

streamout

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1 Hierarchical Index

1.1 Class Hierarchy

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

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2 Class Index

2.1 Class List

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

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Class to navigate in the raw data buffer parse the header and send the payload as Buffer	39
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3 File Index

3.1 File List

Here is a list of all files with brief descriptions:

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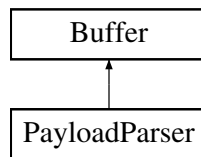
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4 Class Documentation

4.1 Buffer Class Reference

```
#include <libs/core/include/Buffer.h>
```

Inheritance diagram for Buffer:



Public Member Functions

- [Buffer](#) ()
- virtual [~Buffer](#) ()
- [Buffer](#) (const [bit8_t](#) b[], const std::size_t &i)
- [Buffer](#) (const char b[], const std::size_t &i)
- template<typename T >
 [Buffer](#) (const std::vector< T > &rawdata)
- template<typename T, std::size_t N>
 [Buffer](#) (const std::array< T, N > &rawdata)
- std::size_t [size](#) () const
- std::size_t [capacity](#) () const
- bool [empty](#) ()
- void [set](#) (unsigned char *b)
- void [set](#) (const [Buffer](#) &buffer)
- [bit8_t](#) * [begin](#) () const
- [bit8_t](#) * [end](#) () const
- [bit8_t](#) & [operator\[\]](#) (const std::size_t &pos)
- [bit8_t](#) & [operator\[\]](#) (const std::size_t &pos) const
- void [setSize](#) (const std::size_t &size)

4.1.1 Detailed Description

Definition at line 14 of file [Buffer.h](#).

4.1.2 Constructor & Destructor Documentation

4.1.2.1 Buffer() [1/5] Buffer::Buffer () [inline]Definition at line 17 of file [Buffer.h](#).00017 : m_Buffer([nullptr](#)), m_Size(0), m_Capacity(0) {}**4.1.2.2 ~Buffer()** virtual Buffer::~Buffer () [inline], [virtual]Definition at line 18 of file [Buffer.h](#).

00018 {}

4.1.2.3 Buffer() [2/5] Buffer::Buffer (
const [bit8_t](#) *b*[],
const std::size_t & *i*) [inline]Definition at line 19 of file [Buffer.h](#).00019 : m_Buffer([const_cast<bit8_t*>](#)(&b[0])), m_Size(i), m_Capacity(i) {}**4.1.2.4 Buffer()** [3/5] Buffer::Buffer (
const char *b*[],
const std::size_t & *i*) [inline]Definition at line 20 of file [Buffer.h](#).00020 : m_Buffer([const_cast<bit8_t*>](#)([reinterpret_cast<const bit8_t*>](#)(&b[0])), m_Size(i * [sizeof](#)(char)),
m_Capacity(i * [sizeof](#)(char)) {}**4.1.2.5 Buffer()** [4/5] template<typename T >
Buffer::Buffer (
const std::vector< T > & *rawdata*) [inline]Definition at line 21 of file [Buffer.h](#).00021 : m_Buffer([const_cast<bit8_t*>](#)([reinterpret_cast<const bit8_t*>](#)(rawdata.data()))),
m_Size(rawdata.size() * [sizeof](#)(T)), m_Capacity(rawdata.capacity() * [sizeof](#)(T)) {}**4.1.2.6 Buffer()** [5/5] template<typename T , std::size_t N>
Buffer::Buffer (
const std::array< T, N > & *rawdata*) [inline]Definition at line 22 of file [Buffer.h](#).00022 : m_Buffer([const_cast<bit8_t*>](#)([reinterpret_cast<const bit8_t*>](#)(rawdata.data()))),
m_Size(rawdata.size() * [sizeof](#)(T)), m_Capacity(rawdata.size() * [sizeof](#)(T)) {}**4.1.3 Member Function Documentation**

4.1.3.1 `begin()` `bit8_t * Buffer::begin () const [inline]`

Definition at line 35 of file [Buffer.h](#).

```
00035 { return m_Buffer; }
```

4.1.3.2 `capacity()` `std::size_t Buffer::capacity () const [inline]`

Definition at line 25 of file [Buffer.h](#).

```
00025 { return m_Capacity; }
```

4.1.3.3 `empty()` `bool Buffer::empty () [inline]`

Definition at line 27 of file [Buffer.h](#).

```
00027 { return m_Size == 0; }
```

4.1.3.4 `end()` `bit8_t * Buffer::end () const [inline]`

Definition at line 36 of file [Buffer.h](#).

```
00036 { return m_Buffer + m_Size; }
```

4.1.3.5 `operator[]()` [1/2] `bit8_t & Buffer::operator[] (const std::size_t & pos) [inline]`

Definition at line 37 of file [Buffer.h](#).

```
00037 { return m_Buffer[pos]; }
```

4.1.3.6 `operator[]()` [2/2] `bit8_t & Buffer::operator[] (const std::size_t & pos) const [inline]`

Definition at line 38 of file [Buffer.h](#).

```
00038 { return m_Buffer[pos]; }
```

4.1.3.7 `set()` [1/2] `void Buffer::set (const Buffer & buffer) [inline]`

Definition at line 29 of file [Buffer.h](#).

```
00030 {  
00031     m_Buffer = buffer.begin();  
00032     m_Size   = buffer.size();  
00033     m_Capacity = buffer.capacity();  
00034 }
```

4.1.3.8 set() [2/2] void Buffer::set (
 unsigned char * b) [inline]

Definition at line 28 of file [Buffer.h](#).

```
00028 { m_Buffer = b; }
```

4.1.3.9 setSize() void Buffer::setSize (
 const std::size_t & size) [inline]

Definition at line 40 of file [Buffer.h](#).

```
00040 { m_Size = size; }
```

4.1.3.10 size() std::size_t Buffer::size () const [inline]

Definition at line 24 of file [Buffer.h](#).

```
00024 { return m_Size; }
```

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

- [libs/core/include/Buffer.h](#)

4.2 BufferLooper< SOURCE, DESTINATION > Class Template Reference

```
#include <libs/core/include/BufferLooper.h>
```

Public Member Functions

- [BufferLooper](#) (SOURCE &source, DESTINATION &dest, bool debug=false)
- void [addSink](#) (const spdlog::sink_ptr &sink, const spdlog::level::level_enum &level=spdlog::get_level())
- void [loop](#) (const std::uint32_t &m_NbrEventsToProcess=0)
- void [printAllCounters](#) ()
- std::shared_ptr< spdlog::logger > [log](#) ()
- void [setDetectorIDs](#) (const std::vector< [DetectorID](#) > &detectorIDs)

4.2.1 Detailed Description

```
template<typename SOURCE, typename DESTINATION>
class BufferLooper< SOURCE, DESTINATION >
```

Definition at line 28 of file [BufferLooper.h](#).

4.2.2 Constructor & Destructor Documentation

4.2.2.1 BufferLooper() `template<typename SOURCE , typename DESTINATION >`

```
BufferLooper< SOURCE, DESTINATION >::BufferLooper (
    SOURCE & source,
    DESTINATION & dest,
    bool debug = false ) [inline]
```

Definition at line 31 of file [BufferLooper.h](#).

```
00031                                     : m_Source(source),
    m_Destination(dest), m_Debug(debug)
00032 {
00033     m_Logger = spdlog::create<spdlog::sinks::null_sink_mt>("streamout");
00034     if(!spdlog::get("streamout")) { spdlog::register_logger(m_Logger); }
00035     m_Source.setLogger(m_Logger);
00036     m_Destination.setLogger(m_Logger);
00037 }
```

4.2.3 Member Function Documentation

4.2.3.1 addSink() `template<typename SOURCE , typename DESTINATION >`

```
void BufferLooper< SOURCE, DESTINATION >::addSink (
    const spdlog::sink_ptr & sink,
    const spdlog::level::level_enum & level = spdlog::get_level() ) [inline]
```

Definition at line 39 of file [BufferLooper.h](#).

```
00040 {
00041     sink->set_level(level);
00042     m_Sinks.push_back(sink);
00043     m_Logger = std::make_shared<spdlog::logger>("streamout", begin(m_Sinks), end(m_Sinks));
00044     m_Source.setLogger(m_Logger);
00045     m_Destination.setLogger(m_Logger);
00046 }
```

4.2.3.2 log() `template<typename SOURCE , typename DESTINATION >`

```
std::shared_ptr< spdlog::logger > BufferLooper< SOURCE, DESTINATION >::log ( ) [inline]
```

Definition at line 231 of file [BufferLooper.h](#).

```
00231 { return m_Logger; }
```

4.2.3.3 loop() `template<typename SOURCE , typename DESTINATION >`

```
void BufferLooper< SOURCE, DESTINATION >::loop (
    const std::uint32_t & m_NbrEventsToProcess = 0 ) [inline]
```

Definition at line 48 of file [BufferLooper.h](#).

```
00049 {
00050     // clang-format off
00051     fmt::print(fg(fmt::color::medium_orchid) | fmt::emphasis::bold,
00052         "\n"
00053         " SSSSSSSSSSSSSSS      tttt
00054         tttt\n"
00055         "SS:::::::::::::S  ttt::t
00056         ttt::t\n"
00057         "S::::SSSSS:::::S  t::::t
00058         t::::t\n"
00059         "S:::::S      SSSSSS  t::::t
00060         t::::t\n"
00061         "S:::::S      tttttt:::::tttttt  rrrrr  rrrrrrrrr  eeeeeeeeeee  aaaaaaaaaaaa
00062         mmmmmmm  mmmmmmm  oooooooooo  uuuuuu  uuuuuutttttt:::::tttttt\n")
```

```

00058 "S:::::S      t:::::t      r::::rrr:::::r      ee:::::ee a:::::a
mm:::::m m:::::mm oo:::::oo u:::::u u:::::ut:::::t\n"
00059 " S::::SSSS  t:::::t      r:::::r e:::::e eaaaaa:::a
m:::::mm:::::mo:::::ou:::::u u:::::ut:::::t\n"
00060 " SS:::::SSSSStttttt:::::ttttt rr::::rrrrr:::::re:::::e e:::::e a:::::a
m:::::mm:::::mo:::::oo:::::ou:::::u u:::::utttttt:::::ttttt\n"
00061 " SSS:::::SS  t:::::t      r:::::r r:::::re:::::e e:::::e aaaaaa:::a
m:::::mm:::::mm:::::mo:::::o o:::::ou:::::u u:::::u t:::::t\n"
00062 " SSSSS:::S  t:::::t      r:::::r rrrrrrre:::::e aa:::::a m:::::m
m:::::m m:::::mo:::::o o:::::ou:::::u u:::::u t:::::t\n"
00063 " S:::::S  t:::::t      r:::::r e:::::e eeeeeeeeeee a:::::aaaa:::a m:::::m
m:::::m m:::::mo:::::o o:::::ou:::::u u:::::u t:::::t\n"
00064 " S:::::S  t:::::t      tttttt:::::r e:::::e a:::::a a:::::a m:::::m
m:::::m m:::::mo:::::o o:::::ou:::::uuuu:::::u t:::::t tttttt\n"
00065 "SSSSSSS  S:::::S  t:::::t      r:::::r e:::::e a:::::a a:::::a m:::::m
m:::::m m:::::mo:::::oo:::::ou:::::uu t:::::t tttt:::::t\n"
00066 "S:::::SSSSS:::S tt:::::tr:::::r e:::::e eeeeeeeea:::::aaaa:::a m:::::m
m:::::m m:::::mo:::::o u:::::uu:::::u tt:::::t\n"
00067 "S:::::SS  tt:::::tr:::::r ee:::::e a:::::aa:::am:::::m
m:::::m m:::::m oo:::::oo uu:::::uu t:::::t\n"
00068 " SSSSSSSSSSSS  tttttttttt rrrrrrr eeeeeeeeeee aaaaaaaa aaammmmmm
mmmmmmmm mmmmmmm oooooooooo uuuuuuuu uuuu tttttttttt {} \n"
00069 "\n",
00070 fmt::format(fg(fmt::color::red) | fmt::emphasis::bold, "v{}", streamout_version.to_string());
00071 // clang-format on
00072 log()->info("*****");
00073 log()->info("Streamout Version : {}", streamout_version.to_string());
00074 log()->info("Using InterfaceReader {} version {}", m_Source.getName(),
m_Source.getVersion().to_string());
00075 log()->info("Using InterfaceWriter {} version {}", m_Destination.getName(),
m_Destination.getVersion().to_string());
00076
00077 if(!m_Destination.checkCompatibility(m_Source.getName(), m_Source.getVersion().to_string()))
00078 {
00079     log()->critical("{} version {} is not compatible with {} version {} ! ", m_Source.getName(),
m_Source.getVersion().to_string(), m_Destination.getName(), m_Destination.getVersion().to_string());
00080     log()->info("Compatible Interfaces for {} are", m_Destination.getName());
00081     for(std::map<std::string, std::string>::iterator it = m_Destination.getCompatibility().begin();
it != m_Destination.getCompatibility().end(); ++it) { log()->info("{} version {}", it->first,
it->second); }
00082     std::exit(-1);
00083 }
00084 if(!m_DetectorIDs.empty())
00085 {
00086     std::string ids;
00087     for(std::vector<DetectorID>::const_iterator it = m_DetectorIDs.cbegin(); it !=
m_DetectorIDs.cend(); ++it) ids += std::to_string(static_cast<std::uint16_t>(*it)) + ";";
00088     log()->info("Detector ID(s) other than {} will be ignored", ids);
00089 }
00090 log()->info("*****");
00091 RawBufferNavigator bufferNavigator;
00092 Timer timer;
00093 timer.start();
00094 m_Source.start();
00095 m_Destination.start();
00096 while(m_Source.nextEvent() && m_NbrEventsToProcess >= m_NbrEvents)
00097 {
00098     /*****/
00099     /*** START EVENT ***/
00100     m_Source.startEvent();
00101     m_Destination.startEvent();
00102     /*****/
00103
00104     m_Logger->warn("==== Event {} =====", m_NbrEvents);
00105     while(m_Source.nextDIFbuffer())
00106     {
00107         const Buffer& buffer = m_Source.getBuffer();
00108
00109         bufferNavigator.setBuffer(buffer);
00110         if(std::find(m_DetectorIDs.begin(), m_DetectorIDs.end(),
static_cast<DetectorID>(bufferNavigator.getDetectorID())) == m_DetectorIDs.end())
00111         {
00112             m_Logger->debug("Ignoring detector ID : {}", bufferNavigator.getDetectorID());
00113             continue;
00114         }
00115
00116         std::int32_t idstart = bufferNavigator.getStartOfPayload();
00117         if(m_Debug && idstart == -1) m_Logger->info(to_hex(buffer));
00118         c.DIFStarter[idstart]++;
00119         if(!bufferNavigator.validPayload())
00120         {
00121             m_Logger->error("!bufferNavigator.validBuffer()");
00122             continue;
00123         }
00124
00125     /*****/
00126     /*** START DIF ***/

```

```

00127         m_Source.startDIF();
00128         m_Destination.startDIF();
00129         /*****/
00130         PayloadParser d;
00131         // This is really a big error so skip DIF entirely if exception occurs
00132         try
00133         {
00134             d.setBuffer(bufferNavigator.getPayload());
00135         }
00136         catch(const Exception& e)
00137         {
00138             m_Logger->error("{} ", e.what());
00139             continue;
00140         }
00141
00142         if(buffer.end() != d.end()) m_Logger->error("DIF BUFFER END {} {} ", fmt::ptr(buffer.end()),
fmt::ptr(d.end()));
00143         assert(buffer.end() == d.end());
00144
00145         m_Logger->error("CRC : {} ", d.getDIF_CRC());
00146         c.DIFPtrValueAtReturnedPos[d.begin() [d.getEndOfDIFData() - 3]]++;
00147         assert(d.begin() [d.getEndOfDIFData() - 3] == 0xa0);
00148
00149         c.SizeAfterDIFPtr[d.getSizeAfterDIFPtr()]++;
00150         m_Destination.processDIF(d);
00151         for(std::size_t i = 0; i < d.getNumberOfFrames(); ++i)
00152         {
00153             /*****/
00154             /**** START FRAME ****/
00155             m_Source.startFrame();
00156             m_Destination.startFrame();
00157             /*****/
00158             m_Destination.processFrame(d, i);
00159             for(std::size_t j = 0; j < static_cast<std::size_t>(Hardware::NUMBER_PAD); ++j)
00160             {
00161                 if(d.getThresholdStatus(i, j) != 0)
00162                 {
00163                     m_Source.startPad();
00164                     m_Destination.startPad();
00165                     m_Destination.processPadInFrame(d, i, j);
00166                     m_Source.endPad();
00167                     m_Destination.endPad();
00168                 }
00169             }
00170             /*****/
00171             /**** END FRAME ****/
00172             m_Source.endFrame();
00173             m_Destination.endFrame();
00174             /*****/
00175         }
00176         // If I want SlowControl I need to check for it first, If there is an error then it's not a
big deal just continue and say is bad SlowControl
00177         /*try
00178         {
00179             d.setSCBuffer();
00180         }
00181         catch(const Exception& e)
00182         {
00183             m_Logger->error("{} ", e.what());
00184         }
00185
00186         bool processSC = false;
00187         if(d.hasSlowControl())
00188         {
00189             c.hasSlowControl++;
00190             processSC = true;
00191         }
00192         if(d.badSCData())
00193         {
00194             c.hasBadSlowControl++;
00195             processSC = false;
00196         }
00197         if(processSC) { m_Destination.processSlowControl(d.getSCBuffer()); } */
00198
00199         //Buffer eod = d.getEndOfAllData();
00200         //c.SizeAfterAllData[eod.size()]++;
00201         // bit8_t* debug_variable_3 = eod.end();
00202         // if(buffer.end() != debug_variable_3) m_Logger->info("END DATA BUFFER END {} {} ",
fmt::ptr(buffer.end()), fmt::ptr(debug_variable_3));
00203         // assert(buffer.end() == debug_variable_3);
00204         //if(eod.size() != 0) m_Logger->info("End of Data remaining stuff : {} ", to_hex(eod)); */
00205
00206         /*int nonzeroCount = 0;
00207         for(bit8_t* it = eod.begin(); it != eod.end(); it++)
00208             if(static_cast<int>(*it) != 0) nonzeroCount++;
00209         c.NonZeroValusAtEndOfData[nonzeroCount]++; */
00210

```



```

00211 /*****/
00212 /*** END DIF ***/
00213     m_Source.endDIF();
00214     m_Destination.endDIF();
00215 /*****/
00216     } // end of DIF while loop
00217     m_Logger->warn("==== Event {} ====", m_NbrEvents);
00218     m_NbrEvents++;
00219 /*****/
00220 /*** END EVENT ***/
00221     m_Source.endEvent();
00222     m_Destination.endEvent();
00223 /*****/
00224     } // end of event while loop
00225     m_Destination.end();
00226     m_Source.end();
00227     timer.stop();
00228     fmt::print(fg(fmt::color::green) | fmt::emphasis::bold, "=== elapsed time {}ms ({}ms/event)
===\n", timer.getElapsedTime() / 1000, timer.getElapsedTime() / (1000 * m_NbrEvents));
00229     }

```

4.2.3.4 printAllCounters() `template<typename SOURCE , typename DESTINATION >`
`void BufferLooper< SOURCE, DESTINATION >::printAllCounters () [inline]`

Definition at line 230 of file [BufferLooper.h](#).

```
00230 { c.printAllCounters(); }
```

4.2.3.5 setDetectorIDs() `template<typename SOURCE , typename DESTINATION >`
`void BufferLooper< SOURCE, DESTINATION >::setDetectorIDs (`
 `const std::vector< DetectorID > & detectorIDs) [inline]`

Definition at line 233 of file [BufferLooper.h](#).

```
00233 { m_DetectorIDs = detectorIDs; }
```

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

- [libs/core/include/BufferLooper.h](#)

4.3 BufferLooperCounter Struct Reference

```
#include <libs/core/include/BufferLooperCounter.h>
```

Public Member Functions

- `void printCounter` (const std::string &description, const std::map< int, int > &m, const std::ios_base::fmtflags &base=std::ios_base::dec)
- `void printAllCounters` ()

Public Attributes

- int [hasSlowControl](#) = 0
- int [hasBadSlowControl](#) = 0
- std::map< int, int > [DIFStarter](#)
- std::map< int, int > [DIFPtrValueAtReturnedPos](#)
- std::map< int, int > [SizeAfterDIFPtr](#)
- std::map< int, int > [SizeAfterAllData](#)
- std::map< int, int > [NonZeroValusAtEndOfData](#)

4.3.1 Detailed Description

Definition at line 12 of file [BufferLooperCounter.h](#).

4.3.2 Member Function Documentation

4.3.2.1 printAllCounters() void BufferLooperCounter::printAllCounters ()

Definition at line 11 of file [BufferLooperCounter.cc](#).

```
00012 {
00013     fmt::print(fg(fmt::color::crimson) | fmt::emphasis::bold, "BUFFER LOOP FINAL STATISTICS : \n");
00014     printCounter("Start of DIF header", DIFStarter);
00015     printCounter("Value after DIF data are processed", DIFPtrValueAtReturnedPos, std::ios_base::hex);
00016     printCounter("Size remaining in buffer after end of DIF data", SizeAfterDIFPtr);
00017     fmt::print(fg(fmt::color::crimson) | fmt::emphasis::bold, "Number of Slow Control found {} out of
which {} are bad\n", hasSlowControl, hasBadSlowControl);
00018     printCounter("Size remaining after all of data have been processed", SizeAfterAllData);
00019     printCounter("Number on non zero values in end of data buffer", NonZeroValusAtEndOfData);
00020 }
```

4.3.2.2 printCounter() void BufferLooperCounter::printCounter (const std::string & description, const std::map< int, int > & m, const std::ios_base::fmtflags & base = std::ios_base::dec)

Definition at line 22 of file [BufferLooperCounter.cc](#).

```
00023 {
00024     std::string out{"statistics for " + description + " : \n"};
00025     for(std::map<int, int>::const_iterator it = m.begin(); it != m.end(); it++)
00026     {
00027         if(it != m.begin()) out += ", ";
00028         out += " [";
00029         switch(base)
00030         {
00031             case std::ios_base::dec: out += to_dec(static_cast<std::uint32_t>(it->first)); break;
00032             case std::ios_base::hex: out += to_hex(static_cast<std::uint32_t>(it->first)); break;
00033             case std::ios_base::oct: out += to_oct(static_cast<std::uint32_t>(it->first)); break;
00034             default: out += to_dec(static_cast<std::uint32_t>(it->first)); break;
00035         }
00036         out += "]" + std::to_string(it->second);
00037     }
00038     out += "\n";
00039     fmt::print(fg(fmt::color::crimson) | fmt::emphasis::bold, out);
00040 }
```

4.3.3 Member Data Documentation

4.3.3.1 DIFPtrValueAtReturnedPos std::map<int, int> BufferLooperCounter::DIFPtrValueAtReturnedPos

Definition at line 18 of file [BufferLooperCounter.h](#).

4.3.3.2 DIFStarter `std::map<int, int> BufferLooperCounter::DIFStarter`

Definition at line 17 of file [BufferLooperCounter.h](#).

4.3.3.3 hasBadSlowControl `int BufferLooperCounter::hasBadSlowControl = 0`

Definition at line 16 of file [BufferLooperCounter.h](#).

4.3.3.4 hasSlowControl `int BufferLooperCounter::hasSlowControl = 0`

Definition at line 15 of file [BufferLooperCounter.h](#).

4.3.3.5 NonZeroValusAtEndOfData `std::map<int, int> BufferLooperCounter::NonZeroValusAtEndOfData`

Definition at line 21 of file [BufferLooperCounter.h](#).

4.3.3.6 SizeAfterAllData `std::map<int, int> BufferLooperCounter::SizeAfterAllData`

Definition at line 20 of file [BufferLooperCounter.h](#).

4.3.3.7 SizeAfterDIFPtr `std::map<int, int> BufferLooperCounter::SizeAfterDIFPtr`

Definition at line 19 of file [BufferLooperCounter.h](#).

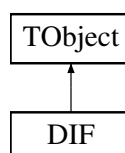
The documentation for this struct was generated from the following files:

- [libs/core/include/BufferLooperCounter.h](#)
- [libs/core/src/BufferLooperCounter.cc](#)

4.4 DIF Class Reference

```
#include <libs/interface/ROOT/include/DIF.h>
```

Inheritance diagram for DIF:



Public Member Functions

- void [clear](#) ()
- void [addHit](#) (const [Hit](#) &)
- void [setID](#) (const std::uint8_t &)
- std::uint8_t [getID](#) () const
- void [setDTC](#) (const std::uint32_t &)
- std::uint32_t [getDTC](#) () const
- void [setGTC](#) (const std::uint32_t &)
- std::uint32_t [getGTC](#) () const
- void [setDIFBCID](#) (const std::uint32_t &)
- std::uint32_t [getDIFBCID](#) () const
- void [setAbsoluteBCID](#) (const std::uint64_t &)
- std::uint64_t [getAbsoluteBCID](#) () const
- std::vector< [Hit](#) >::const_iterator [cbegin](#) () const
- std::vector< [Hit](#) >::const_iterator [cend](#) () const

4.4.1 Detailed Description

Definition at line [16](#) of file [DIF.h](#).

4.4.2 Member Function Documentation

4.4.2.1 [addHit\(\)](#) void [DIF::addHit](#) (
const [Hit](#) & *hit*)

Definition at line [10](#) of file [DIF.cc](#).
00010 { [m_Hits.push_back](#)(hit); }

4.4.2.2 [cbegin\(\)](#) std::vector< [Hit](#) >::const_iterator [DIF::cbegin](#) () const

Definition at line [32](#) of file [DIF.cc](#).
00032 { [return](#) [m_Hits.cbegin](#)(); }

4.4.2.3 [cend\(\)](#) std::vector< [Hit](#) >::const_iterator [DIF::cend](#) () const

Definition at line [34](#) of file [DIF.cc](#).
00034 { [return](#) [m_Hits.cend](#)(); }

4.4.2.4 clear() void DIF::clear ()

Definition at line 36 of file [DIF.cc](#).

```
00036 { m_Hits.clear(); }
```

4.4.2.5 getAbsoluteBCID() std::uint64_t DIF::getAbsoluteBCID () const

Definition at line 30 of file [DIF.cc](#).

```
00030 { return m_AbsoluteBCID; }
```

4.4.2.6 getDIFBCID() std::uint32_t DIF::getDIFBCID () const

Definition at line 26 of file [DIF.cc](#).

```
00026 { return m_DIFBCID; }
```

4.4.2.7 getDTC() std::uint32_t DIF::getDTC () const

Definition at line 18 of file [DIF.cc](#).

```
00018 { return m_DTC; }
```

4.4.2.8 getGTC() std::uint32_t DIF::getGTC () const

Definition at line 22 of file [DIF.cc](#).

```
00022 { return m_GTC; }
```

4.4.2.9 getID() std::uint8_t DIF::getID () const

Definition at line 14 of file [DIF.cc](#).

```
00014 { return m_ID; }
```

4.4.2.10 setAbsoluteBCID() void DIF::setAbsoluteBCID (
const std::uint64_t & absolutebcid)

Definition at line 28 of file [DIF.cc](#).

```
00028 { m_AbsoluteBCID = absolutebcid; }
```

4.4.2.11 setDIFBCID() `void DIF::setDIFBCID (`
`const std::uint32_t & difbcid)`

Definition at line 24 of file [DIF.cc](#).

```
00024 { m_DIFBCID = difbcid; }
```

4.4.2.12 setDTC() `void DIF::setDTC (`
`const std::uint32_t & dtc)`

Definition at line 16 of file [DIF.cc](#).

```
00016 { m_DTC = dtc; }
```

4.4.2.13 setGTC() `void DIF::setGTC (`
`const std::uint32_t & gtc)`

Definition at line 20 of file [DIF.cc](#).

```
00020 { m_GTC = gtc; }
```

4.4.2.14 setID() `void DIF::setID (`
`const std::uint8_t & id)`

Definition at line 12 of file [DIF.cc](#).

```
00012 { m_ID = id; }
```

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

- [libs/interface/ROOT/include/DIF.h](#)
- [libs/interface/ROOT/src/DIF.cc](#)

4.5 DIFPtr Class Reference

M3 MICROROC and HARDROC2 dataformat.

```
#include <libs/core/include/PayloadParser.h>
```

4.5.1 Detailed Description

M3 MICROROC and HARDROC2 dataformat.

Data from the DAQ (once at the beginning of the file) :

(1 fois par fichier) [Données venant de la DAQ]

data format version (8 bits)

daq software version (16 bits)

SDCC firmware version (16 bits)

DIF firmware version (16 bits)

timestamp (32bits) (secondes depuis le 01/01/1970)

timestamp (32bits) (milliseconde)



Explication :

- **data format version** = la version du format de données utilisée, c'est la version 13
- **daq software version** = la version du soft d'acquisition labview ou Xdaq
- **SDCC firmware version** = la version du code VHDL de la carte SDCC
- **DIF firmware version** = la version du code VHDL de la carte DIF
- **timestamp** = secondes et milliseconde depuis le 01/01/1970

Figure 1 Data from the DAQ (once at the beginning of the file)

Data from the **DIF** analog or/and digital (loop) :

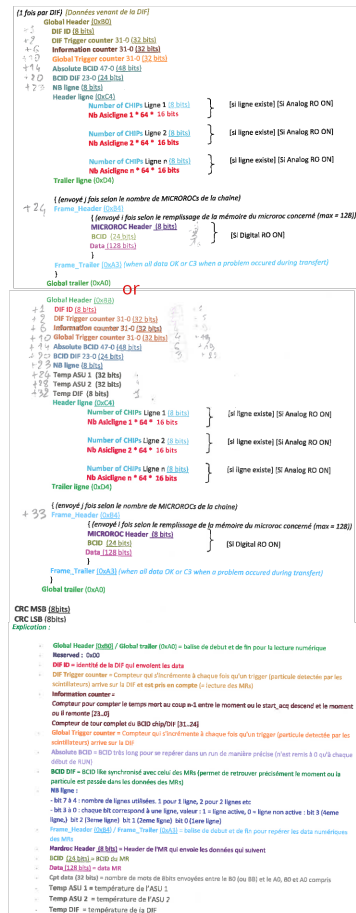


Figure 2 Data from the DIF analog or/and digital

Data from the DAQ (slowcontrol) :

(1 fois par slow control, c'est à dire 1 fois par fichier par DIF) [Données venant de la DAQ]

SC Header (0xB1)

DIF ID (8 bits)

ASIC Header (8 bits)

Size SC ASIC

[74 ou 109 selon le chip]

SC ASIC (n x 8bits)

[n= 74 ou 109 selon le chip]

DIF ID (8 bits)

ASIC Header (8 bits)

Size SC ASIC

[74 ou 109 selon le chip]

SC ASIC (n x 8bits)

[n= 74 ou 109 selon le chip]

...

SC Trailer (0xA1)

Explication :

- **SC Header (0xB1) / SC Trailer (0xA1)** = balise pour repérer les infos sur le Slow Control
- **DIF ID** = identité de la DIF qui envoient les data
- **Size SC ASIC** = taille de la trame SC d'un CHIP (MR=74 byte, HR = 109 byte)
- **ASIC header (8 bits)** : header dans le SC
- **SC ASIC (n x 8bits)** : de 1 a 48 par DIF moins ceux qui sont bypassés

Figure 3 Data from the DAQ (slowcontrol)

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

- `libs/core/include/PayloadParser.h`

4.6 DIFSlowControl Class Reference

```
#include <libs/core/include/DIFSlowControl.h>
```

Public Member Functions

- **DIFSlowControl** (const std::uint8_t &version, const std::uint8_t &DIFid, unsigned char *buf)
Constructor.
- std::uint8_t **getDIFid** ()
get DIF id
- std::map< int, std::map< std::string, int > > **getChipsMap** ()
Get chips map.
- std::map< std::string, int > **getChipSlowControl** (const int &asicid)
Get one chip map.
- int **getChipSlowControl** (const std::int8_t &asicid, const std::string ¶m)
Get one Chip value.
- std::map< int, std::map< std::string, int > >::const_iterator **cbegin** () const
- std::map< int, std::map< std::string, int > >::const_iterator **cend** () const

4.6.1 Detailed Description

Definition at line 13 of file [DIFSlowControl.h](#).

4.6.2 Constructor & Destructor Documentation

4.6.2.1 DIFSlowControl() `DIFSlowControl::DIFSlowControl (`
`const std::uint8_t & version,`
`const std::uint8_t & DIFid,`
`unsigned char * buf)`

Constructor.

Parameters

<i>version</i>	Data format version
<i>DIFid</i>	DIF id
<i>buf</i>	Pointer to the Raw data buffer

Definition at line 7 of file [DIFSlowControl.cc](#).

```
00007 : m_Version(version), m_DIFid(DifId), m_AsicType(2)
00008 {
00009     if(cbuf[0] != 0xb1) return;
00010     int header_shift{6};
00011     if(m_Version < 8) m_NbrAsic = cbuf[5];
00012     else
00013     {
00014         m_DIFid      = cbuf[1];
00015         m_NbrAsic     = cbuf[2];
00016         header_shift = 3;
00017     }
00018     int size_hardroc1 = m_NbrAsic * 72 + header_shift + 1;
00019     if(cbuf[size_hardroc1 - 1] != 0xal) size_hardroc1 = 0;
00020
00021     int size_hardroc2 = m_NbrAsic * 109 + header_shift + 1;
00022     if(cbuf[size_hardroc2 - 1] != 0xal) size_hardroc2 = 0;
00023     if(size_hardroc1 != 0)
00024     {
00025         FillHR1(header_shift, cbuf);
00026         m_AsicType = 1;
00027     }
00028     else if(size_hardroc2 != 0)
00029         FillHR2(header_shift, cbuf);
00030     else
00031         return;
00032 }
```

4.6.3 Member Function Documentation

4.6.3.1 cbegin() `std::map< int, std::map< std::string, int > >::const_iterator DIFSlowControl::cbegin () const` `[inline]`

Definition at line 47 of file [DIFSlowControl.h](#).

```
00047 { return m_MapSC.cbegin(); }
```

4.6.3.2 cend() `std::map< int, std::map< std::string, int > >::const_iterator DIFSlowControl↵
::cend () const [inline]`

Definition at line 49 of file [DIFSlowControl.h](#).

```
00049 { return m_MapSC.cend(); }
```

4.6.3.3 getChipSlowControl() [1/2] `std::map< std::string, int > DIFSlowControl::getChipSlow↵
Control (
const int & asicid) [inline]`

Get one chip map.

Parameters

<i>asicid</i>	ASIC ID
---------------	---------

Returns

a map of <string (parameter name),int (parameter value) >

Definition at line 38 of file [DIFSlowControl.cc](#).

```
00038 { return m_MapSC[asicid]; }
```

4.6.3.4 getChipSlowControl() [2/2] `int DIFSlowControl::getChipSlowControl (
const std::int8_t & asicid,
const std::string & param) [inline]`

Get one Chip value.

Parameters

<i>asicid</i>	ASic ID
<i>param</i>	Parameter name

Definition at line 40 of file [DIFSlowControl.cc](#).

```
00040 { return getChipSlowControl(asicid)[param]; }
```

4.6.3.5 getChipsMap() `std::map< int, std::map< std::string, int > > DIFSlowControl::get↵
ChipsMap () [inline]`

Get chips map.

Returns

a map of < Asic Id, map of <string (parameter name),int (parameter value) >

Definition at line 36 of file [DIFSlowControl.cc](#).

```
00036 { return m_MapSC; }
```

4.6.3.6 getDIFId() `std::uint8_t DIFSlowControl::getDIFId () [inline]`

get [DIF](#) id

Definition at line [34](#) of file [DIFSlowControl.cc](#).

```
00034 { return m_DIFId; }
```

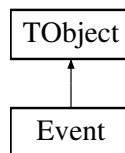
The documentation for this class was generated from the following files:

- [libs/core/include/DIFSlowControl.h](#)
- [libs/core/src/DIFSlowControl.cc](#)

4.7 Event Class Reference

```
#include <libs/interface/ROOT/include/Event.h>
```

Inheritance diagram for Event:



Public Member Functions

- void [clear](#) ()
- void [addDIF](#) (const [DIF](#) &dif)
- std::map< std::uint8_t, [DIF](#) >::const_iterator [cbegin](#) () const
- std::map< std::uint8_t, [DIF](#) >::const_iterator [cend](#) () const

4.7.1 Detailed Description

Definition at line [15](#) of file [Event.h](#).

4.7.2 Member Function Documentation

4.7.2.1 addDIF() `void Event::addDIF (const DIF & dif)`

Definition at line [10](#) of file [Event.cc](#).

```
00010 { DIFs[dif.getID()] = dif; }
```

4.7.2.2 cbegin() `std::map< std::uint8_t, DIF >::const_iterator Event::cbegin () const`

Definition at line 12 of file [Event.cc](#).

```
00012 { return DIFs.cbegin(); }
```

4.7.2.3 cend() `std::map< std::uint8_t, DIF >::const_iterator Event::cend () const`

Definition at line 14 of file [Event.cc](#).

```
00014 { return DIFs.cend(); }
```

4.7.2.4 clear() `void Event::clear ()`

Definition at line 8 of file [Event.cc](#).

```
00008 { DIFs.clear(); }
```

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

- [libs/interface/ROOT/include/Event.h](#)
- [libs/interface/ROOT/src/Event.cc](#)

4.8 Exception Class Reference

```
#include <libs/core/include/Exception.h>
```

Public Member Functions

- virtual const char * [what](#) () const noexcept
- [Exception](#) (const std::string &[message](#))
- [Exception](#) (const std::int32_t &[error](#), const std::string &[message](#))
- std::int32_t [error](#) ()
- std::string [message](#) ()

4.8.1 Detailed Description

Definition at line 11 of file [Exception.h](#).

4.8.2 Constructor & Destructor Documentation

4.8.2.1 Exception() [1/2] `Exception::Exception (const std::string & message) [inline], [explicit]`

Definition at line 15 of file [Exception.h](#).

```
00015 : m_Message(message) { constructWhat(); }
```

4.8.2.2 Exception() [2/2] `Exception::Exception (`
 `const std::int32_t & error,`
 `const std::string & message) [inline]`

Definition at line 16 of file [Exception.h](#).

```
00016 : m_Error(error), m_Message(message) { constructWhat(); }
```

4.8.3 Member Function Documentation

4.8.3.1 error() `std::int32_t Exception::error () [inline]`

Definition at line 17 of file [Exception.h](#).

```
00017 { return m_Error; }
```

4.8.3.2 message() `std::string Exception::message () [inline]`

Definition at line 18 of file [Exception.h](#).

```
00018 { return m_Message; }
```

4.8.3.3 what() `virtual const char * Exception::what () const [inline], [virtual], [noexcept]`

Definition at line 14 of file [Exception.h](#).

```
00014 { return m_What.c_str(); }
```

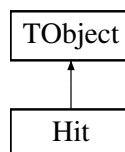
The documentation for this class was generated from the following file:

- [libs/core/include/Exception.h](#)

4.9 Hit Class Reference

```
#include <libs/interface/ROOT/include/Hit.h>
```

Inheritance diagram for Hit:



Public Member Functions

- void [clear](#) ()
- void [setDIF](#) (const std::uint8_t &)
- void [setASIC](#) (const std::uint8_t &)
- void [setChannel](#) (const std::uint8_t &)
- void [setThreshold](#) (const std::uint8_t &)
- void [setDTC](#) (const std::uint32_t &)
- void [setGTC](#) (const std::uint32_t &)
- void [setDIFBCID](#) (const std::uint32_t &)
- void [setFrameBCID](#) (const std::uint32_t &)
- void [setTimestamp](#) (const std::uint32_t &)
- void [setAbsoluteBCID](#) (const std::uint64_t &)
- std::uint8_t [getDIFid](#) () const
- std::uint8_t [getASICid](#) () const
- std::uint8_t [getChannel](#) () const
- std::uint8_t [getThreshold](#) () const
- std::uint32_t [getDTC](#) () const
- std::uint32_t [getGTC](#) () const
- std::uint32_t [getDIFBCID](#) () const
- std::uint32_t [getFrameBCID](#) () const
- std::uint32_t [getTimestamp](#) () const
- std::uint64_t [getAbsoluteBCID](#) () const

4.9.1 Detailed Description

Definition at line 10 of file [Hit.h](#).

4.9.2 Member Function Documentation

4.9.2.1 [clear\(\)](#) void Hit::clear ()

Definition at line 7 of file [Hit.cc](#).

```
00008 {
00009     m_DIF          = 0;
00010     m_ASIC         = 0;
00011     m_Channel      = 0;
00012     m_Threshold    = 0;
00013     m_DTC          = 0;
00014     m_GTC          = 0;
00015     m_DIFBCID      = 0;
00016     m_FrameBCID    = 0;
00017     m_Timestamp     = 0;
00018     m_AbsoluteBCID = 0;
00019 }
```

4.9.2.2 [getAbsoluteBCID\(\)](#) std::uint64_t Hit::getAbsoluteBCID () const

Definition at line 59 of file [Hit.cc](#).

```
00059 { return m_AbsoluteBCID; }
```

4.9.2.3 getASICid() `std::uint8_t Hit::getASICid () const`

Definition at line 43 of file [Hit.cc](#).

```
00043 { return m_ASIC; }
```

4.9.2.4 getChannel() `std::uint8_t Hit::getChannel () const`

Definition at line 45 of file [Hit.cc](#).

```
00045 { return m_Channel; }
```

4.9.2.5 getDIFBCID() `std::uint32_t Hit::getDIFBCID () const`

Definition at line 53 of file [Hit.cc](#).

```
00053 { return m_DIFBCID; }
```

4.9.2.6 getDIFid() `std::uint8_t Hit::getDIFid () const`

Definition at line 41 of file [Hit.cc](#).

```
00041 { return m_DIF; }
```

4.9.2.7 getDTC() `std::uint32_t Hit::getDTC () const`

Definition at line 49 of file [Hit.cc](#).

```
00049 { return m_DTC; }
```

4.9.2.8 getFrameBCID() `std::uint32_t Hit::getFrameBCID () const`

Definition at line 55 of file [Hit.cc](#).

```
00055 { return m_FrameBCID; }
```

4.9.2.9 getGTC() `std::uint32_t Hit::getGTC () const`

Definition at line 51 of file [Hit.cc](#).

```
00051 { return m_GTC; }
```


4.9.2.10 getThreshold() `std::uint8_t Hit::getThreshold () const`

Definition at line 47 of file [Hit.cc](#).

```
00047 { return m_Threshold; }
```

4.9.2.11 getTimestamp() `std::uint32_t Hit::getTimestamp () const`

Definition at line 57 of file [Hit.cc](#).

```
00057 { return m_Timestamp; }
```

4.9.2.12 setAbsoluteBCID() `void Hit::setAbsoluteBCID (const std::uint64_t & absolutebcid)`

Definition at line 39 of file [Hit.cc](#).

```
00039 { m_AbsoluteBCID = absolutebcid; }
```

4.9.2.13 setASIC() `void Hit::setASIC (const std::uint8_t & asic)`

Definition at line 23 of file [Hit.cc](#).

```
00023 { m_ASIC = asic; }
```

4.9.2.14 setChannel() `void Hit::setChannel (const std::uint8_t & channel)`

Definition at line 25 of file [Hit.cc](#).

```
00025 { m_Channel = channel; }
```

4.9.2.15 setDIF() `void Hit::setDIF (const std::uint8_t & dif)`

Definition at line 21 of file [Hit.cc](#).

```
00021 { m_DIF = dif; }
```

4.9.2.16 setDIFBCID() `void Hit::setDIFBCID (const std::uint32_t & difbcid)`

Definition at line 33 of file [Hit.cc](#).

```
00033 { m_DIFBCID = difbcid; }
```

4.9.2.17 setDTC() `void Hit::setDTC (`
`const std::uint32_t & dtc)`

Definition at line 29 of file [Hit.cc](#).

```
00029 { m_DTC = dtc; }
```

4.9.2.18 setFrameBCID() `void Hit::setFrameBCID (`
`const std::uint32_t & framebcid)`

Definition at line 35 of file [Hit.cc](#).

```
00035 { m_FrameBCID = framebcid; }
```

4.9.2.19 setGTC() `void Hit::setGTC (`
`const std::uint32_t & gtc)`

Definition at line 31 of file [Hit.cc](#).

```
00031 { m_GTC = gtc; }
```

4.9.2.20 setThreshold() `void Hit::setThreshold (`
`const std::uint8_t & threshold)`

Definition at line 27 of file [Hit.cc](#).

```
00027 { m_Threshold = threshold; }
```

4.9.2.21 setTimestamp() `void Hit::setTimestamp (`
`const std::uint32_t & timestamp)`

Definition at line 37 of file [Hit.cc](#).

```
00037 { m_Timestamp = timestamp; }
```

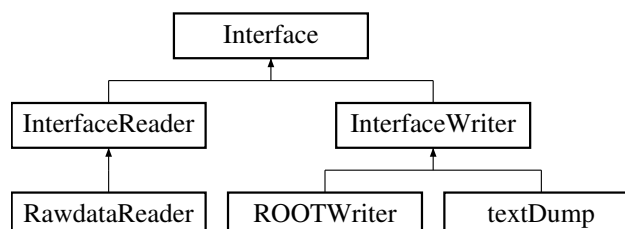
The documentation for this class was generated from the following files:

- [libs/interface/ROOT/include/Hit.h](#)
- [libs/interface/ROOT/src/Hit.cc](#)

4.10 Interface Class Reference

```
#include <libs/core/include/Interface.h>
```

Inheritance diagram for Interface:



Public Member Functions

- [Interface](#) (const std::string &name, const std::string &version, const [InterfaceType](#) &type)
- virtual [~Interface](#) ()=default
- virtual void [startEvent](#) ()
- virtual void [endEvent](#) ()
- virtual void [startDIF](#) ()
- virtual void [endDIF](#) ()
- virtual void [startFrame](#) ()
- virtual void [endFrame](#) ()
- virtual void [startPad](#) ()
- virtual void [endPad](#) ()
- std::shared_ptr< spdlog::logger > & [log](#) ()
- void [setLogger](#) (const std::shared_ptr< spdlog::logger > &logger)
- std::string [getName](#) ()
- [Version](#) [getVersion](#) ()

4.10.1 Detailed Description

Definition at line 38 of file [Interface.h](#).

4.10.2 Constructor & Destructor Documentation

4.10.2.1 Interface() `Interface::Interface (`
`const std::string & name,`
`const std::string & version,`
`const InterfaceType & type) [inline]`

Definition at line 41 of file [Interface.h](#).

```
00041 :   m_Name(name), m_Version(version) {}
```

4.10.2.2 ~Interface() `virtual Interface::~~Interface () [virtual], [default]`

4.10.3 Member Function Documentation

4.10.3.1 endDIF() `virtual void Interface::endDIF () [inline], [virtual]`

Reimplemented in [ROOTWriter](#).

Definition at line 46 of file [Interface.h](#).

```
00046 {}
```

4.10.3.2 endEvent() virtual void Interface::endEvent () [inline], [virtual]

Reimplemented in [ROOTWriter](#).

Definition at line 44 of file [Interface.h](#).

```
00044 {}
```

4.10.3.3 endFrame() virtual void Interface::endFrame () [inline], [virtual]

Reimplemented in [ROOTWriter](#).

Definition at line 48 of file [Interface.h](#).

```
00048 {}
```

4.10.3.4 endPad() virtual void Interface::endPad () [inline], [virtual]

Reimplemented in [ROOTWriter](#).

Definition at line 50 of file [Interface.h](#).

```
00050 {}
```

4.10.3.5 getName() std::string Interface::getName () [inline]

Definition at line 53 of file [Interface.h](#).

```
00053 { return m_Name; }
```

4.10.3.6 getVersion() Version Interface::getVersion () [inline]

Definition at line 54 of file [Interface.h](#).

```
00054 { return m_Version; }
```

4.10.3.7 log() std::shared_ptr< spdlog::logger > & Interface::log () [inline]

Definition at line 51 of file [Interface.h](#).

```
00051 { return m_Logger; }
```

4.10.3.8 setLogger() void Interface::setLogger (
const std::shared_ptr< spdlog::logger > & logger) [inline]

Definition at line 52 of file [Interface.h](#).

```
00052 { m_Logger = logger; }
```

4.10.3.9 startDIF() `virtual void Interface::startDIF () [inline], [virtual]`

Reimplemented in [ROOTWriter](#).

Definition at line 45 of file [Interface.h](#).
00045 {}

4.10.3.10 startEvent() `virtual void Interface::startEvent () [inline], [virtual]`

Reimplemented in [ROOTWriter](#).

Definition at line 43 of file [Interface.h](#).
00043 {}

4.10.3.11 startFrame() `virtual void Interface::startFrame () [inline], [virtual]`

Reimplemented in [ROOTWriter](#).

Definition at line 47 of file [Interface.h](#).
00047 {}

4.10.3.12 startPad() `virtual void Interface::startPad () [inline], [virtual]`

Reimplemented in [ROOTWriter](#).

Definition at line 49 of file [Interface.h](#).
00049 {}

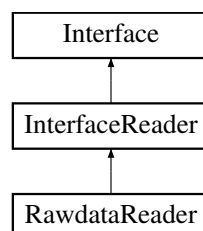
The documentation for this class was generated from the following file:

- [libs/core/include/Interface.h](#)

4.11 InterfaceReader Class Reference

```
#include <libs/core/include/Interface.h>
```

Inheritance diagram for InterfaceReader:



Public Member Functions

- [InterfaceReader](#) (const std::string &name, const std::string &version)
- virtual [~InterfaceReader](#) ()=default

Protected Attributes

- [Buffer](#) [m_Buffer](#)

4.11.1 Detailed Description

Definition at line 63 of file [Interface.h](#).

4.11.2 Constructor & Destructor Documentation

4.11.2.1 InterfaceReader() `InterfaceReader::InterfaceReader (`
 `const std::string & name,`
 `const std::string & version) [inline]`

Definition at line 66 of file [Interface.h](#).

```
00066 : Interface(name, version, InterfaceType::Reader) {}
```

4.11.2.2 ~InterfaceReader() `virtual InterfaceReader::~~InterfaceReader () [virtual], [default]`

4.11.3 Member Data Documentation

4.11.3.1 m_Buffer [Buffer](#) `InterfaceReader::m_Buffer [protected]`

Definition at line 70 of file [Interface.h](#).

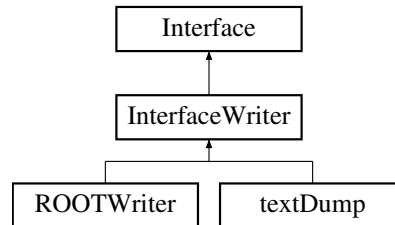
The documentation for this class was generated from the following file:

- `libs/core/include/Interface.h`

4.12 InterfaceWriter Class Reference

```
#include <libs/core/include/Interface.h>
```

Inheritance diagram for InterfaceWriter:



Public Member Functions

- [InterfaceWriter](#) (const std::string &name, const std::string &version)
- void [addCompatibility](#) (const std::string &name, const std::string &version)
- std::map< std::string, std::string > [getCompatibility](#) ()
- bool [checkCompatibility](#) (const std::string &name, const std::string &version)
- virtual [~InterfaceWriter](#) ()=default

4.12.1 Detailed Description

Definition at line 73 of file [Interface.h](#).

4.12.2 Constructor & Destructor Documentation

4.12.2.1 InterfaceWriter() `InterfaceWriter::InterfaceWriter (const std::string & name, const std::string & version) [inline]`

Definition at line 76 of file [Interface.h](#).

```
00076 : Interface(name, version, InterfaceType::Writer) {}
```

4.12.2.2 ~InterfaceWriter() `virtual InterfaceWriter::~~InterfaceWriter () [virtual], [default]`

4.12.3 Member Function Documentation

4.12.3.1 addCompatibility() void InterfaceWriter::addCompatibility (
const std::string & name,
const std::string & version) [inline]

Definition at line 78 of file [Interface.h](#).

```
00078 { m_Compatible[name] = version; }
```

4.12.3.2 checkCompatibility() bool InterfaceWriter::checkCompatibility (
const std::string & name,
const std::string & version) [inline]

Definition at line 82 of file [Interface.h](#).

```
00083 {   
00084     if(m_Compatible.find(name) != m_Compatible.end())   
00085     {   
00086         auto          ran = semver::range::detail::range(m_Compatible[name]);   
00087         semver::version ver = semver::version(version);   
00088         if(ran.satisfies(ver, false)) return true;   
00089         else   
00090             return false;   
00091     }   
00092     else   
00093         return false;   
00094 }
```

4.12.3.3 getCompatibility() std::map< std::string, std::string > InterfaceWriter::getCompatibility
() [inline]

Definition at line 80 of file [Interface.h](#).

```
00080 { return m_Compatible; }
```

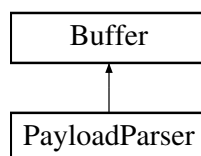
The documentation for this class was generated from the following file:

- [libs/core/include/Interface.h](#)

4.13 PayloadParser Class Reference

```
#include <libs/core/include/PayloadParser.h>
```

Inheritance diagram for PayloadParser:



Public Member Functions

- [PayloadParser](#) ()=default
- void [setBuffer](#) (const [Buffer](#) &buffer)
- bool [hasTemperature](#) () const
- bool [hasAnalogReadout](#) () const
- bool [hasSlowControl](#) () const
- float [getTemperatureDIF](#) () const
- float [getTemperatureASU1](#) () const
- float [getTemperatureASU2](#) () const
- [Buffer](#) [getSlowControl](#) () const
- std::vector< [bit8_t](#) * > [getFramesVector](#) () const
- std::vector< [bit8_t](#) * > [getLinesVector](#) () const
- std::uint32_t [getSizeAfterDIFPtr](#) () const
- std::uint32_t [getEndOfDIFData](#) () const
- std::uint32_t [getDTC](#) () const
- std::uint32_t [getGTC](#) () const
- std::uint64_t [getAbsoluteBCID](#) () const
- std::uint32_t [getBCID](#) () const
- bool [hasLine](#) (const std::uint32_t &) const
- std::uint32_t [getNumberOfFrames](#) () const
- [bit8_t](#) * [getFramePtr](#) (const std::uint32_t &) const
- std::uint32_t [getFrameBCID](#) (const std::uint32_t &) const
- std::uint32_t [getFrameTimeToTrigger](#) (const std::uint32_t &) const
- bool [getFrameLevel](#) (const std::uint32_t &, const std::uint32_t &, const std::uint32_t &) const
- std::uint32_t [getDIFid](#) () const
- std::uint32_t [getASICid](#) (const std::uint32_t &) const
- std::uint32_t [getThresholdStatus](#) (const std::uint32_t &, const std::uint32_t &) const
- std::uint32_t [getDIF_CRC](#) () const

4.13.1 Detailed Description

Definition at line 36 of file [PayloadParser.h](#).

4.13.2 Constructor & Destructor Documentation

4.13.2.1 [PayloadParser\(\)](#) `PayloadParser::PayloadParser () [default]`

4.13.3 Member Function Documentation

4.13.3.1 getAbsoluteBCID() `std::uint64_t PayloadParser::getAbsoluteBCID () const [inline]`

Definition at line 233 of file [PayloadParser.h](#).

```
00234 {
00235     std::uint32_t shift{Size::GLOBAL_HEADER + Size::DIF_IF + Size::DIF_TRIGGER_COUNTER +
        Size::INFORMATION_COUNTER + Size::GLOBAL_TRIGGER_COUNTER};
00236     std::uint64_t LBC = ((begin()[shift] << 16) | (begin()[shift + 1] << 8) | (begin()[shift + 2])) *
        16777216ULL /* to shift the value from the 24 first bits*/
00237         + ((begin()[shift + 3] << 16) | (begin()[shift + 4] << 8) | (begin()[shift + 5]));
00238     return LBC;
00239 }
```

4.13.3.2 getASICid() `std::uint32_t PayloadParser::getASICid (const std::uint32_t & i) const [inline]`

Definition at line 277 of file [PayloadParser.h](#).

```
00277 { return m_Frames[i][0] & 0xFF; }
```

4.13.3.3 getBCID() `std::uint32_t PayloadParser::getBCID () const [inline]`

Definition at line 241 of file [PayloadParser.h](#).

```
00242 {
00243     std::uint32_t shift{Size::GLOBAL_HEADER + Size::DIF_IF + Size::DIF_TRIGGER_COUNTER +
        Size::INFORMATION_COUNTER + Size::GLOBAL_TRIGGER_COUNTER + Size::ABSOLUTE_BCID};
00244     return (begin()[shift] << 16) + (begin()[shift + 1] << 8) + begin()[shift + 2];
00245 }
```

4.13.3.4 getDIF_CRC() `std::uint32_t PayloadParser::getDIF_CRC () const [inline]`

Definition at line 281 of file [PayloadParser.h](#).

```
00282 {
00283     std::uint32_t shift{getEndOfDIFData() - (Size::CRC_MSB + Size::CRC_LSB)};
00284     return (begin()[shift] << 8) + begin()[shift + 1];
00285 }
```

4.13.3.5 getDIFid() `std::uint32_t PayloadParser::getDIFid () const [inline]`

Definition at line 271 of file [PayloadParser.h](#).

```
00272 {
00273     std::uint32_t shift{+Size::GLOBAL_HEADER};
00274     return begin()[shift] & 0xFF;
00275 }
```

4.13.3.6 getDTC() `std::uint32_t PayloadParser::getDTC () const [inline]`

Definition at line 221 of file [PayloadParser.h](#).

```
00222 {
00223     std::uint32_t shift{Size::GLOBAL_HEADER + Size::DIF_IF};
00224     return (begin()[shift] << 24) + (begin()[shift + 1] << 16) + (begin()[shift + 2] << 8) + begin()[shift
        + 3];
00225 }
```

4.13.3.7 getEndOfDIFData() `std::uint32_t PayloadParser::getEndOfDIFData () const [inline]`

Definition at line 289 of file [PayloadParser.h](#).

```
00289 { return theGetFramePtrReturn_; }
```

4.13.3.8 getFrameBCID() `std::uint32_t PayloadParser::getFrameBCID (const std::uint32_t & i) const [inline]`

Definition at line 257 of file [PayloadParser.h](#).

```
00258 {
00259     std::uint32_t shift{+Size::MICROROC_HEADER};
00260     return GrayToBin((m_Frames[i][shift] << 16) + (m_Frames[i][shift + 1] << 8) + m_Frames[i][shift + 2]);
00261 }
```

4.13.3.9 getFrameLevel() `bool PayloadParser::getFrameLevel (const std::uint32_t & i, const std::uint32_t & ipad, const std::uint32_t & ilevel) const [inline]`

Definition at line 265 of file [PayloadParser.h](#).

```
00266 {
00267     std::uint32_t shift{Size::MICROROC_HEADER + Size::BCID};
00268     return ((m_Frames[i][shift + ((3 - ipad / 16) * 4 + (ipad % 16) / 4)] >> (7 - ((ipad % 16) % 4) * 2 + ilevel))) & 0x1;
00269 }
```

4.13.3.10 getFramePtr() `bit8_t * PayloadParser::getFramePtr (const std::uint32_t & i) const [inline]`

Definition at line 255 of file [PayloadParser.h](#).

```
00255 { return m_Frames[i]; }
```

4.13.3.11 getFramesVector() `std::vector< bit8_t * > PayloadParser::getFramesVector () const [inline]`

Definition at line 217 of file [PayloadParser.h](#).

```
00217 { return m_Frames; }
```

4.13.3.12 getFrameTimeToTrigger() `std::uint32_t PayloadParser::getFrameTimeToTrigger (const std::uint32_t & i) const [inline]`

Definition at line 263 of file [PayloadParser.h](#).

```
00263 { return getBCID() - getFrameBCID(i); }
```

4.13.3.13 `getGTC()` `std::uint32_t PayloadParser::getGTC () const [inline]`Definition at line 227 of file [PayloadParser.h](#).

```
00228 {
00229     std::uint32_t shift{Size::GLOBAL_HEADER + Size::DIF_IF + Size::DIF_TRIGGER_COUNTER +
        Size::INFORMATION_COUNTER};
00230     return (begin()[shift] << 24) + (begin()[shift + 1] << 16) + (begin()[shift + 2] << 8) + begin()[shift
        + 3];
00231 }
```

4.13.3.14 `getLinesVector()` `std::vector< bit8_t * > PayloadParser::getLinesVector () const [inline]`Definition at line 219 of file [PayloadParser.h](#).

```
00219 { return m_Lines; }
```

4.13.3.15 `getNumberOfFrames()` `std::uint32_t PayloadParser::getNumberOfFrames () const [inline]`Definition at line 253 of file [PayloadParser.h](#).

```
00253 { return m_Frames.size(); }
```

4.13.3.16 `getSizeAfterDIFPtr()` `std::uint32_t PayloadParser::getSizeAfterDIFPtr () const [inline]`Definition at line 287 of file [PayloadParser.h](#).

```
00287 { return size() - theGetFramePtrReturn_; }
```

4.13.3.17 `getSlowControl()` `Buffer PayloadParser::getSlowControl () const [inline]`Definition at line 210 of file [PayloadParser.h](#).

```
00211 {
00212     if(hasSlowControl()) return Buffer(&begin()[getEndOfDIFData()], size() - getEndOfDIFData());
00213     else
00214         return Buffer();
00215 }
```

4.13.3.18 `getTemperatureASU1()` `float PayloadParser::getTemperatureASU1 () const [inline]`Definition at line 198 of file [PayloadParser.h](#).

```
00199 {
00200     if(!hasTemperature()) throw Exception("Don't have TemperatureASU1 information");
00201     return (getTASU1() >> 3) * 0.0625;
00202 }
```

4.13.3.19 `getTemperatureASU2()` `float PayloadParser::getTemperatureASU2 () const [inline]`

Definition at line 204 of file [PayloadParser.h](#).

```
00205 {
00206     if(!hasTemperature()) throw Exception("Don't have TemperatureASU2 information");
00207     return (getTASU2() » 3) * 0.0625;
00208 }
```

4.13.3.20 `getTemperatureDIF()` `float PayloadParser::getTemperatureDIF () const [inline]`

Definition at line 192 of file [PayloadParser.h](#).

```
00193 {
00194     if(!hasTemperature()) throw Exception("Don't have TemperatureDIF information");
00195     return 0.508 * getTDIF() - 9.659;
00196 }
```

4.13.3.21 `getThresholdStatus()` `std::uint32_t PayloadParser::getThresholdStatus (`
`const std::uint32_t & i,`
`const std::uint32_t & ipad) const [inline]`

Definition at line 279 of file [PayloadParser.h](#).

```
00279 { return ((std::uint32_t)getFrameLevel(i, ipad, 1)) « 1 | ((std::uint32_t)getFrameLevel(i, ipad,
0)); }
```

4.13.3.22 `hasAnalogReadout()` `bool PayloadParser::hasAnalogReadout () const [inline]`

Definition at line 144 of file [PayloadParser.h](#).

```
00144 { return getNumberLines() != 0; }
```

4.13.3.23 `hasLine()` `bool PayloadParser::hasLine (`
`const std::uint32_t & line) const [inline]`

Definition at line 247 of file [PayloadParser.h](#).

```
00248 {
00249     std::uint32_t shift{Size::GLOBAL_HEADER + Size::DIF_IF + Size::DIF_TRIGGER_COUNTER +
        Size::INFORMATION_COUNTER + Size::GLOBAL_TRIGGER_COUNTER + Size::ABSOLUTE_BCID + Size::BCID_DIF};
00250     return ((begin())[shift] » line) & 0x1;
00251 }
```

4.13.3.24 `hasSlowControl()` `bool PayloadParser::hasSlowControl () const [inline]`

Definition at line 172 of file [PayloadParser.h](#).

```
00172 { return theGetFramePtrReturn_ != size(); }
```

4.13.3.25 hasTemperature() `bool PayloadParser::hasTemperature () const [inline]`

Definition at line 142 of file [PayloadParser.h](#).

```
00142 { return (static_cast<std::uint8_t>(begin()[0]) ==
      static_cast<std::uint8_t>(Value::GLOBAL_HEADER_TEMP)); }
```

4.13.3.26 setBuffer() `void PayloadParser::setBuffer (const Buffer & buffer) [inline]`

Definition at line 92 of file [PayloadParser.h](#).

```
00093 {
00094     set(buffer);
00095     m_Frames.clear();
00096     m_Lines.clear();
00097     theGetFramePtrReturn_ = parsePayload();
00098 }
```

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

- [libs/core/include/PayloadParser.h](#)

4.14 RawBufferNavigator Class Reference

class to navigate in the raw data buffer parse the header and send the payload as [Buffer](#)

```
#include <libs/core/include/RawBufferNavigator.h>
```

Public Member Functions

- [RawBufferNavigator \(\)](#)
- [~RawBufferNavigator \(\)=default](#)
- void [setBuffer](#) (const [Buffer](#) &)
- std::uint8_t [getDetectorID](#) ()
- bool [findStartOfPayload](#) ()
- std::int32_t [getStartOfPayload](#) ()
- bool [validPayload](#) ()
- [Buffer](#) [getPayload](#) ()

Static Public Member Functions

- static void [StartAt](#) (const int &start)

4.14.1 Detailed Description

class to navigate in the raw data buffer parse the header and send the payload as [Buffer](#)

Definition at line 13 of file [RawBufferNavigator.h](#).

4.14.2 Constructor & Destructor Documentation

4.14.2.1 RawBufferNavigator() RawBufferNavigator::RawBufferNavigator ()

Definition at line 16 of file [RawBufferNavigator.cc](#).

```
00016 {}
```

4.14.2.2 ~RawBufferNavigator() RawBufferNavigator::~~RawBufferNavigator () [default]

4.14.3 Member Function Documentation

4.14.3.1 findStartOfPayload() bool RawBufferNavigator::findStartOfPayload ()

Definition at line 27 of file [RawBufferNavigator.cc](#).

```
00028 {
00029     if(m_StartPayloadDone == true)
00030     {
00031         if(m_StartPayload == -1) return false;
00032         else
00033             return true;
00034     }
00035     else
00036     {
00037         m_StartPayloadDone = true;
00038         for(std::size_t i = m_Start; i < m_Buffer.size(); i++)
00039         {
00040             if(static_cast<std::uint8_t>(m_Buffer[i]) == static_cast<std::uint8_t>(Value::GLOBAL_HEADER) ||
static_cast<std::uint8_t>(m_Buffer[i]) == static_cast<std::uint8_t>(Value::GLOBAL_HEADER_TEMP))
00041             {
00042                 m_StartPayload = i;
00043                 return true;
00044             }
00045         }
00046         m_StartPayload = -1;
00047         return false;
00048     }
00049 }
```

4.14.3.2 getDetectorID() std::uint8_t RawBufferNavigator::getDetectorID ()

Definition at line 25 of file [RawBufferNavigator.cc](#).

```
00025 { return m_Buffer[0]; }
```

4.14.3.3 getPayload() Buffer RawBufferNavigator::getPayload ()

Definition at line 59 of file [RawBufferNavigator.cc](#).

```
00059 { return Buffer(&(m_Buffer.begin()[m_StartPayload]), m_Buffer.size() - m_StartPayload); }
```

4.14.3.4 `getStartOfPayload()` `std::int32_t RawBufferNavigator::getStartOfPayload ()`

Definition at line 51 of file [RawBufferNavigator.cc](#).

```
00052 {
00053     findStartOfPayload();
00054     return m_StartPayload;
00055 }
```

4.14.3.5 `setBuffer()` `void RawBufferNavigator::setBuffer (const Buffer & b)`

Definition at line 18 of file [RawBufferNavigator.cc](#).

```
00019 {
00020     m_Buffer          = b;
00021     m_StartPayload    = -1;
00022     m_StartPayloadDone = false;
00023 }
```

4.14.3.6 `StartAt()` `void RawBufferNavigator::StartAt (const int & start) [static]`

Definition at line 11 of file [RawBufferNavigator.cc](#).

```
00012 {
00013     if(start >= 0) m_Start = start;
00014 }
```

4.14.3.7 `validPayload()` `bool RawBufferNavigator::validPayload ()`

Definition at line 57 of file [RawBufferNavigator.cc](#).

```
00057 { return m_StartPayload != -1; }
```

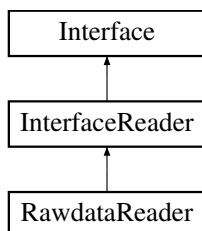
The documentation for this class was generated from the following files:

- [libs/core/include/RawBufferNavigator.h](#)
- [libs/core/src/RawBufferNavigator.cc](#)

4.15 RawdataReader Class Reference

```
#include <libs/interface/RawDataReader/include/RawdataReader.h>
```

Inheritance diagram for RawdataReader:



Public Member Functions

- [RawdataReader](#) (const char *fileName)
- void [start](#) ()
- void [end](#) ()
- float [getFileSize](#) ()
- void [openFile](#) (const std::string &fileName)
- void [closeFile](#) ()
- bool [nextEvent](#) ()
- bool [nextDIFbuffer](#) ()
- const [Buffer](#) & [getBuffer](#) ()
- virtual [~RawdataReader](#) ()

Static Public Member Functions

- static void [setDefaultBufferSize](#) (const std::size_t &size)

Additional Inherited Members

4.15.1 Detailed Description

Definition at line 17 of file [RawdataReader.h](#).

4.15.2 Constructor & Destructor Documentation

4.15.2.1 RawdataReader() `RawdataReader::RawdataReader (const char * fileName) [explicit]`

Definition at line 18 of file [RawdataReader.cc](#).

```
00018                                     : InterfaceReader("RawdataReader", "1.0.0")
00019 {
00020     m_buf.reserve(m_BufferSize);
00021     m_Filename = fileName;
00022 }
```

4.15.2.2 ~RawdataReader() `virtual RawdataReader::~~RawdataReader () [inline], [virtual]`

Definition at line 29 of file [RawdataReader.h](#).

```
00029 { closeFile(); }
```

4.15.3 Member Function Documentation

4.15.3.1 closeFile() void RawdataReader::closeFile ()

Definition at line 47 of file [RawdataReader.cc](#).

```
00048 {
00049     try
00050     {
00051         if(m_FileStream.is_open()) m_FileStream.close();
00052     }
00053     catch(const std::ios_base::failure& e)
00054     {
00055         log()->error("Caught an ios_base::failure in closeFile : {} {}", e.what(), e.code().value());
00056         throw;
00057     }
00058 }
```

4.15.3.2 end() void RawdataReader::end ()

Definition at line 26 of file [RawdataReader.cc](#).

```
00026 { closeFile(); }
```

4.15.3.3 getBuffer() const Buffer & RawdataReader::getBuffer ()

Definition at line 122 of file [RawdataReader.cc](#).

```
00123 {
00124     uncompress();
00125     return m_Buffer;
00126 }
```

4.15.3.4 getFileSize() float RawdataReader::getFileSize ()

Definition at line 130 of file [RawdataReader.cc](#).

```
00130 { return m_FileSize; }
```

4.15.3.5 nextDIFbuffer() bool RawdataReader::nextDIFbuffer ()

Definition at line 95 of file [RawdataReader.cc](#).

```
00096 {
00097     try
00098     {
00099         static int DIF_processed{0};
00100         if(DIF_processed >= m_NumberOfDIF)
00101         {
00102             DIF_processed = 0;
00103             return false;
00104         }
00105         else
00106         {
00107             DIF_processed++;
00108             std::uint32_t bsize{0};
00109             m_FileStream.read(reinterpret_cast<char*>(&bsize), sizeof(std::uint32_t));
00110             m_FileStream.read(reinterpret_cast<char*>(&m_buf[0]), bsize);
00111             m_Buffer = Buffer(m_buf);
00112         }
00113     }
00114     catch(const std::ios_base::failure& e)
00115     {
00116         log()->error("Caught an ios_base::failure in openFile : {}", e.what());
00117         return false;
00118     }
00119     return true;
00120 }
```

4.15.3.6 nextEvent() `bool RawdataReader::nextEvent ()`

Definition at line 81 of file [RawdataReader.cc](#).

```
00082 {
00083     try
00084     {
00085         m_FileStream.read(reinterpret_cast<char*>(&m_EventNumber), sizeof(std::uint32_t));
00086         m_FileStream.read(reinterpret_cast<char*>(&m_NumberOfDIF), sizeof(std::uint32_t));
00087     }
00088     catch(const std::ios_base::failure& e)
00089     {
00090         return false;
00091     }
00092     return true;
00093 }
```

4.15.3.7 openFile() `void RawdataReader::openFile (const std::string & fileName)`

Definition at line 60 of file [RawdataReader.cc](#).

```
00061 {
00062     try
00063     {
00064         m_FileStream.rdbuf()->pubsetbuf(0, 0);
00065         m_FileStream.exceptions(std::ifstream::failbit | std::ifstream::badbit);
00066         m_FileStream.open(fileName.c_str(), std::ios::in | std::ios::binary | std::ios::ate); // Start at
the end to directly calculate the size of the file then come back to beginning
00067         m_FileStream.rdbuf()->pubsetbuf(0, 0);
00068         if(m_FileStream.is_open())
00069         {
00070             setFileSize(m_FileStream.tellg());
00071             m_FileStream.seekg(0, std::ios::beg);
00072         }
00073     }
00074     catch(const std::ios_base::failure& e)
00075     {
00076         log()->error("Caught an ios_base::failure in openFile : {}", e.what());
00077         throw;
00078     }
00079 }
```

4.15.3.8 setDefaultBufferSize() `void RawdataReader::setDefaultBufferSize (const std::size_t & size) [static]`

Definition at line 16 of file [RawdataReader.cc](#).

```
00016 { m_BufferSize = size; }
```

4.15.3.9 start() `void RawdataReader::start ()`

Definition at line 24 of file [RawdataReader.cc](#).

```
00024 { openFile(m_Filename); }
```

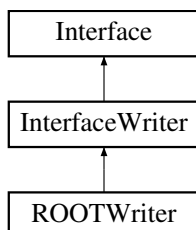
The documentation for this class was generated from the following files:

- `libs/interface/RawDataReader/include/RawdataReader.h`
- `libs/interface/RawDataReader/src/RawdataReader.cc`

4.16 ROOTWriter Class Reference

```
#include <libs/interface/ROOT/include/ROOTWriter.h>
```

Inheritance diagram for ROOTWriter:



Public Member Functions

- [ROOTWriter](#) ()
- void [setFilename](#) (const std::string &)
- void [start](#) ()
- void [processDIF](#) (const [PayloadParser](#) &)
- void [processFrame](#) (const [PayloadParser](#) &, const std::uint32_t &frameIndex)
- void [processPadInFrame](#) (const [PayloadParser](#) &, const std::uint32_t &frameIndex, const std::uint32_t &channelIndex)
- void [processSlowControl](#) (const [Buffer](#) &)
- void [end](#) ()
- virtual void [startEvent](#) ()
- virtual void [endEvent](#) ()
- virtual void [startDIF](#) ()
- virtual void [endDIF](#) ()
- virtual void [startFrame](#) ()
- virtual void [endFrame](#) ()
- virtual void [startPad](#) ()
- virtual void [endPad](#) ()

4.16.1 Detailed Description

Definition at line 18 of file [ROOTWriter.h](#).

4.16.2 Constructor & Destructor Documentation

4.16.2.1 ROOTWriter() `ROOTWriter::ROOTWriter ()`

Definition at line 10 of file [ROOTWriter.cc](#).

```
00010 : InterfaceWriter("ROOTWriter", "1.0.0") { addCompatibility("RawdataReader", ">=1.0.0"); }
```

4.16.3 Member Function Documentation

4.16.3.1 end() void ROOTWriter::end ()

Definition at line 19 of file [ROOTWriter.cc](#).

```
00020 {
00021     if(m_Tree) m_Tree->Write();
00022     if(m_File)
00023     {
00024         m_File->Write();
00025         m_File->Close();
00026     }
00027     if(m_File) delete m_File;
00028 }
```

4.16.3.2 endDIF() void ROOTWriter::endDIF () [virtual]

Reimplemented from [Interface](#).

Definition at line 75 of file [ROOTWriter.cc](#).

```
00076 {
00077     m_Event->addDIF(*m_DIF);
00078     delete m_DIF;
00079 }
```

4.16.3.3 endEvent() void ROOTWriter::endEvent () [virtual]

Reimplemented from [Interface](#).

Definition at line 63 of file [ROOTWriter.cc](#).

```
00064 {
00065     m_Tree->Fill();
00066     if(m_Event) delete m_Event;
00067 }
```

4.16.3.4 endFrame() void ROOTWriter::endFrame () [virtual]

Reimplemented from [Interface](#).

Definition at line 87 of file [ROOTWriter.cc](#).

```
00088 {
00089     m_DIF->addHit(*m_Hit);
00090     delete m_Hit;
00091 }
```

4.16.3.5 endPad() void ROOTWriter::endPad () [virtual]

Reimplemented from [Interface](#).

Definition at line 95 of file [ROOTWriter.cc](#).

```
00095 {}
```

4.16.3.6 processDIF() void ROOTWriter::processDIF (
const PayloadParser & d)

Definition at line 30 of file ROOTWriter.cc.

```
00031 {
00032     m_DIF->setID(d.getDIFid());
00033     m_DIF->setDTC(d.getDTC());
00034     m_DIF->setGTC(d.getGTC());
00035     m_DIF->setDIFBCID(d.getBCID());
00036     m_DIF->setAbsoluteBCID(d.getAbsoluteBCID());
00037 }
```

4.16.3.7 processFrame() void ROOTWriter::processFrame (
const PayloadParser & d,
const std::uint32_t & frameIndex)

Definition at line 39 of file ROOTWriter.cc.

```
00040 {
00041     m_Hit->setDIF(d.getDIFid());
00042     m_Hit->setASIC(d.getASICid(frameIndex));
00043     m_Hit->setDTC(d.getDTC());
00044     m_Hit->setGTC(d.getGTC());
00045     m_Hit->setDIFBCID(d.getBCID());
00046     m_Hit->setAbsoluteBCID(d.getAbsoluteBCID());
00047     m_Hit->setFrameBCID(d.getFrameBCID(frameIndex));
00048     m_Hit->setTimestamp(d.getFrameTimeToTrigger(frameIndex));
00049 }
```

4.16.3.8 processPadInFrame() void ROOTWriter::processPadInFrame (
const PayloadParser & d,
const std::uint32_t & frameIndex,
const std::uint32_t & channelIndex)

Definition at line 51 of file ROOTWriter.cc.

```
00052 {
00053     m_Hit->setChannel(channelIndex);
00054     m_Hit->setThreshold(static_cast<std::uint8_t>(d.getThresholdStatus(frameIndex, channelIndex)));
00055 }
```

4.16.3.9 processSlowControl() void ROOTWriter::processSlowControl (
const Buffer &) [inline]

Definition at line 29 of file ROOTWriter.h.

```
00029 { ; }
```

4.16.3.10 setFilename() void ROOTWriter::setFilename (
const std::string & filename)

Definition at line 8 of file ROOTWriter.cc.

```
00008 { m_Filename = filename; }
```

4.16.3.11 start() void ROOTWriter::start ()

Definition at line 12 of file [ROOTWriter.cc](#).

```
00013 {  
00014     m_File = TFile::Open(m_Filename.c_str(), "RECREATE", m_Filename.c_str(),  
        ROOT::CompressionSettings(ROOT::kZLIB, 5));  
00015     m_Tree = new TTree("RawData", "Raw SDHCAL data tree");  
00016     m_Tree->Branch("Events", &m_Event, 512000, 99);  
00017 }
```

4.16.3.12 startDIF() void ROOTWriter::startDIF () [virtual]

Reimplemented from [Interface](#).

Definition at line 69 of file [ROOTWriter.cc](#).

```
00070 {  
00071     m_DIF = new DIF();  
00072     // m_DIF->clear();  
00073 }
```

4.16.3.13 startEvent() void ROOTWriter::startEvent () [virtual]

Reimplemented from [Interface](#).

Definition at line 57 of file [ROOTWriter.cc](#).

```
00058 {  
00059     m_Event = new Event();  
00060     // m_Event->clear();  
00061 }
```

4.16.3.14 startFrame() void ROOTWriter::startFrame () [virtual]

Reimplemented from [Interface](#).

Definition at line 81 of file [ROOTWriter.cc](#).

```
00082 {  
00083     m_Hit = new Hit();  
00084     // m_Hit->clear();  
00085 }
```

4.16.3.15 startPad() void ROOTWriter::startPad () [virtual]

Reimplemented from [Interface](#).

Definition at line 93 of file [ROOTWriter.cc](#).

```
00093 {}
```

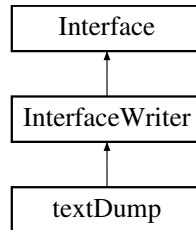
The documentation for this class was generated from the following files:

- [libs/interface/ROOT/include/ROOTWriter.h](#)
- [libs/interface/ROOT/src/ROOTWriter.cc](#)

4.17 textDump Class Reference

```
#include <libs/interface/Dump/include/textDump.h>
```

Inheritance diagram for textDump:



Public Member Functions

- [textDump](#) ()
- void [start](#) ()
- void [processDIF](#) (const [PayloadParser](#) &)
- void [processFrame](#) (const [PayloadParser](#) &, uint32_t frameIndex)
- void [processPadInFrame](#) (const [PayloadParser](#) &, uint32_t frameIndex, uint32_t channelIndex)
- void [processSlowControl](#) (Buffer)
- void [end](#) ()
- std::shared_ptr< spdlog::logger > & [print](#) ()
- void [setLevel](#) (const spdlog::level::level_enum &level)

4.17.1 Detailed Description

Definition at line 14 of file [textDump.h](#).

4.17.2 Constructor & Destructor Documentation

4.17.2.1 textDump() `textDump::textDump ()`

Definition at line 9 of file [textDump.cc](#).

```

00009             : InterfaceWriter("textDump", "1.0.0")
00010 {
00011     m_InternalLogger = std::make_shared<spdlog::logger>("textDump",
std::make_shared<spdlog::sinks::stdout_color_sink_mt>());
00012     m_InternalLogger->set_level(spdlog::level::trace);
00013     addCompatibility("RawdataReader", ">=1.0.0");
00014     addCompatibility("DIFdataExample", ">=1.0.0");
00015 }
```

4.17.3 Member Function Documentation

4.17.3.1 end() void textDump::end ()

Definition at line 33 of file [textDump.cc](#).

```
00033 { print()->info("textDump end of report"); }
```

4.17.3.2 print() std::shared_ptr< spdlog::logger > & textDump::print () [inline]

Definition at line 24 of file [textDump.h](#).

```
00024 { return m_InternalLogger; }
```

4.17.3.3 processDIF() void textDump::processDIF (const PayloadParser & d)

Definition at line 19 of file [textDump.cc](#).

```
00019 { print()->info("DIF_ID : {}, DTC : {}, GTC : {}, DIF BCID {}, Absolute BCID : {}, Nbr frames {}",  
    d.getDIFid(), d.getDTC(), d.getGTC(), d.getBCID(), d.getAbsoluteBCID(), d.getNumberOfFrames()); }
```

4.17.3.4 processFrame() void textDump::processFrame (const PayloadParser & d, uint32_t frameIndex)

Definition at line 21 of file [textDump.cc](#).

```
00022 {  
00023   print()->info("\tDisplaying frame number {} : ASIC ID {}, Frame BCID {}, Frame Time To Trigger  
    (a.k.a timestamp) is {}", frameIndex, d.getASICid(frameIndex), d.getFrameBCID(frameIndex),  
    d.getFrameTimeToTrigger(frameIndex));  
00024 }
```

4.17.3.5 processPadInFrame() void textDump::processPadInFrame (const PayloadParser & d, uint32_t frameIndex, uint32_t channelIndex)

Definition at line 26 of file [textDump.cc](#).

```
00027 {  
00028   if(d.getThresholdStatus(frameIndex, channelIndex) > 0) { print()->info("\t\tChannel {}, Threshold  
    {} ", channelIndex, d.getThresholdStatus(frameIndex, channelIndex)); }  
00029 }
```

4.17.3.6 processSlowControl() void textDump::processSlowControl (Buffer)

Definition at line 31 of file [textDump.cc](#).

```
00031 { print()->error("textDump::processSlowControl not implemented yet."); }
```

4.17.3.7 setLevel() `void textDump::setLevel (`
`const spdlog::level::level_enum & level) [inline]`

Definition at line 25 of file [textDump.h](#).

```
00025 { m_InternalLogger->set_level(level); }
```

4.17.3.8 start() `void textDump::start ()`

Definition at line 17 of file [textDump.cc](#).

```
00017 { print()->info("Will dump bunch of DIF data"); }
```

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

- [libs/interface/Dump/include/textDump.h](#)
- [libs/interface/Dump/src/textDump.cc](#)

4.18 Timer Class Reference

```
#include <libs/core/include/Timer.h>
```

Public Member Functions

- void [start](#) ()
- void [stop](#) ()
- float [getElapsedTime](#) ()

4.18.1 Detailed Description

Definition at line 9 of file [Timer.h](#).

4.18.2 Member Function Documentation

4.18.2.1 getElapsedTime() `float Timer::getElapsedTime () [inline]`

Definition at line 14 of file [Timer.h](#).

```
00014 { return std::chrono::duration_cast<std::chrono::microseconds>(m_StopTime - m_StartTime).count(); }
```

4.18.2.2 start() `void Timer::start () [inline]`

Definition at line 12 of file [Timer.h](#).

```
00012 { m_StartTime = std::chrono::high_resolution_clock::now(); }
```

4.18.2.3 stop() `void Timer::stop () [inline]`

Definition at line 13 of file [Timer.h](#).

```
00013 { m_StopTime = std::chrono::high_resolution_clock::now(); }
```

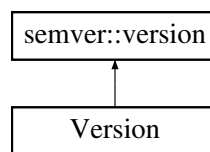
The documentation for this class was generated from the following file:

- [libs/core/include/Timer.h](#)

4.19 Version Class Reference

```
#include <libs/core/include/Version.h>
```

Inheritance diagram for Version:

**Public Member Functions**

- [Version](#) (const std::uint8_t &mj, const std::uint8_t &mn, const std::uint8_t &pt, const semver::prerelease &ppt=semver::prerelease::none, const std::uint8_t &prn=0) noexcept
- [Version](#) (const std::string_view &str)
- [Version](#) ()=default
- std::uint8_t [getMajor](#) ()
- std::uint8_t [getMinor](#) ()
- std::uint8_t [getPatch](#) ()
- std::string [getPreRelease](#) ()
- std::uint8_t [getPreReleaseNumber](#) ()

4.19.1 Detailed Description

Definition at line 11 of file [Version.h](#).

4.19.2 Constructor & Destructor Documentation

4.19.2.1 Version() [1/3] `Version::Version (`
`const std::uint8_t & mj,`
`const std::uint8_t & mn,`
`const std::uint8_t & pt,`
`const semver::prerelease & prt = semver::prerelease::none,`
`const std::uint8_t & prn = 0) [inline], [noexcept]`

Definition at line 14 of file [Version.h](#).

```
00014 : semver::version(mj, mn, pt, prt, prn) {}
```

4.19.2.2 Version() [2/3] `Version::Version (`
`const std::string_view & str) [inline], [explicit]`

Definition at line 15 of file [Version.h](#).

```
00015 : semver::version(str) {}
```

4.19.2.3 Version() [3/3] `Version::Version () [default]`

4.19.3 Member Function Documentation

4.19.3.1 getMajor() `std::uint8_t Version::getMajor ()`

Definition at line 9 of file [Version.cc](#).

```
00009 { return major; }
```

4.19.3.2 getMinor() `std::uint8_t Version::getMinor ()`

Definition at line 11 of file [Version.cc](#).

```
00011 { return minor; }
```

4.19.3.3 getPatch() `std::uint8_t Version::getPatch ()`

Definition at line 13 of file [Version.cc](#).

```
00013 { return patch; }
```

4.19.3.4 getPreRelease() `std::string Version::getPreRelease ()`

Definition at line 15 of file [Version.cc](#).

```
00016 {  
00017     switch(prerelease_type)  
00018     {  
00019         case semver::prerelease::alpha: return "alpha";  
00020         case semver::prerelease::beta: return "beta";  
00021         case semver::prerelease::rc: return "rc";  
00022         case semver::prerelease::none: return "";  
00023         default: return "";  
00024     }  
00025 }
```

4.19.3.5 `getPreReleaseNumber()` `std::uint8_t Version::getPreReleaseNumber ()`

Definition at line 27 of file [Version.cc](#).

```
00027 { return prerelease_number; }
```

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

- [libs/core/include/Version.h](#)
- [libs/core/src/Version.cc](#)

5 File Documentation

5.1 [libs/core/include/Bits.h](#) File Reference

```
#include <cstdint>
#include <iosfwd>
```

Typedefs

- using [bit8_t](#) = `std::uint8_t`
- using [bit16_t](#) = `std::uint16_t`
- using [bit32_t](#) = `std::uint32_t`
- using [bit64_t](#) = `std::uint64_t`

Functions

- `std::ostream & operator<< (std::ostream &os, const bit8_t &c)`
Stream operator to print [bit8_t](#) aka `std::uint8_t` and not char or unsigned char.

5.1.1 Detailed Description

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Definition in file [Bits.h](#).

5.1.2 Typedef Documentation

5.1.2.1 [bit16_t](#) using [bit16_t](#) = `std::uint16_t`

Definition at line 11 of file [Bits.h](#).

5.1.2.2 `bit32_t` using `bit32_t` = `std::uint32_t`

Definition at line 12 of file [Bits.h](#).

5.1.2.3 `bit64_t` using `bit64_t` = `std::uint64_t`

Definition at line 13 of file [Bits.h](#).

5.1.2.4 `bit8_t` using `bit8_t` = `std::uint8_t`

Definition at line 10 of file [Bits.h](#).

5.1.3 Function Documentation

5.1.3.1 `operator<<()` `std::ostream & operator<< (` `std::ostream & os,` `const bit8_t & c)`

Stream operator to print `bit8_t` aka `std::uint8_t` and not char or unsigned char.

Definition at line 8 of file [Bits.cc](#).

```
00008 { return os << c + 0; }
```

5.2 Bits.h

[Go to the documentation of this file.](#)

```
00001
00005 #pragma once
00006
00007 #include <cstdint>
00008 #include <iosfwd>
00009
00010 using bit8_t = std::uint8_t; /*< type to represent 8bits words (1 byte) */
00011 using bit16_t = std::uint16_t; /*< type to represent 16bits words (2 bytes) */
00012 using bit32_t = std::uint32_t; /*< type to represent 32bits words (4 bytes) */
00013 using bit64_t = std::uint64_t; /*< type to represent 64bits words (8 bytes) */
00014
00016 std::ostream& operator<<(std::ostream& os, const bit8_t& c);
```

5.3 libs/core/include/Buffer.h File Reference

```
#include "Bits.h"
#include <array>
#include <string>
#include <vector>
```

Classes

- class [Buffer](#)

5.3.1 Detailed Description

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See also

<https://github.com/apingault/Trivent4HEP>

Definition in file [Buffer.h](#).

5.4 Buffer.h

[Go to the documentation of this file.](#)

```

00001
00006 #pragma once
00007
00008 #include "Bits.h"
00009
00010 #include <array>
00011 #include <string>
00012 #include <vector>
00013
00014 class Buffer
00015 {
00016 public:
00017     Buffer() : m_Buffer(nullptr), m_Size(0), m_Capacity(0) {}
00018     virtual ~Buffer() {}
00019     Buffer(const bit8_t b[], const std::size_t& i) : m_Buffer(const_cast<bit8_t*>(&b[0])), m_Size(i),
m_Capacity(i) {}
00020     Buffer(const char b[], const std::size_t& i) : m_Buffer(const_cast<bit8_t*>(reinterpret_cast<const
bit8_t*>(&b[0])), m_Size(i * sizeof(char)), m_Capacity(i * sizeof(char)) {}
00021     template<typename T> Buffer(const std::vector<T>& rawdata) :
m_Buffer(const_cast<bit8_t*>(reinterpret_cast<const bit8_t*>(rawdata.data()))), m_Size(rawdata.size()
* sizeof(T)), m_Capacity(rawdata.capacity() * sizeof(T)) {}
00022     template<typename T, std::size_t N> Buffer(const std::array<T, N>& rawdata) :
m_Buffer(const_cast<bit8_t*>(reinterpret_cast<const bit8_t*>(rawdata.data()))), m_Size(rawdata.size()
* sizeof(T)), m_Capacity(rawdata.size() * sizeof(T)) {}
00023
00024     std::size_t size()const { return m_Size; }
00025     std::size_t capacity()const { return m_Capacity; }
00026
00027     bool empty() { return m_Size == 0; }
00028     void set(unsigned char* b) { m_Buffer = b; }
00029     void set(const Buffer& buffer)
00030     {
00031         m_Buffer = buffer.begin();
00032         m_Size = buffer.size();
00033         m_Capacity = buffer.capacity();
00034     }
00035     bit8_t* begin()const { return m_Buffer; }
00036     bit8_t* end()const { return m_Buffer + m_Size; }
00037     bit8_t& operator[](const std::size_t& pos) { return m_Buffer[pos]; }
00038     bit8_t& operator[](const std::size_t& pos)const { return m_Buffer[pos]; }
00039
00040     void setSize(const std::size_t& size) { m_Size = size; }
00041
00042 private:
00043     bit8_t* m_Buffer{nullptr};
00044     std::size_t m_Size{0};
00045     std::size_t m_Capacity{0};
00046 };

```

5.5 libs/core/include/BufferLooper.h File Reference

```
#include "AppVersion.h"
#include "Buffer.h"
#include "BufferLooperCounter.h"
#include "DetectorId.h"
#include "Formatters.h"
#include "PayloadParser.h"
#include "RawBufferNavigator.h"
#include "Timer.h"
#include "Words.h"
#include <algorithm>
#include <cassert>
#include <fmt/color.h>
#include <map>
#include <memory>
#include <spdlog/sinks/null_sink.h>
#include <spdlog/spdlog.h>
#include <string>
#include <vector>
```

Classes

- class [BufferLooper< SOURCE, DESTINATION >](#)

5.5.1 Detailed Description

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Definition in file [BufferLooper.h](#).

5.6 BufferLooper.h

[Go to the documentation of this file.](#)

```
00001
00005 #pragma once
00006
00007 #include "AppVersion.h"
00008 #include "Buffer.h"
00009 #include "BufferLooperCounter.h"
00010 #include "DetectorId.h"
00011 #include "Formatters.h"
00012 #include "PayloadParser.h"
00013 #include "RawBufferNavigator.h"
00014 #include "Timer.h"
00015 #include "Words.h"
00016
00017 #include <algorithm>
00018 #include <cassert>
00019 #include <fmt/color.h>
00020 #include <map>
00021 #include <memory>
00022 #include <spdlog/sinks/null_sink.h>
00023 #include <spdlog/spdlog.h>
00024 #include <string>
00025 #include <vector>
00026 // function to loop on buffers
00027
```



```

00028 template<typename SOURCE, typename DESTINATION> class BufferLooper
00029 {
00030 public:
00031     BufferLooper(SOURCE& source, DESTINATION& dest, bool debug = false) : m_Source(source),
        m_Destination(dest), m_Debug(debug)
00032     {
00033         m_Logger = spdlog::create<spdlog::sinks::null_sink_mt>("streamout");
00034         if(!spdlog::get("streamout")) { spdlog::register_logger(m_Logger); }
00035         m_Source.setLogger(m_Logger);
00036         m_Destination.setLogger(m_Logger);
00037     }
00038
00039     void addSink(const spdlog::sink_ptr& sink, const spdlog::level::level_enum& level =
        spdlog::get_level())
00040     {
00041         sink->set_level(level);
00042         m_Sinks.push_back(sink);
00043         m_Logger = std::make_shared<spdlog::logger>("streamout", begin(m_Sinks), end(m_Sinks));
00044         m_Source.setLogger(m_Logger);
00045         m_Destination.setLogger(m_Logger);
00046     }
00047
00048     void loop(const std::uint32_t& m_NbrEventsToProcess = 0)
00049     {
00050         // clang-format off
00051         fmt::print(fg(fmt::color::medium_orchid) | fmt::emphasis::bold,
00052             "\n"
00053             " SSSSSSSSSSSSSSSSS      tttt
        tttt\n"
00054             "SS::::::::::::::::::::S ttt:::t
        ttt:::t\n"
00055             "S::::SSSSSS:::::S t:::::t
        t:::::t\n"
00056             "S:::::S      SSSSSSS t:::::t
        t:::::t\n"
00057             "S:::::S      tttttt:::ttttttt rrrrr rrrrrrrrrr eeeeeeeeeeee aaaaaaaaaaaaaa
        mmmmmmm mmmmmmm oooooooooo uuuuuu uuuuuutttttt:::ttttttt\n"
00058             "S:::::S      t:::::t:::t:::t r:::rrrr:::rr ee:::::::::ee a:::::::::aa
        mm::::::m m:::::mm oo:::oo:::oo u:::u u:::ut:::t:::t:::t\n"
00059             " S::::SSSS t:::::t:::t:::t r:::rrrr:::rr e:::eeeee:::ee aaaaaaaaaa:::a
        m::::::mm:::mm:::mo:::mo:::ou:::u u:::ut:::t:::t:::t\n"
00060             " SS:::::SSSSStttttt:::ttttt rr:::rrrr:::rr re:::re:::e e:::ee a:::a
        m:::~::~:~::~:mo:::mo:::oo:::ou:::u u:::uttttt:::ttttt\n"
00061             " SSS:::::SS t:::::t r:::rr r:::re:::eeeee:::ee aaaaaa:::a
        m:::~::~:~::~:mm:::mo:::o o:::ou:::u u:::u t:::t\n"
00062             " SSSSSS:::S t:::t r:::rr rrrrrre:::e aa:::a m:::m
        m:::~::~:mo:::o o:::ou:::u u:::u t:::t\n"
00063             " S:::::S t:::t r:::rr e:::eeeee:::ee a:::aaaa:::a m:::m
        m:::~::~:mo:::o o:::ou:::u u:::u t:::t\n"
00064             " S:::::S t:::t tttttt:::r e:::ee a:::a a:::a m:::m
        m:::~::~:mo:::o o:::ou:::u u:::u t:::t tttttt\n"
00065             "SSSSSSS S:::::S t:::ttt:::tr:::r e:::ee a:::a a:::a m:::m
        m:::~::~:mo:::oo:::ou:::u t:::ttt:::t\n"
00066             "S:::::SSSSS:::S tt:::tr:::r e:::eeeee:::ee a:::aaaa:::a m:::m
        m:::~::~:mo:::o u:::u tt:::tt:::t\n"
00067             "S:::::SS tt:::tr:::r ee:::ee a:::aa:::am:::m
        m:::~::~:mo oo:::oo uu:::uu tt:::tt:::t\n"
00068             " SSSSSSSSSSSSSSS tttttttttt rrrrrrr eeeeeeeeeeee aaaaaaaaa aaaaammmmmm
        mmmmmmm mmmmmmm oooooooooo uuuuuuuu uuuu tttttttttt {} \n"
00069             "\n",
00070             fmt::format(fg(fmt::color::red) | fmt::emphasis::bold, "v{}", streamout_version.to_string()));
00071         // clang-format on
00072         log()->info("*****");
00073         log()->info("Streamout Version: {}", streamout_version.to_string());
00074         log()->info("Using InterfaceReader {} version {}", m_Source.getName(),
            m_Source.getVersion().to_string());
00075         log()->info("Using InterfaceWriter {} version {}", m_Destination.getName(),
            m_Destination.getVersion().to_string());
00076
00077         if(!m_Destination.checkCompatibility(m_Source.getName(), m_Source.getVersion().to_string()))
00078         {
00079             log()->critical("{} version {} is not compatible with {} version {} ! ", m_Source.getName(),
                m_Source.getVersion().to_string(), m_Destination.getName(), m_Destination.getVersion().to_string());
00080             log()->info("Compatible Interfaces for {} are", m_Destination.getName());
00081             for(std::map<std::string, std::string>::iterator it = m_Destination.getCompatibility().begin();
                it != m_Destination.getCompatibility().end(); ++it) { log()->info("{} version {}", it->first,
                    it->second); }
00082             std::exit(-1);
00083         }
00084         if(!m_DetectorIDs.empty())
00085         {
00086             std::string ids;
00087             for(std::vector<DetectorID>::const_iterator it = m_DetectorIDs.cbegin(); it !=
                m_DetectorIDs.cend(); ++it) ids += std::to_string(static_cast<std::uint16_t>(*it)) + ";";
00088             log()->info("Detector ID(s) other than {} will be ignored", ids);
00089         }
00090         log()->info("*****");

```

```

00091     RawBufferNavigator bufferNavigator;
00092     Timer timer;
00093     timer.start();
00094     m_Source.start();
00095     m_Destination.start();
00096     while(m_Source.nextEvent() && m_NbrEventsToProcess >= m_NbrEvents)
00097     {
00098     /*****
00099     /*** START EVENT ***/
00100         m_Source.startEvent();
00101         m_Destination.startEvent();
00102     /****
00103
00104         m_Logger->warn("==== Event {} =====", m_NbrEvents);
00105         while(m_Source.nextDIFbuffer())
00106         {
00107             const Buffer& buffer = m_Source.getBuffer();
00108
00109             bufferNavigator.setBuffer(buffer);
00110             if(std::find(m_DetectorIDs.begin(), m_DetectorIDs.end(),
static_cast<DetectorID>(bufferNavigator.getDetectorID())) == m_DetectorIDs.end())
00111             {
00112                 m_Logger->debug("Ignoring detector ID : {}", bufferNavigator.getDetectorID());
00113                 continue;
00114             }
00115
00116             std::int32_t idstart = bufferNavigator.getStartOfPayload();
00117             if(m_Debug && idstart == -1) m_Logger->info(to_hex(buffer));
00118             c.DIFStarter[idstart]++;
00119             if(!bufferNavigator.validPayload())
00120             {
00121                 m_Logger->error("!bufferNavigator.validBuffer()");
00122                 continue;
00123             }
00124
00125     /****
00126     /*** START DIF ***/
00127         m_Source.startDIF();
00128         m_Destination.startDIF();
00129     /****
00130         PayloadParser d;
00131         // This is really a big error so skip DIF entirely if exception occurs
00132         try
00133         {
00134             d.setBuffer(bufferNavigator.getPayload());
00135         }
00136         catch(const Exception& e)
00137         {
00138             m_Logger->error("{} ", e.what());
00139             continue;
00140         }
00141
00142         if(buffer.end() != d.end()) m_Logger->error("DIF BUFFER END {} {}", fmt::ptr(buffer.end()),
fmt::ptr(d.end()));
00143         assert(buffer.end() == d.end());
00144
00145         m_Logger->error("CRC : {}", d.getDIF_CRC());
00146         c.DIFPtrValueAtReturnedPos[d.begin() [d.getEndOfDIFData() - 3]]++;
00147         assert(d.begin() [d.getEndOfDIFData() - 3] == 0xa0);
00148
00149         c.SizeAfterDIFPtr[d.getSizeAfterDIFPtr()]++;
00150         m_Destination.processDIF(d);
00151         for(std::size_t i = 0; i < d.getNumberOfFrames(); ++i)
00152         {
00153     /****
00154     /*** START FRAME ***/
00155             m_Source.startFrame();
00156             m_Destination.startFrame();
00157     /****
00158             m_Destination.processFrame(d, i);
00159             for(std::size_t j = 0; j < static_cast<std::size_t>(Hardware::NUMBER_PAD); ++j)
00160             {
00161                 if(d.getThresholdStatus(i, j) != 0)
00162                 {
00163                     m_Source.startPad();
00164                     m_Destination.startPad();
00165                     m_Destination.processPadInFrame(d, i, j);
00166                     m_Source.endPad();
00167                     m_Destination.endPad();
00168                 }
00169             }
00170     /****
00171     /*** END FRAME ***/
00172             m_Source.endFrame();
00173             m_Destination.endFrame();
00174     /****
00175         }

```

```

00176         // If I want SlowControl I need to check for it first, If there is an error then it's not a
        big deal just continue and say is bad SlowControl
00177         /*try
00178         {
00179         d.setSCBuffer();
00180         }
00181         catch(const Exception& e)
00182         {
00183         m_Logger->error("{} ", e.what());
00184         }
00185
00186         bool processSC = false;
00187         if(d.hasSlowControl())
00188         {
00189         c.hasSlowControl++;
00190         processSC = true;
00191         }
00192         if(d.badSCData())
00193         {
00194         c.hasBadSlowControl++;
00195         processSC = false;
00196         }
00197         if(processSC) { m_Destination.processSlowControl(d.getSCBuffer()); } */
00198
00199         //Buffer eod = d.getEndOfAllData();
00200         //c.SizeAfterAllData[eod.size()]++;
00201         // bit8_t* debug_variable_3 = eod.end();
00202         // if(buffer.end() != debug_variable_3) m_Logger->info("END DATA BUFFER END {} {} ",
        fmt::ptr(buffer.end()), fmt::ptr(debug_variable_3));
00203         // assert(buffer.end() == debug_variable_3);
00204         //if(eod.size() != 0) m_Logger->info("End of Data remaining stuff : {} ", to_hex(eod)); */
00205
00206         /*int nonzeroCount = 0;
00207         for(bit8_t* it = eod.begin(); it != eod.end(); it++)
00208         if(static_cast<int>(*it) != 0) nonzeroCount++;
00209         c.NonZeroValusAtEndOfData[nonzeroCount]++; */
00210
00211         /******
00212         *** END DIF ***
00213         m_Source.endDIF();
00214         m_Destination.endDIF();
00215         *****/
00216         } // end of DIF while loop
00217         m_Logger->warn("==== Event {} =====", m_NbrEvents);
00218         m_NbrEvents++;
00219         /******
00220         *** END EVENT ***
00221         m_Source.endEvent();
00222         m_Destination.endEvent();
00223         *****/
00224         } // end of event while loop
00225         m_Destination.end();
00226         m_Source.end();
00227         timer.stop();
00228         fmt::print(fg(fmt::color::green) | fmt::emphasis::bold, "=== elapsed time {}ms ({}ms/event)
        ===\n", timer.getElapsedTime() / 1000, timer.getElapsedTime() / (1000 * m_NbrEvents));
00229     }
00230     void printAllCounters() { c.printAllCounters(); }
00231     std::shared_ptr<spdlog::logger> log() { return m_Logger; }
00232
00233     void setDetectorIDs(const std::vector<DetectorID>& detectorIDs) { m_DetectorIDs = detectorIDs; }
00234
00235 private:
00236     std::vector<DetectorID> m_DetectorIDs;
00237     std::shared_ptr<spdlog::logger> m_Logger{nullptr};
00238     std::vector<spdlog::sink_ptr> m_Sinks;
00239     BufferLooperCounter c;
00240     SOURCE& m_Source{nullptr};
00241     DESTINATION& m_Destination{nullptr};
00242     bool m_Debug{false};
00243     std::uint32_t m_NbrEvents{1};
00244 };

```

5.7 libs/core/include/BufferLooperCounter.h File Reference

```

#include <ios>
#include <map>
#include <memory>
#include <string>

```

Classes

- struct [BufferLooperCounter](#)

5.7.1 Detailed Description

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Definition in file [BufferLooperCounter.h](#).

5.8 BufferLooperCounter.h

[Go to the documentation of this file.](#)

```
00001
00005 #pragma once
00006
00007 #include <ios>
00008 #include <map>
00009 #include <memory>
00010 #include <string>
00011
00012 struct BufferLooperCounter
00013 {
00014 public:
00015     int             hasSlowControl    = 0;
00016     int             hasBadSlowControl = 0;
00017     std::map<int, int> DIFStarter;
00018     std::map<int, int> DIFPtrValueAtReturnedPos;
00019     std::map<int, int> SizeAfterDIFPtr;
00020     std::map<int, int> SizeAfterAllData;
00021     std::map<int, int> NonZeroValusAtEndOfData;
00022
00023     void printCounter(const std::string& description, const std::map<int, int>& m, const
std::ios_base::fmtflags& base = std::ios_base::dec);
00024     void printAllCounters();
00025 };
```

5.9 libs/core/include/DetectorId.h File Reference

```
#include <cstdint>
```

Enumerations

- enum class [DetectorID](#) : std::uint16_t { [HARDROC](#) = 100 , [HARDROC_NEW](#) = 150 , [RUNHEADER](#) = 255 }

5.9.1 Detailed Description

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Definition in file [DetectorId.h](#).

5.9.2 Enumeration Type Documentation

5.9.2.1 DetectorID enum class [DetectorID](#) : std::uint16_t [strong]

Enumerator

HARDROC	
HARDROC_NEW	
RUNHEADER	

Definition at line 9 of file [DetectorId.h](#).

```
00010 {
00011     HARDROC      = 100,
00012     HARDROC_NEW  = 150,
00013     RUNHEADER    = 255
00014 };
```

5.10 DetectorId.h

[Go to the documentation of this file.](#)

```
00001
00005 #pragma once
00006
00007 #include <stdint>
00008
00009 enum class DetectorID : std::uint16_t
00010 {
00011     HARDROC      = 100,
00012     HARDROC_NEW  = 150,
00013     RUNHEADER    = 255
00014 };
```

5.11 libs/core/include/DIFSlowControl.h File Reference

```
#include <bitset>
#include <stdint>
#include <iosfwd>
#include <map>
#include <string>
```

Classes

- class [DIFSlowControl](#)

Functions

- std::string [to_string](#) (const [DIFSlowControl](#) &c)

5.11.1 Detailed Description

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Definition in file [DIFSlowControl.h](#).

5.11.2 Function Documentation

5.11.2.1 to_string() std::string to_string (const DIFSlowControl & c)

Definition at line 256 of file DIFSlowControl.cc.

```
00257 {
00258     std::string ret;
00259     for(std::map<int, std::map<std::string, int>>::const_iterator it = c.cbegin(); it != c.cend(); it++)
00260     {
00261         ret += "ASIC " + std::to_string(it->first) + " :\n";
00262         for(std::map<std::string, int>::const_iterator jt = (it->second).begin(); jt !=
00263             (it->second).end(); jt++) ret += jt->first + " : " + std::to_string(jt->second) + "\n";
00264     }
00265     return ret;
00266 }
```

5.12 DIFSlowControl.h

[Go to the documentation of this file.](#)

```
00001
00005 #pragma once
00006
00007 #include <bitset>
00008 #include <cstdint>
00009 #include <iosfwd>
00010 #include <map>
00011 #include <string>
00012
00013 class DIFSlowControl
00014 {
00015 public:
00017     DIFSlowControl(const std::uint8_t& version, const std::uint8_t& DIFid, unsigned char* buf);
00023
00025     std::uint8_t getDIFid();
00026
00028
00031     std::map<int, std::map<std::string, int> getChipsMap();
00032
00034
00038     std::map<std::string, int> getChipSlowControl(const int& asicid);
00039
00041
00045     int getChipSlowControl(const std::int8_t& asicid, const std::string& param);
00046
00047     std::map<int, std::map<std::string, int>>::const_iterator cbegin()const { return m_MapSC.cbegin(); }
00048
00049     std::map<int, std::map<std::string, int>>::const_iterator cend()const { return m_MapSC.cend(); }
00050
00051 private:
00053     DIFSlowControl() = delete;
00055     void FillHR1(const int& header_shift, unsigned char* cbuf);
00057     void FillHR2(const int& header_shift, unsigned char* cbuf);
00059     void FillAsicHR1(const std::bitset<72 * 8>& bs);
00061     void FillAsicHR2(const std::bitset<109 * 8>& bs);
00062
00063     unsigned int m_DIFid{0};
00064     unsigned int m_Version{0};
00065     unsigned int m_AsicType{0}; // asicType_
00066     unsigned int m_NbrAsic{0};
00067     std::map<int, std::map<std::string, int> m_MapSC;
00068 };
00069
00070 std::string to_string(const DIFSlowControl& c);
00071 /* void setSCBuffer()
00072 {
00073     if(!hasSlowControl()) return;
00074     if(m_SCbuffer.size() != 0) return; // deja fait
00075     if(m_BadSlowControl) return;
00076     m_SCbuffer.set(&(begin()[getEndOfDIFData()]));
00077     // compute Slow Control size
00078     std::size_t maxsize{size() - getEndOfDIFData() + 1}; // should I +1 here ?
00079     uint32_t k{1}; // SC Header
```

```

00080 uint32_t    dif_ID{m_SCbuffer[1]};
00081 uint32_t    chipSize{m_SCbuffer[3]};
00082 while((dif_ID != 0x1 && m_SCbuffer[k] != 0x1 && k < maxsize) || (dif_ID == 0x1 && m_SCbuffer[k + 2]
== chipSize && k < maxsize))
00083 {
00084     k += 2; // DIF ID + ASIC Header
00085     uint32_t scsize = m_SCbuffer[k];
00086     if(scsize != 74 && scsize != 109)
00087     {
00088         k = 0;
00089         m_BadSlowControl = true;
00090         throw Exception(fmt::format("PROBLEM WITH SC SIZE {}", scsize));
00091     }
00092     k++; // skip size bit
00093     k += scsize; // skip the data
00094 }
00095 if(m_SCbuffer[k] == 0x1 && !m_BadSlowControl) m_SCbuffer.setSize(k + 1); // add the trailer
00096 else
00097 {
00098     m_BadSlowControl = true;
00099     throw Exception(fmt::format("PROBLEM SC TRAILER NOT FOUND "));
00100 }
00101 }*/

```

5.13 libs/core/include/Exception.h File Reference

```

#include <stdint>
#include <exception>
#include <string>

```

Classes

- class [Exception](#)

5.13.1 Detailed Description

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Definition in file [Exception.h](#).

5.14 Exception.h

[Go to the documentation of this file.](#)

```

00001
00005 #pragma once
00006
00007 #include <stdint>
00008 #include <exception>
00009 #include <string>
00010
00011 class Exception
00012 {
00013 public:
00014     virtual const char* what() const noexcept { return m_What.c_str(); }
00015     explicit Exception(const std::string& message) : m_Message(message) { constructWhat(); }
00016     Exception(const std::int32_t& error, const std::string& message) : m_Error(error),
m_Message(message) { constructWhat(); }
00017     std::int32_t error() { return m_Error; }
00018     std::string message() { return m_Message; }
00019
00020 private:
00021     void constructWhat()
00022     {
00023         if(m_Error == 0) m_What = m_Message;
00024         else
00025             m_What = std::string("Error ") + std::to_string(m_Error) + std::string(" : ") + m_Message;
00026     }
00027     std::string m_What;
00028     std::string m_Message;
00029     std::int32_t m_Error{0};
00030 };

```

5.15 libs/core/include/Filesystem.h File Reference

```
#include <string>
```

Functions

- `std::string path` (`const std::string &`)
- `std::string extension` (`const std::string &`)
- `std::string filename` (`const std::string &`)

5.15.1 Detailed Description

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Definition in file [Filesystem.h](#).

5.15.2 Function Documentation

5.15.2.1 extension() `std::string extension (`
`const std::string & file)`

Definition at line 13 of file [Filesystem.cc](#).

```
00014 {  
00015     std::size_t position = file.find_last_of(".");  
00016     return (std::string::npos == position || position == 0) ? "" : file.substr(position + 1);  
00017 }
```

5.15.2.2 filename() `std::string filename (`
`const std::string & file)`

Definition at line 19 of file [Filesystem.cc](#).

```
00020 {  
00021     std::size_t position = file.find_last_of(".");  
00022     std::size_t pos      = file.find_last_of("\\\\");  
00023     return (std::string::npos == pos) ? file.substr(0, position) : file.substr(pos + 1, position - pos  
- 1);  
00024 }
```

5.15.2.3 path() `std::string path (`
`const std::string & file)`

Definition at line 7 of file [Filesystem.cc](#).

```
00008 {  
00009     std::size_t pos = file.find_last_of("\\\\");  
00010     return (std::string::npos == pos) ? "" : file.substr(0, pos);  
00011 }
```


5.16 Filesystem.h

[Go to the documentation of this file.](#)

```
00001
00005 #pragma once
00006
00007 #include <string>
00008
00009 std::string path(const std::string&);
00010 std::string extension(const std::string&);
00011 std::string filename(const std::string&);
```

5.17 libs/core/include/Formatters.h File Reference

```
#include "Bits.h"
#include <iosfwd>
#include <string>
```

Functions

- `std::string to_dec (const Buffer &b, const std::size_t &begin=0, const std::size_t &end=-1)`
- `std::string to_dec (const bit8_t &)`
- `std::string to_dec (const bit16_t &)`
- `std::string to_dec (const bit32_t &)`
- `std::string to_dec (const bit64_t &)`
- `std::string to_hex (const Buffer &b, const std::size_t &begin=0, const std::size_t &end=-1)`
- `std::string to_hex (const bit8_t &)`
- `std::string to_hex (const bit16_t &)`
- `std::string to_hex (const bit32_t &)`
- `std::string to_hex (const bit64_t &)`
- `std::string to_bin (const Buffer &b, const std::size_t &begin=0, const std::size_t &end=-1)`
- `std::string to_bin (const bit8_t &)`
- `std::string to_bin (const bit16_t &)`
- `std::string to_bin (const bit32_t &)`
- `std::string to_bin (const bit64_t &)`
- `std::string to_oct (const Buffer &b, const std::size_t &begin=0, const std::size_t &end=-1)`
- `std::string to_oct (const bit8_t &)`
- `std::string to_oct (const bit16_t &)`
- `std::string to_oct (const bit32_t &)`
- `std::string to_oct (const bit64_t &)`

5.17.1 Detailed Description

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Definition in file [Formatters.h](#).

5.17.2 Function Documentation

5.17.2.1 to_bin() [1/5] std::string to_bin (
const bit16_t & b)

Definition at line 71 of file [Formatters.cc](#).

```
00071 { return fmt::format("{:#016b}", b); }
```

5.17.2.2 to_bin() [2/5] std::string to_bin (
const bit32_t & b)

Definition at line 73 of file [Formatters.cc](#).

```
00073 { return fmt::format("{:#032b}", b); }
```

5.17.2.3 to_bin() [3/5] std::string to_bin (
const bit64_t & b)

Definition at line 75 of file [Formatters.cc](#).

```
00075 { return fmt::format("{:#064b}", b); }
```

5.17.2.4 to_bin() [4/5] std::string to_bin (
const bit8_t & b)

Definition at line 69 of file [Formatters.cc](#).

```
00069 { return fmt::format("{:#08b}", b); }
```

5.17.2.5 to_bin() [5/5] std::string to_bin (
const Buffer & b,
const std::size_t & begin = 0,
const std::size_t & end = -1)

Definition at line 56 of file [Formatters.cc](#).

```
00057 {  
00058     std::size_t iend = end;  
00059     if(iend == -1) iend = b.size();  
00060     std::string ret;  
00061     for(std::size_t k = begin; k < iend; k++)  
00062     {  
00063         ret += to_bin(b[k]);  
00064         ret += " - ";  
00065     }  
00066     return ret;  
00067 }
```

5.17.2.6 to_dec() [1/5] std::string to_dec (
const bit16_t & b)

Definition at line 29 of file [Formatters.cc](#).

```
00029 { return fmt::format("{:#d}", b); }
```

5.17.2.7 to_dec() [2/5] std::string to_dec (
const bit32_t & b)

Definition at line 31 of file [Formatters.cc](#).

```
00031 { return fmt::format("{:#d}", b); }
```

5.17.2.8 to_dec() [3/5] std::string to_dec (
const bit64_t & b)

Definition at line 33 of file [Formatters.cc](#).

```
00033 { return fmt::format("{:#d}", b); }
```

5.17.2.9 to_dec() [4/5] std::string to_dec (
const bit8_t & b)

Definition at line 27 of file [Formatters.cc](#).

```
00027 { return fmt::format("{:#d}", b); }
```

5.17.2.10 to_dec() [5/5] std::string to_dec (
const Buffer & b,
const std::size_t & begin = 0,
const std::size_t & end = -1)

Definition at line 14 of file [Formatters.cc](#).

```
00015 {  
00016     std::size_t iend = end;  
00017     if(iend == -1) iend = b.size();  
00018     std::string ret;  
00019     for(std::size_t k = begin; k < iend; k++)  
00020     {  
00021         ret += to_dec(b[k]);  
00022         ret += " - ";  
00023     }  
00024     return ret;  
00025 }
```

5.17.2.11 to_hex() [1/5] std::string to_hex (
const bit16_t & b)

Definition at line 50 of file [Formatters.cc](#).

```
00050 { return fmt::format("{:#04x}", b); }
```

5.17.2.12 to_hex() [2/5] std::string to_hex (
const bit32_t & b)

Definition at line 52 of file [Formatters.cc](#).

```
00052 { return fmt::format("{:#08x}", b); }
```

5.17.2.13 to_hex() [3/5] std::string to_hex (
const bit64_t & b)

Definition at line 54 of file [Formatters.cc](#).

```
00054 { return fmt::format("{:#016x}", b); }
```

5.17.2.14 to_hex() [4/5] std::string to_hex (
const bit8_t & b)

Definition at line 48 of file [Formatters.cc](#).

```
00048 { return fmt::format("{:#02x}", b); }
```

5.17.2.15 to_hex() [5/5] std::string to_hex (
const Buffer & b,
const std::size_t & begin = 0,
const std::size_t & end = -1)

Definition at line 35 of file [Formatters.cc](#).

```
00036 {  
00037     std::size_t iend = end;  
00038     if(iend == -1) iend = b.size();  
00039     std::string ret;  
00040     for(std::size_t k = begin; k < iend; k++)  
00041     {  
00042         ret += to_hex(b[k]);  
00043         ret += " - ";  
00044     }  
00045     return ret;  
00046 }
```

5.17.2.16 to_oct() [1/5] std::string to_oct (
const bit16_t & b)

Definition at line 92 of file [Formatters.cc](#).

```
00092 { return fmt::format("{:#08o}", b); }
```

5.17.2.17 to_oct() [2/5] std::string to_oct (
const bit32_t & b)

Definition at line 94 of file [Formatters.cc](#).

```
00094 { return fmt::format("{:#016o}", b); }
```

5.17.2.18 to_oct() [3/5] std::string to_oct (
const bit64_t & b)

Definition at line 96 of file [Formatters.cc](#).

```
00096 { return fmt::format("{:#032o}", b); }
```

5.17.2.19 to_oct() [4/5] std::string to_oct (
const bit8_t & b)

Definition at line 90 of file [Formatters.cc](#).

```
00090 { return fmt::format("{:#04o}", b); }
```

5.17.2.20 to_oct() [5/5] std::string to_oct (
const Buffer & b,
const std::size_t & begin = 0,
const std::size_t & end = -1)

Definition at line 77 of file [Formatters.cc](#).

```
00078 {  
00079     std::size_t iend = end;  
00080     if(iend == -1) iend = b.size();  
00081     std::string ret;  
00082     for(std::size_t k = begin; k < iend; k++)  
00083     {  
00084         ret += to_oct(b[k]);  
00085         ret += " - ";  
00086     }  
00087     return ret;  
00088 }
```

5.18 Formatters.h

[Go to the documentation of this file.](#)

```
00001  
00005 #pragma once  
00006  
00007 #include "Bits.h"  
00008  
00009 #include <iosfwd>  
00010 #include <string>  
00011  
00012 class Buffer;  
00013  
00014 std::string to_dec(const Buffer& b, const std::size_t& begin = 0, const std::size_t& end = -1);  
00015 std::string to_dec(const bit8_t&);  
00016 std::string to_dec(const bit16_t&);  
00017 std::string to_dec(const bit32_t&);  
00018 std::string to_dec(const bit64_t&);  
00019  
00020 std::string to_hex(const Buffer& b, const std::size_t& begin = 0, const std::size_t& end = -1);  
00021 std::string to_hex(const bit8_t&);  
00022 std::string to_hex(const bit16_t&);  
00023 std::string to_hex(const bit32_t&);  
00024 std::string to_hex(const bit64_t&);  
00025  
00026 std::string to_bin(const Buffer& b, const std::size_t& begin = 0, const std::size_t& end = -1);  
00027 std::string to_bin(const bit8_t&);  
00028 std::string to_bin(const bit16_t&);  
00029 std::string to_bin(const bit32_t&);  
00030 std::string to_bin(const bit64_t&);  
00031  
00032 std::string to_oct(const Buffer& b, const std::size_t& begin = 0, const std::size_t& end = -1);  
00033 std::string to_oct(const bit8_t&);  
00034 std::string to_oct(const bit16_t&);  
00035 std::string to_oct(const bit32_t&);  
00036 std::string to_oct(const bit64_t&);
```

5.19 libs/core/include/Interface.h File Reference

```
#include "AppVersion.h"  
#include "Buffer.h"  
#include "Version.h"
```

```
#include <map>
#include <memory>
#include <semver.hpp>
#include <spdlog/logger.h>
#include <string>
```

Classes

- class [Interface](#)
- class [InterfaceReader](#)
- class [InterfaceWriter](#)

Enumerations

- enum class [InterfaceType](#) { [Unknown](#) = 0 , [Reader](#) = 1 , [Writer](#) = 2 }
template class should implement void SOURCE::start(); bool SOURCE::next(); void SOURCE::end(); const [Buffer](#)& SOURCE::getBuffer();

5.19.1 Detailed Description

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Definition in file [Interface.h](#).

5.19.2 Enumeration Type Documentation

5.19.2.1 [InterfaceType](#) enum class [InterfaceType](#) [strong]

template class should implement void SOURCE::start(); bool SOURCE::next(); void SOURCE::end(); const [Buffer](#)& SOURCE::getBuffer();

void DESTINATION::begin(); void DESTINATION::processDIF(const DIFPtr&); void DESTINATION::process↵Frame(const DIFPtr&,const std::uint32_t& frameIndex); void DESTINATION::processPadInFrame(const DIFPtr&,const std::uint32_t& frameIndex,const std::uint32_t& channelIndex); void DESTINATION::processSlowControl(const [Buffer](#)&); void DESTINATION::end();

Enumerator

Unknown	
Reader	
Writer	

Definition at line 31 of file [Interface.h](#).

```

00032 {
00033     Unknown = 0,
00034     Reader  = 1,
00035     Writer  = 2
00036 };

```

5.20 Interface.h

[Go to the documentation of this file.](#)

```

00001
00004 #pragma once
00005
00006 #include "AppVersion.h"
00007 #include "Buffer.h"
00008 #include "Version.h"
00009
00010 #include <map>
00011 #include <memory>
00012 #include <semver.hpp>
00013 #include <spdlog/logger.h>
00014 #include <string>
00015
00031 enum class InterfaceType
00032 {
00033     Unknown = 0,
00034     Reader  = 1,
00035     Writer  = 2
00036 };
00037
00038 class Interface
00039 {
00040 public:
00041     Interface(const std::string& name, const std::string& version, const InterfaceType& type) :
00042         m_Name(name), m_Version(version) {}
00043     virtual ~Interface() = default;
00044     virtual void startEvent() {}
00045     virtual void endEvent() {}
00046     virtual void startDIF() {}
00047     virtual void endDIF() {}
00048     virtual void startFrame() {}
00049     virtual void endFrame() {}
00050     virtual void startPad() {}
00051     virtual void endPad() {}
00052     std::shared_ptr<spdlog::logger> log() { return m_Logger; }
00053     void setLogger(const std::shared_ptr<spdlog::logger> & logger) { m_Logger
= logger; }
00054     std::string getName() { return m_Name; }
00055     Version getVersion() { return m_Version; }
00056 private:
00057     std::shared_ptr<spdlog::logger> m_Logger{nullptr};
00058     std::string m_Name;
00059     Version m_Version;
00060     InterfaceType m_Type{InterfaceType::Unknown};
00061 };
00062
00063 class InterfaceReader : public Interface
00064 {
00065 public:
00066     InterfaceReader(const std::string& name, const std::string& version) : Interface(name, version,
InterfaceType::Reader) {}
00067     virtual ~InterfaceReader() = default;
00068
00069 protected:
00070     Buffer m_Buffer;
00071 };
00072
00073 class InterfaceWriter : public Interface
00074 {
00075 public:
00076     InterfaceWriter(const std::string& name, const std::string& version) : Interface(name, version,
InterfaceType::Writer) {}
00077
00078     void addCompatibility(const std::string& name, const std::string& version) { m_Compatible[name] =
version; }
00079
00080     std::map<std::string, std::string> getCompatibility() { return m_Compatible; }
00081
00082     bool checkCompatibility(const std::string& name, const std::string& version)
00083     {
00084         if (m_Compatible.find(name) != m_Compatible.end())
00085         {

```

```
00086         auto                ran = semver::range::detail::range(m_Compatible[name]);
00087         semver::version ver = semver::version(version);
00088         if(ran.satisfies(ver, false)) return true;
00089         else
00090             return false;
00091     }
00092     else
00093         return false;
00094 }
00095
00096 virtual ~InterfaceWriter() = default;
00097
00098 private:
00099     std::map<std::string, std::string> m_Compatible;
00100 };
```

5.21 libs/core/include/PayloadParser.h File Reference

```
#include "Bits.h"
#include "Buffer.h"
#include "Exception.h"
#include "Formatters.h"
#include "Utilities.h"
#include "Words.h"
#include <stdint>
#include <spdlog/spdlog.h>
#include <string>
#include <vector>
```

Classes

- class [PayloadParser](#)

5.21.1 Detailed Description

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Definition in file [PayloadParser.h](#).

5.22 PayloadParser.h

[Go to the documentation of this file.](#)

```
00001
00005 #pragma once
00006
00007 #include "Bits.h"
00008 #include "Buffer.h"
00009 #include "Exception.h"
00010 #include "Formatters.h"
00011 #include "Utilities.h"
00012 #include "Words.h"
00013
00014 #include <stdint>
00015 #include <spdlog/spdlog.h>
00016 #include <string>
00017 #include <vector>
00018
00036 class PayloadParser : public Buffer
00037 {
```



```

00038 public:
00039     PayloadParser() = default;
00040
00041     void setBuffer(const Buffer& buffer);
00042
00043     bool hasTemperature() const;
00044
00045     bool hasAnalogReadout() const;
00046
00047     bool hasSlowControl() const;
00048
00049     float getTemperatureDIF() const;
00050
00051     float getTemperatureASU1() const;
00052
00053     float getTemperatureASU2() const;
00054
00055     Buffer getSlowControl() const;
00056
00057     std::vector<bit8_t*> getFramesVector() const;
00058
00059     std::vector<bit8_t*> getLinesVector() const;
00060
00061     std::uint32_t getSizeAfterDIFPtr() const;
00062     std::uint32_t getEndOfDIFData() const;
00063     std::uint32_t getDTC() const;
00064     std::uint32_t getGTC() const;
00065     std::uint64_t getAbsoluteBCID() const;
00066     std::uint32_t getBCID() const;
00067     bool hasLine(const std::uint32_t&) const;
00068     std::uint32_t getNumberOfFrames() const;
00069     bit8_t* getFramePtr(const std::uint32_t&) const;
00070     std::uint32_t getFrameBCID(const std::uint32_t&) const;
00071     std::uint32_t getFrameTimeToTrigger(const std::uint32_t&) const;
00072     bool getFrameLevel(const std::uint32_t&, const std::uint32_t&, const std::uint32_t&) const;
00073     std::uint32_t getDIFid() const;
00074     std::uint32_t getASICid(const std::uint32_t&) const;
00075     std::uint32_t getThresholdStatus(const std::uint32_t&, const std::uint32_t&) const;
00076     std::uint32_t getDIF_CRC() const;
00077
00078 private:
00079     std::uint16_t m_Version{13};
00080     std::uint32_t parsePayload();
00081     std::uint32_t getNumberLines() const;
00082     std::uint32_t parseAnalogLine(const std::uint32_t& idx);
00083     std::uint32_t getTASU1() const;
00084     std::uint32_t getTASU2() const;
00085     std::uint32_t getTDIF() const;
00086
00087     std::vector<bit8_t*> m_Lines;
00088     std::vector<bit8_t*> m_Frames;
00089     std::uint32_t theGetFramePtrReturn_{0};
00090 };
00091
00092 inline void PayloadParser::setBuffer(const Buffer& buffer)
00093 {
00094     set(buffer);
00095     m_Frames.clear();
00096     m_Lines.clear();
00097     theGetFramePtrReturn_ = parsePayload();
00098 }
00099
00100 inline std::uint32_t PayloadParser::parsePayload()
00101 {
00102     std::uint32_t fshift{static_cast<std::uint32_t>(Size::GLOBAL_HEADER)}; // Pass Global Header
00103     if(m_Version >= 13)
00104     {
00105         // Pass DIF_ID, DIF Trigger counter, Information counter, Global Trigger counter, Absolute BCID,
00106         // BCID DIF, NB line
00107         fshift += Size::DIF_IF + Size::DIF_TRIGGER_COUNTER + Size::INFORMATION_COUNTER +
00108             Size::GLOBAL_TRIGGER_COUNTER + Size::ABSOLUTE_BCID + Size::BCID_DIF + Size::NUMBER_LINE;
00109         // If has temperature infos then pass Temp ASU 1, Temp ASU 2, Temp DIF
00110         if(hasTemperature()) fshift += Size::TEMP_ASU1 + Size::TEMP_ASU2 + Size::TEMP_DIF;
00111         // If has AnalogReadout pass them
00112         if(hasAnalogReadout()) fshift = parseAnalogLine(fshift); // to be implemented
00113     }
00114     else
00115     {
00116         throw Exception(fmt::format("Version {} is not implemented", m_Version));
00117     }
00118     while(static_cast<std::uint8_t>(begin()[fshift]) !=
00119         static_cast<std::uint8_t>(Value::GLOBAL_TRAILER))
00120     {
00121         // If I found a FRAME_HEADER there is 2 cases :
00122         // 1) Nothing inside so FRAME_TRAILER comes just after
00123         // 2) Come MICROROC Header, BCID, DATA max 128 times
00124         if(static_cast<std::uint8_t>(begin()[fshift]) == static_cast<std::uint8_t>(Value::FRAME_HEADER))
00125         {

```

```

00122         fshift += +Size::FRAME_HEADER;
00123         if(static_cast<std::uint8_t>(begin()[fshift]) == static_cast<std::uint8_t>(Value::FRAME_TRAILER)
|| static_cast<std::uint8_t>(begin()[fshift]) ==
static_cast<std::uint8_t>(Value::FRAME_TRAILER_ERROR)) { fshift += +Size::FRAME_TRAILER; }
00124         else
00125         {
00126             while(static_cast<std::uint8_t>(begin()[fshift]) !=
static_cast<std::uint8_t>(Value::FRAME_TRAILER) && static_cast<std::uint8_t>(begin()[fshift]) !=
static_cast<std::uint8_t>(Value::FRAME_TRAILER_ERROR))
00127             {
00128                 m_Frames.push_back(&begin()[fshift]);
00129                 fshift += Size::MICROROC_HEADER + Size::BCID + Size::DATA;
00130             }
00131             fshift += +Size::FRAME_TRAILER;
00132         }
00133     }
00134 }
00135 // Pass Global trailer
00136 fshift += +Size::GLOBAL_TRAILER;
00137 // Pass CRC MSB, CRC LSB
00138 fshift += Size::CRC_MSB + Size::CRC_LSB;
00139 return fshift;
00140 }
00141
00142 inline bool PayloadParser::hasTemperature()const { return (static_cast<std::uint8_t>(begin()[0]) ==
static_cast<std::uint8_t>(Value::GLOBAL_HEADER_TEMP)); }
00143
00144 inline bool PayloadParser::hasAnalogReadout()const { return getNumberLines() != 0; }
00145
00146 inline std::uint32_t PayloadParser::getNumberLines()const
00147 {
00148     std::uint32_t shift(Size::GLOBAL_HEADER + Size::DIF_IF + Size::DIF_TRIGGER_COUNTER +
Size::INFORMATION_COUNTER + Size::GLOBAL_TRIGGER_COUNTER + Size::ABSOLUTE_BCID + Size::BCID_DIF);
00149     return ((begin()[shift] >> 4) & 0x5);
00150 }
00151
00152 inline std::uint32_t PayloadParser::parseAnalogLine(const std::uint32_t& idx)
00153 {
00154     std::uint32_t fshift{idx};
00155     // Pass Header line
00156     if(static_cast<std::uint8_t>(begin()[fshift]) != static_cast<std::uint8_t>(Value::HEADER_LINE))
return fshift;
00157     else
00158         fshift += +Size::HEADER_LINE;
00159     while(static_cast<std::uint8_t>(begin()[fshift]) != static_cast<std::uint8_t>(Value::TRAILER_LINE))
00160     {
00161         m_Lines.push_back(&begin()[fshift]);
00162         // Get Number of CHIPS
00163         std::uint32_t nchip{begin()[fshift]};
00164         // Pass Number of CHIPS, NB Asicline*64*16bits
00165         fshift += +Size::NUMBER_CHIPS + static_cast<std::uint32_t>(Size::LINE_SIZE) * nchip;
00166     }
00167     // Pass Trailer line
00168     fshift += +Size::TRAILER_LINE;
00169     return fshift;
00170 }
00171
00172 inline bool PayloadParser::hasSlowControl()const { return theGetFramePtrReturn_ != size(); }
00173
00174 inline std::uint32_t PayloadParser::getTASU1()const
00175 {
00176     std::uint32_t shift(Size::GLOBAL_HEADER + Size::DIF_IF + Size::DIF_TRIGGER_COUNTER +
Size::INFORMATION_COUNTER + Size::GLOBAL_TRIGGER_COUNTER + Size::ABSOLUTE_BCID + Size::BCID_DIF +
Size::NUMBER_LINE);
00177     return (begin()[shift] << 24) + (begin()[shift + 1] << 16) + (begin()[shift + 2] << 8) + begin()[shift
+ 3];
00178 }
00179
00180 inline std::uint32_t PayloadParser::getTASU2()const
00181 {
00182     std::uint32_t shift(Size::GLOBAL_HEADER + Size::DIF_IF + Size::DIF_TRIGGER_COUNTER +
Size::INFORMATION_COUNTER + Size::GLOBAL_TRIGGER_COUNTER + Size::ABSOLUTE_BCID + Size::BCID_DIF +
Size::NUMBER_LINE + Size::TEMP_ASU1);
00183     return (begin()[shift] << 24) + (begin()[shift + 1] << 16) + (begin()[shift + 2] << 8) + begin()[shift
+ 3];
00184 }
00185
00186 inline std::uint32_t PayloadParser::getTDIF()const
00187 {
00188     std::uint32_t shift(Size::GLOBAL_HEADER + Size::DIF_IF + Size::DIF_TRIGGER_COUNTER +
Size::INFORMATION_COUNTER + Size::GLOBAL_TRIGGER_COUNTER + Size::ABSOLUTE_BCID + Size::BCID_DIF +
Size::NUMBER_LINE + Size::TEMP_ASU1 + Size::TEMP_ASU2);
00189     return begin()[shift];
00190 }
00191
00192 inline float PayloadParser::getTemperatureDIF()const
00193 {

```

```

00194     if(!hasTemperature()) throw Exception("Don't have TemperatureDIF information");
00195     return 0.508 * getTDIF() - 9.659;
00196 }
00197
00198 inline float PayloadParser::getTemperatureASU1()const
00199 {
00200     if(!hasTemperature()) throw Exception("Don't have TemperatureASU1 information");
00201     return (getTASU1() » 3) * 0.0625;
00202 }
00203
00204 inline float PayloadParser::getTemperatureASU2()const
00205 {
00206     if(!hasTemperature()) throw Exception("Don't have TemperatureASU2 information");
00207     return (getTASU2() » 3) * 0.0625;
00208 }
00209
00210 inline Buffer PayloadParser::getSlowControl()const
00211 {
00212     if(hasSlowControl()) return Buffer(&begin()[getEndOfDIFData()], size() - getEndOfDIFData());
00213     else
00214         return Buffer();
00215 }
00216
00217 inline std::vector<bit8_t*> PayloadParser::getFramesVector()const { return m_Frames; }
00218
00219 inline std::vector<bit8_t*> PayloadParser::getLinesVector()const { return m_Lines; }
00220
00221 inline std::uint32_t PayloadParser::getDTC()const
00222 {
00223     std::uint32_t shift{Size::GLOBAL_HEADER + Size::DIF_IF};
00224     return (begin()[shift] « 24) + (begin()[shift + 1] « 16) + (begin()[shift + 2] « 8) + begin()[shift
+ 3];
00225 }
00226
00227 inline std::uint32_t PayloadParser::getGTC()const
00228 {
00229     std::uint32_t shift{Size::GLOBAL_HEADER + Size::DIF_IF + Size::DIF_TRIGGER_COUNTER +
Size::INFORMATION_COUNTER};
00230     return (begin()[shift] « 24) + (begin()[shift + 1] « 16) + (begin()[shift + 2] « 8) + begin()[shift
+ 3];
00231 }
00232
00233 inline std::uint64_t PayloadParser::getAbsoluteBCID()const
00234 {
00235     std::uint32_t shift{Size::GLOBAL_HEADER + Size::DIF_IF + Size::DIF_TRIGGER_COUNTER +
Size::INFORMATION_COUNTER + Size::GLOBAL_TRIGGER_COUNTER};
00236     std::uint64_t LBC = ((begin()[shift] « 16) | (begin()[shift + 1] « 8) | (begin()[shift + 2])) *
16777216ULL /* to shift the value from the 24 first bits*/
+ ((begin()[shift + 3] « 16) | (begin()[shift + 4] « 8) | (begin()[shift + 5]));
00237     return LBC;
00238 }
00239
00240
00241 inline std::uint32_t PayloadParser::getBCID()const
00242 {
00243     std::uint32_t shift{Size::GLOBAL_HEADER + Size::DIF_IF + Size::DIF_TRIGGER_COUNTER +
Size::INFORMATION_COUNTER + Size::GLOBAL_TRIGGER_COUNTER + Size::ABSOLUTE_BCID};
00244     return (begin()[shift] « 16) + (begin()[shift + 1] « 8) + begin()[shift + 2];
00245 }
00246
00247 inline bool PayloadParser::hasLine(const std::uint32_t& line)const
00248 {
00249     std::uint32_t shift{Size::GLOBAL_HEADER + Size::DIF_IF + Size::DIF_TRIGGER_COUNTER +
Size::INFORMATION_COUNTER + Size::GLOBAL_TRIGGER_COUNTER + Size::ABSOLUTE_BCID + Size::BCID_DIF};
00250     return ((begin()[shift] » line) & 0x1);
00251 }
00252
00253 inline std::uint32_t PayloadParser::getNumberOfFrames()const { return m_Frames.size(); }
00254
00255 inline bit8_t* PayloadParser::getFramePtr(const std::uint32_t& i)const { return m_Frames[i]; }
00256
00257 inline std::uint32_t PayloadParser::getFrameBCID(const std::uint32_t& i)const
00258 {
00259     std::uint32_t shift{+Size::MICROROC_HEADER};
00260     return GrayToBin((m_Frames[i][shift] « 16) + (m_Frames[i][shift + 1] « 8) + m_Frames[i][shift + 2]);
00261 }
00262
00263 inline std::uint32_t PayloadParser::getFrameTimeToTrigger(const std::uint32_t& i)const { return
getBCID() - getFrameBCID(i); }
00264
00265 inline bool PayloadParser::getFrameLevel(const std::uint32_t& i, const std::uint32_t& ipad, const
std::uint32_t& ilevel)const
00266 {
00267     std::uint32_t shift{Size::MICROROC_HEADER + Size::BCID};
00268     return ((m_Frames[i][shift + ((3 - ipad / 16) * 4 + (ipad % 16) / 4)] » (7 - ((ipad % 16) % 4) * 2
+ ilevel))) & 0x1);
00269 }
00270

```

```

00271 inline std::uint32_t PayloadParser::getDIFid() const
00272 {
00273     std::uint32_t shift{+Size::GLOBAL_HEADER};
00274     return begin()[shift] & 0xFF;
00275 }
00276
00277 inline std::uint32_t PayloadParser::getASICid(const std::uint32_t& i) const { return m_Frames[i][0] &
00278     0xFF; }
00279
00279 inline std::uint32_t PayloadParser::getThresholdStatus(const std::uint32_t& i, const std::uint32_t&
00280     ipad) const { return (((std::uint32_t) getFrameLevel(i, ipad, 1)) << 1) |
00281     ((std::uint32_t) getFrameLevel(i, ipad, 0)); }
00280
00281 inline std::uint32_t PayloadParser::getDIF_CRC() const
00282 {
00283     std::uint32_t shift{getEndOfDIFData() - (Size::CRC_MSB + Size::CRC_LSB)};
00284     return (begin()[shift] << 8) + begin()[shift + 1];
00285 }
00286
00287 inline std::uint32_t PayloadParser::getSizeAfterDIFPtr() const { return size() - theGetFramePtrReturn_;
00288 }
00288
00289 inline std::uint32_t PayloadParser::getEndOfDIFData() const { return theGetFramePtrReturn_; }

```

5.23 libs/core/include/RawBufferNavigator.h File Reference

```
#include "Buffer.h"
```

Classes

- class [RawBufferNavigator](#)
class to navigate in the raw data buffer parse the header and send the payload as [Buffer](#)

5.23.1 Detailed Description

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Definition in file [RawBufferNavigator.h](#).

5.24 RawBufferNavigator.h

[Go to the documentation of this file.](#)

```

00001
00005 #pragma once
00006
00007 #include "Buffer.h"
00008
00013 class RawBufferNavigator
00014 {
00015 public:
00016     static void StartAt(const int& start);
00017     RawBufferNavigator();
00018     ~RawBufferNavigator() = default;
00019     void setBuffer(const Buffer&);
00020     std::uint8_t getDetectorID();
00021     bool findStartOfPayload();
00022     std::int32_t getStartOfPayload();
00023     bool validPayload();
00024     Buffer getPayload();
00025
00026 private:
00027     static int m_Start;
00028     Buffer m_Buffer;
00029     bool m_StartPayloadDone{false};
00030     std::int32_t m_StartPayload{-1}; // -1 Means not found !
00031 };

```

5.25 libs/core/include/Timer.h File Reference

```
#include <chrono>
```

Classes

- class [Timer](#)

5.25.1 Detailed Description

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Definition in file [Timer.h](#).

5.26 Timer.h

[Go to the documentation of this file.](#)

```
00001
00005 #pragma once
00006
00007 #include <chrono>
00008
00009 class Timer
00010 {
00011 public:
00012     void start() { m_StartTime = std::chrono::high_resolution_clock::now(); }
00013     void stop() { m_StopTime = std::chrono::high_resolution_clock::now(); }
00014     float getElapsedTime() { return std::chrono::duration_cast<std::chrono::microseconds>(m_StopTime -
m_StartTime).count(); }
00015
00016 private:
00017     std::chrono::time_point<std::chrono::high_resolution_clock> m_StartTime;
00018     std::chrono::time_point<std::chrono::high_resolution_clock> m_StopTime;
00019 };
```

5.27 libs/core/include/Utilities.h File Reference

```
#include <cstdint>
```

Functions

- `std::uint64_t GrayToBin (const std::uint64_t &n)`

5.27.1 Detailed Description

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Definition in file [Utilities.h](#).

5.27.2 Function Documentation

5.27.2.1 GrayToBin() `std::uint64_t GrayToBin (const std::uint64_t & n) [inline]`

Definition at line 9 of file [Utilities.h](#).

```
00010 {
00011     std::uint64_t ish{1};
00012     std::uint64_t anss{n};
00013     std::uint64_t idiv{0};
00014     std::uint64_t ishmax{sizeof(std::uint64_t) * 8};
00015     while(true)
00016     {
00017         idiv = anss » ish;
00018         anss ^= idiv;
00019         if(idiv <= 1 || ish == ishmax) return anss;
00020         ish «= 1;
00021     }
00022 }
```

5.28 Utilities.h

[Go to the documentation of this file.](#)

```
00001
00005 #pragma once
00006
00007 #include <stdint>
00008
00009 inline std::uint64_t GrayToBin(const std::uint64_t& n)
00010 {
00011     std::uint64_t ish{1};
00012     std::uint64_t anss{n};
00013     std::uint64_t idiv{0};
00014     std::uint64_t ishmax{sizeof(std::uint64_t) * 8};
00015     while(true)
00016     {
00017         idiv = anss » ish;
00018         anss ^= idiv;
00019         if(idiv <= 1 || ish == ishmax) return anss;
00020         ish «= 1;
00021     }
00022 }
```

5.29 libs/core/include/Version.h File Reference

```
#include <stdint>
#include <semver.hpp>
#include <string>
```

Classes

- class [Version](#)

5.29.1 Detailed Description

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Definition in file [Version.h](#).

5.30 Version.h

[Go to the documentation of this file.](#)

```
00001
00005 #pragma once
00006
00007 #include <cstdint>
00008 #include <semver.hpp>
00009 #include <string>
00010
00011 class Version : public semver::version
00012 {
00013 public:
00014     Version(const std::uint8_t& mj, const std::uint8_t& mn, const std::uint8_t& pt, const
semver::prerelease& prt = semver::prerelease::none, const std::uint8_t& prn = 0) noexcept :
semver::version(mj, mn, pt, prt, prn) {}
00015     explicit Version(const std::string_view& str) : semver::version(str) {}
00016     Version() = default;
00017     std::uint8_t getMajor();
00018     std::uint8_t getMinor();
00019     std::uint8_t getPatch();
00020     std::string getPreRelease();
00021     std::uint8_t getPreReleaseNumber();
00022 };
```

5.31 libs/core/include/Words.h File Reference

```
#include <cstdint>
```

Enumerations

- enum class [Hardware](#) : std::uint8_t { [NUMBER_PAD](#) = 64 }
- enum class [Size](#) : std::uint8_t {
[DATA_FORMAT_VERSION](#) = 1 , [DAQ_SOFTWARE_VERSION](#) = 2 , [SDCC_FIRMWARE_VERSION](#) = 2 ,
[DIF_FIRMWARE_VERSION](#) = 2 ,
[TIMESTAMP_SECONDES](#) = 4 , [TIMESTAMP_MILLISECONDS](#) = 4 , [GLOBAL_HEADER](#) = 1 , [DIF_IF](#) = 1 ,
[DIF_TRIGGER_COUNTER](#) = 4 , [INFORMATION_COUNTER](#) = 4 , [GLOBAL_TRIGGER_COUNTER](#) = 4 ,
[ABSOLUTE_BCID](#) = 6 ,
[BCID_DIF](#) = 3 , [NUMBER_LINE](#) = 1 , [TEMP_ASU1](#) = 4 , [TEMP_ASU2](#) = 4 ,
[TEMP_DIF](#) = 1 , [HEADER_LINE](#) = 1 , [NUMBER_CHIPS](#) = 1 , [LINE_SIZE](#) = 64 * 2 ,
[TRAILER_LINE](#) = 1 , [FRAME_HEADER](#) = 1 , [MICROROC_HEADER](#) = 1 , [BCID](#) = 3 ,
[DATA](#) = 16 , [FRAME_TRAILER](#) = 1 , [GLOBAL_TRAILER](#) = 1 , [CRC_MSB](#) = 1 ,
[CRC_LSB](#) = 1 , [SC_HEADER](#) = 1 , [DIF_ID](#) = 1 , [ASIC_HEADER](#) = 1 ,
[SC_ASIC_SIZE](#) = 1 , [SC_TRAILER](#) = 1 }
- enum class [Value](#) : std::uint8_t {
[GLOBAL_HEADER](#) = 0xb0 , [GLOBAL_HEADER_TEMP](#) = 0xbb , [HEADER_LINE](#) = 0xc4 , [TRAILER_LINE](#) =
0xd4 ,
[FRAME_HEADER](#) = 0xb4 , [FRAME_TRAILER](#) = 0xa3 , [FRAME_TRAILER_ERROR](#) = 0xc3 ,
[GLOBAL_TRAILER](#) = 0xa0 ,
[SC_HEADER](#) = 0xb1 , [SC_TRAILER](#) = 0xa1 }

5.31.1 Detailed Description

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Definition in file [Words.h](#).

5.31.2 Enumeration Type Documentation

5.31.2.1 Hardware `enum class Hardware : std::uint8_t [strong]`

Enumerator

NUMBER_PAD	
------------	--

Definition at line 9 of file [Words.h](#).

```
00010 {  
00011     NUMBER_PAD = 64,  
00012 };
```

5.31.2.2 Size `enum class Size : std::uint8_t [strong]`

Enumerator

DATA_FORMAT_VERSION	
DAQ_SOFTWARE_VERSION	
SDCC_FIRMWARE_VERSION	
DIF_FIRMWARE_VERSION	
TIMESTAMP_SECONDES	
TIMESTAMP_MILLISECONDS	
GLOBAL_HEADER	
DIF_IF	
DIF_TRIGGER_COUNTER	
INFORMATION_COUNTER	
GLOBAL_TRIGGER_COUNTER	
ABSOLUTE_BCID	
BCID_DIF	
NUMBER_LINE	
TEMP_ASU1	
TEMP_ASU2	
TEMP_DIF	
HEADER_LINE	
NUMBER_CHIPS	
LINE_SIZE	
TRAILER_LINE	
FRAME_HEADER	
MICROROC_HEADER	
BCID	
DATA	
FRAME_TRAILER	
GLOBAL_TRAILER	
CRC_MSB	
CRC_LSB	
SC_HEADER	

Enumerator

DIF_ID	
ASIC_HEADER	
SC_ASIC_SIZE	
SC_TRAILER	

Definition at line 14 of file [Words.h](#).

```

00015 {
00016     // Header
00017     DATA_FORMAT_VERSION    = 1,
00018     DAQ_SOFTWARE_VERSION    = 2,
00019     SDCC_FIRMWARE_VERSION   = 2,
00020     DIF_FIRMWARE_VERSION    = 2,
00021     TIMESTAMP_SECONDS        = 4,
00022     TIMESTAMP_MILLISECONDS   = 4,
00023     // Payload
00024     GLOBAL_HEADER            = 1,
00025     DIF_IF                    = 1,
00026     DIF_TRIGGER_COUNTER      = 4,
00027     INFORMATION_COUNTER      = 4,
00028     GLOBAL_TRIGGER_COUNTER    = 4,
00029     ABSOLUTE_BCID            = 6,
00030     BCID_DIF                  = 3,
00031     NUMBER_LINE              = 1,
00032     TEMP_ASU1                = 4,
00033     TEMP_ASU2                = 4,
00034     TEMP_DIF                 = 1,
00035     HEADER_LINE              = 1,
00036     NUMBER_CHIPS             = 1,
00037     LINE_SIZE                 = 64 * 2,
00038     TRAILER_LINE             = 1,
00039     FRAME_HEADER             = 1,
00040     MICROROC_HEADER          = 1,
00041     BCID                     = 3,
00042     DATA                    = 16,
00043     FRAME_TRAILER            = 1,
00044     GLOBAL_TRAILER           = 1,
00045     CRC_MSB                  = 1,
00046     CRC_LSB                  = 1,
00047     // Slowcontrol
00048     SC_HEADER                = 1,
00049     DIF_ID                   = 1,
00050     ASIC_HEADER              = 1,
00051     SC_ASIC_SIZE             = 1,
00052     SC_TRAILER               = 1
00053 };

```

5.31.2.3 Value `enum class Value : std::uint8_t [strong]`

Enumerator

GLOBAL_HEADER	
GLOBAL_HEADER_TEMP	
HEADER_LINE	
TRAILER_LINE	
FRAME_HEADER	
FRAME_TRAILER	
FRAME_TRAILER_ERROR	
GLOBAL_TRAILER	
SC_HEADER	
SC_TRAILER	

Definition at line 59 of file [Words.h](#).

```

00060 {
00061     GLOBAL_HEADER      = 0xb0,
00062     GLOBAL_HEADER_TEMP = 0xbb,
00063     HEADER_LINE        = 0xc4,
00064     TRAILER_LINE       = 0xd4,
00065     FRAME_HEADER       = 0xb4,
00066     FRAME_TRAILER      = 0xa3,
00067     FRAME_TRAILER_ERROR = 0xc3,
00068     GLOBAL_TRAILER     = 0xa0,
00069     SC_HEADER          = 0xb1,
00070     SC_TRAILER         = 0xa1
00071 };

```

5.32 Words.h

[Go to the documentation of this file.](#)

```

00001
00005 #pragma once
00006
00007 #include <cstdint>
00008
00009 enum class Hardware : std::uint8_t
00010 {
00011     NUMBER_PAD = 64,
00012 };
00013
00014 enum class Size : std::uint8_t
00015 {
00016     // Header
00017     DATA_FORMAT_VERSION = 1,
00018     DAQ_SOFTWARE_VERSION = 2,
00019     SDCC_FIRMWARE_VERSION = 2,
00020     DIF_FIRMWARE_VERSION = 2,
00021     TIMESTAMP_SECONDES = 4,
00022     TIMESTAMP_MILLISECONDS = 4,
00023     // Payload
00024     GLOBAL_HEADER = 1,
00025     DIF_IF = 1,
00026     DIF_TRIGGER_COUNTER = 4,
00027     INFORMATION_COUNTER = 4,
00028     GLOBAL_TRIGGER_COUNTER = 4,
00029     ABSOLUTE_BCID = 6,
00030     BCID_DIF = 3,
00031     NUMBER_LINE = 1,
00032     TEMP_ASU1 = 4,
00033     TEMP_ASU2 = 4,
00034     TEMP_DIF = 1,
00035     HEADER_LINE = 1,
00036     NUMBER_CHIPS = 1,
00037     LINE_SIZE = 64 * 2,
00038     TRAILER_LINE = 1,
00039     FRAME_HEADER = 1,
00040     MICROROC_HEADER = 1,
00041     BCID = 3,
00042     DATA = 16,
00043     FRAME_TRAILER = 1,
00044     GLOBAL_TRAILER = 1,
00045     CRC_MSB = 1,
00046     CRC_LSB = 1,
00047     // Slowcontrol
00048     SC_HEADER = 1,
00049     DIF_ID = 1,
00050     ASIC_HEADER = 1,
00051     SC_ASIC_SIZE = 1,
00052     SC_TRAILER = 1
00053 };
00054
00055 static inline std::uint32_t operator+(const Size& a, const Size& b) { return
    static_cast<std::uint32_t>(a) + static_cast<std::uint32_t>(b); }
00056 static inline std::uint32_t operator+(const std::uint32_t& a, const Size& b) { return a +
    static_cast<std::uint32_t>(b); }
00057 static inline std::uint32_t operator+(const Size& a) { return static_cast<std::uint32_t>(a); }
00058
00059 enum class Value : std::uint8_t
00060 {
00061     GLOBAL_HEADER      = 0xb0,
00062     GLOBAL_HEADER_TEMP = 0xbb,
00063     HEADER_LINE        = 0xc4,
00064     TRAILER_LINE       = 0xd4,
00065     FRAME_HEADER       = 0xb4,
00066     FRAME_TRAILER      = 0xa3,
00067     FRAME_TRAILER_ERROR = 0xc3,

```

```

00068 GLOBAL_TRAILER    = 0xa0,
00069 SC_HEADER          = 0xb1,
00070 SC_TRAILER          = 0xa1
00071 };

```

5.33 `libs/core/src/Bits.cc` File Reference

```
#include "Bits.h"
```

Functions

- `std::ostream & operator<< (std::ostream &os, const bit8_t &c)`
Stream operator to print `bit8_t` aka `std::uint8_t` and not char or unsigned char.

5.33.1 Detailed Description

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Definition in file `Bits.cc`.

5.33.2 Function Documentation

5.33.2.1 `operator<<()` `std::ostream & operator<< (`
`std::ostream & os,`
`const bit8_t & c)`

Stream operator to print `bit8_t` aka `std::uint8_t` and not char or unsigned char.

Definition at line 8 of file `Bits.cc`.

```
00008 { return os << c + 0; }
```

5.34 `Bits.cc`

[Go to the documentation of this file.](#)

```

00001
00006 #include "Bits.h"
00007
00008 std::ostream& operator<<(std::ostream& os, const bit8_t& c) { return os << c + 0; }

```

5.35 `libs/core/src/BufferLooperCounter.cc` File Reference

```

#include "BufferLooperCounter.h"
#include "Formatters.h"
#include <fmt/color.h>

```

5.36 BufferLooperCounter.cc

[Go to the documentation of this file.](#)

```
00001
00005 #include "BufferLooperCounter.h"
00006
00007 #include "Formatters.h"
00008
00009 #include <fmt/color.h>
00010
00011 void BufferLooperCounter::printAllCounters()
00012 {
00013     fmt::print(fg(fmt::color::crimson) | fmt::emphasis::bold, "BUFFER LOOP FINAL STATISTICS : \n");
00014     printCounter("Start of DIF header", DIFStarter);
00015     printCounter("Value after DIF data are processed", DIFPtrValueAtReturnedPos, std::ios_base::hex);
00016     printCounter("Size remaining in buffer after end of DIF data", SizeAfterDIFPtr);
00017     fmt::print(fg(fmt::color::crimson) | fmt::emphasis::bold, "Number of Slow Control found {} out of
which {} are bad\n", hasSlowControl, hasBadSlowControl);
00018     printCounter("Size remaining after all of data have been processed", SizeAfterAllData);
00019     printCounter("Number on non zero values in end of data buffer", NonZeroValusAtEndOfData);
00020 }
00021
00022 void BufferLooperCounter::printCounter(const std::string& description, const std::map<int, int>& m,
const std::ios_base::fmtflags& base)
00023 {
00024     std::string out{"statistics for " + description + " : \n"};
00025     for(std::map<int, int>::const_iterator it = m.begin(); it != m.end(); it++)
00026     {
00027         if(it != m.begin()) out += ", ";
00028         out += " [";
00029         switch(base)
00030         {
00031             case std::ios_base::dec: out += to_dec(static_cast<std::uint32_t>(it->first)); break;
00032             case std::ios_base::hex: out += to_hex(static_cast<std::uint32_t>(it->first)); break;
00033             case std::ios_base::oct: out += to_oct(static_cast<std::uint32_t>(it->first)); break;
00034             default: out += to_dec(static_cast<std::uint32_t>(it->first)); break;
00035         }
00036         out += "]" + std::to_string(it->second);
00037     }
00038     out += "\n";
00039     fmt::print(fg(fmt::color::crimson) | fmt::emphasis::bold, out);
00040 }
```

5.37 libs/core/src/DIFSlowControl.cc File Reference

```
#include "DIFSlowControl.h"
```

Functions

- `std::string to_string (const DIFSlowControl &c)`

5.37.1 Detailed Description

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Definition in file [DIFSlowControl.cc](#).

5.37.2 Function Documentation

5.37.2.1 to_string() `std::string to_string (`
`const DIFSlowControl & c)`

Definition at line 256 of file DIFSlowControl.cc.

```
00257 {
00258     std::string ret;
00259     for(std::map<int, std::map<std::string, int>::const_iterator it = c.cbegin(); it != c.cend(); it++)
00260     {
00261         ret += "ASIC " + std::to_string(it->first) + " : \n";
00262         for(std::map<std::string, int>::const_iterator jt = (it->second).begin(); jt !=
(it->second).end(); jt++) ret += jt->first + " : " + std::to_string(jt->second) + "\n";
00263     }
00264     return ret;
00265 }
```

5.38 DIFSlowControl.cc

[Go to the documentation of this file.](#)

```
00001
00005 #include "DIFSlowControl.h"
00006
00007 DIFSlowControl::DIFSlowControl(const std::uint8_t& version, const std::uint8_t& DIFId, unsigned char*
cbuf) : m_Version(version), m_DIFId(DIFId), m_AsicType(2)
00008 {
00009     if(cbuf[0] != 0xb1) return;
00010     int header_shift{6};
00011     if(m_Version < 8) m_NbrAsic = cbuf[5];
00012     else
00013     {
00014         m_DIFId = cbuf[1];
00015         m_NbrAsic = cbuf[2];
00016         header_shift = 3;
00017     }
00018     int size_hardroc1 = m_NbrAsic * 72 + header_shift + 1;
00019     if(cbuf[size_hardroc1 - 1] != 0xa1) size_hardroc1 = 0;
00020
00021     int size_hardroc2 = m_NbrAsic * 109 + header_shift + 1;
00022     if(cbuf[size_hardroc2 - 1] != 0xa1) size_hardroc2 = 0;
00023     if(size_hardroc1 != 0)
00024     {
00025         FillHR1(header_shift, cbuf);
00026         m_AsicType = 1;
00027     }
00028     else if(size_hardroc2 != 0)
00029         FillHR2(header_shift, cbuf);
00030     else
00031         return;
00032 }
00033
00034 inline std::uint8_t DIFSlowControl::getDIFId() { return m_DIFId; }
00035
00036 inline std::map<int, std::map<std::string, int> DIFSlowControl::getChipsMap() { return m_MapSC; }
00037
00038 inline std::map<std::string, int> DIFSlowControl::getChipSlowControl(const int& asicid) { return
m_MapSC[asicid]; }
00039
00040 inline int DIFSlowControl::getChipSlowControl(const std::int8_t& asicid, const std::string& param) {
return getChipSlowControl(asicid)[param]; }
00041
00042 void DIFSlowControl::FillHR1(const int& header_shift, unsigned char* cbuf)
00043 {
00044     int nasic{cbuf[header_shift - 1]};
00045     int idx{header_shift};
00046     for(int k = 0; k < nasic; k++)
00047     {
00048         std::bitset<72 * 8> bs;
00049         // printf("%x %x \n", cbuf[idx+k*72+69], cbuf[idx+k*72+70]);
00050         for(int l = 71; l >= 0; l--)
00051         {
00052             // printf("%d %x : %d -->", l, cbuf[idx+k*72+1], (71-l)*8);
00053             for(int m = 0; m < 8; m++)
00054             {
00055                 if((l < m) & cbuf[idx + k * 72 + 1]) != 0) bs.set((71 - l) * 8 + m, 1);
00056                 else
00057                     bs.set((71 - l) * 8 + m, 0);
00058                 // printf("%d", (int) bs[(71-l)*8+m]);
00059             }
00060             // printf("\n");
00061         }
00062         FillAsicHR1(bs);
00063     }
```

```

00064 }
00065
00066 void DIFSlowControl::FillHR2(const int& header_shift, unsigned char* cbuf)
00067 {
00068     // int scsizer=cbuf[header_shift-1]*109+(header_shift-1)+2;
00069     int nasic{cbuf[header_shift - 1]};
00070     int idx{header_shift};
00071     // std::cout<<" DIFSlowControl::FillHR nasic "<nasic<<std::endl;
00072     for(int k = 0; k < nasic; k++)
00073     {
00074         std::bitset<109 * 8> bs;
00075         // printf("%x %x \n",cbuf[idx+k*109+69],cbuf[idx+k*109+70]);
00076         for(int l = 108; l >= 0; l--)
00077         {
00078             // printf("%d %x : %d -->",l,cbuf[idx+k*109+l],(71-l)*8);
00079             for(int m = 0; m < 8; m++)
00080             {
00081                 if((1 < m) & cbuf[idx + k * 109 + l] != 0) bs.set((108 - l) * 8 + m, 1);
00082                 else
00083                     bs.set((108 - l) * 8 + m, 0);
00084                 // printf("%d", (int) bs[(71-l)*8+m]);
00085             }
00086             // printf("\n");
00087         }
00088         FillAsicHR2(bs);
00089     }
00090 }
00091
00092 void DIFSlowControl::FillAsicHR1(const std::bitset<72 * 8>& bs)
00093 {
00094     // Asic Id
00095     int asicid{0};
00096     for(int j = 0; j < 8; j++)
00097         if(bs[j + 9] != 0) asicid += (1 << (7 - j));
00098     std::map<std::string, int> mAsic;
00099     // Slow Control
00100     mAsic["SSC0"] = static_cast<int>(bs[575]);
00101     mAsic["SSC1"] = static_cast<int>(bs[574]);
00102     mAsic["SSC2"] = static_cast<int>(bs[573]);
00103     mAsic["Choix_caisson"] = static_cast<int>(bs[572]);
00104     mAsic["SW_50k"] = static_cast<int>(bs[571]);
00105     mAsic["SW_100k"] = static_cast<int>(bs[570]);
00106     mAsic["SW_100f"] = static_cast<int>(bs[569]);
00107     mAsic["SW_50f"] = static_cast<int>(bs[568]);
00108
00109     mAsic["Valid_DC"] = static_cast<int>(bs[567]);
00110     mAsic["ON_Discri"] = static_cast<int>(bs[566]);
00111     mAsic["ON_Fsb"] = static_cast<int>(bs[565]);
00112     mAsic["ON_Otaq"] = static_cast<int>(bs[564]);
00113     mAsic["ON_W"] = static_cast<int>(bs[563]);
00114     mAsic["ON_Ss"] = static_cast<int>(bs[562]);
00115     mAsic["ON_Buf"] = static_cast<int>(bs[561]);
00116     mAsic["ON_Paf"] = static_cast<int>(bs[560]);
00117     // Gain
00118     for(int i = 0; i < 64; i++)
00119     {
00120         int gain{0};
00121         for(int j = 0; j < 6; j++)
00122             if(bs[176 + i * 6 + j] != 0) gain += (1 << j);
00123         mAsic["Channel_" + std::to_string(i) + "_" + "Gain"] = gain;
00124         mAsic["Channel_" + std::to_string(i) + "_" + "cTest"] = bs[112 + i];
00125         mAsic["Channel_" + std::to_string(i) + "_" + "Valid_trig"] = static_cast<int>(bs[25 + i]);
00126     }
00127
00128     mAsic["ON_Otabg"] = static_cast<int>(bs[111]);
00129     mAsic["ON_Dac"] = static_cast<int>(bs[110]);
00130     mAsic["ON_Otadac"] = static_cast<int>(bs[109]);
00131     // DAC
00132     int dac1{0};
00133     for(int j = 0; j < 10; j++)
00134         if(bs[j + 99] != 0) dac1 += (1 << j);
00135     mAsic["DAC1"] = dac1;
00136     int dac0{0};
00137     for(int j = 0; j < 10; j++)
00138         if(bs[j + 89] != 0) dac0 += (1 << j);
00139     mAsic["DAC0"] = dac0;
00140     mAsic["EN_Raz_Ext"] = static_cast<int>(bs[23]);
00141     mAsic["EN_Raz_Int"] = static_cast<int>(bs[22]);
00142     mAsic["EN_Out_Raz_Int"] = static_cast<int>(bs[21]);
00143     mAsic["EN_Trig_Ext"] = static_cast<int>(bs[20]);
00144     mAsic["EN_Trig_Int"] = static_cast<int>(bs[19]);
00145     mAsic["EN_Out_Trig_Int"] = static_cast<int>(bs[18]);
00146     mAsic["Bypass_Chip"] = static_cast<int>(bs[17]);
00147     mAsic["HardrocHeader"] = static_cast<int>(asicid);
00148     mAsic["EN_Out_Discri"] = static_cast<int>(bs[8]);
00149     mAsic["EN_Transmit_On"] = static_cast<int>(bs[7]);
00150     mAsic["EN_Dout"] = static_cast<int>(bs[6]);

```

```

00151     mAsic["EN_RamFull"]      = static_cast<int>(bs[5]);
00152     m_MapSC[asicid]          = mAsic;
00153 }
00154
00155 void DIFSlowControl::FillAsicHR2(const std::bitset<109 * 8>& bs)
00156 {
00157     int asicid{0};
00158     for(int j = 0; j < 8; j++)
00159         if(bs[j + (108 - 7) * 8 + 2] != 0) asicid += (1 << (7 - j));
00160     std::map<std::string, int> mAsic;
00161     for(int i = 0; i < 64; i++)
00162     {
00163         int gain{0};
00164         int mask{0};
00165         mAsic["Channel_" + std::to_string(i) + "_" + "cTest"] = bs[i];
00166         for(int j = 0; j < 8; j++)
00167             if(bs[64 + i * 8 + j] != 0) gain += (1 << j);
00168         mAsic["Channel_" + std::to_string(i) + "_" + "Gain"] = gain;
00169         for(int j = 0; j < 3; j++)
00170             if(bs[8 * 77 + 2 + i * 3 + j] != 0) mask += (1 << j);
00171         mAsic["Channel_" + std::to_string(i) + "_" + "Mask"] = mask;
00172     }
00173     mAsic["PwrOnPA"] = static_cast<int>(bs[8 * 72]);
00174     mAsic["Cmdb3SS"] = static_cast<int>(bs[8 * 72 + 1]);
00175     mAsic["Cmdb2SS"] = static_cast<int>(bs[8 * 72 + 2]);
00176     mAsic["Cmdb1SS"] = static_cast<int>(bs[8 * 72 + 3]);
00177     mAsic["Cmdb0SS"] = static_cast<int>(bs[8 * 72 + 4]);
00178     mAsic["SwSsc0"] = static_cast<int>(bs[8 * 72 + 5]);
00179     mAsic["SwSsc1"] = static_cast<int>(bs[8 * 72 + 6]);
00180     mAsic["SwSsc2"] = static_cast<int>(bs[8 * 72 + 7]);
00181
00182     mAsic["PwrOnBuff"] = static_cast<int>(bs[8 * 73]);
00183     mAsic["PwrOnSS"] = static_cast<int>(bs[8 * 73 + 1]);
00184     mAsic["PwrOnW"] = static_cast<int>(bs[8 * 73 + 2]);
00185     mAsic["Cmdb3Fsb2"] = static_cast<int>(bs[8 * 73 + 3]);
00186     mAsic["Cmdb2Fsb2"] = static_cast<int>(bs[8 * 73 + 4]);
00187     mAsic["Cmdb1Fsb2"] = static_cast<int>(bs[8 * 73 + 5]);
00188     mAsic["Cmdb0Fsb2"] = static_cast<int>(bs[8 * 73 + 6]);
00189     mAsic["Sw50k2"] = static_cast<int>(bs[8 * 73 + 7]);
00190
00191     mAsic["Sw100k2"] = static_cast<int>(bs[8 * 74]);
00192     mAsic["Sw100f2"] = static_cast<int>(bs[8 * 74 + 1]);
00193     mAsic["Sw50f2"] = static_cast<int>(bs[8 * 74 + 2]);
00194     mAsic["Cmdb3Fsb1"] = static_cast<int>(bs[8 * 74 + 3]);
00195     mAsic["Cmdb2Fsb1"] = static_cast<int>(bs[8 * 74 + 4]);
00196     mAsic["Cmdb1Fsb1"] = static_cast<int>(bs[8 * 74 + 5]);
00197     mAsic["Cmdb0Fsb1"] = static_cast<int>(bs[8 * 74 + 6]);
00198     mAsic["Sw50k1"] = static_cast<int>(bs[8 * 74 + 7]);
00199
00200     mAsic["Sw100k1"] = static_cast<int>(bs[8 * 75]);
00201     mAsic["Sw100f1"] = static_cast<int>(bs[8 * 75 + 1]);
00202     mAsic["Sw50f1"] = static_cast<int>(bs[8 * 75 + 2]);
00203     mAsic["Sel0"] = static_cast<int>(bs[8 * 75 + 3]);
00204     mAsic["Sel11"] = static_cast<int>(bs[8 * 75 + 4]);
00205     mAsic["PwrOnFsb"] = static_cast<int>(bs[8 * 75 + 5]);
00206     mAsic["PwrOnFsb1"] = static_cast<int>(bs[8 * 75 + 6]);
00207     mAsic["PwrOnFsb2"] = static_cast<int>(bs[8 * 75 + 7]);
00208
00209     mAsic["Sw50k0"] = static_cast<int>(bs[8 * 76]);
00210     mAsic["Sw100k0"] = static_cast<int>(bs[8 * 76 + 1]);
00211     mAsic["Sw100f0"] = static_cast<int>(bs[8 * 76 + 2]);
00212     mAsic["Sw50f0"] = static_cast<int>(bs[8 * 76 + 3]);
00213     mAsic["EnOtaQ"] = static_cast<int>(bs[8 * 76 + 4]);
00214     mAsic["OtaQ_PwrADC"] = static_cast<int>(bs[8 * 76 + 5]);
00215     mAsic["Discri_PwrA"] = static_cast<int>(bs[8 * 76 + 6]);
00216     mAsic["Discri2"] = static_cast<int>(bs[8 * 76 + 7]);
00217
00218     mAsic["Discri1"] = static_cast<int>(bs[8 * 77]);
00219     mAsic["RS_or_Discri"] = static_cast<int>(bs[8 * 77 + 1]);
00220
00221     mAsic["Header"] = asicid;
00222     for(int i = 0; i < 3; i++)
00223     {
00224         int B = 0;
00225         for(int j = 0; j < 10; j++)
00226             if(bs[8 * 102 + 2 + i * 10 + j] != 0) B += (1 << j);
00227         mAsic["B" + std::to_string(i)] = B;
00228     }
00229
00230     mAsic["Smallldac"] = static_cast<int>(bs[8 * 106]);
00231     mAsic["DacSw"] = static_cast<int>(bs[8 * 106 + 1]);
00232     mAsic["OtagBgSw"] = static_cast<int>(bs[8 * 106 + 2]);
00233     mAsic["Trig2b"] = static_cast<int>(bs[8 * 106 + 3]);
00234     mAsic["Trig1b"] = static_cast<int>(bs[8 * 106 + 4]);
00235     mAsic["Trig0b"] = static_cast<int>(bs[8 * 106 + 5]);
00236     mAsic["EnTrigOut"] = static_cast<int>(bs[8 * 106 + 6]);
00237     mAsic["DiscrOrOr"] = static_cast<int>(bs[8 * 106 + 7]);

```

```

00238
00239 mAsic["TrigExtVal"] = static_cast<int>(bs[8 * 107]);
00240 mAsic["RazChnIntVal"] = static_cast<int>(bs[8 * 107 + 1]);
00241 mAsic["RazChnExtVal"] = static_cast<int>(bs[8 * 107 + 2]);
00242 mAsic["ScOn"] = static_cast<int>(bs[8 * 107 + 3]);
00243 mAsic["CLKMux"] = static_cast<int>(bs[8 * 107 + 4]);
00244
00245 // EnOCdout1b EnOCdout2b EnOCTransmitOn1b EnOCTransmitOn2b EnOCChipsatb SelStartReadout
SelEndReadout
00246 mAsic["SelEndReadout"] = static_cast<int>(bs[8 * 108 + 1]);
00247 mAsic["SelStartReadout"] = static_cast<int>(bs[8 * 108 + 2]);
00248 mAsic["EnOCChipsatb"] = static_cast<int>(bs[8 * 108 + 3]);
00249 mAsic["EnOCTransmitOn2b"] = static_cast<int>(bs[8 * 108 + 4]);
00250 mAsic["EnOCTransmitOn1b"] = static_cast<int>(bs[8 * 108 + 5]);
00251 mAsic["EnOCdout2b"] = static_cast<int>(bs[8 * 108 + 6]);
00252 mAsic["EnOCdout1b"] = static_cast<int>(bs[8 * 108 + 7]);
00253 m_MapSC[asidid] = mAsic;
00254 }
00255
00256 std::string to_string(const DIFSlowControl& c)
00257 {
00258     std::string ret;
00259     for(std::map<int, std::map<std::string, int>::const_iterator it = c.cbegin(); it != c.cend(); it++)
00260     {
00261         ret += "ASIC " + std::to_string(it->first) + " :\n";
00262         for(std::map<std::string, int>::const_iterator jt = (it->second).begin(); jt !=
(it->second).end(); jt++) ret += jt->first + " : " + std::to_string(jt->second) + "\n";
00263     }
00264     return ret;
00265 }

```

5.39 libs/core/src/FileSystem.cc File Reference

```
#include "FileSystem.h"
```

Functions

- `std::string path` (const `std::string` &file)
- `std::string extension` (const `std::string` &file)
- `std::string filename` (const `std::string` &file)

5.39.1 Detailed Description

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Definition in file [FileSystem.cc](#).

5.39.2 Function Documentation

5.39.2.1 extension() `std::string extension (`
`const std::string & file)`

Definition at line 13 of file [FileSystem.cc](#).

```

00014 {
00015     std::size_t position = file.find_last_of(".");
00016     return (std::string::npos == position || position == 0) ? "" : file.substr(position + 1);
00017 }

```


5.39.2.2 filename() `std::string filename (`
`const std::string & file)`

Definition at line 19 of file [Filesystem.cc](#).

```
00020 {
00021     std::size_t position = file.find_last_of(".");
00022     std::size_t pos      = file.find_last_of("\\\\/");
00023     return (std::string::npos == pos) ? file.substr(0, position) : file.substr(pos + 1, position - pos
- 1);
00024 }
```

5.39.2.3 path() `std::string path (`
`const std::string & file)`

Definition at line 7 of file [Filesystem.cc](#).

```
00008 {
00009     std::size_t pos = file.find_last_of("\\\\/");
00010     return (std::string::npos == pos) ? "" : file.substr(0, pos);
00011 }
```

5.40 Filesystem.cc

[Go to the documentation of this file.](#)

```
00001
00005 #include "Filesystem.h"
00006
00007 std::string path(const std::string& file)
00008 {
00009     std::size_t pos = file.find_last_of("\\\\/");
00010     return (std::string::npos == pos) ? "" : file.substr(0, pos);
00011 }
00012
00013 std::string extension(const std::string& file)
00014 {
00015     std::size_t position = file.find_last_of(".");
00016     return (std::string::npos == position || position == 0) ? "" : file.substr(position + 1);
00017 }
00018
00019 std::string filename(const std::string& file)
00020 {
00021     std::size_t position = file.find_last_of(".");
00022     std::size_t pos      = file.find_last_of("\\\\/");
00023     return (std::string::npos == pos) ? file.substr(0, position) : file.substr(pos + 1, position - pos
- 1);
00024 }
```

5.41 libs/core/src/Formatters.cc File Reference

```
#include "Formatters.h"
#include "Bits.h"
#include "Buffer.h"
#include "Words.h"
#include <fmt/format.h>
```

Functions

- `std::string to_dec (const Buffer &b, const std::size_t &begin, const std::size_t &end)`
- `std::string to_dec (const bit8_t &b)`
- `std::string to_dec (const bit16_t &b)`
- `std::string to_dec (const bit32_t &b)`
- `std::string to_dec (const bit64_t &b)`
- `std::string to_hex (const Buffer &b, const std::size_t &begin, const std::size_t &end)`
- `std::string to_hex (const bit8_t &b)`
- `std::string to_hex (const bit16_t &b)`
- `std::string to_hex (const bit32_t &b)`
- `std::string to_hex (const bit64_t &b)`
- `std::string to_bin (const Buffer &b, const std::size_t &begin, const std::size_t &end)`
- `std::string to_bin (const bit8_t &b)`
- `std::string to_bin (const bit16_t &b)`
- `std::string to_bin (const bit32_t &b)`
- `std::string to_bin (const bit64_t &b)`
- `std::string to_oct (const Buffer &b, const std::size_t &begin, const std::size_t &end)`
- `std::string to_oct (const bit8_t &b)`
- `std::string to_oct (const bit16_t &b)`
- `std::string to_oct (const bit32_t &b)`
- `std::string to_oct (const bit64_t &b)`

5.41.1 Detailed Description

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Definition in file [Formatters.cc](#).

5.41.2 Function Documentation

5.41.2.1 to_bin() [1/5] `std::string to_bin (const bit16_t & b)`

Definition at line 71 of file [Formatters.cc](#).

```
00071 { return fmt::format("{:#016b}", b); }
```

5.41.2.2 to_bin() [2/5] `std::string to_bin (const bit32_t & b)`

Definition at line 73 of file [Formatters.cc](#).

```
00073 { return fmt::format("{:#032b}", b); }
```

5.41.2.3 to_bin() [3/5] std::string to_bin (
const bit64_t & b)

Definition at line 75 of file [Formatters.cc](#).

```
00075 { return fmt::format("{:#064b}", b); }
```

5.41.2.4 to_bin() [4/5] std::string to_bin (
const bit8_t & b)

Definition at line 69 of file [Formatters.cc](#).

```
00069 { return fmt::format("{:#08b}", b); }
```

5.41.2.5 to_bin() [5/5] std::string to_bin (
const Buffer & b,
const std::size_t & begin,
const std::size_t & end)

Definition at line 56 of file [Formatters.cc](#).

```
00057 {  
00058     std::size_t iend = end;  
00059     if(iend == -1) iend = b.size();  
00060     std::string ret;  
00061     for(std::size_t k = begin; k < iend; k++)  
00062     {  
00063         ret += to_bin(b[k]);  
00064         ret += " - ";  
00065     }  
00066     return ret;  
00067 }
```

5.41.2.6 to_dec() [1/5] std::string to_dec (
const bit16_t & b)

Definition at line 29 of file [Formatters.cc](#).

```
00029 { return fmt::format("{:#d}", b); }
```

5.41.2.7 to_dec() [2/5] std::string to_dec (
const bit32_t & b)

Definition at line 31 of file [Formatters.cc](#).

```
00031 { return fmt::format("{:#d}", b); }
```

5.41.2.8 to_dec() [3/5] std::string to_dec (
const bit64_t & b)

Definition at line 33 of file [Formatters.cc](#).

```
00033 { return fmt::format("{:#d}", b); }
```

5.41.2.9 to_dec() [4/5] `std::string to_dec (`
`const bit8_t & b)`

Definition at line 27 of file [Formatters.cc](#).

```
00027 { return fmt::format("{:#d}", b); }
```

5.41.2.10 to_dec() [5/5] `std::string to_dec (`
`const Buffer & b,`
`const std::size_t & begin,`
`const std::size_t & end)`

Definition at line 14 of file [Formatters.cc](#).

```
00015 {  
00016     std::size_t iend = end;  
00017     if(iend == -1) iend = b.size();  
00018     std::string ret;  
00019     for(std::size_t k = begin; k < iend; k++)  
00020     {  
00021         ret += to_dec(b[k]);  
00022         ret += " - ";  
00023     }  
00024     return ret;  
00025 }
```

5.41.2.11 to_hex() [1/5] `std::string to_hex (`
`const bit16_t & b)`

Definition at line 50 of file [Formatters.cc](#).

```
00050 { return fmt::format("{:#04x}", b); }
```

5.41.2.12 to_hex() [2/5] `std::string to_hex (`
`const bit32_t & b)`

Definition at line 52 of file [Formatters.cc](#).

```
00052 { return fmt::format("{:#08x}", b); }
```

5.41.2.13 to_hex() [3/5] `std::string to_hex (`
`const bit64_t & b)`

Definition at line 54 of file [Formatters.cc](#).

```
00054 { return fmt::format("{:#016x}", b); }
```

5.41.2.14 to_hex() [4/5] `std::string to_hex (`
`const bit8_t & b)`

Definition at line 48 of file [Formatters.cc](#).

```
00048 { return fmt::format("{:#02x}", b); }
```

5.41.2.15 to_hex() [5/5] std::string to_hex (
 const Buffer & b,
 const std::size_t & begin,
 const std::size_t & end)

Definition at line 35 of file [Formatters.cc](#).

```
00036 {  
00037     std::size_t iend = end;  
00038     if(iend == -1) iend = b.size();  
00039     std::string ret;  
00040     for(std::size_t k = begin; k < iend; k++)  
00041     {  
00042         ret += to_hex(b[k]);  
00043         ret += " - ";  
00044     }  
00045     return ret;  
00046 }
```

5.41.2.16 to_oct() [1/5] std::string to_oct (
 const bit16_t & b)

Definition at line 92 of file [Formatters.cc](#).

```
00092 { return fmt::format("{:#08o}", b); }
```

5.41.2.17 to_oct() [2/5] std::string to_oct (
 const bit32_t & b)

Definition at line 94 of file [Formatters.cc](#).

```
00094 { return fmt::format("{:#016o}", b); }
```

5.41.2.18 to_oct() [3/5] std::string to_oct (
 const bit64_t & b)

Definition at line 96 of file [Formatters.cc](#).

```
00096 { return fmt::format("{:#032o}", b); }
```

5.41.2.19 to_oct() [4/5] std::string to_oct (
 const bit8_t & b)

Definition at line 90 of file [Formatters.cc](#).

```
00090 { return fmt::format("{:#04o}", b); }
```

```

5.41.2.20 to_oct() [5/5] std::string to_oct (
    const Buffer & b,
    const std::size_t & begin,
    const std::size_t & end )

```

Definition at line 77 of file [Formatters.cc](#).

```

00078 {
00079     std::size_t iend = end;
00080     if(iend == -1) iend = b.size();
00081     std::string ret;
00082     for(std::size_t k = begin; k < iend; k++)
00083     {
00084         ret += to_oct(b[k]);
00085         ret += " - ";
00086     }
00087     return ret;
00088 }

```

5.42 Formatters.cc

[Go to the documentation of this file.](#)

```

00001
00006 #include "Formatters.h"
00007
00008 #include "Bits.h"
00009 #include "Buffer.h"
00010 #include "Words.h"
00011
00012 #include <fmt/format.h>
00013
00014 std::string to_dec(const Buffer& b, const std::size_t& begin, const std::size_t& end)
00015 {
00016     std::size_t iend = end;
00017     if(iend == -1) iend = b.size();
00018     std::string ret;
00019     for(std::size_t k = begin; k < iend; k++)
00020     {
00021         ret += to_dec(b[k]);
00022         ret += " - ";
00023     }
00024     return ret;
00025 }
00026
00027 std::string to_dec(const bit8_t& b) { return fmt::format("{:d}", b); }
00028
00029 std::string to_dec(const bit16_t& b) { return fmt::format("{:d}", b); }
00030
00031 std::string to_dec(const bit32_t& b) { return fmt::format("{:d}", b); }
00032
00033 std::string to_dec(const bit64_t& b) { return fmt::format("{:d}", b); }
00034
00035 std::string to_hex(const Buffer& b, const std::size_t& begin, const std::size_t& end)
00036 {
00037     std::size_t iend = end;
00038     if(iend == -1) iend = b.size();
00039     std::string ret;
00040     for(std::size_t k = begin; k < iend; k++)
00041     {
00042         ret += to_hex(b[k]);
00043         ret += " - ";
00044     }
00045     return ret;
00046 }
00047
00048 std::string to_hex(const bit8_t& b) { return fmt::format("{:02x}", b); }
00049
00050 std::string to_hex(const bit16_t& b) { return fmt::format("{:04x}", b); }
00051
00052 std::string to_hex(const bit32_t& b) { return fmt::format("{:08x}", b); }
00053
00054 std::string to_hex(const bit64_t& b) { return fmt::format("{:016x}", b); }
00055
00056 std::string to_bin(const Buffer& b, const std::size_t& begin, const std::size_t& end)
00057 {
00058     std::size_t iend = end;
00059     if(iend == -1) iend = b.size();
00060     std::string ret;
00061     for(std::size_t k = begin; k < iend; k++)
00062     {
00063         ret += to_bin(b[k]);

```

```

00064     ret += " - ";
00065 }
00066 return ret;
00067 }
00068
00069 std::string to_bin(const bit8_t& b) { return fmt::format("{:#08b}", b); }
00070
00071 std::string to_bin(const bit16_t& b) { return fmt::format("{:#016b}", b); }
00072
00073 std::string to_bin(const bit32_t& b) { return fmt::format("{:#032b}", b); }
00074
00075 std::string to_bin(const bit64_t& b) { return fmt::format("{:#064b}", b); }
00076
00077 std::string to_oct(const Buffer& b, const std::size_t& begin, const std::size_t& end)
00078 {
00079     std::size_t iend = end;
00080     if(iend == -1) iend = b.size();
00081     std::string ret;
00082     for(std::size_t k = begin; k < iend; k++)
00083     {
00084         ret += to_oct(b[k]);
00085         ret += " - ";
00086     }
00087     return ret;
00088 }
00089
00090 std::string to_oct(const bit8_t& b) { return fmt::format("{:#04o}", b); }
00091
00092 std::string to_oct(const bit16_t& b) { return fmt::format("{:#08o}", b); }
00093
00094 std::string to_oct(const bit32_t& b) { return fmt::format("{:#016o}", b); }
00095
00096 std::string to_oct(const bit64_t& b) { return fmt::format("{:#032o}", b); }

```

5.43 libs/core/src/RawBufferNavigator.cc File Reference

```

#include "RawBufferNavigator.h"
#include "Words.h"

```

5.43.1 Detailed Description

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Definition in file [RawBufferNavigator.cc](#).

5.44 RawBufferNavigator.cc

[Go to the documentation of this file.](#)

```

00001
00005 #include "RawBufferNavigator.h"
00006
00007 #include "Words.h"
00008
00009 int RawBufferNavigator::m_Start = 92;
00010
00011 void RawBufferNavigator::StartAt(const int& start)
00012 {
00013     if(start >= 0) m_Start = start;
00014 }
00015
00016 RawBufferNavigator::RawBufferNavigator() {}
00017
00018 void RawBufferNavigator::setBuffer(const Buffer& b)
00019 {
00020     m_Buffer = b;
00021     m_StartPayload = -1;

```

```

00022     m_StartPayloadDone = false;
00023 }
00024
00025 std::uint8_t RawBufferNavigator::getDetectorID() { return m_Buffer[0]; }
00026
00027 bool RawBufferNavigator::findStartOfPayload()
00028 {
00029     if(m_StartPayloadDone == true)
00030     {
00031         if(m_StartPayload == -1) return false;
00032         else
00033             return true;
00034     }
00035     else
00036     {
00037         m_StartPayloadDone = true;
00038         for(std::size_t i = m_Start; i < m_Buffer.size(); i++)
00039         {
00040             if(static_cast<std::uint8_t>(m_Buffer[i]) == static_cast<std::uint8_t>(Value::GLOBAL_HEADER) ||
static_cast<std::uint8_t>(m_Buffer[i]) == static_cast<std::uint8_t>(Value::GLOBAL_HEADER_TEMP))
00041             {
00042                 m_StartPayload = i;
00043                 return true;
00044             }
00045         }
00046         m_StartPayload = -1;
00047         return false;
00048     }
00049 }
00050
00051 std::int32_t RawBufferNavigator::getStartOfPayload()
00052 {
00053     findStartOfPayload();
00054     return m_StartPayload;
00055 }
00056
00057 bool RawBufferNavigator::validPayload() { return m_StartPayload != -1; }
00058
00059 Buffer RawBufferNavigator::getPayload() { return Buffer(&(m_Buffer.begin())[m_StartPayload],
m_Buffer.size() - m_StartPayload); }

```

5.45 libs/core/src/Version.cc File Reference

```
#include "Version.h"
```

5.45.1 Detailed Description

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Definition in file [Version.cc](#).

5.46 Version.cc

[Go to the documentation of this file.](#)

```

00001
00005 #include "Version.h"
00006
00007 const static Version streamout_version;
00008
00009 std::uint8_t Version::getMajor() { return major; }
00010
00011 std::uint8_t Version::getMinor() { return minor; }
00012
00013 std::uint8_t Version::getPatch() { return patch; }
00014
00015 std::string Version::getPreRelease()
00016 {

```



```

00017     switch(prerelease_type)
00018     {
00019         case semver::prerelease::alpha: return "alpha";
00020         case semver::prerelease::beta:  return "beta";
00021         case semver::prerelease::rc:    return "rc";
00022         case semver::prerelease::none:  return "";
00023         default: return "";
00024     }
00025 }
00026
00027 std::uint8_t Version::getPreReleaseNumber() { return prerelease_number; }

```

5.47 libs/interface/Dump/include/textDump.h File Reference

```

#include "Interface.h"
#include "PayloadParser.h"
#include "spdlog/sinks/stdout_color_sinks.h"
#include <memory>
#include <spdlog/logger.h>

```

Classes

- class [textDump](#)

5.47.1 Detailed Description

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Definition in file [textDump.h](#).

5.48 textDump.h

[Go to the documentation of this file.](#)

```

00001
00005 #pragma once
00006
00007 #include "Interface.h"
00008 #include "PayloadParser.h"
00009 #include "spdlog/sinks/stdout_color_sinks.h"
00010
00011 #include <memory>
00012 #include <spdlog/logger.h>
00013
00014 class textDump : public InterfaceWriter
00015 {
00016 public:
00017     textDump();
00018     void start();
00019     void processDIF(const PayloadParser&);
00020     void processFrame(const PayloadParser&, uint32_t frameIndex);
00021     void processPadInFrame(const PayloadParser&, uint32_t frameIndex,
uint32_t channelIndex);
00022     void processSlowControl(Buffer);
00023     void end();
00024     std::shared_ptr<spdlog::logger> print() { return m_InternalLogger; }
00025     void setLevel(const spdlog::level::level_enum& level) {
m_InternalLogger->set_level(level); }
00026
00027 private:
00028     // This class is a dumb class to print on terminal so we need the logger + the standard one given by
the interface.
00029     std::shared_ptr<spdlog::logger> m_InternalLogger{nullptr};
00030 };

```

5.49 libs/interface/Dump/src/textDump.cc File Reference

```
#include "textDump.h"
#include "PayloadParser.h"
```

5.49.1 Detailed Description

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Definition in file [textDump.cc](#).

5.50 textDump.cc

[Go to the documentation of this file.](#)

```
00001
00005 #include "textDump.h"
00006
00007 #include "PayloadParser.h"
00008
00009 textDump::textDump() : InterfaceWriter("textDump", "1.0.0")
00010 {
00011     m_InternalLogger = std::make_shared<spdlog::logger>("textDump",
00012         std::make_shared<spdlog::sinks::stdout_color_sink_mt>());
00013     m_InternalLogger->set_level(spdlog::level::trace);
00014     addCompatibility("RawdataReader", ">=1.0.0");
00015     addCompatibility("DIFdataExample", ">=1.0.0");
00016 }
00017 void textDump::start() { print()->info("Will dump bunch of DIF data"); }
00018
00019 void textDump::processDIF(const PayloadParser& d) { print()->info("DIF_ID : {}, DTC : {}, GTC : {},
00020     DIF BCID {}, Absolute BCID : {}, Nbr frames {}", d.getDIFid(), d.getDTC(), d.getGTC(), d.getBCID(),
00021     d.getAbsoluteBCID(), d.getNumberOfFrames()); }
00022
00023 void textDump::processFrame(const PayloadParser& d, uint32_t frameIndex)
00024 {
00025     print()->info("\tDisplaying frame number {} : ASIC ID {}, Frame BCID {}, Frame Time To Trigger
00026     (a.k.a timestamp) is {}", frameIndex, d.getASICid(frameIndex), d.getFrameBCID(frameIndex),
00027     d.getFrameTimeToTrigger(frameIndex));
00028 }
00029
00030 void textDump::processPadInFrame(const PayloadParser& d, uint32_t frameIndex, uint32_t channelIndex)
00031 {
00032     if(d.getThresholdStatus(frameIndex, channelIndex) > 0) { print()->info("\t\tChannel {}, Threshold
00033     {}", channelIndex, d.getThresholdStatus(frameIndex, channelIndex)); }
00034 }
00035
00036 void textDump::processSlowControl(Buffer) { print()->error("textDump::processSlowControl not
00037     implemented yet."); }
00038
00039 void textDump::end() { print()->info("textDump end of report"); }
```

5.51 libs/interface/LCIO/include/LCIOWriter.h File Reference

5.51.1 Detailed Description

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Definition in file [LCIOWriter.h](#).

5.52 LCIOWriter.h

[Go to the documentation of this file.](#)

```
00001
00005 #pragma once
```

5.53 libs/interface/LCIO/src/LCIOWriter.cc File Reference

5.53.1 Detailed Description

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Definition in file [LCIOWriter.cc](#).

5.54 LCIOWriter.cc

[Go to the documentation of this file.](#)

```
00001
```

5.55 libs/interface/RawDataReader/include/RawdataReader.h File Reference

```
#include "Interface.h"
#include <array>
#include <cstdint>
#include <fstream>
#include <string>
#include <vector>
```

Classes

- class [RawdataReader](#)

5.55.1 Detailed Description

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Definition in file [RawdataReader.h](#).

5.56 RawdataReader.h

[Go to the documentation of this file.](#)

```

00001
00005 #pragma once
00006
00007 #include "Interface.h"
00008
00009 #include <array>
00010 #include <cstdint>
00011 #include <fstream>
00012 #include <string>
00013 #include <vector>
00014
00015 class Buffer;
00016
00017 class RawdataReader : public InterfaceReader
00018 {
00019 public:
00020     explicit RawdataReader(const char* fileName);
00021     void start();
00022     void end();
00023     float getFileSize();
00024     void openFile(const std::string& fileName);
00025     void closeFile();
00026     bool nextEvent();
00027     bool nextDIFbuffer();
00028     const Buffer& getBuffer();
00029     virtual ~RawdataReader() { closeFile(); }
00030     static void setDefaultBufferSize(const std::size_t& size);
00031
00032 private:
00033     void uncompress();
00034     std::ifstream m_FileStream;
00035     void setFileSize(const std::size_t& size);
00036     static std::size_t m_BufferSize;
00037     std::size_t m_FileSize{0};
00038     std::uint32_t m_NumberOfDIF{0};
00039     std::uint32_t m_EventNumber{0};
00040     std::vector<bit8_t> m_buf;
00041     std::string m_Filename;
00042 };

```

5.57 libs/interface/RawDataReader/src/RawdataReader.cc File Reference

```

#include "RawdataReader.h"
#include "Exception.h"
#include <cstdint>
#include <cstring>
#include <stdexcept>
#include <zlib.h>

```

5.57.1 Detailed Description

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Definition in file [RawdataReader.cc](#).

5.58 RawdataReader.cc

[Go to the documentation of this file.](#)

```

00001
00004 #include "RawdataReader.h"
00005
00006 #include "Exception.h"
00007
00008 #include <stdint>
00009 #include <cstring>
00010 #include <stdexcept>
00011 #include <zlib.h>
00012
00014 std::size_t RawdataReader::m_BufferSize = 0x100000;
00015
00016 void RawdataReader::setDefaultBufferSize(const std::size_t& size) { m_BufferSize = size; }
00017
00018 RawdataReader::RawdataReader(const char* fileName) : InterfaceReader("RawdataReader", "1.0.0")
00019 {
00020     m_buf.reserve(m_BufferSize);
00021     m_Filename = fileName;
00022 }
00023
00024 void RawdataReader::start() { openFile(m_Filename); }
00025
00026 void RawdataReader::end() { closeFile(); }
00027
00028 void RawdataReader::uncompress()
00029 {
00030     static const std::size_t size_buffer{0x20000};
00031     std::size_t shift{3 * sizeof(std::uint32_t) + sizeof(std::uint64_t)};
00032     static bit8_t obuf[size_buffer];
00033     unsigned long size_buffer_end{0x20000}; // NOLINT(runtime/int)
00034     std::int8_t rc = ::uncompress(obuf, &size_buffer_end, &m_Buffer[shift], m_Buffer.size()
- shift);
00035     switch(rc)
00036     {
00037         case Z_OK: break;
00038         case Z_MEM_ERROR: throw Exception(Z_MEM_ERROR, "Not enough memory"); break;
00039         case Z_BUF_ERROR: throw Exception(Z_BUF_ERROR, "Not enough room in the output buffer"); break;
00040         case Z_DATA_ERROR: throw Exception(Z_DATA_ERROR, "The input data was corrupted or incomplete");
break;
00041         default: throw Exception("The input data was corrupted or incomplete"); break;
00042     }
00043     memcpy(&m_Buffer[shift], obuf, size_buffer_end);
00044     m_Buffer.setSize(size_buffer_end + shift);
00045 }
00046
00047 void RawdataReader::closeFile()
00048 {
00049     try
00050     {
00051         if(m_FileStream.is_open()) m_FileStream.close();
00052     }
00053     catch(const std::ios_base::failure& e)
00054     {
00055         log()->error("Caught an ios_base::failure in closeFile : {} {}", e.what(), e.code().value());
00056         throw;
00057     }
00058 }
00059
00060 void RawdataReader::openFile(const std::string& fileName)
00061 {
00062     try
00063     {
00064         m_FileStream.rdbuf()->pubsetbuf(0, 0);
00065         m_FileStream.exceptions(std::ifstream::failbit | std::ifstream::badbit);
00066         m_FileStream.open(fileName.c_str(), std::ios::in | std::ios::binary | std::ios::ate); // Start at
the end to directly calculate the size of the file then come back to beginning
00067         m_FileStream.rdbuf()->pubsetbuf(0, 0);
00068         if(m_FileStream.is_open())
00069         {
00070             setFileSize(m_FileStream.tellg());
00071             m_FileStream.seekg(0, std::ios::beg);
00072         }
00073     }
00074     catch(const std::ios_base::failure& e)
00075     {
00076         log()->error("Caught an ios_base::failure in openFile : {}", e.what());
00077         throw;
00078     }
00079 }
00080
00081 bool RawdataReader::nextEvent()
00082 {
00083     try

```

```

00084 {
00085     m_FileStream.read(reinterpret_cast<char*>(&m_EventNumber), sizeof(std::uint32_t));
00086     m_FileStream.read(reinterpret_cast<char*>(&m_NumberOfDIF), sizeof(std::uint32_t));
00087 }
00088 catch(const std::ios_base::failure& e)
00089 {
00090     return false;
00091 }
00092 return true;
00093 }
00094
00095 bool RawdataReader::nextDIFbuffer()
00096 {
00097     try
00098     {
00099         static int DIF_processed{0};
00100         if(DIF_processed >= m_NumberOfDIF)
00101         {
00102             DIF_processed = 0;
00103             return false;
00104         }
00105         else
00106         {
00107             DIF_processed++;
00108             std::uint32_t bsize{0};
00109             m_FileStream.read(reinterpret_cast<char*>(&bsize), sizeof(std::uint32_t));
00110             m_FileStream.read(reinterpret_cast<char*>(&m_buf[0]), bsize);
00111             m_Buffer = Buffer(m_buf);
00112         }
00113     }
00114     catch(const std::ios_base::failure& e)
00115     {
00116         log()->error("Caught an ios_base::failure in openFile : {}", e.what());
00117         return false;
00118     }
00119     return true;
00120 }
00121
00122 const Buffer& RawdataReader::getBuffer()
00123 {
00124     uncompress();
00125     return m_Buffer;
00126 }
00127
00128 void RawdataReader::setFileSize(const std::size_t& size) { m_FileSize = size; }
00129
00130 float RawdataReader::getFileSize() { return m_FileSize; }

```

5.59 libs/interface/ROOT/include/DIF.h File Reference

```

#include "Hit.h"
#include <TObject.h>
#include <cstdint>
#include <map>
#include <vector>

```

Classes

- class [DIF](#)

Typedefs

- using [Hits_const_iterator](#) = std::vector< [Hit](#) >::const_iterator

5.59.1 Detailed Description

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Definition in file [DIF.h](#).

5.59.2 Typedef Documentation

5.59.2.1 Hits_const_iterator using Hits_const_iterator = std::vector<Hit>::const_iterator

Definition at line 14 of file DIF.h.

5.60 DIF.h

[Go to the documentation of this file.](#)

```

00001
00005 #pragma once
00006
00007 #include "Hit.h"
00008
00009 #include <TObject.h>
00010 #include <cstdint>
00011 #include <map>
00012 #include <vector>
00013
00014 using Hits_const_iterator = std::vector<Hit>::const_iterator;
00015
00016 class DIF : public TObject
00017 {
00018 public:
00019     void                clear();
00020     void                addHit(const Hit&);
00021     void                setID(const std::uint8_t&);
00022     std::uint8_t        getID() const;
00023     void                setDTC(const std::uint32_t&);
00024     std::uint32_t        getDTC() const;
00025     void                setGTC(const std::uint32_t&);
00026     std::uint32_t        getGTC() const;
00027     void                setDIFBCID(const std::uint32_t&);
00028     std::uint32_t        getDIFBCID() const;
00029     void                setAbsoluteBCID(const std::uint64_t&);
00030     std::uint64_t        getAbsoluteBCID() const;
00031     std::vector<Hit>::const_iterator cbegin() const;
00032     std::vector<Hit>::const_iterator cend() const;
00033
00034 private:
00035     std::uint8_t        m_ID{0};
00036     std::uint32_t        m_DTC{0};
00037     std::uint32_t        m_GTC{0};
00038     std::uint32_t        m_DIFBCID{0};
00039     std::uint64_t        m_AbsoluteBCID{0};
00040     std::vector<Hit>    m_Hits;
00041     ClassDef(DIF, 1);
00042 };

```

5.61 libs/interface/ROOT/include/DIFLinkDef.h File Reference

```
#include <vector>
```

5.61.1 Detailed Description

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Definition in file DIFLinkDef.h.

5.62 DIFLinkDef.h

[Go to the documentation of this file.](#)

```
00001
00005 #pragma once
00006 #include <vector>
00007
00008 #ifdef __CLING__
00009 #pragma link C++ class DIF;
00010 #pragma link C++ class Hit;
00011 #pragma link C++ class std::vector < Hit>;
00012 #endif
```

5.63 libs/interface/ROOT/include/Event.h File Reference

```
#include "DIF.h"
#include <TObject.h>
#include <cstdint>
#include <map>
```

Classes

- class [Event](#)

Typedefs

- using [DIFs_const_iterator](#) = std::map< std::uint8_t, [DIF](#) >::const_iterator

5.63.1 Detailed Description

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Definition in file [Event.h](#).

5.63.2 Typedef Documentation

5.63.2.1 DIFs_const_iterator using [DIFs_const_iterator](#) = std::map<std::uint8_t, [DIF](#)>::const_iterator↵
iterator

Definition at line 13 of file [Event.h](#).

5.64 Event.h

[Go to the documentation of this file.](#)

```
00001
00005 #pragma once
00006
00007 #include "DIF.h"
00008
00009 #include <TObject.h>
00010 #include <cstdint>
00011 #include <map>
00012
00013 using DIFs_const_iterator = std::map<std::uint8_t, DIF>::const_iterator;
00014
00015 class Event : public TObject
00016 {
00017 public:
00018     void clear();
00019     void addDIF(const DIF& dif);
00020     std::map<std::uint8_t, DIF>::const_iterator cbegin() const;
00021     std::map<std::uint8_t, DIF>::const_iterator cend() const;
00022
00023 private:
00024     std::map<std::uint8_t, DIF> DIFs;
00025     ClassDef(Event, 1);
00026 };
```

5.65 libs/interface/ROOT/include/EventLinkDef.h File Reference

```
#include <cstdint>
#include <map>
#include <vector>
```

5.65.1 Detailed Description

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Definition in file [EventLinkDef.h](#).

5.66 EventLinkDef.h

[Go to the documentation of this file.](#)

```
00001
00005 #pragma once
00006 #include <cstdint>
00007 #include <map>
00008 #include <vector>
00009 #ifdef __CLING__
00010 #pragma link C++ class DIF;
00011 #pragma link C++ class std::vector < DIF>;
00012 #pragma link C++ class Hit;
00013 #pragma link C++ class std::vector < Hit>;
00014 #pragma link C++ class Event;
00015 #pragma link C++ class std::vector < Event>;
00016 #pragma link C++ class std::map < std::uint8_t, DIF>;
00017 #endif
```

5.67 libs/interface/ROOT/include/Hit.h File Reference

```
#include <TObject.h>
#include <cstdint>
```

Classes

- class [Hit](#)

5.67.1 Detailed Description

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Definition in file [Hit.h](#).

5.68 Hit.h

[Go to the documentation of this file.](#)

```
00001
00005 #pragma once
00006
00007 #include <TObject.h>
00008 #include <cstdint>
00009
00010 class Hit : public TObject
00011 {
00012 public:
00013     void                clear();
00014     void                setDIF(const std::uint8_t&);
00015     void                setASIC(const std::uint8_t&);
00016     void                setChannel(const std::uint8_t&);
00017     void                setThreshold(const std::uint8_t&);
00018     void                setDTC(const std::uint32_t&);
00019     void                setGTC(const std::uint32_t&);
00020     void                setDIFBCID(const std::uint32_t&);
00021     void                setFrameBCID(const std::uint32_t&);
00022     void                setTimestamp(const std::uint32_t&);
00023     void                setAbsoluteBCID(const std::uint64_t&);
00024     std::uint8_t        getDIFid() const;
00025     std::uint8_t        getASICid() const;
00026     std::uint8_t        getChannel() const;
00027     std::uint8_t        getThreshold() const;
00028     std::uint32_t        getDTC() const;
00029     std::uint32_t        getGTC() const;
00030     std::uint32_t        getDIFBCID() const;
00031     std::uint32_t        setFrameBCID() const;
00032     std::uint32_t        getTimestamp() const;
00033     std::uint64_t        getAbsoluteBCID() const;
00034
00035 private:
00036     std::uint8_t        m_DIF{0};
00037     std::uint8_t        m_ASIC{0};
00038     std::uint8_t        m_Channel{0};
00039     std::uint8_t        m_Threshold{0};
00040     std::uint32_t        m_DTC{0};
00041     std::uint32_t        m_GTC{0};
00042     std::uint32_t        m_DIFBCID{0};
00043     std::uint32_t        m_FrameBCID{0};
00044     std::uint32_t        m_Timestamp{0};
00045     std::uint64_t        m_AbsoluteBCID{0};
00046     ClassDef(Hit, 1);
00047 };
```

5.69 libs/interface/ROOT/include/HitLinkDef.h File Reference

5.69.1 Detailed Description

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Definition in file [HitLinkDef.h](#).

5.70 HitLinkDef.h

[Go to the documentation of this file.](#)

```
00001
00005 #pragma once
00006 #ifndef __CLING__
00007 #pragma link C++ class Hit;
00008 #endif
```

5.71 libs/interface/ROOT/include/ROOTWriter.h File Reference

```
#include "Buffer.h"
#include "Event.h"
#include "Interface.h"
#include "PayloadParser.h"
#include <TFile.h>
#include <TTree.h>
#include <string>
#include <vector>
```

Classes

- class [ROOTWriter](#)

5.72 ROOTWriter.h

[Go to the documentation of this file.](#)

```
00001
00006 #pragma once
00007
00008 #include "Buffer.h"
00009 #include "Event.h"
00010 #include "Interface.h"
00011 #include "PayloadParser.h"
00012
00013 #include <TFile.h>
00014 #include <TTree.h>
00015 #include <string>
00016 #include <vector>
00017
00018 class ROOTWriter : public InterfaceWriter
00019 {
00020 public:
00021     ROOTWriter();
00022
00023     void setFilename(const std::string&);
00024
00025     void start();
00026     void processDIF(const PayloadParser&);
00027     void processFrame(const PayloadParser&, const std::uint32_t& frameIndex);
00028     void processPadInFrame(const PayloadParser&, const std::uint32_t& frameIndex, const std::uint32_t&
channelIndex);
00029     void processSlowControl(const Buffer&) { ; }
00030     void end();
00031
00032     virtual void startEvent();
00033     virtual void endEvent();
00034     virtual void startDIF();
00035     virtual void endDIF();
00036     virtual void startFrame();
00037     virtual void endFrame();
00038     virtual void startPad();
00039     virtual void endPad();
00040
00041 private:
00042     TFile* m_File{nullptr};
00043     TTree* m_Tree{nullptr};
00044     Event* m_Event{nullptr};
00045     DIF* m_DIF{nullptr};
00046     Hit* m_Hit{nullptr};
00047     std::string m_Filename;
00048 };
```

5.73 libs/interface/ROOT/src/DIF.cc File Reference

```
#include "DIF.h"
#include <stdint>
```

5.73.1 Detailed Description

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Definition in file [DIF.cc](#).

5.74 DIF.cc

[Go to the documentation of this file.](#)

```
00001
00006 #include "DIF.h"
00007
00008 #include <stdint>
00009
00010 void DIF::addHit(const Hit& hit) { m_Hits.push_back(hit); }
00011
00012 void DIF::setID(const std::uint8_t& id) { m_ID = id; }
00013
00014 std::uint8_t DIF::getID()const { return m_ID; }
00015
00016 void DIF::setDTC(const std::uint32_t& dtc) { m_DTC = dtc; }
00017
00018 std::uint32_t DIF::getDTC()const { return m_DTC; }
00019
00020 void DIF::setGTC(const std::uint32_t& gtc) { m_GTC = gtc; }
00021
00022 std::uint32_t DIF::getGTC()const { return m_GTC; }
00023
00024 void DIF::setDIFBCID(const std::uint32_t& difbcid) { m_DIFBCID = difbcid; }
00025
00026 std::uint32_t DIF::getDIFBCID()const { return m_DIFBCID; }
00027
00028 void DIF::setAbsoluteBCID(const std::uint64_t& absolutebcid) { m_AbsoluteBCID = absolutebcid; }
00029
00030 std::uint64_t DIF::getAbsoluteBCID()const { return m_AbsoluteBCID; }
00031
00032 std::vector<Hit>::const_iterator DIF::cbegin()const { return m_Hits.cbegin(); }
00033
00034 std::vector<Hit>::const_iterator DIF::cend()const { return m_Hits.cend(); }
00035
00036 void DIF::clear() { m_Hits.clear(); }
```

5.75 libs/interface/ROOT/src/Event.cc File Reference

```
#include "Event.h"
```

5.75.1 Detailed Description

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Definition in file [Event.cc](#).

5.76 Event.cc

[Go to the documentation of this file.](#)

```
00001
00006 #include "Event.h"
00007
00008 void Event::clear() { DIFs.clear(); }
00009
00010 void Event::addDIF(const DIF& dif) { DIFs[dif.getID()] = dif; }
00011
00012 std::map<std::uint8_t, DIF>::const_iterator Event::cbegin()const { return DIFs.cbegin(); }
00013
00014 std::map<std::uint8_t, DIF>::const_iterator Event::cend()const { return DIFs.cend(); }
```

5.77 libs/interface/ROOT/src/Hit.cc File Reference

```
#include "Hit.h"
```

5.77.1 Detailed Description

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Definition in file [Hit.cc](#).

5.78 Hit.cc

[Go to the documentation of this file.](#)

```
00001
00006 #include "Hit.h"
00007 void Hit::clear()
00008 {
00009     m_DIF          = 0;
00010     m_ASIC         = 0;
00011     m_Channel      = 0;
00012     m_Threshold    = 0;
00013     m_DTC          = 0;
00014     m_GTC          = 0;
00015     m_DIFBCID      = 0;
00016     m_FrameBCID    = 0;
00017     m_Timestamp    = 0;
00018     m_AbsoluteBCID = 0;
00019 }
00020
00021 void Hit::setDIF(const std::uint8_t& dif) { m_DIF = dif; }
00022
00023 void Hit::setASIC(const std::uint8_t& asic) { m_ASIC = asic; }
00024
00025 void Hit::setChannel(const std::uint8_t& channel) { m_Channel = channel; }
00026
00027 void Hit::setThreshold(const std::uint8_t& threshold) { m_Threshold = threshold; }
00028
00029 void Hit::setDTC(const std::uint32_t& dtc) { m_DTC = dtc; }
00030
00031 void Hit::setGTC(const std::uint32_t& gtc) { m_GTC = gtc; }
00032
00033 void Hit::setDIFBCID(const std::uint32_t& difbcid) { m_DIFBCID = difbcid; }
00034
00035 void Hit::setFrameBCID(const std::uint32_t& framebcid) { m_FrameBCID = framebcid; }
00036
00037 void Hit::setTimestamp(const std::uint32_t& timestamp) { m_Timestamp = timestamp; }
00038
00039 void Hit::setAbsoluteBCID(const std::uint64_t& absolutebcid) { m_AbsoluteBCID = absolutebcid; }
00040
00041 std::uint8_t Hit::getDIFid()const { return m_DIF; }
00042
```

```

00043 std::uint8_t Hit::getASICId()const { return m_ASIC; }
00044
00045 std::uint8_t Hit::getChannel()const { return m_Channel; }
00046
00047 std::uint8_t Hit::getThreshold()const { return m_Threshold; }
00048
00049 std::uint32_t Hit::getDTC()const { return m_DTC; }
00050
00051 std::uint32_t Hit::getGTC()const { return m_GTC; }
00052
00053 std::uint32_t Hit::getDIFBCID()const { return m_DIFBCID; }
00054
00055 std::uint32_t Hit::getFrameBCID()const { return m_FrameBCID; }
00056
00057 std::uint32_t Hit::getTimestamp()const { return m_Timestamp; }
00058
00059 std::uint64_t Hit::getAbsoluteBCID()const { return m_AbsoluteBCID; }

```

5.79 libs/interface/ROOT/src/ROOTWriter.cc File Reference

```
#include "ROOTWriter.h"
```

5.79.1 Detailed Description

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Definition in file [ROOTWriter.cc](#).

5.80 ROOTWriter.cc

[Go to the documentation of this file.](#)

```

00001
00006 #include "ROOTWriter.h"
00007
00008 void ROOTWriter::setFilename(const std::string& filename) { m_Filename = filename; }
00009
00010 ROOTWriter::ROOTWriter() : InterfaceWriter("ROOTWriter", "1.0.0") { addCompatibility("RawdataReader",
    ">=1.0.0"); }
00011
00012 void ROOTWriter::start()
00013 {
00014     m_File = TFile::Open(m_Filename.c_str(), "RECREATE", m_Filename.c_str(),
    ROOT::CompressionSettings(ROOT::kZLIB, 5));
00015     m_Tree = new TTree("RawData", "Raw SDHCAL data tree");
00016     m_Tree->Branch("Events", &m_Event, 512000, 99);
00017 }
00018
00019 void ROOTWriter::end()
00020 {
00021     if(m_Tree) m_Tree->Write();
00022     if(m_File)
00023     {
00024         m_File->Write();
00025         m_File->Close();
00026     }
00027     if(m_File) delete m_File;
00028 }
00029
00030 void ROOTWriter::processDIF(const PayloadParser& d)
00031 {
00032     m_DIF->setID(d.getDIFid());
00033     m_DIF->setDTC(d.getDTC());
00034     m_DIF->setGTC(d.getGTC());
00035     m_DIF->setDIFBCID(d.getBCID());
00036     m_DIF->setAbsoluteBCID(d.getAbsoluteBCID());
00037 }
00038

```

```

00039 void ROOTWriter::processFrame(const PayloadParser& d, const std::uint32_t& frameIndex)
00040 {
00041     m_Hit->setDIF(d.getDIFid());
00042     m_Hit->setASIC(d.getASICid(frameIndex));
00043     m_Hit->setDTC(d.getDTC());
00044     m_Hit->setGTC(d.getGTC());
00045     m_Hit->setDIFBCID(d.getBCID());
00046     m_Hit->setAbsoluteBCID(d.getAbsoluteBCID());
00047     m_Hit->setFrameBCID(d.getFrameBCID(frameIndex));
00048     m_Hit->setTimestamp(d.getFrameTimeToTrigger(frameIndex));
00049 }
00050
00051 void ROOTWriter::processPadInFrame(const PayloadParser& d, const std::uint32_t& frameIndex, const
std::uint32_t& channelIndex)
00052 {
00053     m_Hit->setChannel(channelIndex);
00054     m_Hit->setThreshold(static_cast<std::uint8_t>(d.getThresholdStatus(frameIndex, channelIndex)));
00055 }
00056
00057 void ROOTWriter::startEvent()
00058 {
00059     m_Event = new Event();
00060     // m_Event->clear();
00061 }
00062
00063 void ROOTWriter::endEvent()
00064 {
00065     m_Tree->Fill();
00066     if(m_Event) delete m_Event;
00067 }
00068
00069 void ROOTWriter::startDIF()
00070 {
00071     m_DIF = new DIF();
00072     // m_DIF->clear();
00073 }
00074
00075 void ROOTWriter::endDIF()
00076 {
00077     m_Event->addDIF(*m_DIF);
00078     delete m_DIF;
00079 }
00080
00081 void ROOTWriter::startFrame()
00082 {
00083     m_Hit = new Hit();
00084     // m_Hit->clear();
00085 }
00086
00087 void ROOTWriter::endFrame()
00088 {
00089     m_DIF->addHit(*m_Hit);
00090     delete m_Hit;
00091 }
00092
00093 void ROOTWriter::startPad() {}
00094
00095 void ROOTWriter::endPad() {}

```

