streamout

Generated by Doxygen 1.9.3

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:

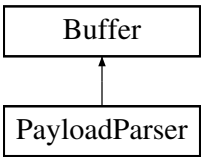
libs/interface/ROOT/src/ROOTWriter.cc 112

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 232 of file BufferLooper.h.

```
00232 { 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      oooooooooo   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::::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:::::::ttttt:::::tr:::::r          e::::::::eeeeeeeea::::a    a:::::a m::::m
      m::::m   m::::mo::::o     o::::ou:::::::::::::::uu    t:::::::ttttt:::::t\n"
00066 "S:::::SSSSSS::::::S  tt:::::::::::::::tr:::::r           e:::::::::::::::::e a::::aaaa::::::a m::::m
      m::::m   m::::mo::::o     o::::o u:::::::::::::::u    tt:::::::::::::::t\n"
00067 "S:::::::::::::::SS     tt:::::::::::::tr:::::r            ee::::::::::::ee 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     if(!m_Destination.checkCompatibility(m_Source.getName(), m_Source.getVersion().to_string()))
00078     {
00079       log()->critical("{} version {} is not compatible with {} version {} !  ", m_Source.getName(),
      m_Source.getVersion().to_string(), m_Destination.getName(), m_Destination.getVersion().to_string());
00080       log()->info("Compatible Interfaces for {} are", m_Destination.getName());
00081       for(std::map<std::string, std::string>::iterator it = m_Destination.getCompatibility().begin();
      it != m_Destination.getCompatibility().end(); ++it) { log()->info("{} version {}", it->first,
      it->second); }
00082       std::exit(-1);
00083     }
00084     if(!m_DetectorIDs.empty())
00085     {
00086       std::string ids;
00087       for(std::vector<DetectorID>::const_iterator it = m_DetectorIDs.cbegin(); it !=
      m_DetectorIDs.cend(); ++it) ids += std::to_string(static_cast<std::uint16_t>(*it)) + ";";
00088       log()->info("Detector ID(s) other than {} will be ignored", ids);
00089     }
00090     log()->info("**********************************************************************");
00091     RawBufferNavigator bufferNavigator;
00092     Timer              timer;
00093     timer.start();
00094     m_Source.start();
00095     m_Destination.start();
00096     while(m_Source.nextEvent() && m_NbrEventsToProcess >= m_NbrEvents)
00097     {
00098 /*******************/
00099 /*** START EVENT ***/
00100       m_Source.startEvent();
00101       m_Destination.startEvent();
00102 /*******************/
00103
00104       m_Logger->warn("====*** Event {} ***===", m_NbrEvents);
00105       while(m_Source.nextDIFbuffer())
00106       {
00107         const Buffer& buffer = m_Source.getBuffer();
00108
00109         bufferNavigator.setBuffer(buffer);
00110         if(std::find(m_DetectorIDs.begin(), m_DetectorIDs.end(),
      static_cast<DetectorID>(bufferNavigator.getDetectorID())) == m_DetectorIDs.end())
00111         {
00112           m_Logger->debug("Ignoring detector ID : {}", bufferNavigator.getDetectorID());
00113           continue;
00114         }
00115
00116         std::int32_t idstart = bufferNavigator.getStartOfPayload();
00117         if(m_Debug && idstart == -1) m_Logger->info(to_hex(buffer));
00118         c.DIFStarter[idstart]++;
00119         if(!bufferNavigator.validPayload())
00120         {
00121           m_Logger->error("!bufferNavigator.validBuffer()");
00122           continue;
00123         }
00124
00125 /******************/
00126 /*** START DIF ***/
```

```
00127         m_Source.startDIF();
00128         m_Destination.startDIF();
00129 /******************/
00130         PayloadParser d;
00131         // This is really a big error so skip DIF entirely if exception occurs
00132         try
00133         {
00134           d.setBuffer(bufferNavigator.getPayload());
00135         }
00136         catch(const Exception& e)
00137         {
00138           m_Logger->error("{}", e.what());
00139           continue;
00140         }
00141
00142         if(buffer.end() != d.end()) m_Logger->error("DIF BUFFER END {} {}", fmt::ptr(buffer.end()),
      fmt::ptr(d.end()));
00143         assert(buffer.end() == d.end());
00144
00145         m_Logger->error("CRC : {}", d.getDIF_CRC());
00146         c.DIFPtrValueAtReturnedPos[d.begin()[d.getEndOfDIFData()-3]]++;
00147         assert(d.begin()[d.getEndOfDIFData()-3] == 0xa0);
00148
00149
00150         c.SizeAfterDIFPtr[d.getSizeAfterDIFPtr()]++;
00151         m_Destination.processDIF(d);
00152         for(std::size_t i = 0; i < d.getNumberOfFrames(); ++i)
00153         {
00154 /********************/
00155 /*** START FRAME ***/
00156           m_Source.startFrame();
00157           m_Destination.startFrame();
00158 /********************/
00159           m_Destination.processFrame(d, i);
00160           for(std::size_t j = 0; j < static_cast<std::size_t>(Hardware::NUMBER_PAD); ++j)
00161           {
00162             if(d.getThresholdStatus(i, j) != 0)
00163             {
00164               m_Source.startPad();
00165               m_Destination.startPad();
00166               m_Destination.processPadInFrame(d, i, j);
00167               m_Source.endPad();
00168               m_Destination.endPad();
00169             }
00170           }
00171 /******************/
00172 /*** END FRAME ***/
00173           m_Source.endFrame();
00174           m_Destination.endFrame();
00175 /******************/
00176         }
00177         // 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
00178         /*try
00179 {
00180 d.setSCBuffer();
00181 }
00182 catch(const Exception& e)
00183 {
00184 m_Logger->error("{}", e.what());
00185 }
00186
00187 bool processSC = false;
00188 if(d.hasSlowControl())
00189 {
00190 c.hasSlowControl++;
00191 processSC = true;
00192 }
00193 if(d.badSCData())
00194 {
00195 c.hasBadSlowControl++;
00196 processSC = false;
00197 }
00198 if(processSC) { m_Destination.processSlowControl(d.getSCBuffer()); }*/
00199
00200         //Buffer eod = d.getEndOfAllData();
00201         //c.SizeAfterAllData[eod.size()]++;
00202        // bit8_t* debug_variable_3 = eod.end();
00203        // if(buffer.end() != debug_variable_3) m_Logger->info("END DATA BUFFER END {} {}",
      fmt::ptr(buffer.end()), fmt::ptr(debug_variable_3));
00204        // assert(buffer.end() == debug_variable_3);
00205         //if(eod.size() != 0) m_Logger->info("End of Data remaining stuff :  {}", to_hex(eod));*/
00206
00207         /*int nonzeroCount = 0;
00208 for(bit8_t* it = eod.begin(); it != eod.end(); it++)
00209 if(static_cast<int>(*it) != 0) nonzeroCount++;
00210 c.NonZeroValusAtEndOfData[nonzeroCount]++;*/
```

```
00211
00212 /***************/
00213 /*** END DIF ***/
00214         m_Source.endDIF();
00215         m_Destination.endDIF();
00216 /***************/
00217       }  // end of DIF while loop
00218       m_Logger->warn("===*** Event {} ***===", m_NbrEvents);
00219       m_NbrEvents++;
00220 /*****************/
00221 /*** END EVENT ***/
00222       m_Source.endEvent();
00223       m_Destination.endEvent();
00224 /*****************/
00225     }  // end of event while loop
00226     m_Destination.end();
00227     m_Source.end();
00228     timer.stop();
00229     fmt::print(fg(fmt::color::green) | fmt::emphasis::bold, "=== elapsed time {}ms ({}ms/event)
      ===\n", timer.getElapsedTime() / 1000, timer.getElapsedTime() / (1000 * m_NbrEvents));
00230   }
```

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

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

Definition at line 231 of file BufferLooper.h.

```
00231 { 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 234 of file BufferLooper.h.

```
00234 { 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 10 of file BufferLooperCounter.cc.

```
00011 {
00012   fmt::print(fg(fmt::color::crimson) | fmt::emphasis::bold, "BUFFER LOOP FINAL STATISTICS : \n");
00013   printCounter("Start of DIF header", DIFStarter);
00014   printCounter("Value after DIF data are processed", DIFPtrValueAtReturnedPos,std::ios_base::hex);
00015   printCounter("Size remaining in buffer after end of DIF data", SizeAfterDIFPtr);
00016   fmt::print(fg(fmt::color::crimson) | fmt::emphasis::bold, "Number of Slow Control found {}  out of
      which {} are bad\n", hasSlowControl, hasBadSlowControl);
00017   printCounter("Size remaining after all of data have been processed", SizeAfterAllData);
00018   printCounter("Number on non zero values in end of data buffer", NonZeroValusAtEndOfData);
00019 }
```

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 21 of file BufferLooperCounter.cc.

```
00022 {
00023   std::string out{"statistics for " + description + " :  \n"};
00024   for(std::map<int, int>::const_iterator it = m.begin(); it != m.end(); it++)
00025   {
00026     if(it != m.begin()) out += ",";
00027     out += " [";
00028     switch(base)
00029     {
00030       case std::ios_base::dec:
00031         out += to_dec(static_cast<std::uint32_t>(it->first));
00032         break;
00033       case std::ios_base::hex:
00034         out += to_hex(static_cast<std::uint32_t>(it->first));
00035         break;
00036       case std::ios_base::oct:
00037         out += to_oct(static_cast<std::uint32_t>(it->first));
00038         break;
00039       default:
00040         out += to_dec(static_cast<std::uint32_t>(it->first));
00041         break;
00042     }
00043     out += "]=" + std::to_string(it->second);
00044   }
00045   out += "\n";
00046   fmt::print(fg(fmt::color::crimson) | fmt::emphasis::bold, out);
00047 }
```

4.3.3 Member Data Documentation

4.3.3.1 DIFPtrValueAtReturnedPos

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

Definition at line 18 of file BufferLooperCounter.h.

4.3.3.2 DIFStarter

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

Definition at line 17 of file BufferLooperCounter.h.

4.3.3.3 hasBadSlowControl

`int BufferLooperCounter::hasBadSlowControl = 0`

Definition at line 16 of file BufferLooperCounter.h.

4.3.3.4 hasSlowControl

`int BufferLooperCounter::hasSlowControl = 0`

Definition at line 15 of file BufferLooperCounter.h.

4.3.3.5 NonZeroValusAtEndOfData

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

Definition at line 21 of file BufferLooperCounter.h.

4.3.3.6 SizeAfterAllData

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

Definition at line 20 of file BufferLooperCounter.h.

4.3.3.7 SizeAfterDIFPtr

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

Definition at line 19 of file BufferLooperCounter.h.

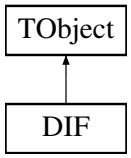
The documentation for this struct was generated from the following files:

- libs/core/include/BufferLooperCounter.h
- libs/core/src/BufferLooperCounter.cc

4.4 DIF Class Reference

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

Inheritance diagram for DIF:



Public Member Functions

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

4.4.1 Detailed Description

Definition at line 16 of file DIF.h.

4.4.2 Member Function Documentation

4.4.2.1 addHit() `void DIF::addHit ( const Hit & hit )`

Definition at line 10 of file DIF.cc.

```
00010 { m_Hits.push_back(hit); }
```

4.4.2.2 cbegin() `std::vector< Hit >::const_iterator DIF::cbegin ( ) const`

Definition at line 32 of file DIF.cc.

```
00032 { return m_Hits.cbegin(); }
```

4.4.2.3 cend() std::vector< Hit >::const_iterator DIF::cend ( ) const

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

4.4.2.4 clear() void DIF::clear ( )

Definition at line 36 of file DIF.cc.
```
00036 { m_Hits.clear(); }
```

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

Definition at line 30 of file DIF.cc.
```
00030 { return m_AbsoluteBCID; }
```

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

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

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

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

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

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

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

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

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

Definition at line 28 of file DIF.cc.

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

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

Definition at line 24 of file DIF.cc.

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

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

Definition at line 16 of file DIF.cc.

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

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

Definition at line 20 of file DIF.cc.

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

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

Definition at line 12 of file DIF.cc.

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

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

- libs/interface/ROOT/include/DIF.h
- libs/interface/ROOT/src/DIF.cc

4.5 DIFPtr Class Reference

M3 MICROROC and HARDROC2 dataformat.

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

4.5.1 Detailed Description

M3 MICROROC and HARDROC2 dataformat.

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

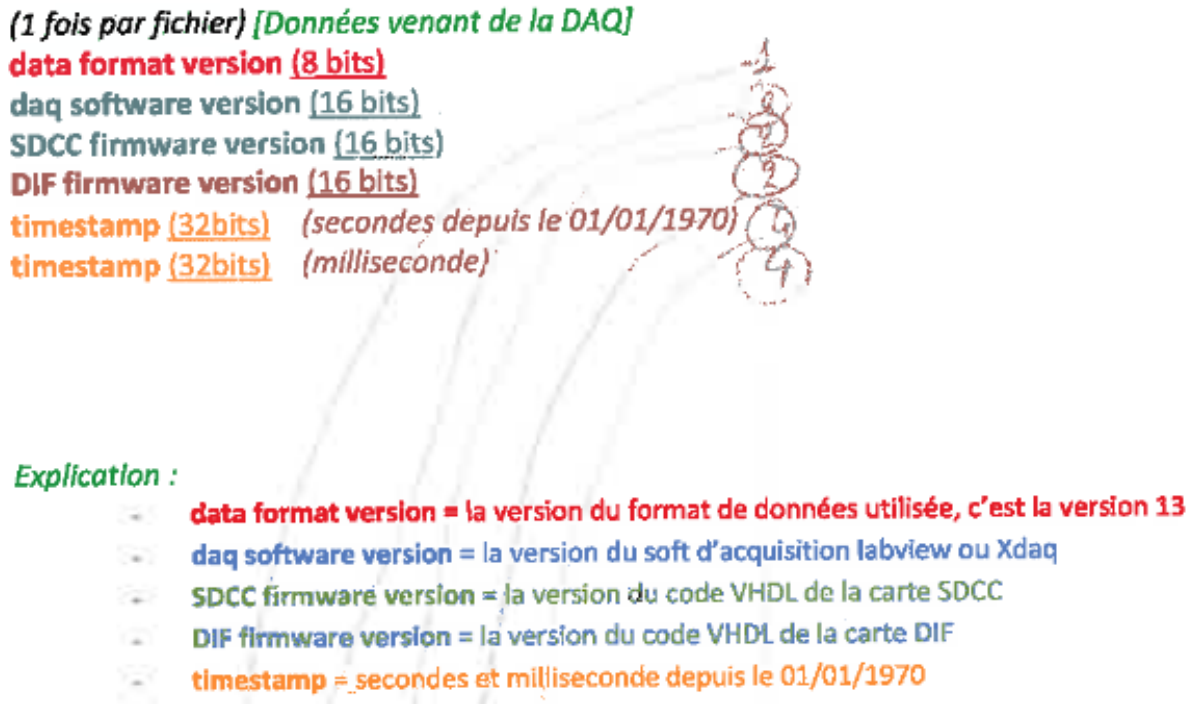


Figure 1 Data from the DAQ (once at the beginning of the file)

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

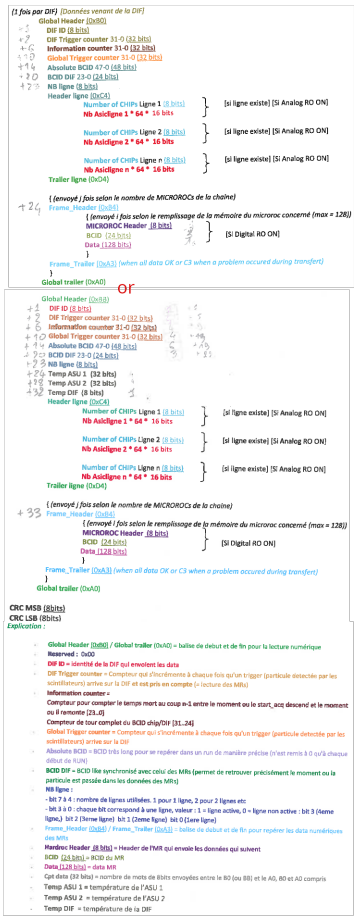


Figure 2 Data from the DIF analog or/and digital

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/PayloadParser.h

4.6 DIFSlowControl Class Reference

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

Public Member Functions

- DIFSlowControl (const std::uint8_t &version, const std::uint8_t &DIFid, unsigned char *buf)
  Constructor.
- std::uint8_t getDIFId ()
  get DIF id
- std::map< int, std::map< std::string, int > > getChipsMap ()
  Get chips map.
- std::map< std::string, int > getChipSlowControl (const int &asicid)
  Get one chip map.
- int getChipSlowControl (const std::int8_t &asicid, const std::string &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; }
```

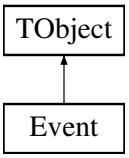
The documentation for this class was generated from the following files:

- 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

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

4.7.1 Detailed Description

Definition at line 15 of file Event.h.

4.7.2 Member Function Documentation

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

Definition at line 10 of file Event.cc.
```
00010 { DIFs[dif.getID()] = dif; }
```

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

Definition at line 12 of file Event.cc.

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

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

Definition at line 14 of file Event.cc.

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

4.7.2.4 clear() void Event::clear ( )

Definition at line 8 of file Event.cc.

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

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

- libs/interface/ROOT/include/Event.h
- libs/interface/ROOT/src/Event.cc

4.8 Exception Class Reference

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

Public Member Functions

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

4.8.1 Detailed Description

Definition at line 11 of file Exception.h.

4.8.2 Constructor & Destructor Documentation

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

Definition at line 15 of file Exception.h.

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

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

Definition at line 16 of file Exception.h.

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

4.8.3 Member Function Documentation

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

Definition at line 17 of file Exception.h.

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

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

Definition at line 18 of file Exception.h.

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

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

Definition at line 14 of file Exception.h.

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

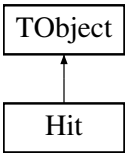
The documentation for this class was generated from the following file:

- libs/core/include/Exception.h

4.9 Hit Class Reference

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

Inheritance diagram for Hit:



Public Member Functions

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

4.9.1 Detailed Description

Definition at line 10 of file Hit.h.

4.9.2 Member Function Documentation

4.9.2.1 clear() `void Hit::clear ( )`

Definition at line 7 of file Hit.cc.

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

4.9.2.2 getAbsoluteBCID() `std::uint64_t Hit::getAbsoluteBCID ( ) const`

Definition at line 59 of file Hit.cc.

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

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

Definition at line 43 of file Hit.cc.
```
00043 { return m_ASIC; }
```

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

Definition at line 45 of file Hit.cc.
```
00045 { return m_Channel; }
```

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

Definition at line 53 of file Hit.cc.
```
00053 { return m_DIFBCID; }
```

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

Definition at line 41 of file Hit.cc.
```
00041 { return m_DIF; }
```

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

Definition at line 49 of file Hit.cc.
```
00049 { return m_DTC; }
```

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

Definition at line 55 of file Hit.cc.
```
00055 { return m_FrameBCID; }
```

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

Definition at line 51 of file Hit.cc.
```
00051 { return m_GTC; }
```

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

Definition at line 47 of file Hit.cc.
```
00047 { return m_Threshold; }
```

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

Definition at line 57 of file Hit.cc.
```
00057 { return m_Timestamp; }
```

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

Definition at line 39 of file Hit.cc.
```
00039 { m_AbsoluteBCID = absolutebcid; }
```

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

Definition at line 23 of file Hit.cc.
```
00023 { m_ASIC = asic; }
```

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

Definition at line 25 of file Hit.cc.
```
00025 { m_Channel = channel; }
```

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

Definition at line 21 of file Hit.cc.
```
00021 { m_DIF = dif; }
```

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

Definition at line 33 of file Hit.cc.
```
00033 { m_DIFBCID = difbcid; }
```

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

Definition at line 29 of file Hit.cc.

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

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

Definition at line 35 of file Hit.cc.

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

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

Definition at line 31 of file Hit.cc.

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

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

Definition at line 27 of file Hit.cc.

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

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

Definition at line 37 of file Hit.cc.

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

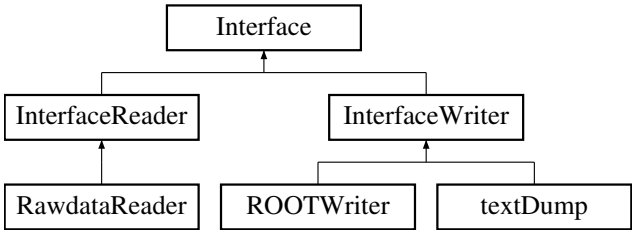
The documentation for this class was generated from the following files:

- libs/interface/ROOT/include/Hit.h
- libs/interface/ROOT/src/Hit.cc

4.10 Interface Class Reference

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

Inheritance diagram for Interface:



Public Member Functions

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

4.10.1 Detailed Description

Definition at line 38 of file Interface.h.

4.10.2 Constructor & Destructor Documentation

4.10.2.1 Interface()

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

Definition at line 41 of file Interface.h.

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

4.10.2.2 ~Interface()

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

4.10.3 Member Function Documentation

4.10.3.1 endDIF()

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

Reimplemented in ROOTWriter.

Definition at line 46 of file Interface.h.

```
00046 {}
```

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

Reimplemented in ROOTWriter.

Definition at line 44 of file Interface.h.

```
00044 {}
```

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

Reimplemented in ROOTWriter.

Definition at line 48 of file Interface.h.

```
00048 {}
```

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

Reimplemented in ROOTWriter.

Definition at line 50 of file Interface.h.

```
00050 {}
```

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

Definition at line 53 of file Interface.h.

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

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

Definition at line 54 of file Interface.h.

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

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

Definition at line 51 of file Interface.h.

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

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

Definition at line 52 of file Interface.h.

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

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

Reimplemented in ROOTWriter.

Definition at line 45 of file Interface.h.
```
00045 {}
```

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

Reimplemented in ROOTWriter.

Definition at line 43 of file Interface.h.
```
00043 {}
```

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

Reimplemented in ROOTWriter.

Definition at line 47 of file Interface.h.
```
00047 {}
```

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

Reimplemented in ROOTWriter.

Definition at line 49 of file Interface.h.
```
00049 {}
```

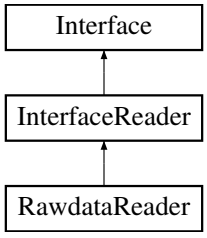
The documentation for this class was generated from the following file:

- libs/core/include/Interface.h

4.11 InterfaceReader Class Reference

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

Inheritance diagram for InterfaceReader:



Public Member Functions

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

Protected Attributes

- Buffer m_Buffer

4.11.1 Detailed Description

Definition at line 63 of file Interface.h.

4.11.2 Constructor & Destructor Documentation

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

Definition at line 66 of file Interface.h.

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

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

4.11.3 Member Data Documentation

4.11.3.1 m_Buffer `Buffer InterfaceReader::m_Buffer [protected]`

Definition at line 70 of file Interface.h.

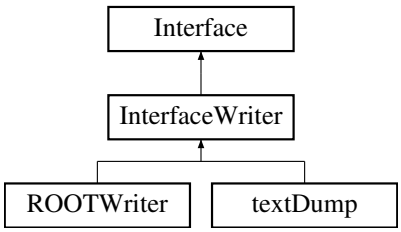
The documentation for this class was generated from the following file:

- libs/core/include/Interface.h

4.12 InterfaceWriter Class Reference

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

Inheritance diagram for InterfaceWriter:



Public Member Functions

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

4.12.1 Detailed Description

Definition at line 73 of file Interface.h.

4.12.2 Constructor & Destructor Documentation

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

Definition at line 76 of file Interface.h.

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

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

4.12.3 Member Function Documentation

4.12.3.1 addCompatibility()

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

Definition at line 78 of file Interface.h.

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

4.12.3.2 checkCompatibility()

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

Definition at line 82 of file Interface.h.

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

4.12.3.3 getCompatibility()

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

Definition at line 80 of file Interface.h.

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

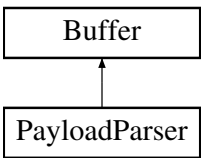
The documentation for this class was generated from the following file:

- libs/core/include/Interface.h

4.13 PayloadParser Class Reference

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

Inheritance diagram for PayloadParser:



Public Member Functions

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

4.13.1 Detailed Description

Definition at line 36 of file PayloadParser.h.

4.13.2 Constructor & Destructor Documentation

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

4.13.3 Member Function Documentation

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

Definition at line 238 of file PayloadParser.h.

```
00239 {
00240   std::uint32_t shift{Size::GLOBAL_HEADER + Size::DIF_IF + Size::DIF_TRIGGER_COUNTER +
      Size::INFORMATION_COUNTER + Size::GLOBAL_TRIGGER_COUNTER};
00241   std::uint64_t LBC = ((begin()[shift] << 16) | (begin()[shift + 1] << 8) | (begin()[shift + 2])) *
      16777216ULL /* to shift the value from the 24 first bits*/
00242                     + ((begin()[shift + 3] << 16) | (begin()[shift + 4] << 8) | (begin()[shift + 5]));
00243   return LBC;
00244 }
```

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

Definition at line 282 of file PayloadParser.h.

```
00282 { return m_Frames[i][0] & 0xFF; }
```

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

Definition at line 246 of file PayloadParser.h.

```
00247 {
00248   std::uint32_t shift{Size::GLOBAL_HEADER + Size::DIF_IF + Size::DIF_TRIGGER_COUNTER +
      Size::INFORMATION_COUNTER + Size::GLOBAL_TRIGGER_COUNTER + Size::ABSOLUTE_BCID};
00249   return (begin()[shift] << 16) + (begin()[shift + 1] << 8) + begin()[shift + 2];
00250 }
```

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

Definition at line 286 of file PayloadParser.h.

```
00287 {
00288   std::uint32_t shift{getEndOfDIFData()-(Size::CRC_MSB+Size::CRC_LSB)};
00289   return (begin()[shift]<<8) + begin()[shift+1];
00290 }
```

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

Definition at line 276 of file PayloadParser.h.

```
00277 {
00278   std::uint32_t shift{+Size::GLOBAL_HEADER};
00279   return begin()[shift] & 0xFF;
00280 }
```

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

Definition at line 226 of file PayloadParser.h.

```
00227 {
00228   std::uint32_t shift{Size::GLOBAL_HEADER + Size::DIF_IF};
00229   return (begin()[shift] << 24) + (begin()[shift + 1] << 16) + (begin()[shift + 2] << 8) + begin()[shift
      + 3];
00230 }
```

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

Definition at line 294 of file PayloadParser.h.

```
00294 { return theGetFramePtrReturn_; }
```

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

Definition at line 262 of file PayloadParser.h.

```
00263 {
00264   std::uint32_t shift{+Size::MICROROC_HEADER};
00265   return GrayToBin((m_Frames[i][shift] « 16) + (m_Frames[i][shift + 1] « 8) + m_Frames[i][shift + 2]);
00266 }
```

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

Definition at line 270 of file PayloadParser.h.

```
00271 {
00272   std::uint32_t shift{Size::MICROROC_HEADER + Size::BCID};
00273   return ((m_Frames[i][shift + ((3 - ipad / 16) * 4 + (ipad % 16) / 4)] » (7 - (((ipad % 16) % 4) * 2
      + ilevel))) & 0x1);
00274 }
```

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

Definition at line 260 of file PayloadParser.h.

```
00260 { return m_Frames[i]; }
```

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

Definition at line 216 of file PayloadParser.h.

```
00217 {
00218   return m_Frames;
00219 }
```

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

Definition at line 268 of file PayloadParser.h.

```
00268 { return getBCID() - getFrameBCID(i); }
```

4.13.3.13 getGTC() std::uint32_t PayloadParser::getGTC ( ) const [inline]

Definition at line 232 of file PayloadParser.h.

```
00233 {
00234   std::uint32_t shift{Size::GLOBAL_HEADER + Size::DIF_IF + Size::DIF_TRIGGER_COUNTER +
      Size::INFORMATION_COUNTER};
00235   return (begin()[shift] « 24) + (begin()[shift + 1] « 16) + (begin()[shift + 2] « 8) + begin()[shift
      + 3];
00236 }
```

4.13.3.14 getLinesVector() std::vector< bit8_t * > PayloadParser::getLinesVector ( ) const [inline]

Definition at line 221 of file PayloadParser.h.

```
00222 {
00223   return m_Lines;
00224 }
```

4.13.3.15 getNumberOfFrames() std::uint32_t PayloadParser::getNumberOfFrames ( ) const [inline]

Definition at line 258 of file PayloadParser.h.

```
00258 { return m_Frames.size(); }
```

4.13.3.16 getSizeAfterDIFPtr() std::uint32_t PayloadParser::getSizeAfterDIFPtr ( ) const [inline]

Definition at line 292 of file PayloadParser.h.

```
00292 { return size() - theGetFramePtrReturn_; }
```

4.13.3.17 getSlowControl() Buffer PayloadParser::getSlowControl ( ) const [inline]

Definition at line 209 of file PayloadParser.h.

```
00210 {
00211   if(hasSlowControl()) return Buffer(&begin()[getEndOfDIFData()], size() - getEndOfDIFData());
00212   else
00213     return Buffer();
00214 }
```

4.13.3.18 getTemperatureASU1() float PayloadParser::getTemperatureASU1 ( ) const [inline]

Definition at line 197 of file PayloadParser.h.

```
00198 {
00199   if(!hasTemperature()) throw Exception("Don't have TemperatureASU1 information");
00200   return (getTASU1() » 3) * 0.0625;
00201 }
```

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

Definition at line 203 of file PayloadParser.h.

```
00204 {
00205   if(!hasTemperature()) throw Exception("Don't have TemperatureASU2 information");
00206   return (getTASU2() >> 3) * 0.0625;
00207 }
```

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

Definition at line 191 of file PayloadParser.h.

```
00192 {
00193   if(!hasTemperature()) throw Exception("Don't have TemperatureDIF information");
00194   return 0.508 * getTDIF() - 9.659;
00195 }
```

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

Definition at line 284 of file PayloadParser.h.

```
00284 { return (((std::uint32_t)getFrameLevel(i, ipad, 1)) << 1) | ((std::uint32_t)getFrameLevel(i, ipad,
      0)); }
```

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

Definition at line 143 of file PayloadParser.h.

```
00143 { return getNumberLines() != 0; }
```

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

Definition at line 252 of file PayloadParser.h.

```
00253 {
00254   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};
00255   return ((begin()[shift] >> line) & 0x1);
00256 }
```

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

Definition at line 171 of file PayloadParser.h.

```
00171 { return theGetFramePtrReturn_ != size(); }
```

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

Definition at line 141 of file PayloadParser.h.

```
00141 { return (static_cast<std::uint8_t>(begin()[0]) ==
      static_cast<std::uint8_t>(Value::GLOBAL_HEADER_TEMP)); }
```

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

Definition at line 91 of file PayloadParser.h.

```
00092 {
00093   set(buffer);
00094   m_Frames.clear();
00095   m_Lines.clear();
00096   theGetFramePtrReturn_ = parsePayload();
00097 }
```

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

- libs/core/include/PayloadParser.h

4.14 RawBufferNavigator Class Reference

class to navigate in the raw data buffer parse the header and send the payload as Buffer

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

Public Member Functions

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

Static Public Member Functions

- static void StartAt (const int &start)

4.14.1 Detailed Description

class to navigate in the raw data buffer parse the header and send the payload as Buffer

Definition at line 13 of file RawBufferNavigator.h.

4.14.2 Constructor & Destructor Documentation

4.14.2.1 RawBufferNavigator() `RawBufferNavigator::RawBufferNavigator ( )`

Definition at line 16 of file RawBufferNavigator.cc.

```
00016 {}
```

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

4.14.3 Member Function Documentation

4.14.3.1 findStartOfPayload() `bool RawBufferNavigator::findStartOfPayload ( )`

Definition at line 27 of file RawBufferNavigator.cc.

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

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

Definition at line 25 of file RawBufferNavigator.cc.

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

4.14.3.3 getPayload() `Buffer RawBufferNavigator::getPayload ( )`

Definition at line 59 of file RawBufferNavigator.cc.

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

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

Definition at line 51 of file RawBufferNavigator.cc.

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

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

Definition at line 18 of file RawBufferNavigator.cc.

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

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

Definition at line 11 of file RawBufferNavigator.cc.

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

4.14.3.7 validPayload() bool RawBufferNavigator::validPayload ( )

Definition at line 57 of file RawBufferNavigator.cc.

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

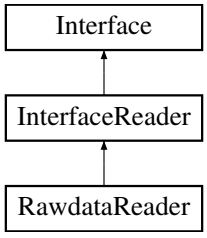
The documentation for this class was generated from the following files:

- libs/core/include/RawBufferNavigator.h
- libs/core/src/RawBufferNavigator.cc

4.15 RawdataReader Class Reference

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

Inheritance diagram for RawdataReader:



Public Member Functions

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

Static Public Member Functions

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

Additional Inherited Members

4.15.1 Detailed Description

Definition at line 17 of file RawdataReader.h.

4.15.2 Constructor & Destructor Documentation

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

Definition at line 18 of file RawdataReader.cc.

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

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

Definition at line 29 of file RawdataReader.h.

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

4.15.3 Member Function Documentation

4.15.3.1 closeFile() void RawdataReader::closeFile ( )

Definition at line 47 of file RawdataReader.cc.

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

4.15.3.2 end() void RawdataReader::end ( )

Definition at line 26 of file RawdataReader.cc.

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

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

Definition at line 122 of file RawdataReader.cc.

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

4.15.3.4 getFileSize() float RawdataReader::getFileSize ( )

Definition at line 130 of file RawdataReader.cc.

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

4.15.3.5 nextDIFbuffer() bool RawdataReader::nextDIFbuffer ( )

Definition at line 95 of file RawdataReader.cc.

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

4.15.3.6 nextEvent() bool RawdataReader::nextEvent ( )

Definition at line 81 of file RawdataReader.cc.

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

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

Definition at line 60 of file RawdataReader.cc.

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

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

Definition at line 16 of file RawdataReader.cc.

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

4.15.3.9 start() void RawdataReader::start ( )

Definition at line 24 of file RawdataReader.cc.

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

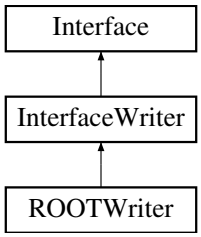
The documentation for this class was generated from the following files:

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

4.16 ROOTWriter Class Reference

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

Inheritance diagram for ROOTWriter:



Public Member Functions

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

4.16.1 Detailed Description

Definition at line 18 of file ROOTWriter.h.

4.16.2 Constructor & Destructor Documentation

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

Definition at line 10 of file ROOTWriter.cc.

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

4.16.3 Member Function Documentation

4.16.3.1 end() void ROOTWriter::end ( )

Definition at line 19 of file ROOTWriter.cc.

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

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

Reimplemented from Interface.

Definition at line 75 of file ROOTWriter.cc.

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

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

Reimplemented from Interface.

Definition at line 63 of file ROOTWriter.cc.

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

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

Reimplemented from Interface.

Definition at line 87 of file ROOTWriter.cc.

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

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

Reimplemented from Interface.

Definition at line 95 of file ROOTWriter.cc.

```
00095 {}
```

4.16.3.6 processDIF() void ROOTWriter::processDIF (

```
const PayloadParser & d )
```

Definition at line 30 of file ROOTWriter.cc.

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

4.16.3.7 processFrame() void ROOTWriter::processFrame (

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

Definition at line 39 of file ROOTWriter.cc.

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

4.16.3.8 processPadInFrame() void ROOTWriter::processPadInFrame (

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

Definition at line 51 of file ROOTWriter.cc.

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

4.16.3.9 processSlowControl() void ROOTWriter::processSlowControl (

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

Definition at line 29 of file ROOTWriter.h.

```
00029 { ; }
```

4.16.3.10 setFilename() void ROOTWriter::setFilename (

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

Definition at line 8 of file ROOTWriter.cc.

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

4.16.3.11 start() void ROOTWriter::start ( )

Definition at line 12 of file ROOTWriter.cc.

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

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

Reimplemented from Interface.

Definition at line 69 of file ROOTWriter.cc.

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

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

Reimplemented from Interface.

Definition at line 57 of file ROOTWriter.cc.

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

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

Reimplemented from Interface.

Definition at line 81 of file ROOTWriter.cc.

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

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

Reimplemented from Interface.

Definition at line 93 of file ROOTWriter.cc.

```
00093 {}
```

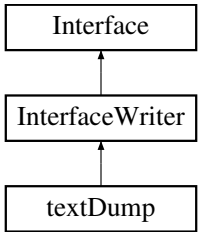
The documentation for this class was generated from the following files:

- libs/interface/ROOT/include/ROOTWriter.h
- libs/interface/ROOT/src/ROOTWriter.cc

4.17 textDump Class Reference

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

Inheritance diagram for textDump:



Public Member Functions

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

4.17.1 Detailed Description

Definition at line 14 of file textDump.h.

4.17.2 Constructor & Destructor Documentation

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

Definition at line 9 of file textDump.cc.

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

4.17.3 Member Function Documentation

4.17.3.1 end() void textDump::end ( )

Definition at line 33 of file textDump.cc.

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

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

Definition at line 24 of file textDump.h.

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

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

Definition at line 19 of file textDump.cc.

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

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

Definition at line 21 of file textDump.cc.

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

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

Definition at line 26 of file textDump.cc.

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

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

Definition at line 31 of file textDump.cc.

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

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

Definition at line 25 of file textDump.h.

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

4.17.3.8 start() void textDump::start ( )

Definition at line 17 of file textDump.cc.

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

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

- libs/interface/Dump/include/textDump.h
- libs/interface/Dump/src/textDump.cc

4.18 Timer Class Reference

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

Public Member Functions

- void start ()
- void stop ()
- float getElapsedTime ()

4.18.1 Detailed Description

Definition at line 9 of file Timer.h.

4.18.2 Member Function Documentation

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

Definition at line 14 of file Timer.h.

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

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

Definition at line 12 of file Timer.h.

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

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

Definition at line 13 of file Timer.h.
```
00013 { m_StopTime = std::chrono::high_resolution_clock::now(); }
```

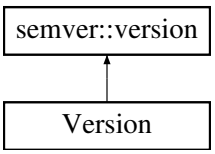
The documentation for this class was generated from the following file:

- libs/core/include/Timer.h

4.19 Version Class Reference

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

Inheritance diagram for Version:



Public Member Functions

- Version (const std::uint8_t &mj, const std::uint8_t &mn, const std::uint8_t &pt, const semver::prerelease &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 ()

4.19.1 Detailed Description

Definition at line 11 of file Version.h.

4.19.2 Constructor & Destructor Documentation

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

Definition at line 14 of file Version.h.
```
00014 :  semver::version(mj, mn, pt, prt, prn) {}
```

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

Definition at line 15 of file Version.h.

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

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

4.19.3 Member Function Documentation

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

Definition at line 9 of file Version.cc.

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

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

Definition at line 11 of file Version.cc.

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

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

Definition at line 13 of file Version.cc.

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

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

Definition at line 15 of file Version.cc.

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

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

Definition at line 27 of file Version.cc.
```
00027 { return prerelease_number; }
```

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

- libs/core/include/Version.h
- libs/core/src/Version.cc

5 File Documentation

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

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

Typedefs

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

Functions

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

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

5.1.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

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

Copyright

2022 G.Grenier F.Lagarde A.Pingault L.Mirabito

See also

https://github.com/apingault/Trivent4HEP

Definition in file Buffer.h.

5.4 Buffer.h

Go to the documentation of this file.

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

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

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

Classes

- class BufferLooper< SOURCE, DESTINATION >

5.5.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

Definition in file BufferLooper.h.

5.6 BufferLooper.h

Go to the documentation of this file.

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

```
00028 template<typename SOURCE, typename DESTINATION> class BufferLooper
00029 {
00030 public:
00031   BufferLooper(SOURCE& source, DESTINATION& dest, bool debug = false) :  m_Source(source),
      m_Destination(dest), m_Debug(debug)
00032   {
00033     m_Logger = spdlog::create<spdlog::sinks::null_sink_mt>("streamout");
00034     if(!spdlog::get("streamout")) { spdlog::register_logger(m_Logger); }
00035     m_Source.setLogger(m_Logger);
00036     m_Destination.setLogger(m_Logger);
00037   }
00038
00039   void addSink(const spdlog::sink_ptr& sink, const spdlog::level::level_enum& level =
      spdlog::get_level())
00040   {
00041     sink->set_level(level);
00042     m_Sinks.push_back(sink);
00043     m_Logger = std::make_shared<spdlog::logger>("streamout", begin(m_Sinks), end(m_Sinks));
00044     m_Source.setLogger(m_Logger);
00045     m_Destination.setLogger(m_Logger);
00046   }
00047
00048   void loop(const std::uint32_t& m_NbrEventsToProcess = 0)
00049   {
00050     // clang-format off
00051     fmt::print(fg(fmt::color::medium_orchid) | fmt::emphasis::bold,
00052             "\n"
00053 " 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:::::uuuu:::::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   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     if(!m_Destination.checkCompatibility(m_Source.getName(), m_Source.getVersion().to_string()))
00078     {
00079       log()->critical("{} version {} is not compatible with {} version {} !  ", m_Source.getName(),
      m_Source.getVersion().to_string(), m_Destination.getName(), m_Destination.getVersion().to_string());
00080       log()->info("Compatible Interfaces for {} are", m_Destination.getName());
00081       for(std::map<std::string, std::string>::iterator it = m_Destination.getCompatibility().begin();
      it != m_Destination.getCompatibility().end(); ++it) { log()->info("{} version {}", it->first,
      it->second); }
00082       std::exit(-1);
00083     }
00084     if(!m_DetectorIDs.empty())
00085     {
00086       std::string ids;
00087       for(std::vector<DetectorID>::const_iterator it = m_DetectorIDs.cbegin(); it !=
      m_DetectorIDs.cend(); ++it) ids += std::to_string(static_cast<std::uint16_t>(*it)) + ";";
00088       log()->info("Detector ID(s) other than {} will be ignored", ids);
00089     }
00090     log()->info("*********************************************************************");
```

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

```
00176         }
00177         // 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
00178         /*try
00179 {
00180 d.setSCBuffer();
00181 }
00182 catch(const Exception& e)
00183 {
00184 m_Logger->error("{}", e.what());
00185 }
00186
00187 bool processSC = false;
00188 if(d.hasSlowControl())
00189 {
00190 c.hasSlowControl++;
00191 processSC = true;
00192 }
00193 if(d.badSCData())
00194 {
00195 c.hasBadSlowControl++;
00196 processSC = false;
00197 }
00198 if(processSC) { m_Destination.processSlowControl(d.getSCBuffer()); }*/
00199
00200         //Buffer eod = d.getEndOfAllData();
00201         //c.SizeAfterAllData[eod.size()]++;
00202        // bit8_t* debug_variable_3 = eod.end();
00203        // if(buffer.end() != debug_variable_3) m_Logger->info("END DATA BUFFER END {} {}",
      fmt::ptr(buffer.end()), fmt::ptr(debug_variable_3));
00204        // assert(buffer.end() == debug_variable_3);
00205         //if(eod.size() != 0) m_Logger->info("End of Data remaining stuff :  {}", to_hex(eod));*/
00206
00207         /*int nonzeroCount = 0;
00208 for(bit8_t* it = eod.begin(); it != eod.end(); it++)
00209 if(static_cast<int>(*it) != 0) nonzeroCount++;
00210 c.NonZeroValusAtEndOfData[nonzeroCount]++;*/
00211
00212 /***************/
00213 /*** END DIF ***/
00214         m_Source.endDIF();
00215         m_Destination.endDIF();
00216 /***************/
00217       }  // end of DIF while loop
00218       m_Logger->warn("===*** Event {} ***===", m_NbrEvents);
00219       m_NbrEvents++;
00220 /*****************/
00221 /*** END EVENT ***/
00222       m_Source.endEvent();
00223       m_Destination.endEvent();
00224 /*****************/
00225     }  // end of event while loop
00226     m_Destination.end();
00227     m_Source.end();
00228     timer.stop();
00229     fmt::print(fg(fmt::color::green) | fmt::emphasis::bold, "=== elapsed time {}ms ({}ms/event)
      ===\n", timer.getElapsedTime() / 1000, timer.getElapsedTime() / (1000 * m_NbrEvents));
00230   }
00231   void                              printAllCounters() { c.printAllCounters(); }
00232   std::shared_ptr<spdlog::logger> log() { return m_Logger; }
00233
00234   void setDetectorIDs(const std::vector<DetectorID>& detectorIDs) { m_DetectorIDs = detectorIDs; }
00235
00236 private:
00237   std::vector<DetectorID>         m_DetectorIDs;
00238   std::shared_ptr<spdlog::logger> m_Logger{nullptr};
00239   std::vector<spdlog::sink_ptr>   m_Sinks;
00240   BufferLooperCounter             c;
00241   SOURCE&                         m_Source{nullptr};
00242   DESTINATION&                    m_Destination{nullptr};
00243   bool                            m_Debug{false};
00244   std::uint32_t                   m_NbrEvents{1};
00245 };
```

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

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

Classes

- struct BufferLooperCounter

5.7.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

Definition in file BufferLooperCounter.h.

5.8 BufferLooperCounter.h

Go to the documentation of this file.

```
00001
00005 #pragma once
00006
00007 #include <map>
00008 #include <memory>
00009 #include <string>
00010 #include<ios>
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

Copyright

2022 G.Grenier F.Lagarde

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

Copyright

2022 G.Grenier F.Lagarde

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

Copyright

2022 G.Grenier F.Lagarde

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

Copyright

2022 G.Grenier F.Lagarde

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

Copyright

2022 G.Grenier F.Lagarde

Definition in file Formatters.h.

5.17.2 Function Documentation

5.17.2.1 to_bin() [1/5] std::string to_bin (

```
const bit16_t & b )
```

Definition at line 71 of file Formatters.cc.

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

5.17.2.2 to_bin() [2/5] std::string to_bin (

```
const bit32_t & b )
```

Definition at line 73 of file Formatters.cc.

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

5.17.2.3 to_bin() [3/5] std::string to_bin (

```
const bit64_t & b )
```

Definition at line 75 of file Formatters.cc.

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

5.17.2.4 to_bin() [4/5] std::string to_bin (

```
const bit8_t & b )
```

Definition at line 69 of file Formatters.cc.

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

5.17.2.5 to_bin() [5/5] std::string to_bin (

```
const Buffer & b,
const std::size_t & begin = 0,
const std::size_t & end = -1 )
```

Definition at line 56 of file Formatters.cc.

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

5.17.2.6 to_dec() [1/5] std::string to_dec (

```
const bit16_t & b )
```

Definition at line 29 of file Formatters.cc.

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

5.17.2.7 to_dec() [2/5] std::string to_dec (

```
const bit32_t & b )
```

Definition at line 31 of file Formatters.cc.

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

5.17.2.8 to_dec() [3/5] std::string to_dec (

```
const bit64_t & b )
```

Definition at line 33 of file Formatters.cc.

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

5.17.2.9 to_dec() [4/5] std::string to_dec (

```
const bit8_t & b )
```

Definition at line 27 of file Formatters.cc.

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

5.17.2.10 to_dec() [5/5] std::string to_dec (

```
const Buffer & b,
const std::size_t & begin = 0,
const std::size_t & end = -1 )
```

Definition at line 14 of file Formatters.cc.

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

5.17.2.11 to_hex() [1/5] std::string to_hex (

```
const bit16_t & b )
```

Definition at line 50 of file Formatters.cc.

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

5.17.2.12 to_hex() [2/5] std::string to_hex (

```
const bit32_t & b )
```

Definition at line 52 of file Formatters.cc.

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

5.17.2.13 to_hex() [3/5] std::string to_hex (

```
const bit64_t & b )
```

Definition at line 54 of file Formatters.cc.

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

5.17.2.14 to_hex() [4/5] std::string to_hex (

```
const bit8_t & b )
```

Definition at line 48 of file Formatters.cc.

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

5.17.2.15 to_hex() [5/5] std::string to_hex (

```
const Buffer & b,
const std::size_t & begin = 0,
const std::size_t & end = -1 )
```

Definition at line 35 of file Formatters.cc.

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

5.17.2.16 to_oct() [1/5] std::string to_oct (

```
const bit16_t & b )
```

Definition at line 92 of file Formatters.cc.

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

5.17.2.17 to_oct() [2/5] std::string to_oct (

```
const bit32_t & b )
```

Definition at line 94 of file Formatters.cc.

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

5.17.2.18 to_oct() [3/5] std::string to_oct (

```
const bit64_t & b )
```

Definition at line 96 of file Formatters.cc.

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

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

Definition at line 90 of file Formatters.cc.

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

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

Definition at line 77 of file Formatters.cc.

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

5.18 Formatters.h

Go to the documentation of this file.

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

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

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

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

Classes

- class Interface
- class InterfaceReader
- class InterfaceWriter

Enumerations

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

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

5.19.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

Definition in file Interface.h.

5.19.2 Enumeration Type Documentation

5.19.2.1 InterfaceType `enum class InterfaceType [strong]`

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

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

Enumerator

Unknown	
Reader	
Writer	

Definition at line 31 of file Interface.h.

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

5.20 Interface.h

Go to the documentation of this file.

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

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

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

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

Classes

- class PayloadParser

5.21.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

Definition in file PayloadParser.h.

5.22 PayloadParser.h

Go to the documentation of this file.

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

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

```
00122       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; }
00123       else
00124       {
00125         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))
00126         {
00127           m_Frames.push_back(&begin()[fshift]);
00128           fshift += Size::MICROROC_HEADER + Size::BCID + Size::DATA;
00129         }
00130         fshift += +Size::FRAME_TRAILER;
00131       }
00132     }
00133   }
00134   // Pass Global trailer
00135   fshift += +Size::GLOBAL_TRAILER;
00136   // Pass CRC MSB, CRC LSB
00137   fshift += Size::CRC_MSB + Size::CRC_LSB;
00138   return fshift;
00139 }
00140
00141 inline bool PayloadParser::hasTemperature()const { return (static_cast<std::uint8_t>(begin()[0]) ==
      static_cast<std::uint8_t>(Value::GLOBAL_HEADER_TEMP)); }
00142
00143 inline bool PayloadParser::hasAnalogReadout()const { return getNumberLines() != 0; }
00144
00145 inline std::uint32_t PayloadParser::getNumberLines()const
00146 {
00147   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};
00148   return ((begin()[shift] » 4) & 0x5);
00149 }
00150
00151 inline std::uint32_t PayloadParser::parseAnalogLine(const std::uint32_t& idx)
00152 {
00153   std::uint32_t fshift{idx};
00154   // Pass Header line
00155   if(static_cast<std::uint8_t>(begin()[fshift]) != static_cast<std::uint8_t>(Value::HEADER_LINE))
      return fshift;
00156   else
00157     fshift += +Size::HEADER_LINE;
00158   while(static_cast<std::uint8_t>(begin()[fshift]) != static_cast<std::uint8_t>(Value::TRAILER_LINE))
00159   {
00160     m_Lines.push_back(&begin()[fshift]);
00161     // Get Number of CHIPS
00162     std::uint32_t nchip{begin()[fshift]};
00163     // Pass Number of CHIPS, NB Asicline*64*16bits
00164     fshift += +Size::NUMBER_CHIPS + static_cast<std::uint32_t>(Size::LINE_SIZE) * nchip;
00165   }
00166   // Pass Trailer line
00167   fshift += +Size::TRAILER_LINE;
00168   return fshift;
00169 }
00170
00171 inline bool PayloadParser::hasSlowControl()const { return theGetFramePtrReturn_ != size(); }
00172
00173 inline std::uint32_t PayloadParser::getTASU1()const
00174 {
00175   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};
00176   return (begin()[shift] « 24) + (begin()[shift + 1] « 16) + (begin()[shift + 2] « 8) + begin()[shift
      + 3];
00177 }
00178
00179 inline std::uint32_t PayloadParser::getTASU2()const
00180 {
00181   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};
00182   return (begin()[shift] « 24) + (begin()[shift + 1] « 16) + (begin()[shift + 2] « 8) + begin()[shift
      + 3];
00183 }
00184
00185 inline std::uint32_t PayloadParser::getTDIF()const
00186 {
00187   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};
00188   return begin()[shift];
00189 }
00190
00191 inline float PayloadParser::getTemperatureDIF()const
00192 {
00193   if(!hasTemperature()) throw Exception("Don't have TemperatureDIF information");
```

```
00194   return 0.508 * getTDIF() - 9.659;
00195 }
00196
00197 inline float PayloadParser::getTemperatureASU1()const
00198 {
00199   if(!hasTemperature()) throw Exception("Don't have TemperatureASU1 information");
00200   return (getTASU1() >> 3) * 0.0625;
00201 }
00202
00203 inline float PayloadParser::getTemperatureASU2()const
00204 {
00205   if(!hasTemperature()) throw Exception("Don't have TemperatureASU2 information");
00206   return (getTASU2() >> 3) * 0.0625;
00207 }
00208
00209 inline Buffer PayloadParser::getSlowControl()const
00210 {
00211   if(hasSlowControl()) return Buffer(&begin()[getEndOfDIFData()], size() - getEndOfDIFData());
00212   else
00213     return Buffer();
00214 }
00215
00216 inline std::vector<bit8_t*> PayloadParser::getFramesVector()const
00217 {
00218   return m_Frames;
00219 }
00220
00221 inline std::vector<bit8_t*> PayloadParser::getLinesVector()const
00222 {
00223   return m_Lines;
00224 }
00225
00226 inline std::uint32_t PayloadParser::getDTC()const
00227 {
00228   std::uint32_t shift{Size::GLOBAL_HEADER + Size::DIF_IF};
00229   return (begin()[shift] << 24) + (begin()[shift + 1] << 16) + (begin()[shift + 2] << 8) + begin()[shift
      + 3];
00230 }
00231
00232 inline std::uint32_t PayloadParser::getGTC()const
00233 {
00234   std::uint32_t shift{Size::GLOBAL_HEADER + Size::DIF_IF + Size::DIF_TRIGGER_COUNTER +
      Size::INFORMATION_COUNTER};
00235   return (begin()[shift] << 24) + (begin()[shift + 1] << 16) + (begin()[shift + 2] << 8) + begin()[shift
      + 3];
00236 }
00237
00238 inline std::uint64_t PayloadParser::getAbsoluteBCID()const
00239 {
00240   std::uint32_t shift{Size::GLOBAL_HEADER + Size::DIF_IF + Size::DIF_TRIGGER_COUNTER +
      Size::INFORMATION_COUNTER + Size::GLOBAL_TRIGGER_COUNTER};
00241   std::uint64_t LBC = ((begin()[shift] << 16) | (begin()[shift + 1] << 8) | (begin()[shift + 2])) *
      16777216ULL /* to shift the value from the 24 first bits*/
00242                     + ((begin()[shift + 3] << 16) | (begin()[shift + 4] << 8) | (begin()[shift + 5]));
00243   return LBC;
00244 }
00245
00246 inline std::uint32_t PayloadParser::getBCID()const
00247 {
00248   std::uint32_t shift{Size::GLOBAL_HEADER + Size::DIF_IF + Size::DIF_TRIGGER_COUNTER +
      Size::INFORMATION_COUNTER + Size::GLOBAL_TRIGGER_COUNTER + Size::ABSOLUTE_BCID};
00249   return (begin()[shift] << 16) + (begin()[shift + 1] << 8) + begin()[shift + 2];
00250 }
00251
00252 inline bool PayloadParser::hasLine(const std::uint32_t& line)const
00253 {
00254   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};
00255   return ((begin()[shift] >> line) & 0x1);
00256 }
00257
00258 inline std::uint32_t PayloadParser::getNumberOfFrames()const { return m_Frames.size(); }
00259
00260 inline bit8_t* PayloadParser::getFramePtr(const std::uint32_t& i)const { return m_Frames[i]; }
00261
00262 inline std::uint32_t PayloadParser::getFrameBCID(const std::uint32_t& i)const
00263 {
00264   std::uint32_t shift{+Size::MICROROC_HEADER};
00265   return GrayToBin((m_Frames[i][shift] << 16) + (m_Frames[i][shift + 1] << 8) + m_Frames[i][shift + 2]);
00266 }
00267
00268 inline std::uint32_t PayloadParser::getFrameTimeToTrigger(const std::uint32_t& i)const { return
      getBCID() - getFrameBCID(i); }
00269
00270 inline bool PayloadParser::getFrameLevel(const std::uint32_t& i, const std::uint32_t& ipad, const
      std::uint32_t& ilevel)const
00271 {
```

```
00272   std::uint32_t shift{Size::MICROROC_HEADER + Size::BCID};
00273   return ((m_Frames[i][shift + ((3 - ipad / 16) * 4 + (ipad % 16) / 4)] » (7 - (((ipad % 16) % 4) * 2
    + ilevel))) & 0x1);
00274 }
00275
00276 inline std::uint32_t PayloadParser::getDIFid()const
00277 {
00278   std::uint32_t shift{+Size::GLOBAL_HEADER};
00279   return begin()[shift] & 0xFF;
00280 }
00281
00282 inline std::uint32_t PayloadParser::getASICid(const std::uint32_t& i)const { return m_Frames[i][0] &
    0xFF; }
00283
00284 inline std::uint32_t PayloadParser::getThresholdStatus(const std::uint32_t& i, const std::uint32_t&
    ipad)const { return (((std::uint32_t)getFrameLevel(i, ipad, 1)) « 1) |
    ((std::uint32_t)getFrameLevel(i, ipad, 0)); }
00285
00286 inline std::uint32_t PayloadParser::getDIF_CRC()const
00287 {
00288   std::uint32_t shift{getEndOfDIFData()-(Size::CRC_MSB+Size::CRC_LSB)};
00289   return (begin()[shift]«8) + begin()[shift+1];
00290 }
00291
00292 inline std::uint32_t PayloadParser::getSizeAfterDIFPtr()const { return size() - theGetFramePtrReturn_;
    }
00293
00294 inline std::uint32_t PayloadParser::getEndOfDIFData()const { return theGetFramePtrReturn_; }
```

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

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

Classes

- class RawBufferNavigator

  class to navigate in the raw data buffer parse the header and send the payload as Buffer

5.23.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

Definition in file RawBufferNavigator.h.

5.24 RawBufferNavigator.h

Go to the documentation of this file.

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

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

```
#include <chrono>
```

Classes

- class Timer

5.25.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

Definition in file Timer.h.

5.26 Timer.h

Go to the documentation of this file.

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

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

```
#include <cstdint>
```

Functions

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

5.27.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

Definition in file Utilities.h.

5.27.2 Function Documentation

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

Definition at line 9 of file Utilities.h.

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

5.28 Utilities.h

Go to the documentation of this file.

```
00001
00005 #pragma once
00006
00007 #include <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 }
```

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

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

Classes

- class Version

5.29.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

Definition in file Version.h.

5.30 Version.h

Go to the documentation of this file.

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

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

```
#include <cstdint>
```

Enumerations

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

5.31.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

Definition in file Words.h.

5.31.2 Enumeration Type Documentation

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

Enumerator

NUMBER_PAD	

Definition at line 9 of file Words.h.

```
00010 {
00011   NUMBER_PAD = 64,
00012 };
```

5.31.2.2 Size `enum class Size : std::uint8_t [strong]`

Enumerator

DATA_FORMAT_VERSION	
DAQ_SOFTWARE_VERSION	
SDCC_FIRMWARE_VERSION	
DIF_FIRMWARE_VERSION	
TIMESTAMP_SECONDES	
TIMESTAMP_MILLISECONDS	
GLOBAL_HEADER	
DIF_IF	
DIF_TRIGGER_COUNTER	
INFORMATION_COUNTER	
GLOBAL_TRIGGER_COUNTER	
ABSOLUTE_BCID	
BCID_DIF	
NUMBER_LINE	
TEMP_ASU1	
TEMP_ASU2	
TEMP_DIF	
HEADER_LINE	
NUMBER_CHIPS	
LINE_SIZE	
TRAILER_LINE	
FRAME_HEADER	
MICROROC_HEADER	
BCID	
DATA	
FRAME_TRAILER	
GLOBAL_TRAILER	
CRC_MSB	
CRC_LSB	
SC_HEADER	

Enumerator

DIF_ID	
ASIC_HEADER	
SC_ASIC_SIZE	
SC_TRAILER	

Definition at line 14 of file Words.h.

```
00015 {
00016   // Header
00017   DATA_FORMAT_VERSION    = 1,
00018   DAQ_SOFTWARE_VERSION   = 2,
00019   SDCC_FIRMWARE_VERSION  = 2,
00020   DIF_FIRMWARE_VERSION   = 2,
00021   TIMESTAMP_SECONDES     = 4,
00022   TIMESTAMP_MILLISECONDS = 4,
00023   // Payload
00024   GLOBAL_HEADER          = 1,
00025   DIF_IF                 = 1,
00026   DIF_TRIGGER_COUNTER    = 4,
00027   INFORMATION_COUNTER    = 4,
00028   GLOBAL_TRIGGER_COUNTER = 4,
00029   ABSOLUTE_BCID          = 6,
00030   BCID_DIF               = 3,
00031   NUMBER_LINE            = 1,
00032   TEMP_ASU1              = 4,
00033   TEMP_ASU2              = 4,
00034   TEMP_DIF               = 1,
00035   HEADER_LINE            = 1,
00036   NUMBER_CHIPS           = 1,
00037   LINE_SIZE              = 64 * 2,
00038   TRAILER_LINE           = 1,
00039   FRAME_HEADER           = 1,
00040   MICROROC_HEADER        = 1,
00041   BCID                   = 3,
00042   DATA                   = 16,
00043   FRAME_TRAILER          = 1,
00044   GLOBAL_TRAILER         = 1,
00045   CRC_MSB                = 1,
00046   CRC_LSB                = 1,
00047   // Slowcontrol
00048   SC_HEADER              = 1,
00049   DIF_ID                 = 1,
00050   ASIC_HEADER            = 1,
00051   SC_ASIC_SIZE           = 1,
00052   SC_TRAILER             = 1
00053 };
```

5.31.2.3 Value `enum class Value : std::uint8_t [strong]`

Enumerator

GLOBAL_HEADER	
GLOBAL_HEADER_TEMP	
HEADER_LINE	
TRAILER_LINE	
FRAME_HEADER	
FRAME_TRAILER	
FRAME_TRAILER_ERROR	
GLOBAL_TRAILER	
SC_HEADER	
SC_TRAILER	

Definition at line 59 of file Words.h.

```
00060 {
00061   GLOBAL_HEADER       = 0xb0,
00062   GLOBAL_HEADER_TEMP  = 0xbb,
00063   HEADER_LINE         = 0xc4,
00064   TRAILER_LINE        = 0xd4,
00065   FRAME_HEADER        = 0xb4,
00066   FRAME_TRAILER       = 0xa3,
00067   FRAME_TRAILER_ERROR = 0xc3,
00068   GLOBAL_TRAILER      = 0xa0,
00069   SC_HEADER           = 0xb1,
00070   SC_TRAILER          = 0xa1
00071 };
```

5.32 Words.h

Go to the documentation of this file.

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

```
00068   GLOBAL_TRAILER      = 0xa0,
00069   SC_HEADER           = 0xb1,
00070   SC_TRAILER          = 0xa1
00071 };
```

5.33 libs/core/src/Bits.cc File Reference

```
#include "Bits.h"
```

Functions

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

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

5.33.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

Definition in file Bits.cc.

5.33.2 Function Documentation

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

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

Definition at line 8 of file Bits.cc.

```
00008 { return os « c + 0; }
```

5.34 Bits.cc

Go to the documentation of this file.

```
00001
00006 #include "Bits.h"
00007
00008 std::ostream& operator«(std::ostream& os, const bit8_t& c) { return os « c + 0; }
```

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

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

5.36 BufferLooperCounter.cc

Go to the documentation of this file.

```
00001
00005 #include "BufferLooperCounter.h"
00006 #include "Formatters.h"
00007
00008 #include <fmt/color.h>
00009
00010 void BufferLooperCounter::printAllCounters()
00011 {
00012   fmt::print(fg(fmt::color::crimson) | fmt::emphasis::bold, "BUFFER LOOP FINAL STATISTICS : \n");
00013   printCounter("Start of DIF header", DIFStarter);
00014   printCounter("Value after DIF data are processed", DIFPtrValueAtReturnedPos,std::ios_base::hex);
00015   printCounter("Size remaining in buffer after end of DIF data", SizeAfterDIFPtr);
00016   fmt::print(fg(fmt::color::crimson) | fmt::emphasis::bold, "Number of Slow Control found {}  out of
      which {} are bad\n", hasSlowControl, hasBadSlowControl);
00017   printCounter("Size remaining after all of data have been processed", SizeAfterAllData);
00018   printCounter("Number on non zero values in end of data buffer", NonZeroValusAtEndOfData);
00019 }
00020
00021 void BufferLooperCounter::printCounter(const std::string& description, const std::map<int, int>&
      m,const std::ios_base::fmtflags& base)
00022 {
00023   std::string out{"statistics for " + description + " :  \n"};
00024   for(std::map<int, int>::const_iterator it = m.begin(); it != m.end(); it++)
00025   {
00026     if(it != m.begin()) out += ",";
00027     out += " [";
00028     switch(base)
00029     {
00030       case std::ios_base::dec:
00031         out += to_dec(static_cast<std::uint32_t>(it->first));
00032         break;
00033       case std::ios_base::hex:
00034         out += to_hex(static_cast<std::uint32_t>(it->first));
00035         break;
00036       case std::ios_base::oct:
00037         out += to_oct(static_cast<std::uint32_t>(it->first));
00038         break;
00039       default:
00040         out += to_dec(static_cast<std::uint32_t>(it->first));
00041         break;
00042     }
00043     out += "]=" + std::to_string(it->second);
00044   }
00045   out += "\n";
00046   fmt::print(fg(fmt::color::crimson) | fmt::emphasis::bold, out);
00047 }
```

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

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

Functions

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

5.37.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

Definition in file DIFSlowControl.cc.

5.37.2 Function Documentation

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

Definition at line 256 of file DIFSlowControl.cc.

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

5.38 DIFSlowControl.cc

Go to the documentation of this file.

```
00001
00005 #include "DIFSlowControl.h"
00006
00007 DIFSlowControl::DIFSlowControl(const std::uint8_t& version, const std::uint8_t& DIfId, unsigned char*
      cbuf) :  m_Version(version), m_DIFId(DIfId), m_AsicType(2)
00008 {
00009   if(cbuf[0] != 0xb1) return;
00010   int header_shift{6};
00011   if(m_Version < 8) m_NbrAsic = cbuf[5];
00012   else
00013   {
00014     m_DIFId      = cbuf[1];
00015     m_NbrAsic    = cbuf[2];
00016     header_shift = 3;
00017   }
00018   int size_hardroc1 = m_NbrAsic * 72 + header_shift + 1;
00019   if(cbuf[size_hardroc1 - 1] != 0xa1) size_hardroc1 = 0;
00020
00021   int size_hardroc2 = m_NbrAsic * 109 + header_shift + 1;
00022   if(cbuf[size_hardroc2 - 1] != 0xa1) size_hardroc2 = 0;
00023   if(size_hardroc1 != 0)
00024   {
00025     FillHR1(header_shift, cbuf);
00026     m_AsicType = 1;
00027   }
00028   else if(size_hardroc2 != 0)
00029     FillHR2(header_shift, cbuf);
00030   else
00031     return;
00032 }
00033
00034 inline std::uint8_t DIFSlowControl::getDIFId() { return m_DIFId; }
00035
00036 inline std::map<int, std::map<std::string, int» DIFSlowControl::getChipsMap() { return m_MapSC; }
00037
00038 inline std::map<std::string, int> DIFSlowControl::getChipSlowControl(const int& asicid) { return
      m_MapSC[asicid]; }
00039
00040 inline int DIFSlowControl::getChipSlowControl(const std::int8_t& asicid, const std::string& param) {
      return getChipSlowControl(asicid)[param]; }
00041
00042 void DIFSlowControl::FillHR1(const int& header_shift, unsigned char* cbuf)
00043 {
00044   int nasic{cbuf[header_shift - 1]};
00045   int idx{header_shift};
00046   for(int k = 0; k < nasic; k++)
00047   {
00048     std::bitset<72 * 8> bs;
00049     // printf("%x %x \n",cbuf[idx+k*72+69],cbuf[idx+k*72+70]);
00050     for(int l = 71; l >= 0; l--)
00051     {
00052       //  printf("%d %x :  %d -->",l,cbuf[idx+k*72+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 }
```

5.39 libs/core/src/Filesystem.cc File Reference

```
#include "Filesystem.h"
```

Functions

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

5.39.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

Definition in file Filesystem.cc.

5.39.2 Function Documentation

5.39.2.1 extension() std::string extension (const std::string & *file*)

Definition at line 13 of file Filesystem.cc.

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

5.39.2.2 filename() std::string filename (const std::string & *file*)

Definition at line 19 of file Filesystem.cc.

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

5.39.2.3 path() std::string path (const std::string & *file*)

Definition at line 7 of file Filesystem.cc.

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

5.40 Filesystem.cc

Go to the documentation of this file.

```
00001
00005 #include "Filesystem.h"
00006
00007 std::string path(const std::string& file)
00008 {
00009   std::size_t pos = file.find_last_of("\\/");
00010   return (std::string::npos == pos) ?  "" :  file.substr(0, pos);
00011 }
00012
00013 std::string extension(const std::string& file)
00014 {
00015   std::size_t position = file.find_last_of(".");
00016   return (std::string::npos == position || position == 0) ?  "" :  file.substr(position + 1);
00017 }
00018
00019 std::string filename(const std::string& file)
00020 {
00021   std::size_t position = file.find_last_of(".");
00022   std::size_t pos      = file.find_last_of("\\/");
00023   return (std::string::npos == pos) ?  file.substr(0, position) :  file.substr(pos + 1, position - pos
      - 1);
00024 }
```

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

```
#include "Formatters.h"
#include "Bits.h"
#include "Buffer.h"
#include "Words.h"
#include <fmt/format.h>
```

Functions

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

5.41.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

Definition in file Formatters.cc.

5.41.2 Function Documentation

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

Definition at line 71 of file Formatters.cc.

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

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

Definition at line 73 of file Formatters.cc.

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

5.41.2.3 to_bin() [3/5] std::string to_bin (

```
const bit64_t & b )
```

Definition at line 75 of file Formatters.cc.

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

5.41.2.4 to_bin() [4/5] std::string to_bin (

```
const bit8_t & b )
```

Definition at line 69 of file Formatters.cc.

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

5.41.2.5 to_bin() [5/5] std::string to_bin (

```
const Buffer & b,
const std::size_t & begin,
const std::size_t & end )
```

Definition at line 56 of file Formatters.cc.

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

5.41.2.6 to_dec() [1/5] std::string to_dec (

```
const bit16_t & b )
```

Definition at line 29 of file Formatters.cc.

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

5.41.2.7 to_dec() [2/5] std::string to_dec (

```
const bit32_t & b )
```

Definition at line 31 of file Formatters.cc.

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

5.41.2.8 to_dec() [3/5] std::string to_dec (

```
const bit64_t & b )
```

Definition at line 33 of file Formatters.cc.

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

5.41.2.9 to_dec() [4/5] std::string to_dec (

```
const bit8_t & b )
```

Definition at line 27 of file Formatters.cc.

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

5.41.2.10 to_dec() [5/5] std::string to_dec (

```
const Buffer & b,
const std::size_t & begin,
const std::size_t & end )
```

Definition at line 14 of file Formatters.cc.

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

5.41.2.11 to_hex() [1/5] std::string to_hex (

```
const bit16_t & b )
```

Definition at line 50 of file Formatters.cc.

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

5.41.2.12 to_hex() [2/5] std::string to_hex (

```
const bit32_t & b )
```

Definition at line 52 of file Formatters.cc.

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

5.41.2.13 to_hex() [3/5] std::string to_hex (

```
const bit64_t & b )
```

Definition at line 54 of file Formatters.cc.

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

5.41.2.14 to_hex() [4/5] std::string to_hex (

```
const bit8_t & b )
```

Definition at line 48 of file Formatters.cc.

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

5.41.2.15 to_hex() [5/5] std::string to_hex (

```
const Buffer & b,
const std::size_t & begin,
const std::size_t & end )
```

Definition at line 35 of file Formatters.cc.

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

5.41.2.16 to_oct() [1/5] std::string to_oct (

```
const bit16_t & b )
```

Definition at line 92 of file Formatters.cc.

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

5.41.2.17 to_oct() [2/5] std::string to_oct (

```
const bit32_t & b )
```

Definition at line 94 of file Formatters.cc.

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

5.41.2.18 to_oct() [3/5] std::string to_oct (

```
const bit64_t & b )
```

Definition at line 96 of file Formatters.cc.

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

5.41.2.19 to_oct() [4/5] std::string to_oct (

```
const bit8_t & b )
```

Definition at line 90 of file Formatters.cc.

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

5.41.2.20 to_oct() [5/5] std::string to_oct (

```
const Buffer & b,
const std::size_t & begin,
const std::size_t & end )
```

Definition at line 77 of file Formatters.cc.

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

5.42 Formatters.cc

Go to the documentation of this file.

```
00001
00006 #include "Formatters.h"
00007
00008 #include "Bits.h"
00009 #include "Buffer.h"
00010 #include "Words.h"
00011
00012 #include <fmt/format.h>
00013
00014 std::string to_dec(const Buffer& b, const std::size_t& begin, const std::size_t& end)
00015 {
00016   std::size_t iend = end;
00017   if(iend == -1) iend = b.size();
00018   std::string ret;
00019   for(std::size_t k = begin; k < iend; k++)
00020   {
00021     ret += to_dec(b[k]);
00022     ret += " - ";
00023   }
00024   return ret;
00025 }
00026
00027 std::string to_dec(const bit8_t& b) { return fmt::format("{:#d}", b); }
00028
00029 std::string to_dec(const bit16_t& b) { return fmt::format("{:#d}", b); }
00030
00031 std::string to_dec(const bit32_t& b) { return fmt::format("{:#d}", b); }
00032
00033 std::string to_dec(const bit64_t& b) { return fmt::format("{:#d}", b); }
00034
00035 std::string to_hex(const Buffer& b, const std::size_t& begin, const std::size_t& end)
00036 {
00037   std::size_t iend = end;
00038   if(iend == -1) iend = b.size();
00039   std::string ret;
00040   for(std::size_t k = begin; k < iend; k++)
00041   {
00042     ret += to_hex(b[k]);
00043     ret += " - ";
00044   }
00045   return ret;
00046 }
00047
00048 std::string to_hex(const bit8_t& b) { return fmt::format("{:#02x}", b); }
00049
00050 std::string to_hex(const bit16_t& b) { return fmt::format("{:#04x}", b); }
00051
00052 std::string to_hex(const bit32_t& b) { return fmt::format("{:#08x}", b); }
00053
00054 std::string to_hex(const bit64_t& b) { return fmt::format("{:#016x}", b); }
00055
00056 std::string to_bin(const Buffer& b, const std::size_t& begin, const std::size_t& end)
00057 {
00058   std::size_t iend = end;
00059   if(iend == -1) iend = b.size();
00060   std::string ret;
00061   for(std::size_t k = begin; k < iend; k++)
00062   {
00063     ret += to_bin(b[k]);
```

```
00064     ret += " - ";
00065   }
00066   return ret;
00067 }
00068
00069 std::string to_bin(const bit8_t& b) { return fmt::format("{:#08b}", b); }
00070
00071 std::string to_bin(const bit16_t& b) { return fmt::format("{:#016b}", b); }
00072
00073 std::string to_bin(const bit32_t& b) { return fmt::format("{:#032b}", b); }
00074
00075 std::string to_bin(const bit64_t& b) { return fmt::format("{:#064b}", b); }
00076
00077 std::string to_oct(const Buffer& b, const std::size_t& begin, const std::size_t& end)
00078 {
00079   std::size_t iend = end;
00080   if(iend == -1) iend = b.size();
00081   std::string ret;
00082   for(std::size_t k = begin; k < iend; k++)
00083   {
00084     ret += to_oct(b[k]);
00085     ret += " - ";
00086   }
00087   return ret;
00088 }
00089
00090 std::string to_oct(const bit8_t& b) { return fmt::format("{:#04o}", b); }
00091
00092 std::string to_oct(const bit16_t& b) { return fmt::format("{:#08o}", b); }
00093
00094 std::string to_oct(const bit32_t& b) { return fmt::format("{:#016o}", b); }
00095
00096 std::string to_oct(const bit64_t& b) { return fmt::format("{:#032o}", b); }
```

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

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

5.43.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

Definition in file RawBufferNavigator.cc.

5.44 RawBufferNavigator.cc

Go to the documentation of this file.

```
00001
00005 #include "RawBufferNavigator.h"
00006
00007 #include "Words.h"
00008
00009 int RawBufferNavigator::m_Start = 92;
00010
00011 void RawBufferNavigator::StartAt(const int& start)
00012 {
00013   if(start >= 0) m_Start = start;
00014 }
00015
00016 RawBufferNavigator::RawBufferNavigator() {}
00017
00018 void RawBufferNavigator::setBuffer(const Buffer& b)
00019 {
00020   m_Buffer           = b;
00021   m_StartPayload     = -1;
```

```
00022   m_StartPayloadDone = false;
00023 }
00024
00025 std::uint8_t RawBufferNavigator::getDetectorID() { return m_Buffer[0]; }
00026
00027 bool RawBufferNavigator::findStartOfPayload()
00028 {
00029   if(m_StartPayloadDone == true)
00030   {
00031     if(m_StartPayload == -1) return false;
00032     else
00033       return true;
00034   }
00035   else
00036   {
00037     m_StartPayloadDone = true;
00038     for(std::size_t i = m_Start; i < m_Buffer.size(); i++)
00039     {
00040       if(static_cast<std::uint8_t>(m_Buffer[i]) == static_cast<std::uint8_t>(Value::GLOBAL_HEADER) ||
      static_cast<std::uint8_t>(m_Buffer[i]) == static_cast<std::uint8_t>(Value::GLOBAL_HEADER_TEMP))
00041       {
00042         m_StartPayload = i;
00043         return true;
00044       }
00045     }
00046     m_StartPayload = -1;
00047     return false;
00048   }
00049 }
00050
00051 std::int32_t RawBufferNavigator::getStartOfPayload()
00052 {
00053   findStartOfPayload();
00054   return m_StartPayload;
00055 }
00056
00057 bool RawBufferNavigator::validPayload() { return m_StartPayload != -1; }
00058
00059 Buffer RawBufferNavigator::getPayload() { return Buffer(&(m_Buffer.begin()[m_StartPayload]),
      m_Buffer.size() - m_StartPayload); }
```

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

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

5.45.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

Definition in file Version.cc.

5.46 Version.cc

Go to the documentation of this file.

```
00001
00005 #include "Version.h"
00006
00007 const static Version streamout_version;
00008
00009 std::uint8_t Version::getMajor() { return major; }
00010
00011 std::uint8_t Version::getMinor() { return minor; }
00012
00013 std::uint8_t Version::getPatch() { return patch; }
00014
00015 std::string Version::getPreRelease()
00016 {
```

```
00017   switch(prerelease_type)
00018   {
00019     case semver::prerelease::alpha:  return "alpha";
00020     case semver::prerelease::beta:  return "beta";
00021     case semver::prerelease::rc:  return "rc";
00022     case semver::prerelease::none:  return "";
00023     default:  return "";
00024   }
00025 }
00026
00027 std::uint8_t Version::getPreReleaseNumber() { return prerelease_number; }
```

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

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

Classes

- class textDump

5.47.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

Definition in file textDump.h.

5.48 textDump.h

Go to the documentation of this file.

```
00001
00005 #pragma once
00006
00007 #include "Interface.h"
00008 #include "PayloadParser.h"
00009 #include "spdlog/sinks/stdout_color_sinks.h"
00010
00011 #include <memory>
00012 #include <spdlog/logger.h>
00013
00014 class textDump :  public InterfaceWriter
00015 {
00016 public:
00017   textDump();
00018   void                              start();
00019   void                              processDIF(const PayloadParser&);
00020   void                              processFrame(const PayloadParser&, uint32_t frameIndex);
00021   void                              processPadInFrame(const PayloadParser&, uint32_t frameIndex,
      uint32_t channelIndex);
00022   void                              processSlowControl(Buffer);
00023   void                              end();
00024   std::shared_ptr<spdlog::logger>& print() { return m_InternalLogger; }
00025   void                              setLevel(const spdlog::level::level_enum& level) {
      m_InternalLogger->set_level(level); }
00026
00027 private:
00028   // This class is a dumb class to print on terminal so we need the logger + the standard one given by
      the interface.
00029   std::shared_ptr<spdlog::logger> m_InternalLogger{nullptr};
00030 };
```

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

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

5.49.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

Definition in file textDump.cc.

5.50 textDump.cc

Go to the documentation of this file.

```
00001
00005 #include "textDump.h"
00006
00007 #include "PayloadParser.h"
00008
00009 textDump::textDump() :  InterfaceWriter("textDump", "1.0.0")
00010 {
00011   m_InternalLogger = std::make_shared<spdlog::logger>("textDump",
      std::make_shared<spdlog::sinks::stdout_color_sink_mt>());
00012   m_InternalLogger->set_level(spdlog::level::trace);
00013   addCompatibility("RawdataReader", ">=1.0.0");
00014   addCompatibility("DIFdataExample", ">=1.0.0");
00015 }
00016
00017 void textDump::start() { print()->info("Will dump bunch of DIF data"); }
00018
00019 void textDump::processDIF(const PayloadParser& d) { print()->info("DIF_ID : {}, DTC : {}, GTC : {},
      DIF BCID {}, Absolute BCID : {}, Nbr frames {}", d.getDIFid(), d.getDTC(), d.getGTC(), d.getBCID(),
      d.getAbsoluteBCID(), d.getNumberOfFrames()); }
00020
00021 void textDump::processFrame(const PayloadParser& d, uint32_t frameIndex)
00022 {
00023   print()->info("\tDisplaying frame number {} :  ASIC ID {}, Frame BCID {}, Frame Time To Trigger
      (a.k.a timestamp) is {}", frameIndex, d.getASICid(frameIndex), d.getFrameBCID(frameIndex),
      d.getFrameTimeToTrigger(frameIndex));
00024 }
00025
00026 void textDump::processPadInFrame(const PayloadParser& d, uint32_t frameIndex, uint32_t channelIndex)
00027 {
00028   if(d.getThresholdStatus(frameIndex, channelIndex) > 0) { print()->info("\t\tChannel {}, Threshold
      {}", channelIndex, d.getThresholdStatus(frameIndex, channelIndex)); }
00029 }
00030
00031 void textDump::processSlowControl(Buffer) { print()->error("textDump::processSlowControl not
      implemented yet."); }
00032
00033 void textDump::end() { print()->info("textDump end of report"); }
```

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

5.51.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

Definition in file LCIOWriter.h.

5.52 LCIOWriter.h

Go to the documentation of this file.

```
00001
00005 #pragma once
```

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

5.53.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

Definition in file LCIOWriter.cc.

5.54 LCIOWriter.cc

Go to the documentation of this file.

```
00001
```

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

```
#include "Interface.h"
#include <array>
#include <cstdint>
#include <fstream>
#include <string>
#include <vector>
```

Classes

- class RawdataReader

5.55.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

Definition in file RawdataReader.h.

5.56 RawdataReader.h

Go to the documentation of this file.

```
00001
00005 #pragma once
00006
00007 #include "Interface.h"
00008
00009 #include <array>
00010 #include <cstdint>
00011 #include <fstream>
00012 #include <string>
00013 #include <vector>
00014
00015 class Buffer;
00016
00017 class RawdataReader :  public InterfaceReader
00018 {
00019 public:
00020   explicit RawdataReader(const char* fileName);
00021   void          start();
00022   void          end();
00023   float         getFileSize();
00024   void          openFile(const std::string& fileName);
00025   void          closeFile();
00026   bool          nextEvent();
00027   bool          nextDIFbuffer();
00028   const Buffer& getBuffer();
00029   virtual ~RawdataReader() { closeFile(); }
00030   static void setDefaultBufferSize(const std::size_t& size);
00031
00032 private:
00033   void                uncompress();
00034   std::ifstream       m_FileStream;
00035   void                setFileSize(const std::size_t& size);
00036   static std::size_t  m_BufferSize;
00037   std::size_t         m_FileSize{0};
00038   std::uint32_t       m_NumberOfDIF{0};
00039   std::uint32_t       m_EventNumber{0};
00040   std::vector<bit8_t> m_buf;
00041   std::string         m_Filename;
00042 };
```

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

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

5.57.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

Definition in file RawdataReader.cc.

5.58 RawdataReader.cc

Go to the documentation of this file.

```
00001
00004 #include "RawdataReader.h"
00005
00006 #include "Exception.h"
00007
00008 #include <cstdint>
00009 #include <cstring>
00010 #include <stdexcept>
00011 #include <zlib.h>
00012
00014 std::size_t RawdataReader::m_BufferSize = 0x100000;
00015
00016 void RawdataReader::setDefaultBufferSize(const std::size_t& size) { m_BufferSize = size; }
00017
00018 RawdataReader::RawdataReader(const char* fileName) :  InterfaceReader("RawdataReader", "1.0.0")
00019 {
00020   m_buf.reserve(m_BufferSize);
00021   m_Filename = fileName;
00022 }
00023
00024 void RawdataReader::start() { openFile(m_Filename); }
00025
00026 void RawdataReader::end() { closeFile(); }
00027
00028 void RawdataReader::uncompress()
00029 {
00030   static const std::size_t size_buffer{0x20000};
00031   std::size_t              shift{3 * sizeof(std::uint32_t) + sizeof(std::uint64_t)};
00032   static bit8_t            obuf[size_buffer];
00033   unsigned long            size_buffer_end{0x20000};  // NOLINT(runtime/int)
00034   std::int8_t              rc = ::uncompress(obuf, &size_buffer_end, &m_Buffer[shift], m_Buffer.size()
      - shift);
00035   switch(rc)
00036   {
00037     case Z_OK: break;
00038     case Z_MEM_ERROR: throw Exception(Z_MEM_ERROR, "Not enough memory"); break;
00039     case Z_BUF_ERROR: throw Exception(Z_BUF_ERROR, "Not enough room in the output buffer"); break;
00040     case Z_DATA_ERROR: throw Exception(Z_DATA_ERROR, "The input data was corrupted or incomplete");
      break;
00041     default:  throw Exception("The input data was corrupted or incomplete"); break;
00042   }
00043   memcpy(&m_Buffer[shift], obuf, size_buffer_end);
00044   m_Buffer.setSize(size_buffer_end + shift);
00045 }
00046
00047 void RawdataReader::closeFile()
00048 {
00049   try
00050   {
00051     if(m_FileStream.is_open()) m_FileStream.close();
00052   }
00053   catch(const std::ios_base::failure& e)
00054   {
00055     log()->error("Caught an ios_base::failure in closeFile :  {} {}", e.what(), e.code().value());
00056     throw;
00057   }
00058 }
00059
00060 void RawdataReader::openFile(const std::string& fileName)
00061 {
00062   try
00063   {
00064     m_FileStream.rdbuf()->pubsetbuf(0, 0);
00065     m_FileStream.exceptions(std::ifstream::failbit | std::ifstream::badbit);
00066     m_FileStream.open(fileName.c_str(), std::ios::in | std::ios::binary | std::ios::ate);  // Start at
      the end to directly calculate the size of the file then come back to beginning
00067     m_FileStream.rdbuf()->pubsetbuf(0, 0);
00068     if(m_FileStream.is_open())
00069     {
00070       setFileSize(m_FileStream.tellg());
00071       m_FileStream.seekg(0, std::ios::beg);
00072     }
00073   }
00074   catch(const std::ios_base::failure& e)
00075   {
00076     log()->error("Caught an ios_base::failure in openFile :  {}", e.what());
00077     throw;
00078   }
00079 }
00080
00081 bool RawdataReader::nextEvent()
00082 {
00083   try
```

```
00084   {
00085     m_FileStream.read(reinterpret_cast<char*>(&m_EventNumber), sizeof(std::uint32_t));
00086     m_FileStream.read(reinterpret_cast<char*>(&m_NumberOfDIF), sizeof(std::uint32_t));
00087   }
00088   catch(const std::ios_base::failure& e)
00089   {
00090     return false;
00091   }
00092   return true;
00093 }
00094
00095 bool RawdataReader::nextDIFbuffer()
00096 {
00097   try
00098   {
00099     static int DIF_processed{0};
00100     if(DIF_processed >= m_NumberOfDIF)
00101     {
00102       DIF_processed = 0;
00103       return false;
00104     }
00105     else
00106     {
00107       DIF_processed++;
00108       std::uint32_t bsize{0};
00109       m_FileStream.read(reinterpret_cast<char*>(&bsize), sizeof(std::uint32_t));
00110       m_FileStream.read(reinterpret_cast<char*>(&m_buf[0]), bsize);
00111       m_Buffer = Buffer(m_buf);
00112     }
00113   }
00114   catch(const std::ios_base::failure& e)
00115   {
00116     log()->error("Caught an ios_base::failure in openFile :  {}", e.what());
00117     return false;
00118   }
00119   return true;
00120 }
00121
00122 const Buffer& RawdataReader::getBuffer()
00123 {
00124   uncompress();
00125   return m_Buffer;
00126 }
00127
00128 void RawdataReader::setFileSize(const std::size_t& size) { m_FileSize = size; }
00129
00130 float RawdataReader::getFileSize() { return m_FileSize; }
```

5.59 libs/interface/ROOT/include/DIF.h File Reference

```
#include "Hit.h"
#include <TObject.h>
#include <cstdint>
#include <map>
#include <vector>
```

Classes

- class DIF

Typedefs

- using Hits_const_iterator = std::vector< Hit >::const_iterator

5.59.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

Definition in file DIF.h.

5.59.2 Typedef Documentation

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

Definition at line 14 of file DIF.h.

5.60 DIF.h

Go to the documentation of this file.

```
00001
00005 #pragma once
00006
00007 #include "Hit.h"
00008
00009 #include <TObject.h>
00010 #include <cstdint>
00011 #include <map>
00012 #include <vector>
00013
00014 using Hits_const_iterator = std::vector<Hit>::const_iterator;
00015
00016 class DIF :  public TObject
00017 {
00018 public:
00019   void                              clear();
00020   void                              addHit(const Hit&);
00021   void                              setID(const std::uint8_t&);
00022   std::uint8_t                      getID() const;
00023   void                              setDTC(const std::uint32_t&);
00024   std::uint32_t                     getDTC() const;
00025   void                              setGTC(const std::uint32_t&);
00026   std::uint32_t                     getGTC() const;
00027   void                              setDIFBCID(const std::uint32_t&);
00028   std::uint32_t                     getDIFBCID() const;
00029   void                              setAbsoluteBCID(const std::uint64_t&);
00030   std::uint64_t                     getAbsoluteBCID() const;
00031   std::vector<Hit>::const_iterator cbegin() const;
00032   std::vector<Hit>::const_iterator cend() const;
00033
00034 private:
00035   std::uint8_t     m_ID{0};
00036   std::uint32_t    m_DTC{0};
00037   std::uint32_t    m_GTC{0};
00038   std::uint32_t    m_DIFBCID{0};
00039   std::uint64_t    m_AbsoluteBCID{0};
00040   std::vector<Hit> m_Hits;
00041   ClassDef(DIF, 1);
00042 };
```

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

`#include <vector>`

5.61.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

Definition in file DIFLinkDef.h.

5.62 DIFLinkDef.h

Go to the documentation of this file.

```
00001
00005 #pragma once
00006 #include <vector>
00007
00008 #ifdef __CLING__
00009 #pragma link C++ class DIF;
00010 #pragma link C++ class Hit;
00011 #pragma link C++ class std::vector < Hit>;
00012 #endif
```

5.63 libs/interface/ROOT/include/Event.h File Reference

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

Classes

- class Event

Typedefs

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

5.63.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

Definition in file Event.h.

5.63.2 Typedef Documentation

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

Definition at line 13 of file Event.h.

5.64 Event.h

Go to the documentation of this file.

```
00001
00005 #pragma once
00006
00007 #include "DIF.h"
00008
00009 #include <TObject.h>
00010 #include <cstdint>
00011 #include <map>
00012
00013 using DIFs_const_iterator = std::map<std::uint8_t, DIF>::const_iterator;
00014
00015 class Event :  public TObject
00016 {
00017 public:
00018   void                                        clear();
00019   void                                        addDIF(const DIF& dif);
00020   std::map<std::uint8_t, DIF>::const_iterator cbegin() const;
00021   std::map<std::uint8_t, DIF>::const_iterator cend() const;
00022
00023 private:
00024   std::map<std::uint8_t, DIF> DIFs;
00025   ClassDef(Event, 1);
00026 };
```

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

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

5.65.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

Definition in file EventLinkDef.h.

5.66 EventLinkDef.h

Go to the documentation of this file.

```
00001
00005 #pragma once
00006 #include <cstdint>
00007 #include <map>
00008 #include <vector>
00009 #ifdef __CLING__
00010 #pragma link C++ class DIF;
00011 #pragma link C++ class std::vector < DIF>;
00012 #pragma link C++ class Hit;
00013 #pragma link C++ class std::vector < Hit>;
00014 #pragma link C++ class Event;
00015 #pragma link C++ class std::vector < Event>;
00016 #pragma link C++ class std::map < std::uint8_t, DIF>;
00017 #endif
```

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

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

Classes

- class Hit

5.67.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

Definition in file Hit.h.

5.68 Hit.h

Go to the documentation of this file.

```
00001
00005 #pragma once
00006
00007 #include <TObject.h>
00008 #include <cstdint>
00009
00010 class Hit :  public TObject
00011 {
00012 public:
00013   void          clear();
00014   void          setDIF(const std::uint8_t&);
00015   void          setASIC(const std::uint8_t&);
00016   void          setChannel(const std::uint8_t&);
00017   void          setThreshold(const std::uint8_t&);
00018   void          setDTC(const std::uint32_t&);
00019   void          setGTC(const std::uint32_t&);
00020   void          setDIFBCID(const std::uint32_t&);
00021   void          setFrameBCID(const std::uint32_t&);
00022   void          setTimestamp(const std::uint32_t&);
00023   void          setAbsoluteBCID(const std::uint64_t&);
00024   std::uint8_t  getDIFid() const;
00025   std::uint8_t  getASICid() const;
00026   std::uint8_t  getChannel() const;
00027   std::uint8_t  getThreshold() const;
00028   std::uint32_t getDTC() const;
00029   std::uint32_t getGTC() const;
00030   std::uint32_t getDIFBCID() const;
00031   std::uint32_t 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 };
```

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

5.69.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

Definition in file HitLinkDef.h.

5.70 HitLinkDef.h

Go to the documentation of this file.

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

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

```
#include "Buffer.h"
#include "Event.h"
#include "Interface.h"
#include "PayloadParser.h"
#include <TFile.h>
#include <TTree.h>
#include <string>
#include <vector>
```

Classes

- class ROOTWriter

5.72 ROOTWriter.h

Go to the documentation of this file.

```
00001
00006 #pragma once
00007
00008 #include "Buffer.h"
00009 #include "Event.h"
00010 #include "Interface.h"
00011 #include "PayloadParser.h"
00012
00013 #include <TFile.h>
00014 #include <TTree.h>
00015 #include <string>
00016 #include <vector>
00017
00018 class ROOTWriter :  public InterfaceWriter
00019 {
00020 public:
00021   ROOTWriter();
00022
00023   void setFilename(const std::string&);
00024
00025   void start();
00026   void processDIF(const PayloadParser&);
00027   void processFrame(const PayloadParser&, const std::uint32_t& frameIndex);
00028   void processPadInFrame(const PayloadParser&, const std::uint32_t& frameIndex, const std::uint32_t&
      channelIndex);
00029   void processSlowControl(const Buffer&) { ; }
00030   void end();
00031
00032   virtual void startEvent();
00033   virtual void endEvent();
00034   virtual void startDIF();
00035   virtual void endDIF();
00036   virtual void startFrame();
00037   virtual void endFrame();
00038   virtual void startPad();
00039   virtual void endPad();
00040
00041 private:
00042   TFile*      m_File{nullptr};
00043   TTree*      m_Tree{nullptr};
00044   Event*      m_Event{nullptr};
00045   DIF*        m_DIF{nullptr};
00046   Hit*        m_Hit{nullptr};
00047   std::string m_Filename;
00048 };
```

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

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

5.73.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

Definition in file DIF.cc.

5.74 DIF.cc

Go to the documentation of this file.

```
00001
00006 #include "DIF.h"
00007
00008 #include <cstdint>
00009
00010 void DIF::addHit(const Hit& hit) { m_Hits.push_back(hit); }
00011
00012 void DIF::setID(const std::uint8_t& id) { m_ID = id; }
00013
00014 std::uint8_t DIF::getID()const { return m_ID; }
00015
00016 void DIF::setDTC(const std::uint32_t& dtc) { m_DTC = dtc; }
00017
00018 std::uint32_t DIF::getDTC()const { return m_DTC; }
00019
00020 void DIF::setGTC(const std::uint32_t& gtc) { m_GTC = gtc; }
00021
00022 std::uint32_t DIF::getGTC()const { return m_GTC; }
00023
00024 void DIF::setDIFBCID(const std::uint32_t& difbcid) { m_DIFBCID = difbcid; }
00025
00026 std::uint32_t DIF::getDIFBCID()const { return m_DIFBCID; }
00027
00028 void DIF::setAbsoluteBCID(const std::uint64_t& absolutebcid) { m_AbsoluteBCID = absolutebcid; }
00029
00030 std::uint64_t DIF::getAbsoluteBCID()const { return m_AbsoluteBCID; }
00031
00032 std::vector<Hit>::const_iterator DIF::cbegin()const { return m_Hits.cbegin(); }
00033
00034 std::vector<Hit>::const_iterator DIF::cend()const { return m_Hits.cend(); }
00035
00036 void DIF::clear() { m_Hits.clear(); }
```

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

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

5.75.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

Definition in file Event.cc.

5.76 Event.cc

Go to the documentation of this file.

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

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

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

5.77.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

Definition in file Hit.cc.

5.78 Hit.cc

Go to the documentation of this file.

```
00001
00006 #include "Hit.h"
00007 void Hit::clear()
00008 {
00009   m_DIF          = 0;
00010   m_ASIC         = 0;
00011   m_Channel      = 0;
00012   m_Threshold    = 0;
00013   m_DTC          = 0;
00014   m_GTC          = 0;
00015   m_DIFBCID      = 0;
00016   m_FrameBCID    = 0;
00017   m_Timestamp    = 0;
00018   m_AbsoluteBCID = 0;
00019 }
00020
00021 void Hit::setDIF(const std::uint8_t& dif) { m_DIF = dif; }
00022
00023 void Hit::setASIC(const std::uint8_t& asic) { m_ASIC = asic; }
00024
00025 void Hit::setChannel(const std::uint8_t& channel) { m_Channel = channel; }
00026
00027 void Hit::setThreshold(const std::uint8_t& threshold) { m_Threshold = threshold; }
00028
00029 void Hit::setDTC(const std::uint32_t& dtc) { m_DTC = dtc; }
00030
00031 void Hit::setGTC(const std::uint32_t& gtc) { m_GTC = gtc; }
00032
00033 void Hit::setDIFBCID(const std::uint32_t& difbcid) { m_DIFBCID = difbcid; }
00034
00035 void Hit::setFrameBCID(const std::uint32_t& framebcid) { m_FrameBCID = framebcid; }
00036
00037 void Hit::setTimestamp(const std::uint32_t& timestamp) { m_Timestamp = timestamp; }
00038
00039 void Hit::setAbsoluteBCID(const std::uint64_t& absolutebcid) { m_AbsoluteBCID = absolutebcid; }
00040
00041 std::uint8_t Hit::getDIFid()const { return m_DIF; }
00042
```

```
00043 std::uint8_t Hit::getASICid()const { return m_ASIC; }
00044
00045 std::uint8_t Hit::getChannel()const { return m_Channel; }
00046
00047 std::uint8_t Hit::getThreshold()const { return m_Threshold; }
00048
00049 std::uint32_t Hit::getDTC()const { return m_DTC; }
00050
00051 std::uint32_t Hit::getGTC()const { return m_GTC; }
00052
00053 std::uint32_t Hit::getDIFBCID()const { return m_DIFBCID; }
00054
00055 std::uint32_t Hit::getFrameBCID()const { return m_FrameBCID; }
00056
00057 std::uint32_t Hit::getTimestamp()const { return m_Timestamp; }
00058
00059 std::uint64_t Hit::getAbsoluteBCID()const { return m_AbsoluteBCID; }
```

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

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

5.79.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

Definition in file ROOTWriter.cc.

5.80 ROOTWriter.cc

Go to the documentation of this file.

```
00001
00006 #include "ROOTWriter.h"
00007
00008 void ROOTWriter::setFilename(const std::string& filename) { m_Filename = filename; }
00009
00010 ROOTWriter::ROOTWriter() :  InterfaceWriter("ROOTWriter", "1.0.0") { addCompatibility("RawdataReader",
      ">=1.0.0"); }
00011
00012 void ROOTWriter::start()
00013 {
00014   m_File = TFile::Open(m_Filename.c_str(), "RECREATE", m_Filename.c_str(),
      ROOT::CompressionSettings(ROOT::kZLIB, 5));
00015   m_Tree = new TTree("RawData", "Raw SDHCAL data tree");
00016   m_Tree->Branch("Events", &m_Event, 512000, 99);
00017 }
00018
00019 void ROOTWriter::end()
00020 {
00021   if(m_Tree) m_Tree->Write();
00022   if(m_File)
00023   {
00024     m_File->Write();
00025     m_File->Close();
00026   }
00027   if(m_File) delete m_File;
00028 }
00029
00030 void ROOTWriter::processDIF(const PayloadParser& d)
00031 {
00032   m_DIF->setID(d.getDIFid());
00033   m_DIF->setDTC(d.getDTC());
00034   m_DIF->setGTC(d.getGTC());
00035   m_DIF->setDIFBCID(d.getBCID());
00036   m_DIF->setAbsoluteBCID(d.getAbsoluteBCID());
00037 }
00038
```

```
00039 void ROOTWriter::processFrame(const PayloadParser& d, const std::uint32_t& frameIndex)
00040 {
00041   m_Hit->setDIF(d.getDIFid());
00042   m_Hit->setASIC(d.getASICid(frameIndex));
00043   m_Hit->setDTC(d.getDTC());
00044   m_Hit->setGTC(d.getGTC());
00045   m_Hit->setDIFBCID(d.getBCID());
00046   m_Hit->setAbsoluteBCID(d.getAbsoluteBCID());
00047   m_Hit->setFrameBCID(d.getFrameBCID(frameIndex));
00048   m_Hit->setTimestamp(d.getFrameTimeToTrigger(frameIndex));
00049 }
00050
00051 void ROOTWriter::processPadInFrame(const PayloadParser& d, const std::uint32_t& frameIndex, const
      std::uint32_t& channelIndex)
00052 {
00053   m_Hit->setChannel(channelIndex);
00054   m_Hit->setThreshold(static_cast<std::uint8_t>(d.getThresholdStatus(frameIndex, channelIndex)));
00055 }
00056
00057 void ROOTWriter::startEvent()
00058 {
00059   m_Event = new Event();
00060   // m_Event->clear();
00061 }
00062
00063 void ROOTWriter::endEvent()
00064 {
00065   m_Tree->Fill();
00066   if(m_Event) delete m_Event;
00067 }
00068
00069 void ROOTWriter::startDIF()
00070 {
00071   m_DIF = new DIF();
00072   // m_DIF->clear();
00073 }
00074
00075 void ROOTWriter::endDIF()
00076 {
00077   m_Event->addDIF(*m_DIF);
00078   delete m_DIF;
00079 }
00080
00081 void ROOTWriter::startFrame()
00082 {
00083   m_Hit = new Hit();
00084   // m_Hit->clear();
00085 }
00086
00087 void ROOTWriter::endFrame()
00088 {
00089   m_DIF->addHit(*m_Hit);
00090   delete m_Hit;
00091 }
00092
00093 void ROOTWriter::startPad() {}
00094
00095 void ROOTWriter::endPad() {}
```