

streamout

0.1.0

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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

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Class to navigate in the raw data buffer parse the header and send the payload as Buffer	50
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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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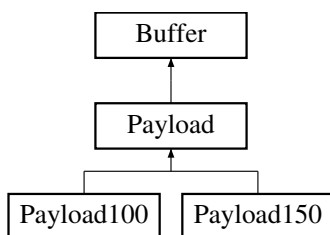
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4 Class Documentation

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 27 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 30 of file [BufferLooper.h](#).

```
00030                                     : m_Source(source),
    m_Destination(dest), m_Debug(debug)
00031 {
00032     m_Logger = spdlog::create<spdlog::sinks::null_sink_mt>("streamout");
00033     if(!spdlog::get("streamout")) { spdlog::register_logger(m_Logger); }
00034     m_Source.setLogger(m_Logger);
00035     m_Destination.setLogger(m_Logger);
00036 }
```

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 38 of file [BufferLooper.h](#).

```
00039 {
00040     sink->set_level(level);
00041     m_Sinks.push_back(sink);
00042     m_Logger = std::make_shared<spdlog::logger>("streamout", begin(m_Sinks), end(m_Sinks));
00043     m_Source.setLogger(m_Logger);
00044     m_Destination.setLogger(m_Logger);
00045 }
```

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

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

Definition at line 239 of file BufferLooper.h.

```
00239 { 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 47 of file BufferLooper.h.

```
00048 {
00049     // clang-format off
00050     fmt::print(fg(fmt::color::medium_orchid) | fmt::emphasis::bold,
00051         "\n"
00052         " SSSSSSSSSSSSSSSSS tttt
00053         tttt\n"
00054         "SS:::t\n"
00055         "S:::SSSSSS:::S t:::t
00056         t:::t\n"
00057         "S:::S SSSSSSS t:::t
00058         t:::t\n"
00059         "S:::S tttttt:::tttttt rrrrr rrrrrrrrrr eeeeeeeeeee aaaaaaaaaaaaa
00060         mmmmmmmmm oooooooooo uuuuuu uuuuuutttttt:::tttttt\n"
00061         "S:::S t:::t r:::rrr:::r ee:::ee a:::a
00062         mm:::m m:::mm oo:::oo u:::u u:::ut:::t\n"
00063         " S:::SSSS t:::t r:::rrr:::r e:::e eeeeeee:::e aaaaaaaaa:::a
00064         m:::mm:::mo:::ou:::u u:::ut:::t\n"
00065         " SS:::SSSSSttttt:::ttttt rr:::rrrrr:::re:::e e:::e a:::a
00066         m:::mm:::mo:::ou:::u u:::uttttt:::ttttt\n"
00067         " SSS:::SS t:::t r:::r r:::re:::e eeeee:::e aaaaaa:::a
00068         m:::mm:::mo:::o o:::ou:::u u:::u t:::t\n"
00069         " SSSSS:::S t:::t r:::r rrrrrre:::e aa:::a m:::m
00070         m:::m m:::mo:::o o:::ou:::u u:::u t:::t\n"
00071         " S:::S t:::t r:::r e:::e eeeeeeeeeee a:::aaaa:::a m:::m
00072         m:::m m:::mo:::o o:::ou:::u u:::u t:::t\n"
00073         " S:::S t:::t tttttt:::r e:::e a:::a a:::a m:::m
00074         m:::m m:::mo:::o o:::ou:::uuu:::u t:::t tttttt\n"
00075         "SSSSSSS S:::S t:::t tr:::r e:::e a:::a a:::a m:::m
00076         m:::m m:::mo:::oo:::ou:::uu t:::tttt:::t\n"
00077         "S:::SSSSSS:::S tt:::tr:::r e:::e eeeeeeeaa:::aaaa:::a m:::m
00078         m:::m m:::mo:::oo u:::uu:::u tt:::tt\n"
00079         " SSSSSSSSSSSSS ttttttttt rrrrrr eeeeeeeeeee aaaaaaaa aaammmmmm
00080         mmmmmmmmm oooooooooo uuuuuuuu uuuu tttttttttt {} \n"
00081         "\n",
00082         fmt::format(fg(fmt::color::red) | fmt::emphasis::bold, "v{}", streamout_version.to_string()));
00083     // clang-format on
00084     log()->info("*****");
00085     log()->info("Streamout Version : {}", streamout_version.to_string());
00086     log()->info("Using InterfaceReader {} version {}", m_Source.getName(),
00087         m_Source.getVersion().to_string());
00088     log()->info("Using InterfaceWriter {} version {}", m_Destination.getName(),
00089         m_Destination.getVersion().to_string());
00090     if(!m_Destination.checkCompatibility(m_Source.getName(), m_Source.getVersion().to_string()))
00091     {
00092         log()->critical("{} version {} is not compatible with {} version {} ! ", m_Source.getName(),
00093             m_Source.getVersion().to_string(), m_Destination.getName(), m_Destination.getVersion().to_string());
00094         log()->info("Compatible Interfaces for {} are", m_Destination.getName());
00095         for(std::map<std::string, std::string>::iterator it = m_Destination.getCompatibility().begin();
00096             it != m_Destination.getCompatibility().end(); ++it) { log()->info("{} version {}", it->first,
00097                 it->second); }
00098         std::exit(-1);
00099     }
00100     if(!m_DetectorIDs.empty())
00101     {
00102         std::string ids;
00103         for(std::vector<DetectorID>::const_iterator it = m_DetectorIDs.cbegin(); it !=
00104             m_DetectorIDs.cend(); ++it) ids += std::to_string(static_cast<std::uint16_t>(*it)) + ";";
00105         log()->info("Detector ID(s) other than {} will be ignored", ids);
00106     }
00107     log()->info("*****");
00108     RawBufferNavigator bufferNavigator;
00109     Timer timer;
00110     timer.start();
```



```

00093     m_Source.start();
00094     m_Destination.start();
00095     while(m_Source.nextEvent() && m_NbrEventsToProcess >= m_NbrEvents)
00096     {
00097         m_Destination.setEventNumber(m_Source.getEventNumber());
00098         /***** START EVENT *****/
00099         m_Source.startEvent();
00100         m_Destination.startEvent();
00101         /***** START DIF *****/
00102         m_Logger->warn("====* Event {} *====", m_NbrEvents);
00103         while(m_Source.nextDIFbuffer())
00104         {
00105             const Buffer& buffer = m_Source.getBuffer();
00106             bufferNavigator.setBuffer(buffer);
00107             if(std::find(m_DetectorIDs.begin(), m_DetectorIDs.end(),
00108                 static_cast<DetectorID>(bufferNavigator.getDetectorID())) == m_DetectorIDs.end())
00109             {
00110                 m_Logger->debug("Ignoring detector ID : {}", bufferNavigator.getDetectorID());
00111                 continue;
00112             }
00113             std::int32_t idstart = bufferNavigator.getStartOfPayload();
00114             if(m_Debug && idstart == -1) m_Logger->info(to_hex(buffer));
00115             c.DIFStarter[idstart]++;
00116             if(!bufferNavigator.validPayload())
00117             {
00118                 m_Logger->error("!bufferNavigator.validBuffer()");
00119                 continue;
00120             }
00121             /***** START DIF *****/
00122             m_Source.startDIF();
00123             m_Destination.startDIF();
00124             /***** START DIF *****/
00125             PayloadLoader payloadLoader;
00126             std::unique_ptr<Payload> d = payloadLoader.getPayload(bufferNavigator.getDetectorID());
00127             if(d == nullptr)
00128             {
00129                 m_Logger->error("streamout don't know how to parse the payload for detector_id {} !
00130                 SKIPPING !", bufferNavigator.getDetectorID());
00131                 continue;
00132             }
00133             // This is really a big error so skip DIF entirely if exception occurs
00134             try
00135             {
00136                 d->setBuffer(bufferNavigator.getPayload());
00137                 m_Logger->info("Parsing payload DIF_ID {} (detector_id {})", d->getDIFid(),
00138                     bufferNavigator.getDetectorID());
00139             }
00140             catch(const Exception& e)
00141             {
00142                 m_Logger->error("{} ", e.what());
00143                 continue;
00144             }
00145             if(buffer.end() != d->end()) m_Logger->error("DIF BUFFER END {} {} ", fmt::ptr(buffer.end()),
00146                 fmt::ptr(d->end()));
00147             assert(buffer.end() == d->end());
00148             c.DIFPtrValueAtReturnedPos[d->begin() [d->getEndOfDIFData() - 3]]++;
00149             assert(d->begin() [d->getEndOfDIFData() - 3] == 0xa0);
00150             c.SizeAfterDIFPtr[d->getSizeAfterDIFPtr()]++;
00151             m_Destination.processDIF(*d);
00152             for(std::size_t i = 0; i < d->getNumberOfFrames(); ++i)
00153             {
00154                 //
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();

```

```

00176         m_Destination.endPad();
00177     }
00178 }
00179 //
00180 m_Source.endFrame();
00181 m_Destination.endFrame();
00182 //
00183 }
00184 // 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
00185 /*try
00186 {
00187 d.setSCBuffer();
00188 }
00189 catch(const Exception& e)
00190 {
00191 m_Logger->error("{} ", e.what());
00192 }
00193
00194 bool processSC = false;
00195 if(d.hasSlowControl())
00196 {
00197 c.hasSlowControl++;
00198 processSC = true;
00199 }
00200 if(d.badSCData())
00201 {
00202 c.hasBadSlowControl++;
00203 processSC = false;
00204 }
00205 if(processSC) { m_Destination.processSlowControl(d.getSCBuffer()); }*/
00206
00207 // Buffer eod = d.getEndOfAllData();
00208 // c.SizeAfterAllData[eod.size()]++;
00209 // bit8_t* debug_variable_3 = eod.end();
00210 // if(buffer.end() != debug_variable_3) m_Logger->info("END DATA BUFFER END {} {} ",
fmt::ptr(buffer.end()), fmt::ptr(debug_variable_3));
00211 // assert(buffer.end() == debug_variable_3);
00212 // if(eod.size() != 0) m_Logger->info("End of Data remaining stuff : {} ", to_hex(eod));*/
00213
00214 /*int nonzeroCount = 0;
00215 for(bit8_t* it = eod.begin(); it != eod.end(); it++)
00216 if(static_cast<int>(*it) != 0) nonzeroCount++;
00217 c.NonZeroValusAtEndOfData[nonzeroCount]++;*/
00218
00219 //
00220 //
00221 m_Source.endDIF();
00222 m_Destination.endDIF();
00223 //
00224 } // end of DIF while loop
00225 m_Logger->warn("***** Event {} *****", m_NbrEvents);
00226 m_NbrEvents++;
00227 /*****/
00228 /*** END EVENT ***/
00229 m_Source.endEvent();
00230 m_Destination.endEvent();
00231 /*****/
00232 } // end of event while loop
00233 m_Destination.end();
00234 m_Source.end();
00235 timer.stop();
00236 fmt::print(fg(fmt::color::green) | fmt::emphasis::bold, "=== elapsed time {}ms ({}ms/event)
===\n", timer.getElapsedTime() / 1000, timer.getElapsedTime() / (1000 * m_NbrEvents));
00237 }

```

4.2.3.4 printAllCounters() `template<typename SOURCE , typename DESTINATION >`

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

Definition at line 238 of file [BufferLooper.h](#).

```
00238 { 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 241 of file [BufferLooper.h](#).

```
00241 { 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(fmt::color::crimson | fmt::emphasis::bold, out);
00040 }
```

4.3.3 Member Data Documentation

4.3.3.1 DIFPtrValueAtReturnedPos std::map<int, int> BufferLooperCounter::DIFPtrValueAt←
ReturnedPos

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](#).

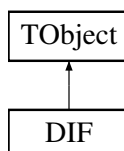
The documentation for this struct was generated from the following files:

- [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/Payload100.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/Payload100.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; }
```

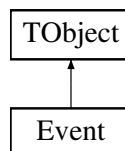
The documentation for this class was generated from the following files:

- [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

- `std::uint32_t getEventNumber ()`
- `void setEventNumber (const std::uint32_t &evtNbr)`
- `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 20 of file [Event.cc](#).

```
00020 { DIFs[dif.getID()] = dif; }
```

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

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

```
00022 { return DIFs.cbegin(); }
```

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

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

```
00024 { return DIFs.cend(); }
```

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

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

```
00018 { DIFs.clear(); }
```

4.7.2.5 getEventNumber() `std::uint32_t Event::getEventNumber ()`

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

```
00009 {  
00010     return m_EventNumber;  
00011 }
```

4.7.2.6 setEventNumber() `void Event::setEventNumber (
const std::uint32_t & evtNbr)`

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

```
00014 {  
00015     m_EventNumber=evtNbr;  
00016 }
```

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(); }
```

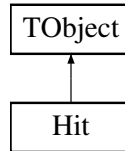
The documentation for this class was generated from the following file:

- `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; }
```

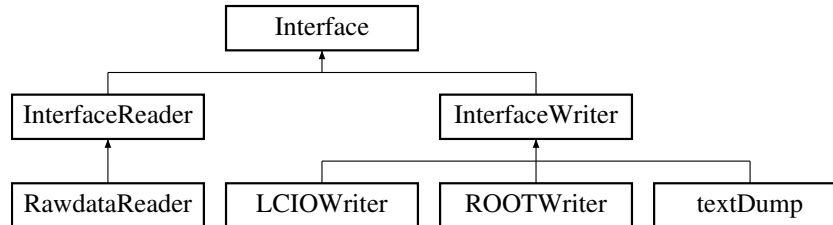
The documentation for this class was generated from the following files:

- [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](#) ()
- std::uint32_t [getEventNumber](#) ()
- void [setEventNumber](#) (const std::uint32_t &nbr)

Protected Attributes

- std::uint32_t [m_EventNumber](#) {0}

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 [LCIOWriter](#), and [ROOTWriter](#).

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

```
00046 {}
```

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

Reimplemented in [LCIOWriter](#), and [ROOTWriter](#).

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

```
00044 {}
```

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

Reimplemented in [LCIOWriter](#), and [ROOTWriter](#).

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

```
00048 {}
```

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

Reimplemented in [LCIOWriter](#), and [ROOTWriter](#).

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

```
00050 {}
```

4.10.3.5 `getEventNumber()` `std::uint32_t Interface::getEventNumber () [inline]`Definition at line 55 of file [Interface.h](#).

```
00055 {return m_EventNumber;}
```

4.10.3.6 `getName()` `std::string Interface::getName () [inline]`Definition at line 53 of file [Interface.h](#).

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

4.10.3.7 `getVersion()` `Version Interface::getVersion () [inline]`Definition at line 54 of file [Interface.h](#).

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

4.10.3.8 `log()` `std::shared_ptr< spdlog::logger > & Interface::log () [inline]`Definition at line 51 of file [Interface.h](#).

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

4.10.3.9 `setEventNumber()` `void Interface::setEventNumber (`
`const std::uint32_t & nbr) [inline]`Definition at line 56 of file [Interface.h](#).

```
00056 {m_EventNumber=nbr;}
```

4.10.3.10 `setLogger()` `void Interface::setLogger (`
`const std::shared_ptr< spdlog::logger > & logger) [inline]`Definition at line 52 of file [Interface.h](#).

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

4.10.3.11 `startDIF()` `virtual void Interface::startDIF () [inline], [virtual]`Reimplemented in [LCIOWriter](#), and [ROOTWriter](#).Definition at line 45 of file [Interface.h](#).

```
00045 {}
```

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

Reimplemented in [LCIOWriter](#), and [ROOTWriter](#).

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

```
00043 {}
```

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

Reimplemented in [LCIOWriter](#), and [ROOTWriter](#).

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

```
00047 {}
```

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

Reimplemented in [LCIOWriter](#), and [ROOTWriter](#).

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

```
00049 {}
```

4.10.4 Member Data Documentation

4.10.4.1 m_EventNumber `std::uint32_t Interface::m_EventNumber {0} [protected]`

Definition at line 58 of file [Interface.h](#).

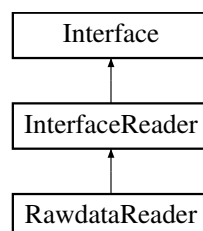
The documentation for this class was generated from the following file:

- [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 66 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 69 of file [Interface.h](#).

```
00069 : 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 73 of file [Interface.h](#).

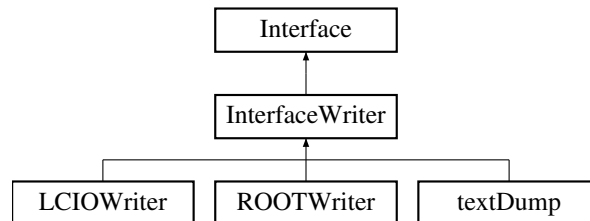
The documentation for this class was generated from the following file:

- `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

Additional Inherited Members

4.12.1 Detailed Description

Definition at line 76 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 79 of file [Interface.h](#).

```
00079 : 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 81 of file [Interface.h](#).

```
00081 { m_Compatible[name] = version; }
```

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

Definition at line 85 of file [Interface.h](#).

```
00086 {
00087     if(m_Compatible.find(name) != m_Compatible.end())
00088     {
00089         auto ran = semver::range::detail::range(m_Compatible[name]);
00090         semver::version ver = semver::version(version);
00091         if(ran.satisfies(ver, false)) return true;
00092     }
00093     return false;
00094 }
00095 else
00096     return false;
00097 }
```

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

Definition at line 83 of file [Interface.h](#).

```
00083 { return m_Compatible; }
```

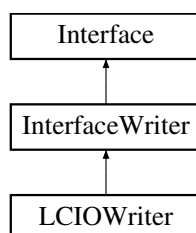
The documentation for this class was generated from the following file:

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

4.13 LCIOWriter Class Reference

```
#include <libs/interface/LCIO/include/LCIOWriter.h>
```

Inheritance diagram for LCIOWriter:



Public Member Functions

- [LCIOWriter](#) ()
- void [setFilename](#) (const std::string &)
- void [start](#) ()
- void [processDIF](#) (const [Payload](#) &)
- void [processFrame](#) (const [Payload](#) &, const std::uint32_t &frameIndex)
- void [processPadInFrame](#) (const [Payload](#) &, 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](#) ()

Additional Inherited Members

4.13.1 Detailed Description

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

4.13.2 Constructor & Destructor Documentation

4.13.2.1 LCIOWriter() `LCIOWriter::LCIOWriter ()`

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

```
00019 : InterfaceWriter("LCIOWriter", "1.0.0"),  
      m_LCWriter(IOIMPL::LCFactory::getInstance\(\)->createLCWriter()) { addCompatibility("RawdataReader",  
      ">=1.0.0"); }
```

4.13.3 Member Function Documentation

4.13.3.1 end() `void LCIOWriter::end ()`

Definition at line 32 of file [LCIOWriter.cc](#).

```
00032 { m_LCWriter->close(); }
```

4.13.3.2 endDIF() void LCIOWriter::endDIF () [virtual]

Reimplemented from [Interface](#).

Definition at line 88 of file [LCIOWriter.cc](#).

```
00088 {}
```

4.13.3.3 endEvent() void LCIOWriter::endEvent () [virtual]

Reimplemented from [Interface](#).

Definition at line 80 of file [LCIOWriter.cc](#).

```
00081 {
00082     m_LCEvent->addCollection(m_CollectionVec, "DHCALRawHits");
00083     m_LCWriter->writeEvent(m_LCEvent.get());
00084 }
```

4.13.3.4 endFrame() void LCIOWriter::endFrame () [virtual]

Reimplemented from [Interface](#).

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

```
00092 {}
```

4.13.3.5 endPad() void LCIOWriter::endPad () [virtual]

Reimplemented from [Interface](#).

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

```
00096 {}
```

4.13.3.6 processDIF() void LCIOWriter::processDIF (
const [Payload](#) & d)

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

```
00035 {
00036     std::string parameter_name = "DIF" + std::to_string(d.getDIFid()) + "_Triggers";
00037     EVENT::IntVec parameters;
00038     parameters.push_back(d.getDTC());
00039     parameters.push_back(d.getGTC());
00040     parameters.push_back(d.getBCID());
00041     parameters.push_back(d.getAbsoluteBCID() & 0xFFFFF);
00042     parameters.push_back((d.getAbsoluteBCID() >> 24) & 0xFFFFF);
00043     parameters.push_back(0);
00044     parameters.push_back(0);
00045     parameters.push_back(0);
00046     m_CollectionVec->parameters().setValues("DIF" + std::to_string(d.getDIFid()) + "_Triggers",
parameters);
00047 }
```

4.13.3.7 processFrame() void LCIOWriter::processFrame (

```
const Payload & d,
const std::uint32_t & frameIndex )
```

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

```
00049 {}
```

4.13.3.8 processPadInFrame() void LCIOWriter::processPadInFrame (

```
const Payload & d,
const std::uint32_t & frameIndex,
const std::uint32_t & channelIndex )
```

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

```
00052 {
00053     m_LCEvent->setTimeStamp(d.getAbsoluteBCID()*10e9);
00054     IMPL::RawCalorimeterHitImpl* hit = new IMPL::RawCalorimeterHitImpl;
00055     int ID0 = channelIndex;
00056     ID0 = ID0 << 8;
00057     ID0 += d.getASICid(frameIndex);
00058     ID0 = ID0 << 8;
00059     ID0 += d.getDIFid();
00060     hit->setCellID0(ID0);
00061     hit->setAmplitude(d.getThresholdStatus(frameIndex, channelIndex));
00062     hit->setTimeStamp(d.getFrameTimeToTrigger(frameIndex));
00063     m_CollectionVec->addElement(hit);
00064 }
```

4.13.3.9 processSlowControl() void LCIOWriter::processSlowControl (

```
const Buffer & ) [inline]
```

Definition at line 30 of file [LCIOWriter.h](#).

```
00030 { ; }
```

4.13.3.10 setFilename() void LCIOWriter::setFilename (

```
const std::string & filename )
```

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

```
00017 { m_Filename = filename; }
```

4.13.3.11 start() void LCIOWriter::start ()

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

```
00022 {
00023     m_LCWriter->open(m_Filename, EVENT::LCIO::WRITE_NEW);
00024     std::unique_ptr<IMPL::LCRunHeaderImpl> runHdr(new IMPL::LCRunHeaderImpl);
00025     runHdr->setRunNumber(50); // FIXME : provide run number
00026     runHdr->setDetectorName(m_DetectorName);
00027     std::string description("data collected with SDHCAL prototype");
00028     runHdr->setDescription(description);
00029     m_LCWriter->writeRunHeader(runHdr.get());
00030 }
```

4.13.3.12 startDIF() void LCIOWriter::startDIF () [virtual]

Reimplemented from [Interface](#).

Definition at line 86 of file [LCIOWriter.cc](#).

```
00086 {}
```

4.13.3.13 startEvent() void LCIOWriter::startEvent () [virtual]

Reimplemented from [Interface](#).

Definition at line 66 of file [LCIOWriter.cc](#).

```
00067 {
00068     m_LCEvent = std::make_unique<IMPL::LCEventImpl>();
00069     m_LCEvent->setEventNumber (getEventNumber ());
00070     m_LCEvent->setDetectorName (m_DetectorName);
00071     m_LCEvent->setWeight (1);
00072     m_CollectionVec = new IMPL::LCCollectionVec (EVENT::LCIO::RAWCALORIMETERHIT);
00073     IMPL::LCFlagImpl flag (0);
00074     // flag.setBit (EVENT::LCIO::RCHBIT_ID1);
00075     flag.setBit (EVENT::LCIO::RCHBIT_TIME);
00076     m_CollectionVec->setFlag (flag.getFlag ());
00077     m_CollectionVec->parameters ().setValue (EVENT::LCIO::CellIDEncoding, "dif:8,asic:8,channel:6");
00078 }
```

4.13.3.14 startFrame() void LCIOWriter::startFrame () [virtual]

Reimplemented from [Interface](#).

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

```
00090 {}
```

4.13.3.15 startPad() void LCIOWriter::startPad () [virtual]

Reimplemented from [Interface](#).

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

```
00094 {}
```

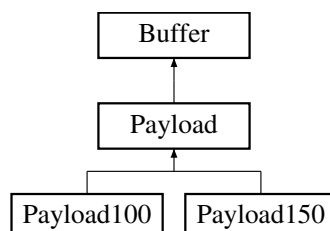
The documentation for this class was generated from the following files:

- [libs/interface/LCIO/include/LCIOWriter.h](#)
- [libs/interface/LCIO/src/LCIOWriter.cc](#)

4.14 Payload Class Reference

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

Inheritance diagram for Payload:



Public Member Functions

- [Payload](#) (const std::int32_t &detector_id)
- void [setBuffer](#) (const [Buffer](#) &buffer)
- std::uint32_t [getEndOfDIFData](#) () const
- std::uint32_t [getSizeAfterDIFPtr](#) () const
- virtual std::uint32_t [getNumberOfFrames](#) () const =0
- virtual std::uint32_t [getThresholdStatus](#) (const std::uint32_t &, const std::uint32_t &) const =0
- virtual std::uint32_t [getDIFid](#) () const =0
- virtual std::uint32_t [getDTC](#) () const =0
- virtual std::uint32_t [getGTC](#) () const =0
- virtual std::uint32_t [getBCID](#) () const =0
- virtual std::uint64_t [getAbsoluteBCID](#) () const =0
- virtual std::uint32_t [getASICid](#) (const std::uint32_t &) const =0
- virtual std::uint32_t [getFrameBCID](#) (const std::uint32_t &) const =0
- virtual std::uint32_t [getFrameTimeToTrigger](#) (const std::uint32_t &) const =0
- virtual [~Payload](#) ()

Protected Member Functions

- virtual void [parsePayload](#) ()=0

Protected Attributes

- std::int32_t [m_DetectorID](#) {-1}
- std::uint32_t [theGetFramePtrReturn_](#) {0}

4.14.1 Detailed Description

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

4.14.2 Constructor & Destructor Documentation

4.14.2.1 Payload() `Payload::Payload (`
`const std::int32_t & detector_id) [inline], [explicit]`

Definition at line 14 of file [Payload.h](#).
00014 {}

4.14.2.2 ~Payload() `virtual Payload::~~Payload () [inline], [virtual]`

Definition at line 29 of file [Payload.h](#).
00029 {}

4.14.3 Member Function Documentation

4.14.3.1 getAbsoluteBCID() `virtual std::uint64_t Payload::getAbsoluteBCID () const [pure virtual]`

Implemented in [Payload100](#), and [Payload150](#).

4.14.3.2 getASICid() `virtual std::uint32_t Payload::getASICid (const std::uint32_t &) const [pure virtual]`

Implemented in [Payload100](#), and [Payload150](#).

4.14.3.3 getBCID() `virtual std::uint32_t Payload::getBCID () const [pure virtual]`

Implemented in [Payload100](#), and [Payload150](#).

4.14.3.4 getDIFid() `virtual std::uint32_t Payload::getDIFid () const [pure virtual]`

Implemented in [Payload100](#), and [Payload150](#).

4.14.3.5 getDTC() `virtual std::uint32_t Payload::getDTC () const [pure virtual]`

Implemented in [Payload100](#), and [Payload150](#).

4.14.3.6 getEndOfDIFData() `std::uint32_t Payload::getEndOfDIFData () const [inline]`

Definition at line 43 of file [Payload.h](#).

```
00043 { return theGetFramePtrReturn_; }
```

4.14.3.7 getFrameBCID() `virtual std::uint32_t Payload::getFrameBCID (const std::uint32_t &) const [pure virtual]`

Implemented in [Payload100](#), and [Payload150](#).

4.14.3.8 getFrameTimeToTrigger() virtual std::uint32_t Payload::getFrameTimeToTrigger (const std::uint32_t &) const [pure virtual]

Implemented in [Payload100](#), and [Payload150](#).

4.14.3.9 getGTC() virtual std::uint32_t Payload::getGTC () const [pure virtual]

Implemented in [Payload100](#), and [Payload150](#).

4.14.3.10 getNumberOfFrames() virtual std::uint32_t Payload::getNumberOfFrames () const [pure virtual]

Implemented in [Payload100](#), and [Payload150](#).

4.14.3.11 getSizeAfterDIFPtr() std::uint32_t Payload::getSizeAfterDIFPtr () const [inline]

Definition at line 45 of file [Payload.h](#).

```
00045 { return size() - theGetFramePtrReturn_; }
```

4.14.3.12 getThresholdStatus() virtual std::uint32_t Payload::getThresholdStatus (const std::uint32_t & , const std::uint32_t &) const [pure virtual]

Implemented in [Payload100](#), and [Payload150](#).

4.14.3.13 parsePayload() virtual void Payload::parsePayload () [protected], [pure virtual]

4.14.3.14 setBuffer() void Payload::setBuffer (const Buffer & buffer) [inline]

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

```
00038 {
00039     set(buffer);
00040     parsePayload();
00041 }
```

4.14.4 Member Data Documentation

4.14.4.1 m_DetectorID `std::int32_t Payload::m_DetectorID {-1} [protected]`

Definition at line 33 of file [Payload.h](#).

4.14.4.2 theGetFramePtrReturn_ `std::uint32_t Payload::theGetFramePtrReturn_ {0} [protected]`

Definition at line 34 of file [Payload.h](#).

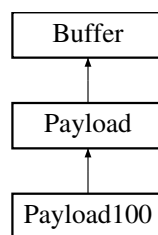
The documentation for this class was generated from the following file:

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

4.15 Payload100 Class Reference

```
#include <libs/core/include/Payload100.h>
```

Inheritance diagram for Payload100:



Public Member Functions

- [Payload100](#) ()
- bool [hasTemperature](#) () const
- bool [hasAnalogReadout](#) () const
- virtual std::uint32_t [getNumberOfFrames](#) () const final
- virtual std::uint32_t [getThresholdStatus](#) (const std::uint32_t &, const std::uint32_t &) const final
- virtual std::uint32_t [getDIFid](#) () const final
- virtual std::uint32_t [getDTC](#) () const final
- virtual std::uint32_t [getGTC](#) () const final
- virtual std::uint32_t [getBCID](#) () const final
- virtual std::uint64_t [getAbsoluteBCID](#) () const final
- virtual std::uint32_t [getASICid](#) (const std::uint32_t &) const final
- virtual std::uint32_t [getFrameBCID](#) (const std::uint32_t &) const final
- virtual std::uint32_t [getFrameTimeToTrigger](#) (const std::uint32_t &) const final
- virtual [~Payload100](#) ()

Additional Inherited Members

4.15.1 Detailed Description

Definition at line 27 of file [Payload100.h](#).

4.15.2 Constructor & Destructor Documentation

4.15.2.1 Payload100() Payload100::Payload100 () [inline]

Definition at line 30 of file [Payload100.h](#).

```
00030 : Payload(100) {}
```

4.15.2.2 ~Payload100() Payload100::~~Payload100 () [virtual]

Definition at line 193 of file [Payload100.cc](#).

```
00193 {}
```

4.15.3 Member Function Documentation

4.15.3.1 getAbsoluteBCID() std::uint64_t Payload100::getAbsoluteBCID () const [inline], [final], [virtual]

Implements [Payload](#).

Definition at line 176 of file [Payload100.cc](#).

```
00177 {
00178     std::uint32_t shift{Size::GLOBAL_HEADER + Size::DIF_IF + Size::DIF_TRIGGER_COUNTER +
        Size::INFORMATION_COUNTER + Size::GLOBAL_TRIGGER_COUNTER};
00179     std::uint64_t LBC = ((begin()[shift] << 16) | (begin()[shift + 1] << 8) | (begin()[shift + 2])) *
        16777216ULL + ((begin()[shift + 3] << 16) | (begin()[shift + 4] << 8) | (begin()[shift + 5]));
00180     return LBC;
00181 }
```

4.15.3.2 getASICid() std::uint32_t Payload100::getASICid (const std::uint32_t & i) const [inline], [final], [virtual]

Implements [Payload](#).

Definition at line 183 of file [Payload100.cc](#).

```
00183 { return m_Frames[i][0] & 0xFF; }
```

4.15.3.3 getBCID() std::uint32_t Payload100::getBCID () const [inline], [final], [virtual]

Implements [Payload](#).

Definition at line 170 of file [Payload100.cc](#).

```
00171 {
00172     std::uint32_t shift{Size::GLOBAL_HEADER + Size::DIF_IF + Size::DIF_TRIGGER_COUNTER +
        Size::INFORMATION_COUNTER + Size::GLOBAL_TRIGGER_COUNTER + Size::ABSOLUTE_BCID};
00173     return (begin()[shift] << 16) + (begin()[shift + 1] << 8) + begin()[shift + 2];
00174 }
```

4.15.3.4 getDIFid() `std::uint32_t Payload100::getDIFid () const [inline], [final], [virtual]`

Implements [Payload](#).

Definition at line 152 of file [Payload100.cc](#).

```
00153 {
00154     std::uint32_t shift{+Size::GLOBAL_HEADER};
00155     return begin()[shift] & 0xFF;
00156 }
```

4.15.3.5 getDTC() `std::uint32_t Payload100::getDTC () const [inline], [final], [virtual]`

Implements [Payload](#).

Definition at line 158 of file [Payload100.cc](#).

```
00159 {
00160     std::uint32_t shift{Size::GLOBAL_HEADER + Size::DIF_IF};
00161     return (begin()[shift] << 24) + (begin()[shift + 1] << 16) + (begin()[shift + 2] << 8) + begin()[shift
+ 3];
00162 }
```

4.15.3.6 getFrameBCID() `std::uint32_t Payload100::getFrameBCID (
const std::uint32_t & i) const [inline], [final], [virtual]`

Implements [Payload](#).

Definition at line 185 of file [Payload100.cc](#).

```
00186 {
00187     std::uint32_t shift{+Size::MICROROC_HEADER};
00188     return GrayToBin((m_Frames[i][shift] << 16) + (m_Frames[i][shift + 1] << 8) + m_Frames[i][shift + 2]);
00189 }
```

4.15.3.7 getFrameTimeToTrigger() `std::uint32_t Payload100::getFrameTimeToTrigger (
const std::uint32_t & i) const [inline], [final], [virtual]`

Implements [Payload](#).

Definition at line 191 of file [Payload100.cc](#).

```
00191 { return getBCID() - getFrameBCID(i); }
```

4.15.3.8 getGTC() `std::uint32_t Payload100::getGTC () const [inline], [final], [virtual]`

Implements [Payload](#).

Definition at line 164 of file [Payload100.cc](#).

```
00165 {
00166     std::uint32_t shift{Size::GLOBAL_HEADER + Size::DIF_IF + Size::DIF_TRIGGER_COUNTER +
Size::INFORMATION_COUNTER};
00167     return (begin()[shift] << 24) + (begin()[shift + 1] << 16) + (begin()[shift + 2] << 8) + begin()[shift
+ 3];
00168 }
```

4.15.3.9 getNumberOfFrames() `std::uint32_t Payload100::getNumberOfFrames () const [inline], [final], [virtual]`

Implements [Payload](#).

Definition at line 142 of file [Payload100.cc](#).

```
00142 { return m_Frames.size(); }
```

4.15.3.10 getThresholdStatus() `std::uint32_t Payload100::getThresholdStatus (const std::uint32_t & i, const std::uint32_t & ipad) const [inline], [final], [virtual]`

Implements [Payload](#).

Definition at line 144 of file [Payload100.cc](#).

```
00144 { return (((std::uint32_t)getFrameLevel(i, ipad, 1))) | ((std::uint32_t)getFrameLevel(i, ipad, 0) « 1); }
```

4.15.3.11 hasAnalogReadout() `bool Payload100::hasAnalogReadout () const [inline]`

Definition at line 114 of file [Payload100.cc](#).

```
00114 { return getNumberLines() != 0; }
```

4.15.3.12 hasTemperature() `bool Payload100::hasTemperature () const [inline]`

Definition at line 112 of file [Payload100.cc](#).

```
00112 { return (static_cast<std::uint8_t>(begin()[0]) == static_cast<std::uint8_t>(Value::GLOBAL_HEADER_TEMP)); }
```

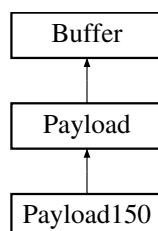
The documentation for this class was generated from the following files:

- [libs/core/include/Payload100.h](#)
- [libs/core/src/Payload100.cc](#)

4.16 Payload150 Class Reference

```
#include <libs/core/include/Payload150.h>
```

Inheritance diagram for Payload150:



Public Member Functions

- [Payload150](#) ()
- virtual std::uint32_t [getNumberOfFrames](#) () const final
- virtual std::uint32_t [getThresholdStatus](#) (const std::uint32_t &, const std::uint32_t &) const final
- virtual std::uint32_t [getDIFid](#) () const final
- virtual std::uint32_t [getDTC](#) () const final
- virtual std::uint32_t [getGTC](#) () const final
- virtual std::uint32_t [getBCID](#) () const final
- virtual std::uint64_t [getAbsoluteBCID](#) () const final
- virtual std::uint32_t [getASICid](#) (const std::uint32_t &) const final
- virtual std::uint32_t [getFrameBCID](#) (const std::uint32_t &) const final
- virtual std::uint32_t [getFrameTimeToTrigger](#) (const std::uint32_t &) const final
- virtual [~Payload150](#) ()

Additional Inherited Members

4.16.1 Detailed Description

Definition at line 10 of file [Payload150.h](#).

4.16.2 Constructor & Destructor Documentation

4.16.2.1 [Payload150\(\)](#) `Payload150::Payload150 () [inline]`

Definition at line 13 of file [Payload150.h](#).

```
00013 :   Payload(150) {}
```

4.16.2.2 [~Payload150\(\)](#) `Payload150::~~Payload150 () [virtual]`

Definition at line 136 of file [Payload150.cc](#).

```
00136 {}
```

4.16.3 Member Function Documentation

4.16.3.1 [getAbsoluteBCID\(\)](#) `std::uint64_t Payload150::getAbsoluteBCID () const [inline], [final], [virtual]`

Implements [Payload](#).

Definition at line 106 of file [Payload150.cc](#).

```
00107 {
00108     std::uint32_t shift{Size::GLOBAL_HEADER + Size::PMR_ID_SHIFT + Size::PMR_NBASIC_SHIFT +
        Size::PMR_FORMAT_SHIFT + Size::PMR_GTC_SHIFT};
00109     std::uint64_t LBC = ((begin() [shift] << 8) | (begin() [shift + 1])) * 16777216ULL + ((begin() [shift +
        2] << 24) | (begin() [shift + 3] << 16) | (begin() [shift + 4] << 8) | begin() [shift + 5]);
00110     return LBC;
00111 }
```

4.16.3.2 getASICid() `std::uint32_t Payload150::getASICid (const std::uint32_t & i) const [inline], [final], [virtual]`

Implements [Payload](#).

Definition at line 126 of file [Payload150.cc](#).

```
00126 { return m_Frames[i][0] & 0xFF; }
```

4.16.3.3 getBCID() `std::uint32_t Payload150::getBCID () const [inline], [final], [virtual]`

Implements [Payload](#).

Definition at line 120 of file [Payload150.cc](#).

```
00121 {
00122     std::uint32_t shift{Size::GLOBAL_HEADER + Size::PMR_ID_SHIFT + Size::PMR_NBASIC_SHIFT +
        Size::PMR_FORMAT_SHIFT + Size::PMR_GTC_SHIFT + Size::PMR_ABCID_SHIFT};
00123     return (begin()[shift] < 16) + (begin()[shift + 1] < 8) + begin()[shift + 2];
00124 }
```

4.16.3.4 getDIFid() `std::uint32_t Payload150::getDIFid () const [inline], [final], [virtual]`

Implements [Payload](#).

Definition at line 94 of file [Payload150.cc](#).

```
00095 {
00096     std::uint32_t shift{+Size::GLOBAL_HEADER};
00097     return begin()[shift] & 0xFF;
00098 }
```

4.16.3.5 getDTC() `std::uint32_t Payload150::getDTC () const [inline], [final], [virtual]`

Implements [Payload](#).

Definition at line 113 of file [Payload150.cc](#).

```
00114 {
00115     // MAYBE NOT USEFUL
00116     std::uint32_t shift{};
00117     return (begin()[shift] < 24) + (begin()[shift + 1] < 16) + (begin()[shift + 2] < 8) + begin()[shift
        + 3];
00118 }
```

4.16.3.6 getFrameBCID() `std::uint32_t Payload150::getFrameBCID (const std::uint32_t & i) const [inline], [final], [virtual]`

Implements [Payload](#).

Definition at line 128 of file [Payload150.cc](#).

```
00129 {
00130     std::uint32_t shift{+Size::MICROROC_HEADER};
00131     return GrayToBin((m_Frames[i][shift] < 16) + (m_Frames[i][shift + 1] < 8) + m_Frames[i][shift + 2]);
00132 }
```

4.16.3.7 getFrameTimeToTrigger() `std::uint32_t Payload150::getFrameTimeToTrigger (const std::uint32_t & i) const [inline], [final], [virtual]`

Implements [Payload](#).

Definition at line 134 of file [Payload150.cc](#).

```
00134 { return getBCID() - getFrameBCID(i); }
```

4.16.3.8 getGTC() `std::uint32_t Payload150::getGTC () const [inline], [final], [virtual]`

Implements [Payload](#).

Definition at line 100 of file [Payload150.cc](#).

```
00101 {
00102     std::uint32_t shift{Size::GLOBAL_HEADER + Size::PMR_ID_SHIFT + Size::PMR_NBASIC_SHIFT +
        Size::PMR_FORMAT_SHIFT};
00103     return (begin()[shift] << 16) + (begin()[shift + 1] << 8) + begin()[shift + 2];
00104 }
```

4.16.3.9 getNumberOfFrames() `std::uint32_t Payload150::getNumberOfFrames () const [inline], [final], [virtual]`

Implements [Payload](#).

Definition at line 84 of file [Payload150.cc](#).

```
00084 { return m_Frames.size(); }
```

4.16.3.10 getThresholdStatus() `std::uint32_t Payload150::getThresholdStatus (const std::uint32_t & i, const std::uint32_t & ipad) const [inline], [final], [virtual]`

Implements [Payload](#).

Definition at line 86 of file [Payload150.cc](#).

```
00086 { return (((std::uint32_t)getFrameLevel(i, ipad, 1))) | ((std::uint32_t)getFrameLevel(i, ipad, 0) <<
    1); }
```

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

- [libs/core/include/Payload150.h](#)
- [libs/core/src/Payload150.cc](#)

4.17 PayloadLoader Class Reference

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

Public Member Functions

- [PayloadLoader](#) ()=default
- `std::unique_ptr< Payload > & getPayload` (const std::int32_t &detector_id)

4.17.1 Detailed Description

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

4.17.2 Constructor & Destructor Documentation

4.17.2.1 PayloadLoader() `PayloadLoader::PayloadLoader () [default]`

4.17.3 Member Function Documentation

4.17.3.1 `getPayload()` `std::unique_ptr< Payload > & PayloadLoader::getPayload (const std::int32_t & detector_id) [inline]`

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

```
00019 {
00020     switch(detector_id)
00021     {
00022         case 100: payload = std::make_unique<Payload100>(); break;
00023         case 150: payload = std::make_unique<Payload150>(); break;
00024     }
00025     return payload;
00026 }
```

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

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

4.18 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::uint32_t` [getDetectorID](#) ()
- bool [findStartOfPayload](#) ()
- `std::int32_t` [getStartOfPayload](#) ()
- bool [validPayload](#) ()
- [Buffer](#) [getPayload](#) ()

Static Public Member Functions

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

4.18.1 Detailed Description

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

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

The buffer structure consists of :

- the detector id (std::int32_t)
- the datasource id (std::int32_t)
- the event id (std::int32_t)
- the bunch crossing id (std::int64_t)
- the payload char array of (buffer size - 20) Based on

Author

Laurent Mirabito

Version

1.0

Date

May 2016

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

4.18.2 Constructor & Destructor Documentation

4.18.2.1 [RawBufferNavigator\(\)](#) `RawBufferNavigator::RawBufferNavigator ()`

Definition at line [16](#) of file [RawBufferNavigator.cc](#).
00016 {}

4.18.2.2 [~RawBufferNavigator\(\)](#) `RawBufferNavigator::~~RawBufferNavigator ()` [default]

4.18.3 Member Function Documentation

4.18.3.1 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>(Valueksks::GLOBAL_HEADER)
|| static_cast<std::uint8_t>(m_Buffer[i]) == static_cast<std::uint8_t>(Valueksks::GLOBAL_HEADER_TEMP))
00041             {
00042                 m_StartPayload = i;
00043                 return true;
00044             }
00045         }
00046         m_StartPayload = -1;
00047         return false;
00048     }
00049 }

```

4.18.3.2 getDetectorID() `std::uint32_t RawBufferNavigator::getDetectorID ()`Definition at line 25 of file [RawBufferNavigator.cc](#).

```

00025 { return m_Buffer[0]; }

```

4.18.3.3 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); }

```

4.18.3.4 getStartOfPayload() `std::int32_t RawBufferNavigator::getStartOfPayload ()`Definition at line 51 of file [RawBufferNavigator.cc](#).

```

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

```

4.18.3.5 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 }

```

4.18.3.6 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 }
```

4.18.3.7 validPayload() `bool RawBufferNavigator::validPayload ()`

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

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

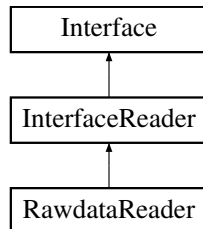
The documentation for this class was generated from the following files:

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

4.19 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

4.19.1 Detailed Description

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

4.19.2 Constructor & Destructor Documentation

4.19.2.1 RawdataReader() RawdataReader::RawdataReader (
 const char * fileName) [explicit]

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

```
00017                                     :   InterfaceReader("RawdataReader", "1.0.0")
00018 {
00019     m_buf.reserve(m_BufferSize);
00020     m_Filename = fileName;
00021 }
```

4.19.2.2 ~RawdataReader() virtual RawdataReader::~RawdataReader () [inline], [virtual]

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

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

4.19.3 Member Function Documentation

4.19.3.1 closeFile() void RawdataReader::closeFile ()

Definition at line 46 of file [RawdataReader.cc](#).

```
00047 {
00048     try
00049     {
00050         if(m_FileStream.is_open()) m_FileStream.close();
00051     }
00052     catch(const std::ios_base::failure& e)
00053     {
00054         log()->error("Caught an ios_base::failure in closeFile :  {} {}", e.what(), e.code().value());
00055         throw;
00056     }
00057 }
```

4.19.3.2 end() void RawdataReader::end ()

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

```
00025 {   closeFile(); }
```

4.19.3.3 `getBuffer()` `const Buffer & RawdataReader::getBuffer ()`

Definition at line 121 of file [RawdataReader.cc](#).

```
00122 {  
00123     uncompress();  
00124     return m_Buffer;  
00125 }
```

4.19.3.4 `getFileSize()` `float RawdataReader::getFileSize ()`

Definition at line 129 of file [RawdataReader.cc](#).

```
00129 { return m_FileSize; }
```

4.19.3.5 `nextDIFbuffer()` `bool RawdataReader::nextDIFbuffer ()`

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

```
00095 {  
00096     try  
00097     {  
00098         static int DIF_processed{0};  
00099         if(DIF_processed >= m_NumberOfDIF)  
00100         {  
00101             DIF_processed = 0;  
00102             return false;  
00103         }  
00104         else  
00105         {  
00106             DIF_processed++;  
00107             std::uint32_t bsize{0};  
00108             m_FileStream.read(reinterpret_cast<char*>(&bsize), sizeof(std::uint32_t));  
00109             m_FileStream.read(reinterpret_cast<char*>(&m_buf[0]), bsize);  
00110             m_Buffer = Buffer(m_buf);  
00111         }  
00112     }  
00113     catch(const std::ios_base::failure& e)  
00114     {  
00115         log()->error("Caught an ios_base::failure in openFile : {}", e.what());  
00116         return false;  
00117     }  
00118     return true;  
00119 }
```

4.19.3.6 `nextEvent()` `bool RawdataReader::nextEvent ()`

Definition at line 80 of file [RawdataReader.cc](#).

```
00081 {  
00082     try  
00083     {  
00084         m_FileStream.read(reinterpret_cast<char*>(&m_EventNumber), sizeof(std::uint32_t));  
00085         m_FileStream.read(reinterpret_cast<char*>(&m_NumberOfDIF), sizeof(std::uint32_t));  
00086     }  
00087     catch(const std::ios_base::failure& e)  
00088     {  
00089         return false;  
00090     }  
00091     return true;  
00092 }
```

4.19.3.7 openFile() void RawdataReader::openFile (
 const std::string & fileName)

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

```
00060 {
00061     try
00062     {
00063         m_FileStream.rdbuf()->pubsetbuf(0, 0);
00064         m_FileStream.exceptions(std::ifstream::failbit | std::ifstream::badbit);
00065         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
00066         m_FileStream.rdbuf()->pubsetbuf(0, 0);
00067         if(m_FileStream.is_open())
00068         {
00069             setFileSize(m_FileStream.tellg());
00070             m_FileStream.seekg(0, std::ios::beg);
00071         }
00072     }
00073     catch(const std::ios_base::failure& e)
00074     {
00075         log()->error("Caught an ios_base::failure in openFile : {}", e.what());
00076         throw;
00077     }
00078 }
```

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

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

```
00015 { m_BufferSize = size; }
```

4.19.3.9 start() void RawdataReader::start ()

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

```
00023 { openFile(m_Filename); }
```

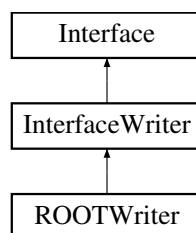
The documentation for this class was generated from the following files:

- [libs/interface/RawDataReader/include/RawdataReader.h](#)
- [libs/interface/RawDataReader/src/RawdataReader.cc](#)

4.20 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 [Payload](#) &)
- void [processFrame](#) (const [Payload](#) &, const std::uint32_t &frameIndex)
- void [processPadInFrame](#) (const [Payload](#) &, 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](#) ()

Additional Inherited Members

4.20.1 Detailed Description

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

4.20.2 Constructor & Destructor Documentation

4.20.2.1 [ROOTWriter\(\)](#) `ROOTWriter::ROOTWriter ()`

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

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

4.20.3 Member Function Documentation

4.20.3.1 [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 }
```


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

Reimplemented from [Interface](#).

Definition at line 76 of file [ROOTWriter.cc](#).

```
00077 {  
00078     m_Event->addDIF(*m_DIF);  
00079     delete m_DIF;  
00080 }
```

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

Reimplemented from [Interface](#).

Definition at line 64 of file [ROOTWriter.cc](#).

```
00065 {  
00066     m_Tree->Fill();  
00067     if(m_Event) delete m_Event;  
00068 }
```

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

Reimplemented from [Interface](#).

Definition at line 88 of file [ROOTWriter.cc](#).

```
00089 {  
00090     m_DIF->addHit(*m_Hit);  
00091     delete m_Hit;  
00092 }
```

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

Reimplemented from [Interface](#).

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

```
00096 {}
```

4.20.3.6 processDIF() void ROOTWriter::processDIF (
const [Payload](#) & 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 }
```

4.20.3.7 processFrame() void ROOTWriter::processFrame (

```
    const Payload & 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 }
```

4.20.3.8 processPadInFrame() void ROOTWriter::processPadInFrame (

```
    const Payload & 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 }
```

4.20.3.9 processSlowControl() void ROOTWriter::processSlowControl (

```
    const Buffer & ) [inline]
```

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

```
00028 { ; }
```

4.20.3.10 setFilename() void ROOTWriter::setFilename (

```
    const std::string & filename )
```

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

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

4.20.3.11 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 }
```

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

Reimplemented from [Interface](#).

Definition at line 70 of file [ROOTWriter.cc](#).

```
00071 {
00072     m_DIF = new DIF();
00073     // m_DIF->clear();
00074 }
```

4.20.3.13 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->setEventNumber(getEventNumber());
00061     // m_Event->clear();
00062 }
```

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

Reimplemented from [Interface](#).

Definition at line 82 of file [ROOTWriter.cc](#).

```
00083 {
00084     m_Hit = new Hit();
00085     // m_Hit->clear();
00086 }
```

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

Reimplemented from [Interface](#).

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

```
00094 {}
```

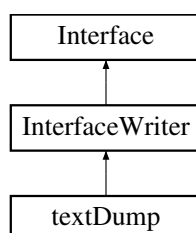
The documentation for this class was generated from the following files:

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

4.21 textDump Class Reference

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

Inheritance diagram for textDump:



Public Member Functions

- [textDump](#) ()
- void [start](#) ()
- void [processDIF](#) (const [Payload](#) &)
- void [processFrame](#) (const [Payload](#) &, uint32_t frameIndex)
- void [processPadInFrame](#) (const [Payload](#) &, 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)

Additional Inherited Members

4.21.1 Detailed Description

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

4.21.2 Constructor & Destructor Documentation

4.21.2.1 [textDump\(\)](#) `textDump::textDump ()`

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

```
00007             : InterfaceWriter ("textDump", "1.0.0")
00008 {
00009     m_InternalLogger = std::make_shared<spdlog::logger>("textDump",
std::make_shared<spdlog::sinks::stdout_color_sink_mt>());
00010     m_InternalLogger->set_level(spdlog::level::trace);
00011     addCompatibility("RawdataReader", ">=1.0.0");
00012     addCompatibility("DIFdataExample", ">=1.0.0");
00013 }
```

4.21.3 Member Function Documentation

4.21.3.1 [end\(\)](#) `void textDump::end ()`

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

```
00031 { print()->info("textDump end of report"); }
```

4.21.3.2 [print\(\)](#) `std::shared_ptr< spdlog::logger > & textDump::print () [inline]`

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

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

4.21.3.3 processDIF() void textDump::processDIF (
const Payload & d)

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

```
00017 { print()->info("DIF_ID : {}, DTC : {}, GTC : {}, DIF BCID {}, Absolute BCID : {}, Nbr frames {}",
    d.getDIFid(), d.getDTC(), d.getGTC(), d.getBCID(), d.getAbsoluteBCID(), d.getNumberOfFrames()); }
```

4.21.3.4 processFrame() void textDump::processFrame (
const Payload & d,
uint32_t frameIndex)

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

```
00020 {
00021     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));
00022 }
```

4.21.3.5 processPadInFrame() void textDump::processPadInFrame (
const Payload & d,
uint32_t frameIndex,
uint32_t channelIndex)

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

```
00025 {
00026     if(d.getThresholdStatus(frameIndex, channelIndex) > 0) { print()->info("\t\tChannel {}, Threshold
{}", channelIndex, d.getThresholdStatus(frameIndex, channelIndex)); }
00027 }
```

4.21.3.6 processSlowControl() void textDump::processSlowControl (
Buffer)

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

```
00029 { print()->error("textDump::processSlowControl not implemented yet."); }
```

4.21.3.7 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); }
```

4.21.3.8 start() void textDump::start ()

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

```
00015 { 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](#)

4.22 Timer Class Reference

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

Public Member Functions

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

4.22.1 Detailed Description

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

4.22.2 Member Function Documentation

4.22.2.1 [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(); }
```

4.22.2.2 [start\(\)](#) void Timer::start () [inline]

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

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

4.22.2.3 [stop\(\)](#) void Timer::stop () [inline]

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

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

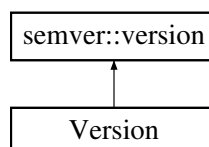
The documentation for this class was generated from the following file:

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

4.23 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 &prt=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](#) ()

4.23.1 Detailed Description

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

4.23.2 Constructor & Destructor Documentation

4.23.2.1 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) {}
```

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

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

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

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

4.23.3 Member Function Documentation

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

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

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

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

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

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

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

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

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

4.23.3.4 `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 }
```

4.23.3.5 `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 <stdint>  
#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 <stdint>
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 "BufferLooperCounter.h"
#include "DetectorId.h"
#include "Formatters.h"
#include "PayloadLoader.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 "BufferLooperCounter.h"
00009 #include "DetectorId.h"
00010 #include "Formatters.h"
00011 #include "PayloadLoader.h"
00012 #include "RawBufferNavigator.h"
00013 #include "Timer.h"
00014 #include "Words.h"
00015
00016 #include <algorithm>
00017 #include <cassert>
00018 #include <fmt/color.h>
00019 #include <map>
00020 #include <memory>
00021 #include <spdlog/sinks/null_sink.h>
00022 #include <spdlog/spdlog.h>
00023 #include <string>
00024 #include <vector>
00025 // function to loop on buffers
00026
00027 template<typename SOURCE, typename DESTINATION> class BufferLooper
00028 {
00029 public:
00030     BufferLooper(SOURCE& source, DESTINATION& dest, bool debug = false) : m_Source(source),
00031         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     void addSink(const spdlog::sink_ptr& sink, const spdlog::level::level_enum& level =
00039         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     void loop(const std::uint32_t& m_NbrEventsToProcess = 0)
00048     {
00049         // clang-format off
00050         fmt::print(fg(fmt::color::medium_orchid) | fmt::emphasis::bold,
00051             "\n"
00052             " SSSSSSSSSSSSSSS      tttt
00053             tttt\n"
00054             "SS:::::::::::::S      ttt::t
00055             ttt::t\n"
00056             "S::::SSSSS:::::S      t::::t
00057             t::::t\n"
00058             "S:::::S      SSSSSS      t::::t
00059             t::::t\n"

```

```

00056 "S::::S      tttttt:::::ttttttt   rrrrr   rrrrrrrrr   eeeeeeeeeee   aaaaaaaaaaaaa
mmmmmmmm   mmmmmmm   oooooooooo   uuuuuu   uuuuuutttttt:::::ttttttt\n"
00057 "S::::S      t:::::t:::::t      r::rrr:::::r   ee:::::ee   a:::::a
mm:::::m   m:::::mm   oo:::::oo   u:::u   u:::ut:::::t\n"
00058 " S::::SSSS   t:::::t      r::rrr:::::r   e:::::e     eeeeeeeeeee:::::a
m:::::mm:::::mm:::::mo:::::ou:::::u   u:::ut:::::t\n"
00059 " SS:::::SSSSStttttt:::::tttttt   rr:::::rrrrr:::::re:::::e   e:::::e   a:::::a
m:::::mm:::::mm:::::mo:::::oooooooo:::::ou:::::u   u:::utttttt:::::ttttttt\n"
00060 " SSS:::::SS   t:::::t      r:::::r   r:::::r   r:::::re:::::e   eeeee:::::e   aaaaaa:::::a
m:::::mmmm:::::mmmm:::::mo:::::o   o:::::ou:::::u   u:::u   t:::::t\n"
00061 " SSSSSS::::S   t:::::t      r:::::r   rrrrrrrre:::::e   aa:::::a   m:::::m
m:::::m   m:::::mo:::::o   o:::::ou:::::u   u:::u   t:::::t\n"
00062 " 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"
00063 " S::::S   t:::::t   ttttttr:::::r   e:::::e   a:::::a   a:::::a   m:::::m
m:::::m   m:::::mo:::::o   o:::::ou:::::uuuu:::::u   t:::::t   tttttt\n"
00064 "SSSSSSS   S::::S   t:::::tttt:::::tr:::::r   e:::::e   a:::::a   a:::::a   m:::::m
m:::::m   m:::::mo:::::oooooooo:::::ou:::::uu   t:::::tttt:::::t\n"
00065 "S:::::SSSSS::::S   tt:::::tr:::::r   e:::::e     eeeeeeeeeee:::::aaaa:::::a   m:::::m
m:::::m   m:::::mo:::::oooooooo:::::ou:::::uu   tt:::::tttt:::::t\n"
00066 "S:::::SS   tt:::::tr:::::r   ee:::::e   a:::::aa:::::am:::::m
m:::::m   m:::::m   oo:::::oo   uu:::::uu:::::u   tt:::::tt\n"
00067 " SSSSSSSSSSSSSS   tttttttttt   rrrrrrr   eeeeeeeeeeeee   aaaaaaaaa   aaaammmmmmm
mmmmmmmm   mmmmmmm   oooooooooo   uuuuuuuu   uuuu   tttttttttt {} \n"
00068 "\n",
00069 fmt::format(fg(fmt::color::red) | fmt::emphasis::bold, "v{}", streamout_version.to_string());
00070 // clang-format on
00071 log()->info("*****");
00072 log()->info("Streamout Version : {}", streamout_version.to_string());
00073 log()->info("Using InterfaceReader {} version {}", m_Source.getName(),
m_Source.getVersion().to_string());
00074 log()->info("Using InterfaceWriter {} version {}", m_Destination.getName(),
m_Destination.getVersion().to_string());
00075
00076 if(!m_Destination.checkCompatibility(m_Source.getName(), m_Source.getVersion().to_string()))
00077 {
00078     log()->critical("{} version {} is not compatible with {} version {} ! ", m_Source.getName(),
m_Source.getVersion().to_string(), m_Destination.getName(), m_Destination.getVersion().to_string());
00079     log()->info("Compatible Interfaces for {} are", m_Destination.getName());
00080     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); }
00081     std::exit(-1);
00082 }
00083 if(!m_DetectorIDs.empty())
00084 {
00085     std::string ids;
00086     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)) + ";";
00087     log()->info("Detector ID(s) other than {} will be ignored", ids);
00088 }
00089 log()->info("*****");
00090 RawBufferNavigator bufferNavigator;
00091 Timer timer;
00092 timer.start();
00093 m_Source.start();
00094 m_Destination.start();
00095 while(m_Source.nextEvent() && m_NbrEventsToProcess >= m_NbrEvents)
00096 {
00097     m_Destination.setEventNumber(m_Source.getEventNumber());
00098     /*****
00099     *** START EVENT ***
00100     m_Source.startEvent();
00101     m_Destination.startEvent();
00102     *****/
00103
00104
00105     m_Logger->warn("==== Event {} =====", m_NbrEvents);
00106     while(m_Source.nextDIFbuffer())
00107     {
00108         const Buffer& buffer = m_Source.getBuffer();
00109
00110         bufferNavigator.setBuffer(buffer);
00111         if(std::find(m_DetectorIDs.begin(), m_DetectorIDs.end(),
static_cast<DetectorID>(bufferNavigator.getDetectorID())) == m_DetectorIDs.end())
00112         {
00113             m_Logger->debug("Ignoring detector ID : {}", bufferNavigator.getDetectorID());
00114             continue;
00115         }
00116
00117         std::int32_t idstart = bufferNavigator.getStartOfPayload();
00118         if(m_Debug && idstart == -1) m_Logger->info(to_hex(buffer));
00119         c.DIFStarter[idstart]++;
00120         if(!bufferNavigator.validPayload())
00121         {
00122             m_Logger->error("!bufferNavigator.validBuffer()");
00123             continue;

```

```

00124     }
00125
00126     /***/
00127     /** START DIF **/
00128     m_Source.startDIF();
00129     m_Destination.startDIF();
00130     /***/
00131
00132     PayloadLoader payloadLoader;
00133
00134     std::unique_ptr<Payload>& d = payloadLoader.getPayload(bufferNavigator.getDetectorID());
00135     if(d == nullptr)
00136     {
00137         m_Logger->error("streamout don't know how to parse the payload for detector_id {} !
00138         SKIPPING !", bufferNavigator.getDetectorID());
00139         continue;
00140     }
00141     // This is really a big error so skip DIF entirely if exception occurs
00142     try
00143     {
00144         d->setBuffer(bufferNavigator.getPayload());
00145         m_Logger->info("Parsing payload DIF_ID {} (detector_id {})", d->getDIFid(),
00146         bufferNavigator.getDetectorID());
00147     }
00148     catch(const Exception& e)
00149     {
00150         m_Logger->error("{} ", e.what());
00151         continue;
00152     }
00153     if(buffer.end() != d->end()) m_Logger->error("DIF BUFFER END {} {} ", fmt::ptr(buffer.end()),
00154     fmt::ptr(d->end()));
00155     assert(buffer.end() == d->end());
00156     c.DIFPtrValueAtReturnedPos[d->begin() [d->getEndOfDIFData() - 3]]++;
00157     assert(d->begin() [d->getEndOfDIFData() - 3] == 0xa0);
00158     c.SizeAfterDIFPtr[d->getSizeAfterDIFPtr()]++;
00159     m_Destination.processDIF(*d);
00160     for(std::size_t i = 0; i < d->getNumberOfFrames(); ++i)
00161     {
00162         //
00163         m_Source.startFrame();
00164         m_Destination.startFrame();
00165         //
00166         m_Destination.processFrame(*d, i);
00167         for(std::size_t j = 0; j < static_cast<std::size_t>(Hardware::NUMBER_PAD); ++j)
00168         {
00169             if(d->getThresholdStatus(i, j) != 0)
00170             {
00171                 m_Source.startPad();
00172                 m_Destination.startPad();
00173                 m_Destination.processPadInFrame(*d, i, j);
00174                 m_Source.endPad();
00175                 m_Destination.endPad();
00176             }
00177         }
00178         //
00179         m_Source.endFrame();
00180         m_Destination.endFrame();
00181         //
00182     }
00183     // If I want SlowControl I need to check for it first, If there is an error then it's not a
00184     big deal just continue and say is bad SlowControl
00185     /*try
00186     {
00187         d.setSCBuffer();
00188     }
00189     catch(const Exception& e)
00190     {
00191         m_Logger->error("{} ", e.what());
00192     }
00193     bool processSC = false;
00194     if(d.hasSlowControl())
00195     {
00196         c.hasSlowControl++;
00197         processSC = true;
00198     }
00199     if(d.badSCData())
00200     {
00201         c.hasBadSlowControl++;
00202         processSC = false;
00203     }
00204     if(processSC) { m_Destination.processSlowControl(d.getSCBuffer()); }*/
00205
00206

```

```

00207         // Buffer eod = d.getEndOfAllData();
00208         // c.SizeAfterAllData[eod.size()]++;
00209         // bit8_t* debug_variable_3 = eod.end();
00210         // if(buffer.end() != debug_variable_3) m_Logger->info("END DATA BUFFER END {} {}",
fmt::ptr(buffer.end()), fmt::ptr(debug_variable_3));
00211         // assert(buffer.end() == debug_variable_3);
00212         // if(eod.size() != 0) m_Logger->info("End of Data remaining stuff : {}", to_hex(eod));*/
00213
00214         /*int nonzeroCount = 0;
00215         for(bit8_t* it = eod.begin(); it != eod.end(); it++)
00216         if(static_cast<int>(*it) != 0) nonzeroCount++;
00217         c.NonZeroValusAtEndOfData[nonzeroCount]++;*/
00218
00219         //
00220         //
00221         m_Source.endDIF();
00222         m_Destination.endDIF();
00223         //
00224     } // end of DIF while loop
00225     m_Logger->warn("====* Event {} *====", m_NbrEvents);
00226     m_NbrEvents++;
00227     /*****
00228     /*** END EVENT ***/
00229     m_Source.endEvent();
00230     m_Destination.endEvent();
00231     *****/
00232     } // end of event while loop
00233     m_Destination.end();
00234     m_Source.end();
00235     timer.stop();
00236     fmt::print(fg(fmt::color::green) | fmt::emphasis::bold, "=== elapsed time {}ms ({}ms/event)
===\n", timer.getElapsedTime() / 1000, timer.getElapsedTime() / (1000 * m_NbrEvents));
00237 }
00238 void printAllCounters() { c.printAllCounters(); }
00239 std::shared_ptr<spdlog::logger> log() { return m_Logger; }
00240
00241 void setDetectorIDs(const std::vector<DetectorID>& detectorIDs) { m_DetectorIDs = detectorIDs; }
00242
00243 private:
00244     std::vector<DetectorID> m_DetectorIDs;
00245     std::shared_ptr<spdlog::logger> m_Logger{nullptr};
00246     std::vector<spdlog::sink_ptr> m_Sinks;
00247     BufferLooperCounter c;
00248     SOURCE& m_Source{nullptr};
00249     DESTINATION& m_Destination{nullptr};
00250     bool m_Debug{false};
00251     std::uint32_t m_NbrEvents{1};
00252 };

```

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 <cstdint>  
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 <cstdint>  
#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 !=
(it->second).end(); jt++) ret += jt->first + " : " + std::to_string(jt->second) + " \n";
00263     }
00264     return ret;
00265 }
```

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 != 0x01 && m_SCbuffer[k] != 0x01 && k < maxsize) || (dif_ID == 0x01 && 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 <cstdint>
#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 <cstdint>
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),
00017         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::processFrame(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     std::uint32_t getEventNumber() { return m_EventNumber; }
00057     void setEventNumber(const std::uint32_t& nbr) { m_EventNumber=nbr; }
00058 protected:
00059     std::uint32_t m_EventNumber{0};
00060 private:
00061     std::shared_ptr<spdlog::logger> m_Logger{nullptr};
00062     std::string m_Name;
00063     Version m_Version;
00064     InterfaceType m_Type{InterfaceType::Unknown};
00065 };
00066 class InterfaceReader : public Interface
00067 {
00068 public:
00069     InterfaceReader(const std::string& name, const std::string& version) : Interface(name, version,
InterfaceType::Reader) {}
00070     virtual ~InterfaceReader() = default;
00071 protected:
00072     Buffer m_Buffer;
00073 };
00074
00075 class InterfaceWriter : public Interface
00076 {
00077 public:
00078     InterfaceWriter(const std::string& name, const std::string& version) : Interface(name, version,
InterfaceType::Writer) {}
00079
00080     void addCompatibility(const std::string& name, const std::string& version) { m_Compatible[name] =
version; }
00081
00082     std::map<std::string, std::string> getCompatibility() { return m_Compatible; }
00083
00084     bool checkCompatibility(const std::string& name, const std::string& version)

```

```

00086 {
00087     if(m_Compatible.find(name) != m_Compatible.end())
00088     {
00089         auto ran = semver::range::detail::range(m_Compatible[name]);
00090         semver::version ver = semver::version(version);
00091         if(ran.satisfies(ver, false)) return true;
00092     }
00093     return false;
00094 }
00095 else
00096     return false;
00097 }
00098 virtual ~InterfaceWriter() = default;
00099 private:
00100     std::map<std::string, std::string> m_Compatible;
00101 };

```

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

```

#include "Buffer.h"
#include "Exception.h"
#include <fmt/format.h>

```

Classes

- class [Payload](#)

5.21.1 Detailed Description

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

5.22 Payload.h

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

```

00001
00004 #pragma once
00005
00006 #include "Buffer.h"
00007 #include "Exception.h"
00008
00009 #include <fmt/format.h>
00010
00011 class Payload : public Buffer
00012 {
00013 public:
00014     explicit Payload(const std::int32_t& detector_id) {}
00015     void setBuffer(const Buffer& buffer);
00016     std::uint32_t getEndOfDIFData() const;
00017     std::uint32_t getSizeAfterDIFPtr() const;
00018     virtual std::uint32_t getNumberOfFrames() const = 0;
00019     virtual std::uint32_t getThresholdStatus(const std::uint32_t&, const std::uint32_t&) const = 0;
00020     virtual std::uint32_t getDIFid() const = 0;
00021     virtual std::uint32_t getDTC() const = 0;
00022     virtual std::uint32_t getGTC() const = 0;
00023     virtual std::uint32_t getBCID() const = 0;
00024     virtual std::uint64_t getAbsoluteBCID() const = 0;
00025     virtual std::uint32_t getASICid(const std::uint32_t&) const = 0;
00026     virtual std::uint32_t getFrameBCID(const std::uint32_t&) const = 0;
00027     virtual std::uint32_t getFrameTimeToTrigger(const std::uint32_t&) const = 0;

```

```

00028
00029     virtual ~Payload() {}
00030
00031 protected:
00032     virtual void parsePayload() = 0;
00033     std::int32_t m_DetectorID{-1};
00034     std::uint32_t theGetFramePtrReturn_{0};
00035 };
00036
00037 inline void Payload::setBuffer(const Buffer& buffer)
00038 {
00039     set(buffer);
00040     parsePayload();
00041 }
00042
00043 inline std::uint32_t Payload::getEndOfDIFData()const { return theGetFramePtrReturn_; }
00044
00045 inline std::uint32_t Payload::getSizeAfterDIFPtr()const { return size() - theGetFramePtrReturn_; }

```

5.23 libs/core/include/Payload100.h File Reference

```

#include "Payload.h"
#include <vector>

```

Classes

- class [Payload100](#)

5.23.1 Detailed Description

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Definition in file [Payload100.h](#).

5.24 Payload100.h

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

```

00001
00005 #pragma once
00006 #include "Payload.h"
00007
00008 #include <vector>
00009
00027 class Payload100 : public Payload
00028 {
00029 public:
00030     Payload100() : Payload(100) {}
00031     bool hasTemperature() const;
00032     bool hasAnalogReadout() const;
00033     virtual std::uint32_t getNumberOfFrames() const final;
00034     virtual std::uint32_t getThresholdStatus(const std::uint32_t&, const std::uint32_t&) const final;
00035     virtual std::uint32_t getDIFid() const final;
00036     virtual std::uint32_t getDTC() const final;
00037     virtual std::uint32_t getGTC() const final;
00038     virtual std::uint32_t getBCID() const final;
00039     virtual std::uint64_t getAbsoluteBCID() const final;
00040     virtual std::uint32_t getASICid(const std::uint32_t&) const final;
00041     virtual std::uint32_t getFrameBCID(const std::uint32_t&) const final;
00042     virtual std::uint32_t getFrameTimeToTrigger(const std::uint32_t&) const final;
00043     virtual ~Payload100();
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 bool          hasLine(const std::uint32_t&) const;
00062
00063 bit8_t*       getFramePtr(const std::uint32_t&) const;
00064
00065 std::uint32_t getDIF_CRC() const;
00066
00067 private:
00068
00069 std::uint32_t getTASU1() const;
00070 std::uint32_t getTASU2() const;
00071 std::uint32_t getTDIF() const;
00072 */
00073
00074 private:
00075     bool          getFrameLevel(const std::uint32_t&, const std::uint32_t&, const std::uint32_t&)
00076     const;
00077     std::uint16_t  m_Version{13};
00078     std::vector<bit8_t*> m_Lines;
00079     std::vector<bit8_t*> m_Frames;
00080     virtual void    parsePayload() final;
00081     std::uint32_t    parseAnalogLine(const std::uint32_t& idx);
00082     std::uint32_t    getNumberLines() const;
00083 };

```

5.25 libs/core/include/Payload150.h File Reference

```

#include "Payload.h"
#include <vector>

```

Classes

- class [Payload150](#)

5.25.1 Detailed Description

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Definition in file [Payload150.h](#).

5.26 Payload150.h

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

```

00001
00005 #pragma once
00006 #include "Payload.h"
00007
00008 #include <vector>
00009
00010 class Payload150 : public Payload

```

```

00011 {
00012 public:
00013     Payload150() : Payload(150) {}
00014     virtual std::uint32_t getNumberOfFrames() const final;
00015     virtual std::uint32_t getThresholdStatus(const std::uint32_t&, const std::uint32_t&) const final;
00016     virtual std::uint32_t getDIFid() const final;
00017     virtual std::uint32_t getDTC() const final;
00018     virtual std::uint32_t getGTC() const final;
00019     virtual std::uint32_t getBCID() const final;
00020     virtual std::uint64_t getAbsoluteBCID() const final;
00021     virtual std::uint32_t getASICid(const std::uint32_t&) const final;
00022     virtual std::uint32_t getFrameBCID(const std::uint32_t&) const final;
00023     virtual std::uint32_t getFrameTimeToTrigger(const std::uint32_t&) const final;
00024     virtual ~Payload150();
00025
00026 private:
00027     bool getFrameLevel(const std::uint32_t&, const std::uint32_t&, const std::uint32_t&)
00028         const;
00029     std::vector<bit8_t*> m_Frames;
00030     virtual void parsePayload() final;
00031 };

```

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

```

#include "Payload.h"
#include "Payload100.h"
#include "Payload150.h"
#include <cstdint>
#include <memory>

```

Classes

- class [PayloadLoader](#)

5.27.1 Detailed Description

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

5.28 PayloadLoader.h

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

```

00001
00005 #pragma once
00006
00007 #include "Payload.h"
00008 #include "Payload100.h"
00009 #include "Payload150.h"
00010
00011 #include <cstdint>
00012 #include <memory>
00013
00014 class PayloadLoader
00015 {
00016 public:
00017     PayloadLoader() = default;
00018     std::unique_ptr<Payload>& getPayload(const std::int32_t& detector_id)
00019     {
00020         switch(detector_id)
00021         {
00022             case 100: payload = std::make_unique<Payload100>(); break;
00023             case 150: payload = std::make_unique<Payload150>(); break;
00024         }
00025         return payload;
00026     }
00027
00028 private:
00029     std::unique_ptr<Payload> payload{nullptr};
00030 };

```

5.29 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](#)

5.29.1 Detailed Description

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

5.30 RawBufferNavigator.h

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

```
00001
00005 #pragma once
00006
00007 #include "Buffer.h"
00008
00024 class RawBufferNavigator
00025 {
00026 public:
00027     static void StartAt(const int& start);
00028     RawBufferNavigator();
00029     ~RawBufferNavigator() = default;
00030     void          setBuffer(const Buffer&);
00031     std::uint32_t getDetectorID();
00032     bool          findStartOfPayload();
00033     std::int32_t  getStartOfPayload();
00034     bool          validPayload();
00035     Buffer         getPayload();
00036
00037 private:
00038     static int    m_Start;
00039     Buffer         m_Buffer;
00040     bool          m_StartPayloadDone{false};
00041     std::int32_t  m_StartPayload{-1}; // -1 Means not found !
00042 };
```

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

```
#include <chrono>
```

Classes

- class [Timer](#)

5.31.1 Detailed Description

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

5.32 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 };
```

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

```
#include <stdint>
```

Functions

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

5.33.1 Detailed Description

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

5.33.2 Function Documentation

5.33.2.1 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 }
```

5.34 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 }
```

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

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

Classes

- class [Version](#)

5.35.1 Detailed Description

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

5.36 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 };

```

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

Enumerations

- enum class [Valueksks](#) : std::uint8_t { [GLOBAL_HEADER](#) = 0xb0 , [GLOBAL_HEADER_TEMP](#) = 0xbb }
- enum class [Hardware](#) : std::uint8_t { [NUMBER_PAD](#) = 64 }

5.37.1 Detailed Description

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

5.37.2 Enumeration Type Documentation

5.37.2.1 Hardware enum class [Hardware](#) : std::uint8_t [strong]

Enumerator

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

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

```

00016 {
00017     NUMBER\_PAD = 64,
00018 };

```

5.37.2.2 Valueksks `enum class Valueksks : std::uint8_t [strong]`

Enumerator

GLOBAL_HEADER	
GLOBAL_HEADER_TEMP	

Definition at line 8 of file [Words.h](#).

```
00009 {
00010     GLOBAL_HEADER      = 0xb0,
00011     GLOBAL_HEADER_TEMP = 0xbb,
00012 };
```

5.38 Words.h

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

```
00001
00005 #pragma once
00006
00007 // TODO(flagarde): SUPPRESS THIS ***
00008 enum class Valueksks : std::uint8_t
00009 {
00010     GLOBAL_HEADER      = 0xb0,
00011     GLOBAL_HEADER_TEMP = 0xbb,
00012 };
00013
00014 // TODO(flagarde): SUPPRESS THIS ***
00015 enum class Hardware : std::uint8_t
00016 {
00017     NUMBER_PAD = 64,
00018 };
```

5.39 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`.

5.39.1 Detailed Description

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

5.39.2 Function Documentation

```
5.39.2.1 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; }
```

5.40 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; }
```

5.41 libs/core/src/BufferLooperCounter.cc File Reference

```
#include "BufferLooperCounter.h"
#include "Formatters.h"
#include <fmt/color.h>
```

5.42 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 }
```

5.43 libs/core/src/DIFSlowControl.cc File Reference

```
#include "DIFSlowControl.h"
```

Functions

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

5.43.1 Detailed Description

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

5.43.2 Function Documentation

5.43.2.1 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 }
```

5.44 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*
00008     cbuf) : m_Version(version), m_DIFId(DIFId), m_AsicType(2)
00009 {
00010     if(cbuf[0] != 0xb1) return;
00011     int header_shift{6};
00012     if(m_Version < 8) m_NbrAsic = cbuf[5];
00013     else
00014     {
00015         m_DIFId = cbuf[1];
00016         m_NbrAsic = cbuf[2];
00017         header_shift = 3;
00018     }
00019     int size_hardroc1 = m_NbrAsic * 72 + header_shift + 1;
00020     if(cbuf[size_hardroc1 - 1] != 0xa1) size_hardroc1 = 0;
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+l], (71-l)*8);
00053             for(int m = 0; m < 8; m++)
00054             {
00055                 if(((1 < m) & cbuf[idx + k * 72 + l]) != 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_Discr1"] = 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_Discr1"] = 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["CmdblFsb1"] = 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["Smalldac"] = 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["Trigl1b"] = 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[asicid] = 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 }

```

5.45 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`)

5.45.1 Detailed Description

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

5.45.2 Function Documentation

5.45.2.1 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 }
```

5.45.2.2 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 }
```

5.45.2.3 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 }
```

5.46 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 }

```

5.47 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)`

5.47.1 Detailed Description

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

5.47.2 Function Documentation

5.47.2.1 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); }
```

5.47.2.2 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); }
```

5.47.2.3 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); }
```

5.47.2.4 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); }
```

5.47.2.5 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 }
```

5.47.2.6 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); }
```

5.47.2.7 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); }
```

5.47.2.8 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); }
```

5.47.2.9 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); }
```

5.47.2.10 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 }
```

5.47.2.11 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); }
```

5.47.2.12 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); }
```

5.47.2.13 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); }
```

5.47.2.14 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); }
```

5.47.2.15 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 }
```

5.47.2.16 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); }
```

5.47.2.17 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); }
```

5.47.2.18 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); }
```

5.47.2.19 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); }
```

```

5.47.2.20 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 }

```

5.48 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); }

```

5.49 libs/core/src/Payload100.cc File Reference

```

#include "Payload100.h"
#include "Utilities.h"

```

Enumerations

- 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 , 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 , PMR_ID_SHIFT = 1 , PMR_NBASIC_SHIFT = 1 , PMR_FORMAT_SHIFT = 1 ,
 PMR_GTC_SHIFT = 3 , PMR_ABCID_SHIFT = 6 , PMR_BCID_SHIFT = 3 , PMR_LTRG_SHIFT = 4 ,
 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 , 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 }

```

5.49.1 Detailed Description

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Definition in file [Payload100.cc](#).

5.49.2 Enumeration Type Documentation

5.49.2.1 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	

Enumerator

BCID	
DATA	
FRAME_TRAILER	
GLOBAL_TRAILER	
CRC_MSB	
CRC_LSB	
SC_HEADER	
DIF_ID	
ASIC_HEADER	
SC_ASIC_SIZE	
SC_TRAILER	
DATA_FORMAT_VERSION	
DAQ_SOFTWARE_VERSION	
SDCC_FIRMWARE_VERSION	
DIF_FIRMWARE_VERSION	
TIMESTAMP_SECONDES	
TIMESTAMP_MILLISECONDS	
GLOBAL_HEADER	
PMR_ID_SHIFT	
PMR_NBASIC_SHIFT	
PMR_FORMAT_SHIFT	
PMR_GTC_SHIFT	
PMR_ABCID_SHIFT	
PMR_BCID_SHIFT	
PMR_LTRG_SHIFT	
HEADER_LINE	
NUMBER_CHIPS	
LINE_SIZE	
TRAILER_LINE	
FRAME_HEADER	
MICROROC_HEADER	
BCID	
DATA	
FRAME_TRAILER	
GLOBAL_TRAILER	
CRC_MSB	
CRC_LSB	
SC_HEADER	
DIF_ID	
ASIC_HEADER	
SC_ASIC_SIZE	
SC_TRAILER	

Definition at line 9 of file [Payload100.cc](#).

```

00010 {
00011     // Header
00012     DATA_FORMAT_VERSION    = 1,
00013     DAQ_SOFTWARE_VERSION    = 2,
00014     SDCC_FIRMWARE_VERSION   = 2,
00015     DIF_FIRMWARE_VERSION    = 2,
00016     TIMESTAMP_SECONDES      = 4,
00017     TIMESTAMP_MILLISECONDS  = 4,

```

```

00018 // Payload
00019 GLOBAL_HEADER      = 1,
00020 DIF_IF             = 1,
00021 DIF_TRIGGER_COUNTER = 4,
00022 INFORMATION_COUNTER = 4,
00023 GLOBAL_TRIGGER_COUNTER = 4,
00024 ABSOLUTE_BCID      = 6,
00025 BCID_DIF            = 3,
00026 NUMBER_LINE        = 1,
00027 TEMP_ASU1          = 4,
00028 TEMP_ASU2          = 4,
00029 TEMP_DIF           = 1,
00030 HEADER_LINE        = 1,
00031 NUMBER_CHIPS       = 1,
00032 LINE_SIZE          = 64 * 2,
00033 TRAILER_LINE       = 1,
00034 FRAME_HEADER       = 1,
00035 MICROROC_HEADER    = 1,
00036 BCID               = 3,
00037 DATA              = 16,
00038 FRAME_TRAILER      = 1,
00039 GLOBAL_TRAILER     = 1,
00040 CRC_MSB            = 1,
00041 CRC_LSB            = 1,
00042 // Slowcontrol
00043 SC_HEADER          = 1,
00044 DIF_ID             = 1,
00045 ASIC_HEADER        = 1,
00046 SC_ASIC_SIZE       = 1,
00047 SC_TRAILER         = 1
00048 };

```

5.49.2.2 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	
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 54 of file [Payload100.cc](#).

```

00055 {
00056     GLOBAL_HEADER      = 0xb0,
00057     GLOBAL_HEADER_TEMP = 0xbb,
00058     HEADER_LINE        = 0xc4,
00059     TRAILER_LINE       = 0xd4,

```

```

00060     FRAME_HEADER       = 0xb4,
00061     FRAME_TRAILER      = 0xa3,
00062     FRAME_TRAILER_ERROR = 0xc3,
00063     GLOBAL_TRAILER     = 0xa0,
00064     SC_HEADER          = 0xb1,
00065     SC_TRAILER         = 0xa1
00066 };

```

5.50 Payload100.cc

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

```

00001
00005 #include "Payload100.h"
00006
00007 #include "Utilities.h"
00008
00009 enum class Size : std::uint8_t
00010 {
00011     // Header
00012     DATA_FORMAT_VERSION = 1,
00013     DAQ_SOFTWARE_VERSION = 2,
00014     SDCC_FIRMWARE_VERSION = 2,
00015     DIF_FIRMWARE_VERSION = 2,
00016     TIMESTAMP_SECONDES = 4,
00017     TIMESTAMP_MILLISECONDS = 4,
00018     // Payload
00019     GLOBAL_HEADER = 1,
00020     DIF_IF = 1,
00021     DIF_TRIGGER_COUNTER = 4,
00022     INFORMATION_COUNTER = 4,
00023     GLOBAL_TRIGGER_COUNTER = 4,
00024     ABSOLUTE_BCID = 6,
00025     BCID_DIF = 3,
00026     NUMBER_LINE = 1,
00027     TEMP_ASU1 = 4,
00028     TEMP_ASU2 = 4,
00029     TEMP_DIF = 1,
00030     HEADER_LINE = 1,
00031     NUMBER_CHIPS = 1,
00032     LINE_SIZE = 64 * 2,
00033     TRAILER_LINE = 1,
00034     FRAME_HEADER = 1,
00035     MICROROC_HEADER = 1,
00036     BCID = 3,
00037     DATA = 16,
00038     FRAME_TRAILER = 1,
00039     GLOBAL_TRAILER = 1,
00040     CRC_MSB = 1,
00041     CRC_LSB = 1,
00042     // Slowcontrol
00043     SC_HEADER = 1,
00044     DIF_ID = 1,
00045     ASIC_HEADER = 1,
00046     SC_ASIC_SIZE = 1,
00047     SC_TRAILER = 1
00048 };
00049
00050 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); }
00051 static inline std::uint32_t operator+(const std::uint32_t& a, const Size& b) { return a +
static_cast<std::uint32_t>(b); }
00052 static inline std::uint32_t operator+(const Size& a) { return static_cast<std::uint32_t>(a); }
00053
00054 enum class Value : std::uint8_t
00055 {
00056     GLOBAL_HEADER = 0xb0,
00057     GLOBAL_HEADER_TEMP = 0xbb,
00058     HEADER_LINE = 0xc4,
00059     TRAILER_LINE = 0xd4,
00060     FRAME_HEADER = 0xb4,
00061     FRAME_TRAILER = 0xa3,
00062     FRAME_TRAILER_ERROR = 0xc3,
00063     GLOBAL_TRAILER = 0xa0,
00064     SC_HEADER = 0xb1,
00065     SC_TRAILER = 0xa1
00066 };
00067
00068 inline void Payload100::parsePayload()
00069 {
00070     m_Frames.clear();
00071     m_Lines.clear();
00072     std::uint32_t fshift{static_cast<std::uint32_t>(Size::GLOBAL_HEADER)}; // Pass Global Header

```

```

00073     if(m_Version >= 13)
00074     {
00075         // Pass DIF_ID, DIF Trigger counter, Information counter, Global Trigger counter, Absolute BCID,
        BCID DIF, NB line
00076         fshift += Size::DIF_IF + Size::DIF_TRIGGER_COUNTER + Size::INFORMATION_COUNTER +
        Size::GLOBAL_TRIGGER_COUNTER + Size::ABSOLUTE_BCID + Size::BCID_DIF + Size::NUMBER_LINE;
00077         // If has temperature infos then pass Temp ASU 1, Temp ASU 2, Temp DIF
00078         if(hasTemperature()) fshift += Size::TEMP_ASU1 + Size::TEMP_ASU2 + Size::TEMP_DIF;
00079         // If has AnalogReadout pass them
00080         if(hasAnalogReadout()) fshift = parseAnalogLine(fshift); // to be implemented
00081     }
00082     else
00083         throw Exception(fmt::format("Version {} is not implemented", m_Version));
00084
00085     while(static_cast<std::uint8_t>(begin()[fshift]) !=
        static_cast<std::uint8_t>(Value::GLOBAL_TRAILER))
00086     {
00087         // If I found a FRAME_HEADER there is 2 cases :
00088         // 1) Nothing inside so FRAME_TRAILER comes just after
00089         // 2) Come MICROROC Header, BCID, DATA max 128 times
00090         if(static_cast<std::uint8_t>(begin()[fshift]) == static_cast<std::uint8_t>(Value::FRAME_HEADER))
00091         {
00092             fshift += +Size::FRAME_HEADER;
00093             if(static_cast<std::uint8_t>(begin()[fshift]) == static_cast<std::uint8_t>(Value::FRAME_TRAILER))
00094             || static_cast<std::uint8_t>(begin()[fshift]) ==
        static_cast<std::uint8_t>(Value::FRAME_TRAILER_ERROR)) { fshift += +Size::FRAME_TRAILER; }
00095         }
00096         else
00097         {
00098             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))
00099             {
00100                 m_Frames.push_back(&begin()[fshift]);
00101                 fshift += Size::MICROROC_HEADER + Size::BCID + Size::DATA;
00102             }
00103         }
00104     }
00105     // Pass Global trailer
00106     fshift += +Size::GLOBAL_TRAILER;
00107     // Pass CRC MSB, CRC LSB
00108     fshift += Size::CRC_MSB + Size::CRC_LSB;
00109     theGetFramePtrReturn_ = fshift;
00110 }
00111
00112 inline bool Payload100::hasTemperature()const { return (static_cast<std::uint8_t>(begin()[0]) ==
        static_cast<std::uint8_t>(Value::GLOBAL_HEADER_TEMP)); }
00113
00114 inline bool Payload100::hasAnalogReadout()const { return getNumberLines() != 0; }
00115
00116 inline std::uint32_t Payload100::getNumberLines()const
00117 {
00118     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};
00119     return ((begin()[shift] >> 4) & 0x5);
00120 }
00121
00122 inline std::uint32_t Payload100::parseAnalogLine(const std::uint32_t& idx)
00123 {
00124     std::uint32_t fshift{idx};
00125     // Pass Header line
00126     if(static_cast<std::uint8_t>(begin()[fshift]) != static_cast<std::uint8_t>(Value::HEADER_LINE))
        return fshift;
00127     else
00128     {
00129         fshift += +Size::HEADER_LINE;
00130         while(static_cast<std::uint8_t>(begin()[fshift]) != static_cast<std::uint8_t>(Value::TRAILER_LINE))
00131         {
00132             m_Lines.push_back(&begin()[fshift]);
00133             // Get Number of CHIPS
00134             std::uint32_t nchip{begin()[fshift]};
00135             // Pass Number of CHIPS, NB Asicline*64*16bits
00136             fshift += +Size::NUMBER_CHIPS + static_cast<std::uint32_t>(Size::LINE_SIZE) * nchip;
00137         }
00138         // Pass Trailer line
00139         fshift += +Size::TRAILER_LINE;
00140     }
00141 }
00142 inline std::uint32_t Payload100::getNumberOfFrames()const { return m_Frames.size(); }
00143
00144 inline std::uint32_t Payload100::getThresholdStatus(const std::uint32_t& i, const std::uint32_t&
        ipad)const { return (((std::uint32_t)getFrameLevel(i, ipad, 1))) | ((std::uint32_t)getFrameLevel(i,
        ipad, 0) << 1); }
00145
00146 inline bool Payload100::getFrameLevel(const std::uint32_t& i, const std::uint32_t& ipad, const
        std::uint32_t& ilevel)const

```

```

00147 {
00148     std::uint32_t shift{Size::MICROROC_HEADER + Size::BCID};
00149     return ((m_Frames[i][shift + ((3 - ipad / 16) * 4 + (ipad % 16) / 4)] » (7 - (((ipad % 16) % 4) * 2
+ ilevel))) & 0x1);
00150 }
00151
00152 inline std::uint32_t Payload100::getDIFid() const
00153 {
00154     std::uint32_t shift{+Size::GLOBAL_HEADER};
00155     return begin()[shift] & 0xFF;
00156 }
00157
00158 inline std::uint32_t Payload100::getDTC() const
00159 {
00160     std::uint32_t shift{Size::GLOBAL_HEADER + Size::DIF_IF};
00161     return (begin()[shift] « 24) + (begin()[shift + 1] « 16) + (begin()[shift + 2] « 8) + begin()[shift
+ 3];
00162 }
00163
00164 inline std::uint32_t Payload100::getGTC() const
00165 {
00166     std::uint32_t shift{Size::GLOBAL_HEADER + Size::DIF_IF + Size::DIF_TRIGGER_COUNTER +
Size::INFORMATION_COUNTER};
00167     return (begin()[shift] « 24) + (begin()[shift + 1] « 16) + (begin()[shift + 2] « 8) + begin()[shift
+ 3];
00168 }
00169
00170 inline std::uint32_t Payload100::getBCID() const
00171 {
00172     std::uint32_t shift{Size::GLOBAL_HEADER + Size::DIF_IF + Size::DIF_TRIGGER_COUNTER +
Size::INFORMATION_COUNTER + Size::GLOBAL_TRIGGER_COUNTER + Size::ABSOLUTE_BCID};
00173     return (begin()[shift] « 16) + (begin()[shift + 1] « 8) + begin()[shift + 2];
00174 }
00175
00176 inline std::uint64_t Payload100::getAbsoluteBCID() const
00177 {
00178     std::uint32_t shift{Size::GLOBAL_HEADER + Size::DIF_IF + Size::DIF_TRIGGER_COUNTER +
Size::INFORMATION_COUNTER + Size::GLOBAL_TRIGGER_COUNTER};
00179     std::uint64_t LBC = ((begin()[shift] « 16) | (begin()[shift + 1] « 8) | (begin()[shift + 2])) *
16777216ULL + ((begin()[shift + 3] « 16) | (begin()[shift + 4] « 8) | (begin()[shift + 5]));
00180     return LBC;
00181 }
00182
00183 inline std::uint32_t Payload100::getASICid(const std::uint32_t& i) const { return m_Frames[i][0] &
0xFF; }
00184
00185 inline std::uint32_t Payload100::getFrameBCID(const std::uint32_t& i) const
00186 {
00187     std::uint32_t shift{+Size::MICROROC_HEADER};
00188     return GrayToBin((m_Frames[i][shift] « 16) + (m_Frames[i][shift + 1] « 8) + m_Frames[i][shift + 2]);
00189 }
00190
00191 inline std::uint32_t Payload100::getFrameTimeToTrigger(const std::uint32_t& i) const { return getBCID()
- getFrameBCID(i); }
00192
00193 Payload100::~Payload100() {}
00194 /*
00195 inline bool Payload100::hasSlowControl() const { return theGetFramePtrReturn_ != size(); }
00196
00197 inline std::uint32_t Payload100::getTASU1() const
00198 {
00199     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};
00200     return (begin()[shift] « 24) + (begin()[shift + 1] « 16) + (begin()[shift + 2] « 8) + begin()[shift +
3];
00201 }
00202
00203 inline std::uint32_t Payload100::getTASU2() const
00204 {
00205     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};
00206     return (begin()[shift] « 24) + (begin()[shift + 1] « 16) + (begin()[shift + 2] « 8) + begin()[shift +
3];
00207 }
00208
00209 inline std::uint32_t Payload100::getTDIF() const
00210 {
00211     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};
00212     return begin()[shift];
00213 }
00214
00215 inline float Payload100::getTemperatureDIF() const
00216 {

```

```

00217 if(!hasTemperature()) throw Exception("Don't have TemperatureDIF information");
00218 return 0.508 * getTDIF() - 9.659;
00219 }
00220
00221 inline float Payload100::getTemperatureASU1() const
00222 {
00223 if(!hasTemperature()) throw Exception("Don't have TemperatureASU1 information");
00224 return (getTASU1() >> 3) * 0.0625;
00225 }
00226
00227 inline float Payload100::getTemperatureASU2() const
00228 {
00229 if(!hasTemperature()) throw Exception("Don't have TemperatureASU2 information");
00230 return (getTASU2() >> 3) * 0.0625;
00231 }
00232
00233 inline Buffer Payload100::getSlowControl() const
00234 {
00235 if(hasSlowControl()) return Buffer(&begin()[getEndOfDIFData()], size() - getEndOfDIFData());
00236 else
00237 return Buffer();
00238 }
00239
00240 inline std::vector<bit8_t> Payload100::getFramesVector() const { return m_Frames; }
00241
00242 inline std::vector<bit8_t> Payload100::getLinesVector() const { return m_Lines; }
00243
00244 inline bool Payload100::hasLine(const std::uint32_t& line) const
00245 {
00246 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};
00247 return ((begin()[shift] >> line) & 0x1);
00248 }
00249
00250 inline bit8_t* Payload100::getFramePtr(const std::uint32_t& i) const { return m_Frames[i]; }
00251
00252 inline std::uint32_t Payload100::getDIF_CRC() const
00253 {
00254 std::uint32_t shift{getEndOfDIFData() - (Size::CRC_MSB + Size::CRC_LSB)};
00255 return (begin()[shift] << 8) + begin()[shift + 1];
00256 }
00257
00258 */

```

5.51 libs/core/src/Payload150.cc File Reference

```

#include "Payload150.h"
#include "Utilities.h"

```

Enumerations

- 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 , [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 , [PMR_ID_SHIFT](#) = 1 , [PMR_NBASIC_SHIFT](#) = 1 , [PMR_FORMAT_SHIFT](#) = 1 ,
 [PMR_GTC_SHIFT](#) = 3 , [PMR_ABCID_SHIFT](#) = 6 , [PMR_BCID_SHIFT](#) = 3 , [PMR_LTRG_SHIFT](#) = 4 ,


```

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 , 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 }

```

5.51.1 Detailed Description

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Definition in file [Payload150.cc](#).

5.51.2 Enumeration Type Documentation

5.51.2.1 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	

Enumerator

LINE_SIZE	
TRAILER_LINE	
FRAME_HEADER	
MICROROC_HEADER	
BCID	
DATA	
FRAME_TRAILER	
GLOBAL_TRAILER	
CRC_MSB	
CRC_LSB	
SC_HEADER	
DIF_ID	
ASIC_HEADER	
SC_ASIC_SIZE	
SC_TRAILER	
DATA_FORMAT_VERSION	
DAQ_SOFTWARE_VERSION	
SDCC_FIRMWARE_VERSION	
DIF_FIRMWARE_VERSION	
TIMESTAMP_SECONDES	
TIMESTAMP_MILLISECONDS	
GLOBAL_HEADER	
PMR_ID_SHIFT	
PMR_NBASIC_SHIFT	
PMR_FORMAT_SHIFT	
PMR_GTC_SHIFT	
PMR_ABCID_SHIFT	
PMR_BCID_SHIFT	
PMR_LTRG_SHIFT	
HEADER_LINE	
NUMBER_CHIPS	
LINE_SIZE	
TRAILER_LINE	
FRAME_HEADER	
MICROROC_HEADER	
BCID	
DATA	
FRAME_TRAILER	
GLOBAL_TRAILER	
CRC_MSB	
CRC_LSB	
SC_HEADER	
DIF_ID	
ASIC_HEADER	
SC_ASIC_SIZE	
SC_TRAILER	

Definition at line 9 of file [Payload150.cc](#).

00010 {

```

00011  // Header
00012  DATA_FORMAT_VERSION    = 1,
00013  DAQ_SOFTWARE_VERSION    = 2,
00014  SDCC_FIRMWARE_VERSION   = 2,
00015  DIF_FIRMWARE_VERSION    = 2,
00016  TIMESTAMP_SECONDS       = 4,
00017  TIMESTAMP_MILLISECONDS  = 4,
00018  // Payload
00019  GLOBAL_HEADER           = 1,
00020  PMR_ID_SHIFT            = 1,
00021  PMR_NBASIC_SHIFT        = 1,
00022  PMR_FORMAT_SHIFT        = 1,
00023  PMR_GTC_SHIFT           = 3,
00024  PMR_ABCID_SHIFT         = 6,
00025  PMR_BCID_SHIFT          = 3,
00026  PMR_LTRG_SHIFT          = 4,
00027  //
00028  HEADER_LINE             = 1,
00029  NUMBER_CHIPS            = 1,
00030  LINE_SIZE               = 64 * 2,
00031  TRAILER_LINE            = 1,
00032  FRAME_HEADER            = 1,
00033  MICROROC_HEADER        = 1,
00034  BCID                   = 3,
00035  DATA                   = 16,
00036  FRAME_TRAILER           = 1,
00037  GLOBAL_TRAILER          = 1,
00038  CRC_MSB                 = 1,
00039  CRC_LSB                 = 1,
00040  // Slowcontrol
00041  SC_HEADER               = 1,
00042  DIF_ID                  = 1,
00043  ASIC_HEADER             = 1,
00044  SC_ASIC_SIZE            = 1,
00045  SC_TRAILER              = 1
00046 };

```

5.51.2.2 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
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 48 of file [Payload150.cc](#).

```

00049 {
00050     GLOBAL_HEADER           = 0xb0,
00051     GLOBAL_HEADER_TEMP     = 0xbb,
00052     HEADER_LINE            = 0xc4,
00053     TRAILER_LINE           = 0xd4,
00054     FRAME_HEADER           = 0xb4,
00055     FRAME_TRAILER          = 0xa3,
00056     FRAME_TRAILER_ERROR    = 0xc3,
00057     GLOBAL_TRAILER         = 0xa0,
00058     SC_HEADER              = 0xb1,
00059     SC_TRAILER             = 0xa1
00060 };

```

5.52 Payload150.cc

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

```

00001
00005 #include "Payload150.h"
00006
00007 #include "Utilities.h"
00008
00009 enum class Size : std::uint8_t
00010 {
00011     // Header
00012     DATA_FORMAT_VERSION     = 1,
00013     DAQ_SOFTWARE_VERSION     = 2,
00014     SDCC_FIRMWARE_VERSION    = 2,
00015     DIF_FIRMWARE_VERSION     = 2,
00016     TIMESTAMP_SECONDES       = 4,
00017     TIMESTAMP_MILLISECONDS   = 4,
00018     // Payload
00019     GLOBAL_HEADER            = 1,
00020     PMR_ID_SHIFT             = 1,
00021     PMR_NBASIC_SHIFT         = 1,
00022     PMR_FORMAT_SHIFT         = 1,
00023     PMR_GTC_SHIFT            = 3,
00024     PMR_ABCID_SHIFT          = 6,
00025     PMR_BCID_SHIFT           = 3,
00026     PMR_LTRG_SHIFT           = 4,
00027     //
00028     HEADER_LINE              = 1,
00029     NUMBER_CHIPS              = 1,
00030     LINE_SIZE                 = 64 * 2,
00031     TRAILER_LINE             = 1,
00032     FRAME_HEADER              = 1,
00033     MICROROC_HEADER          = 1,
00034     BCID                     = 3,
00035     DATA                    = 16,
00036     FRAME_TRAILER            = 1,
00037     GLOBAL_TRAILER           = 1,
00038     CRC_MSB                  = 1,
00039     CRC_LSB                   = 1,
00040     // Slowcontrol
00041     SC_HEADER                = 1,
00042     DIF_ID                   = 1,
00043     ASIC_HEADER              = 1,
00044     SC_ASIC_SIZE             = 1,
00045     SC_TRAILER               = 1
00046 };
00047
00048 enum class Value : std::uint8_t
00049 {
00050     GLOBAL_HEADER           = 0xb0,
00051     GLOBAL_HEADER_TEMP     = 0xbb,
00052     HEADER_LINE            = 0xc4,
00053     TRAILER_LINE           = 0xd4,
00054     FRAME_HEADER           = 0xb4,
00055     FRAME_TRAILER          = 0xa3,
00056     FRAME_TRAILER_ERROR    = 0xc3,
00057     GLOBAL_TRAILER         = 0xa0,
00058     SC_HEADER              = 0xb1,
00059     SC_TRAILER             = 0xa1
00060 };
00061
00062 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); }
00063 static inline std::uint32_t operator+(const std::uint32_t& a, const Size& b) { return a +
    static_cast<std::uint32_t>(b); }
00064 static inline std::uint32_t operator+(const Size& a) { return static_cast<std::uint32_t>(a); }
00065
00066 inline void Payload150::parsePayload()
00067 {

```

```

00068     m_Frames.clear();
00069     std::uint32_t fshift{static_cast<std::uint32_t>(Size::GLOBAL_HEADER)}; // Pass Global Header
00070     // Pass DIF_ID, DIF Trigger counter, Information counter, Global Trigger counter, Absolute BCID,
    BCID DIF, NB line
00071     fshift += Size::PMR_ID_SHIFT + Size::PMR_NBASIC_SHIFT + Size::PMR_FORMAT_SHIFT + Size::PMR_GTC_SHIFT
+ Size::PMR_ABCID_SHIFT + Size::PMR_BCID_SHIFT + Size::PMR_LTRG_SHIFT;
00072     while(static_cast<std::uint8_t>(begin()[fshift]) !=
static_cast<std::uint8_t>(Value::GLOBAL_TRAILER))
00073     {
00074         m_Frames.push_back(&begin()[fshift]);
00075         fshift += Size::MICROROC_HEADER + Size::BCID + Size::DATA;
00076     }
00077     // Pass Global trailer
00078     fshift += +Size::GLOBAL_TRAILER;
00079     // Pass CRC MSB, CRC LSB
00080     fshift += Size::CRC_MSB + Size::CRC_LSB;
00081     theGetFramePtrReturn_ = fshift;
00082 }
00083
00084 inline std::uint32_t Payload150::getNumberOfFrames()const { return m_Frames.size(); }
00085
00086 inline std::uint32_t Payload150::getThresholdStatus(const std::uint32_t& i, const std::uint32_t&
ipad)const { return (((std::uint32_t)getFrameLevel(i, ipad, 1))) | ((std::uint32_t)getFrameLevel(i,
ipad, 0) << 1); }
00087
00088 inline bool Payload150::getFrameLevel(const std::uint32_t& i, const std::uint32_t& ipad, const
std::uint32_t& ilevel)const
00089 {
00090     std::uint32_t shift{Size::MICROROC_HEADER + Size::BCID};
00091     return ((m_Frames[i][shift + ((3 - ipad / 16) * 4 + (ipad % 16) / 4)] >> (7 - ((ipad % 16) % 4) * 2
+ ilevel))) & 0x1;
00092 }
00093
00094 inline std::uint32_t Payload150::getDIFid()const
00095 {
00096     std::uint32_t shift{+Size::GLOBAL_HEADER};
00097     return begin()[shift] & 0xFF;
00098 }
00099
00100 inline std::uint32_t Payload150::getGTC()const
00101 {
00102     std::uint32_t shift{Size::GLOBAL_HEADER + Size::PMR_ID_SHIFT + Size::PMR_NBASIC_SHIFT +
Size::PMR_FORMAT_SHIFT};
00103     return (begin()[shift] << 16) + (begin()[shift + 1] << 8) + begin()[shift + 2];
00104 }
00105
00106 inline std::uint64_t Payload150::getAbsoluteBCID()const
00107 {
00108     std::uint32_t shift{Size::GLOBAL_HEADER + Size::PMR_ID_SHIFT + Size::PMR_NBASIC_SHIFT +
Size::PMR_FORMAT_SHIFT + Size::PMR_GTC_SHIFT};
00109     std::uint64_t LBC = ((begin()[shift] << 8) | (begin()[shift + 1])) * 16777216ULL + ((begin()[shift +
2] << 24) | (begin()[shift + 3] << 16) | (begin()[shift + 4] << 8) | begin()[shift + 5]);
00110     return LBC;
00111 }
00112
00113 inline std::uint32_t Payload150::getDTC()const
00114 {
00115     // MAYBE NOR USEFUL
00116     std::uint32_t shift{};
00117     return (begin()[shift] << 24) + (begin()[shift + 1] << 16) + (begin()[shift + 2] << 8) + begin()[shift
+ 3];
00118 }
00119
00120 inline std::uint32_t Payload150::getBCID()const
00121 {
00122     std::uint32_t shift{Size::GLOBAL_HEADER + Size::PMR_ID_SHIFT + Size::PMR_NBASIC_SHIFT +
Size::PMR_FORMAT_SHIFT + Size::PMR_GTC_SHIFT + Size::PMR_ABCID_SHIFT};
00123     return (begin()[shift] << 16) + (begin()[shift + 1] << 8) + begin()[shift + 2];
00124 }
00125
00126 inline std::uint32_t Payload150::getASICid(const std::uint32_t& i)const { return m_Frames[i][0] &
0xFF; }
00127
00128 inline std::uint32_t Payload150::getFrameBCID(const std::uint32_t& i)const
00129 {
00130     std::uint32_t shift{+Size::MICROROC_HEADER};
00131     return GrayToBin((m_Frames[i][shift] << 16) + (m_Frames[i][shift + 1] << 8) + m_Frames[i][shift + 2]);
00132 }
00133
00134 inline std::uint32_t Payload150::getFrameTimeToTrigger(const std::uint32_t& i)const { return getBCID()
- getFrameBCID(i); }
00135
00136 Payload150::~Payload150() {}

```

5.53 libs/core/src/RawBufferNavigator.cc File Reference

```
#include "RawBufferNavigator.h"
#include "Words.h"
```

5.53.1 Detailed Description

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

5.54 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::uint32_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>(Valueksks::GLOBAL_HEADER)
|| static_cast<std::uint8_t>(m_Buffer[i]) == static_cast<std::uint8_t>(Valueksks::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); }
```

5.55 libs/core/src/Version.cc File Reference

```
#include "Version.h"
```

5.55.1 Detailed Description

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

5.56 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; }
```

5.57 libs/interface/Dump/include/textDump.h File Reference

```
#include "Interface.h"
#include "Payload.h"
#include "spdlog/sinks/stdout_color_sinks.h"
#include <memory>
#include <spdlog/logger.h>
```

Classes

- class [textDump](#)

5.57.1 Detailed Description

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

5.58 textDump.h

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

```

00001
00005 #pragma once
00006
00007 #include "Interface.h"
00008 #include "Payload.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 Payload&);
00020     void processFrame(const Payload&, uint32_t frameIndex);
00021     void processPadInFrame(const Payload&, 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 };

```

5.59 libs/interface/Dump/src/textDump.cc File Reference

```
#include "textDump.h"
```

5.59.1 Detailed Description

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Definition in file [textDump.cc](#).

5.60 textDump.cc

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

```

00001
00005 #include "textDump.h"
00006
00007 textDump::textDump() : InterfaceWriter("textDump", "1.0.0")
00008 {
00009     m_InternalLogger = std::make_shared<spdlog::logger>("textDump",
std::make_shared<spdlog::sinks::stdout_color_sink_mt>());
00010     m_InternalLogger->set_level(spdlog::level::trace);
00011     addCompatibility("RawdataReader", ">=1.0.0");
00012     addCompatibility("DIFdataExample", ">=1.0.0");
00013 }
00014
00015 void textDump::start() { print()->info("Will dump bunch of DIF data"); }
00016
00017 void textDump::processDIF(const Payload& d) { print()->info("DIF_ID : {}, DTC : {}, GTC : {}, DIF BCID
{}, Absolute BCID : {}, Nbr frames {}", d.getDIFid(), d.getDTC(), d.getGTC(), d.getBCID(),
d.getAbsoluteBCID(), d.getNumberOfFrames()); }
00018

```



```

00019 void textDump::processFrame(const Payload& d, uint32_t frameIndex)
00020 {
00021     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));
00022 }
00023
00024 void textDump::processPadInFrame(const Payload& d, uint32_t frameIndex, uint32_t channelIndex)
00025 {
00026     if(d.getThresholdStatus(frameIndex, channelIndex) > 0) { print()->info("\t\tChannel {}, Threshold
{}", channelIndex, d.getThresholdStatus(frameIndex, channelIndex)); }
00027 }
00028
00029 void textDump::processSlowControl(Buffer) { print()->error("textDump::processSlowControl not
implemented yet."); }
00030
00031 void textDump::end() { print()->info("textDump end of report"); }

```

5.61 libs/interface/LCIO/include/LCIOWriter.h File Reference

```

#include "EVENT/LCIO.h"
#include "IMPL/LCCollectionVec.h"
#include "IMPL/LCEventImpl.h"
#include "IMPL/RawCalorimeterHitImpl.h"
#include "IO/LCWriter.h"
#include "Interface.h"
#include "Payload.h"
#include <memory>
#include <string>
#include <vector>

```

Classes

- class [LCIOWriter](#)

5.61.1 Detailed Description

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

5.62 LCIOWriter.h

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

```

00001
00005 #pragma once
00006
00007 #include "EVENT/LCIO.h"
00008 #include "IMPL/LCCollectionVec.h"
00009 #include "IMPL/LCEventImpl.h"
00010 #include "IMPL/RawCalorimeterHitImpl.h"
00011 #include "IO/LCWriter.h"
00012 #include "Interface.h"
00013 #include "Payload.h"
00014
00015 #include <memory>
00016 #include <string>
00017 #include <vector>
00018

```

```

00019 class LCIOWriter : public InterfaceWriter
00020 {
00021 public:
00022     LCIOWriter();
00023
00024     void setFilename(const std::string&);
00025
00026     void start();
00027     void processDIF(const Payload&);
00028     void processFrame(const Payload&, const std::uint32_t& frameIndex);
00029     void processPadInFrame(const Payload&, const std::uint32_t& frameIndex, const std::uint32_t&
channelIndex);
00030     void processSlowControl(const Buffer&) { ; }
00031     void end();
00032
00033     virtual void startEvent();
00034     virtual void endEvent();
00035     virtual void startDIF();
00036     virtual void endDIF();
00037     virtual void startFrame();
00038     virtual void endFrame();
00039     virtual void startPad();
00040     virtual void endPad();
00041
00042 private:
00043     std::unique_ptr<IO::LCWriter> m_LCWriter{nullptr};
00044     std::unique_ptr<IMPL::LCEventImpl> m_LCEvent{nullptr};
00045     IMPL::LCCollectionVec* m_CollectionVec{nullptr};
00046     std::string m_DetectorName{"SDHCAL_prototype"};
00047     std::string m_Filename;
00048 };

```

5.63 libs/interface/LCIO/src/LCIOWriter.cc File Reference

```

#include "LCIOWriter.h"
#include "IMPL/LCFlagImpl.h"
#include "IMPL/LCParametersImpl.h"
#include "IMPL/LCRunHeaderImpl.h"
#include "IOIMPL/LCFactory.h"
#include "LCIOSTLTypes.h"

```

5.63.1 Detailed Description

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Definition in file [LCIOWriter.cc](#).

5.64 LCIOWriter.cc

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

```

00001
00009 #include "LCIOWriter.h"
00010
00011 #include "IMPL/LCFlagImpl.h"
00012 #include "IMPL/LCParametersImpl.h"
00013 #include "IMPL/LCRunHeaderImpl.h"
00014 #include "IOIMPL/LCFactory.h"
00015 #include "LCIOSTLTypes.h"
00016
00017 void LCIOWriter::setFilename(const std::string& filename) { m_Filename = filename; }
00018
00019 LCIOWriter::LCIOWriter() : InterfaceWriter("LCIOWriter", "1.0.0"),
m_LCWriter(IOIMPL::LCFactory::getInstance()->createLCWriter()) { addCompatibility("RawdataReader",
">=1.0.0"); }

```

```

00020
00021 void LCIOWriter::start()
00022 {
00023     m_LCWriter->open(m_Filename, EVENT::LCIO::WRITE_NEW);
00024     std::unique_ptr<IMPL::LCRunHeaderImpl> runHdr(new IMPL::LCRunHeaderImpl);
00025     runHdr->setRunNumber(50); // FIXME : provide run number
00026     runHdr->setDetectorName(m_DetectorName);
00027     std::string description("data collected with SDHCAL prototype");
00028     runHdr->setDescription(description);
00029     m_LCWriter->writeRunHeader(runHdr.get());
00030 }
00031
00032 void LCIOWriter::end() { m_LCWriter->close(); }
00033
00034 void LCIOWriter::processDIF(const Payload& d)
00035 {
00036     std::string parameter_name = "DIF" + std::to_string(d.getDIFid()) + "_Triggers";
00037     EVENT::IntVec parameters;
00038     parameters.push_back(d.getDTC());
00039     parameters.push_back(d.getGTC());
00040     parameters.push_back(d.getBCID());
00041     parameters.push_back(d.getAbsoluteBCID() & 0xFFFFF);
00042     parameters.push_back((d.getAbsoluteBCID() >> 24) & 0xFFFFF);
00043     parameters.push_back(0);
00044     parameters.push_back(0);
00045     parameters.push_back(0);
00046     m_CollectionVec->parameters().setValues("DIF" + std::to_string(d.getDIFid()) + "_Triggers",
parameters);
00047 }
00048
00049 void LCIOWriter::processFrame(const Payload& d, const std::uint32_t& frameIndex) {}
00050
00051 void LCIOWriter::processPadInFrame(const Payload& d, const std::uint32_t& frameIndex, const
std::uint32_t& channelIndex)
00052 {
00053     m_LCEvent->setTimeStamp(d.getAbsoluteBCID()*10e9);
00054     IMPL::RawCalorimeterHitImpl* hit = new IMPL::RawCalorimeterHitImpl;
00055     int ID0 = channelIndex;
00056     ID0 = ID0 << 8;
00057     ID0 += d.getAsICid(frameIndex);
00058     ID0 = ID0 << 8;
00059     ID0 += d.getDIFid();
00060     hit->setCellID0(ID0);
00061     hit->setAmplitude(d.getThresholdStatus(frameIndex, channelIndex));
00062     hit->setTimeStamp(d.getFrameTimeToTrigger(frameIndex));
00063     m_CollectionVec->addElement(hit);
00064 }
00065
00066 void LCIOWriter::startEvent()
00067 {
00068     m_LCEvent = std::make_unique<IMPL::LCEventImpl>();
00069     m_LCEvent->setEventNumber(getEventNumber());
00070     m_LCEvent->setDetectorName(m_DetectorName);
00071     m_LCEvent->setWeight(1);
00072     m_CollectionVec = new IMPL::LCCollectionVec(EVENT::LCIO::RAWCALORIMETERHIT);
00073     IMPL::LCFlagImpl flag(0);
00074     // flag.setBit(EVENT::LCIO::RCHBIT_ID1);
00075     flag.setBit(EVENT::LCIO::RCHBIT_TIME);
00076     m_CollectionVec->setFlag(flag.getFlag());
00077     m_CollectionVec->parameters().setValue(EVENT::LCIO::CellIDEncoding, "dif:8,asic:8,channel:6");
00078 }
00079
00080 void LCIOWriter::endEvent()
00081 {
00082     m_LCEvent->addCollection(m_CollectionVec, "DHCALRawHits");
00083     m_LCWriter->writeEvent(m_LCEvent.get());
00084 }
00085
00086 void LCIOWriter::startDIF() {}
00087
00088 void LCIOWriter::endDIF() {}
00089
00090 void LCIOWriter::startFrame() {}
00091
00092 void LCIOWriter::endFrame() {}
00093
00094 void LCIOWriter::startPad() {}
00095
00096 void LCIOWriter::endPad() {}

```

5.65 libs/interface/RawDataReader/include/RawdataReader.h File Reference

```

#include "Interface.h"
#include <array>

```

```
#include <cstdint>
#include <fstream>
#include <string>
#include <vector>
```

Classes

- class [RawdataReader](#)

5.65.1 Detailed Description

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

5.66 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::vector<bit8_t> m_buf;
00040     std::string m_Filename;
00041 };
```

5.67 libs/interface/RawDataReader/src/RawdataReader.cc File Reference

```
#include "RawdataReader.h"
#include "Exception.h"
#include <cstring>
#include <stdexcept>
#include <zlib.h>
```

5.67.1 Detailed Description

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Definition in file [RawdataReader.cc](#).

5.68 RawdataReader.cc

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

```

00001
00004 #include "RawdataReader.h"
00005
00006 #include "Exception.h"
00007
00008 #include <cstring>
00009 #include <stdexcept>
00010 #include <zlib.h>
00011
00013 std::size_t RawdataReader::m_BufferSize = 0x100000;
00014
00015 void RawdataReader::setDefaultBufferSize(const std::size_t& size) { m_BufferSize = size; }
00016
00017 RawdataReader::RawdataReader(const char* fileName) : InterfaceReader("RawdataReader", "1.0.0")
00018 {
00019     m_buf.reserve(m_BufferSize);
00020     m_Filename = fileName;
00021 }
00022
00023 void RawdataReader::start() { openFile(m_Filename); }
00024
00025 void RawdataReader::end() { closeFile(); }
00026
00027 void RawdataReader::uncompress()
00028 {
00029     static const std::size_t size_buffer{0x20000};
00030     std::size_t shift{3 * sizeof(std::uint32_t) + sizeof(std::uint64_t)};
00031     static bit8_t obuf[size_buffer];
00032     unsigned long size_buffer_end{0x20000}; // NOLINT(runtime/int)
00033     std::int8_t rc = ::uncompress(obuf, &size_buffer_end, &m_Buffer[shift], m_Buffer.size()
- shift);
00034     switch(rc)
00035     {
00036         case Z_OK: break;
00037         case Z_MEM_ERROR: throw Exception(Z_MEM_ERROR, "Not enough memory"); break;
00038         case Z_BUF_ERROR: throw Exception(Z_BUF_ERROR, "Not enough room in the output buffer"); break;
00039         case Z_DATA_ERROR: throw Exception(Z_DATA_ERROR, "The input data was corrupted or incomplete");
break;
00040         default: throw Exception("The input data was corrupted or incomplete"); break;
00041     }
00042     memcpy(&m_Buffer[shift], obuf, size_buffer_end);
00043     m_Buffer.setSize(size_buffer_end + shift);
00044 }
00045
00046 void RawdataReader::closeFile()
00047 {
00048     try
00049     {
00050         if(m_FileStream.is_open()) m_FileStream.close();
00051     }
00052     catch(const std::ios_base::failure& e)
00053     {
00054         log()->error("Caught an ios_base::failure in closeFile : {} {}", e.what(), e.code().value());
00055         throw;
00056     }
00057 }
00058
00059 void RawdataReader::openFile(const std::string& fileName)
00060 {
00061     try
00062     {
00063         m_FileStream.rdbuf()->pubsetbuf(0, 0);
00064         m_FileStream.exceptions(std::ifstream::failbit | std::ifstream::badbit);
00065         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
00066         m_FileStream.rdbuf()->pubsetbuf(0, 0);
00067         if(m_FileStream.is_open())

```

```

00068     {
00069         setFileSize(m_FileStream.tellg());
00070         m_FileStream.seekg(0, std::ios::beg);
00071     }
00072 }
00073 catch(const std::ios_base::failure& e)
00074 {
00075     log()->error("Caught an ios_base::failure in openFile : {}", e.what());
00076     throw;
00077 }
00078 }
00079
00080 bool RawdataReader::nextEvent()
00081 {
00082     try
00083     {
00084         m_FileStream.read(reinterpret_cast<char*>(&m_EventNumber), sizeof(std::uint32_t));
00085         m_FileStream.read(reinterpret_cast<char*>(&m_NumberOfDIF), sizeof(std::uint32_t));
00086     }
00087     catch(const std::ios_base::failure& e)
00088     {
00089         return false;
00090     }
00091     return true;
00092 }
00093
00094 bool RawdataReader::nextDIFbuffer()
00095 {
00096     try
00097     {
00098         static int DIF_processed{0};
00099         if(DIF_processed >= m_NumberOfDIF)
00100         {
00101             DIF_processed = 0;
00102             return false;
00103         }
00104         else
00105         {
00106             DIF_processed++;
00107             std::uint32_t bsize{0};
00108             m_FileStream.read(reinterpret_cast<char*>(&bsize), sizeof(std::uint32_t));
00109             m_FileStream.read(reinterpret_cast<char*>(&m_buf[0]), bsize);
00110             m_Buffer = Buffer(m_buf);
00111         }
00112     }
00113     catch(const std::ios_base::failure& e)
00114     {
00115         log()->error("Caught an ios_base::failure in openFile : {}", e.what());
00116         return false;
00117     }
00118     return true;
00119 }
00120
00121 const Buffer& RawdataReader::getBuffer()
00122 {
00123     uncompress();
00124     return m_Buffer;
00125 }
00126
00127 void RawdataReader::setFileSize(const std::size_t& size) { m_FileSize = size; }
00128
00129 float RawdataReader::getFileSize() { return m_FileSize; }

```

5.69 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

5.69.1 Detailed Description

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

5.69.2 Typedef Documentation

5.69.2.1 Hits_const_iterator using [Hits_const_iterator](#) = std::vector<[Hit](#)>::const_iterator

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

5.70 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 };

```

5.71 libs/interface/ROOT/include/DIFLinkDef.h File Reference

```
#include <vector>
```

5.71.1 Detailed Description

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

5.72 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
```

5.73 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

5.73.1 Detailed Description

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

5.73.2 Typedef Documentation

5.73.2.1 DIFs_const_iterator using `DIFs_const_iterator = std::map<std::uint8_t, DIF>::const_iterator`

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

5.74 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     std::uint32_t                getEventNumber();
00019     void                        setEventNumber(const std::uint32_t& evtNbr);
00020     void                        clear();
00021     void                        addDIF(const DIF& dif);
00022     std::map<std::uint8_t, DIF>::const_iterator cbegin() const;
00023     std::map<std::uint8_t, DIF>::const_iterator cend() const;
00024
00025 private:
00026     std::uint32_t m_EventNumber{0};
00027     std::map<std::uint8_t, DIF> DIFs;
00028     ClassDef(Event, 1);
00029 };
```

5.75 libs/interface/ROOT/include/EventLinkDef.h File Reference

```
#include <cstdint>
#include <map>
#include <vector>
```

5.75.1 Detailed Description

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

5.76 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
```

5.77 libs/interface/ROOT/include/Hit.h File Reference

```
#include <TObject.h>
#include <cstdint>
```

Classes

- class [Hit](#)

5.77.1 Detailed Description

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

5.78 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 getFrameBCID() 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 };

```

5.79 libs/interface/ROOT/include/HitLinkDef.h File Reference

5.79.1 Detailed Description

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

5.80 HitLinkDef.h

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

```

00001
00005 #pragma once
00006 #ifndef __CLING__
00007 #pragma link C++ class Hit;
00008 #endif

```

5.81 libs/interface/ROOT/include/ROOTWriter.h File Reference

```

#include "Event.h"
#include "Interface.h"
#include "Payload.h"
#include <TFile.h>
#include <TTree.h>
#include <string>
#include <vector>

```

Classes

- class [ROOTWriter](#)

5.82 ROOTWriter.h

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

```

00001
00006 #pragma once
00007
00008 #include "Event.h"
00009 #include "Interface.h"
00010 #include "Payload.h"
00011
00012 #include <TFile.h>
00013 #include <TTree.h>
00014 #include <string>
00015 #include <vector>
00016
00017 class ROOTWriter : public InterfaceWriter
00018 {
00019 public:
00020     ROOTWriter();
00021
00022     void setFilename(const std::string&);
00023
00024     void start();
00025     void processDIF(const Payload&);
00026     void processFrame(const Payload&, const std::uint32_t& frameIndex);
00027     void processPadInFrame(const Payload&, const std::uint32_t& frameIndex, const std::uint32_t&
channelIndex);
00028     void processSlowControl(const Buffer&) { ; }
00029     void end();
00030
00031     virtual void startEvent();
00032     virtual void endEvent();
00033     virtual void startDIF();
00034     virtual void endDIF();
00035     virtual void startFrame();
00036     virtual void endFrame();
00037     virtual void startPad();
00038     virtual void endPad();
00039
00040 private:
00041     TFile*      m_File{nullptr};
00042     TTree*      m_Tree{nullptr};
00043     Event*      m_Event{nullptr};
00044     DIF*        m_DIF{nullptr};
00045     Hit*        m_Hit{nullptr};
00046     std::string m_Filename;
00047 };

```

5.83 libs/interface/ROOT/src/DIF.cc File Reference

```

#include "DIF.h"
#include <cstdint>

```

5.83.1 Detailed Description

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Definition in file [DIF.cc](#).

5.84 DIF.cc

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

```

00001
00006 #include "DIF.h"
00007
00008 #include <cstdint>
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(); }

```

5.85 libs/interface/ROOT/src/Event.cc File Reference

```
#include "Event.h"
```

5.85.1 Detailed Description

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Definition in file [Event.cc](#).

5.86 Event.cc

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

```

00001
00006 #include "Event.h"
00007
00008 std::uint32_t Event::getEventNumber()
00009 {
00010     return m_EventNumber;
00011 }
00012
00013 void Event::setEventNumber(const std::uint32_t& evtNbr)
00014 {
00015     m_EventNumber=evtNbr;
00016 }
00017
00018 void Event::clear() { DIFs.clear(); }
00019
00020 void Event::addDIF(const DIF& dif) { DIFs[dif.getID()] = dif; }
00021
00022 std::map<std::uint8_t, DIF>::const_iterator Event::cbegin()const { return DIFs.cbegin(); }
00023
00024 std::map<std::uint8_t, DIF>::const_iterator Event::cend()const { return DIFs.cend(); }

```

5.87 libs/interface/ROOT/src/Hit.cc File Reference

```
#include "Hit.h"
```

5.87.1 Detailed Description

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Definition in file [Hit.cc](#).

5.88 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; }
```

5.89 libs/interface/ROOT/src/ROOTWriter.cc File Reference

```
#include "ROOTWriter.h"
```

5.89.1 Detailed Description

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Definition in file [ROOTWriter.cc](#).

5.90 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 Payload& 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 Payload& 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 Payload& 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->setEventNumber(getEventNumber());
00061     // m_Event->clear();
00062 }
00063
00064 void ROOTWriter::endEvent()
00065 {
00066     m_Tree->Fill();
00067     if(m_Event) delete m_Event;
00068 }
00069
00070 void ROOTWriter::startDIF()
00071 {
00072     m_DIF = new DIF();
00073     // m_DIF->clear();
00074 }
00075
00076 void ROOTWriter::endDIF()
00077 {
00078     m_Event->addDIF(*m_DIF);
00079     delete m_DIF;
00080 }
00081
00082 void ROOTWriter::startFrame()
00083 {
00084     m_Hit = new Hit();
00085     // m_Hit->clear();
00086 }
00087
00088 void ROOTWriter::endFrame()
00089 {
00090     m_DIF->addHit(*m_Hit);
00091     delete m_Hit;
00092 }
00093
00094 void ROOTWriter::startPad() {}
00095
00096 void ROOTWriter::endPad() {}
```