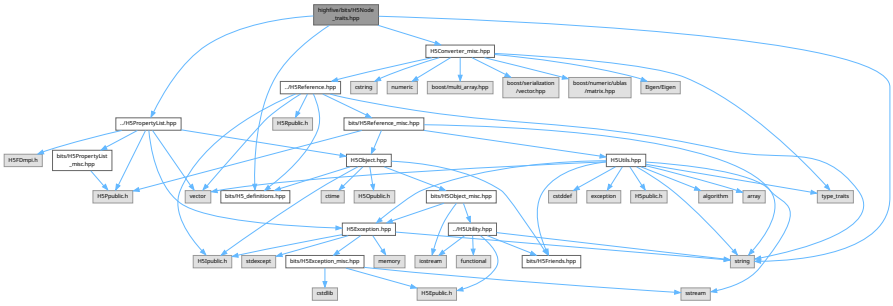
```
00001 /*
00002  *  Copyright (c), 2017, Adrien Devresse <adrien.devresse@epfl.ch>
```

```
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
00011 #include <exception>
00012 #include <string>
00013 #include <vector>
00014
00015 #include <H5Ipublic.h>
00016
00017 namespace HighFive {
00018
00019 namespace details {
00020
00021 // iterator for H5 iterate
00022
00023 struct HighFiveIterateData {
00024     inline HighFiveIterateData(std::vector<std::string>& my_names)
00025         : names(my_names)
00026         , err(NULL) {}
00027
00028     std::vector<std::string>& names;
00029     std::exception* err;
00030
00031     inline void throwIfError() {
00032         if (err) {
00033             throw *err;
00034         }
00035     }
00036 };
00037
00038 template <typename InfoType>
00039 inline herr_t internal_high_five_iterate(hid_t /*id*/,
00040                                          const char* name,
00041                                          const InfoType* /*info*/,
00042                                          void* op_data) {
00043     auto* data = static_cast<HighFiveIterateData*>(op_data);
00044     try {
00045         data->names.emplace_back(name);
00046         return 0;
00047     } catch (...) {
00048         data->err = new ObjectException("Exception during H5Iterate, abort listing");
00049     }
00050     return -1;
00051 }
00052
00053 }  // namespace details
00054 }  // namespace HighFive
```

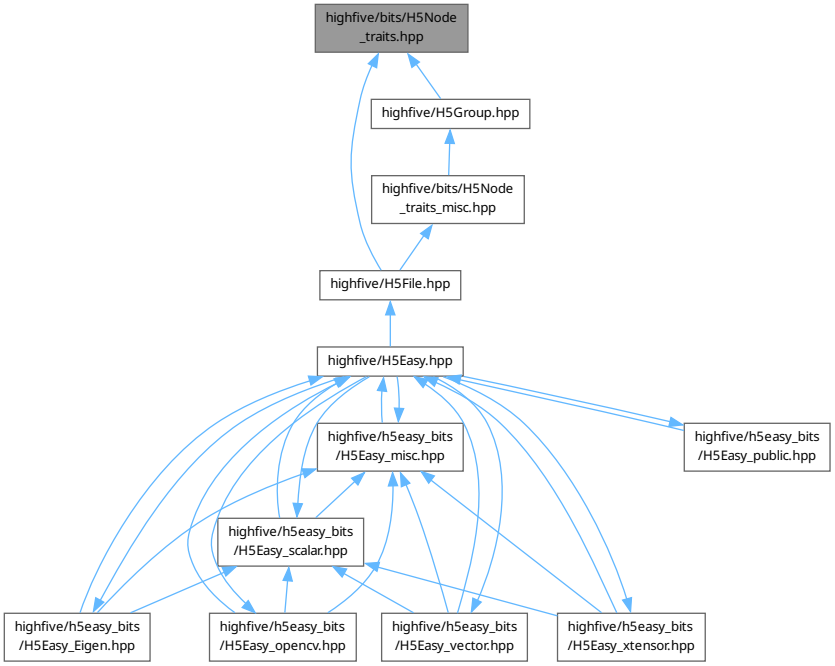
10.28 highfive/bits/H5Node_traits.hpp File Reference

```
#include <string>
#include "../H5PropertyList.hpp"
#include "H5_definitions.hpp"
#include "H5Converter_misc.hpp"
```

Include dependency graph for H5Node_traits.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class HighFive::NodeTraits< Derivate >

  NodeTraits: Base class for Group and File.

Namespaces

- namespace HighFive

Enumerations

- enum class HighFive::IndexType : std::underlying_type< H5_index_t >::type { HighFive::NAME = H5_↩ INDEX_NAME , HighFive::CRT_ORDER = H5_INDEX_CRT_ORDER }
- enum class HighFive::LinkType { HighFive::Hard , HighFive::Soft , HighFive::External , HighFive::Other }

  The possible types of group entries (link concept)

10.29 H5Node_traits.hpp

Go to the documentation of this file.

```
00001 /*
00002  *  Copyright (c), 2017, Adrien Devresse <adrien.devresse@epfl.ch>
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
```

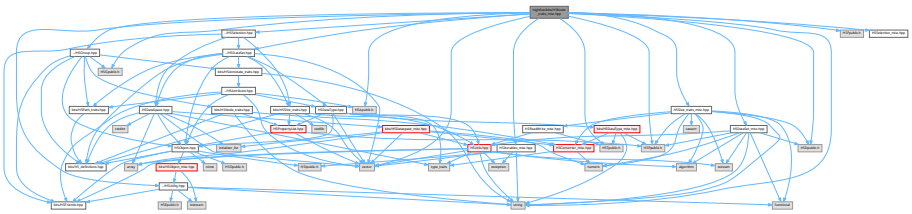
```
00008  */
00009 #pragma once
00010
00011 #include <string>
00012
00013 #include "../H5PropertyList.hpp"
00014 #include "H5_definitions.hpp"
00015 #include "H5Converter_misc.hpp"
00016
00017 namespace HighFive {
00018
00019 enum class IndexType : std::underlying_type<H5_index_t>::type {
00020     NAME = H5_INDEX_NAME,
00021     CRT_ORDER = H5_INDEX_CRT_ORDER,
00022 };
00023
00027 template <typename Derivate>
00028 class NodeTraits {
00029   public:
00040     DataSet createDataSet(const std::string& dataset_name,
00041                           const DataSpace& space,
00042                           const DataType& type,
00043                           const DataSetCreateProps& createProps = DataSetCreateProps::Default(),
00044                           const DataSetAccessProps& accessProps = DataSetAccessProps::Default(),
00045                           bool parents = true);
00046
00056     template <typename T,
00057               typename std::enable_if<
00058                   std::is_same<typename details::inspector<T>::base_type, details::Boolean>::value,
00059                   int>::type* = nullptr>
00060     DataSet createDataSet(const std::string& dataset_name,
00061                           const DataSpace& space,
00062                           const DataSetCreateProps& createProps = DataSetCreateProps::Default(),
00063                           const DataSetAccessProps& accessProps = DataSetAccessProps::Default(),
00064                           bool parents = true);
00065
00066     template <typename T,
00067               typename std::enable_if<
00068                   !std::is_same<typename details::inspector<T>::base_type, details::Boolean>::value,
00069                   int>::type* = nullptr>
00070     DataSet createDataSet(const std::string& dataset_name,
00071                           const DataSpace& space,
00072                           const DataSetCreateProps& createProps = DataSetCreateProps::Default(),
00073                           const DataSetAccessProps& accessProps = DataSetAccessProps::Default(),
00074                           bool parents = true);
00075
00086     template <typename T>
00087     DataSet createDataSet(const std::string& dataset_name,
00088                           const T& data,
00089                           const DataSetCreateProps& createProps = DataSetCreateProps::Default(),
00090                           const DataSetAccessProps& accessProps = DataSetAccessProps::Default(),
00091                           bool parents = true);
00092
00093
00094     template <std::size_t N>
00095     DataSet createDataSet(const std::string& dataset_name,
00096                           const FixedLenStringArray<N>& data,
00097                           const DataSetCreateProps& createProps = DataSetCreateProps::Default(),
00098                           const DataSetAccessProps& accessProps = DataSetAccessProps::Default(),
00099                           bool parents = true);
00100
00106     DataSet getDataSet(const std::string& dataset_name,
00107                        const DataSetAccessProps& accessProps = DataSetAccessProps::Default()) const;
00108
00114     Group createGroup(const std::string& group_name, bool parents = true);
00115
00122     Group createGroup(const std::string& group_name,
00123                       const GroupCreateProps& createProps,
00124                       bool parents = true);
00125
00130     Group getGroup(const std::string& group_name) const;
00131
00135     size_t getNumberObjects() const;
00136
00140     std::string getObjectName(size_t index) const;
00141
00148     bool rename(const std::string& src_path,
00149                 const std::string& dest_path,
00150                 bool parents = true) const;
00151
00158     std::vector<std::string> listObjectNames(IndexType idx_type = IndexType::NAME) const;
00159
00164     bool exist(const std::string& node_name) const;
00165
00169     void unlink(const std::string& node_name) const;
00170
00174     LinkType getLinkType(const std::string& node_name) const;
```

```
00175
00179     ObjectType getObjectType(const std::string& node_name) const;
00180
00184     template <typename T, typename = decltype(&T::getPath)>
00185     void createSoftLink(const std::string& linkName, const T& obj) {
00186         static_assert(!std::is_same<T, Attribute>::value,
00187                       "hdf5 doesn't support soft links to Attributes");
00188         createSoftLink(linkName, obj.getPath());
00189     }
00190
00198     void createSoftLink(const std::string& link_name,
00199                         const std::string& obj_path,
00200                         LinkCreateProps linkCreateProps = LinkCreateProps(),
00201                         const LinkAccessProps& linkAccessProps = LinkAccessProps(),
00202                         const bool parents = true);
00203
00204     void createExternalLink(const std::string& link_name,
00205                             const std::string& h5_file,
00206                             const std::string& obj_path,
00207                             LinkCreateProps linkCreateProps = LinkCreateProps(),
00208                             const LinkAccessProps& linkAccessProps = LinkAccessProps(),
00209                             const bool parents = true);
00210
00211   private:
00212     using derivate_type = Derivate;
00213
00214     // A wrapper over the low-level H5Lexist
00215     // It makes behavior consistent among versions and by default transforms
00216     // errors to exceptions
00217     bool _exist(const std::string& node_name, bool raise_errors = true) const;
00218
00219     // Opens an arbitrary object to obtain info
00220     Object _open(const std::string& node_name,
00221                  const DataSetAccessProps& accessProps = DataSetAccessProps::Default()) const;
00222 };
00223
00224
00228 enum class LinkType {
00229     Hard,
00230     Soft,
00231     External,
00232     Other  // Reserved or User-defined
00233 };
00234
00235
00236 }  // namespace HighFive
```

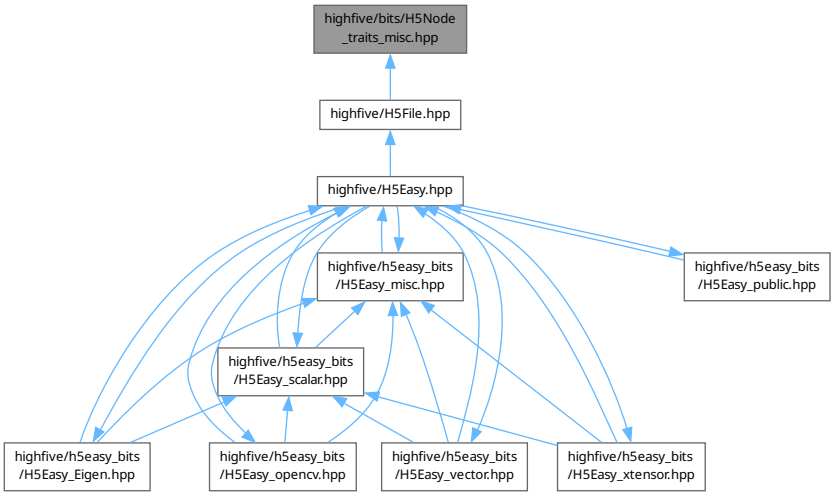
10.30 highfive/bits/H5Node_traits_misc.hpp File Reference

```
#include <string>
#include <vector>
#include <H5Apublic.h>
#include <H5Dpublic.h>
#include <H5Fpublic.h>
#include <H5Gpublic.h>
#include <H5Ppublic.h>
#include <H5Tpublic.h>
#include "../H5DataSet.hpp"
#include "../H5Group.hpp"
#include "../H5Selection.hpp"
#include "../H5Utility.hpp"
#include "H5DataSet_misc.hpp"
#include "H5Iterables_misc.hpp"
#include "H5Selection_misc.hpp"
#include "H5Slice_traits_misc.hpp"
```

Include dependency graph for H5Node_traits_misc.hpp:



This graph shows which files directly or indirectly include this file:



Namespaces

- namespace HighFive

10.31 H5Node_traits_misc.hpp

Go to the documentation of this file.

```
00001 /*
00002  *  Copyright (c), 2017, Adrien Devresse <adrien.devresse@epfl.ch>
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
00011 #include <string>
00012 #include <vector>
00013
00014 #include <H5Apublic.h>
00015 #include <H5Dpublic.h>
00016 #include <H5Fpublic.h>
00017 #include <H5Gpublic.h>
00018 #include <H5Ppublic.h>
00019 #include <H5Tpublic.h>
```

```
00020
00021 #include "../H5DataSet.hpp"
00022 #include "../H5Group.hpp"
00023 #include "../H5Selection.hpp"
00024 #include "../H5Utility.hpp"
00025 #include "H5DataSet_misc.hpp"
00026 #include "H5Iterables_misc.hpp"
00027 #include "H5Selection_misc.hpp"
00028 #include "H5Slice_traits_misc.hpp"
00029
00030 namespace HighFive {
00031
00032
00033 template <typename Derivate>
00034 inline DataSet NodeTraits<Derivate>::createDataSet(const std::string& dataset_name,
00035                                                    const DataSpace& space,
00036                                                    const DataType& dtype,
00037                                                    const DataSetCreateProps& createProps,
00038                                                    const DataSetAccessProps& accessProps,
00039                                                    bool parents) {
00040     LinkCreateProps lcpl;
00041     lcpl.add(CreateIntermediateGroup(parents));
00042     const auto hid = H5Dcreate2(static_cast<Derivate*>(this)->getId(),
00043                                 dataset_name.c_str(),
00044                                 dtype.getId(),
00045                                 space.getId(),
00046                                 lcpl.getId(),
00047                                 createProps.getId(),
00048                                 accessProps.getId());
00049     if (hid < 0) {
00050         HDF5ErrMapper::ToException<DataSetException>(
00051             std::string("Unable to create the dataset \"") + dataset_name + "\":");
00052     }
00053     return DataSet(hid);
00054 }
00055
00056 template <typename Derivate>
00057 template <typename T,
00058           typename std::enable_if<
00059               std::is_same<typename details::inspector<T>::base_type, details::Boolean>::value,
00060               int>::type*>
00061 inline DataSet NodeTraits<Derivate>::createDataSet(const std::string& dataset_name,
00062                                                    const DataSpace& space,
00063                                                    const DataSetCreateProps& createProps,
00064                                                    const DataSetAccessProps& accessProps,
00065                                                    bool parents) {
00066     return createDataSet(dataset_name,
00067                          space,
00068                          create_and_check_datatype<typename details::inspector<T>::base_type>(),
00069                          createProps,
00070                          accessProps,
00071                          parents);
00072 }
00073
00074 template <typename Derivate>
00075 template <typename T,
00076           typename std::enable_if<
00077               !std::is_same<typename details::inspector<T>::base_type, details::Boolean>::value,
00078               int>::type*>
00079 inline DataSet NodeTraits<Derivate>::createDataSet(const std::string& dataset_name,
00080                                                    const DataSpace& space,
00081                                                    const DataSetCreateProps& createProps,
00082                                                    const DataSetAccessProps& accessProps,
00083                                                    bool parents) {
00084     return createDataSet(
00085         dataset_name, space, create_and_check_datatype<T>(), createProps, accessProps, parents);
00086 }
00087
00088 template <typename Derivate>
00089 template <typename T>
00090 inline DataSet NodeTraits<Derivate>::createDataSet(const std::string& dataset_name,
00091                                                    const T& data,
00092                                                    const DataSetCreateProps& createProps,
00093                                                    const DataSetAccessProps& accessProps,
00094                                                    bool parents) {
00095     DataSet ds =
00096         createDataSet(dataset_name,
00097                       DataSpace::From(data),
00098                       create_and_check_datatype<typename details::inspector<T>::base_type>(),
00099                       createProps,
00100                       accessProps,
00101                       parents);
00102     ds.write(data);
00103     return ds;
00104 }
00105
00106 template <typename Derivate>
```

```
00107 template <std::size_t N>
00108 inline DataSet NodeTraits<Derivate>::createDataSet(const std::string& dataset_name,
00109                                                     const FixedLenStringArray<N>& data,
00110                                                     const DataSetCreateProps& createProps,
00111                                                     const DataSetAccessProps& accessProps,
00112                                                     bool parents) {
00113     DataSet ds = createDataSet<char[N]>(
00114         dataset_name, DataSpace(data.size()), createProps, accessProps, parents);
00115     ds.write(data);
00116     return ds;
00117 }
00118
00119 template <typename Derivate>
00120 inline DataSet NodeTraits<Derivate>::getDataSet(const std::string& dataset_name,
00121                                                 const DataSetAccessProps& accessProps) const {
00122     const auto hid = H5Dopen2(static_cast<const Derivate*>(this)->getId(),
00123                               dataset_name.c_str(),
00124                               accessProps.getId());
00125     if (hid < 0) {
00126         HDF5ErrMapper::ToException<DataSetException>(std::string("Unable to open the dataset \"") +
00127                                                      dataset_name + "\":");
00128     }
00129     return DataSet(hid);
00130 }
00131
00132 template <typename Derivate>
00133 inline Group NodeTraits<Derivate>::createGroup(const std::string& group_name, bool parents) {
00134     LinkCreateProps lcpl;
00135     lcpl.add(CreateIntermediateGroup(parents));
00136     const auto hid = H5Gcreate2(static_cast<Derivate*>(this)->getId(),
00137                                 group_name.c_str(),
00138                                 lcpl.getId(),
00139                                 H5P_DEFAULT,
00140                                 H5P_DEFAULT);
00141     if (hid < 0) {
00142         HDF5ErrMapper::ToException<GroupException>(std::string("Unable to create the group \"") +
00143                                                    group_name + "\":");
00144     }
00145     return detail::make_group(hid);
00146 }
00147
00148 template <typename Derivate>
00149 inline Group NodeTraits<Derivate>::createGroup(const std::string& group_name,
00150                                                const GroupCreateProps& createProps,
00151                                                bool parents) {
00152     LinkCreateProps lcpl;
00153     lcpl.add(CreateIntermediateGroup(parents));
00154     const auto hid = H5Gcreate2(static_cast<Derivate*>(this)->getId(),
00155                                 group_name.c_str(),
00156                                 lcpl.getId(),
00157                                 createProps.getId(),
00158                                 H5P_DEFAULT);
00159     if (hid < 0) {
00160         HDF5ErrMapper::ToException<GroupException>(std::string("Unable to create the group \"") +
00161                                                    group_name + "\":");
00162     }
00163     return detail::make_group(hid);
00164 }
00165
00166 template <typename Derivate>
00167 inline Group NodeTraits<Derivate>::getGroup(const std::string& group_name) const {
00168     const auto hid =
00169         H5Gopen2(static_cast<const Derivate*>(this)->getId(), group_name.c_str(), H5P_DEFAULT);
00170     if (hid < 0) {
00171         HDF5ErrMapper::ToException<GroupException>(std::string("Unable to open the group \"") +
00172                                                    group_name + "\":");
00173     }
00174     return detail::make_group(hid);
00175 }
00176
00177 template <typename Derivate>
00178 inline size_t NodeTraits<Derivate>::getNumberObjects() const {
00179     hsize_t res;
00180     if (H5Gget_num_objs(static_cast<const Derivate*>(this)->getId(), &res) < 0) {
00181         HDF5ErrMapper::ToException<GroupException>(
00182             std::string("Unable to count objects in existing group or file"));
00183     }
00184     return static_cast<size_t>(res);
00185 }
00186
00187 template <typename Derivate>
00188 inline std::string NodeTraits<Derivate>::getObjectName(size_t index) const {
00189     return details::get_name([&](char* buffer, size_t length) {
00190         return H5Lget_name_by_idx(static_cast<const Derivate*>(this)->getId(),
00191                                   ".",
00192                                   H5_INDEX_NAME,
00193                                   H5_ITER_INC,
```

```
00194                                   index,
00195                                   buffer,
00196                                   length,
00197                                   H5P_DEFAULT);
00198     });
00199 }
00200
00201 template <typename Derivate>
00202 inline bool NodeTraits<Derivate>::rename(const std::string& src_path,
00203                                          const std::string& dst_path,
00204                                          bool parents) const {
00205     LinkCreateProps lcpl;
00206     lcpl.add(CreateIntermediateGroup(parents));
00207     herr_t status = H5Lmove(static_cast<const Derivate*>(this)->getId(),
00208                             src_path.c_str(),
00209                             static_cast<const Derivate*>(this)->getId(),
00210                             dst_path.c_str(),
00211                             lcpl.getId(),
00212                             H5P_DEFAULT);
00213     if (status < 0) {
00214         HDF5ErrMapper::ToException<GroupException>(std::string("Unable to move link to \"") +
00215                                                    dst_path + "\":");
00216         return false;
00217     }
00218     return true;
00219 }
00220
00221 template <typename Derivate>
00222 inline std::vector<std::string> NodeTraits<Derivate>::listObjectNames(IndexType idx_type) const {
00223     std::vector<std::string> names;
00224     details::HighFiveIterateData iterateData(names);
00225
00226     size_t num_objs = getNumberObjects();
00227     names.reserve(num_objs);
00228
00229     if (H5Literate(static_cast<const Derivate*>(this)->getId(),
00230                    static_cast<H5_index_t>(idx_type),
00231                    H5_ITER_INC,
00232                    NULL,
00233                    &details::internal_high_five_iterate<H5L_info_t>,
00234                    static_cast<void*>(&iterateData)) < 0) {
00235         HDF5ErrMapper::ToException<GroupException>(std::string("Unable to list objects in group"));
00236     }
00237
00238     return names;
00239 }
00240
00241 template <typename Derivate>
00242 inline bool NodeTraits<Derivate>::_exist(const std::string& node_name, bool raise_errors) const {
00243     SilenceHDF5 silencer{};
00244     const auto val =
00245         H5Lexists(static_cast<const Derivate*>(this)->getId(), node_name.c_str(), H5P_DEFAULT);
00246     if (val < 0) {
00247         if (raise_errors) {
00248             HDF5ErrMapper::ToException<GroupException>("Invalid link for exist()");
00249         } else {
00250             return false;
00251         }
00252     }
00253
00254     // The root path always exists, but H5Lexists return 0 or 1
00255     // depending of the version of HDF5, so always return true for it
00256     // We had to call H5Lexists anyway to check that there are no errors
00257     return (node_name == "/") ? true : (val > 0);
00258 }
00259
00260 template <typename Derivate>
00261 inline bool NodeTraits<Derivate>::exist(const std::string& group_path) const {
00262     // When there are slashes, first check everything is fine
00263     // so that subsequent errors are only due to missing intermediate groups
00264     if (group_path.find('/') != std::string::npos) {
00265         _exist("/");  // Shall not throw under normal circumstances
00266         // Unless "/" (already checked), verify path exists (not throwing errors)
00267         return (group_path == "/") ? true : _exist(group_path, false);
00268     }
00269     return _exist(group_path);
00270 }
00271
00272
00273 template <typename Derivate>
00274 inline void NodeTraits<Derivate>::unlink(const std::string& node_name) const {
00275     const herr_t val =
00276         H5Ldelete(static_cast<const Derivate*>(this)->getId(), node_name.c_str(), H5P_DEFAULT);
00277     if (val < 0) {
00278         HDF5ErrMapper::ToException<GroupException>(std::string("Invalid name for unlink() "));
00279     }
00280 }
```

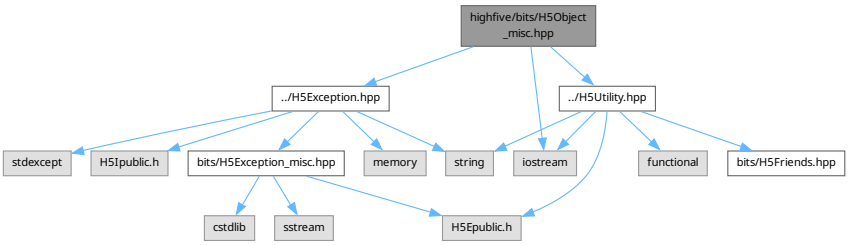
```
00281
00282
00283 // convert internal link types to enum class.
00284 // This function is internal, so H5L_TYPE_ERROR shall be handled in the calling context
00285 static inline LinkType _convert_link_type(const H5L_type_t& ltype) noexcept {
00286     switch (ltype) {
00287     case H5L_TYPE_HARD:
00288         return LinkType::Hard;
00289     case H5L_TYPE_SOFT:
00290         return LinkType::Soft;
00291     case H5L_TYPE_EXTERNAL:
00292         return LinkType::External;
00293     default:
00294         // Other link types are possible but are considered strange to HighFive.
00295         // see https://support.hdfgroup.org/HDF5/doc/RM/H5L/H5Lregister.htm
00296         return LinkType::Other;
00297     }
00298 }
00299
00300 template <typename Derivate>
00301 inline LinkType NodeTraits<Derivate>::getLinkType(const std::string& node_name) const {
00302     H5L_info_t linkinfo;
00303     if (H5Lget_info(static_cast<const Derivate*>(this)->getId(),
00304                     node_name.c_str(),
00305                     &linkinfo,
00306                     H5P_DEFAULT) < 0 ||
00307         linkinfo.type == H5L_TYPE_ERROR) {
00308         HDF5ErrMapper::ToException<GroupException>(std::string("Unable to obtain info for link ") +
00309                                                    node_name);
00310     }
00311     return _convert_link_type(linkinfo.type);
00312 }
00313
00314 template <typename Derivate>
00315 inline ObjectType NodeTraits<Derivate>::getObjectType(const std::string& node_name) const {
00316     return _open(node_name).getType();
00317 }
00318
00319
00320 template <typename Derivate>
00321 inline void NodeTraits<Derivate>::createSoftLink(const std::string& link_name,
00322                                                  const std::string& obj_path,
00323                                                  LinkCreateProps linkCreateProps,
00324                                                  const LinkAccessProps& linkAccessProps,
00325                                                  const bool parents) {
00326     if (parents) {
00327         linkCreateProps.add(CreateIntermediateGroup{});
00328     }
00329     auto status = H5Lcreate_soft(obj_path.c_str(),
00330                                  static_cast<const Derivate*>(this)->getId(),
00331                                  link_name.c_str(),
00332                                  linkCreateProps.getId(),
00333                                  linkAccessProps.getId());
00334     if (status < 0) {
00335         HDF5ErrMapper::ToException<GroupException>(std::string("Unable to create soft link: "));
00336     }
00337 }
00338
00339
00340 template <typename Derivate>
00341 inline void NodeTraits<Derivate>::createExternalLink(const std::string& link_name,
00342                                                      const std::string& h5_file,
00343                                                      const std::string& obj_path,
00344                                                      LinkCreateProps linkCreateProps,
00345                                                      const LinkAccessProps& linkAccessProps,
00346                                                      const bool parents) {
00347     if (parents) {
00348         linkCreateProps.add(CreateIntermediateGroup{});
00349     }
00350     auto status = H5Lcreate_external(h5_file.c_str(),
00351                                      obj_path.c_str(),
00352                                      static_cast<const Derivate*>(this)->getId(),
00353                                      link_name.c_str(),
00354                                      linkCreateProps.getId(),
00355                                      linkAccessProps.getId());
00356     if (status < 0) {
00357         HDF5ErrMapper::ToException<GroupException>(std::string("Unable to create external link: "));
00358     }
00359 }
00360
00361
00362 template <typename Derivate>
00363 inline Object NodeTraits<Derivate>::_open(const std::string& node_name,
00364                                           const DataSetAccessProps& accessProps) const {
00365     const auto id = H5Oopen(static_cast<const Derivate*>(this)->getId(),
00366                             node_name.c_str(),
00367                             accessProps.getId());
```

```
00368     if (id < 0) {
00369         HDF5ErrMapper::ToException<GroupException>(std::string("Unable to open \"") + node_name +
00370                                                    "\":");
00371     }
00372     return detail::make_object(id);
00373 }
00374
00375
00376 }  // namespace HighFive
```

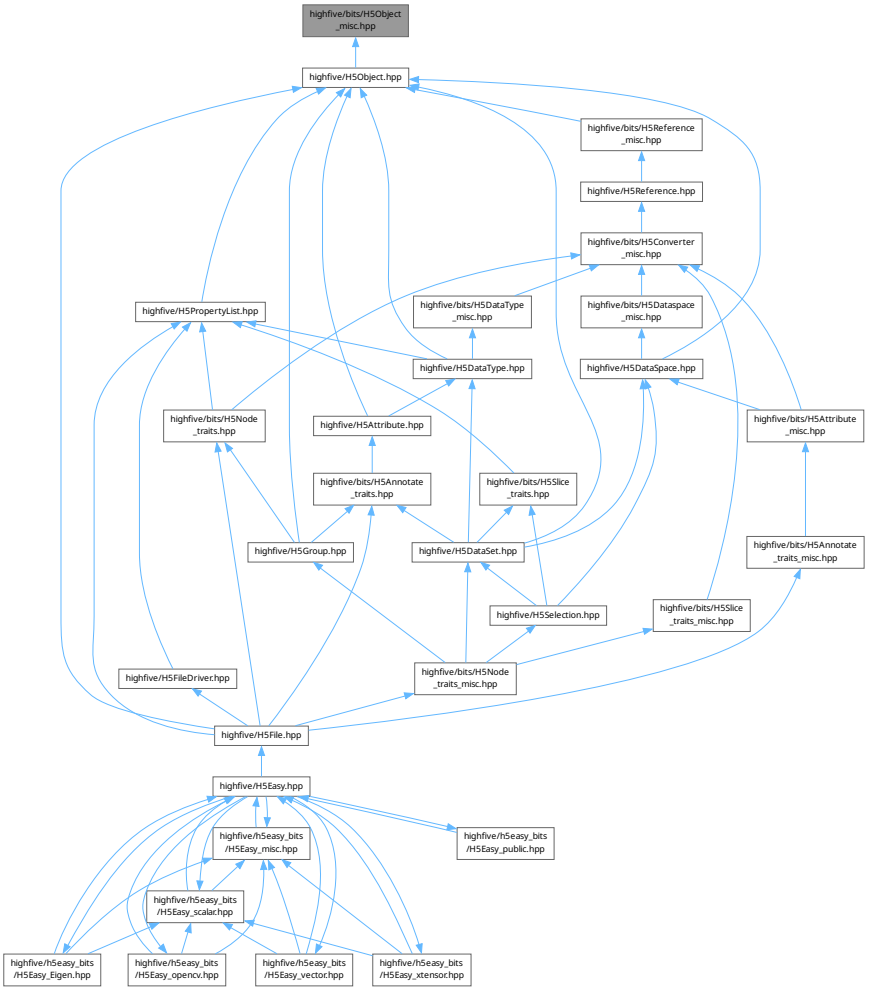
10.32 highfive/bits/H5Object_misc.hpp File Reference

```
#include <iostream>
#include ¨../H5Exception.hpp¨
#include ¨../H5Utility.hpp¨
```

Include dependency graph for H5Object_misc.hpp:



This graph shows which files directly or indirectly include this file:



Namespaces

- namespace HighFive

10.33 H5Object_misc.hpp

Go to the documentation of this file.

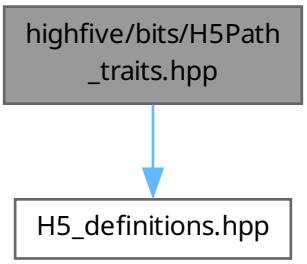
```
00001 /*
00002  *  Copyright (c), 2017, Adrien Devresse <adrien.devresse@epfl.ch>
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
00011 #include <iostream>
00012
00013 #include "../H5Exception.hpp"
00014 #include "../H5Utility.hpp"
00015
00016 namespace HighFive {
```

```
00017 namespace detail {
00018 inline Object make_object(hid_t hid) {
00019     return Object(hid);
00020 }
00021 }  // namespace detail
00022
00023
00024 inline Object::Object()
00025     : _hid(H5I_INVALID_HID) {}
00026
00027 inline Object::Object(hid_t hid)
00028     : _hid(hid) {}
00029
00030 inline Object::Object(const Object& other)
00031     : _hid(other._hid) {
00032     if (other.isValid() && H5Iinc_ref(_hid) < 0) {
00033         throw ObjectException("Reference counter increase failure");
00034     }
00035 }
00036
00037 inline Object::Object(Object&& other) noexcept
00038     : _hid(other._hid) {
00039     other._hid = H5I_INVALID_HID;
00040 }
00041
00042 inline Object& Object::operator=(const Object& other) {
00043     if (this != &other) {
00044         if (isValid())
00045             H5Idec_ref(_hid);
00046
00047         _hid = other._hid;
00048         if (other.isValid() && H5Iinc_ref(_hid) < 0) {
00049             throw ObjectException("Reference counter increase failure");
00050         }
00051     }
00052     return *this;
00053 }
00054
00055 inline Object::~Object() {
00056     if (isValid() && H5Idec_ref(_hid) < 0) {
00057         HIGHFIVE_LOG_ERROR("HighFive::~Object: reference counter decrease failure");
00058     }
00059 }
00060
00061 inline bool Object::isValid() const noexcept {
00062     return (_hid != H5I_INVALID_HID) && (H5Iis_valid(_hid) != false);
00063 }
00064
00065 inline hid_t Object::getId() const noexcept {
00066     return _hid;
00067 }
00068
00069 static inline ObjectType _convert_object_type(const H5I_type_t& h5type) {
00070     switch (h5type) {
00071     case H5I_FILE:
00072         return ObjectType::File;
00073     case H5I_GROUP:
00074         return ObjectType::Group;
00075     case H5I_DATATYPE:
00076         return ObjectType::UserDataType;
00077     case H5I_DATASPACE:
00078         return ObjectType::DataSpace;
00079     case H5I_DATASET:
00080         return ObjectType::Dataset;
00081     case H5I_ATTR:
00082         return ObjectType::Attribute;
00083     default:
00084         return ObjectType::Other;
00085     }
00086 }
00087
00088 inline ObjectType Object::getType() const {
00089     // H5Iget_type is a very lightweight func which extracts the type from the id
00090     H5I_type_t h5type;
00091     if ((h5type = H5Iget_type(_hid)) == H5I_BADID) {
00092         HDF5ErrMapper::ToException<ObjectException>("Invalid hid or object type");
00093     }
00094     return _convert_object_type(h5type);
00095 }
00096
00097 inline ObjectInfo Object::getInfo() const {
00098     ObjectInfo info;
00099 #if (H5Oget_info_vers < 3)
00100     if (H5Oget_info(_hid, &info.raw_info) < 0) {
00101 #else
00102     if (H5Oget_info1(_hid, &info.raw_info) < 0) {
00103 #endif
```

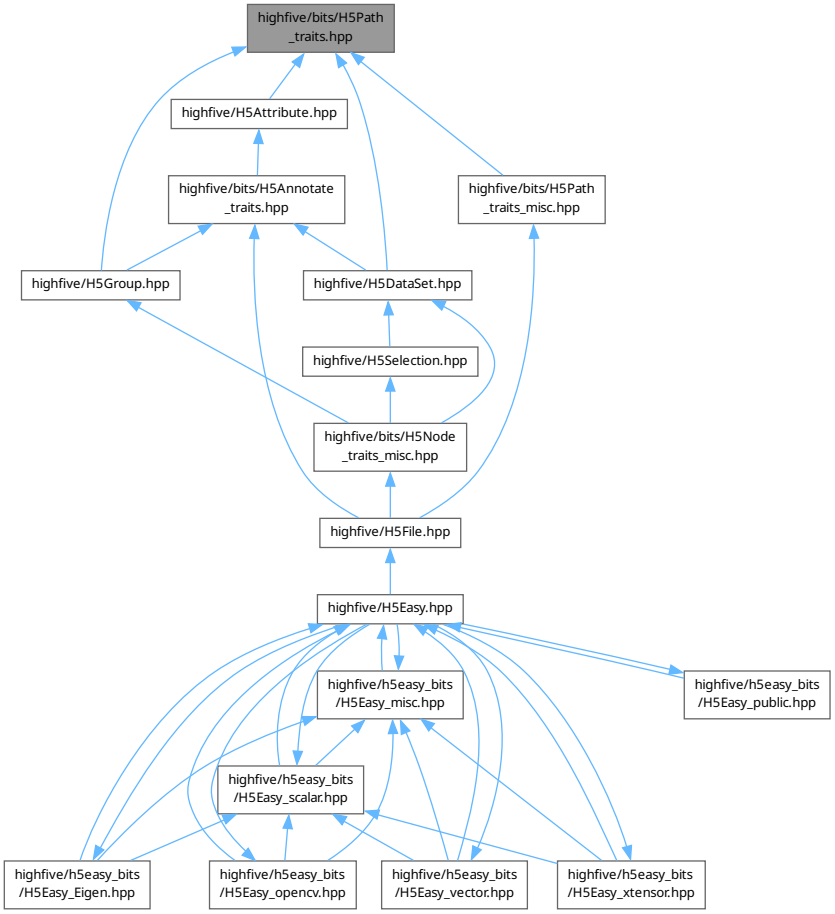
```
00104         HDF5ErrMapper::ToException<ObjectException>("Unable to obtain info for object");
00105     }
00106     return info;
00107 }
00108
00109 inline haddr_t ObjectInfo::getAddress() const noexcept {
00110     return raw_info.addr;
00111 }
00112 inline size_t ObjectInfo::getRefCount() const noexcept {
00113     return raw_info.rc;
00114 }
00115 inline time_t ObjectInfo::getCreationTime() const noexcept {
00116     return raw_info.btime;
00117 }
00118 inline time_t ObjectInfo::getModificationTime() const noexcept {
00119     return raw_info.mtime;
00120 }
00121
00122
00123 }  // namespace HighFive
```

10.34 highfive/bits/H5Path_traits.hpp File Reference

`#include ¨H5_definitions.hpp¨`
Include dependency graph for H5Path_traits.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class HighFive::PathTraits< Derivate >

Namespaces

- namespace HighFive

10.35 H5Path_traits.hpp

Go to the documentation of this file.

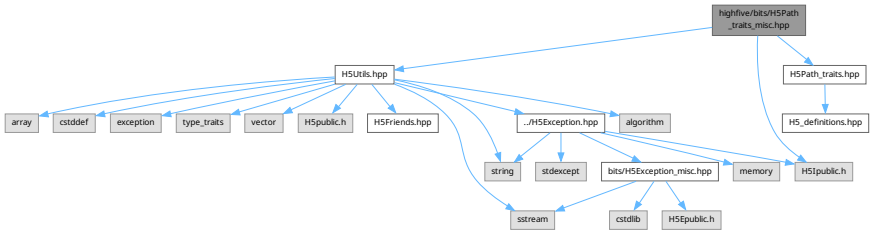
```
00001 /*
00002  *  Copyright (c), 2020, EPFL - Blue Brain Project
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
```

```
00011 #include "H5_definitions.hpp"
00012
00013 namespace HighFive {
00014
00015 template <typename Derivate>
00016 class PathTraits {
00017   public:
00018     PathTraits();
00019
00023     std::string getPath() const;
00024
00028     File& getFile() const noexcept;
00029
00030
00031   protected:
00032     std::shared_ptr<File> _file_obj;  // keep a ref to file so we keep its ref count > 0
00033 };
00034
00035 }  // namespace HighFive
```

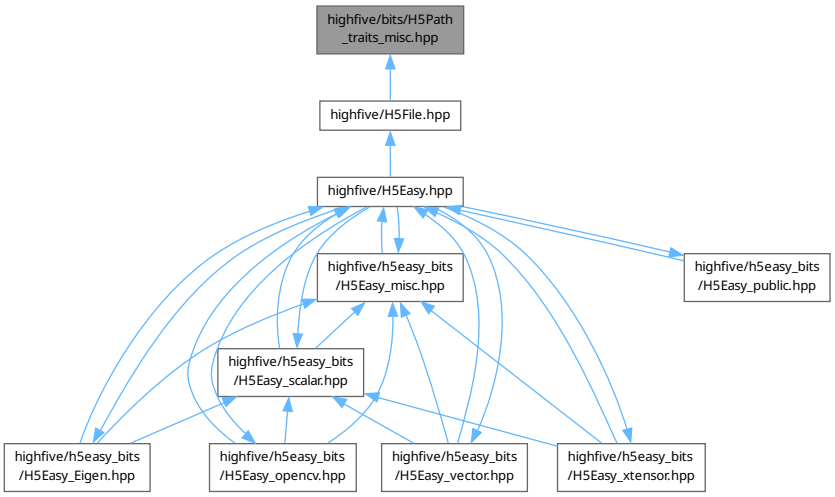
10.36 highfive/bits/H5Path_traits_misc.hpp File Reference

```
#include <H5Ipublic.h>
#include ¨H5Utils.hpp¨
#include ¨H5Path_traits.hpp¨
```

Include dependency graph for H5Path_traits_misc.hpp:



This graph shows which files directly or indirectly include this file:



Namespaces

- namespace HighFive

10.37 H5Path_traits_misc.hpp

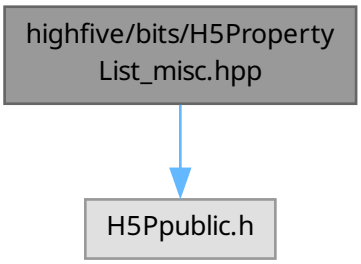
Go to the documentation of this file.

```
00001 /*
00002  *  Copyright (c), 2020, EPFL - Blue Brain Project
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
00011 #include <H5Ipublic.h>
00012
00013 #include "H5Utils.hpp"
00014 #include "H5Path_traits.hpp"
00015
00016 namespace HighFive {
00017
00018 template <typename Derivate>
00019 inline PathTraits<Derivate>::PathTraits() {
00020     static_assert(std::is_same<Derivate, Group>::value || std::is_same<Derivate, DataSet>::value ||
00021                       std::is_same<Derivate, Attribute>::value,
00022                   "PathTraits can only be applied to Group, DataSet and Attribute");
00023     const auto& obj = static_cast<const Derivate&>(*this);
00024     if (!obj.isValid()) {
00025         return;
00026     }
00027     const hid_t file_id = H5Iget_file_id(obj.getId());
00028     if (file_id < 0) {
00029         HDF5ErrMapper::ToException<PropertyException>("getFile(): Could not obtain file of object");
00030     }
00031     _file_obj.reset(new File(file_id));
00032 }
00033
00034 template <typename Derivate>
00035 inline std::string PathTraits<Derivate>::getPath() const {
00036     return details::get_name([this](char* buffer, size_t length) {
00037         return H5Iget_name(static_cast<const Derivate*>(this)->getId(), buffer, length);
00038     });
00039 }
00040
00041 template <typename Derivate>
00042 inline File& PathTraits<Derivate>::getFile() const noexcept {
00043     return *_file_obj;
00044 }
00045
00046 }  // namespace HighFive
```

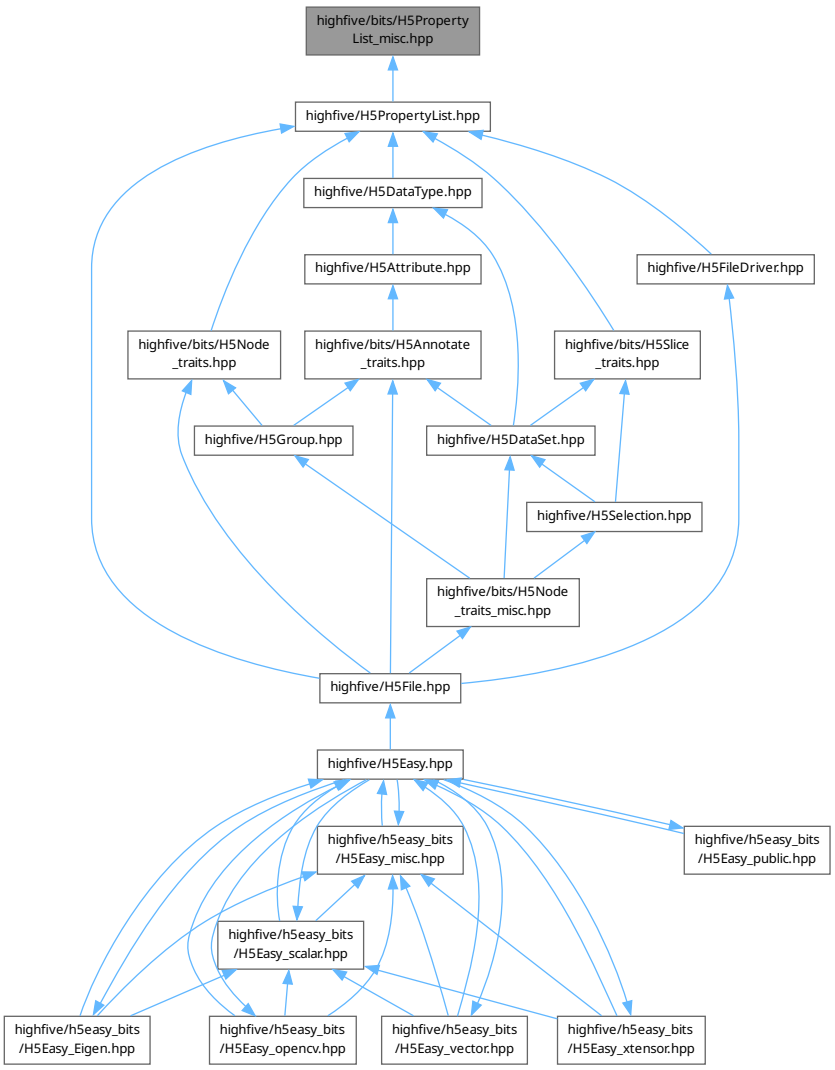
10.38 highfive/bits/H5PropertyList_misc.hpp File Reference

```
#include <H5Ppublic.h>
```

Include dependency graph for H5PropertyList_misc.hpp:



This graph shows which files directly or indirectly include this file:



Namespaces

- namespace HighFive

10.39 H5PropertyList_misc.hpp

Go to the documentation of this file.

```
00001 /*
00002  *  Copyright (c), 2017-2018, Adrien Devresse <adrien.devresse@epfl.ch>
00003  *                            Juan Hernando <juan.hernando@epfl.ch>
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
00011 #include <H5Ppublic.h>
```

```
00012
00013 namespace HighFive {
00014
00015 namespace {
00016 inline hid_t convert_plist_type(PropertyType propertyType) {
00017     // The HP5_XXX are macros with function calls so we can't assign
00018     // them as the enum values
00019     switch (propertyType) {
00020     case PropertyType::OBJECT_CREATE:
00021         return H5P_OBJECT_CREATE;
00022     case PropertyType::FILE_CREATE:
00023         return H5P_FILE_CREATE;
00024     case PropertyType::FILE_ACCESS:
00025         return H5P_FILE_ACCESS;
00026     case PropertyType::DATASET_CREATE:
00027         return H5P_DATASET_CREATE;
00028     case PropertyType::DATASET_ACCESS:
00029         return H5P_DATASET_ACCESS;
00030     case PropertyType::DATASET_XFER:
00031         return H5P_DATASET_XFER;
00032     case PropertyType::GROUP_CREATE:
00033         return H5P_GROUP_CREATE;
00034     case PropertyType::GROUP_ACCESS:
00035         return H5P_GROUP_ACCESS;
00036     case PropertyType::DATATYPE_CREATE:
00037         return H5P_DATATYPE_CREATE;
00038     case PropertyType::DATATYPE_ACCESS:
00039         return H5P_DATATYPE_ACCESS;
00040     case PropertyType::STRING_CREATE:
00041         return H5P_STRING_CREATE;
00042     case PropertyType::ATTRIBUTE_CREATE:
00043         return H5P_ATTRIBUTE_CREATE;
00044     case PropertyType::OBJECT_COPY:
00045         return H5P_OBJECT_COPY;
00046     case PropertyType::LINK_CREATE:
00047         return H5P_LINK_CREATE;
00048     case PropertyType::LINK_ACCESS:
00049         return H5P_LINK_ACCESS;
00050     default:
00051         HDF5ErrMapper::ToException<PropertyException>("Unsupported property list type");
00052     }
00053 }
00054
00055 }  // namespace
00056
00057
00058 inline PropertyListBase::PropertyListBase() noexcept
00059     : Object(H5P_DEFAULT) {}
00060
00061
00062 template <PropertyType T>
00063 inline void PropertyList<T>::_initializeIfNeeded() {
00064     if (_hid != H5P_DEFAULT) {
00065         return;
00066     }
00067     if ((_hid = H5Pcreate(convert_plist_type(T))) < 0) {
00068         HDF5ErrMapper::ToException<PropertyException>("Unable to create property list");
00069     }
00070 }
00071
00072 template <PropertyType T>
00073 template <typename P>
00074 inline void PropertyList<T>::add(const P& property) {
00075     _initializeIfNeeded();
00076     property.apply(_hid);
00077 }
00078
00079 template <PropertyType T>
00080 template <typename F, typename... Args>
00081 inline void RawPropertyList<T>::add(const F& funct, const Args&... args) {
00082     this->_initializeIfNeeded();
00083     if (funct(this->_hid, args...) < 0) {
00084         HDF5ErrMapper::ToException<PropertyException>("Error setting raw hdf5 property.");
00085     }
00086 }
00087
00088 // Specific options to be added to Property Lists
00089 #if H5_VERSION_GE(1, 10, 1)
00090 inline FileSpaceStrategy::FileSpaceStrategy(H5F_fspace_strategy_t strategy,
00091                                             hbool_t persist,
00092                                             hsize_t threshold)
00093     : _strategy(strategy)
00094     , _persist(persist)
00095     , _threshold(threshold) {}
00096
00097 inline FileSpaceStrategy::FileSpaceStrategy(const FileCreateProps& fcpl) {
00098     if (H5Pget_file_space_strategy(fcpl.getId(), &_strategy, &_persist, &_threshold) < 0) {
```

```
00099         HDF5ErrMapper::ToException<PropertyException>("Unable to get file space strategy");
00100     }
00101 }
00102
00103 inline void FileSpaceStrategy::apply(const hid_t list) const {
00104     if (H5Pset_file_space_strategy(list, _strategy, _persist, _threshold) < 0) {
00105         HDF5ErrMapper::ToException<PropertyException>("Error setting file space strategy.");
00106     }
00107 }
00108
00109 inline H5F_fspace_strategy_t FileSpaceStrategy::getStrategy() const {
00110     return _strategy;
00111 }
00112
00113 inline hbool_t FileSpaceStrategy::getPersist() const {
00114     return _persist;
00115 }
00116
00117 inline hsize_t FileSpaceStrategy::getThreshold() const {
00118     return _threshold;
00119 }
00120
00121 inline FileSpacePageSize::FileSpacePageSize(hsize_t page_size)
00122     : _page_size(page_size) {}
00123
00124 inline void FileSpacePageSize::apply(const hid_t list) const {
00125     if (H5Pset_file_space_page_size(list, _page_size) < 0) {
00126         HDF5ErrMapper::ToException<PropertyException>("Error setting file space page size.");
00127     }
00128 }
00129
00130 inline FileSpacePageSize::FileSpacePageSize(const FileCreateProps& fcpl) {
00131     if (H5Pget_file_space_page_size(fcpl.getId(), &_page_size) < 0) {
00132         HDF5ErrMapper::ToException<PropertyException>("Unable to get file space page size");
00133     }
00134 }
00135
00136 inline hsize_t FileSpacePageSize::getPageSize() const {
00137     return _page_size;
00138 }
00139
00140 #ifndef H5_HAVE_PARALLEL
00141 inline PageBufferSize::PageBufferSize(size_t page_buffer_size,
00142                                       unsigned min_meta_percent,
00143                                       unsigned min_raw_percent)
00144     : _page_buffer_size(page_buffer_size)
00145     , _min_meta(min_meta_percent)
00146     , _min_raw(min_raw_percent) {}
00147
00148 inline PageBufferSize::PageBufferSize(const FileAccessProps& plist) {
00149     if (H5Pget_page_buffer_size(plist.getId(), &_page_buffer_size, &_min_meta, &_min_raw) < 0) {
00150         HDF5ErrMapper::ToException<PropertyException>("Error setting page buffer size.");
00151     }
00152 }
00153
00154 inline void PageBufferSize::apply(const hid_t list) const {
00155     if (H5Pset_page_buffer_size(list, _page_buffer_size, _min_meta, _min_raw) < 0) {
00156         HDF5ErrMapper::ToException<PropertyException>("Error setting page buffer size.");
00157     }
00158 }
00159
00160 inline size_t PageBufferSize::getPageBufferSize() const {
00161     return _page_buffer_size;
00162 }
00163
00164 inline unsigned PageBufferSize::getMinMetaPercent() const {
00165     return _min_meta;
00166 }
00167
00168 inline unsigned PageBufferSize::getMinRawPercent() const {
00169     return _min_raw;
00170 }
00171 #endif
00172 #endif
00173
00174 #ifdef H5_HAVE_PARALLEL
00175
00176 inline MPIOFileAccess::MPIOFileAccess(MPI_Comm comm, MPI_Info info)
00177     : _comm(comm)
00178     , _info(info) {}
00179
00180 inline void MPIOFileAccess::apply(const hid_t list) const {
00181     if (H5Pset_fapl_mpio(list, _comm, _info) < 0) {
00182         HDF5ErrMapper::ToException<FileException>("Unable to set-up MPIO Driver configuration");
00183     }
00184 }
00185
```

```
00186 inline void MPIOCollectiveMetadata::apply(const hid_t plist) const {
00187     auto read = MPIOCollectiveMetadataRead{collective_read_};
00188     auto write = MPIOCollectiveMetadataWrite{collective_write_};
00189
00190     read.apply(plist);
00191     write.apply(plist);
00192 }
00193
00194 inline MPIOCollectiveMetadata::MPIOCollectiveMetadata(bool collective)
00195     : collective_read_(collective)
00196     , collective_write_(collective) {}
00197
00198
00199 inline MPIOCollectiveMetadata::MPIOCollectiveMetadata(const FileAccessProps& plist)
00200     : collective_read_(MPIOCollectiveMetadataRead(plist).isCollective())
00201     , collective_write_(MPIOCollectiveMetadataWrite(plist).isCollective()) {}
00202
00203 inline bool MPIOCollectiveMetadata::isCollectiveRead() const {
00204     return collective_read_;
00205 }
00206
00207 inline bool MPIOCollectiveMetadata::isCollectiveWrite() const {
00208     return collective_write_;
00209 }
00210
00211
00212 inline void MPIOCollectiveMetadataRead::apply(const hid_t plist) const {
00213     if (H5Pset_all_coll_metadata_ops(plist, collective_) < 0) {
00214         HDF5ErrMapper::ToException<FileException>("Unable to request collective metadata reads");
00215     }
00216 }
00217
00218 inline bool MPIOCollectiveMetadataRead::isCollective() const {
00219     return collective_;
00220 }
00221
00222 inline MPIOCollectiveMetadataRead::MPIOCollectiveMetadataRead(const FileAccessProps& plist) {
00223     if (H5Pget_all_coll_metadata_ops(plist.getId(), &collective_) < 0) {
00224         HDF5ErrMapper::ToException<PropertyException>("Error loading MPI metadata read.");
00225     }
00226 }
00227
00228 inline MPIOCollectiveMetadataRead::MPIOCollectiveMetadataRead(bool collective)
00229     : collective_(collective) {}
00230
00231 inline void MPIOCollectiveMetadataWrite::apply(const hid_t plist) const {
00232     if (H5Pset_coll_metadata_write(plist, collective_) < 0) {
00233         HDF5ErrMapper::ToException<FileException>("Unable to request collective metadata writes");
00234     }
00235 }
00236
00237 inline bool MPIOCollectiveMetadataWrite::isCollective() const {
00238     return collective_;
00239 }
00240
00241 inline MPIOCollectiveMetadataWrite::MPIOCollectiveMetadataWrite(const FileAccessProps& plist) {
00242     if (H5Pget_coll_metadata_write(plist.getId(), &collective_) < 0) {
00243         HDF5ErrMapper::ToException<PropertyException>("Error loading MPI metadata write.");
00244     }
00245 }
00246
00247 inline MPIOCollectiveMetadataWrite::MPIOCollectiveMetadataWrite(bool collective)
00248     : collective_(collective) {}
00249
00250 #endif
00251
00252 inline FileVersionBounds::FileVersionBounds(H5F_libver_t low, H5F_libver_t high)
00253     : _low(low)
00254     , _high(high) {}
00255
00256 inline FileVersionBounds::FileVersionBounds(const FileAccessProps& fapl) {
00257     if (H5Pget_libver_bounds(fapl.getId(), &_low, &_high) < 0) {
00258         HDF5ErrMapper::ToException<PropertyException>("Unable to access file version bounds");
00259     }
00260 }
00261
00262 inline std::pair<H5F_libver_t, H5F_libver_t> FileVersionBounds::getVersion() const {
00263     return std::make_pair(_low, _high);
00264 }
00265
00266 inline void FileVersionBounds::apply(const hid_t list) const {
00267     if (H5Pset_libver_bounds(list, _low, _high) < 0) {
00268         HDF5ErrMapper::ToException<PropertyException>("Error setting file version bounds");
00269     }
00270 }
00271
00272 inline MetadataBlockSize::MetadataBlockSize(hsize_t size)
```

```
00273     : _size(size) {}
00274
00275 inline MetadataBlockSize::MetadataBlockSize(const FileAccessProps& fapl) {
00276     if (H5Pget_meta_block_size(fapl.getId(), &_size) < 0) {
00277         HDF5ErrMapper::ToException<PropertyException>("Unable to access file metadata block size");
00278     }
00279 }
00280
00281 inline void MetadataBlockSize::apply(const hid_t list) const {
00282     if (H5Pset_meta_block_size(list, _size) < 0) {
00283         HDF5ErrMapper::ToException<PropertyException>("Error setting metadata block size");
00284     }
00285 }
00286
00287 inline hsize_t MetadataBlockSize::getSize() const {
00288     return _size;
00289 }
00290
00291 inline void EstimatedLinkInfo::apply(const hid_t hid) const {
00292     if (H5Pset_est_link_info(hid, _entries, _length) < 0) {
00293         HDF5ErrMapper::ToException<PropertyException>("Error setting estimated link info");
00294     }
00295 }
00296
00297 inline EstimatedLinkInfo::EstimatedLinkInfo(unsigned entries, unsigned length)
00298     : _entries(entries)
00299     , _length(length) {}
00300
00301 inline EstimatedLinkInfo::EstimatedLinkInfo(const GroupCreateProps& gcpl) {
00302     if (H5Pget_est_link_info(gcpl.getId(), &_entries, &_length) < 0) {
00303         HDF5ErrMapper::ToException<PropertyException>("Unable to access group link size property");
00304     }
00305 }
00306
00307 inline unsigned EstimatedLinkInfo::getEntries() const {
00308     return _entries;
00309 }
00310
00311 inline unsigned EstimatedLinkInfo::getNameLength() const {
00312     return _length;
00313 }
00314
00315 inline void Chunking::apply(const hid_t hid) const {
00316     if (H5Pset_chunk(hid, static_cast<int>(_dims.size()), _dims.data()) < 0) {
00317         HDF5ErrMapper::ToException<PropertyException>("Error setting chunk property");
00318     }
00319 }
00320
00321 inline Chunking::Chunking(const std::vector<hsize_t>& dims)
00322     : _dims(dims) {}
00323
00324 inline Chunking::Chunking(const std::initializer_list<hsize_t>& items)
00325     : Chunking(std::vector<hsize_t>{items}) {}
00326
00327 inline Chunking::Chunking(DataSetCreateProps& plist, size_t max_dims)
00328     : _dims(max_dims + 1) {
00329     auto n_loaded = H5Pget_chunk(plist.getId(), static_cast<int>(_dims.size()), _dims.data());
00330     if (n_loaded < 0) {
00331         HDF5ErrMapper::ToException<PropertyException>("Error getting chunk size");
00332     }
00333
00334     if (n_loaded >= static_cast<int>(_dims.size())) {
00335         *this = Chunking(plist, 8 * max_dims);
00336     } else {
00337         _dims.resize(static_cast<size_t>(n_loaded));
00338     }
00339 }
00340
00341 inline const std::vector<hsize_t>& Chunking::getDimensions() const noexcept {
00342     return _dims;
00343 }
00344
00345 template <typename... Args>
00346 inline Chunking::Chunking(hsize_t item, Args... args)
00347     : Chunking(std::vector<hsize_t>{item, static_cast<hsize_t>(args)...}) {}
00348
00349 inline void Deflate::apply(const hid_t hid) const {
00350     if (!H5Zfilter_avail(H5Z_FILTER_DEFLATE) || H5Pset_deflate(hid, _level) < 0) {
00351         HDF5ErrMapper::ToException<PropertyException>("Error setting deflate property");
00352     }
00353 }
00354
00355 inline Deflate::Deflate(unsigned int level)
00356     : _level(level) {}
00357
00358 inline void Szip::apply(const hid_t hid) const {
00359     if (!H5Zfilter_avail(H5Z_FILTER_SZIP)) {
```

```
00360         HDF5ErrMapper::ToException<PropertyException>("Error setting szip property");
00361     }
00362
00363     if (H5Pset_szip(hid, _options_mask, _pixels_per_block) < 0) {
00364         HDF5ErrMapper::ToException<PropertyException>("Error setting szip property");
00365     }
00366 }
00367
00368 inline Szip::Szip(unsigned int options_mask, unsigned int pixels_per_block)
00369     : _options_mask(options_mask)
00370     , _pixels_per_block(pixels_per_block) {}
00371
00372 inline unsigned Szip::getOptionsMask() const {
00373     return _options_mask;
00374 }
00375
00376 inline unsigned Szip::getPixelsPerBlock() const {
00377     return _pixels_per_block;
00378 }
00379
00380 inline void Shuffle::apply(const hid_t hid) const {
00381     if (!H5Zfilter_avail(H5Z_FILTER_SHUFFLE)) {
00382         HDF5ErrMapper::ToException<PropertyException>("Error setting shuffle property");
00383     }
00384
00385     if (H5Pset_shuffle(hid) < 0) {
00386         HDF5ErrMapper::ToException<PropertyException>("Error setting shuffle property");
00387     }
00388 }
00389
00390 inline AllocationTime::AllocationTime(H5D_alloc_time_t alloc_time)
00391     : _alloc_time(alloc_time) {}
00392
00393 inline AllocationTime::AllocationTime(const DataSetCreateProps& dcpl) {
00394     if (H5Pget_alloc_time(dcpl.getId(), &_alloc_time) < 0) {
00395         HDF5ErrMapper::ToException<PropertyException>("Error getting allocation time");
00396     }
00397 }
00398
00399 inline void AllocationTime::apply(hid_t dcpl) const {
00400     if (H5Pset_alloc_time(dcpl, _alloc_time) < 0) {
00401         HDF5ErrMapper::ToException<PropertyException>("Error setting allocation time");
00402     }
00403 }
00404
00405 inline H5D_alloc_time_t AllocationTime::getAllocationTime() {
00406     return _alloc_time;
00407 }
00408
00409 inline Caching::Caching(const DataSetCreateProps& dcpl) {
00410     if (H5Pget_chunk_cache(dcpl.getId(), &_numSlots, &_cacheSize, &_w0) < 0) {
00411         HDF5ErrMapper::ToException<PropertyException>("Error getting dataset cache parameters");
00412     }
00413 }
00414
00415 inline void Caching::apply(const hid_t hid) const {
00416     if (H5Pset_chunk_cache(hid, _numSlots, _cacheSize, _w0) < 0) {
00417         HDF5ErrMapper::ToException<PropertyException>("Error setting dataset cache parameters");
00418     }
00419 }
00420
00421 inline Caching::Caching(const size_t numSlots, const size_t cacheSize, const double w0)
00422     : _numSlots(numSlots)
00423     , _cacheSize(cacheSize)
00424     , _w0(w0) {}
00425
00426 inline size_t Caching::getNumSlots() const {
00427     return _numSlots;
00428 }
00429
00430 inline size_t Caching::getCacheSize() const {
00431     return _cacheSize;
00432 }
00433
00434 inline double Caching::getW0() const {
00435     return _w0;
00436 }
00437
00438 inline CreateIntermediateGroup::CreateIntermediateGroup(bool create)
00439     : _create(create) {}
00440
00441 inline CreateIntermediateGroup::CreateIntermediateGroup(const ObjectCreateProps& ocpl) {
00442     fromPropertyList(ocpl.getId());
00443 }
00444
00445
00446 inline void CreateIntermediateGroup::apply(const hid_t hid) const {
```

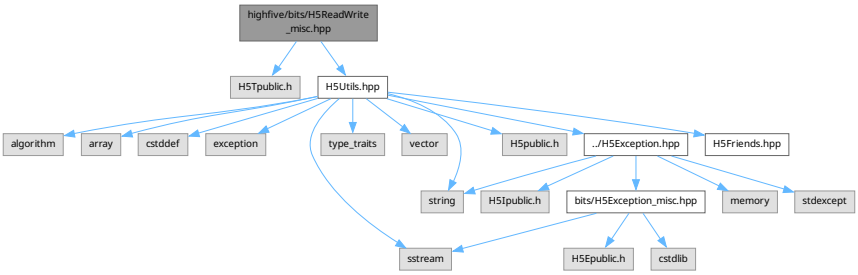
```
00447     if (H5Pset_create_intermediate_group(hid, _create ? 1 : 0) < 0) {
00448         HDF5ErrMapper::ToException<PropertyException>(
00449             "Error setting property for create intermediate groups");
00450     }
00451 }
00452
00453 inline CreateIntermediateGroup::CreateIntermediateGroup(const LinkCreateProps& lcpl) {
00454     fromPropertyList(lcpl.getId());
00455 }
00456
00457 inline void CreateIntermediateGroup::fromPropertyList(hid_t hid) {
00458     unsigned c_bool = 0;
00459     if (H5Pget_create_intermediate_group(hid, &c_bool) < 0) {
00460         HDF5ErrMapper::ToException<PropertyException>(
00461             "Error getting property for create intermediate groups");
00462     }
00463
00464     _create = bool(c_bool);
00465 }
00466
00467 inline bool CreateIntermediateGroup::isSet() const {
00468     return _create;
00469 }
00470
00471 #ifdef H5_HAVE_PARALLEL
00472 inline UseCollectiveIO::UseCollectiveIO(bool enable)
00473     : _enable(enable) {}
00474
00475 inline void UseCollectiveIO::apply(const hid_t hid) const {
00476     if (H5Pset_dxpl_mpio(hid, _enable ? H5FD_MPIO_COLLECTIVE : H5FD_MPIO_INDEPENDENT) < 0) {
00477         HDF5ErrMapper::ToException<PropertyException>("Error setting H5Pset_dxpl_mpio.");
00478     }
00479 }
00480
00481 inline UseCollectiveIO::UseCollectiveIO(const DataTransferProps& dxpl) {
00482     H5FD_mpio_xfer_t collective;
00483
00484     if (H5Pget_dxpl_mpio(dxpl.getId(), &collective) < 0) {
00485         HDF5ErrMapper::ToException<PropertyException>("Error getting H5Pset_dxpl_mpio.");
00486     }
00487
00488     if (collective != H5FD_MPIO_COLLECTIVE && collective != H5FD_MPIO_INDEPENDENT) {
00489         throw std::logic_error("H5Pget_dxpl_mpio returned something strange.");
00490     }
00491
00492     _enable = collective == H5FD_MPIO_COLLECTIVE;
00493 }
00494
00495 inline bool UseCollectiveIO::isCollective() const {
00496     return _enable;
00497 }
00498
00499 inline MpioNoCollectiveCause::MpioNoCollectiveCause(const DataTransferProps& dxpl) {
00500     if (H5Pget_mpio_no_collective_cause(dxpl.getId(), &_local_cause, &_global_cause) < 0) {
00501         HDF5ErrMapper::ToException<PropertyException>("Failed to check mpio_no_collective_cause.");
00502     }
00503 }
00504
00505 inline bool MpioNoCollectiveCause::wasCollective() const {
00506     return _local_cause == 0 && _global_cause == 0;
00507 }
00508
00509 inline uint32_t MpioNoCollectiveCause::getLocalCause() const {
00510     return _local_cause;
00511 }
00512
00513 inline uint32_t MpioNoCollectiveCause::getGlobalCause() const {
00514     return _global_cause;
00515 }
00516
00517 inline std::pair<uint32_t, uint32_t> MpioNoCollectiveCause::getCause() const {
00518     return {_local_cause, _global_cause};
00519 }
00520 #endif
00521
00522 inline LinkCreationOrder::LinkCreationOrder(const FileCreateProps& fcpl) {
00523     fromPropertyList(fcpl.getId());
00524 }
00525
00526 inline LinkCreationOrder::LinkCreationOrder(const GroupCreateProps& gcpl) {
00527     fromPropertyList(gcpl.getId());
00528 }
00529
00530 inline unsigned LinkCreationOrder::getFlags() const {
00531     return _flags;
00532 }
00533
```

```
00534 inline void LinkCreationOrder::apply(const hid_t hid) const {
00535     if (H5Pset_link_creation_order(hid, _flags) < 0) {
00536         HDF5ErrMapper::ToException<PropertyException>("Error setting LinkCreationOrder.");
00537     }
00538 }
00539
00540 inline void LinkCreationOrder::fromPropertyList(hid_t hid) {
00541     if (H5Pget_link_creation_order(hid, &_flags) < 0) {
00542         HDF5ErrMapper::ToException<PropertyException>(
00543             "Error getting property for link creation order");
00544     }
00545 }
00546 }  // namespace HighFive
```

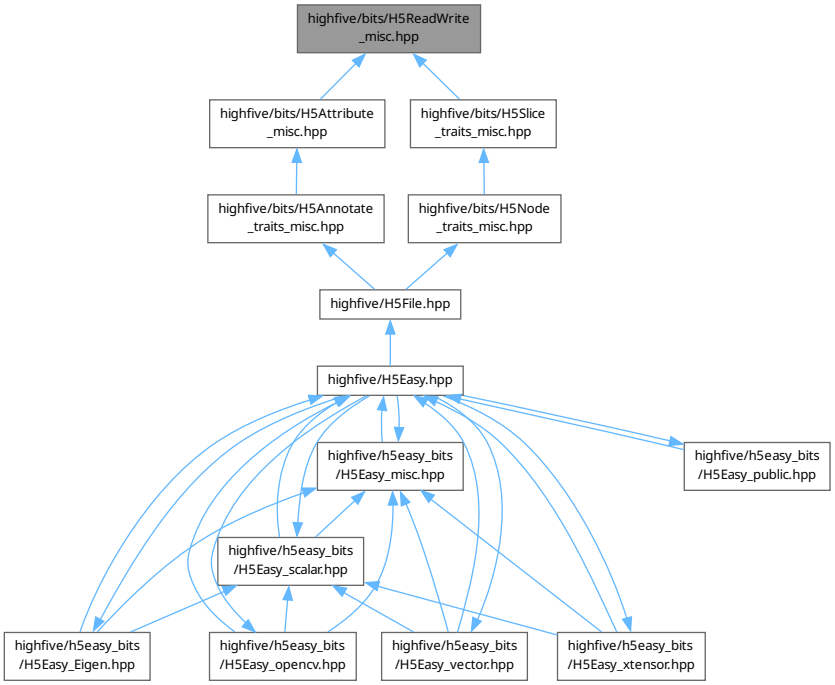
10.40 highfive/bits/H5ReadWrite_misc.hpp File Reference

```
#include <H5Tpublic.h>
#include ¨H5Utils.hpp¨
```

Include dependency graph for H5ReadWrite_misc.hpp:



This graph shows which files directly or indirectly include this file:



Namespaces

- namespace HighFive

10.41 H5ReadWrite_misc.hpp

Go to the documentation of this file.

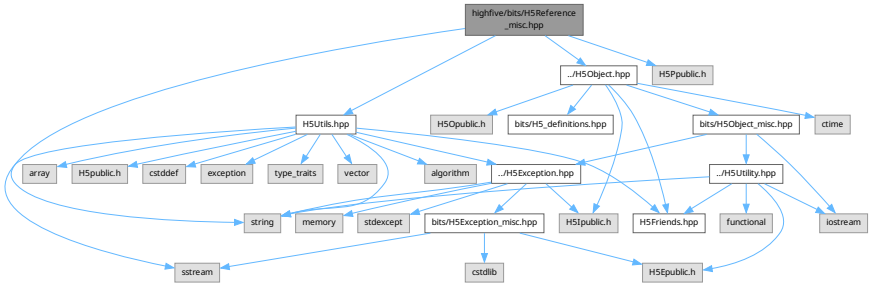
```
00001 /*
00002  *  Copyright (c) 2020 Blue Brain Project
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
00011 #include <H5Tpublic.h>
00012 #include "H5Utils.hpp"
00013
00014 namespace HighFive {
00015
00016 namespace details {
00017
00018 template <typename T>
00019 using unqualified_t = typename std::remove_const<typename std::remove_reference<T>::type>::type;
00020
00021 // Find the type of an eventual char array, otherwise void
00022 template <typename>
00023 struct type_char_array {
00024     using type = void;
00025 };
00026
00027 template <typename T>
00028 struct type_char_array<T*> {
00029     using type = typename std::conditional<std::is_same<unqualified_t<T>, char>::value,
00030                                            char*,
00031                                            typename type_char_array<T>::type>::type;
00032 };
00033
00034 template <typename T, std::size_t N>
00035 struct type_char_array<T[N]> {
00036     using type = typename std::conditional<std::is_same<unqualified_t<T>, char>::value,
00037                                            char[N],
00038                                            typename type_char_array<T>::type>::type;
00039 };
00040
00041 template <typename T>
00042 struct BufferInfo {
00043     using type_no_const = typename std::remove_const<T>::type;
00044     using elem_type = typename details::inspector<type_no_const>::base_type;
00045     using char_array_t = typename details::type_char_array<type_no_const>::type;
00046     static constexpr bool is_char_array = !std::is_same<char_array_t, void>::value;
00047
00048     enum Operation { read, write };
00049     const Operation op;
00050
00051     template <class F>
00052     BufferInfo(const DataType& dtype, F getName, Operation _op);
00053
00054     // member data for info depending on the destination dataset type
00055     const bool is_fixed_len_string;
00056     const size_t n_dimensions;
00057     const DataType data_type;
00058 };
00059
00060 // details implementation
00061 template <typename SrcStrT>
00062 struct string_type_checker {
00063     static DataType getDataType(const DataType&, const DataType&);
00064 };
00065
00066 template <>
00067 struct string_type_checker<void> {
00068     inline static DataType getDataType(const DataType& element_type, const DataType& dtype) {
00069         // TEMP. CHANGE: Ensure that the character set is properly configured to prevent
00070         // converter issues on HDF5 <=v1.12.0 when loading ASCII strings first.
00071         // See https://github.com/HDFGroup/hdf5/issues/544 for further information.
00072         if (H5Tget_class(element_type.getId()) == H5T_STRING &&
00073             H5Tget_cset(dtype.getId()) == H5T_CSET_ASCII) {
```

```
00074             H5Tset_cset(element_type.getId(), H5T_CSET_ASCII);
00075         }
00076         return element_type;
00077     }
00078 };
00079
00080 template <std::size_t FixedLen>
00081 struct string_type_checker<char[FixedLen]> {
00082     inline static DataType getDataType(const DataType& element_type, const DataType& dtype) {
00083         DataType return_type = (dtype.isFixedLenStr()) ? AtomicType<char[FixedLen]>()
00084                                                        : element_type;
00085         // TEMP. CHANGE: See string_type_checker<void> definition
00086         if (H5Tget_cset(dtype.getId()) == H5T_CSET_ASCII) {
00087             H5Tset_cset(return_type.getId(), H5T_CSET_ASCII);
00088         }
00089         return return_type;
00090     }
00091 };
00092
00093 template <>
00094 struct string_type_checker<char*> {
00095     inline static DataType getDataType(const DataType&, const DataType& dtype) {
00096         if (dtype.isFixedLenStr())
00097             throw DataSetException("Can't output variable-length to fixed-length strings");
00098         // TEMP. CHANGE: See string_type_checker<void> definition
00099         DataType return_type = AtomicType<std::string>();
00100         if (H5Tget_cset(dtype.getId()) == H5T_CSET_ASCII) {
00101             H5Tset_cset(return_type.getId(), H5T_CSET_ASCII);
00102         }
00103         return return_type;
00104     }
00105 };
00106
00107 template <typename T>
00108 template <class F>
00109 BufferInfo<T>::BufferInfo(const DataType& dtype, F getName, Operation _op)
00110     : op(_op)
00111     , is_fixed_len_string(dtype.isFixedLenStr())
00112     // In case we are using Fixed-len strings we need to subtract one dimension
00113     , n_dimensions(details::inspector<type_no_const>::recursive_ndim -
00114                    ((is_fixed_len_string && is_char_array) ? 1 : 0))
00115     , data_type(
00116           string_type_checker<char_array_t>::getDataType(create_datatype<elem_type>(), dtype)) {
00117     if (is_fixed_len_string && std::is_same<elem_type, std::string>::value) {
00118         throw DataSetException(
00119             "Can't output std::string as fixed-length. "
00120             "Use raw arrays or FixedLenStringArray");
00121     }
00122     // We warn. In case they are really not convertible an exception will rise on read/write
00123     if (dtype.getClass() != data_type.getClass()) {
00124         HIGHFIVE_LOG_WARN(getName() + "\": data and hdf5 dataset have different types: " +
00125                           data_type.string() + " -> " + dtype.string());
00126     } else if ((dtype.getClass() & data_type.getClass()) == DataTypeClass::Float) {
00127         HIGHFIVE_LOG_WARN_IF(
00128             (op == read) && (dtype.getSize() > data_type.getSize()),
00129             getName() + "\": hdf5 dataset has higher floating point precision than data on read: " +
00130                 dtype.string() + " -> " + data_type.string());
00131
00132         HIGHFIVE_LOG_WARN_IF(
00133             (op == write) && (dtype.getSize() < data_type.getSize()),
00134             getName() +
00135                 "\": data has higher floating point precision than hdf5 dataset on write: " +
00136                 data_type.string() + " -> " + dtype.string());
00137     }
00138 }
00139
00140 }  // namespace details
00141
00142 }  // namespace HighFive
```

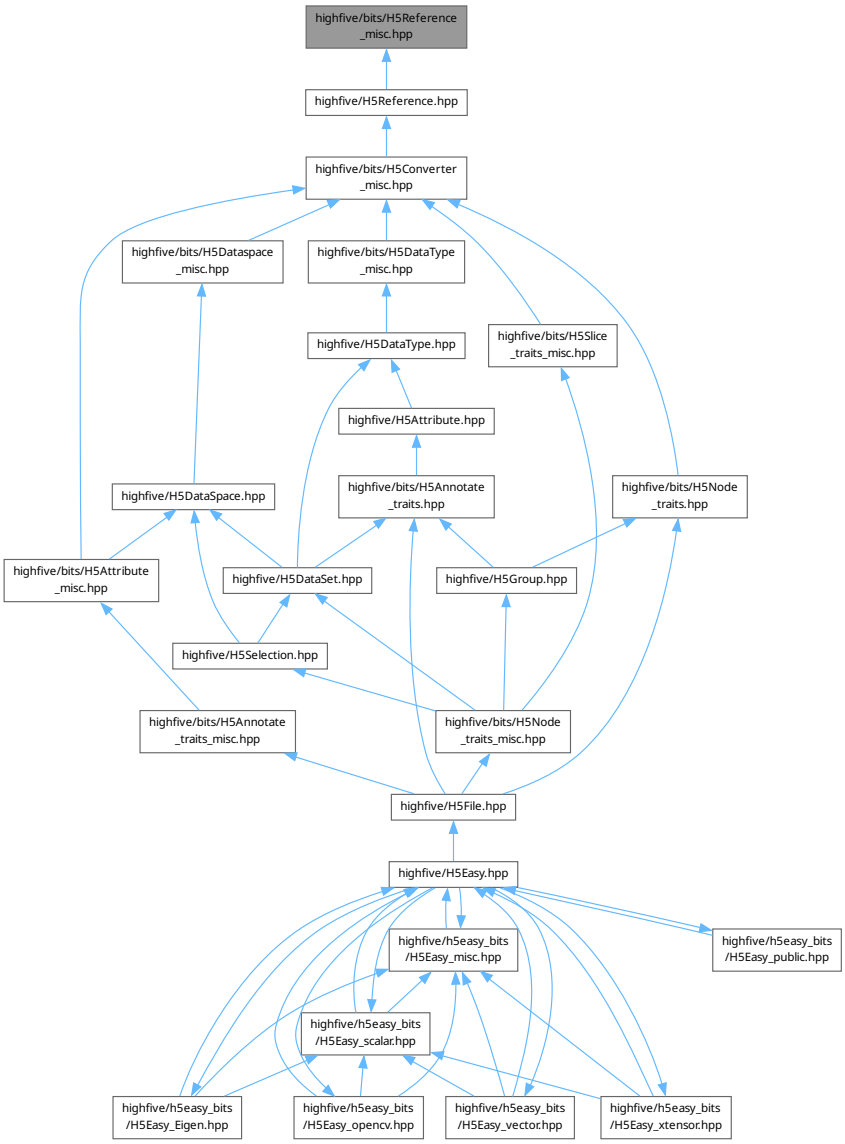
10.42 highfive/bits/H5Reference_misc.hpp File Reference

```
#include <string>
#include <H5Ppublic.h>
#include ¨H5Utils.hpp¨
#include ¨../H5Object.hpp¨
```

Include dependency graph for H5Reference_misc.hpp:



This graph shows which files directly or indirectly include this file:



Namespaces

- namespace HighFive

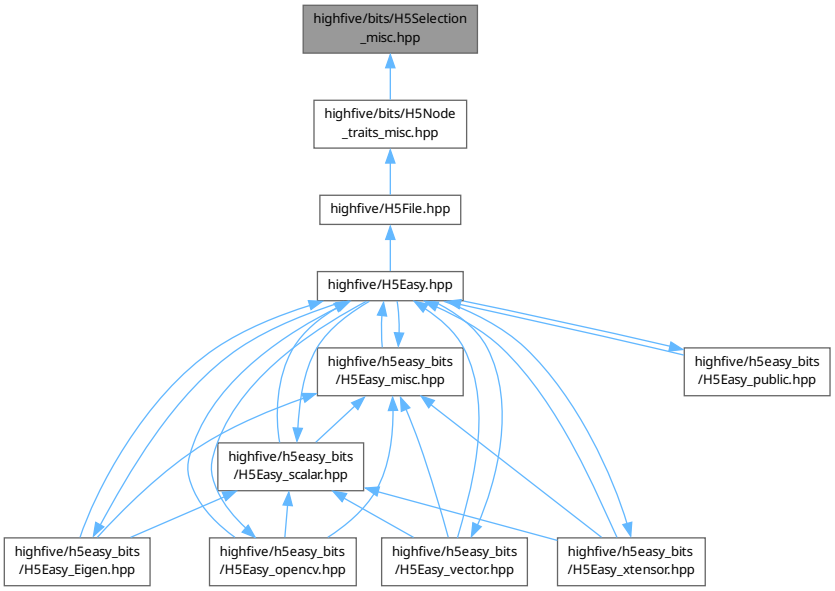
10.43 H5Reference_misc.hpp

Go to the documentation of this file.

```
00001 /*
00002  *  Copyright (c), 2020, EPFL - Blue Brain Project
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009
00010 #pragma once
00011
00012 #include <string>
00013 #include <H5Ppublic.h>
00014
00015 #include "H5Utils.hpp"
00016
00017 #include "../H5Object.hpp"
00018
00019 namespace HighFive {
00020
00021 inline Reference::Reference(const Object& location, const Object& object)
00022     : parent_id(location.getId()) {
00023     obj_name = details::get_name(
00024         [&](char* buffer, size_t length) { return H5Iget_name(object.getId(), buffer, length); });
00025 }
00026
00027 inline void Reference::create_ref(hobj_ref_t* refptr) const {
00028     if (H5Rcreate(refptr, parent_id, obj_name.c_str(), H5R_OBJECT, -1) < 0) {
00029         HDF5ErrMapper::ToException<ReferenceException>(
00030             std::string("Unable to create the reference for \"") + obj_name + "\":");
00031     }
00032 }
00033
00034 inline ObjectType Reference::getType(const Object& location) const {
00035     return get_ref(location).getType();
00036 }
00037
00038 template <typename T>
00039 inline T Reference::dereference(const Object& location) const {
00040     static_assert(std::is_same<DataSet, T>::value || std::is_same<Group, T>::value,
00041                   "We can only (de)reference HighFive::Group or HighFive:DataSet");
00042     auto obj = get_ref(location);
00043     if (obj.getType() != T::type) {
00044         HDF5ErrMapper::ToException<ReferenceException>("Trying to dereference the wrong type");
00045     }
00046 #if defined __GNUC__ && __GNUC__ < 9
00047     return std::move(obj);
00048 #else
00049     return obj;
00050 #endif
00051 }
00052
00053 inline Object Reference::get_ref(const Object& location) const {
00054     hid_t res;
00055 #if (H5Rdereference_vers == 2)
00056     if ((res = H5Rdereference(location.getId(), H5P_DEFAULT, H5R_OBJECT, &href)) < 0) {
00057         HDF5ErrMapper::ToException<ReferenceException>("Unable to dereference.");
00058     }
00059 #else
00060     if ((res = H5Rdereference(location.getId(), H5R_OBJECT, &href)) < 0) {
00061         HDF5ErrMapper::ToException<ReferenceException>("Unable to dereference.");
00062     }
00063 #endif
00064     return Object(res);
00065 }
00066
00067 }  // namespace HighFive
```

10.44 highfive/bits/H5Selection_misc.hpp File Reference

This graph shows which files directly or indirectly include this file:



Namespaces

- namespace HighFive

10.45 H5Selection_misc.hpp

Go to the documentation of this file.

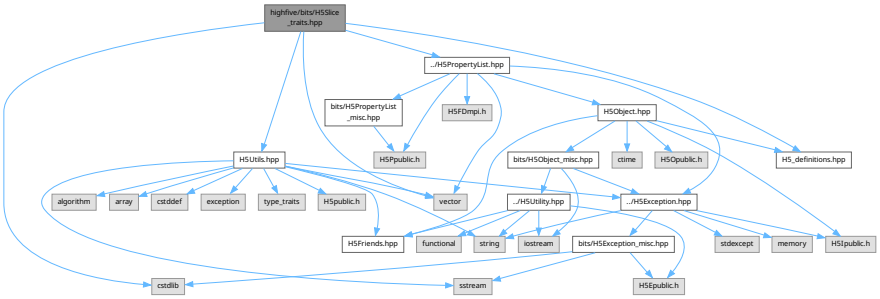
```
00001 /*
00002  *  Copyright (c), 2017, Adrien Devresse <adrien.devresse@epfl.ch>
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
00011 namespace HighFive {
00012
00013 inline Selection::Selection(const DataSpace& memspace,
00014                             const DataSpace& file_space,
00015                             const DataSet& set)
00016     : _mem_space(memspace)
00017     , _file_space(file_space)
00018     , _set(set) {}
00019
00020 inline DataSpace Selection::getSpace() const noexcept {
00021     return _file_space;
00022 }
00023
00024 inline DataSpace Selection::getMemSpace() const noexcept {
00025     return _mem_space;
00026 }
00027
00028 inline DataSet& Selection::getDataset() noexcept {
00029     return _set;
```

```
00030 }
00031
00032 inline const DataSet& Selection::getDataset() const noexcept {
00033     return _set;
00034 }
00035
00036 // Not only a shortcut but also for templated compat with H5Dataset
00037 inline const DataType Selection::getDataType() const {
00038     return _set.getDataType();
00039 }
00040
00041 namespace detail {
00042 inline Selection make_selection(const DataSpace& mem_space,
00043                                 const DataSpace& file_space,
00044                                 const DataSet& set) {
00045     return Selection(mem_space, file_space, set);
00046 }
00047 }  // namespace detail
00048
00049 }  // namespace HighFive
```

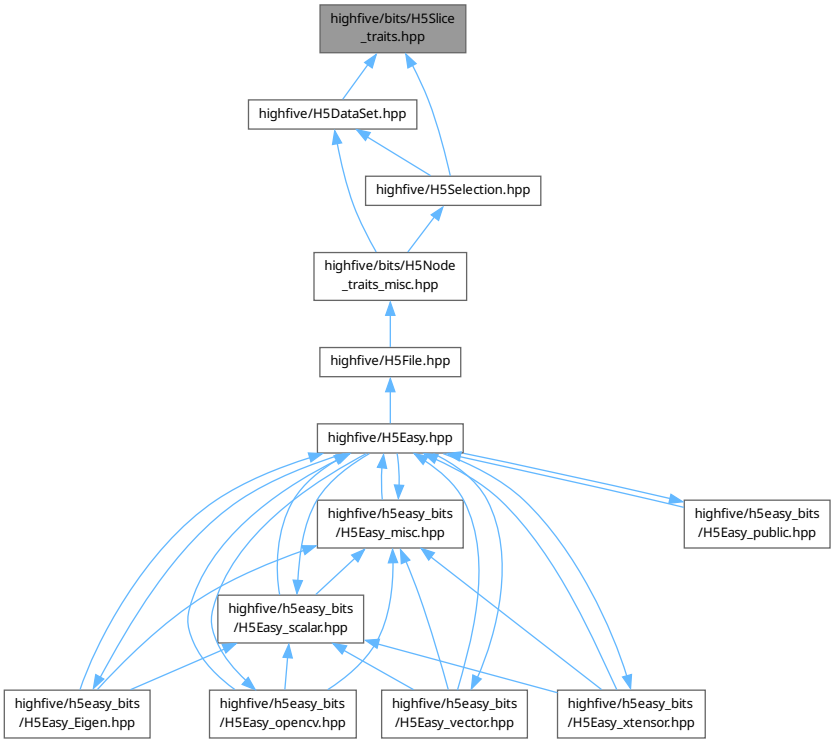
10.46 highfive/bits/H5Slice_traits.hpp File Reference

```
#include <cstdlib>
#include <vector>
#include ¨H5_definitions.hpp¨
#include ¨H5Utils.hpp¨
#include ¨../H5PropertyList.hpp¨
```

Include dependency graph for H5Slice_traits.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class HighFive::ElementSet
- struct HighFive::RegularHyperSlab
- class HighFive::HyperSlab
- class HighFive::SliceTraits< Derivate >

Namespaces

- namespace HighFive

Functions

- std::vector< hsize_t > HighFive::toHDF5SizeVector (const std::vector< size_t > &from)
- std::vector< size_t > HighFive::toSTLSizeVector (const std::vector< hsize_t > &from)

10.47 H5Slice_traits.hpp

Go to the documentation of this file.

```
00001 /*
00002  *  Copyright (c), 2017, Adrien Devresse <adrien.devresse@epfl.ch>
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
00011 #include <cstdlib>
00012 #include <vector>
00013
00014 #include "H5_definitions.hpp"
00015 #include "H5Utils.hpp"
00016
00017 #include "../H5PropertyList.hpp"
00018
00019 namespace HighFive {
00020
00021 class ElementSet {
00022   public:
00028     explicit ElementSet(std::initializer_list<std::size_t> list);
00033     explicit ElementSet(std::initializer_list<std::vector<std::size_t» list);
00039     explicit ElementSet(const std::vector<std::size_t>& element_ids);
00044     explicit ElementSet(const std::vector<std::vector<std::size_t»& element_ids);
00045
00046   private:
00047     std::vector<std::size_t> _ids;
00048
00049     template <typename Derivate>
00050     friend class SliceTraits;
00051 };
00052
00053 namespace detail {
00054
00055 template <class To, class From>
00056 inline std::vector<To> convertSizeVector(const std::vector<From>& from) {
00057     std::vector<To> to(from.size());
00058     std::copy(from.cbegin(), from.cend(), to.begin());
00059
00060     return to;
00061 }
00062 }  // namespace detail
00063
00064 inline std::vector<hsize_t> toHDF5SizeVector(const std::vector<size_t>& from) {
00065     return detail::convertSizeVector<hsize_t>(from);
00066 }
00067
00068 inline std::vector<size_t> toSTLSizeVector(const std::vector<hsize_t>& from) {
00069     return detail::convertSizeVector<size_t>(from);
00070 }
00071
00072 struct RegularHyperSlab {
00073     RegularHyperSlab() = default;
00074
00075     RegularHyperSlab(std::vector<size_t> offset_,
00076                      std::vector<size_t> count_ = {},
00077                      std::vector<size_t> stride_ = {},
00078                      std::vector<size_t> block_ = {})
00079         : offset(toHDF5SizeVector(offset_))
00080         , count(toHDF5SizeVector(count_))
00081         , stride(toHDF5SizeVector(stride_))
00082         , block(toHDF5SizeVector(block_)) {}
00083
00084     static RegularHyperSlab fromHDF5Sizes(std::vector<hsize_t> offset_,
00085                                           std::vector<hsize_t> count_ = {},
00086                                           std::vector<hsize_t> stride_ = {},
00087                                           std::vector<hsize_t> block_ = {}) {
00088         RegularHyperSlab slab;
00089         slab.offset = offset_;
00090         slab.count = count_;
00091         slab.stride = stride_;
00092         slab.block = block_;
00093
00094         return slab;
00095     }
00096
00097     size_t rank() const {
00098         return std::max(std::max(offset.size(), count.size()),
00099                         std::max(stride.size(), block.size()));
00100     }
```

```
00101
00103     std::vector<size_t> packedDims() const {
00104         auto n_dims = rank();
00105         auto dims = std::vector<size_t>(n_dims, 0);
00106
00107         for (size_t i = 0; i < n_dims; ++i) {
00108             dims[i] = count[i] * (block.empty() ? 1 : block[i]);
00109         }
00110
00111         return dims;
00112     }
00113
00114     std::vector<hsize_t> offset;
00115     std::vector<hsize_t> count;
00116     std::vector<hsize_t> stride;
00117     std::vector<hsize_t> block;
00118 };
00119
00120 class HyperSlab {
00121   public:
00122     HyperSlab() {
00123         selects.emplace_back(RegularHyperSlab{}, Op::None);
00124     };
00125
00126     explicit HyperSlab(const RegularHyperSlab& sel) {
00127         selects.emplace_back(sel, Op::Set);
00128     }
00129
00130     HyperSlab operator|(const RegularHyperSlab& sel) const {
00131         auto ret = *this;
00132         ret |= sel;
00133         return ret;
00134     }
00135
00136     HyperSlab& operator|=(const RegularHyperSlab& sel) {
00137         selects.emplace_back(sel, Op::Or);
00138         return *this;
00139     }
00140
00141     HyperSlab operator&(const RegularHyperSlab& sel) const {
00142         auto ret = *this;
00143         ret &= sel;
00144         return ret;
00145     }
00146
00147     HyperSlab& operator&=(const RegularHyperSlab& sel) {
00148         selects.emplace_back(sel, Op::And);
00149         return *this;
00150     }
00151
00152     HyperSlab operator^(const RegularHyperSlab& sel) const {
00153         auto ret = *this;
00154         ret ^= sel;
00155         return ret;
00156     }
00157
00158     HyperSlab& operator^=(const RegularHyperSlab& sel) {
00159         selects.emplace_back(sel, Op::Xor);
00160         return *this;
00161     }
00162
00163     HyperSlab& notA(const RegularHyperSlab& sel) {
00164         selects.emplace_back(sel, Op::NotA);
00165         return *this;
00166     }
00167
00168     HyperSlab& notB(const RegularHyperSlab& sel) {
00169         selects.emplace_back(sel, Op::NotB);
00170         return *this;
00171     }
00172
00173     DataSpace apply(const DataSpace& space_) const {
00174         auto space = space_.clone();
00175         for (const auto& sel: selects) {
00176             if (sel.op == Op::None) {
00177                 H5Sselect_none(space.getId());
00178             } else {
00179                 auto error_code =
00180                     H5Sselect_hyperslab(space.getId(),
00181                                         convert(sel.op),
00182                                         sel.offset.empty() ? nullptr : sel.offset.data(),
00183                                         sel.stride.empty() ? nullptr : sel.stride.data(),
00184                                         sel.count.empty() ? nullptr : sel.count.data(),
00185                                         sel.block.empty() ? nullptr : sel.block.data());
00186
00187                 if (error_code < 0) {
00188                     HDF5ErrMapper::ToException<DataSpaceException>("Unable to select hyperslab");
```

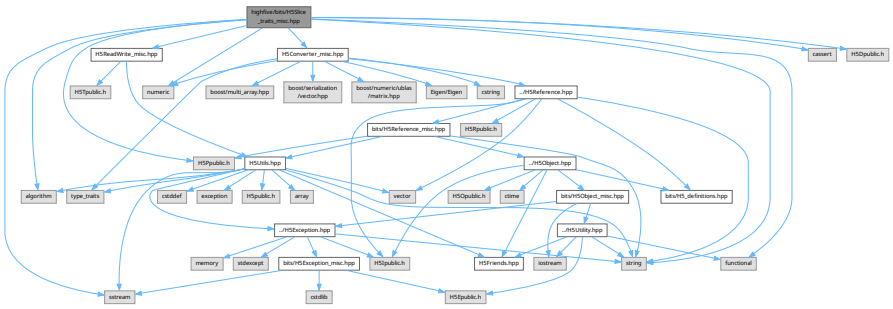
```
00189                 }
00190             }
00191         }
00192         return space;
00193     }
00194
00195   private:
00196     enum class Op {
00197         Noop,
00198         Set,
00199         Or,
00200         And,
00201         Xor,
00202         NotB,
00203         NotA,
00204         Append,
00205         Prepend,
00206         Invalid,
00207         None,
00208     };
00209
00210     H5S_seloper_t convert(Op op) const {
00211         switch (op) {
00212         case Op::Noop:
00213             return H5S_SELECT_NOOP;
00214         case Op::Set:
00215             return H5S_SELECT_SET;
00216         case Op::Or:
00217             return H5S_SELECT_OR;
00218         case Op::And:
00219             return H5S_SELECT_AND;
00220         case Op::Xor:
00221             return H5S_SELECT_XOR;
00222         case Op::NotB:
00223             return H5S_SELECT_NOTB;
00224         case Op::NotA:
00225             return H5S_SELECT_NOTA;
00226         case Op::Append:
00227             return H5S_SELECT_APPEND;
00228         case Op::Prepend:
00229             return H5S_SELECT_PREPEND;
00230         case Op::Invalid:
00231             return H5S_SELECT_INVALID;
00232         default:
00233             throw DataSpaceException("Invalid HyperSlab operation.");
00234         }
00235     }
00236
00237     struct Select_: public RegularHyperSlab {
00238         Select_(const RegularHyperSlab& sel, Op op_)
00239             : RegularHyperSlab(sel)
00240             , op(op_) {}
00241
00242         Op op;
00243     };
00244
00245     std::vector<Select_> selects;
00246 };
00247
00248 template <typename Derivate>
00249 class SliceTraits {
00250   public:
00259     Selection select(const HyperSlab& hyperslab) const;
00260
00268     Selection select(const std::vector<size_t>& offset,
00269                      const std::vector<size_t>& count,
00270                      const std::vector<size_t>& stride = {},
00271                      const std::vector<size_t>& block = {}) const;
00272
00278     Selection select(const std::vector<size_t>& columns) const;
00279
00283     Selection select(const ElementSet& elements) const;
00284
00285     template <typename T>
00286     T read(const DataTransferProps& xfer_props = DataTransferProps()) const;
00287
00297     template <typename T>
00298     void read(T& array, const DataTransferProps& xfer_props = DataTransferProps()) const;
00299
00309     template <typename T>
00310     void read(T* array,
00311               const DataType& dtype = DataType(),
00312               const DataTransferProps& xfer_props = DataTransferProps()) const;
00313
00321     template <typename T>
00322     void write(const T& buffer, const DataTransferProps& xfer_props = DataTransferProps());
00323
```

```
00334     template <typename T>
00335     void write_raw(const T* buffer,
00336                    const DataType& dtype = DataType(),
00337                    const DataTransferProps& xfer_props = DataTransferProps());
00338
00339   protected:
00340     inline Selection select_impl(const HyperSlab& hyperslab, const DataSpace& memspace) const;
00341 };
00342
00343 }  // namespace HighFive
```

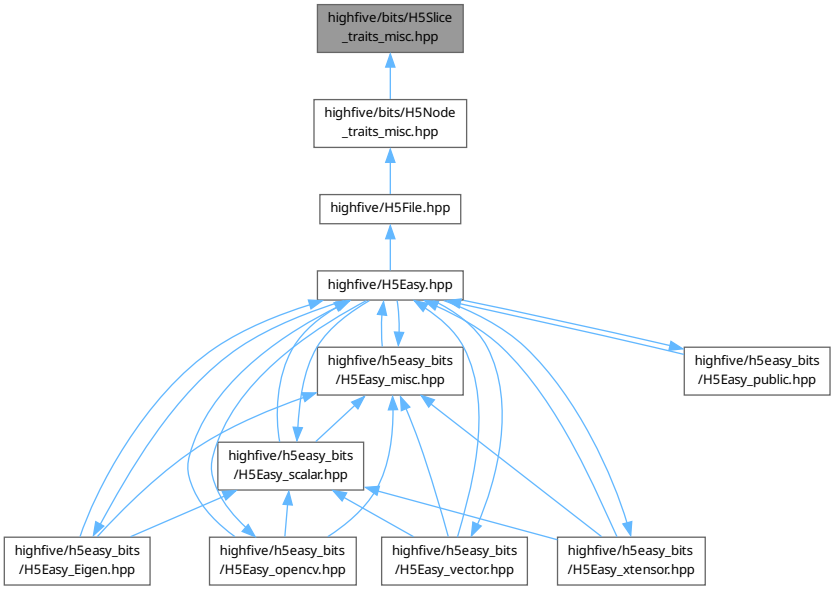
10.48 highfive/bits/H5Slice_traits_misc.hpp File Reference

```
#include <algorithm>
#include <cassert>
#include <functional>
#include <numeric>
#include <sstream>
#include <string>
#include <H5Dpublic.h>
#include <H5Ppublic.h>
#include "H5ReadWrite_misc.hpp"
#include "H5Converter_misc.hpp"
```

Include dependency graph for H5Slice_traits_misc.hpp:



This graph shows which files directly or indirectly include this file:



Namespaces

- namespace HighFive

10.49 H5Slice_traits_misc.hpp

Go to the documentation of this file.

```
00001 /*
00002  *  Copyright (c), 2017, Adrien Devresse <adrien.devresse@epfl.ch>
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
00011 #include <algorithm>
00012 #include <cassert>
00013 #include <functional>
00014 #include <numeric>
00015 #include <sstream>
00016 #include <string>
00017
00018 #include <H5Dpublic.h>
00019 #include <H5Ppublic.h>
00020
00021 #include "H5ReadWrite_misc.hpp"
00022 #include "H5Converter_misc.hpp"
00023
00024 namespace HighFive {
00025
00026 namespace details {
00027
00028 // map the correct reference to the dataset depending of the layout
00029 // dataset -> itself
00030 // subselection -> parent dataset
00031 inline const DataSet& get_dataset(const Selection& sel) {
00032     return sel.getDataset();
00033 }
```

```
00034
00035 inline const DataSet& get_dataset(const DataSet& ds) {
00036     return ds;
00037 }
00038
00039 // map the correct memspace identifier depending of the layout
00040 // dataset -> entire memspace
00041 // selection -> resolve space id
00042 inline hid_t get_memspace_id(const Selection& ptr) {
00043     return ptr.getMemSpace().getId();
00044 }
00045
00046 inline hid_t get_memspace_id(const DataSet&) {
00047     return H5S_ALL;
00048 }
00049 }  // namespace details
00050
00051 inline ElementSet::ElementSet(std::initializer_list<std::size_t> list)
00052     : _ids(list) {}
00053
00054 inline ElementSet::ElementSet(std::initializer_list<std::vector<std::size_t>> list)
00055     : ElementSet(std::vector<std::vector<std::size_t>>(list)) {}
00056
00057 inline ElementSet::ElementSet(const std::vector<std::size_t>& element_ids)
00058     : _ids(element_ids) {}
00059
00060 inline ElementSet::ElementSet(const std::vector<std::vector<std::size_t>>& element_ids) {
00061     for (const auto& vec: element_ids) {
00062         std::copy(vec.begin(), vec.end(), std::back_inserter(_ids));
00063     }
00064 }
00065
00066 template <typename Derivate>
00067 inline Selection SliceTraits<Derivate>::select_impl(const HyperSlab& hyperslab,
00068                                                     const DataSpace& memspace) const {
00069     // Note: The current limitation are that memspace must describe a
00070     //       packed memspace.
00071     //
00072     //       The reason for this is that we're unable to unpack general
00073     //       hyperslabs when the memory is not contiguous, e.g.
00074     //       `std::vector<std::vector<double>>`.
00075     const auto& slice = static_cast<const Derivate&>(*this);
00076     auto filespace = hyperslab.apply(slice.getSpace());
00077
00078     return detail::make_selection(memspace, filespace, details::get_dataset(slice));
00079 }
00080
00081 template <typename Derivate>
00082 inline Selection SliceTraits<Derivate>::select(const HyperSlab& hyper_slab) const {
00083     const auto& slice = static_cast<const Derivate&>(*this);
00084     auto filespace = slice.getSpace();
00085     filespace = hyper_slab.apply(filespace);
00086
00087     auto n_elements = H5Sget_select_npoints(filespace.getId());
00088     auto memspace = DataSpace(std::array<size_t, 1>{size_t(n_elements)});
00089
00090     return detail::make_selection(memspace, filespace, details::get_dataset(slice));
00091 }
00092
00093
00094 template <typename Derivate>
00095 inline Selection SliceTraits<Derivate>::select(const std::vector<size_t>& offset,
00096                                                const std::vector<size_t>& count,
00097                                                const std::vector<size_t>& stride,
00098                                                const std::vector<size_t>& block) const {
00099     auto slab = HyperSlab(RegularHyperSlab(offset, count, stride, block));
00100     auto memspace = DataSpace(count);
00101     return select_impl(slab, memspace);
00102 }
00103
00104 template <typename Derivate>
00105 inline Selection SliceTraits<Derivate>::select(const std::vector<size_t>& columns) const {
00106     const auto& slice = static_cast<const Derivate&>(*this);
00107     const DataSpace& space = slice.getSpace();
00108     std::vector<size_t> dims = space.getDimensions();
00109
00110     std::vector<size_t> counts = dims;
00111     counts.back() = 1;
00112
00113     std::vector<size_t> offsets(dims.size(), 0);
00114
00115     HyperSlab slab;
00116     for (const auto& column: columns) {
00117         offsets.back() = column;
00118         slab |= RegularHyperSlab(offsets, counts);
00119     }
00120
```

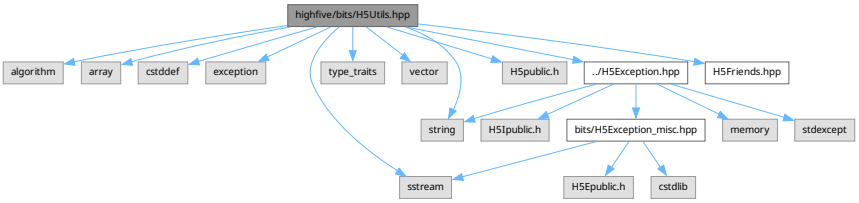
```
00121     std::vector<size_t> memdims = dims;
00122     memdims.back() = columns.size();
00123
00124     return select_impl(slab, DataSpace(memdims));
00125 }
00126
00127 template <typename Derivate>
00128 inline Selection SliceTraits<Derivate>::select(const ElementSet& elements) const {
00129     const auto& slice = static_cast<const Derivate&>(*this);
00130     const hsize_t* data = nullptr;
00131     const DataSpace space = slice.getSpace().clone();
00132     const std::size_t length = elements._ids.size();
00133     if (length % space.getNumberDimensions() != 0) {
00134         throw DataSpaceException(
00135             "Number of coordinates in elements picking "
00136             "should be a multiple of the dimensions.");
00137     }
00138     const std::size_t num_elements = length / space.getNumberDimensions();
00139     std::vector<hsize_t> raw_elements;
00140
00141     // optimised at compile time
00142     // switch for data conversion on 32bits platforms
00143     if (std::is_same<std::size_t, hsize_t>::value) {
00144         // `if constexpr` can't be used, thus a reinterpret_cast is needed.
00145         data = reinterpret_cast<const hsize_t*>(&(elements._ids[0]));
00146     } else {
00147         raw_elements.resize(length);
00148         std::copy(elements._ids.begin(), elements._ids.end(), raw_elements.begin());
00149         data = raw_elements.data();
00150     }
00151
00152     if (H5Sselect_elements(space.getId(), H5S_SELECT_SET, num_elements, data) < 0) {
00153         HDF5ErrMapper::ToException<DataSpaceException>("Unable to select elements");
00154     }
00155
00156     return detail::make_selection(DataSpace(num_elements), space, details::get_dataset(slice));
00157 }
00158
00159
00160 template <typename Derivate>
00161 template <typename T>
00162 inline T SliceTraits<Derivate>::read(const DataTransferProps& xfer_props) const {
00163     T array;
00164     read(array, xfer_props);
00165     return array;
00166 }
00167
00168
00169 template <typename Derivate>
00170 template <typename T>
00171 inline void SliceTraits<Derivate>::read(T& array, const DataTransferProps& xfer_props) const {
00172     const auto& slice = static_cast<const Derivate&>(*this);
00173     const DataSpace& mem_space = slice.getMemSpace();
00174
00175     const details::BufferInfo<T> buffer_info(
00176         slice.getDataType(),
00177         [&slice]() -> std::string { return details::get_dataset(slice).getPath(); },
00178         details::BufferInfo<T>::Operation::read);
00179
00180     if (!details::checkDimensions(mem_space, buffer_info.n_dimensions)) {
00181         std::ostringstream ss;
00182         ss « "Impossible to read DataSet of dimensions " « mem_space.getNumberDimensions()
00183            « " into arrays of dimensions " « buffer_info.n_dimensions;
00184         throw DataSpaceException(ss.str());
00185     }
00186     auto dims = mem_space.getDimensions();
00187
00188     if (mem_space.getElementCount() == 0) {
00189         auto effective_dims = details::squeezeDimensions(dims,
00190                                                          details::inspector<T>::recursive_ndim);
00191
00192         details::inspector<T>::prepare(array, effective_dims);
00193         return;
00194     }
00195
00196     auto r = details::data_converter::get_reader<T>(dims, array);
00197     read(r.get_pointer(), buffer_info.data_type, xfer_props);
00198     // re-arrange results
00199     r.unserialize();
00200     auto t = create_datatype<typename details::inspector<T>::base_type>();
00201     auto c = t.getClass();
00202     if (c == DataTypeClass::VarLen || t.isVariableStr()) {
00203 #if H5_VERSION_GE(1, 12, 0)
00204         // This one have been created in 1.12.0
00205         (void) H5Treclaim(t.getId(), mem_space.getId(), xfer_props.getId(), r.get_pointer());
00206 #else
00207         // This one is deprecated since 1.12.0
```

```
00208         (void) H5Dvlen_reclaim(t.getId(), mem_space.getId(), xfer_props.getId(), r.get_pointer());
00209 #endif
00210     }
00211 }
00212
00213
00214 template <typename Derivate>
00215 template <typename T>
00216 inline void SliceTraits<Derivate>::read(T* array,
00217                                         const DataType& dtype,
00218                                         const DataTransferProps& xfer_props) const {
00219     static_assert(!std::is_const<T>::value,
00220                   "read() requires a non-const structure to read data into");
00221     const auto& slice = static_cast<const Derivate&>(*this);
00222     using element_type = typename details::inspector<T>::base_type;
00223
00224     // Auto-detect mem datatype if not provided
00225     const DataType& mem_datatype = dtype.empty() ? create_and_check_datatype<element_type>()
00226                                                  : dtype;
00227
00228     if (H5Dread(details::get_dataset(slice).getId(),
00229                 mem_datatype.getId(),
00230                 details::get_memspace_id(slice),
00231                 slice.getSpace().getId(),
00232                 xfer_props.getId(),
00233                 static_cast<void*>(array)) < 0) {
00234         HDF5ErrMapper::ToException<DataSetException>("Error during HDF5 Read.");
00235     }
00236 }
00237
00238
00239 template <typename Derivate>
00240 template <typename T>
00241 inline void SliceTraits<Derivate>::write(const T& buffer, const DataTransferProps& xfer_props) {
00242     const auto& slice = static_cast<const Derivate&>(*this);
00243     const DataSpace& mem_space = slice.getMemSpace();
00244
00245     if (mem_space.getElementCount() == 0) {
00246         return;
00247     }
00248
00249     const details::BufferInfo<T> buffer_info(
00250         slice.getDataType(),
00251         [&slice]() -> std::string { return details::get_dataset(slice).getPath(); },
00252         details::BufferInfo<T>::Operation::write);
00253
00254     if (!details::checkDimensions(mem_space, buffer_info.n_dimensions)) {
00255         std::ostringstream ss;
00256         ss << "Impossible to write buffer of dimensions "
00257            << details::format_vector(mem_space.getDimensions())
00258            << " into dataset with n = " << buffer_info.n_dimensions << " dimensions.";
00259         throw DataSpaceException(ss.str());
00260     }
00261     auto w = details::data_converter::serialize<T>(buffer);
00262     write_raw(w.get_pointer(), buffer_info.data_type, xfer_props);
00263 }
00264
00265
00266 template <typename Derivate>
00267 template <typename T>
00268 inline void SliceTraits<Derivate>::write_raw(const T* buffer,
00269                                              const DataType& dtype,
00270                                              const DataTransferProps& xfer_props) {
00271     using element_type = typename details::inspector<T>::base_type;
00272     const auto& slice = static_cast<const Derivate&>(*this);
00273     const auto& mem_datatype = dtype.empty() ? create_and_check_datatype<element_type>() : dtype;
00274
00275     if (H5Dwrite(details::get_dataset(slice).getId(),
00276                  mem_datatype.getId(),
00277                  details::get_memspace_id(slice),
00278                  slice.getSpace().getId(),
00279                  xfer_props.getId(),
00280                  static_cast<const void*>(buffer)) < 0) {
00281         HDF5ErrMapper::ToException<DataSetException>("Error during HDF5 Write: ");
00282     }
00283 }
00284
00285
00286 }  // namespace HighFive
```

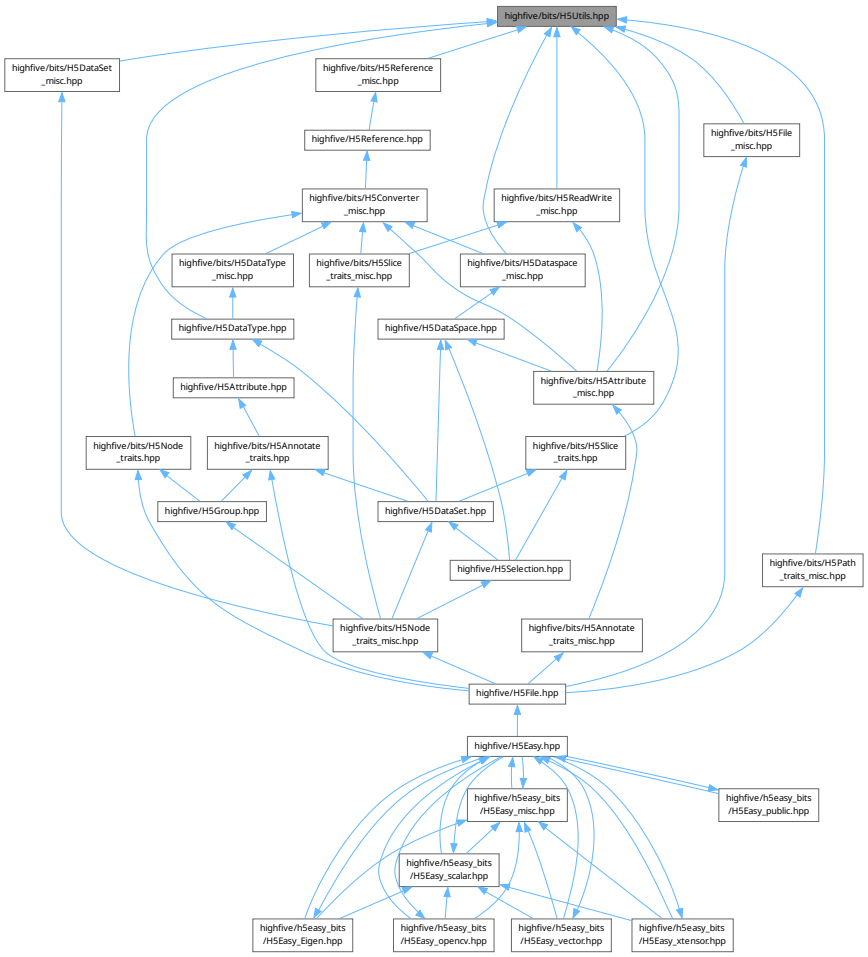
10.50 highfive/bits/H5Utils.hpp File Reference

```
#include <algorithm>
#include <array>
#include <cstddef>
#include <exception>
#include <string>
#include <type_traits>
#include <vector>
#include <sstream>
#include <H5public.h>
#include "../H5Exception.hpp"
#include "H5Friends.hpp"
```

Include dependency graph for H5Utils.hpp:



This graph shows which files directly or indirectly include this file:



Namespaces

- namespace HighFive

10.51 H5Utils.hpp

Go to the documentation of this file.

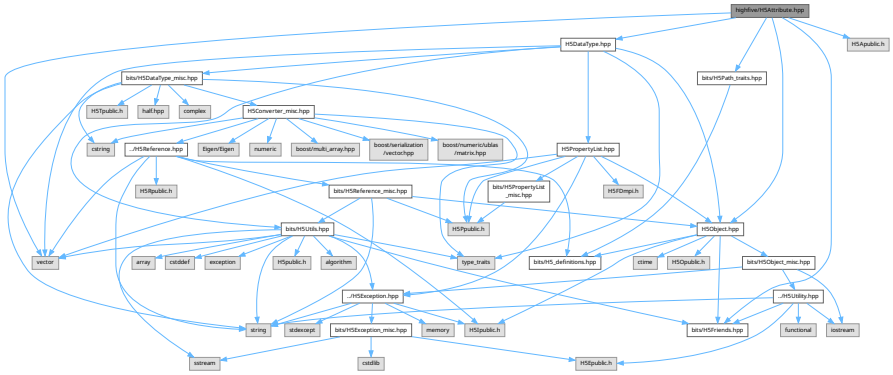
```
00001 /*
00002  *  Copyright (c), 2017, Adrien Devresse <adrien.devresse@epfl.ch>
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
00011 // internal utilities functions
00012 #include <algorithm>
00013 #include <array>
00014 #include <cstddef>  // __GLIBCXX__
00015 #include <exception>
00016 #include <string>
00017 #include <type_traits>
```

```
00018 #include <vector>
00019 #include <sstream>
00020
00021 #include <H5public.h>
00022
00023 #include "../H5Exception.hpp"
00024 #include "H5Friends.hpp"
00025
00026 namespace HighFive {
00027
00028 // If ever used, recognize dimensions of FixedLenStringArray
00029 template <std::size_t N>
00030 class FixedLenStringArray;
00031
00032 namespace details {
00033 // converter function for hsize_t -> size_t when hsize_t != size_t
00034 template <typename Size>
00035 inline std::vector<std::size_t> to_vector_size_t(const std::vector<Size>& vec) {
00036     static_assert(std::is_same<Size, std::size_t>::value == false,
00037                   " hsize_t != size_t mandatory here");
00038     std::vector<size_t> res(vec.size());
00039     std::transform(vec.cbegin(), vec.cend(), res.begin(), [](Size e) {
00040         return static_cast<size_t>(e);
00041     });
00042     return res;
00043 }
00044
00045 // converter function for hsize_t -> size_t when size_t == hsize_t
00046 inline std::vector<std::size_t> to_vector_size_t(const std::vector<std::size_t>& vec) {
00047     return vec;
00048 }
00049
00050 // read name from a H5 object using the specified function
00051 template <typename T>
00052 inline std::string get_name(T fct) {
00053     const size_t maxLength = 255;
00054     char buffer[maxLength + 1];
00055     ssize_t retcode = fct(buffer, static_cast<hsize_t>(maxLength) + 1);
00056     if (retcode < 0) {
00057         HDF5ErrMapper::ToException<GroupException>("Error accessing object name");
00058     }
00059     const size_t length = static_cast<std::size_t>(retcode);
00060     if (length <= maxLength) {
00061         return std::string(buffer, length);
00062     }
00063     std::vector<char> bigBuffer(length + 1, 0);
00064     fct(bigBuffer.data(), length + 1);
00065     return std::string(bigBuffer.data(), length);
00066 }
00067
00068 template <class Container>
00069 inline std::string format_vector(const Container& container) {
00070     auto sout = std::stringstream{};
00071
00072     sout « "[ ";
00073     for (size_t i = 0; i < container.size(); ++i) {
00074         sout « container[i] « (i == container.size() - 1 ? "" : ", ");
00075     }
00076     sout « "]";
00077
00078     return sout.str();
00079 }
00080
00081 }  // namespace details
00082 }  // namespace HighFive
```

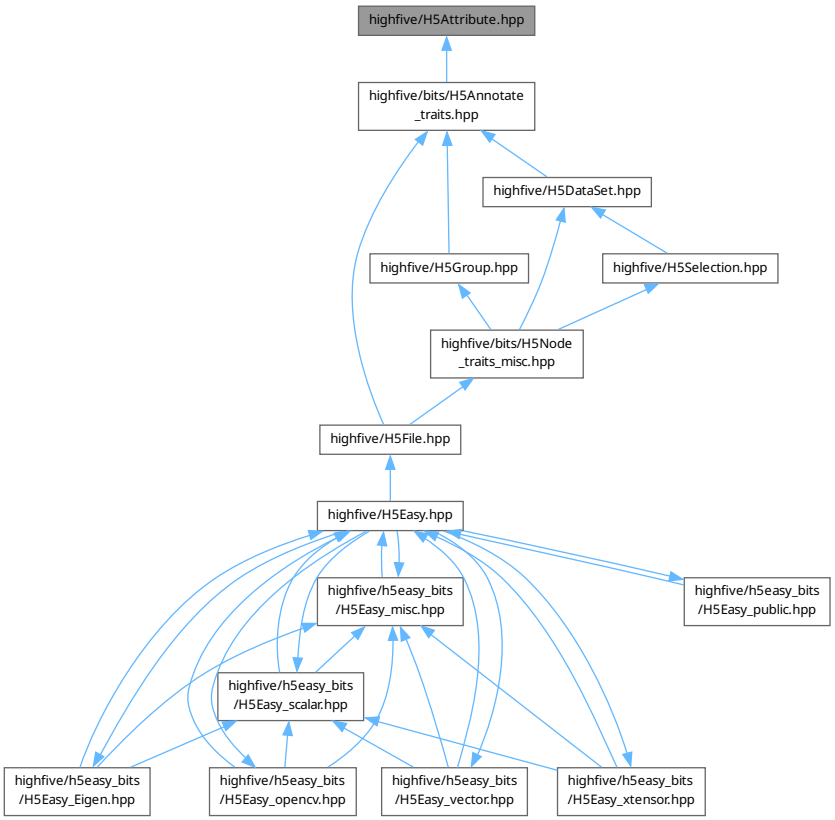
10.52 highfive/H5Attribute.hpp File Reference

```
#include <vector>
#include <H5Apublic.h>
#include ¨H5DataType.hpp¨
#include ¨H5Object.hpp¨
#include ¨bits/H5Friends.hpp¨
#include ¨bits/H5Path_traits.hpp¨
```

Include dependency graph for H5Attribute.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class HighFive::Attribute

  Class representing an attribute of a dataset or group.

Namespaces

- namespace HighFive

10.53 H5Attribute.hpp

Go to the documentation of this file.

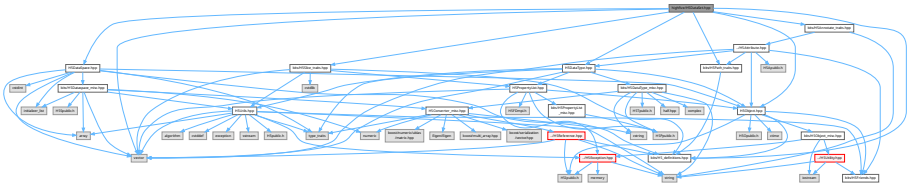
```
00001 /*
00002  *  Copyright (c), 2017, Ali Can Demiralp <ali.demiralp@rwth-aachen.de>
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
00011 #include <vector>
00012
00013 #include <H5Apublic.h>
00014
00015 #include "H5DataType.hpp"
00016 #include "H5Object.hpp"
00017 #include "bits/H5Friends.hpp"
00018 #include "bits/H5Path_traits.hpp"
00019
00020 namespace HighFive {
00021 class DataSpace;
00022
00023 namespace detail {
00024
00040 Attribute make_attribute(hid_t hid);
00041 }  // namespace detail
00042
00046 class Attribute: public Object, public PathTraits<Attribute> {
00047   public:
00048     const static ObjectType type = ObjectType::Attribute;
00049
00053     std::string getName() const;
00054
00055     size_t getStorageSize() const;
00056
00061     DataType getDataType() const;
00062
00067     DataSpace getSpace() const;
00068
00074     DataSpace getMemSpace() const;
00075
00077     template <typename T>
00078     T read() const;
00079
00087     template <typename T>
00088     void read(T& array) const;
00089
00091     template <typename T>
00092     void read(T* array, const DataType& dtype = {}) const;
00093
00101     template <typename T>
00102     void write(const T& buffer);
00103
00105     template <typename T>
00106     void write_raw(const T* buffer, const DataType& dtype = {});
00107
00109     AttributeCreateProps getCreatePropertyList() const {
00110         return details::get_plist<AttributeCreateProps>(*this, H5Aget_create_plist);
00111     }
00112
00113     // No empty attributes
00114     Attribute() = delete;
00115
00116   protected:
00117     using Object::Object;
00118
00119   private:
00120 #if HIGHFIVE_HAS_FRIEND_DECLARATIONS
00121     template <typename Derivate>
00122     friend class ::HighFive::AnnotateTraits;
00123 #endif
00124
00125     friend Attribute detail::make_attribute(hid_t);
```

```
00126 };
00127
00128 namespace detail {
00129 inline Attribute make_attribute(hid_t hid) {
00130     return Attribute(hid);
00131 }
00132 }  // namespace detail
00133
00134 }  // namespace HighFive
```

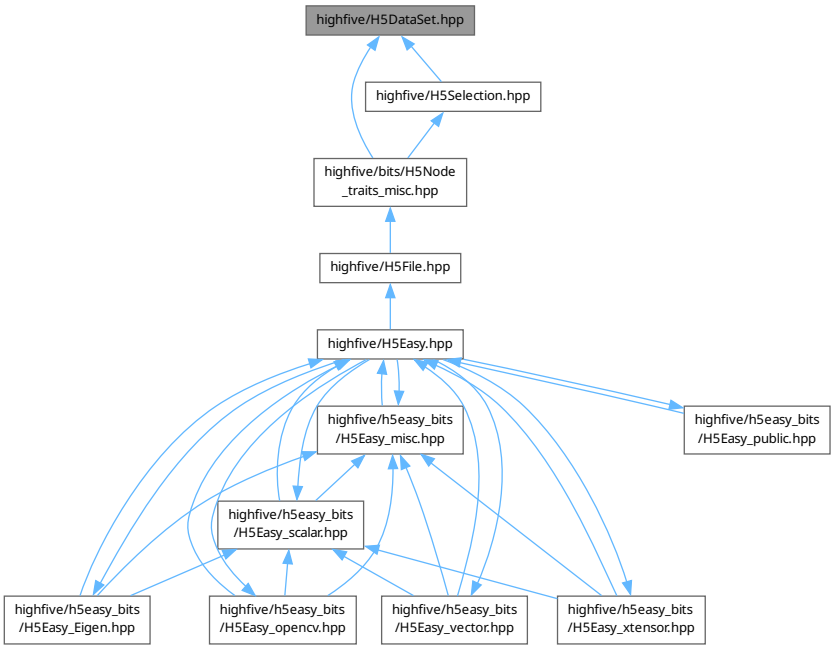
10.54 highfive/H5DataSet.hpp File Reference

```
#include <vector>
#include "H5DataSpace.hpp"
#include "H5DataType.hpp"
#include "H5Object.hpp"
#include "bits/H5_definitions.hpp"
#include "bits/H5Annotate_traits.hpp"
#include "bits/H5Slice_traits.hpp"
#include "bits/H5Path_traits.hpp"
```

Include dependency graph for H5DataSet.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class HighFive::DataSet

  Class representing a dataset.

Namespaces

- namespace HighFive

10.55 H5DataSet.hpp

Go to the documentation of this file.

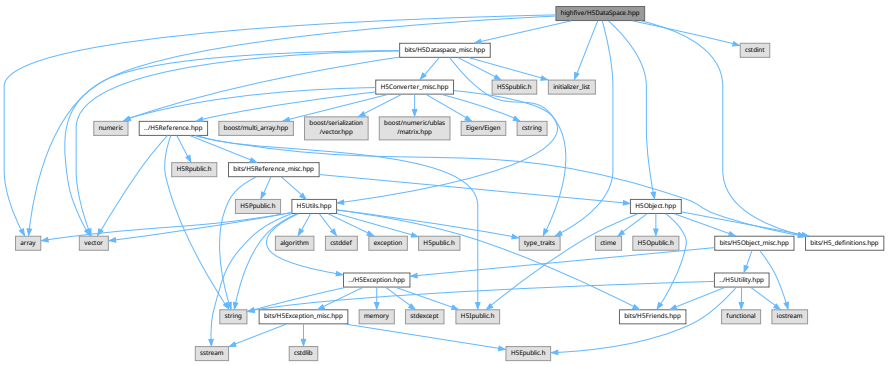
```
00001 /*
00002  *  Copyright (c), 2017, Adrien Devresse <adrien.devresse@epfl.ch>
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
00011 #include <vector>
00012
00013 #include "H5DataSpace.hpp"
00014 #include "H5DataType.hpp"
00015 #include "H5Object.hpp"
00016 #include "bits/H5_definitions.hpp"
00017 #include "bits/H5Annotate_traits.hpp"
00018 #include "bits/H5Slice_traits.hpp"
00019 #include "bits/H5Path_traits.hpp"
00020 #include "bits/H5_definitions.hpp"
00021
00022 namespace HighFive {
00023
00027 class DataSet: public Object,
00028                public SliceTraits<DataSet>,
00029                public AnnotateTraits<DataSet>,
00030                public PathTraits<DataSet> {
00031   public:
00032     const static ObjectType type = ObjectType::Dataset;
00033
00038     uint64_t getStorageSize() const;
00039
00044     uint64_t getOffset() const;
00045
00050     DataType getDataType() const;
00051
00056     DataSpace getSpace() const;
00057
00063     DataSpace getMemSpace() const;
00064
00065
00071     void resize(const std::vector<size_t>& dims);
00072
00073
00078     inline std::vector<size_t> getDimensions() const {
00079         return getSpace().getDimensions();
00080     }
00081
00087     inline size_t getElementCount() const {
00088         return getSpace().getElementCount();
00089     }
00090
00092     DataSetCreateProps getCreatePropertyList() const {
00093         return details::get_plist<DataSetCreateProps>(*this, H5Dget_create_plist);
00094     }
00095
00097     DataSetAccessProps getAccessPropertyList() const {
00098         return details::get_plist<DataSetAccessProps>(*this, H5Dget_access_plist);
00099     }
00100
00102     H5_DEPRECATED("Default constructor creates unsafe uninitialized objects")
00103     DataSet() = default;
00104
00105   protected:
```

```
00106     using Object::Object;  // bring DataSet(hid_t)
00107
00108     DataSet(Object&& o) noexcept
00109         : Object(std::move(o)) {}
00110
00111     friend class Reference;
00112     template <typename Derivate>
00113     friend class NodeTraits;
00114 };
00115
00116 }  // namespace HighFive
```

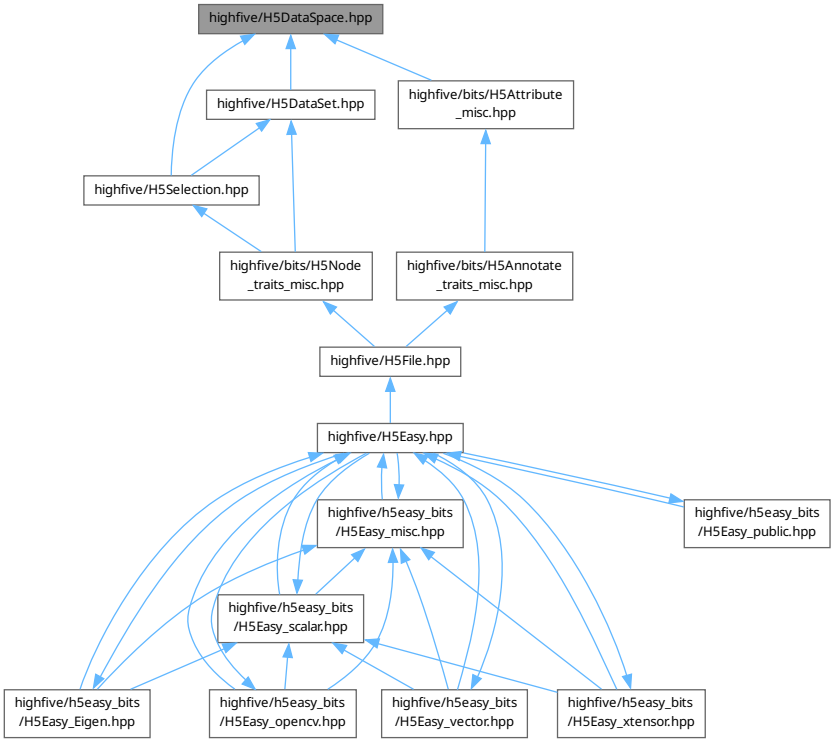
10.56 highfive/H5DataSpace.hpp File Reference

```
#include <vector>
#include <array>
#include <cstdint>
#include <type_traits>
#include <initializer_list>
#include "H5Object.hpp"
#include "bits/H5_definitions.hpp"
#include "bits/H5Dataspace_misc.hpp"
```

Include dependency graph for H5DataSpace.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class HighFive::DataSpace

  Class representing the space (dimensions) of a dataset.

Namespaces

- namespace HighFive

10.57 H5DataSpace.hpp

Go to the documentation of this file.

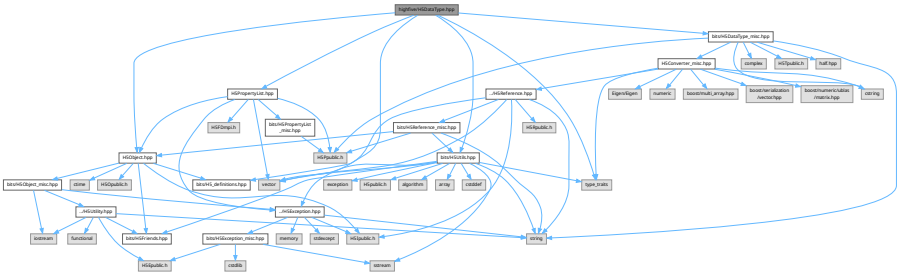
```
00001 /*
00002  *  Copyright (c), 2017, Adrien Devresse <adrien.devresse@epfl.ch>
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
00011 #include <vector>
00012 #include <array>
00013 #include <cstdint>
00014 #include <type_traits>
00015 #include <initializer_list>
00016
```

```
00017 #include "H5Object.hpp"
00018 #include "bits/H5_definitions.hpp"
00019
00020 namespace HighFive {
00021
00025 class DataSpace: public Object {
00026   public:
00027     const static ObjectType type = ObjectType::DataSpace;
00028
00029     static const size_t UNLIMITED = SIZE_MAX;
00030
00032     enum DataspaceType {
00033         dataspace_scalar,
00034         dataspace_null
00035         // simple dataspace are handle directly from their dimensions
00036     };
00037
00043     explicit DataSpace(const std::vector<size_t>& dims);
00044
00045     // create a dataspace of N-dimensions
00046     template <size_t N>
00047     explicit DataSpace(const std::array<size_t, N>& dims);
00048
00052     DataSpace(const std::initializer_list<size_t>& items);
00053
00056     template <typename... Args>
00057     explicit DataSpace(size_t dim1, Args... dims);
00058
00062     template <typename IT,
00063               typename = typename std::enable_if<!std::is_integral<IT>::value, IT>::type>
00064     DataSpace(const IT begin, const IT end);
00065
00069     explicit DataSpace(const std::vector<size_t>& dims, const std::vector<size_t>& maxdims);
00070
00074     explicit DataSpace(DataspaceType dtype);
00075
00078     DataSpace clone() const;
00079
00084     size_t getNumberDimensions() const;
00085
00089     std::vector<size_t> getDimensions() const;
00090
00093     size_t getElementCount() const;
00094
00098     std::vector<size_t> getMaxDimensions() const;
00099
00101     template <typename T>
00102     static DataSpace From(const T& value);
00103
00104     template <std::size_t N, std::size_t Width>
00105     static DataSpace FromCharArrayStrings(const char (&)[N][Width]);
00106
00107   protected:
00108     DataSpace() = default;
00109
00110     friend class Attribute;
00111     friend class File;
00112     friend class DataSet;
00113 };
00114
00115 }  // namespace HighFive
00116
00117 // We include bits right away since DataSpace is user-constructible
00118 #include "bits/H5Dataspace_misc.hpp"
```

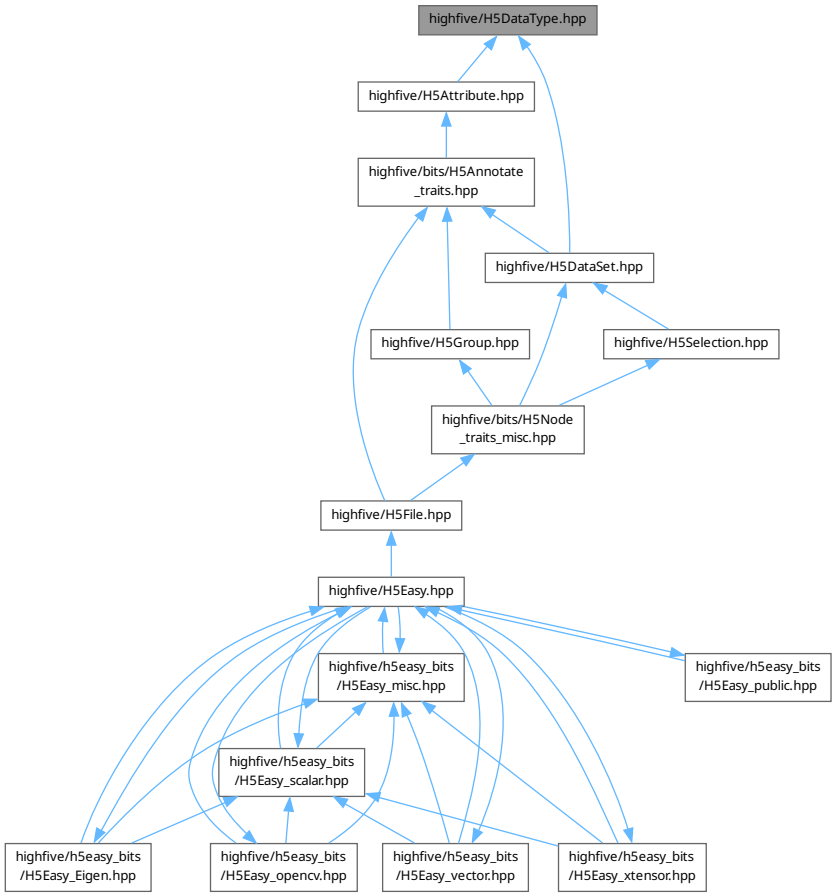
10.58 highfive/H5DataType.hpp File Reference

```
#include <type_traits>
#include <vector>
#include ¨H5Object.hpp¨
#include ¨bits/H5Utils.hpp¨
#include ¨H5PropertyList.hpp¨
#include ¨bits/H5DataType_misc.hpp¨
```

Include dependency graph for H5DataType.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class HighFive::DataType

  HDF5 Data Type.
- class HighFive::AtomicType< T >

  create an HDF5 DataType from a C++ type
- class HighFive::CompoundType

Create a compound HDF5 datatype.

- struct HighFive::CompoundType::member_def

  Use for defining a sub-type of compound type.

- class HighFive::EnumType< T >

  Create a enum HDF5 datatype.

- struct HighFive::EnumType< T >::member_def

  Use for defining a member of enum type.

- class HighFive::FixedLenStringArray< N >

  A structure representing a set of fixed-length strings.

Namespaces

- namespace HighFive

Macros

- #define HIGHFIVE_REGISTER_TYPE(type, function)

  Macro to extend datatype of HighFive.

Enumerations

- enum class HighFive::DataTypeClass {
  HighFive::Time = 1 << 1 , HighFive::Integer = 1 << 2 , HighFive::Float = 1 << 3 , HighFive::String = 1 << 4 ,
  HighFive::BitField = 1 << 5 , HighFive::Opaque = 1 << 6 , HighFive::Compound = 1 << 7 , HighFive::Reference = 1 << 8 ,
  HighFive::Enum = 1 << 9 , HighFive::VarLen = 1 << 10 , HighFive::Array = 1 << 11 , HighFive::Invalid = 0
  }

  Enum of Fundamental data classes.

Functions

- DataTypeClass HighFive::operator| (DataTypeClass lhs, DataTypeClass rhs)
- DataTypeClass HighFive::operator& (DataTypeClass lhs, DataTypeClass rhs)
- template<typename T >
  DataType HighFive::create_datatype ()

  Create a DataType instance representing type T.

- template<typename T >
  DataType HighFive::create_and_check_datatype ()

  Create a DataType instance representing type T and perform a sanity check on its size.

10.58.1 Macro Definition Documentation

10.58.1.1 HIGHFIVE_REGISTER_TYPE

```
#define HIGHFIVE_REGISTER_TYPE(
              type,
              function )
```

Value:

```
    template <>                                                         \
    inline HighFive::DataType HighFive::create_datatype<type>() { \
        return function();                                              \
    }
```

Macro to extend datatype of HighFive.

This macro has to be called outside of any namespace.

```
enum FooBar { FOO = 1, BAR = 2 };
EnumType create_enum_foobar() {
   return EnumType<FooBar>({{"FOO", FooBar::FOO},
                            {"BAR", FooBar::BAR}});
}
HIGHFIVE_REGISTER_TYPE(FooBar, create_enum_foobar)
```

10.59 H5DataType.hpp

Go to the documentation of this file.

```
00001 /*
00002  *  Copyright (c), 2017, Adrien Devresse <adrien.devresse@epfl.ch>
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
00011 #include <type_traits>
00012 #include <vector>
00013
00014 #include "H5Object.hpp"
00015 #include "bits/H5Utils.hpp"
00016
00017 #include "H5PropertyList.hpp"
00018
00019 namespace HighFive {
00020
00021
00025 enum class DataTypeClass {
00026     Time = 1 << 1,
00027     Integer = 1 << 2,
00028     Float = 1 << 3,
00029     String = 1 << 4,
00030     BitField = 1 << 5,
00031     Opaque = 1 << 6,
00032     Compound = 1 << 7,
00033     Reference = 1 << 8,
00034     Enum = 1 << 9,
00035     VarLen = 1 << 10,
00036     Array = 1 << 11,
00037     Invalid = 0
00038 };
00039
00040 inline DataTypeClass operator|(DataTypeClass lhs, DataTypeClass rhs) {
00041     using T = std::underlying_type<DataTypeClass>::type;
00042     return static_cast<DataTypeClass>(static_cast<T>(lhs) | static_cast<T>(rhs));
00043 }
00044
00045 inline DataTypeClass operator&(DataTypeClass lhs, DataTypeClass rhs) {
00046     using T = std::underlying_type<DataTypeClass>::type;
00047     return static_cast<DataTypeClass>(static_cast<T>(lhs) & static_cast<T>(rhs));
00048 }
00049
00050
```

```
00054 class DataType: public Object {
00055   public:
00056     bool operator==(const DataType& other) const;
00057
00058     bool operator!=(const DataType& other) const;
00059
00063     DataTypeClass getClass() const;
00064
00071     size_t getSize() const;
00072
00076     std::string string() const;
00077
00081     bool isVariableStr() const;
00082
00086     bool isFixedLenStr() const;
00087
00092     bool empty() const noexcept;
00093
00095     bool isReference() const;
00096
00098     DataTypeCreateProps getCreatePropertyList() const {
00099         return details::get_plist<DataTypeCreateProps>(*this, H5Tget_create_plist);
00100     }
00101
00102   protected:
00103     using Object::Object;
00104
00105     friend class Attribute;
00106     friend class File;
00107     friend class DataSet;
00108     friend class CompoundType;
00109 };
00110
00116 template <typename T>
00117 class AtomicType: public DataType {
00118   public:
00119     AtomicType();
00120
00121     using basic_type = T;
00122 };
00123
00124
00128 class CompoundType: public DataType {
00129   public:
00132     struct member_def {
00133         member_def(std::string t_name, DataType t_base_type, size_t t_offset = 0)
00134             : name(std::move(t_name))
00135             , base_type(std::move(t_base_type))
00136             , offset(t_offset) {}
00137         std::string name;
00138         DataType base_type;
00139         size_t offset;
00140     };
00141
00142     CompoundType(const CompoundType& other) = default;
00143
00148     inline CompoundType(const std::vector<member_def>& t_members, size_t size = 0)
00149         : members(t_members) {
00150         create(size);
00151     }
00152     inline CompoundType(std::vector<member_def>&& t_members, size_t size = 0)
00153         : members(std::move(t_members)) {
00154         create(size);
00155     }
00156     inline CompoundType(const std::initializer_list<member_def>& t_members, size_t size = 0)
00157         : members(t_members) {
00158         create(size);
00159     }
00160
00164     inline CompoundType(DataType&& type)
00165         : DataType(type) {
00166         if (getClass() != DataTypeClass::Compound) {
00167             std::ostringstream ss;
00168             ss << "hid " << _hid << " does not refer to a compound data type";
00169             throw DataTypeException(ss.str());
00170         }
00171         int result = H5Tget_nmembers(_hid);
00172         if (result < 0) {
00173             throw DataTypeException("Could not get members of compound datatype");
00174         }
00175         size_t n_members = static_cast<size_t>(result);
00176         members.reserve(n_members);
00177         for (unsigned i = 0; i < n_members; i++) {
00178             const char* name = H5Tget_member_name(_hid, i);
00179             size_t offset = H5Tget_member_offset(_hid, i);
00180             hid_t member_hid = H5Tget_member_type(_hid, i);
00181             DataType member_type{member_hid};
```

```
00182             members.emplace_back(name, member_type, offset);
00183         }
00184     }
00185
00189     inline void commit(const Object& object, const std::string& name) const;
00190
00192     inline const std::vector<member_def>& getMembers() const noexcept {
00193         return members;
00194     }
00195
00196   private:
00198     std::vector<member_def> members;
00199
00203     void create(size_t size = 0);
00204 };
00205
00227 template <typename T>
00228 class EnumType: public DataType {
00229   public:
00232     struct member_def {
00233         member_def(const std::string& t_name, T t_value)
00234             : name(t_name)
00235             , value(std::move(t_value)) {}
00236         std::string name;
00237         T value;
00238     };
00239
00240     EnumType(const EnumType& other) = default;
00241
00242     EnumType(const std::vector<member_def>& t_members)
00243         : members(t_members) {
00244         static_assert(std::is_enum<T>::value, "EnumType<T>::create takes only enum");
00245         if (members.empty()) {
00246             HDF5ErrMapper::ToException<DataTypeException>(
00247                 "Could not create an enum without members");
00248         }
00249         create();
00250     }
00251
00252     EnumType(std::initializer_list<member_def> t_members)
00253         : EnumType(std::vector<member_def>({t_members})) {}
00254
00258     void commit(const Object& object, const std::string& name) const;
00259
00260   private:
00261     std::vector<member_def> members;
00262
00263     void create();
00264 };
00265
00266
00268 template <typename T>
00269 DataType create_datatype();
00270
00271
00273 template <typename T>
00274 DataType create_and_check_datatype();
00275
00276
00283 template <std::size_t N>
00284 class FixedLenStringArray {
00285   public:
00286     FixedLenStringArray() = default;
00287
00291     FixedLenStringArray(const char array[][N], std::size_t length);
00292
00298     explicit FixedLenStringArray(const std::vector<std::string>& vec);
00299
00300     FixedLenStringArray(const std::string* iter_begin, const std::string* iter_end);
00301
00302     FixedLenStringArray(const std::initializer_list<std::string>&);
00303
00307     void push_back(const std::string&);
00308
00309     void push_back(const std::array<char, N>&);
00310
00314     std::string getString(std::size_t index) const;
00315
00316     // Container interface
00317     inline const char* operator[](std::size_t i) const noexcept {
00318         return datavec[i].data();
00319     }
00320     inline const char* at(std::size_t i) const {
00321         return datavec.at(i).data();
00322     }
00323     inline bool empty() const noexcept {
00324         return datavec.empty();
```

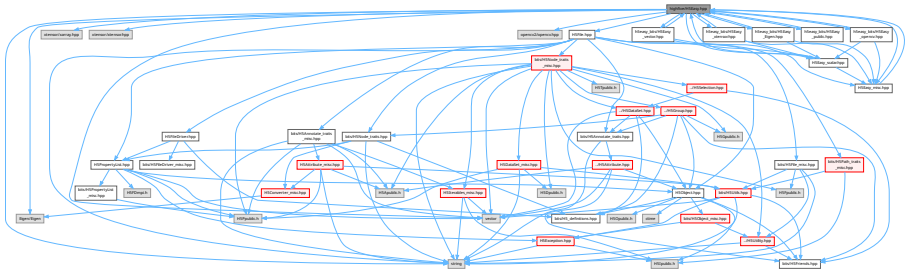
```
00325     }
00326     inline std::size_t size() const noexcept {
00327         return datavec.size();
00328     }
00329     inline void resize(std::size_t n) {
00330         datavec.resize(n);
00331     }
00332     inline const char* front() const {
00333         return datavec.front().data();
00334     }
00335     inline const char* back() const {
00336         return datavec.back().data();
00337     }
00338     inline char* data() noexcept {
00339         return datavec[0].data();
00340     }
00341     inline const char* data() const noexcept {
00342         return datavec[0].data();
00343     }
00344
00345   private:
00346     using vector_t = typename std::vector<std::array<char, N>>;
00347
00348   public:
00349     // Use the underlying iterator
00350     using iterator = typename vector_t::iterator;
00351     using const_iterator = typename vector_t::const_iterator;
00352     using reverse_iterator = typename vector_t::reverse_iterator;
00353     using const_reverse_iterator = typename vector_t::const_reverse_iterator;
00354     using value_type = typename vector_t::value_type;
00355
00356     inline iterator begin() noexcept {
00357         return datavec.begin();
00358     }
00359     inline iterator end() noexcept {
00360         return datavec.end();
00361     }
00362     inline const_iterator begin() const noexcept {
00363         return datavec.begin();
00364     }
00365     inline const_iterator cbegin() const noexcept {
00366         return datavec.cbegin();
00367     }
00368     inline const_iterator end() const noexcept {
00369         return datavec.end();
00370     }
00371     inline const_iterator cend() const noexcept {
00372         return datavec.cend();
00373     }
00374     inline reverse_iterator rbegin() noexcept {
00375         return datavec.rbegin();
00376     }
00377     inline reverse_iterator rend() noexcept {
00378         return datavec.rend();
00379     }
00380     inline const_reverse_iterator rbegin() const noexcept {
00381         return datavec.rbegin();
00382     }
00383     inline const_reverse_iterator rend() const noexcept {
00384         return datavec.rend();
00385     }
00386
00387   private:
00388     vector_t datavec;
00389 };
00390
00391 }  // namespace HighFive
00392
00393
00406 #define HIGHFIVE_REGISTER_TYPE(type, function)                    \
00407     template <>                                                   \
00408     inline HighFive::DataType HighFive::create_datatype<type>() { \
00409         return function();                                        \
00410     }
00411
00412 #include "bits/H5DataType_misc.hpp"
```

10.60 highfive/H5Easy.hpp File Reference

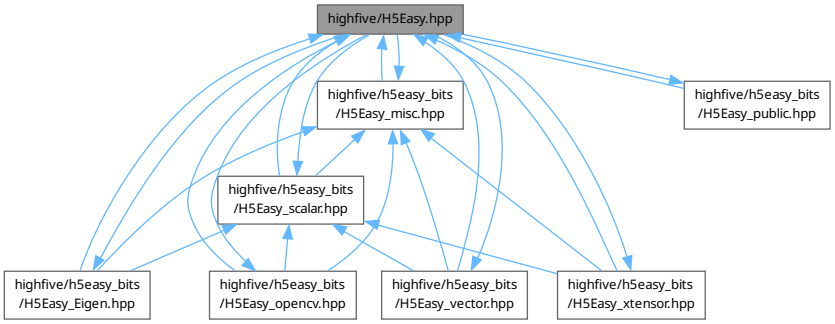
```
#include <string>
#include <vector>
```

```
#include <xtensor/xarray.hpp>
#include <xtensor/xtensor.hpp>
#include <Eigen/Eigen>
#include <opencv2/opencv.hpp>
#include "H5File.hpp"
#include "h5easy_bits/H5Easy_Eigen.hpp"
#include "h5easy_bits/H5Easy_misc.hpp"
#include "h5easy_bits/H5Easy_opencv.hpp"
#include "h5easy_bits/H5Easy_public.hpp"
#include "h5easy_bits/H5Easy_scalar.hpp"
#include "h5easy_bits/H5Easy_vector.hpp"
#include "h5easy_bits/H5Easy_xtensor.hpp"
```

Include dependency graph for H5Easy.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class H5Easy::Compression

  Signal to set compression level for written DataSets.
- class H5Easy::DumpOptions

  Define options for dumping data.

Namespaces

- namespace H5Easy

  Read/dump DataSets or Attribute using a minimalistic syntax. To this end, the functions are templated, and accept:

Enumerations

- enum class H5Easy::DumpMode { H5Easy::Create = 0 , H5Easy::Overwrite = 1 }

  Write mode for DataSets.
- enum class H5Easy::Flush { H5Easy::False = 0 , H5Easy::True = 1 }

  Signal to enable/disable automatic flushing after write operations.

Functions

- size_t H5Easy::getSize (const File &file, const std::string &path)

  Get the size of an existing DataSet in an open HDF5 file.
- std::vector< size_t > H5Easy::getShape (const File &file, const std::string &path)

  Get the shape of an existing DataSet in an readable file.
- template<class T >
  DataSet H5Easy::dump (File &file, const std::string &path, const T &data, DumpMode mode=DumpMode::Create)

  Write object (templated) to a (new) DataSet in an open HDF5 file.
- template<class T >
  DataSet H5Easy::dump (File &file, const std::string &path, const T &data, const DumpOptions &options)

  Write object (templated) to a (new) DataSet in an open HDF5 file.
- template<class T >
  DataSet H5Easy::dump (File &file, const std::string &path, const T &data, const std::vector< size_t > &idx)

  Write a scalar to a (new, extendible) DataSet in an open HDF5 file.
- template<class T >
  DataSet H5Easy::dump (File &file, const std::string &path, const T &data, const std::initializer_list< size_t > &idx)

  Write a scalar to a (new, extendable) DataSet in an open HDF5 file.
- template<class T >
  DataSet H5Easy::dump (File &file, const std::string &path, const T &data, const std::vector< size_t > &idx, const DumpOptions &options)

  Write a scalar to a (new, extendible) DataSet in an open HDF5 file.
- template<class T >
  DataSet H5Easy::dump (File &file, const std::string &path, const T &data, const std::initializer_list< size_t > &idx, const DumpOptions &options)

  Write a scalar to a (new, extendible) DataSet in an open HDF5 file.
- template<class T >
  T H5Easy::load (const File &file, const std::string &path, const std::vector< size_t > &idx)

  Load entry `{i, j, ...}` from a DataSet in an open HDF5 file to a scalar.
- template<class T >
  T H5Easy::load (const File &file, const std::string &path)

  Load a DataSet in an open HDF5 file to an object (templated).
- template<class T >
  Attribute H5Easy::dumpAttribute (File &file, const std::string &path, const std::string &key, const T &data, DumpMode mode=DumpMode::Create)

  Write object (templated) to a (new) Attribute in an open HDF5 file.
- template<class T >
  Attribute H5Easy::dumpAttribute (File &file, const std::string &path, const std::string &key, const T &data, const DumpOptions &options)

  Write object (templated) to a (new) Attribute in an open HDF5 file.
- template<class T >
  T H5Easy::loadAttribute (const File &file, const std::string &path, const std::string &key)

  Load a Attribute in an open HDF5 file to an object (templated).

10.61 H5Easy.hpp

Go to the documentation of this file.

```
00001 /*
00002  *  Copyright (c), 2017, Adrien Devresse <adrien.devresse@epfl.ch>
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009
00017
00018 #pragma once
00019
00020 #include <string>
00021 #include <vector>
00022
00023 // optionally enable xtensor plug-in and load the library
00024 #ifdef XTENSOR_VERSION_MAJOR
00025 #ifndef H5_USE_XTENSOR
00026 #define H5_USE_XTENSOR
00027 #endif
00028 #endif
00029
00030 #ifdef H5_USE_XTENSOR
00031 #include <xtensor/xarray.hpp>
00032 #include <xtensor/xtensor.hpp>
00033 #endif
00034
00035 // optionally enable Eigen plug-in and load the library
00036 #ifdef EIGEN_WORLD_VERSION
00037 #ifndef H5_USE_EIGEN
00038 #define H5_USE_EIGEN
00039 #endif
00040 #endif
00041
00042 #ifdef H5_USE_EIGEN
00043 #include <Eigen/Eigen>
00044 #endif
00045
00046 // optionally enable OpenCV plug-in and load the library
00047 #ifdef CV_MAJOR_VERSION
00048 #ifndef H5_USE_OPENCV
00049 #define H5_USE_OPENCV
00050 #endif
00051 #endif
00052
00053 #ifdef H5_USE_OPENCV
00054 #include <opencv2/opencv.hpp>
00055 #endif
00056
00057 #include "H5File.hpp"
00058
00059 namespace H5Easy {
00060
00061 using HighFive::AtomicType;
00062 using HighFive::Attribute;
00063 using HighFive::Chunking;
00064 using HighFive::DataSet;
00065 using HighFive::DataSetCreateProps;
00066 using HighFive::DataSpace;
00067 using HighFive::Deflate;
00068 using HighFive::Exception;
00069 using HighFive::File;
00070 using HighFive::ObjectType;
00071 using HighFive::Shuffle;
00072
00075 enum class DumpMode {
00076     Create = 0,
00077     Overwrite = 1
00078 };
00079
00082 enum class Flush {
00083     False = 0,
00084     True = 1
00085 };
00086
00089 class Compression {
00090   public:
00096     explicit Compression(bool enable = true);
00097
00102     template <class T>
00103     Compression(T level);
00104
```

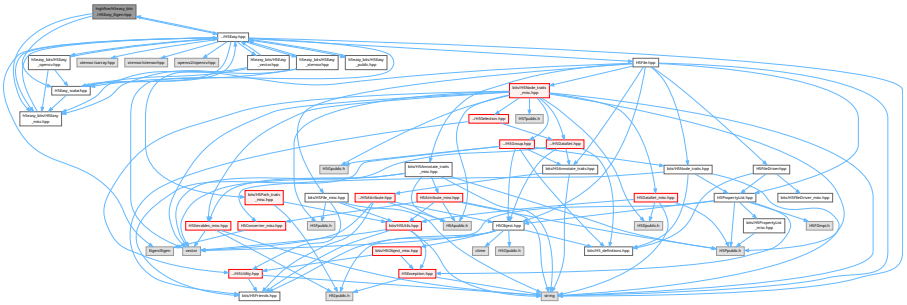
```
00107     inline unsigned get() const;
00108
00109   private:
00110     unsigned m_compression_level;
00111 };
00112
00121 class DumpOptions {
00122   public:
00125     DumpOptions() = default;
00126
00130     template <class... Args>
00131     DumpOptions(Args... args) {
00132         set(args...);
00133     }
00134
00138     inline void set(DumpMode mode);
00139
00143     inline void set(Flush mode);
00144
00148     inline void set(const Compression& level);
00149
00154     template <class T, class... Args>
00155     inline void set(T arg, Args... args);
00156
00160     template <class T>
00161     inline void setChunkSize(const std::vector<T>& shape);
00162
00166     inline void setChunkSize(std::initializer_list<size_t> shape);
00167
00171     inline bool overwrite() const;
00172
00176     inline bool flush() const;
00177
00181     inline bool compress() const;
00182
00186     inline unsigned getCompressionLevel() const;
00187
00192     inline bool isChunked() const;
00193
00197     inline std::vector<hsize_t> getChunkSize() const;
00198
00199   private:
00200     bool m_overwrite = false;
00201     bool m_flush = true;
00202     unsigned m_compression_level = 0;
00203     std::vector<hsize_t> m_chunk_size = {};
00204 };
00205
00213 inline size_t getSize(const File& file, const std::string& path);
00214
00222 inline std::vector<size_t> getShape(const File& file, const std::string& path);
00223
00234 template <class T>
00235 inline DataSet dump(File& file,
00236                     const std::string& path,
00237                     const T& data,
00238                     DumpMode mode = DumpMode::Create);
00239
00250 template <class T>
00251 inline DataSet dump(File& file, const std::string& path, const T& data, const DumpOptions& options);
00252
00263 template <class T>
00264 inline DataSet dump(File& file,
00265                     const std::string& path,
00266                     const T& data,
00267                     const std::vector<size_t>& idx);
00268
00279 template <class T>
00280 inline DataSet dump(File& file,
00281                     const std::string& path,
00282                     const T& data,
00283                     const std::initializer_list<size_t>& idx);
00284
00296 template <class T>
00297 inline DataSet dump(File& file,
00298                     const std::string& path,
00299                     const T& data,
00300                     const std::vector<size_t>& idx,
00301                     const DumpOptions& options);
00302
00314 template <class T>
00315 inline DataSet dump(File& file,
00316                     const std::string& path,
00317                     const T& data,
00318                     const std::initializer_list<size_t>& idx,
00319                     const DumpOptions& options);
00320
```

```
00330 template <class T>
00331 inline T load(const File& file, const std::string& path, const std::vector<size_t>& idx);
00332
00341 template <class T>
00342 inline T load(const File& file, const std::string& path);
00343
00355 template <class T>
00356 inline Attribute dumpAttribute(File& file,
00357                                const std::string& path,
00358                                const std::string& key,
00359                                const T& data,
00360                                DumpMode mode = DumpMode::Create);
00361
00373 template <class T>
00374 inline Attribute dumpAttribute(File& file,
00375                                const std::string& path,
00376                                const std::string& key,
00377                                const T& data,
00378                                const DumpOptions& options);
00379
00389 template <class T>
00390 inline T loadAttribute(const File& file, const std::string& path, const std::string& key);
00391
00392 }  // namespace H5Easy
00393
00394 #include "h5easy_bits/H5Easy_Eigen.hpp"
00395 #include "h5easy_bits/H5Easy_misc.hpp"
00396 #include "h5easy_bits/H5Easy_opencv.hpp"
00397 #include "h5easy_bits/H5Easy_public.hpp"
00398 #include "h5easy_bits/H5Easy_scalar.hpp"
00399 #include "h5easy_bits/H5Easy_vector.hpp"
00400 #include "h5easy_bits/H5Easy_xtensor.hpp"
```

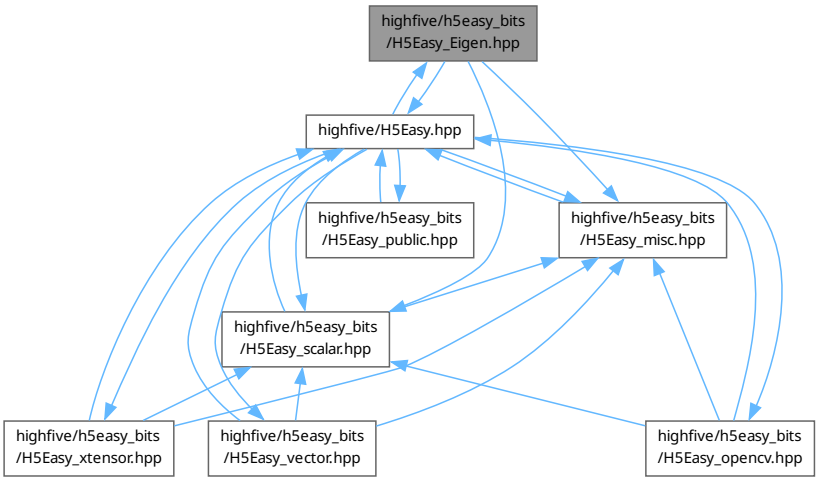
10.62 highfive/h5easy_bits/H5Easy_Eigen.hpp File Reference

```
#include "../H5Easy.hpp"
#include "H5Easy_misc.hpp"
#include "H5Easy_scalar.hpp"
```

Include dependency graph for H5Easy_Eigen.hpp:



This graph shows which files directly or indirectly include this file:



Namespaces

- namespace H5Easy

  Read/dump DataSets or Attribute using a minimalistic syntax. To this end, the functions are templated, and accept:

10.63 H5Easy_Eigen.hpp

Go to the documentation of this file.

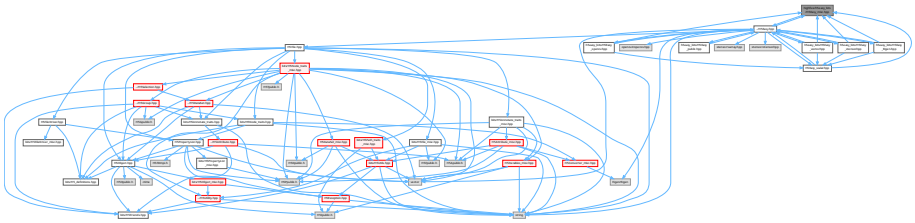
```
00001 /*
00002  *  Copyright (c), 2017, Adrien Devresse <adrien.devresse@epfl.ch>
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
00011 #include "../H5Easy.hpp"
00012 #include "H5Easy_misc.hpp"
00013 #include "H5Easy_scalar.hpp"
00014
00015 #ifdef H5_USE_EIGEN
00016
00017 namespace H5Easy {
00018
00019 namespace detail {
00020
00021 template <typename T>
00022 struct io_impl<T, typename std::enable_if<std::is_base_of<Eigen::DenseBase<T>, T>::value>::type> {
00023     // abbreviate row-major <-> col-major conversions
00024     template <typename S>
00025     struct types {
00026         using row_major = Eigen::Ref<
00027             const Eigen::Array<typename std::decay<T>::type::Scalar,
00028                                std::decay<T>::type::RowsAtCompileTime,
00029                                std::decay<T>::type::ColsAtCompileTime,
00030                                std::decay<T>::type::ColsAtCompileTime == 1 ? Eigen::ColMajor
00031                                                                            : Eigen::RowMajor,
00032                                std::decay<T>::type::MaxRowsAtCompileTime,
00033                                std::decay<T>::type::MaxColsAtCompileTime>,
00034             0,
00035             Eigen::InnerStride<1»;
00036
```

```
00037         using col_major =
00038             Eigen::Map<Eigen::Array<typename std::decay<T>::type::Scalar,
00039                                     std::decay<T>::type::RowsAtCompileTime,
00040                                     std::decay<T>::type::ColsAtCompileTime,
00041                                     std::decay<T>::type::ColsAtCompileTime == 1 ? Eigen::ColMajor
00042                                                                                 : Eigen::RowMajor,
00043                                     std::decay<T>::type::MaxRowsAtCompileTime,
00044                                     std::decay<T>::type::MaxColsAtCompileTime>>;
00045     };
00046
00047     // return the shape of Eigen::DenseBase<T> object as size 1 or 2 "std::vector<size_t>"
00048     inline static std::vector<size_t> shape(const T& data) {
00049         if (std::decay<T>::type::RowsAtCompileTime == 1) {
00050             return {static_cast<size_t>(data.cols())};
00051         }
00052         if (std::decay<T>::type::ColsAtCompileTime == 1) {
00053             return {static_cast<size_t>(data.rows())};
00054         }
00055         return {static_cast<size_t>(data.rows()), static_cast<size_t>(data.cols())};
00056     }
00057
00058     using EigenIndex = Eigen::DenseIndex;
00059
00060     // get the shape of a "DataSet" as size 2 "std::vector<Eigen::Index>"
00061     template <class D>
00062     inline static std::vector<EigenIndex> shape(const File& file,
00063                                                 const std::string& path,
00064                                                 const D& dataset,
00065                                                 int RowsAtCompileTime) {
00066         std::vector<size_t> dims = dataset.getDimensions();
00067
00068         if (dims.size() == 1 && RowsAtCompileTime == 1) {
00069             return std::vector<EigenIndex>{1u, static_cast<EigenIndex>(dims[0])};
00070         }
00071         if (dims.size() == 1) {
00072             return std::vector<EigenIndex>{static_cast<EigenIndex>(dims[0]), 1u};
00073         }
00074         if (dims.size() == 2) {
00075             return std::vector<EigenIndex>{static_cast<EigenIndex>(dims[0]),
00076                                            static_cast<EigenIndex>(dims[1])};
00077         }
00078
00079         throw detail::error(file, path, "H5Easy::load: Inconsistent rank");
00080     }
00081
00082     inline static DataSet dump(File& file,
00083                                const std::string& path,
00084                                const T& data,
00085                                const DumpOptions& options) {
00086         using row_major_type = typename types<T>::row_major;
00087         using value_type = typename std::decay<T>::type::Scalar;
00088         row_major_type row_major(data);
00089         DataSet dataset = initDataset<value_type>(file, path, shape(data), options);
00090         dataset.write_raw(row_major.data());
00091         if (options.flush()) {
00092             file.flush();
00093         }
00094         return dataset;
00095     }
00096
00097     inline static T load(const File& file, const std::string& path) {
00098         DataSet dataset = file.getDataSet(path);
00099         std::vector<typename T::Index> dims = shape(file, path, dataset, T::RowsAtCompileTime);
00100         T data(dims[0], dims[1]);
00101         dataset.read(data.data());
00102         if (data.IsVectorAtCompileTime || data.IsRowMajor) {
00103             return data;
00104         }
00105         using col_major = typename types<T>::col_major;
00106         return col_major(data.data(), dims[0], dims[1]);
00107     }
00108
00109     inline static Attribute dumpAttribute(File& file,
00110                                           const std::string& path,
00111                                           const std::string& key,
00112                                           const T& data,
00113                                           const DumpOptions& options) {
00114         using row_major_type = typename types<T>::row_major;
00115         using value_type = typename std::decay<T>::type::Scalar;
00116         row_major_type row_major(data);
00117         Attribute attribute = initAttribute<value_type>(file, path, key, shape(data), options);
00118         attribute.write_raw(row_major.data());
00119         if (options.flush()) {
00120             file.flush();
00121         }
00122         return attribute;
00123     }
```

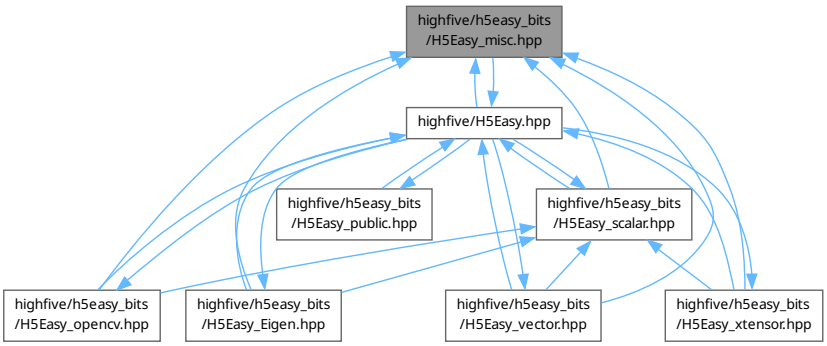
```
00124
00125     inline static T loadAttribute(const File& file,
00126                                   const std::string& path,
00127                                   const std::string& key) {
00128         DataSet dataset = file.getDataSet(path);
00129         Attribute attribute = dataset.getAttribute(key);
00130         DataSpace dataspace = attribute.getSpace();
00131         std::vector<typename T::Index> dims = shape(file, path, dataspace, T::RowsAtCompileTime);
00132         T data(dims[0], dims[1]);
00133         attribute.read(data.data());
00134         if (data.IsVectorAtCompileTime || data.IsRowMajor) {
00135             return data;
00136         }
00137         using col_major = typename types<T>::col_major;
00138         return col_major(data.data(), dims[0], dims[1]);
00139     }
00140 };
00141
00142 }  // namespace detail
00143 }  // namespace H5Easy
00144
00145 #endif  // H5_USE_EIGEN
```

10.64 highfive/h5easy_bits/H5Easy_misc.hpp File Reference

`#include ¨../H5Easy.hpp¨`
Include dependency graph for H5Easy_misc.hpp:



This graph shows which files directly or indirectly include this file:



Namespaces

- namespace H5Easy

  Read/dump DataSets or Attribute using a minimalistic syntax. To this end, the functions are templated, and accept:

10.65 H5Easy_misc.hpp

Go to the documentation of this file.

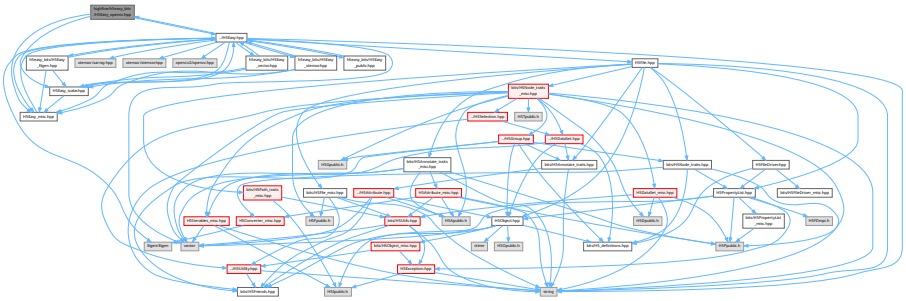
```
00001 /*
00002  *  Copyright (c), 2017, Adrien Devresse <adrien.devresse@epfl.ch>
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
00011 #include "../H5Easy.hpp"
00012
00013 namespace H5Easy {
00014
00015 namespace detail {
00016
00017 // Generate error-stream and return "Exception" (not yet thrown).
00018 inline Exception error(const File& file, const std::string& path, const std::string& message) {
00019     std::ostringstream ss;
00020     ss « message « std::endl
00021        « "Path: " « path « std::endl
00022        « "Filename: " « file.getName() « std::endl;
00023     return Exception(ss.str());
00024 }
00025
00026 // Generate specific dump error
00027 inline Exception dump_error(File& file, const std::string& path) {
00028     if (file.getObjectType(path) == ObjectType::Dataset) {
00029         return error(file,
00030                      path,
00031                      "H5Easy: Dataset already exists, dump with H5Easy::DumpMode::Overwrite "
00032                      "to overwrite (with an array of the same shape).");
00033     } else {
00034         return error(
00035             file,
00036             path,
00037             "H5Easy: path exists, but does not correspond to a Dataset. Dump not possible.");
00038     }
00039 }
00040
00041 // get a opened DataSet: nd-array
00042 template <class T>
00043 inline DataSet initDataset(File& file,
00044                            const std::string& path,
00045                            const std::vector<size_t>& shape,
00046                            const DumpOptions& options) {
00047     if (!file.exist(path)) {
00048         if (!options.compress() && !options.isChunked()) {
00049             return file.createDataSet<T>(path, DataSpace(shape), {}, {}, true);
00050         } else {
00051             std::vector<hsize_t> chunks(shape.begin(), shape.end());
00052             if (options.isChunked()) {
00053                 chunks = options.getChunkSize();
00054                 if (chunks.size() != shape.size()) {
00055                     throw error(file, path, "H5Easy::dump: Incorrect rank ChunkSize");
00056                 }
00057             }
00058             DataSetCreateProps props;
00059             props.add(Chunking(chunks));
00060             if (options.compress()) {
00061                 props.add(Shuffle());
00062                 props.add(Deflate(options.getCompressionLevel()));
00063             }
00064             return file.createDataSet<T>(path, DataSpace(shape), props, {}, true);
00065         }
00066     } else if (options.overwrite() && file.getObjectType(path) == ObjectType::Dataset) {
00067         DataSet dataset = file.getDataSet(path);
00068         if (dataset.getDimensions() != shape) {
00069             throw error(file, path, "H5Easy::dump: Inconsistent dimensions");
00070         }
00071         return dataset;
00072     }
00073     throw dump_error(file, path);
00074 }
00075
00076 // get a opened DataSet: scalar
00077 template <class T>
00078 inline DataSet initScalarDataset(File& file,
00079                                  const std::string& path,
00080                                  const T& data,
00081                                  const DumpOptions& options) {
00082     if (!file.exist(path)) {
```

```
00083         return file.createDataSet<T>(path, DataSpace::From(data), {}, {}, true);
00084     } else if (options.overwrite() && file.getObjectType(path) == ObjectType::Dataset) {
00085         DataSet dataset = file.getDataSet(path);
00086         if (dataset.getElementCount() != 1) {
00087             throw error(file, path, "H5Easy::dump: Existing field not a scalar");
00088         }
00089         return dataset;
00090     }
00091     throw dump_error(file, path);
00092 }
00093
00094 // get a opened Attribute: nd-array
00095 template <class T>
00096 inline Attribute initAttribute(File& file,
00097                                const std::string& path,
00098                                const std::string& key,
00099                                const std::vector<size_t>& shape,
00100                                const DumpOptions& options) {
00101     if (!file.exist(path)) {
00102         throw error(file, path, "H5Easy::dumpAttribute: DataSet does not exist");
00103     }
00104     if (file.getObjectType(path) != ObjectType::Dataset) {
00105         throw error(file, path, "H5Easy::dumpAttribute: path not a DataSet");
00106     }
00107     DataSet dataset = file.getDataSet(path);
00108     if (!dataset.hasAttribute(key)) {
00109         return dataset.createAttribute<T>(key, DataSpace(shape));
00110     } else if (options.overwrite()) {
00111         Attribute attribute = dataset.getAttribute(key);
00112         DataSpace dataspace = attribute.getSpace();
00113         if (dataspace.getDimensions() != shape) {
00114             throw error(file, path, "H5Easy::dumpAttribute: Inconsistent dimensions");
00115         }
00116         return attribute;
00117     }
00118     throw error(file,
00119                 path,
00120                 "H5Easy: Attribute exists, overwrite with H5Easy::DumpMode::Overwrite.");
00121 }
00122
00123 // get a opened Attribute: scalar
00124 template <class T>
00125 inline Attribute initScalarAttribute(File& file,
00126                                      const std::string& path,
00127                                      const std::string& key,
00128                                      const T& data,
00129                                      const DumpOptions& options) {
00130     if (!file.exist(path)) {
00131         throw error(file, path, "H5Easy::dumpAttribute: DataSet does not exist");
00132     }
00133     if (file.getObjectType(path) != ObjectType::Dataset) {
00134         throw error(file, path, "H5Easy::dumpAttribute: path not a DataSet");
00135     }
00136     DataSet dataset = file.getDataSet(path);
00137     if (!dataset.hasAttribute(key)) {
00138         return dataset.createAttribute<T>(key, DataSpace::From(data));
00139     } else if (options.overwrite()) {
00140         Attribute attribute = dataset.getAttribute(key);
00141         DataSpace dataspace = attribute.getSpace();
00142         if (dataspace.getElementCount() != 1) {
00143             throw error(file, path, "H5Easy::dumpAttribute: Existing field not a scalar");
00144         }
00145         return attribute;
00146     }
00147     throw error(file,
00148                 path,
00149                 "H5Easy: Attribute exists, overwrite with H5Easy::DumpMode::Overwrite.");
00150 }
00151
00152 }  // namespace detail
00153 }  // namespace H5Easy
```

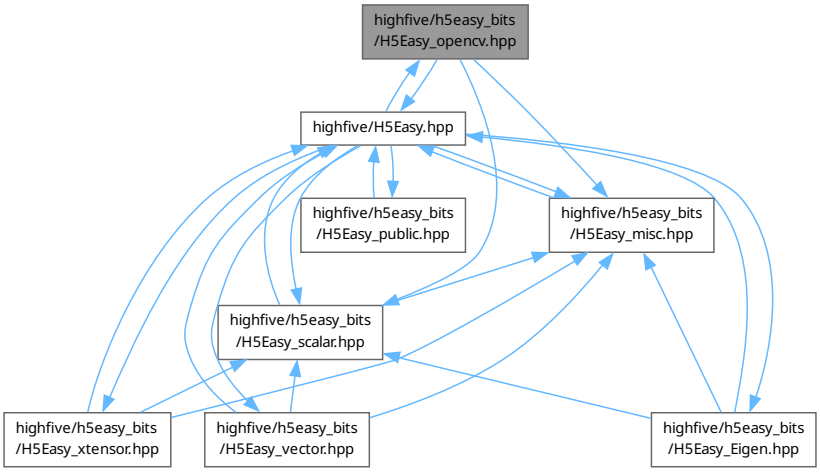
10.66 highfive/h5easy_bits/H5Easy_opencv.hpp File Reference

```
#include "../H5Easy.hpp"
#include "H5Easy_misc.hpp"
#include "H5Easy_scalar.hpp"
```

Include dependency graph for H5Easy_opencv.hpp:



This graph shows which files directly or indirectly include this file:



Namespaces

- namespace H5Easy

  Read/dump DataSets or Attribute using a minimalistic syntax. To this end, the functions are templated, and accept:

10.67 H5Easy_opencv.hpp

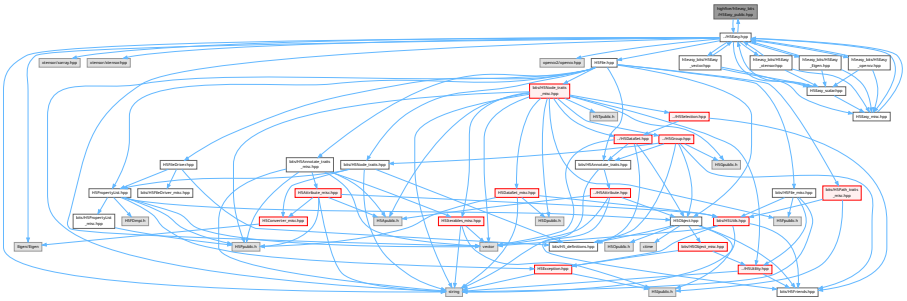
Go to the documentation of this file.

```
00001 /*
00002  *  Copyright (c), 2017, Adrien Devresse <adrien.devresse@epfl.ch>
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
00011 #include "../H5Easy.hpp"
00012 #include "H5Easy_misc.hpp"
00013 #include "H5Easy_scalar.hpp"
00014
```

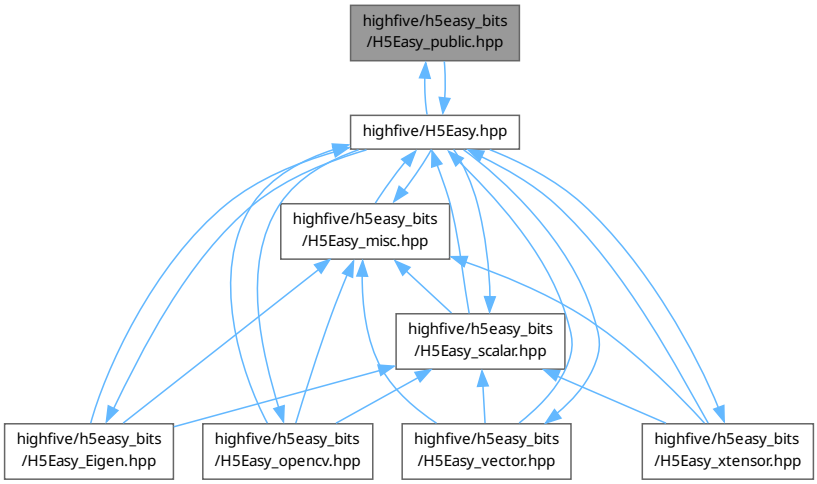
```
00015 #ifdef H5_USE_OPENCV
00016
00017 namespace H5Easy {
00018
00019 namespace detail {
00020
00021 template <class T>
00022 struct is_opencv: std::false_type {};
00023 template <class T>
00024 struct is_opencv<cv::Mat_<T>: std::true_type {};
00025
00026 template <typename T>
00027 struct io_impl<T, typename std::enable_if<is_opencv<T>::value>::type> {
00028     inline static std::vector<size_t> shape(const T& data) {
00029         return std::vector<size_t>{static_cast<size_t>(data.rows), static_cast<size_t>(data.cols)};
00030     }
00031
00032     inline static std::vector<int> shape(const File& file,
00033                                          const std::string& path,
00034                                          std::vector<size_t> dims) {
00035         if (dims.size() == 1) {
00036             return std::vector<int>{static_cast<int>(dims[0]), 1ul};
00037         }
00038         if (dims.size() == 2) {
00039             return std::vector<int>{static_cast<int>(dims[0]), static_cast<int>(dims[1])};
00040         }
00041
00042         throw detail::error(file, path, "H5Easy::load: Inconsistent rank");
00043     }
00044
00045     inline static DataSet dump(File& file,
00046                                const std::string& path,
00047                                const T& data,
00048                                const DumpOptions& options) {
00049         using value_type = typename T::value_type;
00050         DataSet dataset = initDataset<value_type>(file, path, shape(data), options);
00051         std::vector<value_type> v(data.begin(), data.end());
00052         dataset.write_raw(v.data());
00053         if (options.flush()) {
00054             file.flush();
00055         }
00056         return dataset;
00057     }
00058
00059     inline static T load(const File& file, const std::string& path) {
00060         using value_type = typename T::value_type;
00061         DataSet dataset = file.getDataSet(path);
00062         std::vector<int> dims = shape(file, path, dataset.getDimensions());
00063         T data(dims[0], dims[1]);
00064         dataset.read(reinterpret_cast<value_type*>(data.data));
00065         return data;
00066     }
00067
00068     inline static Attribute dumpAttribute(File& file,
00069                                           const std::string& path,
00070                                           const std::string& key,
00071                                           const T& data,
00072                                           const DumpOptions& options) {
00073         using value_type = typename T::value_type;
00074         Attribute attribute = initAttribute<value_type>(file, path, key, shape(data), options);
00075         std::vector<value_type> v(data.begin(), data.end());
00076         attribute.write_raw(v.data());
00077         if (options.flush()) {
00078             file.flush();
00079         }
00080         return attribute;
00081     }
00082
00083     inline static T loadAttribute(const File& file,
00084                                   const std::string& path,
00085                                   const std::string& key) {
00086         using value_type = typename T::value_type;
00087         DataSet dataset = file.getDataSet(path);
00088         Attribute attribute = dataset.getAttribute(key);
00089         DataSpace dataspace = attribute.getSpace();
00090         std::vector<int> dims = shape(file, path, dataspace.getDimensions());
00091         T data(dims[0], dims[1]);
00092         attribute.read(reinterpret_cast<value_type*>(data.data));
00093         return data;
00094     }
00095 };
00096
00097 }  // namespace detail
00098 }  // namespace H5Easy
00099
00100 #endif  // H5_USE_OPENCV
```

10.68 highfive/h5easy_bits/H5Easy_public.hpp File Reference

`#include ¨../H5Easy.hpp¨`
Include dependency graph for H5Easy_public.hpp:



This graph shows which files directly or indirectly include this file:



Namespaces

- namespace H5Easy

  Read/dump DataSets or Attribute using a minimalistic syntax. To this end, the functions are templated, and accept:

Functions

- size_t H5Easy::getSize (const File &file, const std::string &path)

  Get the size of an existing DataSet in an open HDF5 file.
- std::vector< size_t > H5Easy::getShape (const File &file, const std::string &path)

  Get the shape of an existing DataSet in an readable file.
- template<class T >
  DataSet H5Easy::dump (File &file, const std::string &path, const T &data, const DumpOptions &options)

Write object (templated) to a (new) DataSet in an open HDF5 file.

- template<class T >
  DataSet H5Easy::dump (File &file, const std::string &path, const T &data, DumpMode mode=DumpMode::Create)

  Write object (templated) to a (new) DataSet in an open HDF5 file.
- template<class T >
  DataSet H5Easy::dump (File &file, const std::string &path, const T &data, const std::vector< size_t > &idx, const DumpOptions &options)

  Write a scalar to a (new, extendible) DataSet in an open HDF5 file.
- template<class T >
  DataSet H5Easy::dump (File &file, const std::string &path, const T &data, const std::initializer_list< size_t > &idx, const DumpOptions &options)

  Write a scalar to a (new, extendible) DataSet in an open HDF5 file.
- template<class T >
  DataSet H5Easy::dump (File &file, const std::string &path, const T &data, const std::vector< size_t > &idx)

  Write a scalar to a (new, extendible) DataSet in an open HDF5 file.
- template<class T >
  DataSet H5Easy::dump (File &file, const std::string &path, const T &data, const std::initializer_list< size_t > &idx)

  Write a scalar to a (new, extendable) DataSet in an open HDF5 file.
- template<class T >
  T H5Easy::load (const File &file, const std::string &path, const std::vector< size_t > &idx)

  Load entry `{i, j, ...}` from a DataSet in an open HDF5 file to a scalar.
- template<class T >
  T H5Easy::load (const File &file, const std::string &path)

  Load a DataSet in an open HDF5 file to an object (templated).
- template<class T >
  Attribute H5Easy::dumpAttribute (File &file, const std::string &path, const std::string &key, const T &data, DumpMode mode=DumpMode::Create)

  Write object (templated) to a (new) Attribute in an open HDF5 file.
- template<class T >
  Attribute H5Easy::dumpAttribute (File &file, const std::string &path, const std::string &key, const T &data, const DumpOptions &options)

  Write object (templated) to a (new) Attribute in an open HDF5 file.
- template<class T >
  T H5Easy::loadAttribute (const File &file, const std::string &path, const std::string &key)

  Load a Attribute in an open HDF5 file to an object (templated).

10.69 H5Easy_public.hpp

Go to the documentation of this file.

```
00001 /*
00002  *  Copyright (c), 2017, Adrien Devresse <adrien.devresse@epfl.ch>
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
00011 #include "../H5Easy.hpp"
00012
00013 namespace H5Easy {
00014
00015 inline Compression::Compression(bool enable) {
00016     if (enable) {
00017         m_compression_level = 9;
00018     } else {
00019         m_compression_level = 0;
```

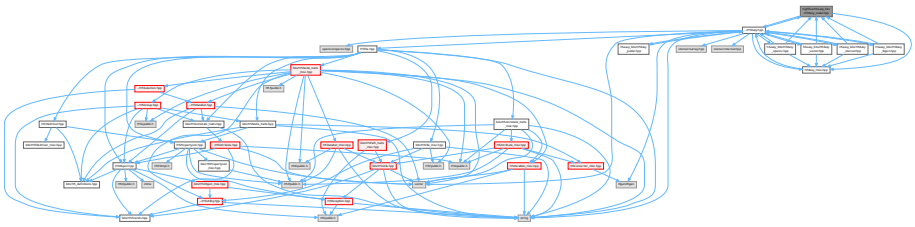
```
00020     }
00021 }
00022
00023 template <class T>
00024 inline Compression::Compression(T level)
00025     : m_compression_level(static_cast<unsigned>(level)) {}
00026
00027 inline unsigned Compression::get() const {
00028     return m_compression_level;
00029 }
00030
00031 inline void DumpOptions::set(DumpMode mode) {
00032     m_overwrite = static_cast<bool>(mode);
00033 }
00034
00035 inline void DumpOptions::set(Flush mode) {
00036     m_flush = static_cast<bool>(mode);
00037 }
00038
00039 inline void DumpOptions::set(const Compression& level) {
00040     m_compression_level = level.get();
00041 }
00042
00043 template <class T, class... Args>
00044 inline void DumpOptions::set(T arg, Args... args) {
00045     set(arg);
00046     set(args...);
00047 }
00048
00049 template <class T>
00050 inline void DumpOptions::setChunkSize(const std::vector<T>& shape) {
00051     m_chunk_size = std::vector<hsize_t>(shape.begin(), shape.end());
00052 }
00053
00054 inline void DumpOptions::setChunkSize(std::initializer_list<size_t> shape) {
00055     m_chunk_size = std::vector<hsize_t>(shape.begin(), shape.end());
00056 }
00057
00058 inline bool DumpOptions::overwrite() const {
00059     return m_overwrite;
00060 }
00061
00062 inline bool DumpOptions::flush() const {
00063     return m_flush;
00064 }
00065
00066 inline bool DumpOptions::compress() const {
00067     return m_compression_level > 0;
00068 }
00069
00070 inline unsigned DumpOptions::getCompressionLevel() const {
00071     return m_compression_level;
00072 }
00073
00074 inline bool DumpOptions::isChunked() const {
00075     return m_chunk_size.size() > 0;
00076 }
00077
00078 inline std::vector<hsize_t> DumpOptions::getChunkSize() const {
00079     return m_chunk_size;
00080 }
00081
00082 inline size_t getSize(const File& file, const std::string& path) {
00083     return file.getDataSet(path).getElementCount();
00084 }
00085
00086 inline std::vector<size_t> getShape(const File& file, const std::string& path) {
00087     return file.getDataSet(path).getDimensions();
00088 }
00089
00090 template <class T>
00091 inline DataSet dump(File& file,
00092                     const std::string& path,
00093                     const T& data,
00094                     const DumpOptions& options) {
00095     return detail::io_impl<T>::dump(file, path, data, options);
00096 }
00097
00098 template <class T>
00099 inline DataSet dump(File& file, const std::string& path, const T& data, DumpMode mode) {
00100     return detail::io_impl<T>::dump(file, path, data, DumpOptions(mode));
00101 }
00102
00103 template <class T>
00104 inline DataSet dump(File& file,
00105                     const std::string& path,
00106                     const T& data,
```

```
00107                     const std::vector<size_t>& idx,
00108                     const DumpOptions& options) {
00109     return detail::io_impl<T>::dump_extend(file, path, data, idx, options);
00110 }
00111
00112 template <class T>
00113 inline DataSet dump(File& file,
00114                     const std::string& path,
00115                     const T& data,
00116                     const std::initializer_list<size_t>& idx,
00117                     const DumpOptions& options) {
00118     return detail::io_impl<T>::dump_extend(file, path, data, idx, options);
00119 }
00120
00121 template <class T>
00122 inline DataSet dump(File& file,
00123                     const std::string& path,
00124                     const T& data,
00125                     const std::vector<size_t>& idx) {
00126     return detail::io_impl<T>::dump_extend(file, path, data, idx, DumpOptions());
00127 }
00128
00129 template <class T>
00130 inline DataSet dump(File& file,
00131                     const std::string& path,
00132                     const T& data,
00133                     const std::initializer_list<size_t>& idx) {
00134     return detail::io_impl<T>::dump_extend(file, path, data, idx, DumpOptions());
00135 }
00136
00137 template <class T>
00138 inline T load(const File& file, const std::string& path, const std::vector<size_t>& idx) {
00139     return detail::io_impl<T>::load_part(file, path, idx);
00140 }
00141
00142 template <class T>
00143 inline T load(const File& file, const std::string& path) {
00144     return detail::io_impl<T>::load(file, path);
00145 }
00146
00147 template <class T>
00148 inline Attribute dumpAttribute(File& file,
00149                                const std::string& path,
00150                                const std::string& key,
00151                                const T& data,
00152                                DumpMode mode) {
00153     return detail::io_impl<T>::dumpAttribute(file, path, key, data, DumpOptions(mode));
00154 }
00155
00156 template <class T>
00157 inline Attribute dumpAttribute(File& file,
00158                                const std::string& path,
00159                                const std::string& key,
00160                                const T& data,
00161                                const DumpOptions& options) {
00162     return detail::io_impl<T>::dumpAttribute(file, path, key, data, options);
00163 }
00164
00165 template <class T>
00166 inline T loadAttribute(const File& file, const std::string& path, const std::string& key) {
00167     return detail::io_impl<T>::loadAttribute(file, path, key);
00168 }
00169
00170 }  // namespace H5Easy
```

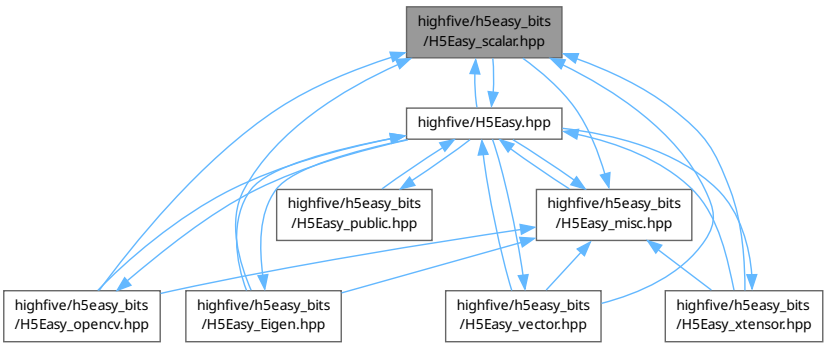
10.70 highfive/h5easy_bits/H5Easy_scalar.hpp File Reference

```
#include "../H5Easy.hpp"
#include "H5Easy_misc.hpp"
```

Include dependency graph for H5Easy_scalar.hpp:



This graph shows which files directly or indirectly include this file:



Namespaces

- namespace H5Easy

  Read/dump DataSets or Attribute using a minimalistic syntax. To this end, the functions are templated, and accept:

10.71 H5Easy_scalar.hpp

Go to the documentation of this file.

```
00001 /*
00002  *  Copyright (c), 2017, Adrien Devresse <adrien.devresse@epfl.ch>
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
00011 #include "../H5Easy.hpp"
00012 #include "H5Easy_misc.hpp"
00013
00014 namespace H5Easy {
00015
00016 namespace detail {
00017
00018 /*
00019 Base template for partial specialization: the fallback if specialized templates don't match.
00020 Used e.g. for scalars.
00021 */
00022 template <typename T, typename = void>
00023 struct io_impl {
00024     inline static DataSet dump(File& file,
```

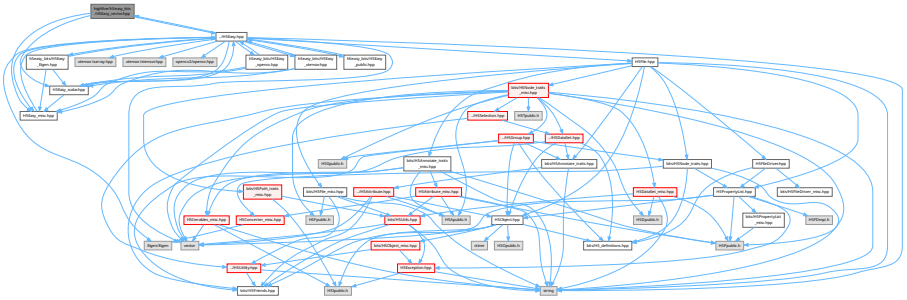
```
00025                               const std::string& path,
00026                               const T& data,
00027                               const DumpOptions& options) {
00028         DataSet dataset = initScalarDataset(file, path, data, options);
00029         dataset.write(data);
00030         if (options.flush()) {
00031             file.flush();
00032         }
00033         return dataset;
00034     }
00035
00036     inline static T load(const File& file, const std::string& path) {
00037         DataSet dataset = file.getDataSet(path);
00038         T data;
00039         dataset.read(data);
00040         return data;
00041     }
00042
00043     inline static Attribute dumpAttribute(File& file,
00044                                           const std::string& path,
00045                                           const std::string& key,
00046                                           const T& data,
00047                                           const DumpOptions& options) {
00048         Attribute attribute = initScalarAttribute(file, path, key, data, options);
00049         attribute.write(data);
00050         if (options.flush()) {
00051             file.flush();
00052         }
00053         return attribute;
00054     }
00055
00056     inline static T loadAttribute(const File& file,
00057                                   const std::string& path,
00058                                   const std::string& key) {
00059         DataSet dataset = file.getDataSet(path);
00060         Attribute attribute = dataset.getAttribute(key);
00061         T data;
00062         attribute.read(data);
00063         return data;
00064     }
00065
00066     inline static DataSet dump_extend(File& file,
00067                                       const std::string& path,
00068                                       const T& data,
00069                                       const std::vector<size_t>& idx,
00070                                       const DumpOptions& options) {
00071         std::vector<size_t> ones(idx.size(), 1);
00072
00073         if (file.exist(path)) {
00074             DataSet dataset = file.getDataSet(path);
00075             std::vector<size_t> dims = dataset.getDimensions();
00076             std::vector<size_t> shape = dims;
00077             if (dims.size() != idx.size()) {
00078                 throw detail::error(
00079                     file,
00080                     path,
00081                     "H5Easy::dump: Dimension of the index and the existing field do not match");
00082             }
00083             for (size_t i = 0; i < dims.size(); ++i) {
00084                 shape[i] = std::max(dims[i], idx[i] + 1);
00085             }
00086             if (shape != dims) {
00087                 dataset.resize(shape);
00088             }
00089             dataset.select(idx, ones).write(data);
00090             if (options.flush()) {
00091                 file.flush();
00092             }
00093             return dataset;
00094         }
00095
00096         std::vector<size_t> shape = idx;
00097         const size_t unlim = DataSpace::UNLIMITED;
00098         std::vector<size_t> unlim_shape(idx.size(), unlim);
00099         std::vector<hsize_t> chunks(idx.size(), 10);
00100         if (options.isChunked()) {
00101             chunks = options.getChunkSize();
00102             if (chunks.size() != idx.size()) {
00103                 throw error(file, path, "H5Easy::dump: Incorrect dimension ChunkSize");
00104             }
00105         }
00106         for (size_t& i: shape) {
00107             i++;
00108         }
00109         DataSpace dataspace = DataSpace(shape, unlim_shape);
00110         DataSetCreateProps props;
00111         props.add(Chunking(chunks));
```

```
00112         DataSet dataset = file.createDataSet(path, dataspace, AtomicType<T>(), props, {}, true);
00113         dataset.select(idx, ones).write(data);
00114         if (options.flush()) {
00115             file.flush();
00116         }
00117         return dataset;
00118     }
00119
00120     inline static T load_part(const File& file,
00121                               const std::string& path,
00122                               const std::vector<size_t>& idx) {
00123         std::vector<size_t> ones(idx.size(), 1);
00124         DataSet dataset = file.getDataSet(path);
00125         T data;
00126         dataset.select(idx, ones).read(data);
00127         return data;
00128     }
00129 };
00130
00131 }  // namespace detail
00132 }  // namespace H5Easy
```

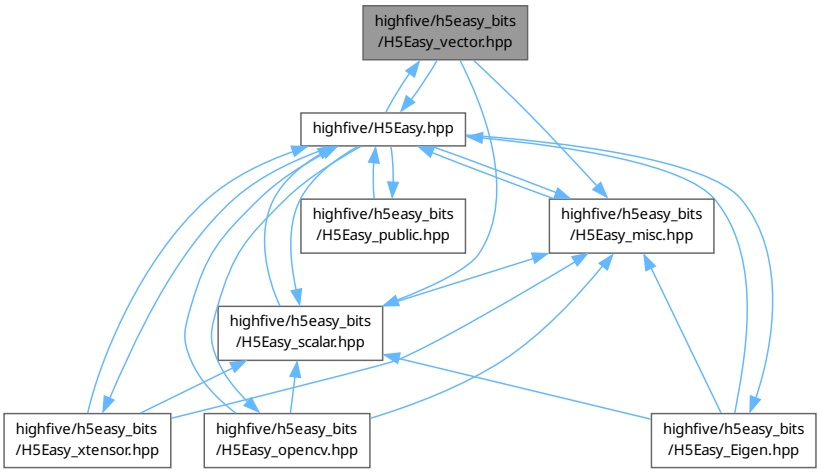
10.72 highfive/h5easy_bits/H5Easy_vector.hpp File Reference

```
#include "../H5Easy.hpp"
#include "H5Easy_misc.hpp"
#include "H5Easy_scalar.hpp"
```

Include dependency graph for H5Easy_vector.hpp:



This graph shows which files directly or indirectly include this file:



Namespaces

- namespace H5Easy

  Read/dump DataSets or Attribute using a minimalistic syntax. To this end, the functions are templated, and accept:

10.73 H5Easy_vector.hpp

Go to the documentation of this file.

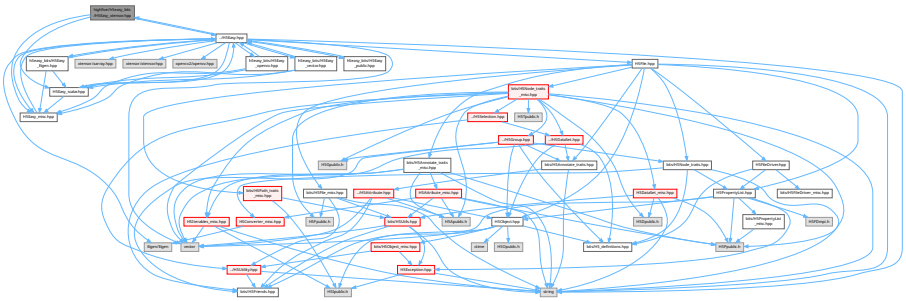
```
00001 /*
00002  *  Copyright (c), 2017, Adrien Devresse <adrien.devresse@epfl.ch>
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
00011 #include "../H5Easy.hpp"
00012 #include "H5Easy_misc.hpp"
00013 #include "H5Easy_scalar.hpp"
00014
00015 namespace H5Easy {
00016
00017 namespace detail {
00018
00019 template <class T>
00020 struct is_vector: std::false_type {};
00021 template <class T>
00022 struct is_vector<std::vector<T»: std::true_type {};
00023
00024 using HighFive::details::inspector;
00025
00026 template <typename T>
00027 struct io_impl<T, typename std::enable_if<is_vector<T>::value>::type> {
00028     inline static DataSet dump(File& file,
00029                                const std::string& path,
00030                                const T& data,
00031                                const DumpOptions& options) {
00032         using value_type = typename inspector<T>::base_type;
00033         auto dims = inspector<T>::getDimensions(data);
00034         DataSet dataset = initDataset<value_type>(file,
00035                                                   path,
00036                                                   std::vector<size_t>(dims.begin(), dims.end()),
00037                                                   options);
00038         dataset.write(data);
00039         if (options.flush()) {
00040             file.flush();
00041         }
00042         return dataset;
00043     }
00044
00045     inline static T load(const File& file, const std::string& path) {
00046         DataSet dataset = file.getDataSet(path);
00047         T data;
00048         dataset.read(data);
00049         return data;
00050     }
00051
00052     inline static Attribute dumpAttribute(File& file,
00053                                           const std::string& path,
00054                                           const std::string& key,
00055                                           const T& data,
00056                                           const DumpOptions& options) {
00057         using value_type = typename inspector<T>::base_type;
00058         auto dims = inspector<T>::getDimensions(data);
00059         std::vector<size_t> shape(dims.begin(), dims.end());
00060         Attribute attribute = initAttribute<value_type>(file, path, key, shape, options);
00061         attribute.write(data);
00062         if (options.flush()) {
00063             file.flush();
00064         }
00065         return attribute;
00066     }
00067
00068     inline static T loadAttribute(const File& file,
00069                                   const std::string& path,
00070                                   const std::string& key) {
00071         DataSet dataset = file.getDataSet(path);
```

```
00072         Attribute attribute = dataset.getAttribute(key);
00073         T data;
00074         attribute.read(data);
00075         return data;
00076     }
00077 };
00078
00079 }  // namespace detail
00080 }  // namespace H5Easy
```

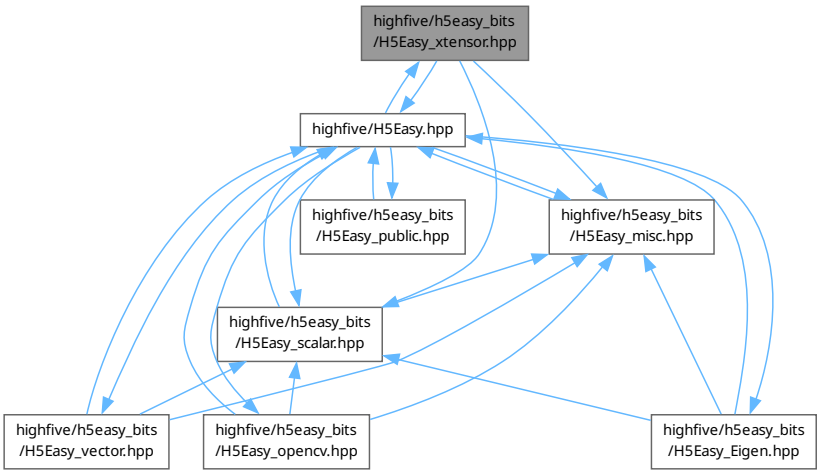
10.74 highfive/h5easy_bits/H5Easy_xtensor.hpp File Reference

```
#include "../H5Easy.hpp"
#include "H5Easy_misc.hpp"
#include "H5Easy_scalar.hpp"
```

Include dependency graph for H5Easy_xtensor.hpp:



This graph shows which files directly or indirectly include this file:



Namespaces

- namespace H5Easy

  Read/dump DataSets or Attribute using a minimalistic syntax. To this end, the functions are templated, and accept:

10.75 H5Easy_xtensor.hpp

Go to the documentation of this file.

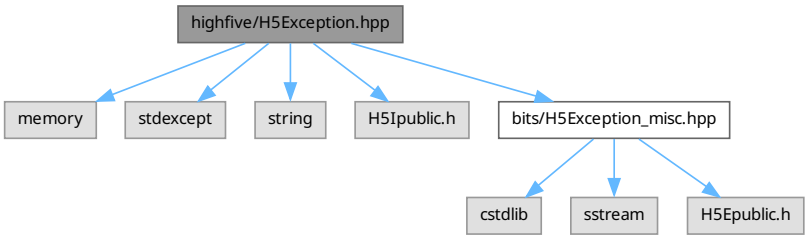
```
00001 /*
00002  *  Copyright (c), 2017, Adrien Devresse <adrien.devresse@epfl.ch>
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
00011 #include "../H5Easy.hpp"
00012 #include "H5Easy_misc.hpp"
00013 #include "H5Easy_scalar.hpp"
00014
00015 #ifdef H5_USE_XTENSOR
00016
00017 namespace H5Easy {
00018
00019 namespace detail {
00020
00021 template <typename T>
00022 struct io_impl<T, typename std::enable_if<xt::is_xexpression<T>::value>::type> {
00023     inline static std::vector<size_t> shape(const T& data) {
00024         return std::vector<size_t>(data.shape().cbegin(), data.shape().cend());
00025     }
00026
00027     inline static DataSet dump(File& file,
00028                                const std::string& path,
00029                                const T& data,
00030                                const DumpOptions& options) {
00031         using value_type = typename std::decay_t<T>::value_type;
00032         DataSet dataset = initDataset<value_type>(file, path, shape(data), options);
00033         dataset.write_raw(data.data());
00034         if (options.flush()) {
00035             file.flush();
00036         }
00037         return dataset;
00038     }
00039
00040     inline static T load(const File& file, const std::string& path) {
00041         static_assert(
00042             xt::has_data_interface<T>::value,
00043             "Cannot load to xt::xfunction or xt::xgenerator, use e.g. xt::xtensor or xt::xarray");
00044         DataSet dataset = file.getDataSet(path);
00045         std::vector<size_t> dims = dataset.getDimensions();
00046         T data = T::from_shape(dims);
00047         dataset.read(data.data());
00048         return data;
00049     }
00050
00051     inline static Attribute dumpAttribute(File& file,
00052                                           const std::string& path,
00053                                           const std::string& key,
00054                                           const T& data,
00055                                           const DumpOptions& options) {
00056         using value_type = typename std::decay_t<T>::value_type;
00057         Attribute attribute = initAttribute<value_type>(file, path, key, shape(data), options);
00058         attribute.write_raw(data.data());
00059         if (options.flush()) {
00060             file.flush();
00061         }
00062         return attribute;
00063     }
00064
00065     inline static T loadAttribute(const File& file,
00066                                   const std::string& path,
00067                                   const std::string& key) {
00068         static_assert(
00069             xt::has_data_interface<T>::value,
00070             "Cannot load to xt::xfunction or xt::xgenerator, use e.g. xt::xtensor or xt::xarray");
00071         DataSet dataset = file.getDataSet(path);
00072         Attribute attribute = dataset.getAttribute(key);
00073         DataSpace dataspace = attribute.getSpace();
00074         std::vector<size_t> dims = dataspace.getDimensions();
00075         T data = T::from_shape(dims);
00076         attribute.read(data.data());
00077         return data;
00078     }
00079 };
00080
00081 }  // namespace detail
00082 }  // namespace H5Easy
```

```
00083
00084 #endif  // H5_USE_XTENSOR
```

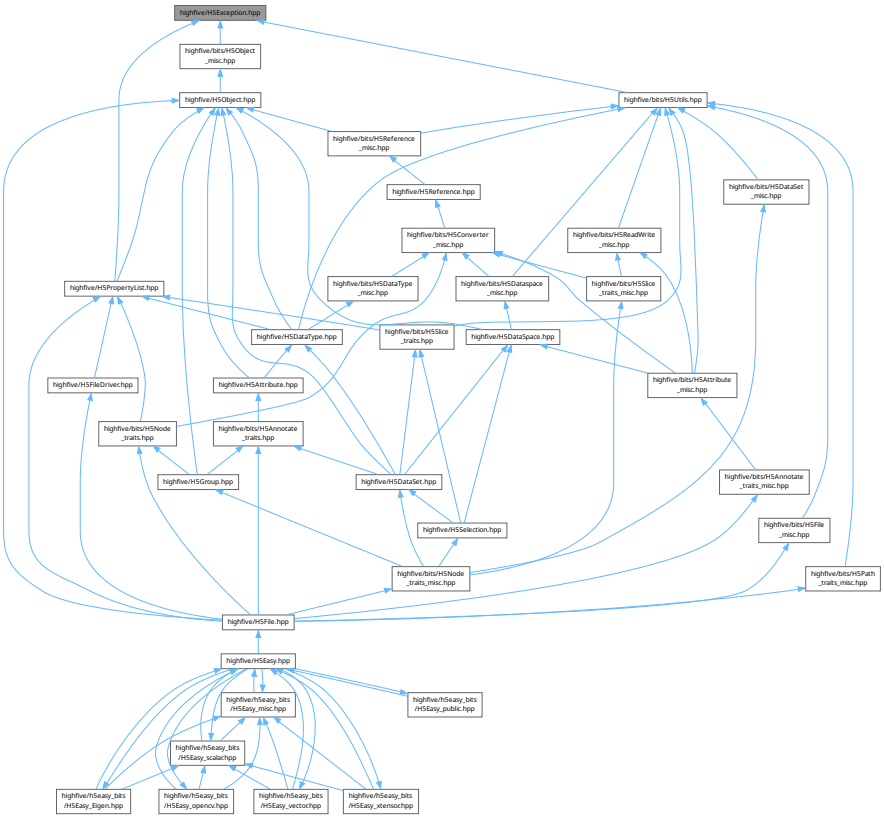
10.76 highfive/H5Exception.hpp File Reference

```
#include <memory>
#include <stdexcept>
#include <string>
#include <H5Ipublic.h>
#include ¨bits/H5Exception_misc.hpp¨
```

Include dependency graph for H5Exception.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class HighFive::Exception

  Basic HighFive Exception class.
- class HighFive::ObjectException

  Exception specific to HighFive Object interface.
- class HighFive::DataTypeException

  Exception specific to HighFive DataType interface.
- class HighFive::FileException

  Exception specific to HighFive File interface.
- class HighFive::DataSpaceException

  Exception specific to HighFive DataSpace interface.
- class HighFive::AttributeException

  Exception specific to HighFive Attribute interface.
- class HighFive::DataSetException

  Exception specific to HighFive DataSet interface.
- class HighFive::GroupException

  Exception specific to HighFive Group interface.
- class HighFive::PropertyException

  Exception specific to HighFive Property interface.
- class HighFive::ReferenceException

  Exception specific to HighFive Reference interface.

Namespaces

- namespace HighFive

10.77 H5Exception.hpp

Go to the documentation of this file.

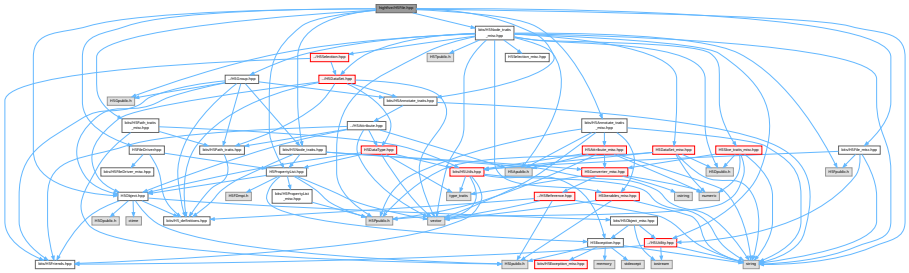
```
00001 /*
00002  *  Copyright (c), 2017, Adrien Devresse <adrien.devresse@epfl.ch>
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
00011 #include <memory>
00012 #include <stdexcept>
00013 #include <string>
00014
00015 #include <H5Ipublic.h>
00016
00017 namespace HighFive {
00018
00023 class Exception: public std::exception {
00024   public:
00025     Exception(const std::string& err_msg)
00026         : _errmsg(err_msg)
00027         , _next()
00028         , _err_major(0)
00029         , _err_minor(0) {}
00030
00031     virtual ~Exception() throw() {}
00032
00037     inline const char* what() const throw() override {
00038         return _errmsg.c_str();
00039     }
00040
```

```
00045     inline virtual void setErrorMsg(const std::string& errmsg) {
00046         _errmsg = errmsg;
00047     }
00048
00054     inline Exception* nextException() const {
00055         return _next.get();
00056     }
00057
00062     inline hid_t getErrMajor() const {
00063         return _err_major;
00064     }
00065
00070     inline hid_t getErrMinor() const {
00071         return _err_minor;
00072     }
00073
00074   protected:
00075     std::string _errmsg;
00076     std::shared_ptr<Exception> _next;
00077     hid_t _err_major, _err_minor;
00078
00079     friend struct HDF5ErrMapper;
00080 };
00081
00085 class ObjectException: public Exception {
00086   public:
00087     ObjectException(const std::string& err_msg)
00088         : Exception(err_msg) {}
00089 };
00090
00094 class DataTypeException: public Exception {
00095   public:
00096     DataTypeException(const std::string& err_msg)
00097         : Exception(err_msg) {}
00098 };
00099
00103 class FileException: public Exception {
00104   public:
00105     FileException(const std::string& err_msg)
00106         : Exception(err_msg) {}
00107 };
00108
00112 class DataSpaceException: public Exception {
00113   public:
00114     DataSpaceException(const std::string& err_msg)
00115         : Exception(err_msg) {}
00116 };
00117
00121 class AttributeException: public Exception {
00122   public:
00123     AttributeException(const std::string& err_msg)
00124         : Exception(err_msg) {}
00125 };
00126
00130 class DataSetException: public Exception {
00131   public:
00132     DataSetException(const std::string& err_msg)
00133         : Exception(err_msg) {}
00134 };
00135
00139 class GroupException: public Exception {
00140   public:
00141     GroupException(const std::string& err_msg)
00142         : Exception(err_msg) {}
00143 };
00144
00148 class PropertyException: public Exception {
00149   public:
00150     PropertyException(const std::string& err_msg)
00151         : Exception(err_msg) {}
00152 };
00153
00157 class ReferenceException: public Exception {
00158   public:
00159     ReferenceException(const std::string& err_msg)
00160         : Exception(err_msg) {}
00161 };
00162 }  // namespace HighFive
00163
00164 #include "bits/H5Exception_misc.hpp"
```

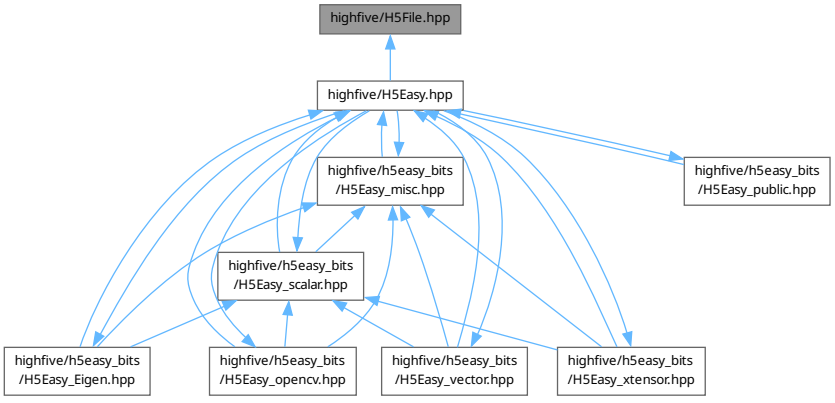
10.78 highfive/H5File.hpp File Reference

```
#include <string>
#include "H5FileDriver.hpp"
#include "H5Object.hpp"
#include "H5PropertyList.hpp"
#include "bits/H5Annotate_traits.hpp"
#include "bits/H5Node_traits.hpp"
#include "bits/H5Annotate_traits_misc.hpp"
#include "bits/H5File_misc.hpp"
#include "bits/H5Node_traits_misc.hpp"
#include "bits/H5Path_traits_misc.hpp"
```

Include dependency graph for H5File.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class HighFive::File

  File class.

Namespaces

- namespace HighFive

10.79 H5File.hpp

Go to the documentation of this file.

```
00001 /*
00002  *  Copyright (c), 2017, Adrien Devresse <adrien.devresse@epfl.ch>
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00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
00011 #include <string>
00012
00013 #include "H5FileDriver.hpp"
00014 #include "H5Object.hpp"
00015 #include "H5PropertyList.hpp"
00016 #include "bits/H5Annotate_traits.hpp"
00017 #include "bits/H5Node_traits.hpp"
00018
00019 namespace HighFive {
00020
00024 class File: public Object, public NodeTraits<File>, public AnnotateTraits<File> {
00025   public:
00026     const static ObjectType type = ObjectType::File;
00027
00028     enum : unsigned {
00030         ReadOnly = 0x00u,
00032         ReadWrite = 0x01u,
00034         Truncate = 0x02u,
00036         Excl = 0x04u,
00038         Debug = 0x08u,
00040         Create = 0x10u,
00042         Overwrite = Truncate,
00044         OpenOrCreate = ReadWrite | Create
00045     };
00046
00054     explicit File(const std::string& filename,
00055                   unsigned openFlags = ReadOnly,
00056                   const FileAccessProps& fileAccessProps = FileAccessProps::Default());
00057
00066     File(const std::string& filename,
00067          unsigned openFlags,
00068          const FileCreateProps& fileCreateProps,
00069          const FileAccessProps& fileAccessProps = FileAccessProps::Default());
00070
00074     const std::string& getName() const noexcept;
00075
00076
00078     std::string getPath() const noexcept {
00079         return "/";
00080     }
00081
00083     hsize_t getMetadataBlockSize() const;
00084
00086     std::pair<H5F_libver_t, H5F_libver_t> getVersionBounds() const;
00087
00088 #if H5_VERSION_GE(1, 10, 1)
00090     H5F_fspace_strategy_t getFileSpaceStrategy() const;
00091
00093     hsize_t getFileSpacePageSize() const;
00094 #endif
00095
00101     void flush();
00102
00104     FileCreateProps getCreatePropertyList() const {
00105         return details::get_plist<FileCreateProps>(*this, H5Fget_create_plist);
00106     }
00107
00109     FileAccessProps getAccessPropertyList() const {
00110         return details::get_plist<FileAccessProps>(*this, H5Fget_access_plist);
00111     }
00112
00113   protected:
00114     File() = default;
00115     using Object::Object;
00116
00117   private:
00118     mutable std::string _filename{};
00119
00120     template <typename>
00121     friend class PathTraits;
00122 };
00123
```
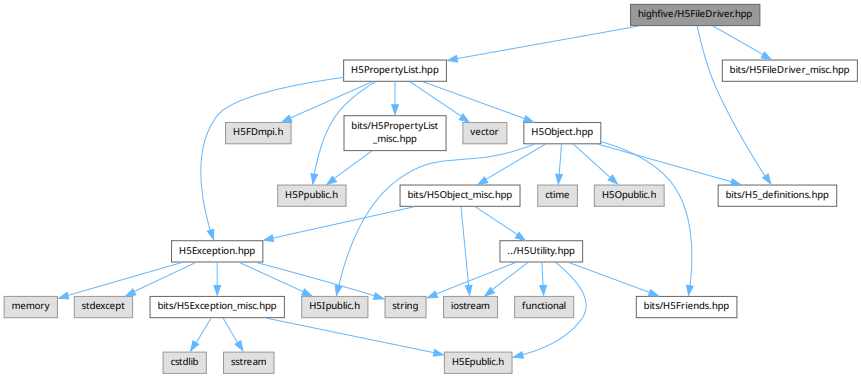

```
00124 }  // namespace HighFive
00125
00126 // H5File is the main user constructible -> bring in implementation headers
00127 #include "bits/H5Annotate_traits_misc.hpp"
00128 #include "bits/H5File_misc.hpp"
00129 #include "bits/H5Node_traits_misc.hpp"
00130 #include "bits/H5Path_traits_misc.hpp"
```

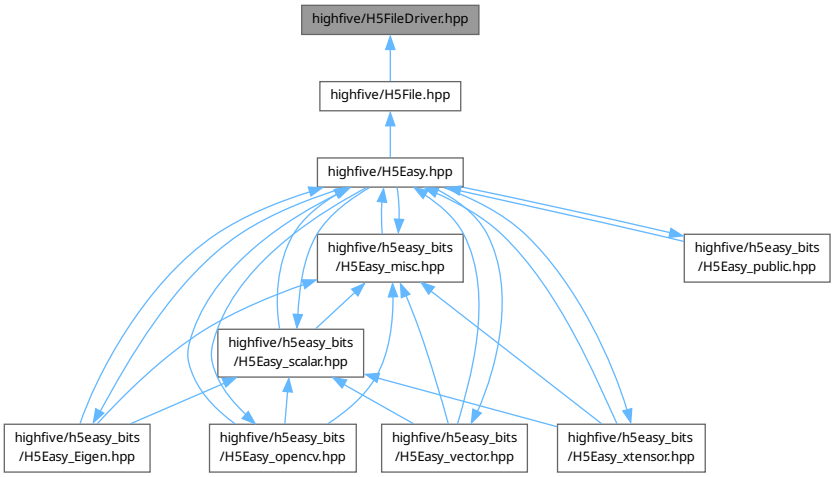
10.80 highfive/H5FileDriver.hpp File Reference

```
#include ¨H5PropertyList.hpp¨
#include ¨bits/H5_definitions.hpp¨
#include ¨bits/H5FileDriver_misc.hpp¨
```

Include dependency graph for H5FileDriver.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class HighFive::FileDriver

  file driver base concept
- class HighFive::MPIOFileDriver

  MPIIO Driver for Parallel HDF5.

Namespaces

- namespace HighFive

10.81 H5FileDriver.hpp

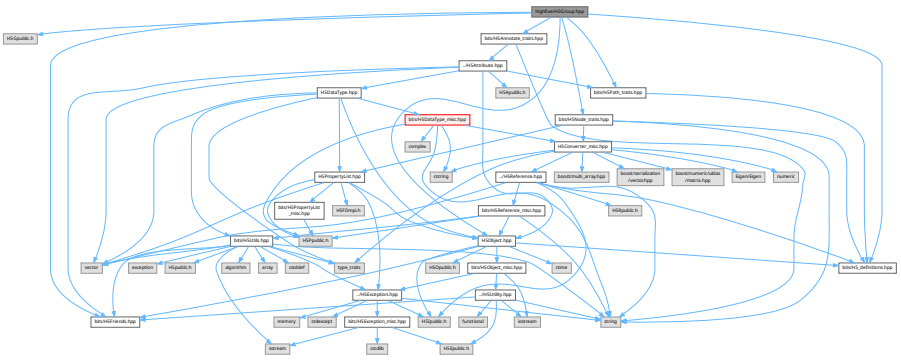
Go to the documentation of this file.

```
00001 /*
00002  *  Copyright (c), 2017, Adrien Devresse <adrien.devresse@epfl.ch>
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
00011 #include "H5PropertyList.hpp"
00012 #include "bits/H5_definitions.hpp"
00013
00014 namespace HighFive {
00015
00018 class H5_DEPRECATED("Use FileAccessProps directly") FileDriver: public FileAccessProps {};
00019
00020 #ifdef H5_HAVE_PARALLEL
00023 class H5_DEPRECATED("Add MPIOFileAccess directly to FileAccessProps") MPIOFileDriver
00024     : public FileAccessProps {
00025   public:
00026     inline MPIOFileDriver(MPI_Comm mpi_comm, MPI_Info mpi_info);
00027 };
00028 #endif
00029
00030 }  // namespace HighFive
00031
00032 #include "bits/H5FileDriver_misc.hpp"
```

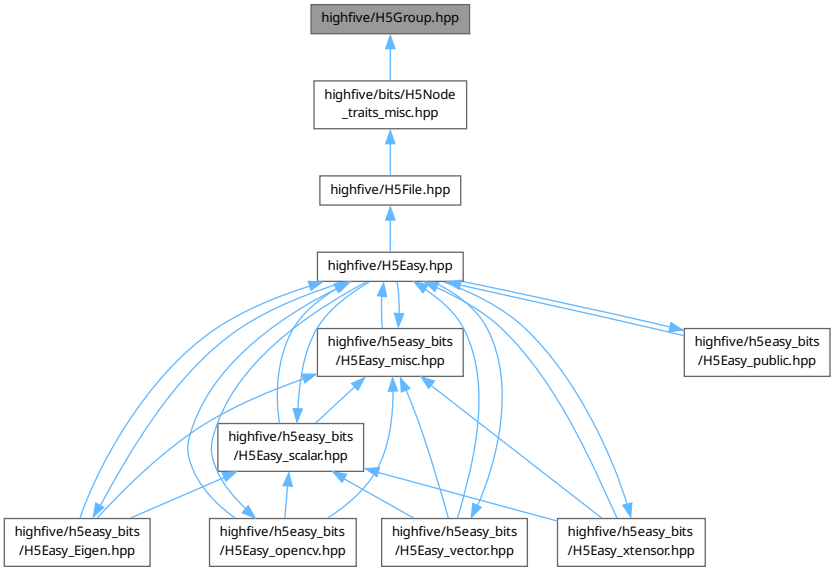
10.82 highfive/H5Group.hpp File Reference

```
#include <H5Gpublic.h>
#include ¨H5Object.hpp¨
#include ¨bits/H5Friends.hpp¨
#include ¨bits/H5_definitions.hpp¨
#include ¨bits/H5Annotate_traits.hpp¨
#include ¨bits/H5Node_traits.hpp¨
#include ¨bits/H5Path_traits.hpp¨
```

Include dependency graph for H5Group.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class HighFive::Group

  Represents an hdf5 group.

Namespaces

- namespace HighFive

10.83 H5Group.hpp

Go to the documentation of this file.

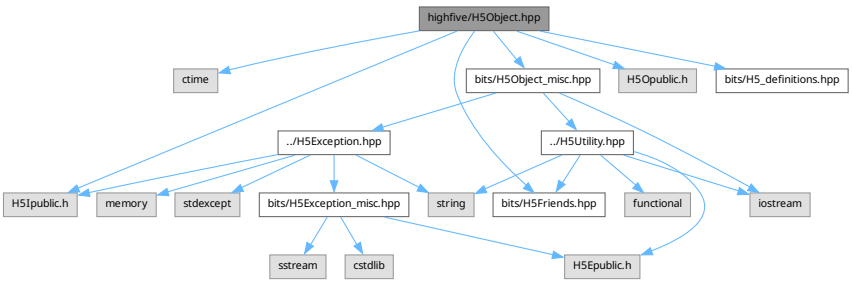
```
00001 /*
00002  *  Copyright (c), 2017, Adrien Devresse <adrien.devresse@epfl.ch>
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
00011 #include <H5Gpublic.h>
00012
00013 #include "H5Object.hpp"
00014 #include "bits/H5Friends.hpp"
00015 #include "bits/H5_definitions.hpp"
00016 #include "bits/H5Annotate_traits.hpp"
00017 #include "bits/H5Node_traits.hpp"
00018 #include "bits/H5Path_traits.hpp"
00019
00020 namespace HighFive {
00021
00022 namespace detail {
00038 Group make_group(hid_t);
00039 }  // namespace detail
```

```
00040
00043 class Group: public Object,
00044              public NodeTraits<Group>,
00045              public AnnotateTraits<Group>,
00046              public PathTraits<Group> {
00047   public:
00048     const static ObjectType type = ObjectType::Group;
00049
00051     H5_DEPRECATED("Default constructor creates unsafe uninitialized objects")
00052     Group() = default;
00053
00054     std::pair<unsigned int, unsigned int> getEstimatedLinkInfo() const;
00055
00057     GroupCreateProps getCreatePropertyList() const {
00058         return details::get_plist<GroupCreateProps>(*this, H5Gget_create_plist);
00059     }
00060
00061     Group(Object&& o) noexcept
00062         : Object(std::move(o)){};
00063
00064   protected:
00065     using Object::Object;
00066
00067     friend Group detail::make_group(hid_t);
00068     friend class File;
00069     friend class Reference;
00070 #if HIGHFIVE_HAS_FRIEND_DECLARATIONS
00071     template <typename Derivate>
00072     friend class ::HighFive::NodeTraits;
00073 #endif
00074 };
00075
00076 inline std::pair<unsigned int, unsigned int> Group::getEstimatedLinkInfo() const {
00077     auto gcpl = getCreatePropertyList();
00078     auto eli = EstimatedLinkInfo(gcpl);
00079     return std::make_pair(eli.getEntries(), eli.getNameLength());
00080 }
00081
00082 namespace detail {
00083 inline Group make_group(hid_t hid) {
00084     return Group(hid);
00085 }
00086 }  // namespace detail
00087
00088 }  // namespace HighFive
```

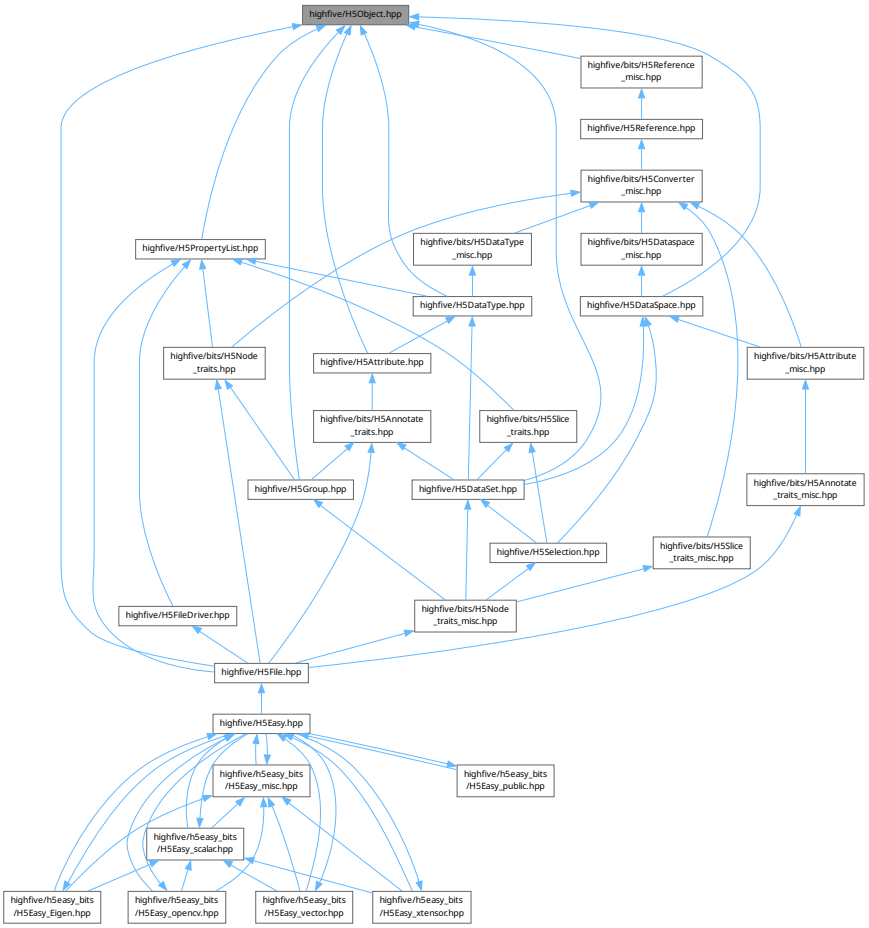
10.84 highfive/H5Object.hpp File Reference

```
#include <ctime>
#include <H5Ipublic.h>
#include <H5Opublic.h>
#include "bits/H5_definitions.hpp"
#include "bits/H5Friends.hpp"
#include "bits/H5Object_misc.hpp"
```

Include dependency graph for H5Object.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class HighFive::Object
- class HighFive::ObjectInfo

  A class for accessing hdf5 objects info.

Namespaces

- namespace HighFive

Enumerations

- enum class HighFive::ObjectType { HighFive::File , HighFive::Group , HighFive::UserDataType , HighFive::DataSpace , HighFive::Dataset , HighFive::Attribute , HighFive::Other }

  Enum of the types of objects (H5O api)

10.85 H5Object.hpp

Go to the documentation of this file.

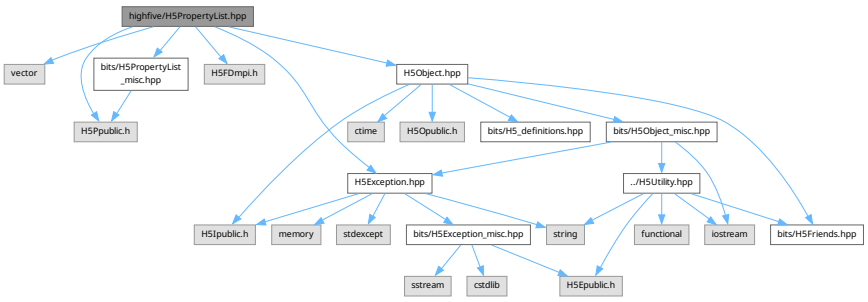
```
00001 /*
00002  *  Copyright (c), 2017, Adrien Devresse <adrien.devresse@epfl.ch>
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
00011 #include <ctime>
00012
00013 #include <H5Ipublic.h>
00014 #include <H5Opublic.h>
00015
00016 #include "bits/H5_definitions.hpp"
00017 #include "bits/H5Friends.hpp"
00018
00019 namespace HighFive {
00020
00024 enum class ObjectType {
00025     File,
00026     Group,
00027     UserDataType,
00028     DataSpace,
00029     Dataset,
00030     Attribute,
00031     Other  // Internal/custom object type
00032 };
00033
00034 namespace detail {
00050 Object make_object(hid_t hid);
00051 }  // namespace detail
00052
00053
00054 class Object {
00055   public:
00056     // move constructor, reuse hid
00057     Object(Object&& other) noexcept;
00058
00059     // decrease reference counter
00060     ~Object();
00061
00066     bool isValid() const noexcept;
00067
00073     hid_t getId() const noexcept;
00074
00078     ObjectInfo getInfo() const;
00079
00085     ObjectType getType() const;
00086
00087     // Check if refer to same object
00088     bool operator==(const Object& other) const noexcept {
00089         return _hid == other._hid;
00090     }
00091
00092   protected:
00093     // empty constructor
00094     Object();
00095
00096     // copy constructor, increase reference counter
00097     Object(const Object& other);
00098
00099     // Init with an low-level object id
00100     explicit Object(hid_t);
00101
00102     // Copy-Assignment operator
00103     Object& operator=(const Object& other);
00104
00105     hid_t _hid;
00106
00107   private:
00108     friend Object detail::make_object(hid_t);
00109     friend class Reference;
00110     friend class CompoundType;
00111
00112 #if HIGHFIVE_HAS_FRIEND_DECLARATIONS
00113     template <typename Derivate>
00114     friend class NodeTraits;
00115     template <typename Derivate>
00116     friend class AnnotateTraits;
00117     template <typename Derivate>
```

```
00118     friend class PathTraits;
00119 #endif
00120 };
00121
00122
00126 class ObjectInfo {
00127   public:
00130     H5_DEPRECATED("Deprecated since HighFive 2.2. Soon supporting VOL tokens")
00131     haddr_t getAddress() const noexcept;
00132
00134     size_t getRefCount() const noexcept;
00135
00137     time_t getCreationTime() const noexcept;
00138
00140     time_t getModificationTime() const noexcept;
00141
00142   protected:
00143 #if (H5Oget_info_vers < 3)
00144     H5O_info_t raw_info;
00145 #else
00146     // Use compat H5O_info1_t while getAddress() is supported (deprecated)
00147     H5O_info1_t raw_info;
00148 #endif
00149
00150     friend class Object;
00151 };
00152
00153 }  // namespace HighFive
00154
00155 #include "bits/H5Object_misc.hpp"
```

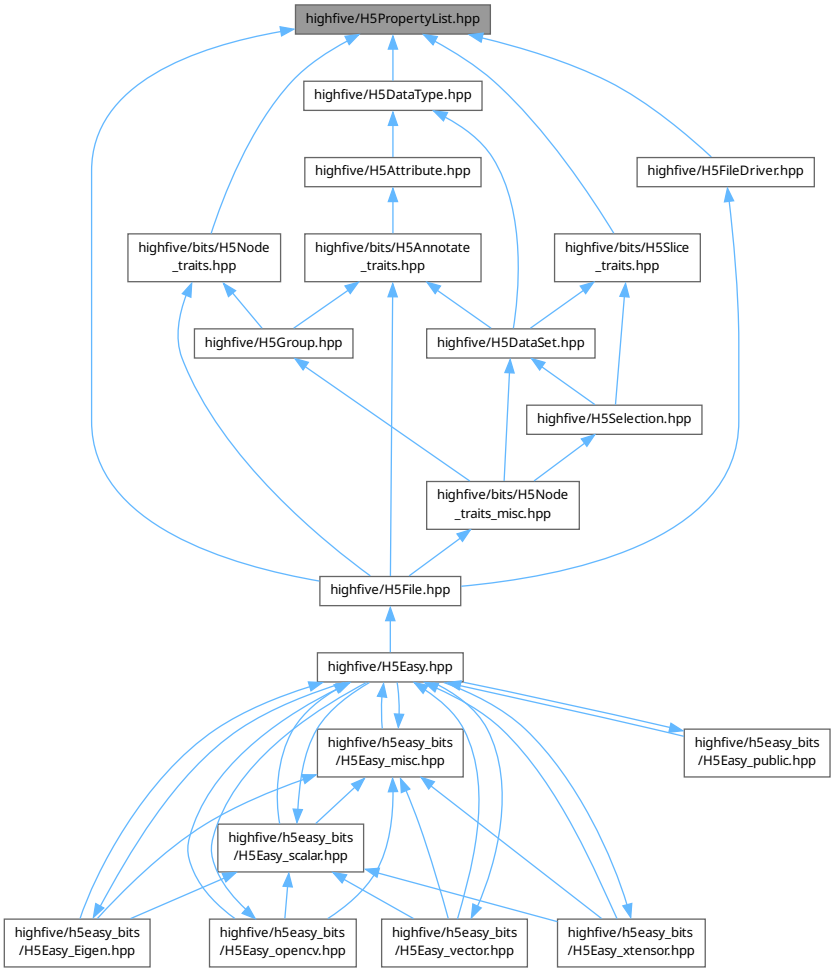
10.86 highfive/H5PropertyList.hpp File Reference

```
#include <vector>
#include <H5Ppublic.h>
#include <H5FDmpi.h>
#include ¨H5Exception.hpp¨
#include ¨H5Object.hpp¨
#include ¨bits/H5PropertyList_misc.hpp¨
```

Include dependency graph for H5PropertyList.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class HighFive::PropertyListBase

  Base Class for Property lists, providing global default.
- class HighFive::PropertyList< T >

  HDF5 property Lists.
- class HighFive::RawPropertyList< T >
- class HighFive::MPIOFileAccess

  Configure MPI access for the file.
- class HighFive::MPIOCollectiveMetadata

  Use collective MPI-IO for metadata read and write.
- class HighFive::MPIOCollectiveMetadataRead

  Use collective MPI-IO for metadata read?
- class HighFive::MPIOCollectiveMetadataWrite

  Use collective MPI-IO for metadata write?
- class HighFive::FileVersionBounds

  Configure the version bounds for the file.

- class HighFive::MetadataBlockSize

  Configure the metadata block size to use writing to files.
- class HighFive::EstimatedLinkInfo

  Set hints as to how many links to expect and their average length.
- class HighFive::Chunking
- class HighFive::Deflate
- class HighFive::Szip
- class HighFive::Shuffle
- class HighFive::AllocationTime

  When are datasets allocated?
- class HighFive::Caching
- class HighFive::CreateIntermediateGroup
- class HighFive::UseCollectiveIO
- class HighFive::MpioNoCollectiveCause

  The cause for non-collective I/O.
- struct HighFive::CreationOrder
- class HighFive::LinkCreationOrder

  Track and index creation order time.

Namespaces

- namespace HighFive

Typedefs

- using HighFive::ObjectCreateProps = PropertyList< PropertyType::OBJECT_CREATE >
- using HighFive::FileCreateProps = PropertyList< PropertyType::FILE_CREATE >
- using HighFive::FileAccessProps = PropertyList< PropertyType::FILE_ACCESS >
- using HighFive::DataSetCreateProps = PropertyList< PropertyType::DATASET_CREATE >
- using HighFive::DataSetAccessProps = PropertyList< PropertyType::DATASET_ACCESS >
- using HighFive::DataTransferProps = PropertyList< PropertyType::DATASET_XFER >
- using HighFive::GroupCreateProps = PropertyList< PropertyType::GROUP_CREATE >
- using HighFive::GroupAccessProps = PropertyList< PropertyType::GROUP_ACCESS >
- using HighFive::DataTypeCreateProps = PropertyList< PropertyType::DATATYPE_CREATE >
- using HighFive::DataTypeAccessProps = PropertyList< PropertyType::DATATYPE_ACCESS >
- using HighFive::StringCreateProps = PropertyList< PropertyType::STRING_CREATE >
- using HighFive::AttributeCreateProps = PropertyList< PropertyType::ATTRIBUTE_CREATE >
- using HighFive::ObjectCopyProps = PropertyList< PropertyType::OBJECT_COPY >
- using HighFive::LinkCreateProps = PropertyList< PropertyType::LINK_CREATE >
- using HighFive::LinkAccessProps = PropertyList< PropertyType::LINK_ACCESS >

Enumerations

- enum class HighFive::PropertyType : int {
  HighFive::OBJECT_CREATE , HighFive::FILE_CREATE , HighFive::FILE_ACCESS , HighFive::DATASET_CREATE ,
  HighFive::DATASET_ACCESS , HighFive::DATASET_XFER , HighFive::GROUP_CREATE , HighFive::GROUP_ACCESS ,
  HighFive::DATATYPE_CREATE , HighFive::DATATYPE_ACCESS , HighFive::STRING_CREATE , HighFive::ATTRIBUTE_CREATE ,
  HighFive::OBJECT_COPY , HighFive::LINK_CREATE , HighFive::LINK_ACCESS }

  Types of property lists.

10.87 H5PropertyList.hpp

Go to the documentation of this file.

```
00001 /*
00002  *  Copyright (c), 2017-2018, Adrien Devresse <adrien.devresse@epfl.ch>
00003  *                            Juan Hernando <juan.hernando@epfl.ch>
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
00011 #include <vector>
00012
00013 #include <H5Ppublic.h>
00014
00015 // Required by MPIOFileAccess
00016 #ifdef H5_HAVE_PARALLEL
00017 #include <H5FDmpi.h>
00018 #endif
00019
00020 #include "H5Exception.hpp"
00021 #include "H5Object.hpp"
00022
00023 namespace HighFive {
00024
00028 enum class PropertyType : int {
00029     OBJECT_CREATE,
00030     FILE_CREATE,
00031     FILE_ACCESS,
00032     DATASET_CREATE,
00033     DATASET_ACCESS,
00034     DATASET_XFER,
00035     GROUP_CREATE,
00036     GROUP_ACCESS,
00037     DATATYPE_CREATE,
00038     DATATYPE_ACCESS,
00039     STRING_CREATE,
00040     ATTRIBUTE_CREATE,
00041     OBJECT_COPY,
00042     LINK_CREATE,
00043     LINK_ACCESS,
00044 };
00045
00046 namespace details {
00047 template <typename T, typename U>
00048 T get_plist(const U& obj, hid_t (*f)(hid_t)) {
00049     auto hid = f(obj.getId());
00050     if (hid < 0) {
00051         HDF5ErrMapper::ToException<PropertyException>("Unable to get property list");
00052     }
00053     T t{};
00054     t._hid = hid;
00055     return t;
00056 }
00057 }  // namespace details
00058
00061 class PropertyListBase: public Object {
00062   public:
00063     PropertyListBase() noexcept;
00064
00065     static const PropertyListBase& Default() noexcept {
00066         static const PropertyListBase plist{};
00067         return plist;
00068     }
00069
00070   private:
00071     template <typename T, typename U>
00072     friend T details::get_plist(const U&, hid_t (*f)(hid_t));
00073 };
00074
00078 template <PropertyType T>
00079 class PropertyList: public PropertyListBase {
00080   public:
00083     constexpr PropertyType getType() const noexcept {
00084         return T;
00085     }
00086
00092     template <typename P>
00093     void add(const P& property);
00094
00097     static const PropertyList<T>& Default() noexcept {
00098         return static_cast<const PropertyList<T>&>(PropertyListBase::Default());
00099     }
```

```
00100
00101   protected:
00102     void _initializeIfNeeded();
00103 };
00104
00105 using ObjectCreateProps = PropertyList<PropertyType::OBJECT_CREATE>;
00106 using FileCreateProps = PropertyList<PropertyType::FILE_CREATE>;
00107 using FileAccessProps = PropertyList<PropertyType::FILE_ACCESS>;
00108 using DataSetCreateProps = PropertyList<PropertyType::DATASET_CREATE>;
00109 using DataSetAccessProps = PropertyList<PropertyType::DATASET_ACCESS>;
00110 using DataTransferProps = PropertyList<PropertyType::DATASET_XFER>;
00111 using GroupCreateProps = PropertyList<PropertyType::GROUP_CREATE>;
00112 using GroupAccessProps = PropertyList<PropertyType::GROUP_ACCESS>;
00113 using DataTypeCreateProps = PropertyList<PropertyType::DATATYPE_CREATE>;
00114 using DataTypeAccessProps = PropertyList<PropertyType::DATATYPE_ACCESS>;
00115 using StringCreateProps = PropertyList<PropertyType::STRING_CREATE>;
00116 using AttributeCreateProps = PropertyList<PropertyType::ATTRIBUTE_CREATE>;
00117 using ObjectCopyProps = PropertyList<PropertyType::OBJECT_COPY>;
00118 using LinkCreateProps = PropertyList<PropertyType::LINK_CREATE>;
00119 using LinkAccessProps = PropertyList<PropertyType::LINK_ACCESS>;
00120
00125 template <PropertyType T>
00126 class RawPropertyList: public PropertyList<T> {
00127   public:
00128     template <typename F, typename... Args>
00129     void add(const F& funct, const Args&... args);
00130 };
00131
00132 #ifdef H5_HAVE_PARALLEL
00139 class MPIOFileAccess {
00140   public:
00141     MPIOFileAccess(MPI_Comm comm, MPI_Info info);
00142
00143   private:
00144     friend FileAccessProps;
00145     void apply(const hid_t list) const;
00146
00147     MPI_Comm _comm;
00148     MPI_Info _info;
00149 };
00150
00156 class MPIOCollectiveMetadata {
00157   public:
00158     explicit MPIOCollectiveMetadata(bool collective = true);
00159     explicit MPIOCollectiveMetadata(const FileAccessProps& plist);
00160
00161     bool isCollectiveRead() const;
00162     bool isCollectiveWrite() const;
00163
00164
00165   private:
00166     friend FileAccessProps;
00167     void apply(hid_t plist) const;
00168
00169     bool collective_read_;
00170     bool collective_write_;
00171 };
00172
00186 class MPIOCollectiveMetadataRead {
00187   public:
00188     explicit MPIOCollectiveMetadataRead(bool collective = true);
00189     explicit MPIOCollectiveMetadataRead(const FileAccessProps& plist);
00190
00191     bool isCollective() const;
00192
00193   private:
00194     friend FileAccessProps;
00195     friend MPIOCollectiveMetadata;
00196
00197     void apply(hid_t plist) const;
00198
00199     bool collective_;
00200 };
00201
00212 class MPIOCollectiveMetadataWrite {
00213   public:
00214     explicit MPIOCollectiveMetadataWrite(bool collective = true);
00215     explicit MPIOCollectiveMetadataWrite(const FileAccessProps& plist);
00216
00217     bool isCollective() const;
00218
00219   private:
00220     friend FileAccessProps;
00221     friend MPIOCollectiveMetadata;
00222
00223     void apply(hid_t plist) const;
00224
```

```
00225     bool collective_;
00226 };
00227
00228 #endif
00229
00246 class FileVersionBounds {
00247   public:
00248     FileVersionBounds(H5F_libver_t low, H5F_libver_t high);
00249     explicit FileVersionBounds(const FileAccessProps& fapl);
00250
00251     std::pair<H5F_libver_t, H5F_libver_t> getVersion() const;
00252
00253   private:
00254     friend FileAccessProps;
00255     void apply(const hid_t list) const;
00256
00257     H5F_libver_t _low;
00258     H5F_libver_t _high;
00259 };
00260
00266 class MetadataBlockSize {
00267   public:
00268     explicit MetadataBlockSize(hsize_t size);
00269     explicit MetadataBlockSize(const FileAccessProps& fapl);
00270
00271     hsize_t getSize() const;
00272
00273   private:
00274     friend FileAccessProps;
00275     void apply(const hid_t list) const;
00276     hsize_t _size;
00277 };
00278
00279 #if H5_VERSION_GE(1, 10, 1)
00286 class FileSpaceStrategy {
00287   public:
00294     FileSpaceStrategy(H5F_fspace_strategy_t strategy, hbool_t persist, hsize_t threshold);
00295     explicit FileSpaceStrategy(const FileCreateProps& fcpl);
00296
00297     H5F_fspace_strategy_t getStrategy() const;
00298     hbool_t getPersist() const;
00299     hsize_t getThreshold() const;
00300
00301   private:
00302     friend FileCreateProps;
00303
00304     void apply(const hid_t list) const;
00305
00306     H5F_fspace_strategy_t _strategy;
00307     hbool_t _persist;
00308     hsize_t _threshold;
00309 };
00310
00320 class FileSpacePageSize {
00321   public:
00326     explicit FileSpacePageSize(hsize_t page_size);
00327     explicit FileSpacePageSize(const FileCreateProps& fcpl);
00328
00329     hsize_t getPageSize() const;
00330
00331   private:
00332     friend FileCreateProps;
00333     void apply(const hid_t list) const;
00334
00335     hsize_t _page_size;
00336 };
00337
00338 #ifndef H5_HAVE_PARALLEL
00350 class PageBufferSize {
00351   public:
00357     explicit PageBufferSize(size_t page_buffer_size,
00358                             unsigned min_meta_percent = 0,
00359                             unsigned min_raw_percent = 0);
00360
00361     explicit PageBufferSize(const FileAccessProps& fapl);
00362
00363     size_t getPageBufferSize() const;
00364     unsigned getMinMetaPercent() const;
00365     unsigned getMinRawPercent() const;
00366
00367   private:
00368     friend FileAccessProps;
00369
00370     void apply(hid_t list) const;
00371
00372     size_t _page_buffer_size;
00373     unsigned _min_meta;
```

```
00374     unsigned _min_raw;
00375 };
00376 #endif
00377 #endif
00378
00381 class EstimatedLinkInfo {
00382   public:
00387     explicit EstimatedLinkInfo(unsigned entries, unsigned length);
00388
00389     explicit EstimatedLinkInfo(const GroupCreateProps& gcpl);
00390
00392     unsigned getEntries() const;
00393
00395     unsigned getNameLength() const;
00396
00397   private:
00398     friend GroupCreateProps;
00399     void apply(hid_t hid) const;
00400     unsigned _entries;
00401     unsigned _length;
00402 };
00403
00404
00405 class Chunking {
00406   public:
00407     explicit Chunking(const std::vector<hsize_t>& dims);
00408     Chunking(const std::initializer_list<hsize_t>& items);
00409
00410     template <typename... Args>
00411     explicit Chunking(hsize_t item, Args... args);
00412
00413     explicit Chunking(DataSetCreateProps& plist, size_t max_dims = 32);
00414
00415     const std::vector<hsize_t>& getDimensions() const noexcept;
00416
00417   private:
00418     friend DataSetCreateProps;
00419     void apply(hid_t hid) const;
00420     std::vector<hsize_t> _dims;
00421 };
00422
00423 class Deflate {
00424   public:
00425     explicit Deflate(unsigned level);
00426
00427   private:
00428     friend DataSetCreateProps;
00429     friend GroupCreateProps;
00430     void apply(hid_t hid) const;
00431     const unsigned _level;
00432 };
00433
00434 class Szip {
00435   public:
00436     explicit Szip(unsigned options_mask = H5_SZIP_EC_OPTION_MASK,
00437                   unsigned pixels_per_block = H5_SZIP_MAX_PIXELS_PER_BLOCK);
00438
00439     unsigned getOptionsMask() const;
00440     unsigned getPixelsPerBlock() const;
00441
00442   private:
00443     friend DataSetCreateProps;
00444     void apply(hid_t hid) const;
00445     const unsigned _options_mask;
00446     const unsigned _pixels_per_block;
00447 };
00448
00449 class Shuffle {
00450   public:
00451     Shuffle() = default;
00452
00453   private:
00454     friend DataSetCreateProps;
00455     void apply(hid_t hid) const;
00456 };
00457
00463 class AllocationTime {
00464   public:
00465     explicit AllocationTime(H5D_alloc_time_t alloc_time);
00466     explicit AllocationTime(const DataSetCreateProps& dcpl);
00467
00468     H5D_alloc_time_t getAllocationTime();
00469
00470   private:
00471     friend DataSetCreateProps;
00472     void apply(hid_t dcpl) const;
00473
```

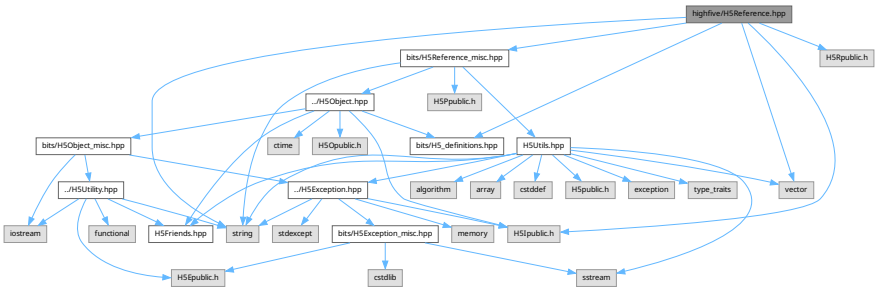
```
00474     H5D_alloc_time_t _alloc_time;
00475 };
00476
00479 class Caching {
00480   public:
00483     Caching(const size_t numSlots,
00484             const size_t cacheSize,
00485             const double w0 = static_cast<double>(H5D_CHUNK_CACHE_W0_DEFAULT));
00486
00487     explicit Caching(const DataSetCreateProps& dcpl);
00488
00489     size_t getNumSlots() const;
00490     size_t getCacheSize() const;
00491     double getW0() const;
00492
00493   private:
00494     friend DataSetAccessProps;
00495     void apply(hid_t hid) const;
00496     size_t _numSlots;
00497     size_t _cacheSize;
00498     double _w0;
00499 };
00500
00501 class CreateIntermediateGroup {
00502   public:
00503     explicit CreateIntermediateGroup(bool create = true);
00504
00505     explicit CreateIntermediateGroup(const ObjectCreateProps& ocpl);
00506     explicit CreateIntermediateGroup(const LinkCreateProps& lcpl);
00507
00508     bool isSet() const;
00509
00510   protected:
00511     void fromPropertyList(hid_t hid);
00512
00513   private:
00514     friend ObjectCreateProps;
00515     friend LinkCreateProps;
00516     void apply(hid_t hid) const;
00517     bool _create;
00518 };
00519
00520 #ifdef H5_HAVE_PARALLEL
00521 class UseCollectiveIO {
00522   public:
00523     explicit UseCollectiveIO(bool enable = true);
00524
00525     explicit UseCollectiveIO(const DataTransferProps& dxpl);
00526
00528     bool isCollective() const;
00529
00530   private:
00531     friend DataTransferProps;
00532     void apply(hid_t hid) const;
00533     bool _enable;
00534 };
00535
00536
00543 class MpioNoCollectiveCause {
00544   public:
00545     explicit MpioNoCollectiveCause(const DataTransferProps& dxpl);
00546
00548     bool wasCollective() const;
00549
00551     uint32_t getLocalCause() const;
00552
00554     uint32_t getGlobalCause() const;
00555
00557     std::pair<uint32_t, uint32_t> getCause() const;
00558
00559   private:
00560     friend DataTransferProps;
00561     uint32_t _local_cause;
00562     uint32_t _global_cause;
00563 };
00564 #endif
00565
00566 struct CreationOrder {
00567     enum _CreationOrder {
00568         Tracked = H5P_CRT_ORDER_TRACKED,
00569         Indexed = H5P_CRT_ORDER_INDEXED,
00570     };
00571 };
00572
00578 class LinkCreationOrder {
00579   public:
00584     explicit LinkCreationOrder(unsigned flags)
```

```
00585         : _flags(flags) {}
00586
00587     explicit LinkCreationOrder(const FileCreateProps& fcpl);
00588     explicit LinkCreationOrder(const GroupCreateProps& gcpl);
00589
00590     unsigned getFlags() const;
00591
00592   protected:
00593     void fromPropertyList(hid_t hid);
00594
00595   private:
00596     friend FileCreateProps;
00597     friend GroupCreateProps;
00598     void apply(hid_t hid) const;
00599     unsigned _flags;
00600 };
00601
00602 }  // namespace HighFive
00603
00604 #include "bits/H5PropertyList_misc.hpp"
```

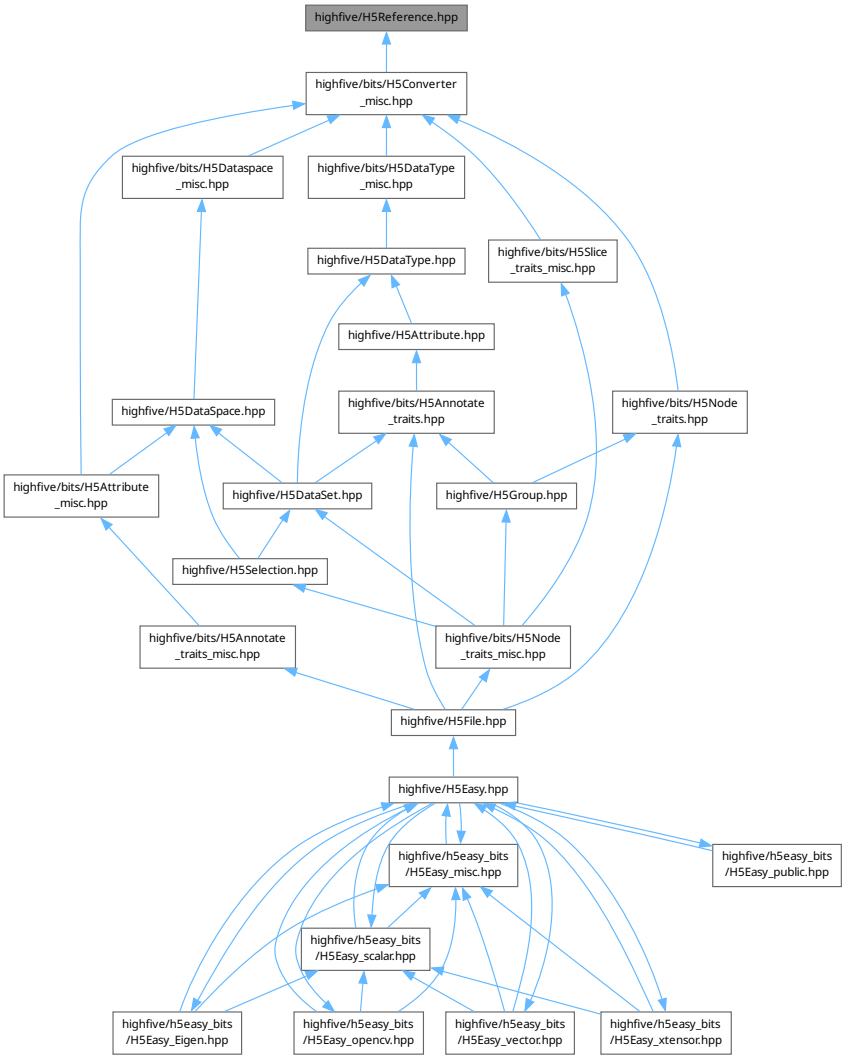
10.88 highfive/H5Reference.hpp File Reference

```
#include <string>
#include <vector>
#include <H5Ipublic.h>
#include <H5Rpublic.h>
#include ¨bits/H5_definitions.hpp¨
#include ¨bits/H5Reference_misc.hpp¨
```

Include dependency graph for H5Reference.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class HighFive::Reference

  An HDF5 (object) reference type.

Namespaces

- namespace HighFive

10.89 H5Reference.hpp

Go to the documentation of this file.

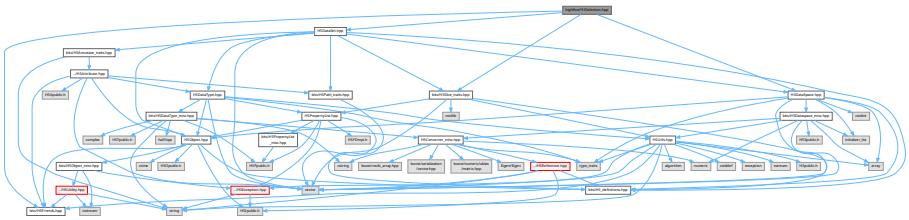
```
00001 /*
00002  *  Copyright (c), 2020, EPFL - Blue Brain Project
```

```
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009
00010 #pragma once
00011
00012 #include <string>
00013 #include <vector>
00014
00015 #include <H5Ipublic.h>
00016 #include <H5Rpublic.h>
00017
00018 #include "bits/H5_definitions.hpp"
00019
00020 namespace HighFive {
00021
00022 namespace details {
00023 template <typename T>
00024 struct inspector;
00025 }
00033 class Reference {
00034   public:
00036     Reference() = default;
00037
00042     Reference(const Object& location, const Object& object);
00043
00049     template <typename T>
00050     T dereference(const Object& location) const;
00051
00056     ObjectType getType(const Object& location) const;
00057
00058   protected:
00060     inline explicit Reference(const hobj_ref_t h5_ref)
00061         : href(h5_ref){};
00062
00067     void create_ref(hobj_ref_t* refptr) const;
00068
00069   private:
00070     Object get_ref(const Object& location) const;
00071
00072     hobj_ref_t href{};
00073     std::string obj_name{};
00074     hid_t parent_id{};
00075
00076     friend struct details::inspector<Reference>;
00077 };
00078
00079 }  // namespace HighFive
00080
00081 #include "bits/H5Reference_misc.hpp"
```

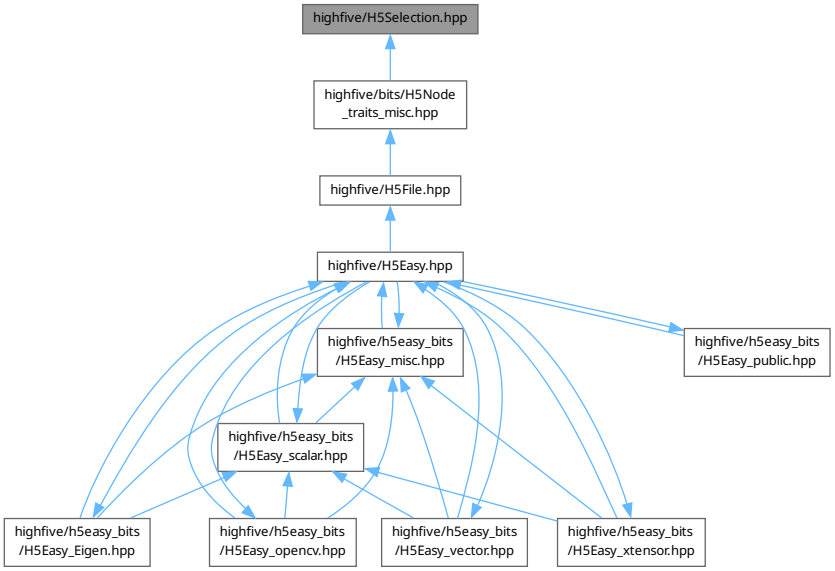
10.90 highfive/H5Selection.hpp File Reference

```
#include ¨H5DataSet.hpp¨
#include ¨H5DataSpace.hpp¨
#include ¨bits/H5Slice_traits.hpp¨
#include ¨bits/H5Friends.hpp¨
```

Include dependency graph for H5Selection.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class HighFive::Selection

  Selection: represent a view on a slice/part of a dataset.

Namespaces

- namespace HighFive

10.91 H5Selection.hpp

Go to the documentation of this file.

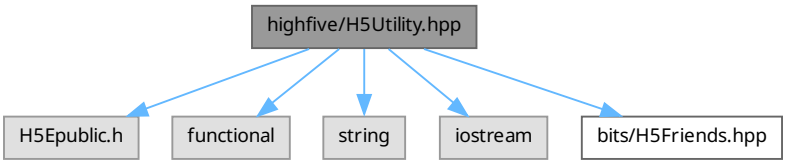
```
00001 /*
00002  *  Copyright (c), 2017, Adrien Devresse <adrien.devresse@epfl.ch>
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009 #pragma once
00010
00011 #include "H5DataSet.hpp"
00012 #include "H5DataSpace.hpp"
00013 #include "bits/H5Slice_traits.hpp"
00014 #include "bits/H5Friends.hpp"
00015
00016 namespace HighFive {
00017
00018 namespace detail {
00019 Selection make_selection(const DataSpace&, const DataSpace&, const DataSet&);
00020 }
00021
00027 class Selection: public SliceTraits<Selection> {
00028   public:
00033     DataSpace getSpace() const noexcept;
```

```
00034
00040     DataSpace getMemSpace() const noexcept;
00041
00046     DataSet& getDataset() noexcept;
00047     const DataSet& getDataset() const noexcept;
00048
00052     const DataType getDataType() const;
00053
00054   protected:
00055     Selection(const DataSpace& memspace, const DataSpace& file_space, const DataSet& set);
00056
00057   private:
00058     DataSpace _mem_space, _file_space;
00059     DataSet _set;
00060
00061 #if HIGHFIVE_HAS_FRIEND_DECLARATIONS
00062     template <typename Derivate>
00063     friend class ::HighFive::SliceTraits;
00064 #endif
00065     friend Selection detail::make_selection(const DataSpace&, const DataSpace&, const DataSet&);
00066 };
00067
00068 }  // namespace HighFive
```

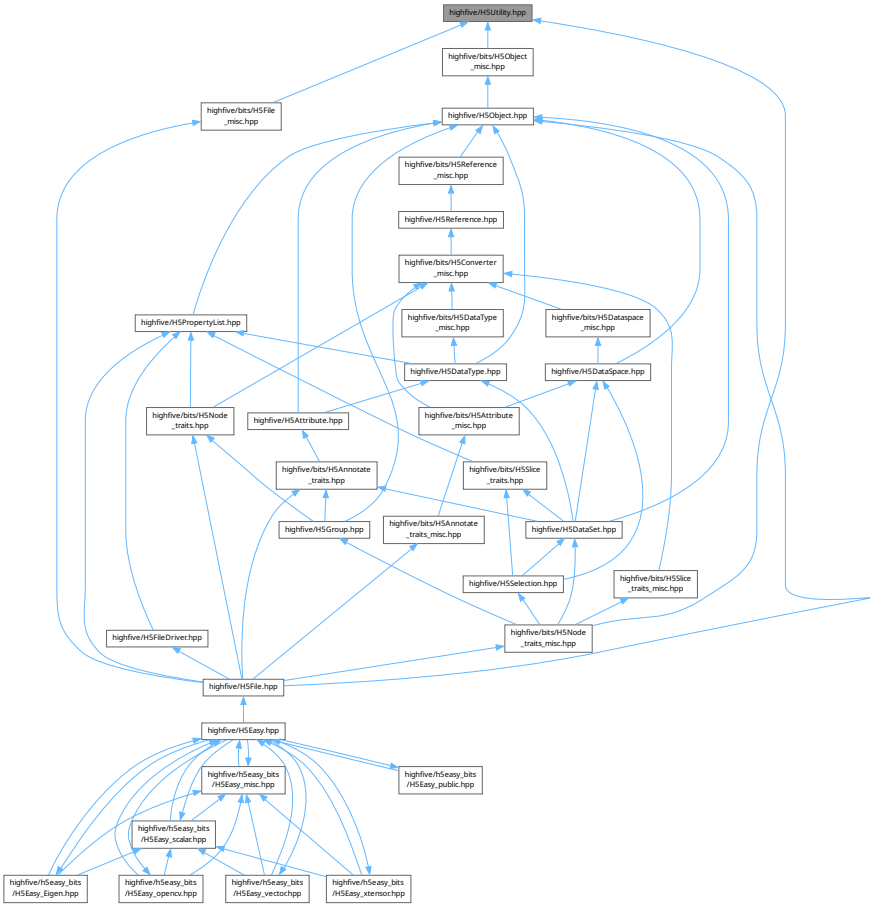
10.92 highfive/H5Utility.hpp File Reference

```
#include <H5Epublic.h>
#include <functional>
#include <string>
#include <iostream>
#include ¨bits/H5Friends.hpp¨
```

Include dependency graph for H5Utility.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- class HighFive::SilenceHDF5

  Utility class to disable HDF5 stack printing inside a scope.
- class HighFive::Logger

  A logger with supporting basic functionality.

Namespaces

- namespace HighFive

Macros

- #define HIGHFIVE_LOG_LEVEL_DEBUG 10
- #define HIGHFIVE_LOG_LEVEL_INFO 20
- #define HIGHFIVE_LOG_LEVEL_WARN 30
- #define HIGHFIVE_LOG_LEVEL_ERROR 40
- #define HIGHFIVE_LOG_LEVEL HIGHFIVE_LOG_LEVEL_WARN
- #define HIGHFIVE_LOG_DEBUG(message) ::HighFive::detail::log(::HighFive::LogSeverity::Debug, (message), __FILE__, __LINE__);

- #define HIGHFIVE_LOG_DEBUG_IF(cond, message)
- #define HIGHFIVE_LOG_INFO(message) ::HighFive::detail::log(::HighFive::LogSeverity::Info, (message), __FILE__, __LINE__);
- #define HIGHFIVE_LOG_INFO_IF(cond, message)
- #define HIGHFIVE_LOG_WARN(message) ::HighFive::detail::log(::HighFive::LogSeverity::Warn, (message), __FILE__, __LINE__);
- #define HIGHFIVE_LOG_WARN_IF(cond, message)
- #define HIGHFIVE_LOG_ERROR(message) ::HighFive::detail::log(::HighFive::LogSeverity::Error, (message), __FILE__, __LINE__);
- #define HIGHFIVE_LOG_ERROR_IF(cond, message)

Enumerations

- enum class HighFive::LogSeverity { HighFive::Debug = HIGHFIVE_LOG_LEVEL_DEBUG , HighFive::Info = HIGHFIVE_LOG_LEVEL_INFO , HighFive::Warn = HIGHFIVE_LOG_LEVEL_WARN , HighFive::Error = HIGHFIVE_LOG_LEVEL_ERROR }

Functions

- std::string HighFive::to_string (LogSeverity severity)
- void HighFive::default_logging_callback (LogSeverity severity, const std::string &message, const std::string &file, int line)
- Logger & HighFive::get_global_logger ()

  Obtain a reference to the logger used by HighFive.
- void HighFive::register_logging_callback (Logger::callback_type cb)

  Sets the callback that's used by the logger.

10.92.1 Macro Definition Documentation

10.92.1.1 HIGHFIVE_LOG_DEBUG

```
#define HIGHFIVE_LOG_DEBUG(
              message )  ::HighFive::detail::log(::HighFive::LogSeverity::Debug, (message), __↩
FILE__, __LINE__);
```

10.92.1.2 HIGHFIVE_LOG_DEBUG_IF

```
#define HIGHFIVE_LOG_DEBUG_IF(
              cond,
              message )
```

Value:

```
    if ((cond)) {                          \
        HIGHFIVE_LOG_DEBUG((message));     \
    }
```

10.92.1.3 HIGHFIVE_LOG_ERROR

```
#define HIGHFIVE_LOG_ERROR(
              message )  ::HighFive::detail::log(::HighFive::LogSeverity::Error, (message), __↩
FILE__, __LINE__);
```

10.92.1.4 HIGHFIVE_LOG_ERROR_IF

```
#define HIGHFIVE_LOG_ERROR_IF(
              cond,
              message )
```

Value:

```
    if ((cond)) {                           \
        HIGHFIVE_LOG_ERROR((message));      \
    }
```

10.92.1.5 HIGHFIVE_LOG_INFO

```
#define HIGHFIVE_LOG_INFO(
              message )  ::HighFive::detail::log(::HighFive::LogSeverity::Info, (message), __↩
FILE__, __LINE__);
```

10.92.1.6 HIGHFIVE_LOG_INFO_IF

```
#define HIGHFIVE_LOG_INFO_IF(
              cond,
              message )
```

Value:

```
    if ((cond)) {                           \
        HIGHFIVE_LOG_INFO((message));       \
    }
```

10.92.1.7 HIGHFIVE_LOG_LEVEL

```
#define HIGHFIVE_LOG_LEVEL HIGHFIVE_LOG_LEVEL_WARN
```

10.92.1.8 HIGHFIVE_LOG_LEVEL_DEBUG

```
#define HIGHFIVE_LOG_LEVEL_DEBUG 10
```

10.92.1.9 HIGHFIVE_LOG_LEVEL_ERROR

```
#define HIGHFIVE_LOG_LEVEL_ERROR 40
```

10.92.1.10 HIGHFIVE_LOG_LEVEL_INFO

```
#define HIGHFIVE_LOG_LEVEL_INFO 20
```

10.92.1.11 HIGHFIVE_LOG_LEVEL_WARN

```
#define HIGHFIVE_LOG_LEVEL_WARN 30
```

10.92.1.12 HIGHFIVE_LOG_WARN

```
#define HIGHFIVE_LOG_WARN(
              message )  ::HighFive::detail::log(::HighFive::LogSeverity::Warn, (message), __↩
FILE__, __LINE__);
```

10.92.1.13 HIGHFIVE_LOG_WARN_IF

```
#define HIGHFIVE_LOG_WARN_IF(
              cond,
              message )
```

Value:

```
    if ((cond)) {                           \
        HIGHFIVE_LOG_WARN((message));       \
    }
```

10.93 H5Utility.hpp

Go to the documentation of this file.

```
00001 /*
00002  *  Copyright (c), 2017, Blue Brain Project - EPFL (CH)
00003  *
00004  *  Distributed under the Boost Software License, Version 1.0.
00005  *    (See accompanying file LICENSE_1_0.txt or copy at
00006  *          http://www.boost.org/LICENSE_1_0.txt)
00007  *
00008  */
00009
00010 #pragma once
00011
00012 #include <H5Epublic.h>
00013 #include <functional>
00014 #include <string>
00015 #include <iostream>
00016
00017 #include "bits/H5Friends.hpp"
00018
00019 namespace HighFive {
00020
00024 class SilenceHDF5 {
00025   public:
00026     inline SilenceHDF5(bool enable = true)
00027         : _client_data(nullptr) {
00028         H5Eget_auto2(H5E_DEFAULT, &_func, &_client_data);
00029         if (enable)
00030             H5Eset_auto2(H5E_DEFAULT, NULL, NULL);
00031     }
00032
00033     inline ~SilenceHDF5() {
00034         H5Eset_auto2(H5E_DEFAULT, _func, _client_data);
00035     }
00036
00037   private:
00038     H5E_auto2_t _func;
00039     void* _client_data;
00040 };
00041
00042 #define HIGHFIVE_LOG_LEVEL_DEBUG 10
00043 #define HIGHFIVE_LOG_LEVEL_INFO  20
00044 #define HIGHFIVE_LOG_LEVEL_WARN  30
00045 #define HIGHFIVE_LOG_LEVEL_ERROR 40
00046
00047 #ifndef HIGHFIVE_LOG_LEVEL
00048 #define HIGHFIVE_LOG_LEVEL HIGHFIVE_LOG_LEVEL_WARN
00049 #endif
00050
00051 enum class LogSeverity {
00052     Debug = HIGHFIVE_LOG_LEVEL_DEBUG,
00053     Info = HIGHFIVE_LOG_LEVEL_INFO,
00054     Warn = HIGHFIVE_LOG_LEVEL_WARN,
00055     Error = HIGHFIVE_LOG_LEVEL_ERROR
```

```
00056 };
00057
00058 inline std::string to_string(LogSeverity severity) {
00059     switch (severity) {
00060     case LogSeverity::Debug:
00061         return "DEBUG";
00062     case LogSeverity::Info:
00063         return "INFO";
00064     case LogSeverity::Warn:
00065         return "WARN";
00066     case LogSeverity::Error:
00067         return "ERROR";
00068     default:
00069         return "??";
00070     }
00071 }
00072
00087 class Logger {
00088   public:
00089     using callback_type =
00090         std::function<void(LogSeverity, const std::string&, const std::string&, int)>;
00091
00092   public:
00093     Logger() = delete;
00094     Logger(const Logger&) = delete;
00095     Logger(Logger&&) = delete;
00096
00097     explicit Logger(callback_type cb)
00098         : _cb(std::move(cb)) {}
00099
00100     Logger& operator=(const Logger&) = delete;
00101     Logger& operator=(Logger&&) = delete;
00102
00103     inline void log(LogSeverity severity,
00104                     const std::string& message,
00105                     const std::string& file,
00106                     int line) {
00107         _cb(severity, message, file, line);
00108     }
00109
00110     inline void set_logging_callback(callback_type cb) {
00111         _cb = std::move(cb);
00112     }
00113
00114   private:
00115     callback_type _cb;
00116 };
00117
00118 inline void default_logging_callback(LogSeverity severity,
00119                                      const std::string& message,
00120                                      const std::string& file,
00121                                      int line) {
00122     std::clog « file « ": " « line « " :: " « to_string(severity) « message « std::endl;
00123 }
00124
00132 inline Logger& get_global_logger() {
00133     static Logger logger(&default_logging_callback);
00134     return logger;
00135 }
00136
00138 inline void register_logging_callback(Logger::callback_type cb) {
00139     auto& logger = get_global_logger();
00140     logger.set_logging_callback(std::move(cb));
00141 }
00142
00143 namespace detail {
00145 inline void log(LogSeverity severity,
00146                 const std::string& message,
00147                 const std::string& file,
00148                 int line) {
00149     auto& logger = get_global_logger();
00150     logger.log(severity, message, file, line);
00151 }
00152 }  // namespace detail
00153
00154 #if HIGHFIVE_LOG_LEVEL <= HIGHFIVE_LOG_LEVEL_DEBUG
00155 #define HIGHFIVE_LOG_DEBUG(message) \
00156     ::HighFive::detail::log(::HighFive::LogSeverity::Debug, (message), __FILE__, __LINE__);
00157
00158 // Useful, for the common pattern: if ...; then log something.
00159 #define HIGHFIVE_LOG_DEBUG_IF(cond, message) \
00160     if ((cond)) {                            \
00161         HIGHFIVE_LOG_DEBUG((message));       \
00162     }
00163
00164 #else
00165 #define HIGHFIVE_LOG_DEBUG(message)          ;
```

```
00166 #define HIGHFIVE_LOG_DEBUG_IF(cond, message) ;
00167 #endif
00168
00169 #if HIGHFIVE_LOG_LEVEL <= HIGHFIVE_LOG_LEVEL_INFO
00170 #define HIGHFIVE_LOG_INFO(message) \
00171     ::HighFive::detail::log(::HighFive::LogSeverity::Info, (message), __FILE__, __LINE__);
00172
00173 // Useful, for the common pattern: if ...; then log something.
00174 #define HIGHFIVE_LOG_INFO_IF(cond, message) \
00175     if ((cond)) {                           \
00176         HIGHFIVE_LOG_INFO((message));       \
00177     }
00178
00179 #else
00180 #define HIGHFIVE_LOG_INFO(message)          ;
00181 #define HIGHFIVE_LOG_INFO_IF(cond, message) ;
00182 #endif
00183
00184
00185 #if HIGHFIVE_LOG_LEVEL <= HIGHFIVE_LOG_LEVEL_WARN
00186 #define HIGHFIVE_LOG_WARN(message) \
00187     ::HighFive::detail::log(::HighFive::LogSeverity::Warn, (message), __FILE__, __LINE__);
00188
00189 // Useful, for the common pattern: if ...; then log something.
00190 #define HIGHFIVE_LOG_WARN_IF(cond, message) \
00191     if ((cond)) {                           \
00192         HIGHFIVE_LOG_WARN((message));       \
00193     }
00194
00195 #else
00196 #define HIGHFIVE_LOG_WARN(message)          ;
00197 #define HIGHFIVE_LOG_WARN_IF(cond, message) ;
00198 #endif
00199
00200 #if HIGHFIVE_LOG_LEVEL <= HIGHFIVE_LOG_LEVEL_ERROR
00201 #define HIGHFIVE_LOG_ERROR(message) \
00202     ::HighFive::detail::log(::HighFive::LogSeverity::Error, (message), __FILE__, __LINE__);
00203
00204 // Useful, for the common pattern: if ...; then log something.
00205 #define HIGHFIVE_LOG_ERROR_IF(cond, message) \
00206     if ((cond)) {                            \
00207         HIGHFIVE_LOG_ERROR((message));       \
00208     }
00209
00210 #else
00211 #define HIGHFIVE_LOG_ERROR(message)          ;
00212 #define HIGHFIVE_LOG_ERROR_IF(cond, message) ;
00213 #endif
00214
00215 }  // namespace HighFive
```

10.94 /builddir/build/BUILD/HighFive-2.7.1/README.md File Reference

Index