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:

2 Class Index

2.1 Class List

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

3 File Index

3.1 File List

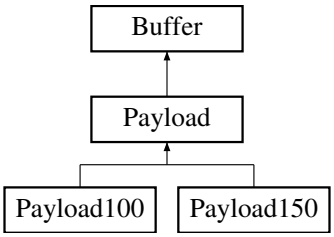
Here is a list of all files with brief descriptions:

4 Class Documentation

4.1 Buffer Class Reference

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

Inheritance diagram for Buffer:



Public Member Functions

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

4.1.1 Detailed Description

Definition at line 14 of file Buffer.h.

4.1.2 Constructor & Destructor Documentation

4.1.2.1 Buffer() [1/5] Buffer::Buffer ( ) [inline]

Definition at line 17 of file Buffer.h.

```
00017 :  m_Buffer(nullptr), m_Size(0), m_Capacity(0) {}
```

4.1.2.2 ~Buffer() virtual Buffer::~Buffer ( ) [inline], [virtual]

Definition at line 18 of file Buffer.h.

```
00018 {}
```

4.1.2.3 Buffer() [2/5] Buffer::Buffer (

```
const bit8_t b[],
const std::size_t & i ) [inline]
```

Definition at line 19 of file Buffer.h.

```
00019 :  m_Buffer(const_cast<bit8_t*>(&b[0])), m_Size(i), m_Capacity(i) {}
```

4.1.2.4 Buffer() [3/5] Buffer::Buffer (const char *b[]*, const std::size_t & *i*) [inline]

Definition at line 20 of file Buffer.h.

```
00020 :  m_Buffer(const_cast<bit8_t*>(reinterpret_cast<const bit8_t*>(&b[0]))), m_Size(i * sizeof(char)),
      m_Capacity(i * sizeof(char)) {}
```

4.1.2.5 Buffer() [4/5] template<typename T > Buffer::Buffer (const std::vector< T > & *rawdata*) [inline]

Definition at line 21 of file Buffer.h.

```
00021 :  m_Buffer(const_cast<bit8_t*>(reinterpret_cast<const bit8_t*>(rawdata.data()))),
      m_Size(rawdata.size() * sizeof(T)), m_Capacity(rawdata.capacity() * sizeof(T)) {}
```

4.1.2.6 Buffer() [5/5] template<typename T , std::size_t N> Buffer::Buffer (const std::array< T, N > & *rawdata*) [inline]

Definition at line 22 of file Buffer.h.

```
00022 :  m_Buffer(const_cast<bit8_t*>(reinterpret_cast<const bit8_t*>(rawdata.data()))),
      m_Size(rawdata.size() * sizeof(T)), m_Capacity(rawdata.size() * sizeof(T)) {}
```

4.1.3 Member Function Documentation

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

Definition at line 35 of file Buffer.h.

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

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

Definition at line 25 of file Buffer.h.

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

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

Definition at line 27 of file Buffer.h.

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

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

Definition at line 36 of file Buffer.h.

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

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

Definition at line 37 of file Buffer.h.

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

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

Definition at line 38 of file Buffer.h.

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

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

Definition at line 29 of file Buffer.h.

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

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

Definition at line 28 of file Buffer.h.

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

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

Definition at line 40 of file Buffer.h.

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

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

Definition at line 24 of file Buffer.h.

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

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

- libs/core/include/Buffer.h

4.2 BufferLooper< SOURCE, DESTINATION > Class Template Reference

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

Public Member Functions

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

4.2.1 Detailed Description

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

Definition at line 28 of file BufferLooper.h.

4.2.2 Constructor & Destructor Documentation

4.2.2.1 BufferLooper() template<typename SOURCE , typename DESTINATION > BufferLooper< SOURCE, DESTINATION >::BufferLooper (SOURCE & *source*, DESTINATION & *dest*, bool *debug* = *false*) [inline]

Definition at line 31 of file BufferLooper.h.

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

4.2.3 Member Function Documentation

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

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

Definition at line 39 of file BufferLooper.h.

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

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

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

Definition at line 240 of file BufferLooper.h.

```
00240 { return m_Logger; }
```

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

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

Definition at line 48 of file BufferLooper.h.

```
00049   {
00050     // clang-format off
00051     fmt::print(fg(fmt::color::medium_orchid) | fmt::emphasis::bold,
00052           "\n"
00053 " SSSSSSSSSSSSSSS      tttt
      tttt\n"
00054 "SS:::::::::::::::S  ttt:::t
      ttt:::t\n"
00055 "S:::::SSSSSS::::::S  t:::::t
      t:::::t\n"
00056 "S:::::S     SSSSSSS  t:::::t
      t:::::t\n"
00057 "S:::::S        ttttttt:::::ttttttt   rrrrr   rrrrrrrrr       eeeeeeeeeeee    aaaaaaaaaaaaa
      mmmmmmm    mmmmmmm      ooooooooooo   uuuuuu    uuuuuuttttttt:::::ttttttt\n"
00058 "S:::::S        t:::::::::::::::::t   r::::rrr:::::::::r    ee::::::::::::ee  a::::::::::::a
      mm:::::::m  m:::::::mm  oo:::::::::::oo u:::::u    u:::::ut:::::::::::::::::t\n"
00059 " S::::SSSS     t:::::::::::::::::t   r:::::::::::::::::r  e::::::eeeee:::::eeaaaaaaaaa:::::a
      m::::::::::mm::::::::::mo:::::::::::::::ou:::::u    u:::::ut:::::::::::::::::t\n"
00060 "  SS::::::SSSSStttttt:::::::tttttt   rr::::::rrrrr::::::re::::::e     e:::::e         a::::a
      m:::::::::::::::::::::mo:::::ooooo:::::ou:::::u    u:::::utttttt:::::::tttttt\n"
00061 "    SSS::::::::SS    t:::::t          r:::::r     r:::::re:::::::eeeee:::::e  aaaaaaa:::::a
      m:::::mmm::::::mmm:::::mo::::o     o::::ou:::::u    u:::::u      t:::::t\n"
00062 "       SSSSSS::::S   t:::::t          r:::::r     rrrrrrre:::::::::::::::::e aa::::::::::::a m::::m
      m::::m   m::::mo::::o     o::::ou:::::u    u:::::u      t:::::t\n"
00063 "            S:::::S  t:::::t          r:::::r          e::::::eeeeeeeeeee a::::aaaa::::::a m::::m
      m::::m   m::::mo::::o     o::::ou:::::u    u:::::u      t:::::t\n"
00064 "            S:::::S  t:::::t    ttttttr::::::r          e:::::::e         a::::a    a:::::a m::::m
      m::::m   m::::mo::::o     o::::ou:::::u    u:::::u      t:::::t    ttttt\n"
00065 "SSSSSSS     S:::::S  t::::::tttt:::::tr::::::r          e::::::::e        a::::a    a:::::a m::::m
      m::::m   m::::mo:::::ooooo:::::ou:::::::::::::::uu    t::::::tttt:::::t\n"
00066 "S::::::SSSSSS:::::S  tt::::::::::::::tr::::::r           e::::::::eeeeeeeea:::::aaaa::::::a m::::m
      m::::m   m::::mo:::::::::::::::o u::::::::::::::u    tt:::::::::::::::t\n"
00067 "S:::::::::::::::SS     tt:::::::::::ttr::::::r            ee::::::::::::e a::::::::::aa:::am::::m
      m::::m   m::::m oo:::::::::::oo   uu::::::::uu:::u      tt:::::::::::tt\n"
00068 " SSSSSSSSSSSSSSS         ttttttttttt  rrrrrrr               eeeeeeeeeeeeee  aaaaaaaaaa  aaaammmmmm
      mmmmmm   mmmmmm   oooooooooo       uuuuuuuu  uuuu        ttttttttttt {}\n"
```

```
00069 "\n",
00070 fmt::format(fg(fmt::color::red) | fmt::emphasis::bold, "v{}", streamout_version.to_string()));
00071     // clang-format on
00072     log()->info("*********************************************************************");
00073     log()->info("Streamout Version :  {}", streamout_version.to_string());
00074     log()->info("Using InterfaceReader {} version {}", m_Source.getName(),
      m_Source.getVersion().to_string());
00075     log()->info("Using InterfaceWriter {} version {}", m_Destination.getName(),
      m_Destination.getVersion().to_string());
00076
00077     VersionInfos version;
00078     version.setLibraryInfos("streamout",streamout_version);
00079     version.setReaderInfos(m_Source.getName(),m_Source.getVersion());
00080     version.setWriterInfos(m_Destination.getName(),m_Destination.getVersion());
00081
00082
00083     if(!m_Destination.checkCompatibility(m_Source.getName(), m_Source.getVersion().to_string()))
00084     {
00085       log()->critical("{} version {} is not compatible with {} version {} !  ", m_Source.getName(),
      m_Source.getVersion().to_string(), m_Destination.getName(), m_Destination.getVersion().to_string());
00086       log()->info("Compatible Interfaces for {} are", m_Destination.getName());
00087       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); }
00088       std::exit(-1);
00089     }
00090     if(!m_DetectorIDs.empty())
00091     {
00092       std::string ids;
00093       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)) + ";";
00094       log()->info("Detector ID(s) other than {} will be ignored", ids);
00095     }
00096     log()->info("*********************************************************************");
00097     RawBufferNavigator bufferNavigator;
00098     Timer              timer;
00099     timer.start();
00100     m_Source.start(version);
00101     m_Destination.start(version);
00102     while(m_Source.nextEvent() && m_NbrEventsToProcess >= m_NbrEvents)
00103     {
00104       m_Destination.setEventNumber(m_Source.getEventNumber());
00105 /*******************/
00106 /*** START EVENT ***/
00107       m_Source.startEvent();
00108       m_Destination.startEvent();
00109 /*******************/
00110
00111       m_Logger->warn("===*** Event {} ***===", m_NbrEvents);
00112       while(m_Source.nextDIFbuffer())
00113       {
00114         const Buffer& buffer = m_Source.getBuffer();
00115
00116         bufferNavigator.setBuffer(buffer);
00117         if(std::find(m_DetectorIDs.begin(), m_DetectorIDs.end(),
      static_cast<DetectorID>(bufferNavigator.getDetectorID())) == m_DetectorIDs.end())
00118         {
00119           m_Logger->debug("Ignoring detector ID : {}", bufferNavigator.getDetectorID());
00120           continue;
00121         }
00122
00123         std::int32_t idstart = bufferNavigator.getStartOfPayload();
00124         if(m_Debug && idstart == -1) m_Logger->info(to_hex(buffer));
00125         c.DIFStarter[idstart]++;
00126
00127 /******************/
00128 /*** START DIF ***/
00129         m_Source.startDIF();
00130         m_Destination.startDIF();
00131 /******************/
00132
00133         PayloadLoader payloadLoader;
00134
00135         std::unique_ptr<Payload>& d = payloadLoader.getPayload(bufferNavigator.getDetectorID());
00136         if(d == nullptr)
00137         {
00138           m_Logger->error("streamout don't know how to parse the payload for detector_id {} !
      SKIPPING !", bufferNavigator.getDetectorID());
00139           continue;
00140         }
00141
00142         // This is really a big error so skip DIF entirely if exception occurs
00143         try
00144         {
00145           d->setBuffer(bufferNavigator.getPayload());
00146           m_Logger->info("Parsing payload DIF_ID {} (detector_id {})", d->getDIFid(),
      bufferNavigator.getDetectorID());
```

```
00147         }
00148         catch(const Exception& e)
00149         {
00150           m_Logger->error("{}", e.what());
00151           continue;
00152         }
00153
00154         if(buffer.end() != d->end()) m_Logger->error("DIF BUFFER END {} {}", fmt::ptr(buffer.end()),
      fmt::ptr(d->end()));
00155         assert(buffer.end() == d->end());
00156
00157         c.DIFPtrValueAtReturnedPos[d->begin()[d->getEndOfDIFData() - 3]]++;
00158         assert(d->begin()[d->getEndOfDIFData() - 3] == 0xa0);
00159
00160         c.SizeAfterDIFPtr[d->getSizeAfterDIFPtr()]++;
00161         m_Destination.processDIF(*d);
00162         for(std::size_t i = 0; i < d->getNumberOfFrames(); ++i)
00163         {
00164           //
00165           m_Source.startFrame();
00166           m_Destination.startFrame();
00167           //
00168           m_Destination.processFrame(*d, i);
00169           for(std::size_t j = 0; j < static_cast<std::size_t>(Hardware::NUMBER_PAD); ++j)
00170           {
00171             if(d->getThresholdStatus(i, j) != 0)
00172             {
00173               m_Source.startPad();
00174               m_Destination.startPad();
00175               m_Destination.processPadInFrame(*d, i, j);
00176               m_Source.endPad();
00177               m_Destination.endPad();
00178             }
00179           }
00180           //
00181           m_Source.endFrame();
00182           m_Destination.endFrame();
00183           //
00184         }
00185         // 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
00186         /*try
00187 {
00188 d.setSCBuffer();
00189 }
00190 catch(const Exception& e)
00191 {
00192 m_Logger->error("{}", e.what());
00193 }
00194
00195 bool processSC = false;
00196 if(d.hasSlowControl())
00197 {
00198 c.hasSlowControl++;
00199 processSC = true;
00200 }
00201 if(d.badSCData())
00202 {
00203 c.hasBadSlowControl++;
00204 processSC = false;
00205 }
00206 if(processSC) { m_Destination.processSlowControl(d.getSCBuffer()); }*/
00207
00208         // Buffer eod = d.getEndOfAllData();
00209         // c.SizeAfterAllData[eod.size()]++;
00210         // bit8_t* debug_variable_3 = eod.end();
00211         // if(buffer.end() != debug_variable_3) m_Logger->info("END DATA BUFFER END {} {}",
      fmt::ptr(buffer.end()), fmt::ptr(debug_variable_3));
00212         // assert(buffer.end() == debug_variable_3);
00213         // if(eod.size() != 0) m_Logger->info("End of Data remaining stuff :  {}", to_hex(eod));*/
00214
00215         /*int nonzeroCount = 0;
00216 for(bit8_t* it = eod.begin(); it != eod.end(); it++)
00217 if(static_cast<int>(*it) != 0) nonzeroCount++;
00218 c.NonZeroValusAtEndOfData[nonzeroCount]++;*/
00219
00220         //
00221         //
00222         m_Source.endDIF();
00223         m_Destination.endDIF();
00224         //
00225       }  // end of DIF while loop
00226       m_Logger->warn("===*** Event {} ***===", m_NbrEvents);
00227       m_NbrEvents++;
00228 /*****************/
00229 /*** END EVENT ***/
00230       m_Source.endEvent();
```

```
00231       m_Destination.endEvent();
00232 /*****************/
00233     }  // end of event while loop
00234     m_Destination.end();
00235     m_Source.end();
00236     timer.stop();
00237     fmt::print(fg(fmt::color::green) | fmt::emphasis::bold, "=== elapsed time {}ms ({}ms/event)
      ===\n", timer.getElapsedTime() / 1000, timer.getElapsedTime() / (1000 * m_NbrEvents));
00238   }
```

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

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

Definition at line 239 of file BufferLooper.h.

```
00239 { 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 242 of file BufferLooper.h.

```
00242 { m_DetectorIDs = detectorIDs; }
```

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

- libs/core/include/BufferLooper.h

4.3 BufferLooperCounter Struct Reference

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

Public Member Functions

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

Public Attributes

- int hasSlowControl = 0
- int hasBadSlowControl = 0
- std::map< int, int > DIFStarter
- std::map< int, int > DIFPtrValueAtReturnedPos
- std::map< int, int > SizeAfterDIFPtr
- std::map< int, int > SizeAfterAllData
- std::map< int, int > NonZeroValusAtEndOfData

4.3.1 Detailed Description

Definition at line 12 of file BufferLooperCounter.h.

4.3.2 Member Function Documentation

4.3.2.1 printAllCounters() void BufferLooperCounter::printAllCounters ( )

Definition at line 11 of file BufferLooperCounter.cc.

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

4.3.2.2 printCounter() void BufferLooperCounter::printCounter (

```
const std::string & description,
const std::map< int, int > & m,
const std::ios_base::fmtflags & base = std::ios_base::dec )
```

Definition at line 22 of file BufferLooperCounter.cc.

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

4.3.3 Member Data Documentation

4.3.3.1 DIFPtrValueAtReturnedPos std::map<int, int> BufferLooperCounter::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::NonZeroValusAtEnd↩OfData`

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.

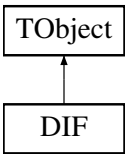
The documentation for this struct was generated from the following files:

- 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 setDetectorID (const std::uint32_t &)
- std::uint8_t getDetectorID () 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 getDetectorID() `std::uint8_t DIF::getDetectorID ( ) const`

Definition at line 40 of file DIF.cc.
```
00040 { return m_DetectorID; }
```

4.4.2.7 getDIFBCID() `std::uint32_t DIF::getDIFBCID ( ) const`

Definition at line 26 of file DIF.cc.
```
00026 { return m_DIFBCID; }
```

4.4.2.8 getDTC() `std::uint32_t DIF::getDTC ( ) const`

Definition at line 18 of file DIF.cc.
```
00018 { return m_DTC; }
```

4.4.2.9 getGTC() `std::uint32_t DIF::getGTC ( ) const`

Definition at line 22 of file DIF.cc.
```
00022 { return m_GTC; }
```

4.4.2.10 getID() `std::uint8_t DIF::getID ( ) const`

Definition at line 14 of file DIF.cc.
```
00014 { return m_ID; }
```

4.4.2.11 setAbsoluteBCID() void DIF::setAbsoluteBCID (const std::uint64_t & *absolutebcid*)

Definition at line 28 of file DIF.cc.

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

4.4.2.12 setDetectorID() void DIF::setDetectorID (const std::uint32_t & *detector_id*)

Definition at line 38 of file DIF.cc.

```
00038 { m_DetectorID = detector_id; }
```

4.4.2.13 setDIFBCID() void DIF::setDIFBCID (const std::uint32_t & *difbcid*)

Definition at line 24 of file DIF.cc.

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

4.4.2.14 setDTC() void DIF::setDTC (const std::uint32_t & *dtc*)

Definition at line 16 of file DIF.cc.

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

4.4.2.15 setGTC() void DIF::setGTC (const std::uint32_t & *gtc*)

Definition at line 20 of file DIF.cc.

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

4.4.2.16 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) :

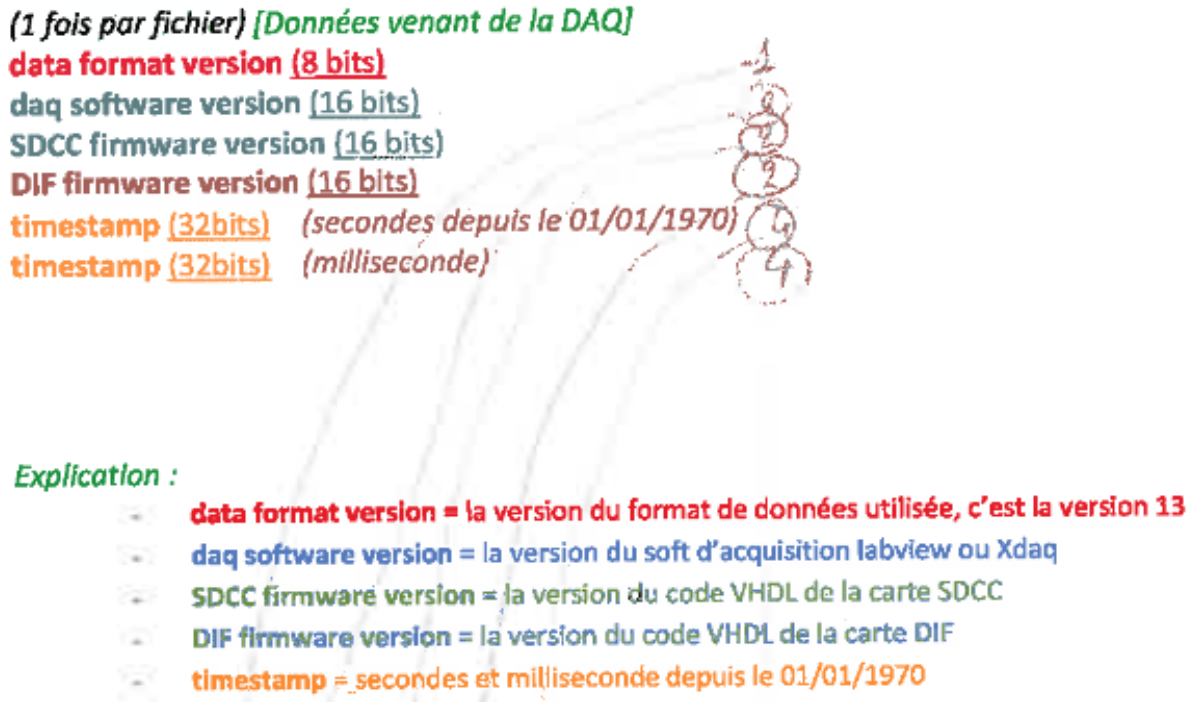


Figure 1 Data from the DAQ (once at the beginning of the file)

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

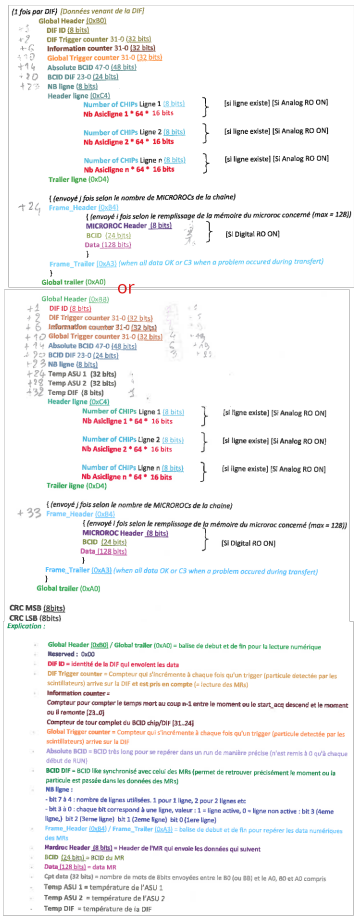


Figure 2 Data from the DIF analog or/and digital

Data from the DAQ (slowcontrol) :

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 &param)
  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

version	Data format version
DIFid	DIF id
buf	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] != 0xa1) size_hardroc1 = 0;
00020
00021   int size_hardroc2 = m_NbrAsic * 109 + header_shift + 1;
00022   if(cbuf[size_hardroc2 - 1] != 0xa1) size_hardroc2 = 0;
00023   if(size_hardroc1 != 0)
00024   {
00025     FillHR1(header_shift, cbuf);
00026     m_AsicType = 1;
00027   }
00028   else if(size_hardroc2 != 0)
00029     FillHR2(header_shift, cbuf);
00030   else
00031     return;
00032 }
```

4.6.3 Member Function Documentation

4.6.3.1 cbegin() std::map< int, std::map< std::string, int > >::const_iterator DIFSlow↩ Control::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::getChipSlowControl (const int & *asicid*) [inline]

Get one chip map.

Parameters

asicid	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

asicid	ASic ID
param	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::getChipsMap ( ) [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; }
```

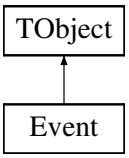
The documentation for this class was generated from the following files:

- 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 14 of file Event.cc.

```
00014 { DIFs[dif.getID()] = dif; }
```

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

Definition at line 16 of file Event.cc.

```
00016 { return DIFs.cbegin(); }
```

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

Definition at line 18 of file Event.cc.

```
00018 { return DIFs.cend(); }
```

4.7.2.4 clear() void Event::clear ( )

Definition at line 12 of file Event.cc.

```
00012 { DIFs.clear(); }
```

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

Definition at line 8 of file Event.cc.

```
00008 { return m_EventNumber; }
```

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

Definition at line 10 of file Event.cc.

```
00010 { m_EventNumber = evtNbr; }
```

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(); }
```

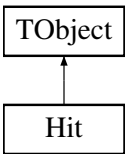
The documentation for this class was generated from the following file:

- 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; }
```

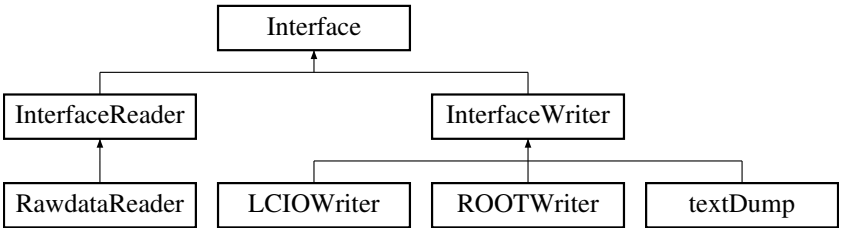
The documentation for this class was generated from the following files:

- 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 start (const VersionInfos &ver)
- virtual 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 ()
- 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)
- std::uint32_t getRunNumber ()
- void setRunNumber (const std::uint32_t &nbr)

Protected Attributes

- std::uint32_t m_EventNumber {0}
- std::uint32_t m_RunNumber {0}

4.10.1 Detailed Description

Definition at line 39 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 42 of file Interface.h.

```
00042 : 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 end() `virtual void Interface::end ( ) [inline], [virtual]`

Reimplemented in textDump, LCIOWriter, RawdataReader, and ROOTWriter.

Definition at line 45 of file Interface.h.

```
00045 {};
```

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

Reimplemented in LCIOWriter, and ROOTWriter.

Definition at line 49 of file Interface.h.

```
00049 {}
```

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

Reimplemented in LCIOWriter, and ROOTWriter.

Definition at line 47 of file Interface.h.

```
00047 {}
```

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

Reimplemented in LCIOWriter, and ROOTWriter.

Definition at line 51 of file Interface.h.

```
00051 {}
```

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

Reimplemented in LCIOWriter, and ROOTWriter.

Definition at line 53 of file Interface.h.
```
00053 {}
```

4.10.3.6 getEventNumber() `std::uint32_t Interface::getEventNumber ( ) [inline]`

Definition at line 58 of file Interface.h.
```
00058 { return m_EventNumber; }
```

4.10.3.7 getName() `std::string Interface::getName ( ) [inline]`

Definition at line 56 of file Interface.h.
```
00056 { return m_Name; }
```

4.10.3.8 getRunNumber() `std::uint32_t Interface::getRunNumber ( ) [inline]`

Definition at line 60 of file Interface.h.
```
00060 { return m_RunNumber; }
```

4.10.3.9 getVersion() `Version Interface::getVersion ( ) [inline]`

Definition at line 57 of file Interface.h.
```
00057 { return m_Version; }
```

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

Definition at line 54 of file Interface.h.
```
00054 { return m_Logger; }
```

4.10.3.11 setEventNumber() `void Interface::setEventNumber ( const std::uint32_t & nbr ) [inline]`

Definition at line 59 of file Interface.h.
```
00059 { m_EventNumber = nbr; }
```

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

Definition at line 55 of file Interface.h.

```
00055 { m_Logger = logger; }
```

4.10.3.13 setRunNumber() void Interface::setRunNumber (const std::uint32_t & *nbr*) [inline]

Definition at line 61 of file Interface.h.

```
00061 { m_RunNumber = nbr; }
```

4.10.3.14 start() virtual void Interface::start (const VersionInfos & *ver*) [inline], [virtual]

Reimplemented in ROOTWriter, textDump, LCIOWriter, and RawdataReader.

Definition at line 44 of file Interface.h.

```
00044 {};
```

4.10.3.15 startDIF() virtual void Interface::startDIF ( ) [inline], [virtual]

Reimplemented in LCIOWriter, and ROOTWriter.

Definition at line 48 of file Interface.h.

```
00048 {}
```

4.10.3.16 startEvent() virtual void Interface::startEvent ( ) [inline], [virtual]

Reimplemented in LCIOWriter, and ROOTWriter.

Definition at line 46 of file Interface.h.

```
00046 {}
```

4.10.3.17 startFrame() virtual void Interface::startFrame ( ) [inline], [virtual]

Reimplemented in LCIOWriter, and ROOTWriter.

Definition at line 50 of file Interface.h.

```
00050 {}
```

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

Reimplemented in LCIOWriter, and ROOTWriter.

Definition at line 52 of file Interface.h.
```
00052 {}
```

4.10.4 Member Data Documentation

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

Definition at line 64 of file Interface.h.

4.10.4.2 m_RunNumber `std::uint32_t Interface::m_RunNumber {0} [protected]`

Definition at line 65 of file Interface.h.

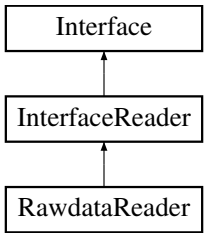
The documentation for this class was generated from the following file:

- 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 74 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 77 of file Interface.h.

```
00077 :  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 81 of file Interface.h.

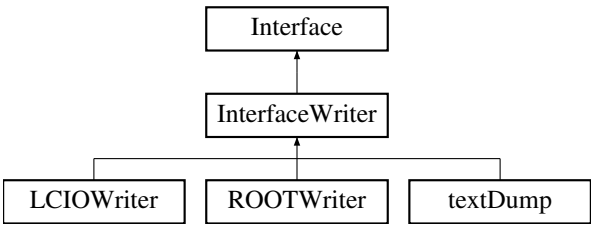
The documentation for this class was generated from the following file:

- 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 84 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 87 of file Interface.h.

```
00087 :  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 89 of file Interface.h.

```
00089 { m_Compatible[name] = version; }
```

4.12.3.2 checkCompatibility()

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

Definition at line 93 of file Interface.h.

```
00094   {
00095     if(m_Compatible.find(name) != m_Compatible.end())
00096     {
00097       auto           ran = semver::range::detail::range(m_Compatible[name]);
00098       semver::version ver = semver::version(version);
00099       if(ran.satisfies(ver, false))
00100       {
00101         return true;
00102       }
00103       else
00104         return false;
00105     }
00106     else
00107       return false;
00108   }
```

4.12.3.3 getCompatibility()

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

Definition at line 91 of file Interface.h.

```
00091 { return m_Compatible; }
```

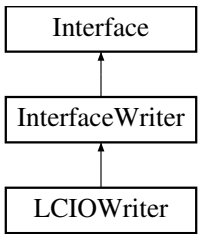
The documentation for this class was generated from the following file:

- 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 (const VersionInfos &ver) final
- 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 &channel↩ Index)
- 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 20 of file LCIOWriter.cc.

```
00020 :  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 ( )  [virtual]`

Reimplemented from Interface.

Definition at line 44 of file LCIOWriter.cc.

```
00044 { m_LCWriter->close(); }
```

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

Reimplemented from Interface.

Definition at line 104 of file LCIOWriter.cc.

```
00104 {}
```

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

Reimplemented from Interface.

Definition at line 96 of file LCIOWriter.cc.

```
00097 {
00098   m_LCEvent->addCollection(m_CollectionVec, "DHCALRawHits");
00099   m_LCWriter->writeEvent(m_LCEvent.get());
00100 }
```

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

Reimplemented from Interface.

Definition at line 108 of file LCIOWriter.cc.

```
00108 {}
```

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

Reimplemented from Interface.

Definition at line 112 of file LCIOWriter.cc.

```
00112 {}
```

4.13.3.6 processDIF() void LCIOWriter::processDIF (const Payload & d)

Definition at line 46 of file LCIOWriter.cc.

```
00047 {
00048   std::string   parameter_name = "DIF" + std::to_string(d.getDIFid()) + "_Triggers";
00049   EVENT::IntVec parameters;
00050   parameters.push_back(d.getDTC());
00051   parameters.push_back(d.getGTC());
00052   parameters.push_back(d.getBCID());
00053   parameters.push_back(d.getAbsoluteBCID() & 0xFFFFFF);
00054   parameters.push_back((d.getAbsoluteBCID() >> 24) & 0xFFFFFF);
00055   parameters.push_back(0);
00056   parameters.push_back(0);
00057   parameters.push_back(0);
00058   m_CollectionVec->parameters().setValues("DIF" + std::to_string(d.getDIFid()) + "_Triggers",
      parameters);
00059   parameter_name = "DIF_DetectorID_" + std::to_string(d.getDIFid());
00060   m_CollectionVec->parameters().setValue(parameter_name, static_cast<int>(d.getDetectorID()));
00061 }
```

4.13.3.7 processFrame() void LCIOWriter::processFrame (const Payload & d, const std::uint32_t & frameIndex)

Definition at line 63 of file LCIOWriter.cc.

```
00063 {}
```

4.13.3.8 processPadInFrame() void LCIOWriter::processPadInFrame (const Payload & *d*, const std::uint32_t & *frameIndex*, const std::uint32_t & *channelIndex*)

Definition at line 65 of file LCIOWriter.cc.

```
00066 {
00067   m_LCEvent->setTimeStamp(d.getAbsoluteBCID() * 200);
00068   m_LCEvent->setRunNumber(getRunNumber());
00069   IMPL::RawCalorimeterHitImpl* hit = new IMPL::RawCalorimeterHitImpl;
00070   int                          ID0 = channelIndex;
00071   ID0                              = ID0 << 8;
00072   ID0 += d.getASICid(frameIndex);
00073   ID0 = ID0 << 8;
00074   ID0 += d.getDIFid();
00075   hit->setCellID0(ID0);
00076   hit->setCellID1(d.getFrameBCID(frameIndex));
00077   hit->setAmplitude(d.getThresholdStatus(frameIndex, channelIndex));
00078   hit->setTimeStamp(d.getFrameTimeToTrigger(frameIndex));
00079   m_CollectionVec->addElement(hit);
00080 }
```

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 18 of file LCIOWriter.cc.

```
00018 { m_Filename = filename; }
```

4.13.3.11 start() void LCIOWriter::start (const VersionInfos & *ver*) [final], [virtual]

Reimplemented from Interface.

Definition at line 22 of file LCIOWriter.cc.

```
00023 {
00024   m_LCWriter->open(m_Filename, EVENT::LCIO::WRITE_NEW);
00025   std::unique_ptr<IMPL::LCRunHeaderImpl> runHdr(new IMPL::LCRunHeaderImpl);
00026   std::string                            filename_ = filename(m_Filename);
00027   std::size_t                            begin_    = filename_.find_last_of("_R");
00028   if(begin_ == std::string::npos) begin_ = filename_.find_last_of('_');
00029   filename_ = filename_.substr(begin_ + 1);
00030   setRunNumber(stoi(filename_));
00031   runHdr->setRunNumber(getRunNumber());
00032   runHdr->setDetectorName(m_DetectorName);
00033   std::string description("data collected with SDHCAL prototype");
00034   runHdr->setDescription(description);
00035   runHdr->parameters().setValue("Library_Name", ver.getLibraryInfos().first);
00036   runHdr->parameters().setValue("Library_Version", ver.getLibraryInfos().second.to_string());
00037   runHdr->parameters().setValue("Reader_Name", ver.getReaderInfos().first);
00038   runHdr->parameters().setValue("Reader_Version", ver.getReaderInfos().second.to_string());
00039   runHdr->parameters().setValue("Writer_Name", ver.getWriterInfos().first);
00040   runHdr->parameters().setValue("Writer_Version", ver.getWriterInfos().second.to_string());
00041   m_LCWriter->writeRunHeader(runHdr.get());
00042 }
```

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

Reimplemented from Interface.

Definition at line 102 of file LCIOWriter.cc.

```
00102 {}
```

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

Reimplemented from Interface.

Definition at line 82 of file LCIOWriter.cc.

```
00083 {
00084   m_LCEvent = std::make_unique<IMPL::LCEventImpl>();
00085   m_LCEvent->setEventNumber(getEventNumber());
00086   m_LCEvent->setDetectorName(m_DetectorName);
00087   m_LCEvent->setWeight(1);
00088   m_CollectionVec = new IMPL::LCCollectionVec(EVENT::LCIO::RAWCALORIMETERHIT);
00089   IMPL::LCFlagImpl flag(0);
00090   flag.setBit(EVENT::LCIO::RCHBIT_ID1);
00091   flag.setBit(EVENT::LCIO::RCHBIT_TIME);
00092   m_CollectionVec->setFlag(flag.getFlag());
00093   m_CollectionVec->parameters().setValue(EVENT::LCIO::CellIDEncoding, "dif:8,asic:8,channel:6");
00094 }
```

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

Reimplemented from Interface.

Definition at line 106 of file LCIOWriter.cc.

```
00106 {}
```

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

Reimplemented from Interface.

Definition at line 110 of file LCIOWriter.cc.

```
00110 {}
```

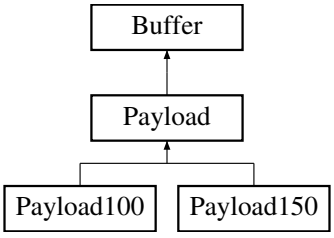
The documentation for this class was generated from the following files:

- 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
- std::uint32_t getDetectorID () const
- 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 :  m_DetectorID(detector_id) {}
```

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

Definition at line 31 of file Payload.h.

```
00031 {}
```

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 getDetectorID() `std::uint32_t Payload::getDetectorID ( ) const [inline]`

Definition at line 29 of file Payload.h.

```
00029 { return m_DetectorID; }
```

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

Implemented in Payload100, and Payload150.

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

Implemented in Payload100, and Payload150.

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

Definition at line 45 of file Payload.h.

```
00045 { return theGetFramePtrReturn_; }
```

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

Implemented in Payload100, and Payload150.

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

Implemented in Payload100, and Payload150.

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

Implemented in Payload100, and Payload150.

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

Implemented in Payload100, and Payload150.

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

Definition at line 47 of file Payload.h.

```
00047 { return size() - theGetFramePtrReturn_; }
```

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

Implemented in Payload100, and Payload150.

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

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

Definition at line 39 of file Payload.h.

```
00040 {
00041   set(buffer);
00042   parsePayload();
00043 }
```

4.14.4 Member Data Documentation

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

Definition at line 35 of file Payload.h.

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

Definition at line 36 of file Payload.h.

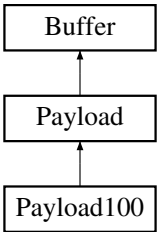
The documentation for this class was generated from the following file:

- 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)); }
```

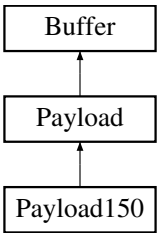
The documentation for this class was generated from the following files:

- 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 NOR 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 14 of file RawBufferNavigator.cc.

```
00014 {}
```

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

4.18.3 Member Function Documentation

4.18.3.1 findStartOfPayload() `bool RawBufferNavigator::findStartOfPayload ( )`

4.18.3.2 getDetectorID() `std::uint32_t RawBufferNavigator::getDetectorID ( )`

Definition at line 18 of file RawBufferNavigator.cc.

```
00018 { return m_Buffer[0]; }
```

4.18.3.3 getPayload() `Buffer RawBufferNavigator::getPayload ( )`

Definition at line 22 of file RawBufferNavigator.cc.

```
00022 { 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 20 of file RawBufferNavigator.cc.

```
00020 { return m_StartPayload; }
```

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

Definition at line 16 of file RawBufferNavigator.cc.

```
00016 { m_Buffer = b; }
```

4.18.3.6 startAt() `void RawBufferNavigator::startAt ( const int & start ) [static]`

Definition at line 9 of file RawBufferNavigator.cc.

```
00010 {
00011   if(start >= 0) m_StartPayload = start;
00012 }
```

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

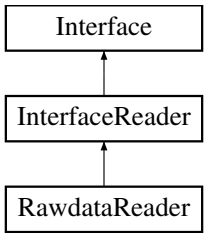
The documentation for this class was generated from the following files:

- 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 (const VersionInfos &ver) final
- 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 ( ) [virtual]`

Reimplemented from Interface.

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 (const VersionInfos & *ver*) [final], [virtual]

Reimplemented from Interface.

Definition at line 23 of file RawdataReader.cc.

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

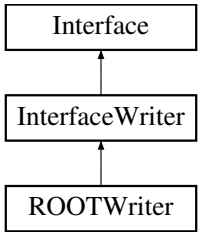
The documentation for this class was generated from the following files:

- 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 (const VersionInfos &ver)
- 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 &channel↩ Index)
- 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 ( )  [virtual]`

Reimplemented from Interface.

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 77 of file ROOTWriter.cc.

```
00078 {
00079   m_Event->addDIF(*m_DIF);
00080   delete m_DIF;
00081 }
```

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

Reimplemented from Interface.

Definition at line 65 of file ROOTWriter.cc.

```
00066 {
00067   m_Tree->Fill();
00068   if(m_Event) delete m_Event;
00069 }
```

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

Reimplemented from Interface.

Definition at line 89 of file ROOTWriter.cc.

```
00090 {
00091   m_DIF->addHit(*m_Hit);
00092   delete m_Hit;
00093 }
```

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

Reimplemented from Interface.

Definition at line 97 of file ROOTWriter.cc.

```
00097 {}
```

4.20.3.6 processDIF() void ROOTWriter::processDIF (const Payload & d)

Definition at line 30 of file ROOTWriter.cc.

```
00031 {
00032   m_DIF->setDetectorID(d.getDetectorID());
00033   m_DIF->setID(d.getDIFid());
00034   m_DIF->setDTC(d.getDTC());
00035   m_DIF->setGTC(d.getGTC());
00036   m_DIF->setDIFBCID(d.getBCID());
00037   m_DIF->setAbsoluteBCID(d.getAbsoluteBCID());
00038 }
```

4.20.3.7 processFrame() void ROOTWriter::processFrame (

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

Definition at line 40 of file ROOTWriter.cc.

```
00041 {
00042   m_Hit->setDIF(d.getDIFid());
00043   m_Hit->setASIC(d.getASICid(frameIndex));
00044   m_Hit->setDTC(d.getDTC());
00045   m_Hit->setGTC(d.getGTC());
00046   m_Hit->setDIFBCID(d.getBCID());
00047   m_Hit->setAbsoluteBCID(d.getAbsoluteBCID());
00048   m_Hit->setFrameBCID(d.getFrameBCID(frameIndex));
00049   m_Hit->setTimestamp(d.getFrameTimeToTrigger(frameIndex));
00050 }
```

4.20.3.8 processPadInFrame() void ROOTWriter::processPadInFrame (

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

Definition at line 52 of file ROOTWriter.cc.

```
00053 {
00054   m_Hit->setChannel(channelIndex);
00055   m_Hit->setThreshold(static_cast<std::uint8_t>(d.getThresholdStatus(frameIndex, channelIndex)));
00056 }
```

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 (

```
const VersionInfos & ver )  [virtual]
```

Reimplemented from Interface.

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 71 of file ROOTWriter.cc.

```
00072 {
00073   m_DIF = new DIF();
00074   // m_DIF->clear();
00075 }
```

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

Reimplemented from Interface.

Definition at line 58 of file ROOTWriter.cc.

```
00059 {
00060   m_Event = new Event();
00061   m_Event->setEventNumber(getEventNumber());
00062   // m_Event->clear();
00063 }
```

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

Reimplemented from Interface.

Definition at line 83 of file ROOTWriter.cc.

```
00084 {
00085   m_Hit = new Hit();
00086   // m_Hit->clear();
00087 }
```

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

Reimplemented from Interface.

Definition at line 95 of file ROOTWriter.cc.

```
00095 {}
```

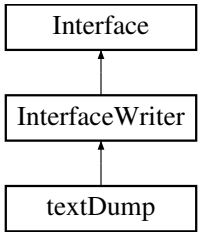
The documentation for this class was generated from the following files:

- 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 (const VersionInfos &ver) final
- 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 ( )  [virtual]`

Reimplemented from Interface.

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 (const VersionInfos & ver) [final], [virtual]

Reimplemented from Interface.

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(); }
```

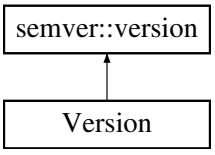
The documentation for this class was generated from the following file:

- 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

4.24 VersionInfos Class Reference

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

Public Member Functions

- void setLibraryInfos (const std::string &name, const Version &version)
- void setReaderInfos (const std::string &name, const Version &version)
- void setWriterInfos (const std::string &name, const Version &version)
- std::pair< std::string, Version > getLibraryInfos () const
- std::pair< std::string, Version > getReaderInfos () const
- std::pair< std::string, Version > getWriterInfos () const

4.24.1 Detailed Description

Definition at line 11 of file VersionInfos.h.

4.24.2 Member Function Documentation

4.24.2.1 getLibraryInfos() std::pair< std::string, Version > VersionInfos::getLibraryInfos ( ) const [inline]

Definition at line 26 of file VersionInfos.h.

```
00027   {
00028     return m_StreamoutLibraryInfos;
00029   }
```

4.24.2.2 getReaderInfos() std::pair< std::string, Version > VersionInfos::getReaderInfos ( ) const [inline]

Definition at line 30 of file VersionInfos.h.

```
00031   {
00032     return m_ReaderInfos;
00033   }
```

4.24.2.3 getWriterInfos() std::pair< std::string, Version > VersionInfos::getWriterInfos ( ) const [inline]

Definition at line 34 of file VersionInfos.h.

```
00035   {
00036     return m_WriterInfos;
00037   }
```

4.24.2.4 setLibraryInfos() void VersionInfos::setLibraryInfos (const std::string & *name*, const Version & *version*) [inline]

Definition at line 14 of file VersionInfos.h.

```
00015   {
00016     m_StreamoutLibraryInfos=std::pair<std::string,Version>{name,version};
00017   }
```

4.24.2.5 setReaderInfos() void VersionInfos::setReaderInfos (const std::string & *name*, const Version & *version*) [inline]

Definition at line 18 of file VersionInfos.h.

```
00019   {
00020     m_ReaderInfos=std::pair<std::string,Version>{name,version};
00021   }
```

4.24.2.6 setWriterInfos() void VersionInfos::setWriterInfos (const std::string & *name*, const Version & *version*) [inline]

Definition at line 22 of file VersionInfos.h.

```
00023   {
00024     m_WriterInfos=std::pair<std::string,Version>{name,version};
00025   }
```

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

- libs/core/include/VersionInfos.h

5 File Documentation

5.1 libs/core/include/Bits.h File Reference

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

Typedefs

- using bit8_t = std::uint8_t
- using bit16_t = std::uint16_t
- using bit32_t = std::uint32_t
- using bit64_t = std::uint64_t

Functions

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

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

5.1.1 Detailed Description

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Definition in file Bits.h.

5.1.2 Typedef Documentation

5.1.2.1 bit16_t `using bit16_t = std::uint16_t`

Definition at line 11 of file Bits.h.

5.1.2.2 bit32_t `using bit32_t = std::uint32_t`

Definition at line 12 of file Bits.h.

5.1.2.3 bit64_t `using bit64_t = std::uint64_t`

Definition at line 13 of file Bits.h.

5.1.2.4 bit8_t `using bit8_t = std::uint8_t`

Definition at line 10 of file Bits.h.

5.1.3 Function Documentation

5.1.3.1 operator<<() `std::ostream & operator<< (`

```
std::ostream & os,
const bit8_t & c )
```

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

Definition at line 8 of file Bits.cc.

```
00008 { return os « c + 0; }
```

5.2 Bits.h

Go to the documentation of this file.

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

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

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

Classes

- class Buffer

5.3.1 Detailed Description

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See also

https://github.com/apingault/Trivent4HEP

Definition in file Buffer.h.

5.4 Buffer.h

Go to the documentation of this file.

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

```
00037   bit8_t& operator[](const std::size_t& pos) { return m_Buffer[pos]; }
00038   bit8_t& operator[](const std::size_t& pos)const { return m_Buffer[pos]; }
00039
00040   void setSize(const std::size_t& size) { m_Size = size; }
00041
00042 private:
00043   bit8_t*     m_Buffer{nullptr};
00044   std::size_t m_Size{0};
00045   std::size_t m_Capacity{0};
00046 };
```

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

```
#include "AppVersion.h"
#include "BufferLooperCounter.h"
#include "DetectorId.h"
#include "Formatters.h"
#include "PayloadLoader.h"
#include "RawBufferNavigator.h"
#include "Timer.h"
#include "Words.h"
#include "VersionInfos.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 #include "VersionInfos.h"
00016
00017 #include <algorithm>
00018 #include <cassert>
00019 #include <fmt/color.h>
00020 #include <map>
00021 #include <memory>
00022 #include <spdlog/sinks/null_sink.h>
00023 #include <spdlog/spdlog.h>
00024 #include <string>
00025 #include <vector>
00026 // function to loop on buffers
00027
00028 template<typename SOURCE, typename DESTINATION> class BufferLooper
00029 {
00030 public:
00031   BufferLooper(SOURCE& source, DESTINATION& dest, bool debug = false) :  m_Source(source),
      m_Destination(dest), m_Debug(debug)
00032   {
00033     m_Logger = spdlog::create<spdlog::sinks::null_sink_mt>("streamout");
00034     if(!spdlog::get("streamout")) { spdlog::register_logger(m_Logger); }
00035     m_Source.setLogger(m_Logger);
00036     m_Destination.setLogger(m_Logger);
00037   }
00038
00039   void addSink(const spdlog::sink_ptr& sink, const spdlog::level::level_enum& level =
      spdlog::get_level())
00040   {
00041     sink->set_level(level);
00042     m_Sinks.push_back(sink);
00043     m_Logger = std::make_shared<spdlog::logger>("streamout", begin(m_Sinks), end(m_Sinks));
00044     m_Source.setLogger(m_Logger);
00045     m_Destination.setLogger(m_Logger);
00046   }
00047
00048   void loop(const std::uint32_t& m_NbrEventsToProcess = 0)
00049   {
00050     // clang-format off
00051     fmt::print(fg(fmt::color::medium_orchid) | fmt::emphasis::bold,
00052             "\n"
00053 " SSSSSSSSSSSSSSS      tttt
      tttt\n"
00054 "SS:::::::::::::::S  ttt:::t
      ttt:::t\n"
00055 "S:::::SSSSSS::::::S  t:::::t
      t:::::t\n"
00056 "S:::::S     SSSSSSS  t:::::t
      t:::::t\n"
00057 "S:::::S        ttttttt:::::ttttttt    rrrrr   rrrrrrrrr       eeeeeeeeeeee    aaaaaaaaaaaaa
      mmmmmmm    mmmmmmm      ooooooooooo   uuuuuu    uuuuuuttttttttt:::::ttttttt\n"
00058 "S:::::S        t:::::::::::::::::t   r::::rrr:::::::::r    ee::::::::::::ee  a::::::::::::a
      mm:::::::m  m:::::::mm  oo:::::::::::oo u::::u    u::::ut:::::::::::::::::t\n"
00059 " S::::SSSS     t:::::::::::::::::t   r:::::::::::::::::r  e::::::eeeee:::::eeaaaaaaaaa:::::a
      m::::::::::mm::::::::::mo:::::::::::::::ou::::u    u::::ut:::::::::::::::::t\n"
00060 "  SS::::::SSSSStttttt:::::::tttttt   rr::::::rrrrr::::::re::::::e     e:::::e         a::::a
      m::::::::::::::::::::::mo::::::ooooo::::::ou::::u    u::::uttttttt:::::::tttttt\n"
00061 "    SSS::::::::SS    t:::::t           r:::::r     r:::::re:::::::eeeee:::::e  aaaaaaa:::::a
      m::::::mmm:::::::mmm::::::mo::::o     o::::ou::::u    u::::u      t:::::t\n"
00062 "       SSSSSS::::S   t:::::t           r:::::r     rrrrrrre:::::::::::::::::e aa::::::::::::a m::::m
      m::::m   m::::mo::::o     o::::ou::::u    u::::u      t:::::t\n"
00063 "            S:::::S  t:::::t           r:::::r         e::::::eeeeeeeeeee a::::aaaa::::::a m::::m
      m::::m   m::::mo::::o     o::::ou::::u    u::::u      t:::::t\n"
00064 "            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    ttttttt\n"
00065 "SSSSSSS     S:::::S  t::::::tttt:::::tr:::::::r          e::::::::e        a::::a    a:::::a m::::m
      m::::m   m::::mo:::::ooooo:::::ou:::::::::::::::uu    t:::::::tttt:::::t\n"
00066 "S::::::SSSSSS:::::S  tt:::::::::::::::tr::::::r           e::::::::eeeeeeeea:::::aaaa::::::a m::::m
      m::::m   m::::mo::::::::::::::::o u::::::::::::::u    tt::::::::::::::t\n"
00067 "S:::::::::::::::SS     tt:::::::::::::ttr::::::r            ee::::::::::::e a::::::::::aa:::am::::m
      m::::m   m::::m oo::::::::::::oo   uu::::::::uu:::u      tt::::::::::::tt\n"
00068 " SSSSSSSSSSSSSSS         ttttttttttt  rrrrrrr                eeeeeeeeeeeeee  aaaaaaaaaa  aaaammmmmm
      mmmmmm   mmmmmm   ooooooooooo       uuuuuuuu  uuuu        ttttttttttt {}\n"
00069 "\n",
00070 fmt::format(fg(fmt::color::red) | fmt::emphasis::bold, "v{}", streamout_version.to_string()));
00071     // clang-format on
00072     log()->info("*********************************************************************");
00073     log()->info("Streamout Version :  {}", streamout_version.to_string());
00074     log()->info("Using InterfaceReader {} version {}", m_Source.getName(),
      m_Source.getVersion().to_string());
00075     log()->info("Using InterfaceWriter {} version {}", m_Destination.getName(),
      m_Destination.getVersion().to_string());
00076
00077     VersionInfos version;
00078     version.setLibraryInfos("streamout",streamout_version);
00079     version.setReaderInfos(m_Source.getName(),m_Source.getVersion());
00080     version.setWriterInfos(m_Destination.getName(),m_Destination.getVersion());
```

```
00081
00082
00083     if(!m_Destination.checkCompatibility(m_Source.getName(), m_Source.getVersion().to_string()))
00084     {
00085       log()->critical("{} version {} is not compatible with {} version {} !  ", m_Source.getName(),
      m_Source.getVersion().to_string(), m_Destination.getName(), m_Destination.getVersion().to_string());
00086       log()->info("Compatible Interfaces for {} are", m_Destination.getName());
00087       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); }
00088       std::exit(-1);
00089     }
00090     if(!m_DetectorIDs.empty())
00091     {
00092       std::string ids;
00093       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)) + ";";
00094       log()->info("Detector ID(s) other than {} will be ignored", ids);
00095     }
00096     log()->info("*********************************************************************");
00097     RawBufferNavigator bufferNavigator;
00098     Timer              timer;
00099     timer.start();
00100     m_Source.start(version);
00101     m_Destination.start(version);
00102     while(m_Source.nextEvent() && m_NbrEventsToProcess >= m_NbrEvents)
00103     {
00104       m_Destination.setEventNumber(m_Source.getEventNumber());
00105 /*******************/
00106 /*** START EVENT ***/
00107       m_Source.startEvent();
00108       m_Destination.startEvent();
00109 /*******************/
00110
00111       m_Logger->warn("===*** Event {} ***===", m_NbrEvents);
00112       while(m_Source.nextDIFbuffer())
00113       {
00114         const Buffer& buffer = m_Source.getBuffer();
00115
00116         bufferNavigator.setBuffer(buffer);
00117         if(std::find(m_DetectorIDs.begin(), m_DetectorIDs.end(),
      static_cast<DetectorID>(bufferNavigator.getDetectorID())) == m_DetectorIDs.end())
00118         {
00119           m_Logger->debug("Ignoring detector ID : {}", bufferNavigator.getDetectorID());
00120           continue;
00121         }
00122
00123         std::int32_t idstart = bufferNavigator.getStartOfPayload();
00124         if(m_Debug && idstart == -1) m_Logger->info(to_hex(buffer));
00125         c.DIFStarter[idstart]++;
00126
00127 /*******************/
00128 /*** START DIF ***/
00129         m_Source.startDIF();
00130         m_Destination.startDIF();
00131 /*******************/
00132
00133         PayloadLoader payloadLoader;
00134
00135         std::unique_ptr<Payload>& d = payloadLoader.getPayload(bufferNavigator.getDetectorID());
00136         if(d == nullptr)
00137         {
00138           m_Logger->error("streamout don't know how to parse the payload for detector_id {} !
      SKIPPING !", bufferNavigator.getDetectorID());
00139           continue;
00140         }
00141
00142         // This is really a big error so skip DIF entirely if exception occurs
00143         try
00144         {
00145           d->setBuffer(bufferNavigator.getPayload());
00146           m_Logger->info("Parsing payload DIF_ID {} (detector_id {})", d->getDIFid(),
      bufferNavigator.getDetectorID());
00147         }
00148         catch(const Exception& e)
00149         {
00150           m_Logger->error("{}", e.what());
00151           continue;
00152         }
00153
00154         if(buffer.end() != d->end()) m_Logger->error("DIF BUFFER END {} {}", fmt::ptr(buffer.end()),
      fmt::ptr(d->end()));
00155         assert(buffer.end() == d->end());
00156
00157         c.DIFPtrValueAtReturnedPos[d->begin()[d->getEndOfDIFData() - 3]]++;
00158         assert(d->begin()[d->getEndOfDIFData() - 3] == 0xa0);
00159
```

```
00160         c.SizeAfterDIFPtr[d->getSizeAfterDIFPtr()]++;
00161         m_Destination.processDIF(*d);
00162         for(std::size_t i = 0; i < d->getNumberOfFrames(); ++i)
00163         {
00164           //
00165           m_Source.startFrame();
00166           m_Destination.startFrame();
00167           //
00168           m_Destination.processFrame(*d, i);
00169           for(std::size_t j = 0; j < static_cast<std::size_t>(Hardware::NUMBER_PAD); ++j)
00170           {
00171             if(d->getThresholdStatus(i, j) != 0)
00172             {
00173               m_Source.startPad();
00174               m_Destination.startPad();
00175               m_Destination.processPadInFrame(*d, i, j);
00176               m_Source.endPad();
00177               m_Destination.endPad();
00178             }
00179           }
00180           //
00181           m_Source.endFrame();
00182           m_Destination.endFrame();
00183           //
00184         }
00185         // 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
00186         /*try
00187 {
00188 d.setSCBuffer();
00189 }
00190 catch(const Exception& e)
00191 {
00192 m_Logger->error("{}", e.what());
00193 }
00194
00195 bool processSC = false;
00196 if(d.hasSlowControl())
00197 {
00198 c.hasSlowControl++;
00199 processSC = true;
00200 }
00201 if(d.badSCData())
00202 {
00203 c.hasBadSlowControl++;
00204 processSC = false;
00205 }
00206 if(processSC) { m_Destination.processSlowControl(d.getSCBuffer()); }*/
00207
00208         // Buffer eod = d.getEndOfAllData();
00209         // c.SizeAfterAllData[eod.size()]++;
00210         // bit8_t* debug_variable_3 = eod.end();
00211         // if(buffer.end() != debug_variable_3) m_Logger->info("END DATA BUFFER END {} {}",
      fmt::ptr(buffer.end()), fmt::ptr(debug_variable_3));
00212         // assert(buffer.end() == debug_variable_3);
00213         // if(eod.size() != 0) m_Logger->info("End of Data remaining stuff :  {}", to_hex(eod));*/
00214
00215         /*int nonzeroCount = 0;
00216 for(bit8_t* it = eod.begin(); it != eod.end(); it++)
00217 if(static_cast<int>(*it) != 0) nonzeroCount++;
00218 c.NonZeroValusAtEndOfData[nonzeroCount]++;*/
00219
00220         //
00221         //
00222         m_Source.endDIF();
00223         m_Destination.endDIF();
00224         //
00225       }  // end of DIF while loop
00226       m_Logger->warn("======* Event {} *******", m_NbrEvents);
00227       m_NbrEvents++;
00228 /*****************/
00229 /*** END EVENT ***/
00230       m_Source.endEvent();
00231       m_Destination.endEvent();
00232 /*****************/
00233     }  // end of event while loop
00234     m_Destination.end();
00235     m_Source.end();
00236     timer.stop();
00237     fmt::print(fg(fmt::color::green) | fmt::emphasis::bold, "=== elapsed time {}ms ({}ms/event)
      ===\n", timer.getElapsedTime() / 1000, timer.getElapsedTime() / (1000 * m_NbrEvents));
00238   }
00239   void                            printAllCounters() { c.printAllCounters(); }
00240   std::shared_ptr<spdlog::logger> log() { return m_Logger; }
00241
00242   void setDetectorIDs(const std::vector<DetectorID>& detectorIDs) { m_DetectorIDs = detectorIDs; }
00243
```

```
00244 private:
00245   std::vector<DetectorID>         m_DetectorIDs;
00246   std::shared_ptr<spdlog::logger> m_Logger{nullptr};
00247   std::vector<spdlog::sink_ptr>   m_Sinks;
00248   BufferLooperCounter             c;
00249   SOURCE&                         m_Source{nullptr};
00250   DESTINATION&                    m_Destination{nullptr};
00251   bool                            m_Debug{false};
00252   std::uint32_t                   m_NbrEvents{1};
00253 };
```

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
00022   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 != 0xa1 && m_SCbuffer[k] != 0xa1 && k < maxsize) || (dif_ID == 0xa1 && 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] == 0xa1 && !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),
      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 "VersionInfos.h"
#include <map>
#include <memory>
#include <semver.hpp>
#include <spdlog/logger.h>
#include <string>
```

Classes

- class Interface
- class InterfaceReader
- class InterfaceWriter

Enumerations

- enum class InterfaceType { Unknown = 0 , Reader = 1 , Writer = 2 }

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

5.19.1 Detailed Description

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Definition in file Interface.h.

5.19.2 Enumeration Type Documentation

5.19.2.1 InterfaceType `enum class InterfaceType [strong]`

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

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

Enumerator

Unknown	
Reader	
Writer	

Definition at line 32 of file Interface.h.

```
00033 {
00034   Unknown = 0,
00035   Reader  = 1,
00036   Writer  = 2
00037 };
```

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 #include "VersionInfos.h"
00010
00011 #include <map>
00012 #include <memory>
00013 #include <semver.hpp>
00014 #include <spdlog/logger.h>
00015 #include <string>
00016
00032 enum class InterfaceType
00033 {
00034   Unknown = 0,
00035   Reader  = 1,
00036   Writer  = 2
00037 };
00038
00039 class Interface
00040 {
00041 public:
00042   Interface(const std::string& name, const std::string& version, const InterfaceType& type) :
      m_Name(name), m_Version(version) {}
00043   virtual ~Interface() = default;
00044   virtual void                      start(const VersionInfos& ver){};
00045   virtual void                      end(){};
00046   virtual void                      startEvent() {}
00047   virtual void                      endEvent() {}
00048   virtual void                      startDIF() {}
00049   virtual void                      endDIF() {}
00050   virtual void                      startFrame() {}
00051   virtual void                      endFrame() {}
00052   virtual void                      startPad() {}
00053   virtual void                      endPad() {}
00054   std::shared_ptr<spdlog::logger>& log() { return m_Logger; }
00055   void                              setLogger(const std::shared_ptr<spdlog::logger>& logger) { m_Logger
      = logger; }
00056   std::string                       getName() { return m_Name; }
00057   Version                           getVersion() { return m_Version; }
00058   std::uint32_t                     getEventNumber() { return m_EventNumber; }
00059   void                              setEventNumber(const std::uint32_t& nbr) { m_EventNumber = nbr; }
00060   std::uint32_t                     getRunNumber() { return m_RunNumber; }
00061   void                              setRunNumber(const std::uint32_t& nbr) { m_RunNumber = nbr; }
00062
00063 protected:
00064   std::uint32_t m_EventNumber{0};
00065   std::uint32_t m_RunNumber{0};
00066
00067 private:
00068   std::shared_ptr<spdlog::logger> m_Logger{nullptr};
00069   std::string                     m_Name;
00070   Version                         m_Version;
00071   InterfaceType                   m_Type{InterfaceType::Unknown};
00072 };
00073
00074 class InterfaceReader :  public Interface
00075 {
00076 public:
00077   InterfaceReader(const std::string& name, const std::string& version) :  Interface(name, version,
      InterfaceType::Reader) {}
00078   virtual ~InterfaceReader() = default;
00079
00080 protected:
00081   Buffer m_Buffer;
00082 };
00083
00084 class InterfaceWriter :  public Interface
00085 {
00086 public:
00087   InterfaceWriter(const std::string& name, const std::string& version) :  Interface(name, version,
      InterfaceType::Writer) {}
00088
00089   void addCompatibility(const std::string& name, const std::string& version) { m_Compatible[name] =
      version; }
00090
00091   std::map<std::string, std::string> getCompatibility() { return m_Compatible; }
00092
00093   bool checkCompatibility(const std::string& name, const std::string& version)
00094   {
00095     if(m_Compatible.find(name) != m_Compatible.end())
00096     {
00097       auto            ran = semver::range::detail::range(m_Compatible[name]);
00098       semver::version ver = semver::version(version);
00099       if(ran.satisfies(ver, false))
```

```
00100       {
00101         return true;
00102       }
00103       else
00104         return false;
00105     }
00106     else
00107       return false;
00108   }
00109   virtual ~InterfaceWriter() = default;
00110 private:
00111   std::map<std::string, std::string> m_Compatible;
00112 };
```

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

Copyright

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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) :  m_DetectorID(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   std::uint32_t getDetectorID()const { return m_DetectorID; }
00030
00031   virtual ~Payload() {}
```

```
00032
00033 protected:
00034   virtual void  parsePayload() = 0;
00035   std::int32_t  m_DetectorID{-1};
00036   std::uint32_t theGetFramePtrReturn_{0};
00037 };
00038
00039 inline void Payload::setBuffer(const Buffer& buffer)
00040 {
00041   set(buffer);
00042   parsePayload();
00043 }
00044
00045 inline std::uint32_t Payload::getEndOfDIFData()const { return theGetFramePtrReturn_; }
00046
00047 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&)
      const;
00076   std::uint16_t       m_Version{13};
00077   std::vector<bit8_t*> m_Lines;
00078   std::vector<bit8_t*> m_Frames;
00079   virtual void        parsePayload() final;
00080   std::uint32_t       parseAnalogLine(const std::uint32_t& idx);
00081   std::uint32_t       getNumberLines() const;
00082 };
```

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&)
      const;
00028   std::vector<bit8_t*> m_Frames;
00029   virtual void         parsePayload() final;
00030 };
```

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

Copyright

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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   Buffer              m_Buffer;
00039   static std::int32_t m_StartPayload;
00040 };
```

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

```
#include <chrono>
```

Classes

- class Timer

5.31.1 Detailed Description

Copyright

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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 <cstdint>
```

Functions

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

5.33.1 Detailed Description

Copyright

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

Classes

- class Version

5.35.1 Detailed Description

Copyright

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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/VersionInfos.h File Reference

```
#include <utility>
#include <string>
#include "Version.h"
```

Classes

- class VersionInfos

5.37.1 Detailed Description

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Definition in file VersionInfos.h.

5.38 VersionInfos.h

Go to the documentation of this file.

```
00001
00005 #pragma once
00006
00007 #include <utility>
00008 #include <string>
00009 #include "Version.h"
00010
00011 class VersionInfos
00012 {
00013 public:
00014   void setLibraryInfos(const std::string& name,const Version& version)
00015   {
00016     m_StreamoutLibraryInfos=std::pair<std::string,Version>{name,version};
00017   }
00018   void setReaderInfos(const std::string& name,const Version& version)
00019   {
```

```
00020     m_ReaderInfos=std::pair<std::string,Version>{name,version};
00021   }
00022   void setWriterInfos(const std::string& name,const Version& version)
00023   {
00024     m_WriterInfos=std::pair<std::string,Version>{name,version};
00025   }
00026   std::pair<std::string,Version> getLibraryInfos()const
00027 {
00028     return m_StreamoutLibraryInfos;
00029   }
00030   std::pair<std::string,Version> getReaderInfos()const
00031 {
00032     return m_ReaderInfos;
00033   }
00034   std::pair<std::string,Version> getWriterInfos()const
00035 {
00036     return m_WriterInfos;
00037   }
00038 private:
00039   std::pair<std::string,Version> m_StreamoutLibraryInfos;
00040   std::pair<std::string,Version> m_ReaderInfos;
00041   std::pair<std::string,Version> m_WriterInfos;
00042 };
```

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

Enumerations

- enum class Hardware : std::uint8_t { NUMBER_PAD = 64 }

5.39.1 Detailed Description

Copyright

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Definition in file Words.h.

5.39.2 Enumeration Type Documentation

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

Enumerator

NUMBER_PAD	

Definition at line 8 of file Words.h.

```
00009 {
00010   NUMBER_PAD = 64,
00011 };
```

5.40 Words.h

Go to the documentation of this file.

```
00001
00005 #pragma once
00006
00007 // TODO(flagarde):  SUPPRESS THIS ***
00008 enum class Hardware :  std::uint8_t
00009 {
00010   NUMBER_PAD = 64,
00011 };
```

5.41 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.

5.41.1 Detailed Description

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Definition in file Bits.cc.

5.41.2 Function Documentation

5.41.2.1 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; }
```

5.42 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; }
```

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

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

5.44 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 }
```

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

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

Functions

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

5.45.1 Detailed Description

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Definition in file DIFSlowControl.cc.

5.45.2 Function Documentation

5.45.2.1 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 }
```

5.46 DIFSlowControl.cc

Go to the documentation of this file.

```
00001
00005 #include "DIFSlowControl.h"
00006
00007 DIFSlowControl::DIFSlowControl(const std::uint8_t& version, const std::uint8_t& DIfId, unsigned char*
      cbuf) :  m_Version(version), m_DIFId(DIfId), m_AsicType(2)
00008 {
00009   if(cbuf[0] != 0xb1) return;
00010   int header_shift{6};
00011   if(m_Version < 8) m_NbrAsic = cbuf[5];
00012   else
00013   {
00014     m_DIFId      = cbuf[1];
00015     m_NbrAsic    = cbuf[2];
00016     header_shift = 3;
00017   }
00018   int size_hardroc1 = m_NbrAsic * 72 + header_shift + 1;
00019   if(cbuf[size_hardroc1 - 1] != 0xa1) size_hardroc1 = 0;
00020
00021   int size_hardroc2 = m_NbrAsic * 109 + header_shift + 1;
00022   if(cbuf[size_hardroc2 - 1] != 0xa1) size_hardroc2 = 0;
00023   if(size_hardroc1 != 0)
00024   {
00025     FillHR1(header_shift, cbuf);
00026     m_AsicType = 1;
00027   }
00028   else if(size_hardroc2 != 0)
00029     FillHR2(header_shift, cbuf);
00030   else
00031     return;
00032 }
00033
00034 inline std::uint8_t DIFSlowControl::getDIFId() { return m_DIFId; }
00035
00036 inline std::map<int, std::map<std::string, int» DIFSlowControl::getChipsMap() { return m_MapSC; }
00037
00038 inline std::map<std::string, int> DIFSlowControl::getChipSlowControl(const int& asicid) { return
      m_MapSC[asicid]; }
00039
00040 inline int DIFSlowControl::getChipSlowControl(const std::int8_t& asicid, const std::string& param) {
      return getChipSlowControl(asicid)[param]; }
00041
00042 void DIFSlowControl::FillHR1(const int& header_shift, unsigned char* cbuf)
00043 {
00044   int nasic{cbuf[header_shift - 1]};
00045   int idx{header_shift};
00046   for(int k = 0; k < nasic; k++)
00047   {
00048     std::bitset<72 * 8> bs;
00049     // printf("%x %x \n",cbuf[idx+k*72+69],cbuf[idx+k*72+70]);
00050     for(int l = 71; l >= 0; l--)
00051     {
00052       //  printf("%d %x :  %d -->",l,cbuf[idx+k*72+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 scsize1=cbuf[header_shift-1]*109+(header_shift-1)+2;
00069   int nasic{cbuf[header_shift - 1]};
00070   int idx{header_shift};
00071   // std::cout<<" DIFSlowControl::FillHR nasic "<<nasic<<std::endl;
00072   for(int k = 0; k < nasic; k++)
00073   {
00074     std::bitset<109 * 8> bs;
00075     // printf("%x %x \n",cbuf[idx+k*109+69],cbuf[idx+k*109+70]);
00076     for(int l = 108; l >= 0; l--)
00077     {
00078       //  printf("%d %x :  %d -->",l,cbuf[idx+k*109+l],(71-l)*8);
00079       for(int m = 0; m < 8; m++)
00080       {
00081         if(((1 << m) & cbuf[idx + k * 109 + l]) != 0) bs.set((108 - l) * 8 + m, 1);
00082         else
00083           bs.set((108 - l) * 8 + m, 0);
00084         // printf("%d",(int) bs[(71-l)*8+m]);
00085       }
00086       // printf("\n");
00087     }
00088     FillAsicHR2(bs);
00089   }
00090 }
00091
00092 void DIFSlowControl::FillAsicHR1(const std::bitset<72 * 8>& bs)
00093 {
00094   // Asic Id
00095   int asicid{0};
00096   for(int j = 0; j < 8; j++)
00097     if(bs[j + 9] != 0) asicid += (1 << (7 - j));
00098   std::map<std::string, int> mAsic;
00099   // Slow Control
00100   mAsic["SSC0"]          = static_cast<int>(bs[575]);
00101   mAsic["SSC1"]          = static_cast<int>(bs[574]);
00102   mAsic["SSC2"]          = static_cast<int>(bs[573]);
00103   mAsic["Choix_caisson"] = static_cast<int>(bs[572]);
00104   mAsic["SW_50k"]        = static_cast<int>(bs[571]);
00105   mAsic["SW_100k"]       = static_cast<int>(bs[570]);
00106   mAsic["SW_100f"]       = static_cast<int>(bs[569]);
00107   mAsic["SW_50f"]        = static_cast<int>(bs[568]);
00108
00109   mAsic["Valid_DC"]  = static_cast<int>(bs[567]);
00110   mAsic["ON_Discri"] = static_cast<int>(bs[566]);
00111   mAsic["ON_Fsb"]    = static_cast<int>(bs[565]);
00112   mAsic["ON_Otaq"]   = static_cast<int>(bs[564]);
00113   mAsic["ON_W"]      = static_cast<int>(bs[563]);
00114   mAsic["ON_Ss"]     = static_cast<int>(bs[562]);
00115   mAsic["ON_Buf"]    = static_cast<int>(bs[561]);
00116   mAsic["ON_Paf"]    = static_cast<int>(bs[560]);
00117   // Gain
00118   for(int i = 0; i < 64; i++)
00119   {
00120     int gain{0};
00121     for(int j = 0; j < 6; j++)
00122       if(bs[176 + i * 6 + j] != 0) gain += (1 << j);
00123     mAsic["Channel_" + std::to_string(i) + "_" + "Gain"]       = gain;
00124     mAsic["Channel_" + std::to_string(i) + "_" + "cTest"]      = bs[112 + i];
00125     mAsic["Channel_" + std::to_string(i) + "_" + "Valid_trig"] = static_cast<int>(bs[25 + i]);
00126   }
00127
00128   mAsic["ON_Otabg"]  = static_cast<int>(bs[111]);
00129   mAsic["ON_Dac"]    = static_cast<int>(bs[110]);
00130   mAsic["ON_Otadac"] = static_cast<int>(bs[109]);
00131   // DAC
00132   int dac1{0};
00133   for(int j = 0; j < 10; j++)
00134     if(bs[j + 99] != 0) dac1 += (1 << j);
00135   mAsic["DAC1"] = dac1;
00136   int dac0{0};
00137   for(int j = 0; j < 10; j++)
00138     if(bs[j + 89] != 0) dac0 += (1 << j);
00139   mAsic["DAC0"]            = dac0;
00140   mAsic["EN_Raz_Ext"]      = static_cast<int>(bs[23]);
00141   mAsic["EN_Raz_Int"]      = static_cast<int>(bs[22]);
```

```
00142   mAsic["EN_Out_Raz_Int"]  = static_cast<int>(bs[21]);
00143   mAsic["EN_Trig_Ext"]     = static_cast<int>(bs[20]);
00144   mAsic["EN_Trig_Int"]     = static_cast<int>(bs[19]);
00145   mAsic["EN_Out_Trig_Int"] = static_cast<int>(bs[18]);
00146   mAsic["Bypass_Chip"]     = static_cast<int>(bs[17]);
00147   mAsic["HardrocHeader"]   = static_cast<int>(asicid);
00148   mAsic["EN_Out_Discri"]   = static_cast<int>(bs[8]);
00149   mAsic["EN_Transmit_On"]  = static_cast<int>(bs[7]);
00150   mAsic["EN_Dout"]         = static_cast<int>(bs[6]);
00151   mAsic["EN_RamFull"]      = static_cast<int>(bs[5]);
00152   m_MapSC[asicid]          = mAsic;
00153 }
00154
00155 void DIFSlowControl::FillAsicHR2(const std::bitset<109 * 8>& bs)
00156 {
00157   int asicid{0};
00158   for(int j = 0; j < 8; j++)
00159     if(bs[j + (108 - 7) * 8 + 2] != 0) asicid += (1 << (7 - j));
00160   std::map<std::string, int> mAsic;
00161   for(int i = 0; i < 64; i++)
00162   {
00163     int gain{0};
00164     int mask{0};
00165     mAsic["Channel_" + std::to_string(i) + "_" + "cTest"] = bs[i];
00166     for(int j = 0; j < 8; j++)
00167       if(bs[64 + i * 8 + j] != 0) gain += (1 << j);
00168     mAsic["Channel_" + std::to_string(i) + "_" + "Gain"] = gain;
00169     for(int j = 0; j < 3; j++)
00170       if(bs[8 * 77 + 2 + i * 3 + j] != 0) mask += (1 << j);
00171     mAsic["Channel_" + std::to_string(i) + "_" + "Mask"] = mask;
00172   }
00173   mAsic["PwrOnPA"] = static_cast<int>(bs[8 * 72]);
00174   mAsic["Cmdb3SS"] = static_cast<int>(bs[8 * 72 + 1]);
00175   mAsic["Cmdb2SS"] = static_cast<int>(bs[8 * 72 + 2]);
00176   mAsic["Cmdb1SS"] = static_cast<int>(bs[8 * 72 + 3]);
00177   mAsic["Cmdb0SS"] = static_cast<int>(bs[8 * 72 + 4]);
00178   mAsic["SwSsc0"]  = static_cast<int>(bs[8 * 72 + 5]);
00179   mAsic["SwSsc1"]  = static_cast<int>(bs[8 * 72 + 6]);
00180   mAsic["SwSsc2"]  = static_cast<int>(bs[8 * 72 + 7]);
00181
00182   mAsic["PwrOnBuff"] = static_cast<int>(bs[8 * 73]);
00183   mAsic["PwrOnSS"]   = static_cast<int>(bs[8 * 73 + 1]);
00184   mAsic["PwrOnW"]    = static_cast<int>(bs[8 * 73 + 2]);
00185   mAsic["Cmdb3Fsb2"] = static_cast<int>(bs[8 * 73 + 3]);
00186   mAsic["Cmdb2Fsb2"] = static_cast<int>(bs[8 * 73 + 4]);
00187   mAsic["Cmdb1Fsb2"] = static_cast<int>(bs[8 * 73 + 5]);
00188   mAsic["Cmdb0Fsb2"] = static_cast<int>(bs[8 * 73 + 6]);
00189   mAsic["Sw50k2"]    = static_cast<int>(bs[8 * 73 + 7]);
00190
00191   mAsic["Sw100k2"]   = static_cast<int>(bs[8 * 74]);
00192   mAsic["Sw100f2"]   = static_cast<int>(bs[8 * 74 + 1]);
00193   mAsic["Sw50f2"]    = static_cast<int>(bs[8 * 74 + 2]);
00194   mAsic["Cmdb3Fsb1"] = static_cast<int>(bs[8 * 74 + 3]);
00195   mAsic["Cmdb2Fsb1"] = static_cast<int>(bs[8 * 74 + 4]);
00196   mAsic["Cmdb1Fsb1"] = static_cast<int>(bs[8 * 74 + 5]);
00197   mAsic["Cmdb0Fsb1"] = static_cast<int>(bs[8 * 74 + 6]);
00198   mAsic["Sw50k1"]    = static_cast<int>(bs[8 * 74 + 7]);
00199
00200   mAsic["Sw100k1"]   = static_cast<int>(bs[8 * 75]);
00201   mAsic["Sw100f1"]   = static_cast<int>(bs[8 * 75 + 1]);
00202   mAsic["Sw50f1"]    = static_cast<int>(bs[8 * 75 + 2]);
00203   mAsic["Sel0"]      = static_cast<int>(bs[8 * 75 + 3]);
00204   mAsic["Sel11"]     = static_cast<int>(bs[8 * 75 + 4]);
00205   mAsic["PwrOnFsb"]  = static_cast<int>(bs[8 * 75 + 5]);
00206   mAsic["PwrOnFsb1"] = static_cast<int>(bs[8 * 75 + 6]);
00207   mAsic["PwrOnFsb2"] = static_cast<int>(bs[8 * 75 + 7]);
00208
00209   mAsic["Sw50k0"]      = static_cast<int>(bs[8 * 76]);
00210   mAsic["Sw100k0"]     = static_cast<int>(bs[8 * 76 + 1]);
00211   mAsic["Sw100f0"]     = static_cast<int>(bs[8 * 76 + 2]);
00212   mAsic["Sw50f0"]      = static_cast<int>(bs[8 * 76 + 3]);
00213   mAsic["EnOtaQ"]      = static_cast<int>(bs[8 * 76 + 4]);
00214   mAsic["OtaQ_PwrADC"] = static_cast<int>(bs[8 * 76 + 5]);
00215   mAsic["Discri_PwrA"] = static_cast<int>(bs[8 * 76 + 6]);
00216   mAsic["Discri2"]     = static_cast<int>(bs[8 * 76 + 7]);
00217
00218   mAsic["Discri1"]      = static_cast<int>(bs[8 * 77]);
00219   mAsic["RS_or_Discri"] = static_cast<int>(bs[8 * 77 + 1]);
00220
00221   mAsic["Header"] = asicid;
00222   for(int i = 0; i < 3; i++)
00223   {
00224     int B = 0;
00225     for(int j = 0; j < 10; j++)
00226       if(bs[8 * 102 + 2 + i * 10 + j] != 0) B += (1 << j);
00227     mAsic["B" + std::to_string(i)] = B;
00228   }
```

```
00229
00230   mAsic["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["Trig1b"]    = static_cast<int>(bs[8 * 106 + 4]);
00235   mAsic["Trig0b"]    = static_cast<int>(bs[8 * 106 + 5]);
00236   mAsic["EnTrigOut"] = static_cast<int>(bs[8 * 106 + 6]);
00237   mAsic["DiscrOrOr"] = static_cast<int>(bs[8 * 106 + 7]);
00238
00239   mAsic["TrigExtVal"]   = static_cast<int>(bs[8 * 107]);
00240   mAsic["RazChnIntVal"] = static_cast<int>(bs[8 * 107 + 1]);
00241   mAsic["RazChnExtVal"] = static_cast<int>(bs[8 * 107 + 2]);
00242   mAsic["ScOn"]         = static_cast<int>(bs[8 * 107 + 3]);
00243   mAsic["CLKMux"]       = static_cast<int>(bs[8 * 107 + 4]);
00244
00245   // EnOCDout1b   EnOCDout2b   EnOCTransmitOn1b   EnOCTransmitOn2b   EnOCChipsatb   SelStartReadout
      SelEndReadout
00246   mAsic["SelEndReadout"]    = static_cast<int>(bs[8 * 108 + 1]);
00247   mAsic["SelStartReadout"]  = static_cast<int>(bs[8 * 108 + 2]);
00248   mAsic["EnOCChipsatb"]     = static_cast<int>(bs[8 * 108 + 3]);
00249   mAsic["EnOCTransmitOn2b"] = static_cast<int>(bs[8 * 108 + 4]);
00250   mAsic["EnOCTransmitOn1b"] = static_cast<int>(bs[8 * 108 + 5]);
00251   mAsic["EnOCDout2b"]       = static_cast<int>(bs[8 * 108 + 6]);
00252   mAsic["EnOCDout1b"]       = static_cast<int>(bs[8 * 108 + 7]);
00253   m_MapSC[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 }
```

5.47 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)

5.47.1 Detailed Description

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Definition in file Filesystem.cc.

5.47.2 Function Documentation

5.47.2.1 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 }
```

5.47.2.2 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 }
```

5.47.2.3 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 }
```

5.48 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 }
```

5.49 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)

5.49.1 Detailed Description

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Definition in file Formatters.cc.

5.49.2 Function Documentation

5.49.2.1 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); }
```

5.49.2.2 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); }
```

5.49.2.3 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); }
```

5.49.2.4 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); }
```

5.49.2.5 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 }
```

5.49.2.6 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); }
```

5.49.2.7 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); }
```

5.49.2.8 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); }
```

5.49.2.9 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); }
```

5.49.2.10 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 }
```

5.49.2.11 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); }
```

5.49.2.12 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); }
```

5.49.2.13 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); }
```

5.49.2.14 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); }
```

5.49.2.15 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 }
```

5.49.2.16 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); }
```

5.49.2.17 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); }
```

5.49.2.18 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); }
```

5.49.2.19 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); }
```

5.49.2.20 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 }
```

5.50 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); }
```

5.51 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 }

5.51.1 Detailed Description

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Definition in file Payload100.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	
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 };
```

5.51.2.2 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 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 };
```

5.52 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)
      || static_cast<std::uint8_t>(begin()[fshift]) ==
      static_cast<std::uint8_t>(Value::FRAME_TRAILER_ERROR)) { fshift += +Size::FRAME_TRAILER; }
00094       else
00095       {
00096         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))
00097         {
00098           m_Frames.push_back(&begin()[fshift]);
00099           fshift += Size::MICROROC_HEADER + Size::BCID + Size::DATA;
00100         }
00101         fshift += +Size::FRAME_TRAILER;
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     fshift += +Size::HEADER_LINE;
00129   while(static_cast<std::uint8_t>(begin()[fshift]) != static_cast<std::uint8_t>(Value::TRAILER_LINE))
00130   {
00131     m_Lines.push_back(&begin()[fshift]);
00132     // Get Number of CHIPS
00133     std::uint32_t nchip{begin()[fshift]};
00134     // Pass Number of CHIPS, NB Asicline*64*16bits
00135     fshift += +Size::NUMBER_CHIPS + static_cast<std::uint32_t>(Size::LINE_SIZE) * nchip;
00136   }
00137   // Pass Trailer line
00138   fshift += +Size::TRAILER_LINE;
00139   return fshift;
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 */
```

5.53 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 }

5.53.1 Detailed Description

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Definition in file Payload150.cc.

5.53.2 Enumeration Type Documentation

5.53.2.1 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_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 };
```

5.53.2.2 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 };
```

5.54 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() {}
```

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

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

5.55.1 Detailed Description

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Definition in file RawBufferNavigator.cc.

5.56 RawBufferNavigator.cc

Go to the documentation of this file.

```
00001
00005 #include "RawBufferNavigator.h"
00006
00007 std::int32_t RawBufferNavigator::m_StartPayload{20};
00008
00009 void RawBufferNavigator::startAt(const int& start)
00010 {
00011   if(start >= 0) m_StartPayload = start;
00012 }
00013
00014 RawBufferNavigator::RawBufferNavigator() {}
00015
00016 void RawBufferNavigator::setBuffer(const Buffer& b) { m_Buffer = b; }
00017
00018 std::uint32_t RawBufferNavigator::getDetectorID() { return m_Buffer[0]; }
00019
00020 std::int32_t RawBufferNavigator::getStartOfPayload() { return m_StartPayload; }
00021
00022 Buffer RawBufferNavigator::getPayload() { return Buffer(&(m_Buffer.begin()[m_StartPayload]),
      m_Buffer.size() - m_StartPayload); }
```

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

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

5.57.1 Detailed Description

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Definition in file Version.cc.

5.58 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; }
```

5.59 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

5.59.1 Detailed Description

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Definition in file textDump.h.

5.60 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(const VersionInfos& ver) final;
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 };
```

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

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

5.61.1 Detailed Description

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Definition in file textDump.cc.

5.62 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(const VersionInfos& ver) { 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"); }
```

5.63 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

5.63.1 Detailed Description

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Definition in file LCIOWriter.h.

5.64 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(const VersionInfos& ver) final;
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 };
```

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

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

5.65.1 Detailed Description

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Definition in file LCIOWriter.cc.

5.66 LCIOWriter.cc

Go to the documentation of this file.

```
00001
00009 #include "LCIOWriter.h"
00010
00011 #include "Filesystem.h"
00012 #include "IMPL/LCFlagImpl.h"
00013 #include "IMPL/LCParametersImpl.h"
00014 #include "IMPL/LCRunHeaderImpl.h"
00015 #include "IOIMPL/LCFactory.h"
00016 #include "LCIOSTLTypes.h"
00017
00018 void LCIOWriter::setFilename(const std::string& filename) { m_Filename = filename; }
00019
00020 LCIOWriter::LCIOWriter() :  InterfaceWriter("LCIOWriter", "1.0.0"),
      m_LCWriter(IOIMPL::LCFactory::getInstance()->createLCWriter()) { addCompatibility("RawdataReader",
      ">=1.0.0"); }
00021
00022 void LCIOWriter::start(const VersionInfos& ver)
00023 {
00024   m_LCWriter->open(m_Filename, EVENT::LCIO::WRITE_NEW);
00025   std::unique_ptr<IMPL::LCRunHeaderImpl> runHdr(new IMPL::LCRunHeaderImpl);
00026   std::string                            filename_ = filename(m_Filename);
00027   std::size_t                            begin_    = filename_.find_last_of("_R");
00028   if(begin_ == std::string::npos) begin_ = filename_.find_last_of('_');
00029   filename_ = filename_.substr(begin_ + 1);
00030   setRunNumber(stoi(filename_));
00031   runHdr->setRunNumber(getRunNumber());
00032   runHdr->setDetectorName(m_DetectorName);
00033   std::string description("data collected with SDHCAL prototype");
00034   runHdr->setDescription(description);
00035   runHdr->parameters().setValue("Library_Name", ver.getLibraryInfos().first);
00036   runHdr->parameters().setValue("Library_Version", ver.getLibraryInfos().second.to_string());
00037   runHdr->parameters().setValue("Reader_Name", ver.getReaderInfos().first);
00038   runHdr->parameters().setValue("Reader_Version", ver.getReaderInfos().second.to_string());
00039   runHdr->parameters().setValue("Writer_Name", ver.getWriterInfos().first);
```

```
00040   runHdr->parameters().setValue("Writer_Version", ver.getWriterInfos().second.to_string());
00041   m_LCWriter->writeRunHeader(runHdr.get());
00042 }
00043
00044 void LCIOWriter::end() { m_LCWriter->close(); }
00045
00046 void LCIOWriter::processDIF(const Payload& d)
00047 {
00048   std::string   parameter_name = "DIF" + std::to_string(d.getDIFid()) + "_Triggers";
00049   EVENT::IntVec parameters;
00050   parameters.push_back(d.getDTC());
00051   parameters.push_back(d.getGTC());
00052   parameters.push_back(d.getBCID());
00053   parameters.push_back(d.getAbsoluteBCID() & 0xFFFFFF);
00054   parameters.push_back((d.getAbsoluteBCID() >> 24) & 0xFFFFFF);
00055   parameters.push_back(0);
00056   parameters.push_back(0);
00057   parameters.push_back(0);
00058   m_CollectionVec->parameters().setValues("DIF" + std::to_string(d.getDIFid()) + "_Triggers",
      parameters);
00059   parameter_name = "DIF_DetectorID_" + std::to_string(d.getDIFid());
00060   m_CollectionVec->parameters().setValue(parameter_name, static_cast<int>(d.getDetectorID()));
00061 }
00062
00063 void LCIOWriter::processFrame(const Payload& d, const std::uint32_t& frameIndex) {}
00064
00065 void LCIOWriter::processPadInFrame(const Payload& d, const std::uint32_t& frameIndex, const
      std::uint32_t& channelIndex)
00066 {
00067   m_LCEvent->setTimeStamp(d.getAbsoluteBCID() * 200);
00068   m_LCEvent->setRunNumber(getRunNumber());
00069   IMPL::RawCalorimeterHitImpl* hit = new IMPL::RawCalorimeterHitImpl;
00070   int                          ID0 = channelIndex;
00071   ID0                              = ID0 << 8;
00072   ID0 += d.getASICid(frameIndex);
00073   ID0 = ID0 << 8;
00074   ID0 += d.getDIFid();
00075   hit->setCellID0(ID0);
00076   hit->setCellID1(d.getFrameBCID(frameIndex));
00077   hit->setAmplitude(d.getThresholdStatus(frameIndex, channelIndex));
00078   hit->setTimeStamp(d.getFrameTimeToTrigger(frameIndex));
00079   m_CollectionVec->addElement(hit);
00080 }
00081
00082 void LCIOWriter::startEvent()
00083 {
00084   m_LCEvent = std::make_unique<IMPL::LCEventImpl>();
00085   m_LCEvent->setEventNumber(getEventNumber());
00086   m_LCEvent->setDetectorName(m_DetectorName);
00087   m_LCEvent->setWeight(1);
00088   m_CollectionVec = new IMPL::LCCollectionVec(EVENT::LCIO::RAWCALORIMETERHIT);
00089   IMPL::LCFlagImpl flag(0);
00090   flag.setBit(EVENT::LCIO::RCHBIT_ID1);
00091   flag.setBit(EVENT::LCIO::RCHBIT_TIME);
00092   m_CollectionVec->setFlag(flag.getFlag());
00093   m_CollectionVec->parameters().setValue(EVENT::LCIO::CellIDEncoding, "dif:8,asic:8,channel:6");
00094 }
00095
00096 void LCIOWriter::endEvent()
00097 {
00098   m_LCEvent->addCollection(m_CollectionVec, "DHCALRawHits");
00099   m_LCWriter->writeEvent(m_LCEvent.get());
00100 }
00101
00102 void LCIOWriter::startDIF() {}
00103
00104 void LCIOWriter::endDIF() {}
00105
00106 void LCIOWriter::startFrame() {}
00107
00108 void LCIOWriter::endFrame() {}
00109
00110 void LCIOWriter::startPad() {}
00111
00112 void LCIOWriter::endPad() {}
```

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

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

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

Classes

- class RawdataReader

5.67.1 Detailed Description

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Definition in file RawdataReader.h.

5.68 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(const VersionInfos& ver) final;
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 };
```

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

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

5.69.1 Detailed Description

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Definition in file RawdataReader.cc.

5.70 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(const VersionInfos& ver) { 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; }
```

5.71 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

5.71.1 Detailed Description

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Definition in file DIF.h.

5.71.2 Typedef Documentation

5.71.2.1 Hits_const_iterator `using Hits_const_iterator = std::vector<Hit>::const_iterator`

Definition at line 14 of file DIF.h.

5.72 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                              setDetectorID(const std::uint32_t&);
00026   std::uint8_t                      getDetectorID() const;
00027   void                              setGTC(const std::uint32_t&);
00028   std::uint32_t                     getGTC() const;
00029   void                              setDIFBCID(const std::uint32_t&);
00030   std::uint32_t                     getDIFBCID() const;
00031   void                              setAbsoluteBCID(const std::uint64_t&);
00032   std::uint64_t                     getAbsoluteBCID() const;
00033   std::vector<Hit>::const_iterator cbegin() const;
00034   std::vector<Hit>::const_iterator cend() const;
00035
00036 private:
00037   std::uint8_t     m_DetectorID{0};
00038   std::uint8_t     m_ID{0};
00039   std::uint32_t    m_DTC{0};
00040   std::uint32_t    m_GTC{0};
00041   std::uint32_t    m_DIFBCID{0};
00042   std::uint64_t    m_AbsoluteBCID{0};
00043   std::vector<Hit> m_Hits;
00044   ClassDef(DIF, 1);
00045 };
```

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

```
#include <vector>
```

5.73.1 Detailed Description

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Definition in file DIFLinkDef.h.

5.74 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
```

5.75 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

5.75.1 Detailed Description

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Definition in file Event.h.

5.75.2 Typedef Documentation

5.75.2.1 DIFs_const_iterator `using DIFs_const_iterator = std::map<std::uint8_t, DIF>::const_↩ iterator`

Definition at line 13 of file Event.h.

5.76 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 };
```

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

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

5.77.1 Detailed Description

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Definition in file EventLinkDef.h.

5.78 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
```

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

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

Classes

- class Hit

5.79.1 Detailed Description

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Definition in file Hit.h.

5.80 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 };
```

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

5.81.1 Detailed Description

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Definition in file HitLinkDef.h.

5.82 HitLinkDef.h

Go to the documentation of this file.

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

5.83 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

5.84 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(const VersionInfos& ver);
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 };
```

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

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

5.85.1 Detailed Description

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Definition in file DIF.cc.

5.86 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(); }
00037
00038 void DIF::setDetectorID(const std::uint32_t& detector_id) { m_DetectorID = detector_id; }
00039
00040 std::uint8_t DIF::getDetectorID()const { return m_DetectorID; }
```

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

`#include "Event.h"`

5.87.1 Detailed Description

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Definition in file Event.cc.

5.88 Event.cc

Go to the documentation of this file.

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

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

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

5.89.1 Detailed Description

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Definition in file Hit.cc.

5.90 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; }
```

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

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

5.91.1 Detailed Description

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Definition in file ROOTWriter.cc.

5.92 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(const VersionInfos& ver)
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->setDetectorID(d.getDetectorID());
00033   m_DIF->setID(d.getDIFid());
00034   m_DIF->setDTC(d.getDTC());
00035   m_DIF->setGTC(d.getGTC());
00036   m_DIF->setDIFBCID(d.getBCID());
00037   m_DIF->setAbsoluteBCID(d.getAbsoluteBCID());
00038 }
00039
00040 void ROOTWriter::processFrame(const Payload& d, const std::uint32_t& frameIndex)
00041 {
00042   m_Hit->setDIF(d.getDIFid());
00043   m_Hit->setASIC(d.getASICid(frameIndex));
00044   m_Hit->setDTC(d.getDTC());
00045   m_Hit->setGTC(d.getGTC());
00046   m_Hit->setDIFBCID(d.getBCID());
00047   m_Hit->setAbsoluteBCID(d.getAbsoluteBCID());
00048   m_Hit->setFrameBCID(d.getFrameBCID(frameIndex));
00049   m_Hit->setTimestamp(d.getFrameTimeToTrigger(frameIndex));
00050 }
00051
00052 void ROOTWriter::processPadInFrame(const Payload& d, const std::uint32_t& frameIndex, const
      std::uint32_t& channelIndex)
00053 {
00054   m_Hit->setChannel(channelIndex);
00055   m_Hit->setThreshold(static_cast<std::uint8_t>(d.getThresholdStatus(frameIndex, channelIndex)));
00056 }
00057
00058 void ROOTWriter::startEvent()
```

```
00059 {
00060   m_Event = new Event();
00061   m_Event->setEventNumber(getEventNumber());
00062   // m_Event->clear();
00063 }
00064
00065 void ROOTWriter::endEvent()
00066 {
00067   m_Tree->Fill();
00068   if(m_Event) delete m_Event;
00069 }
00070
00071 void ROOTWriter::startDIF()
00072 {
00073   m_DIF = new DIF();
00074   // m_DIF->clear();
00075 }
00076
00077 void ROOTWriter::endDIF()
00078 {
00079   m_Event->addDIF(*m_DIF);
00080   delete m_DIF;
00081 }
00082
00083 void ROOTWriter::startFrame()
00084 {
00085   m_Hit = new Hit();
00086   // m_Hit->clear();
00087 }
00088
00089 void ROOTWriter::endFrame()
00090 {
00091   m_DIF->addHit(*m_Hit);
00092   delete m_Hit;
00093 }
00094
00095 void ROOTWriter::startPad() {}
00096
00097 void ROOTWriter::endPad() {}
```