

streamout

0.1.0

Generated by Doxygen 1.9.5

<b>1 Hierarchical Index</b>	<b>1</b>
1.1 Class Hierarchy	1
<b>2 Class Index</b>	<b>1</b>
2.1 Class List	1
<b>3 File Index</b>	<b>2</b>
3.1 File List	2
<b>4 Class Documentation</b>	<b>4</b>
4.1 Buffer Class Reference	4
4.1.1 Detailed Description	5
4.1.2 Constructor & Destructor Documentation	5
4.1.3 Member Function Documentation	6
4.2 BufferLooper< SOURCE, DESTINATION > Class Template Reference	7
4.2.1 Detailed Description	8
4.2.2 Constructor & Destructor Documentation	8
4.2.3 Member Function Documentation	8
4.3 BufferLooperCounter Struct Reference	12
4.3.1 Detailed Description	12
4.3.2 Member Function Documentation	12
4.3.3 Member Data Documentation	13
4.4 DIF Class Reference	14
4.4.1 Detailed Description	15
4.4.2 Member Function Documentation	15
4.5 DIFPtr Class Reference	17
4.5.1 Detailed Description	17
4.6 DIFSlowControl Class Reference	19
4.6.1 Detailed Description	20
4.6.2 Constructor & Destructor Documentation	20
4.6.3 Member Function Documentation	20
4.7 Event Class Reference	22
4.7.1 Detailed Description	22
4.7.2 Member Function Documentation	22
4.8 Exception Class Reference	23
4.8.1 Detailed Description	23
4.8.2 Constructor & Destructor Documentation	23
4.8.3 Member Function Documentation	24
4.9 Hit Class Reference	24
4.9.1 Detailed Description	25
4.9.2 Member Function Documentation	25
4.10 Interface Class Reference	28
4.10.1 Detailed Description	29

4.10.2 Constructor & Destructor Documentation	29
4.10.3 Member Function Documentation	29
4.11 InterfaceReader Class Reference	31
4.11.1 Detailed Description	32
4.11.2 Constructor & Destructor Documentation	32
4.11.3 Member Data Documentation	32
4.12 InterfaceWriter Class Reference	33
4.12.1 Detailed Description	33
4.12.2 Constructor & Destructor Documentation	33
4.12.3 Member Function Documentation	33
4.13 LCIOWriter Class Reference	34
4.13.1 Detailed Description	35
4.13.2 Constructor & Destructor Documentation	35
4.13.3 Member Function Documentation	35
4.14 Payload Class Reference	38
4.14.1 Detailed Description	39
4.14.2 Constructor & Destructor Documentation	39
4.14.3 Member Function Documentation	40
4.14.4 Member Data Documentation	41
4.15 Payload100 Class Reference	42
4.15.1 Detailed Description	42
4.15.2 Constructor & Destructor Documentation	43
4.15.3 Member Function Documentation	43
4.16 Payload150 Class Reference	45
4.16.1 Detailed Description	46
4.16.2 Constructor & Destructor Documentation	46
4.16.3 Member Function Documentation	46
4.17 PayloadLoader Class Reference	48
4.17.1 Detailed Description	49
4.17.2 Constructor & Destructor Documentation	49
4.17.3 Member Function Documentation	49
4.18 RawBufferNavigator Class Reference	49
4.18.1 Detailed Description	50
4.18.2 Constructor & Destructor Documentation	50
4.18.3 Member Function Documentation	50
4.19 RawdataReader Class Reference	52
4.19.1 Detailed Description	53
4.19.2 Constructor & Destructor Documentation	53
4.19.3 Member Function Documentation	53
4.20 ROOTWriter Class Reference	55
4.20.1 Detailed Description	56
4.20.2 Constructor & Destructor Documentation	56

4.20.3 Member Function Documentation . . . . .	56
4.21 textDump Class Reference . . . . .	59
4.21.1 Detailed Description . . . . .	60
4.21.2 Constructor & Destructor Documentation . . . . .	60
4.21.3 Member Function Documentation . . . . .	60
4.22 Timer Class Reference . . . . .	62
4.22.1 Detailed Description . . . . .	62
4.22.2 Member Function Documentation . . . . .	62
4.23 Version Class Reference . . . . .	62
4.23.1 Detailed Description . . . . .	63
4.23.2 Constructor & Destructor Documentation . . . . .	63
4.23.3 Member Function Documentation . . . . .	63
<b>5 File Documentation</b> . . . . .	<b>64</b>
5.1 libs/core/include/Bits.h File Reference . . . . .	64
5.1.1 Detailed Description . . . . .	65
5.1.2 Typedef Documentation . . . . .	65
5.1.3 Function Documentation . . . . .	66
5.2 Bits.h . . . . .	66
5.3 libs/core/include/Buffer.h File Reference . . . . .	66
5.3.1 Detailed Description . . . . .	66
5.4 Buffer.h . . . . .	67
5.5 libs/core/include/BufferLooper.h File Reference . . . . .	67
5.5.1 Detailed Description . . . . .	68
5.6 BufferLooper.h . . . . .	68
5.7 libs/core/include/BufferLooperCounter.h File Reference . . . . .	71
5.7.1 Detailed Description . . . . .	71
5.8 BufferLooperCounter.h . . . . .	72
5.9 libs/core/include/DetectorId.h File Reference . . . . .	72
5.9.1 Detailed Description . . . . .	72
5.9.2 Enumeration Type Documentation . . . . .	72
5.10 DetectorId.h . . . . .	73
5.11 libs/core/include/DIFSlowControl.h File Reference . . . . .	73
5.11.1 Detailed Description . . . . .	73
5.11.2 Function Documentation . . . . .	73
5.12 DIFSlowControl.h . . . . .	74
5.13 libs/core/include/Exception.h File Reference . . . . .	75
5.13.1 Detailed Description . . . . .	75
5.14 Exception.h . . . . .	75
5.15 libs/core/include/FileSystem.h File Reference . . . . .	76
5.15.1 Detailed Description . . . . .	76
5.15.2 Function Documentation . . . . .	76

5.16 Filesystem.h . . . . .	77
5.17 libs/core/include/Formatters.h File Reference . . . . .	77
5.17.1 Detailed Description . . . . .	77
5.17.2 Function Documentation . . . . .	77
5.18 Formatters.h . . . . .	81
5.19 libs/core/include/Interface.h File Reference . . . . .	81
5.19.1 Detailed Description . . . . .	82
5.19.2 Enumeration Type Documentation . . . . .	82
5.20 Interface.h . . . . .	83
5.21 libs/core/include/Payload.h File Reference . . . . .	84
5.21.1 Detailed Description . . . . .	84
5.22 Payload.h . . . . .	84
5.23 libs/core/include/Payload100.h File Reference . . . . .	85
5.23.1 Detailed Description . . . . .	85
5.24 Payload100.h . . . . .	85
5.25 libs/core/include/Payload150.h File Reference . . . . .	86
5.25.1 Detailed Description . . . . .	86
5.26 Payload150.h . . . . .	86
5.27 libs/core/include/PayloadLoader.h File Reference . . . . .	87
5.27.1 Detailed Description . . . . .	87
5.28 PayloadLoader.h . . . . .	87
5.29 libs/core/include/RawBufferNavigator.h File Reference . . . . .	88
5.29.1 Detailed Description . . . . .	88
5.30 RawBufferNavigator.h . . . . .	88
5.31 libs/core/include/Timer.h File Reference . . . . .	88
5.31.1 Detailed Description . . . . .	89
5.32 Timer.h . . . . .	89
5.33 libs/core/include/Utilities.h File Reference . . . . .	89
5.33.1 Detailed Description . . . . .	89
5.33.2 Function Documentation . . . . .	89
5.34 Utilities.h . . . . .	90
5.35 libs/core/include/Version.h File Reference . . . . .	90
5.35.1 Detailed Description . . . . .	90
5.36 Version.h . . . . .	91
5.37 libs/core/include/Words.h File Reference . . . . .	91
5.37.1 Detailed Description . . . . .	91
5.37.2 Enumeration Type Documentation . . . . .	91
5.38 Words.h . . . . .	92
5.39 libs/core/src/Bits.cc File Reference . . . . .	92
5.39.1 Detailed Description . . . . .	92
5.39.2 Function Documentation . . . . .	92
5.40 Bits.cc . . . . .	93

5.41 <a href="#">libs/core/src/BufferLooperCounter.cc File Reference</a>	93
5.42 <a href="#">BufferLooperCounter.cc</a>	93
5.43 <a href="#">libs/core/src/DIFSlowControl.cc File Reference</a>	94
5.43.1 Detailed Description	94
5.43.2 Function Documentation	94
5.44 <a href="#">DIFSlowControl.cc</a>	94
5.45 <a href="#">libs/core/src/Filesytem.cc File Reference</a>	97
5.45.1 Detailed Description	98
5.45.2 Function Documentation	98
5.46 <a href="#">Filesytem.cc</a>	99
5.47 <a href="#">libs/core/src/Formatters.cc File Reference</a>	99
5.47.1 Detailed Description	100
5.47.2 Function Documentation	100
5.48 <a href="#">Formatters.cc</a>	104
5.49 <a href="#">libs/core/src/Payload100.cc File Reference</a>	105
5.49.1 Detailed Description	106
5.49.2 Enumeration Type Documentation	106
5.50 <a href="#">Payload100.cc</a>	109
5.51 <a href="#">libs/core/src/Payload150.cc File Reference</a>	112
5.51.1 Detailed Description	113
5.51.2 Enumeration Type Documentation	113
5.52 <a href="#">Payload150.cc</a>	116
5.53 <a href="#">libs/core/src/RawBufferNavigator.cc File Reference</a>	118
5.53.1 Detailed Description	118
5.54 <a href="#">RawBufferNavigator.cc</a>	118
5.55 <a href="#">libs/core/src/Version.cc File Reference</a>	119
5.55.1 Detailed Description	119
5.56 <a href="#">Version.cc</a>	119
5.57 <a href="#">libs/interface/Dump/include/textDump.h File Reference</a>	119
5.57.1 Detailed Description	119
5.58 <a href="#">textDump.h</a>	120
5.59 <a href="#">libs/interface/Dump/src/textDump.cc File Reference</a>	120
5.59.1 Detailed Description	120
5.60 <a href="#">textDump.cc</a>	120
5.61 <a href="#">libs/interface/LCIO/include/LCIOWriter.h File Reference</a>	121
5.61.1 Detailed Description	121
5.62 <a href="#">LCIOWriter.h</a>	121
5.63 <a href="#">libs/interface/LCIO/src/LCIOWriter.cc File Reference</a>	122
5.63.1 Detailed Description	122
5.64 <a href="#">LCIOWriter.cc</a>	122
5.65 <a href="#">libs/interface/RawDataReader/include/RawdataReader.h File Reference</a>	123
5.65.1 Detailed Description	124

5.66 RawdataReader.h . . . . .	124
5.67 libs/interface/RawDataReader/src/RawdataReader.cc File Reference . . . . .	124
5.67.1 Detailed Description . . . . .	125
5.68 RawdataReader.cc . . . . .	125
5.69 libs/interface/ROOT/include/DIF.h File Reference . . . . .	126
5.69.1 Detailed Description . . . . .	127
5.69.2 Typedef Documentation . . . . .	127
5.70 DIF.h . . . . .	127
5.71 libs/interface/ROOT/include/DIFLinkDef.h File Reference . . . . .	128
5.71.1 Detailed Description . . . . .	128
5.72 DIFLinkDef.h . . . . .	128
5.73 libs/interface/ROOT/include/Event.h File Reference . . . . .	128
5.73.1 Detailed Description . . . . .	128
5.73.2 Typedef Documentation . . . . .	129
5.74 Event.h . . . . .	129
5.75 libs/interface/ROOT/include/EventLinkDef.h File Reference . . . . .	129
5.75.1 Detailed Description . . . . .	129
5.76 EventLinkDef.h . . . . .	130
5.77 libs/interface/ROOT/include/Hit.h File Reference . . . . .	130
5.77.1 Detailed Description . . . . .	130
5.78 Hit.h . . . . .	130
5.79 libs/interface/ROOT/include/HitLinkDef.h File Reference . . . . .	131
5.79.1 Detailed Description . . . . .	131
5.80 HitLinkDef.h . . . . .	131
5.81 libs/interface/ROOT/include/ROOTWriter.h File Reference . . . . .	131
5.82 ROOTWriter.h . . . . .	132
5.83 libs/interface/ROOT/src/DIF.cc File Reference . . . . .	132
5.83.1 Detailed Description . . . . .	132
5.84 DIF.cc . . . . .	133
5.85 libs/interface/ROOT/src/Event.cc File Reference . . . . .	133
5.85.1 Detailed Description . . . . .	133
5.86 Event.cc . . . . .	133
5.87 libs/interface/ROOT/src/Hit.cc File Reference . . . . .	134
5.87.1 Detailed Description . . . . .	134
5.88 Hit.cc . . . . .	134
5.89 libs/interface/ROOT/src/ROOTWriter.cc File Reference . . . . .	135
5.89.1 Detailed Description . . . . .	135
5.90 ROOTWriter.cc . . . . .	135

## 1 Hierarchical Index

### 1.1 Class Hierarchy

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

<b>Buffer</b>	<b><a href="#">4</a></b>
<b>Payload</b>	<b><a href="#">38</a></b>
<b>Payload100</b>	<b><a href="#">42</a></b>
<b>Payload150</b>	<b><a href="#">45</a></b>
<b>BufferLooper&lt; SOURCE, DESTINATION &gt;</b>	<b><a href="#">7</a></b>
<b>BufferLooperCounter</b>	<b><a href="#">12</a></b>
<b>DIFPtr</b>	<b><a href="#">17</a></b>
<b>DIFSlowControl</b>	<b><a href="#">19</a></b>
<b>Exception</b>	<b><a href="#">23</a></b>
<b>Interface</b>	<b><a href="#">28</a></b>
<b>InterfaceReader</b>	<b><a href="#">31</a></b>
<b>RawdataReader</b>	<b><a href="#">52</a></b>
<b>InterfaceWriter</b>	<b><a href="#">33</a></b>
<b>LCIOWriter</b>	<b><a href="#">34</a></b>
<b>ROOTWriter</b>	<b><a href="#">55</a></b>
<b>textDump</b>	<b><a href="#">59</a></b>
<b>PayloadLoader</b>	<b><a href="#">48</a></b>
<b>RawBufferNavigator</b>	<b><a href="#">49</a></b>
<b>Timer</b>	<b><a href="#">62</a></b>
<b>TObject</b>	
<b>DIF</b>	<b><a href="#">14</a></b>
<b>Event</b>	<b><a href="#">22</a></b>
<b>Hit</b>	<b><a href="#">24</a></b>
semver::version	
<b>Version</b>	<b><a href="#">62</a></b>

## 2 Class Index

### 2.1 Class List

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



<a href="#">Buffer</a>	4
<a href="#">BufferLooper&lt; SOURCE, DESTINATION &gt;</a>	7
<a href="#">BufferLooperCounter</a>	12
<a href="#">DIF</a>	14
<a href="#">DIFPtr</a>	
M3 MICROROC and HARDROC2 dataformat	17
<a href="#">DIFSlowControl</a>	19
<a href="#">Event</a>	22
<a href="#">Exception</a>	23
<a href="#">Hit</a>	24
<a href="#">Interface</a>	28
<a href="#">InterfaceReader</a>	31
<a href="#">InterfaceWriter</a>	33
<a href="#">LCIOWriter</a>	34
<a href="#">Payload</a>	38
<a href="#">Payload100</a>	42
<a href="#">Payload150</a>	45
<a href="#">PayloadLoader</a>	48
<a href="#">RawBufferNavigator</a>	
Class to navigate in the raw data buffer parse the header and send the payload as <a href="#">Buffer</a>	49
<a href="#">RawdataReader</a>	52
<a href="#">ROOTWriter</a>	55
<a href="#">textDump</a>	59
<a href="#">Timer</a>	62
<a href="#">Version</a>	62

## 3 File Index

### 3.1 File List

Here is a list of all files with brief descriptions:

<a href="#">libs/core/include/Bits.h</a>	64
<a href="#">libs/core/include/Buffer.h</a>	66
<a href="#">libs/core/include/BufferLooper.h</a>	67

libs/core/include/BufferLooperCounter.h	71
libs/core/include/DetectorId.h	72
libs/core/include/DIFSlowControl.h	73
libs/core/include/Exception.h	75
libs/core/include/FileSystem.h	76
libs/core/include/Formatters.h	77
libs/core/include/Interface.h	81
libs/core/include/Payload.h	84
libs/core/include/Payload100.h	85
libs/core/include/Payload150.h	86
libs/core/include/PayloadLoader.h	87
libs/core/include/RawBufferNavigator.h	88
libs/core/include/Timer.h	88
libs/core/include/Utilities.h	89
libs/core/include/Version.h	90
libs/core/include/Words.h	91
libs/core/src/Bits.cc	92
libs/core/src/BufferLooperCounter.cc	93
libs/core/src/DIFSlowControl.cc	94
libs/core/src/FileSystem.cc	97
libs/core/src/Formatters.cc	99
libs/core/src/Payload100.cc	105
libs/core/src/Payload150.cc	112
libs/core/src/RawBufferNavigator.cc	118
libs/core/src/Version.cc	119
libs/interface/Dump/include/textDump.h	119
libs/interface/Dump/src/textDump.cc	120
libs/interface/LCIO/include/LCIOWriter.h	121
libs/interface/LCIO/src/LCIOWriter.cc	122
libs/interface/RawDataReader/include/RawdataReader.h	123
libs/interface/RawDataReader/src/RawdataReader.cc	124
libs/interface/ROOT/include/DIF.h	126

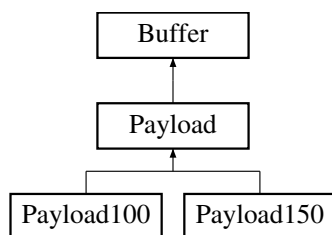
<a href="#">libs/interface/ROOT/include/DIFLinkDef.h</a>	128
<a href="#">libs/interface/ROOT/include/Event.h</a>	128
<a href="#">libs/interface/ROOT/include/EventLinkDef.h</a>	129
<a href="#">libs/interface/ROOT/include/Hit.h</a>	130
<a href="#">libs/interface/ROOT/include/HitLinkDef.h</a>	131
<a href="#">libs/interface/ROOT/include/ROOTWriter.h</a>	131
<a href="#">libs/interface/ROOT/src/DIF.cc</a>	132
<a href="#">libs/interface/ROOT/src/Event.cc</a>	133
<a href="#">libs/interface/ROOT/src/Hit.cc</a>	134
<a href="#">libs/interface/ROOT/src/ROOTWriter.cc</a>	135

## 4 Class Documentation

### 4.1 Buffer Class Reference

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

Inheritance diagram for Buffer:



#### Public Member Functions

- [Buffer](#) ()
- virtual [~Buffer](#) ()
- [Buffer](#) (const [bit8\\_t](#) b[], const std::size\_t &i)
- [Buffer](#) (const char b[], const std::size\_t &i)
- template<typename T >  
  [Buffer](#) (const std::vector< T > &rawdata)
- template<typename T, std::size\_t N>  
  [Buffer](#) (const std::array< T, N > &rawdata)
- std::size\_t [size](#) () const
- std::size\_t [capacity](#) () const
- bool [empty](#) ()
- void [set](#) (unsigned char \*b)
- void [set](#) (const [Buffer](#) &buffer)
- [bit8\\_t](#) \* [begin](#) () const
- [bit8\\_t](#) \* [end](#) () const
- [bit8\\_t](#) & [operator\[\]](#) (const std::size\_t &pos)
- [bit8\\_t](#) & [operator\[\]](#) (const std::size\_t &pos) const
- void [setSize](#) (const std::size\_t &size)

### 4.1.1 Detailed Description

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

### 4.1.2 Constructor & Destructor Documentation

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

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

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

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

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

```
00018 {}
```

#### 4.1.2.3 Buffer() [2/5] Buffer::Buffer ( const bit8\_t b[], const std::size\_t & i ) [inline]

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

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

#### 4.1.2.4 Buffer() [3/5] Buffer::Buffer ( const char b[], const std::size\_t & i ) [inline]

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

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

#### 4.1.2.5 Buffer() [4/5] template<typename T >

```
Buffer::Buffer ( const std::vector< T > & rawdata ) [inline]
```

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

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

#### 4.1.2.6 Buffer() [5/5] `template<typename T , std::size_t N>`

```
Buffer::Buffer (
    const std::array< T, N > & rawdata ) [inline]
```

Definition at line 22 of file [Buffer.h](#).

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

### 4.1.3 Member Function Documentation

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

## 4.2 BufferLooper< SOURCE, DESTINATION > Class Template Reference

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

## Public Member Functions

- [BufferLooper](#) (SOURCE &source, DESTINATION &dest, bool debug=false)
- void [addSink](#) (const spdlog::sink\_ptr &sink, const spdlog::level::level\_enum &level=spdlog::get\_level())
- void [loop](#) (const std::uint32\_t &m\_NbrEventsToProcess=0)
- void [printAllCounters](#) ()
- std::shared\_ptr< spdlog::logger > [log](#) ()
- void [setDetectorIDs](#) (const std::vector< [DetectorID](#) > &detectorIDs)

### 4.2.1 Detailed Description

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

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

### 4.2.2 Constructor & Destructor Documentation

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

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

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

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

### 4.2.3 Member Function Documentation

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

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

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

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

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

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

Definition at line 237 of file BufferLooper.h.

```
00237 { return m_Logger; }
```

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

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

Definition at line 47 of file BufferLooper.h.

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



```

00093     m_Source.start();
00094     m_Destination.start();
00095     while(m_Source.nextEvent() && m_NbrEventsToProcess >= m_NbrEvents)
00096     {
00097         /*****/
00098         /**** START EVENT ****/
00099         m_Source.startEvent();
00100         m_Destination.startEvent();
00101         /*****/
00102
00103         m_Logger->warn("==== Event {} =====", m_NbrEvents);
00104         while(m_Source.nextDIFbuffer())
00105         {
00106             const Buffer& buffer = m_Source.getBuffer();
00107
00108             bufferNavigator.setBuffer(buffer);
00109             if(std::find(m_DetectorIDs.begin(), m_DetectorIDs.end(),
static_cast<DetectorID>(bufferNavigator.getDetectorID())) == m_DetectorIDs.end())
00110             {
00111                 m_Logger->debug("Ignoring detector ID : {}", bufferNavigator.getDetectorID());
00112                 continue;
00113             }
00114
00115             std::int32_t idstart = bufferNavigator.getStartOfPayload();
00116             if(m_Debug && idstart == -1) m_Logger->info(to_hex(buffer));
00117             c.DIFStarter[idstart]++;
00118             if(!bufferNavigator.validPayload())
00119             {
00120                 m_Logger->error("!bufferNavigator.validBuffer()");
00121                 continue;
00122             }
00123
00124         /*****/
00125         /**** START DIF ****/
00126         m_Source.startDIF();
00127         m_Destination.startDIF();
00128         /*****/
00129
00130         PayloadLoader payloadLoader;
00131
00132         std::unique_ptr<Payload>& d = payloadLoader.getPayload(bufferNavigator.getDetectorID());
00133         if(d == nullptr)
00134         {
00135             m_Logger->error("streamout don't know how to parse the payload for detector_id {} !
SKIPPING !", bufferNavigator.getDetectorID());
00136             continue;
00137         }
00138
00139         // This is really a big error so skip DIF entirely if exception occurs
00140         try
00141         {
00142             d->setBuffer(bufferNavigator.getPayload());
00143             m_Logger->info("Parsing payload DIF_ID {} (detector_id {})", d->getDIFid(),
bufferNavigator.getDetectorID());
00144         }
00145         catch(const Exception& e)
00146         {
00147             m_Logger->error("{} ", e.what());
00148             continue;
00149         }
00150
00151         if(buffer.end() != d->end()) m_Logger->error("DIF BUFFER END {} {} ", fmt::ptr(buffer.end()),
fmt::ptr(d->end()));
00152         assert(buffer.end() == d->end());
00153
00154         c.DIFPtrValueAtReturnedPos[d->begin() [d->getEndOfDIFData() - 3]]++;
00155         assert(d->begin() [d->getEndOfDIFData() - 3] == 0xa0);
00156
00157         c.SizeAfterDIFPtr[d->getSizeAfterDIFPtr()]++;
00158         m_Destination.processDIF(*d);
00159         for(std::size_t i = 0; i < d->getNumberOfFrames(); ++i)
00160         {
00161             //
00162             m_Source.startFrame();
00163             m_Destination.startFrame();
00164             //
00165             m_Destination.processFrame(*d, i);
00166             for(std::size_t j = 0; j < static_cast<std::size_t>(Hardware::NUMBER_PAD); ++j)
00167             {
00168                 if(d->getThresholdStatus(i, j) != 0)
00169                 {
00170                     m_Source.startPad();
00171                     m_Destination.startPad();
00172                     m_Destination.processPadInFrame(*d, i, j);
00173                     m_Source.endPad();
00174                     m_Destination.endPad();
00175                 }

```

```

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

```

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

Definition at line 236 of file [BufferLooper.h](#).  
00236 { 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 239 of file [BufferLooper.h](#).

```
00239 { m_DetectorIDs = detectorIDs; }
```

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

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

## 4.3 BufferLooperCounter Struct Reference

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

### Public Member Functions

- void [printCounter](#) (const std::string &description, const std::map< int, int > &m, const std::ios\_base::fmtflags &base=std::ios\_base::dec)
- void [printAllCounters](#) ()

### Public Attributes

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

#### 4.3.1 Detailed Description

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

#### 4.3.2 Member Function Documentation

##### 4.3.2.1 [printAllCounters\(\)](#) void BufferLooperCounter::printAllCounters ( )

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

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

**4.3.2.2 printCounter()** void BufferLooperCounter::printCounter (

```

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

```

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

```

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

```

### 4.3.3 Member Data Documentation

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

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

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

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

**4.3.3.3 hasBadSlowControl** int BufferLooperCounter::hasBadSlowControl = 0

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

**4.3.3.4 hasSlowControl** int BufferLooperCounter::hasSlowControl = 0

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

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

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

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

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

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

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

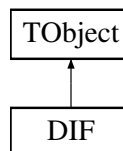
The documentation for this struct was generated from the following files:

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

## 4.4 DIF Class Reference

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

Inheritance diagram for DIF:



### Public Member Functions

- void [clear](#) ()
- void [addHit](#) (const [Hit](#) &)
- void [setID](#) (const std::uint8\_t &)
- std::uint8\_t [getID](#) () const
- void [setDTC](#) (const std::uint32\_t &)
- std::uint32\_t [getDTC](#) () const
- void [setGTC](#) (const std::uint32\_t &)
- std::uint32\_t [getGTC](#) () const
- void [setDIFBCID](#) (const std::uint32\_t &)
- std::uint32\_t [getDIFBCID](#) () const
- void [setAbsoluteBCID](#) (const std::uint64\_t &)
- std::uint64\_t [getAbsoluteBCID](#) () const
- std::vector< [Hit](#) >::const\_iterator [cbegin](#) () const
- std::vector< [Hit](#) >::const\_iterator [cend](#) () const

#### 4.4.1 Detailed Description

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

#### 4.4.2 Member Function Documentation

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

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

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

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

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

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

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

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

```
00034 { return m_Hits.cend(); }
```

**4.4.2.4 clear()** void DIF::clear ( )

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

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

**4.4.2.5 getAbsoluteBCID()** std::uint64\_t DIF::getAbsoluteBCID ( ) const

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

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

**4.4.2.6 getDIFBCID()** std::uint32\_t DIF::getDIFBCID ( ) const

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

**4.4.2.14 setID()** void DIF::setID (   
 const std::uint8\_t & id )

Definition at line 12 of file DIF.cc.

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

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

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

## 4.5 DIFPtr Class Reference

M3 MICROROC and HARDROC2 dataformat.

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

### 4.5.1 Detailed Description

M3 MICROROC and HARDROC2 dataformat.

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

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

**data format version (8 bits)**

**daq software version (16 bits)**

**SDCC firmware version (16 bits)**

**DIF firmware version (16 bits)**

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

**timestamp (32bits)** (milliseconde)



**Explication :**

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

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

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





Figure 2 Data from the DIF analog or/and digital

Data from the DAQ (slowcontrol) :

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

**SC Header (0xB1)**

**DIF ID (8 bits)**

**ASIC Header (8 bits)**

**Size SC ASIC**

[74 ou 109 selon le chip]

**SC ASIC (n x 8bits)**

[n= 74 ou 109 selon le chip]

**DIF ID (8 bits)**

**ASIC Header (8 bits)**

**Size SC ASIC**

[74 ou 109 selon le chip]

**SC ASIC (n x 8bits)**

[n= 74 ou 109 selon le chip]

...

**SC Trailer (0xA1)**

**Explication :**

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

Figure 3 Data from the DAQ (slowcontrol)

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

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

## 4.6 DIFSlowControl Class Reference

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

### Public Member Functions

- [DIFSlowControl](#) (const std::uint8\_t &version, const std::uint8\_t &DIFid, unsigned char \*buf)  
*Constructor.*
- std::uint8\_t [getDIFid](#) ()  
*get DIF id*
- std::map< int, std::map< std::string, int > > [getChipsMap](#) ()  
*Get chips map.*
- std::map< std::string, int > [getChipSlowControl](#) (const int &asicid)  
*Get one chip map.*
- int [getChipSlowControl](#) (const std::int8\_t &asicid, const std::string &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

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

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

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

### 4.6.3 Member Function Documentation

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

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

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

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

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

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

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

Get one chip map.

#### Parameters

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

#### Returns

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

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

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

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

Get one Chip value.

#### Parameters

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

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

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

**4.6.3.5 getChipsMap()** `std::map< int, std::map< std::string, int > > DIFSlowControl::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; }
```

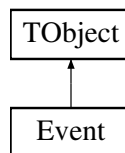
The documentation for this class was generated from the following files:

- [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(); }
```

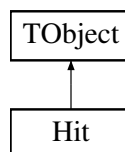
The documentation for this class was generated from the following file:

- [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; }
```

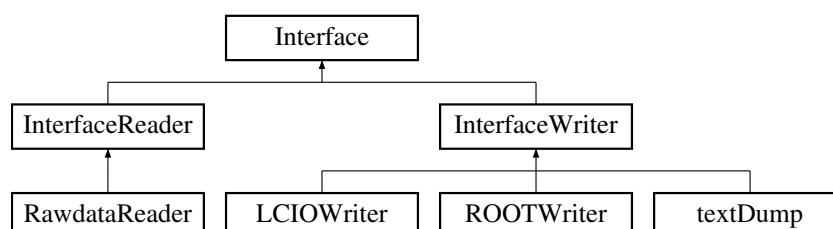
The documentation for this class was generated from the following files:

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

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

```
00046 {}
```

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

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

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

```
00044 {}
```

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

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

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

```
00048 {}
```

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

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

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

```
00050 {}
```

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

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

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

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

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

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

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

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

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

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

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

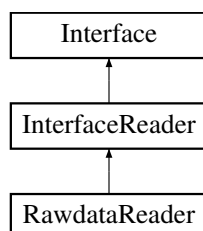
The documentation for this class was generated from the following file:

- [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](#).

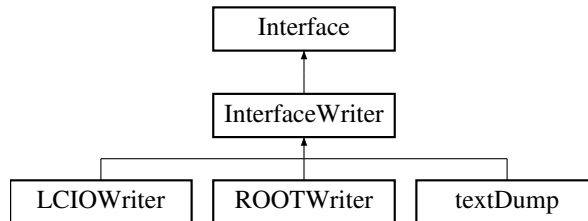
The documentation for this class was generated from the following file:

- `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     }
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; }
```

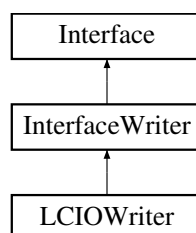
The documentation for this class was generated from the following file:

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

## 4.13 LCIOWriter Class Reference

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

Inheritance diagram for LCIOWriter:



## Public Member Functions

- [LCIOWriter](#) ()
- void [setFilename](#) (const std::string &)
- void [start](#) ()
- void [processDIF](#) (const [Payload](#) &)
- void [processFrame](#) (const [Payload](#) &, const std::uint32\_t &frameIndex)
- void [processPadInFrame](#) (const [Payload](#) &, const std::uint32\_t &frameIndex, const std::uint32\_t &channelIndex)
- void [processSlowControl](#) (const [Buffer](#) &)
- void [end](#) ()
- virtual void [startEvent](#) ()
- virtual void [endEvent](#) ()
- virtual void [startDIF](#) ()
- virtual void [endDIF](#) ()
- virtual void [startFrame](#) ()
- virtual void [endFrame](#) ()
- virtual void [startPad](#) ()
- virtual void [endPad](#) ()

### 4.13.1 Detailed Description

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

### 4.13.2 Constructor & Destructor Documentation

#### 4.13.2.1 [LCIOWriter](#)() `LCIOWriter::LCIOWriter ( )`

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

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

### 4.13.3 Member Function Documentation

#### 4.13.3.1 [end](#)() `void LCIOWriter::end ( )`

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

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

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

Reimplemented from [Interface](#).

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

```
00088 {}
```

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

Reimplemented from [Interface](#).

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

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

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

Reimplemented from [Interface](#).

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

```
00092 {}
```

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

Reimplemented from [Interface](#).

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

```
00096 {}
```

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

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

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

**4.13.3.7 processFrame()** void LCIOWriter::processFrame (

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

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

```
00049 {}
```

**4.13.3.8 processPadInFrame()** void LCIOWriter::processPadInFrame (

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

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

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

**4.13.3.9 processSlowControl()** void LCIOWriter::processSlowControl (

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

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

```
00030 { ; }
```

**4.13.3.10 setFilename()** void LCIOWriter::setFilename (

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

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

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

**4.13.3.11 start()** void LCIOWriter::start ( )

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

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

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

Reimplemented from [Interface](#).

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

```
00086 {}
```

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

Reimplemented from [Interface](#).

Definition at line 65 of file [LCIOWriter.cc](#).

```
00066 {
00067     m_LCEvent = std::make_unique<IMPL::LCEventImpl>();
00068     m_LCEvent->setEventNumber(0);
00069     m_LCEvent->setDetectorName(m_DetectorName);
00070     m_LCEvent->setTimeStamp(0);
00071     m_LCEvent->setWeight(1);
00072     m_CollectionVec = new IMPL::LCCollectionVec(EVENT::LCIO::RAWCALORIMETERHIT);
00073     IMPL::LCFlagImpl flag(0);
00074     // flag.setBit(EVENT::LCIO::RCHBIT_ID1);
00075     flag.setBit(EVENT::LCIO::RCHBIT_TIME);
00076     m_CollectionVec->setFlag(flag.getFlag());
00077     m_CollectionVec->parameters().setValue(EVENT::LCIO::CellIDEncoding, "dif:8,asic:8,channel:6");
00078 }
```

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

Reimplemented from [Interface](#).

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

```
00090 {}
```

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

Reimplemented from [Interface](#).

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

```
00094 {}
```

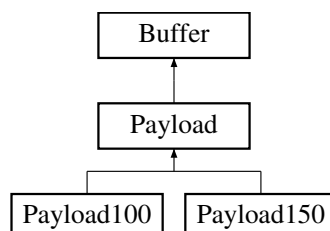
The documentation for this class was generated from the following files:

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

## 4.14 Payload Class Reference

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

Inheritance diagram for Payload:



## Public Member Functions

- [Payload](#) (const std::int32\_t &detector\_id)
- void [setBuffer](#) (const [Buffer](#) &buffer)
- std::uint32\_t [getEndOfDIFData](#) () const
- std::uint32\_t [getSizeAfterDIFPtr](#) () const
- virtual std::uint32\_t [getNumberOfFrames](#) () const =0
- virtual std::uint32\_t [getThresholdStatus](#) (const std::uint32\_t &, const std::uint32\_t &) const =0
- virtual std::uint32\_t [getDIFid](#) () const =0
- virtual std::uint32\_t [getDTC](#) () const =0
- virtual std::uint32\_t [getGTC](#) () const =0
- virtual std::uint32\_t [getBCID](#) () const =0
- virtual std::uint64\_t [getAbsoluteBCID](#) () const =0
- virtual std::uint32\_t [getASICid](#) (const std::uint32\_t &) const =0
- virtual std::uint32\_t [getFrameBCID](#) (const std::uint32\_t &) const =0
- virtual std::uint32\_t [getFrameTimeToTrigger](#) (const std::uint32\_t &) const =0
- virtual [~Payload](#) ()

## Protected Member Functions

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

## Protected Attributes

- std::int32\_t [m\\_DetectorID](#) {-1}
- std::uint32\_t [theGetFramePtrReturn\\_](#) {0}

### 4.14.1 Detailed Description

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

### 4.14.2 Constructor & Destructor Documentation

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

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

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

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

### 4.14.3 Member Function Documentation

**4.14.3.1 getAbsoluteBCID()** virtual std::uint64\_t Payload::getAbsoluteBCID ( ) const [pure virtual]

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

**4.14.3.2 getASICid()** virtual std::uint32\_t Payload::getASICid ( const std::uint32\_t & ) const [pure virtual]

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

**4.14.3.3 getBCID()** virtual std::uint32\_t Payload::getBCID ( ) const [pure virtual]

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

**4.14.3.4 getDIFid()** virtual std::uint32\_t Payload::getDIFid ( ) const [pure virtual]

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

**4.14.3.5 getDTC()** virtual std::uint32\_t Payload::getDTC ( ) const [pure virtual]

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

**4.14.3.6 getEndOfDIFData()** std::uint32\_t Payload::getEndOfDIFData ( ) const [inline]

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

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

**4.14.3.7 getFrameBCID()** virtual std::uint32\_t Payload::getFrameBCID ( const std::uint32\_t & ) const [pure virtual]

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

**4.14.3.8 getFrameTimeToTrigger()** virtual std::uint32\_t Payload::getFrameTimeToTrigger ( const std::uint32\_t & ) const [pure virtual]

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

**4.14.3.9 getGTC()** virtual std::uint32\_t Payload::getGTC ( ) const [pure virtual]

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

**4.14.3.10 getNumberOfFrames()** virtual std::uint32\_t Payload::getNumberOfFrames ( ) const [pure virtual]

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

**4.14.3.11 getSizeAfterDIFPtr()** std::uint32\_t Payload::getSizeAfterDIFPtr ( ) const [inline]

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

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

**4.14.3.12 getThresholdStatus()** virtual std::uint32\_t Payload::getThresholdStatus ( const std::uint32\_t & , const std::uint32\_t & ) const [pure virtual]

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

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

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

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

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

## 4.14.4 Member Data Documentation



**4.14.4.1 m\_DetectorID** `std::int32_t Payload::m_DetectorID {-1} [protected]`

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

**4.14.4.2 theGetFramePtrReturn\_** `std::uint32_t Payload::theGetFramePtrReturn_ {0} [protected]`

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

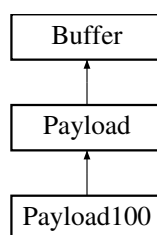
The documentation for this class was generated from the following file:

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

## 4.15 Payload100 Class Reference

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

Inheritance diagram for Payload100:



### Public Member Functions

- [Payload100](#) ()
- bool [hasTemperature](#) () const
- bool [hasAnalogReadout](#) () const
- virtual std::uint32\_t [getNumberOfFrames](#) () const final
- virtual std::uint32\_t [getThresholdStatus](#) (const std::uint32\_t &, const std::uint32\_t &) const final
- virtual std::uint32\_t [getDIFid](#) () const final
- virtual std::uint32\_t [getDTC](#) () const final
- virtual std::uint32\_t [getGTC](#) () const final
- virtual std::uint32\_t [getBCID](#) () const final
- virtual std::uint64\_t [getAbsoluteBCID](#) () const final
- virtual std::uint32\_t [getASICid](#) (const std::uint32\_t &) const final
- virtual std::uint32\_t [getFrameBCID](#) (const std::uint32\_t &) const final
- virtual std::uint32\_t [getFrameTimeToTrigger](#) (const std::uint32\_t &) const final
- virtual [~Payload100](#) ()

### Additional Inherited Members

#### 4.15.1 Detailed Description

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

## 4.15.2 Constructor & Destructor Documentation

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

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

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

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

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

```
00193 {}
```

## 4.15.3 Member Function Documentation

### 4.15.3.1 getAbsoluteBCID() std::uint64\_t Payload100::getAbsoluteBCID ( ) const [inline], [final], [virtual]

Implements [Payload](#).

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

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

### 4.15.3.2 getASICid() std::uint32\_t Payload100::getASICid ( const std::uint32\_t & i ) const [inline], [final], [virtual]

Implements [Payload](#).

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

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

### 4.15.3.3 getBCID() std::uint32\_t Payload100::getBCID ( ) const [inline], [final], [virtual]

Implements [Payload](#).

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

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

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

Implements [Payload](#).

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

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

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

Implements [Payload](#).

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

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

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

Implements [Payload](#).

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

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

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

Implements [Payload](#).

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

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

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

Implements [Payload](#).

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

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

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

Implements [Payload](#).

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

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

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

Implements [Payload](#).

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

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

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

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

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

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

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

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

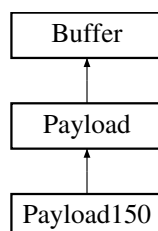
The documentation for this class was generated from the following files:

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

## 4.16 Payload150 Class Reference

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

Inheritance diagram for Payload150:



## Public Member Functions

- [Payload150](#) ()
- virtual std::uint32\_t [getNumberOfFrames](#) () const final
- virtual std::uint32\_t [getThresholdStatus](#) (const std::uint32\_t &, const std::uint32\_t &) const final
- virtual std::uint32\_t [getDIFid](#) () const final
- virtual std::uint32\_t [getDTC](#) () const final
- virtual std::uint32\_t [getGTC](#) () const final
- virtual std::uint32\_t [getBCID](#) () const final
- virtual std::uint64\_t [getAbsoluteBCID](#) () const final
- virtual std::uint32\_t [getASICid](#) (const std::uint32\_t &) const final
- virtual std::uint32\_t [getFrameBCID](#) (const std::uint32\_t &) const final
- virtual std::uint32\_t [getFrameTimeToTrigger](#) (const std::uint32\_t &) const final
- virtual [~Payload150](#) ()

## Additional Inherited Members

### 4.16.1 Detailed Description

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

### 4.16.2 Constructor & Destructor Documentation

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

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

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

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

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

```
00136 {}
```

### 4.16.3 Member Function Documentation

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

Implements [Payload](#).

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

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

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

Implements [Payload](#).

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

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

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

Implements [Payload](#).

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

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

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

Implements [Payload](#).

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

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

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

Implements [Payload](#).

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

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

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

Implements [Payload](#).

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

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

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

Implements [Payload](#).

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

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

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

Implements [Payload](#).

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

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

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

Implements [Payload](#).

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

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

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

Implements [Payload](#).

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

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

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

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

## 4.17 PayloadLoader Class Reference

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

### Public Member Functions

- [PayloadLoader](#) ()=default
- `std::unique_ptr< Payload > & getPayload` (const std::int32\_t &detector\_id)

### 4.17.1 Detailed Description

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

### 4.17.2 Constructor & Destructor Documentation

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

### 4.17.3 Member Function Documentation

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

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

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

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

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

## 4.18 RawBufferNavigator Class Reference

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

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

### Public Member Functions

- [RawBufferNavigator \(\)](#)
- [~RawBufferNavigator \(\)=default](#)
- void [setBuffer](#) (const [Buffer](#) &)
- std::uint32\_t [getDetectorID](#) ()
- bool [findStartOfPayload](#) ()
- std::int32\_t [getStartOfPayload](#) ()
- bool [validPayload](#) ()
- [Buffer](#) [getPayload](#) ()



### Static Public Member Functions

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

#### 4.18.1 Detailed Description

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

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

The buffer structure consists of :

- the detector id (std::int32\_t)
- the datasource id (std::int32\_t)
- the event id (std::int32\_t)
- the bunch crossing id (std::int64\_t)
- the payload char array of (buffer size - 20) Based on

##### Author

Laurent Mirabito

##### Version

1.0

##### Date

May 2016

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

#### 4.18.2 Constructor & Destructor Documentation

##### 4.18.2.1 RawBufferNavigator() `RawBufferNavigator::RawBufferNavigator ( )`

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

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

#### 4.18.3 Member Function Documentation

#### 4.18.3.1 findStartOfPayload() bool RawBufferNavigator::findStartOfPayload ( )

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

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

#### 4.18.3.2 getDetectorID() std::uint32\_t RawBufferNavigator::getDetectorID ( )

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

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

#### 4.18.3.3 getPayload() Buffer RawBufferNavigator::getPayload ( )

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

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

#### 4.18.3.4 getStartOfPayload() std::int32\_t RawBufferNavigator::getStartOfPayload ( )

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

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

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

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

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

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

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

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

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

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

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

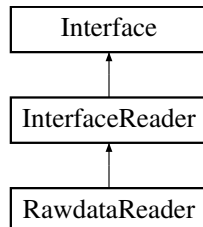
The documentation for this class was generated from the following files:

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

## 4.19 RawdataReader Class Reference

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

Inheritance diagram for RawdataReader:



### Public Member Functions

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

### Static Public Member Functions

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

## Additional Inherited Members

### 4.19.1 Detailed Description

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

### 4.19.2 Constructor & Destructor Documentation

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

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

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

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

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

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

### 4.19.3 Member Function Documentation

#### 4.19.3.1 closeFile() void RawdataReader::closeFile ( )

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

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

#### 4.19.3.2 end() void RawdataReader::end ( )

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

```
00060 {
00061     try
00062     {
00063         m_FileStream.rdbuf()->pubsetbuf(0, 0);
00064         m_FileStream.exceptions(std::ifstream::failbit | std::ifstream::badbit);
00065         m_FileStream.open(fileName.c_str(), std::ios::in | std::ios::binary | std::ios::ate); // Start at
the end to directly calculate the size of the file then come back to beginning
00066         m_FileStream.rdbuf()->pubsetbuf(0, 0);
00067         if(m_FileStream.is_open())
00068         {
00069             setFileSize(m_FileStream.tellg());
00070             m_FileStream.seekg(0, std::ios::beg);
00071         }
00072     }
00073     catch(const std::ios_base::failure& e)
00074     {
00075         log()->error("Caught an ios_base::failure in openFile : {}", e.what());
00076         throw;
00077     }
00078 }
```

**4.19.3.8 setDefaultBufferSize()** void RawdataReader::setDefaultBufferSize (   
 const std::size\_t & size ) [static]

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

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

**4.19.3.9 start()** void RawdataReader::start ( )

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

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

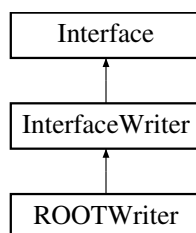
The documentation for this class was generated from the following files:

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

## 4.20 ROOTWriter Class Reference

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

Inheritance diagram for ROOTWriter:



## Public Member Functions

- [ROOTWriter](#) ()
- void [setFilename](#) (const std::string &)
- void [start](#) ()
- void [processDIF](#) (const [Payload](#) &)
- void [processFrame](#) (const [Payload](#) &, const std::uint32\_t &frameIndex)
- void [processPadInFrame](#) (const [Payload](#) &, const std::uint32\_t &frameIndex, const std::uint32\_t &channel↵  
Index)
- void [processSlowControl](#) (const [Buffer](#) &)
- void [end](#) ()
- virtual void [startEvent](#) ()
- virtual void [endEvent](#) ()
- virtual void [startDIF](#) ()
- virtual void [endDIF](#) ()
- virtual void [startFrame](#) ()
- virtual void [endFrame](#) ()
- virtual void [startPad](#) ()
- virtual void [endPad](#) ()

### 4.20.1 Detailed Description

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

### 4.20.2 Constructor & Destructor Documentation

#### 4.20.2.1 ROOTWriter() `ROOTWriter::ROOTWriter ( )`

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

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

### 4.20.3 Member Function Documentation

#### 4.20.3.1 end() `void ROOTWriter::end ( )`

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

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

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

Reimplemented from [Interface](#).

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

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

**4.20.3.3 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 }
```

**4.20.3.4 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 }
```

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

Reimplemented from [Interface](#).

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

```
00095 {}
```

**4.20.3.6 processDIF()** void ROOTWriter::processDIF (   
const [Payload](#) & d )

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

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



**4.20.3.7 processFrame()** void ROOTWriter::processFrame (   
const Payload & d,   
const std::uint32\_t & frameIndex )

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

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

**4.20.3.8 processPadInFrame()** void ROOTWriter::processPadInFrame (   
const Payload & d,   
const std::uint32\_t & frameIndex,   
const std::uint32\_t & channelIndex )

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

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

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

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

```
00028 { ; }
```

**4.20.3.10 setFilename()** void ROOTWriter::setFilename (   
const std::string & filename )

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

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

**4.20.3.11 start()** void ROOTWriter::start ( )

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

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

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

Reimplemented from [Interface](#).

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

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

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

Reimplemented from [Interface](#).

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

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

**4.20.3.14 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 }
```

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

Reimplemented from [Interface](#).

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

```
00093 {}
```

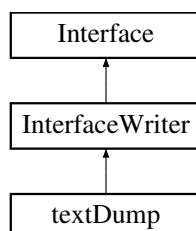
The documentation for this class was generated from the following files:

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

## 4.21 textDump Class Reference

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

Inheritance diagram for textDump:



## Public Member Functions

- [textDump](#) ()
- void [start](#) ()
- void [processDIF](#) (const [Payload](#) &)
- void [processFrame](#) (const [Payload](#) &, uint32\_t frameIndex)
- void [processPadInFrame](#) (const [Payload](#) &, uint32\_t frameIndex, uint32\_t channelIndex)
- void [processSlowControl](#) ([Buffer](#))
- void [end](#) ()
- std::shared\_ptr< spdlog::logger > & [print](#) ()
- void [setLevel](#) (const spdlog::level::level\_enum &level)

### 4.21.1 Detailed Description

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

### 4.21.2 Constructor & Destructor Documentation

#### 4.21.2.1 textDump() textDump::textDump ( )

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

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

### 4.21.3 Member Function Documentation

#### 4.21.3.1 end() void textDump::end ( )

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

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

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

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

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

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

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

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

**4.21.3.4 processFrame()** void textDump::processFrame (   
     const Payload & d,   
     uint32\_t frameIndex )

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

```
00020 {
00021     print()->info("\tDisplaying frame number {} : ASIC ID {}, Frame BCID {}, Frame Time To Trigger
(a.k.a timestamp) is {}", frameIndex, d.getASICid(frameIndex), d.getFrameBCID(frameIndex),
    d.getFrameTimeToTrigger(frameIndex));
00022 }
```

**4.21.3.5 processPadInFrame()** void textDump::processPadInFrame (   
     const Payload & d,   
     uint32\_t frameIndex,   
     uint32\_t channelIndex )

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

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

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

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

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

**4.21.3.7 setLevel()** void textDump::setLevel (   
     const spdlog::level::level\_enum & level ) [inline]

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

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

**4.21.3.8 start()** void textDump::start ( )

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

```
00015 { print()->info("Will dump bunch of DIF data"); }
```

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

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

## 4.22 Timer Class Reference

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

### Public Member Functions

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

### 4.22.1 Detailed Description

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

### 4.22.2 Member Function Documentation

#### 4.22.2.1 [getElapsedTime\(\)](#) float Timer::getElapsedTime ( ) [inline]

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

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

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

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

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

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

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

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

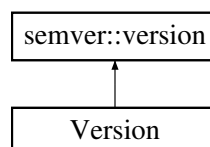
The documentation for this class was generated from the following file:

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

## 4.23 Version Class Reference

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

Inheritance diagram for Version:



## Public Member Functions

- [Version](#) (const std::uint8\_t &mj, const std::uint8\_t &mn, const std::uint8\_t &pt, const semver::prerelease &prr=semver::prerelease::none, const std::uint8\_t &prn=0) noexcept
- [Version](#) (const std::string\_view &str)
- [Version](#) ()=default
- std::uint8\_t [getMajor](#) ()
- std::uint8\_t [getMinor](#) ()
- std::uint8\_t [getPatch](#) ()
- std::string [getPreRelease](#) ()
- std::uint8\_t [getPreReleaseNumber](#) ()

### 4.23.1 Detailed Description

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

### 4.23.2 Constructor & Destructor Documentation

**4.23.2.1 Version()** [1/3] `Version::Version (`  
    `const std::uint8_t & mj,`  
    `const std::uint8_t & mn,`  
    `const std::uint8_t & pt,`  
    `const semver::prerelease & prr = 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, prr, prn) {}
```

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

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

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

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

### 4.23.3 Member Function Documentation

#### 4.23.3.1 getMajor() std::uint8\_t Version::getMajor ( )

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

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

#### 4.23.3.2 getMinor() std::uint8\_t Version::getMinor ( )

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

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

#### 4.23.3.3 getPatch() std::uint8\_t Version::getPatch ( )

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

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

#### 4.23.3.4 getPreRelease() std::string Version::getPreRelease ( )

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

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

#### 4.23.3.5 getPreReleaseNumber() std::uint8\_t Version::getPreReleaseNumber ( )

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

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

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

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

## 5 File Documentation

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

```
#include <stdint>  
#include <iosfwd>
```

## Typedefs

- using [bit8\\_t](#) = std::uint8\_t
- using [bit16\\_t](#) = std::uint16\_t
- using [bit32\\_t](#) = std::uint32\_t
- using [bit64\\_t](#) = std::uint64\_t

## Functions

- std::ostream & [operator<<](#) (std::ostream &os, const [bit8\\_t](#) &c)  
*Stream operator to print bit8\_t aka std::uint8\_t and not char or unsigned char.*

### 5.1.1 Detailed Description

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

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

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

### Classes

- class [Buffer](#)

### 5.3.1 Detailed Description

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

```

## Classes

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

## 5.5.1 Detailed Description

## 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 "BufferLooperCounter.h"
00009 #include "DetectorId.h"
00010 #include "Formatters.h"
00011 #include "PayloadLoader.h"
00012 #include "RawBufferNavigator.h"
00013 #include "Timer.h"
00014 #include "Words.h"
00015
00016 #include <algorithm>
00017 #include <cassert>
00018 #include <fmt/color.h>
00019 #include <map>
00020 #include <memory>
00021 #include <spdlog/sinks/null_sink.h>
00022 #include <spdlog/spdlog.h>
00023 #include <string>
00024 #include <vector>
00025 // function to loop on buffers
00026
00027 template<typename SOURCE, typename DESTINATION> class BufferLooper
00028 {
00029 public:
00030     BufferLooper(SOURCE& source, DESTINATION& dest, bool debug = false) : m_Source(source),
00031         m_Destination(dest), m_Debug(debug)
00032     {
00033         m_Logger = spdlog::create<spdlog::sinks::null_sink_mt>("streamout");
00034         if(!spdlog::get("streamout")) { spdlog::register_logger(m_Logger); }
00035         m_Source.setLogger(m_Logger);
00036         m_Destination.setLogger(m_Logger);
00037     }
00038     void addSink(const spdlog::sink_ptr& sink, const spdlog::level::level_enum& level =
00039         spdlog::get_level())
00040     {
00041         sink->set_level(level);
00042         m_Sinks.push_back(sink);
00043         m_Logger = std::make_shared<spdlog::logger>("streamout", begin(m_Sinks), end(m_Sinks));
00044         m_Source.setLogger(m_Logger);
00045         m_Destination.setLogger(m_Logger);
00046     }
00047     void loop(const std::uint32_t& m_NbrEventsToProcess = 0)
00048     {
00049         // clang-format off
00050         fmt::print(fg(fmt::color::medium_orchid) | fmt::emphasis::bold,
00051             "\n"
00052             " SSSSSSSSSSSSSSS      tttt
00053             tttt\n"
00054             "SS:::::::::::::S   ttt::t
00055             ttt::t\n"
00056             "S::::SSSSS:::::S   t::::t
00057             t::::t\n"
00058             "S:::::S      SSSSSS   t::::t
00059             t::::t\n"

```

```

00056 "S::::S      tttttt::::ttttttt rrrrr rrrrrrrrrr eeeeeeeeeeee aaaaaaaaaaaaaa
mmmmmmmm mmmmmmm oooooooooo uuuuuu uuuuuutttttt::::ttttttt\n"
00057 "S::::S      t:::::t:::::t r::::rrr:::::r ee:::::ee a:::::a
mm:::::m m:::::mm oo:::::oo u::::u u::::ut:::::t\n"
00058 " S::::SSSS t:::::t r:::::r e:::::eeeeee:::eeaaaaaaaaa:::a
m:::::mm:::::mm:::::mo:::::ou:::::u u::::ut:::::t\n"
00059 " SS:::::SSSSStttttt:::::tttttt rr:::::rrrrr:::::re:::::e e:::::e a::::a
m:::::mo:::::mo:::::oo:::::ou:::::u u::::utttttt:::::tttttt\n"
00060 " SSS:::::SS t:::::t r:::::r r:::::re:::::eeeeee:::e aaaaaa:::a
m:::::mmmm:::::mmmm:::::mo:::::o o::::ou:::::u u::::u t:::::t\n"
00061 " SSSSSS::::S t:::::t r:::::r rrrrrrrre:::::e aa:::::a m::::m
m::::m m::::mo::::o o::::ou::::u u::::u t:::::t\n"
00062 " S::::S t:::::t r:::::r e:::::eeeeeeeeee a::::aaaa:::a m::::m
m::::m m::::mo::::o o::::ou::::u u::::u t:::::t\n"
00063 " S::::S t:::::t ttttttr::::r e:::::e a::::a a::::a m::::m
m::::m m::::mo::::o o::::ou::::uuuu::::u t:::::t tttttt\n"
00064 "SSSSSSS S::::S t:::::ttt::::tr::::r e:::::e a::::a a::::a m::::m
m::::m m::::mo::::o:::::ou:::::uu t:::::tttt:::t\n"
00065 "S:::::SSSSS::::S tt:::::tr::::r e:::::eeeeeeea:::aaaa:::a m::::m
m::::m m::::mo:::::o u:::::u tt:::::t\n"
00066 "S:::::SS tt:::::tr::::r ee:::::e a:::::aa:::am::::m
m::::m m::::m oo:::::oo uu:::::uu tt:::::t\n"
00067 " SSSSSSSSSSSSSS tttttttttt rrrrrrr eeeeeeeeeeee aaaaaaaaa aaaammmmmmm
mmmmmmmm mmmmmmm oooooooooo uuuuuuuu uuuu tttttttttt {} \n"
00068 "\n",
00069 fmt::format(fg(fmt::color::red) | fmt::emphasis::bold, "v{}", streamout_version.to_string());
00070 // clang-format on
00071 log()->info("*****");
00072 log()->info("Streamout Version : {}", streamout_version.to_string());
00073 log()->info("Using InterfaceReader {} version {}", m_Source.getName(),
m_Source.getVersion().to_string());
00074 log()->info("Using InterfaceWriter {} version {}", m_Destination.getName(),
m_Destination.getVersion().to_string());
00075
00076 if(!m_Destination.checkCompatibility(m_Source.getName(), m_Source.getVersion().to_string()))
00077 {
00078     log()->critical("{} version {} is not compatible with {} version {} ! ", m_Source.getName(),
m_Source.getVersion().to_string(), m_Destination.getName(), m_Destination.getVersion().to_string());
00079     log()->info("Compatible Interfaces for {} are", m_Destination.getName());
00080     for(std::map<std::string, std::string>::iterator it = m_Destination.getCompatibility().begin();
it != m_Destination.getCompatibility().end(); ++it) { log()->info("{} version {}", it->first,
it->second); }
00081     std::exit(-1);
00082 }
00083 if(!m_DetectorIDs.empty())
00084 {
00085     std::string ids;
00086     for(std::vector<DetectorID>::const_iterator it = m_DetectorIDs.cbegin(); it !=
m_DetectorIDs.cend(); ++it) ids += std::to_string(static_cast<std::uint16_t>(*it)) + ";";
00087     log()->info("Detector ID(s) other than {} will be ignored", ids);
00088 }
00089 log()->info("*****");
00090 RawBufferNavigator bufferNavigator;
00091 Timer timer;
00092 timer.start();
00093 m_Source.start();
00094 m_Destination.start();
00095 while(m_Source.nextEvent() && m_NbrEventsToProcess >= m_NbrEvents)
00096 {
00097     /***/
00098     /*** START EVENT ***/
00099     m_Source.startEvent();
00100     m_Destination.startEvent();
00101     /***/
00102
00103     m_Logger->warn("==== Event {} =====", m_NbrEvents);
00104     while(m_Source.nextDIFbuffer())
00105     {
00106         const Buffer& buffer = m_Source.getBuffer();
00107
00108         bufferNavigator.setBuffer(buffer);
00109         if(std::find(m_DetectorIDs.begin(), m_DetectorIDs.end(),
static_cast<DetectorID>(bufferNavigator.getDetectorID())) == m_DetectorIDs.end())
00110         {
00111             m_Logger->debug("Ignoring detector ID : {}", bufferNavigator.getDetectorID());
00112             continue;
00113         }
00114
00115         std::int32_t idstart = bufferNavigator.getStartOfPayload();
00116         if(m_Debug && idstart == -1) m_Logger->info(to_hex(buffer));
00117         c.DIFStarter[idstart]++;
00118         if(!bufferNavigator.validPayload())
00119         {
00120             m_Logger->error("!bufferNavigator.validBuffer()");
00121             continue;
00122         }
00123

```

```

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

```

```

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

```

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

```

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

```

### Classes

- struct [BufferLooperCounter](#)

#### 5.7.1 Detailed Description

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

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

```
#include <cstdint>
```

### Enumerations

- enum class [DetectorID](#) : std::uint16\_t { [HARDROC](#) = 100 , [HARDROC\\_NEW](#) = 150 , [RUNHEADER](#) = 255 }

### 5.9.1 Detailed Description

#### 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     DIFSlowControl(const std::uint8_t& version, const std::uint8_t& DIFid, unsigned char* buf);
00023
00025     std::uint8_t getDIFid();
00026
00028
00031     std::map<int, std::map<std::string, int> getChipsMap();
00032
00034
00038     std::map<std::string, int> getChipSlowControl(const int& asicid);
00039
00041
00045     int getChipSlowControl(const std::int8_t& asicid, const std::string& param);
00046
00047     std::map<int, std::map<std::string, int>::const_iterator cbegin()const { return m_MapSC.cbegin(); }
00048
00049     std::map<int, std::map<std::string, int>::const_iterator cend()const { return m_MapSC.cend(); }
00050
00051 private:
00053     DIFSlowControl() = delete;
00055     void FillHR1(const int& header_shift, unsigned char* cbuf);
00057     void FillHR2(const int& header_shift, unsigned char* cbuf);
00059     void FillAsicHR1(const std::bitset<72 * 8>& bs);
00061     void FillAsicHR2(const std::bitset<109 * 8>& bs);
00062
00063     unsigned int m_DIFid{0};
00064     unsigned int m_Version{0};
00065     unsigned int m_AsicType{0}; // asicType_
00066     unsigned int m_NbrAsic{0};
00067     std::map<int, std::map<std::string, int> m_MapSC;
00068 };
00069
00070 std::string to_string(const DIFSlowControl& c);
00071 /* void setSCBuffer()
00072 {
00073     if(!hasSlowControl()) return;
00074     if(m_SCbuffer.size() != 0) return; // deja fait
00075     if(m_BadSlowControl) return;
00076     m_SCbuffer.set(&(begin() [getEndOfDIFData()]));
00077     // compute Slow Control size
00078     std::size_t maxsize{size() - getEndOfDIFData() + 1}; // should I +1 here ?
00079     uint32_t k{1}; // SC Header
00080     uint32_t dif_ID{m_SCbuffer[1]};
00081     uint32_t chipSize{m_SCbuffer[3]};
00082     while((dif_ID != 0x01 && m_SCbuffer[k] != 0x01 && k < maxsize) || (dif_ID == 0x01 && m_SCbuffer[k + 2]
== chipSize && k < maxsize))
00083     {
00084         k += 2; // DIF ID + ASIC Header
00085         uint32_t scsize = m_SCbuffer[k];
00086         if(scsize != 74 && scsize != 109)
00087         {
```

```

00088 k                = 0;
00089 m_BadSlowControl = true;
00090 throw Exception(fmt::format("PROBLEM WITH SC SIZE {}", scsize));
00091 }
00092 k++;                // skip size bit
00093 k += scsize;        // skip the data
00094 }
00095 if(m_SCbuffer[k] == 0xal && !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),
00017         m_Message(message) { constructWhat(); }
00018     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) :
00042         m_Name(name), m_Version(version) {}
00043     virtual ~Interface() = default;
00044     virtual void startEvent() {}
00045     virtual void endEvent() {}
00046     virtual void startDIF() {}
00047     virtual void endDIF() {}
00048     virtual void startFrame() {}
00049     virtual void endFrame() {}
00050     virtual void startPad() {}
00051     virtual void endPad() {}
00052     std::shared_ptr<spdlog::logger>& log() { return m_Logger; }
00053     void setLogger(const std::shared_ptr<spdlog::logger>& logger) { m_Logger
00054         = logger; }
00055     std::string getName() { return m_Name; }
00056     Version getVersion() { return m_Version; }
00057 private:
00058     std::shared_ptr<spdlog::logger> m_Logger{nullptr};
00059     std::string m_Name;
00060     Version m_Version;
00061     InterfaceType m_Type{InterfaceType::Unknown};
00062 };
00063 class InterfaceReader : public Interface
00064 {
00065 public:
00066     InterfaceReader(const std::string& name, const std::string& version) : Interface(name, version,
00067         InterfaceType::Reader) {}
00068     virtual ~InterfaceReader() = default;
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,
00077         InterfaceType::Writer) {}
00078     void addCompatibility(const std::string& name, const std::string& version) { m_Compatible[name] =
00079         version; }
00080     std::map<std::string, std::string> getCompatibility() { return m_Compatible; }
00081     bool checkCompatibility(const std::string& name, const std::string& version)
00082     {
00083         if (m_Compatible.find(name) != m_Compatible.end())
00084         {
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/Payload.h File Reference

```

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

```

### Classes

- class [Payload](#)

### 5.21.1 Detailed Description

#### Copyright

2022 G.Grenier F.Lagarde

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

## 5.22 Payload.h

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

```

00001
00004 #pragma once
00005
00006 #include "Buffer.h"
00007 #include "Exception.h"
00008
00009 #include <fmt/format.h>
00010
00011 class Payload : public Buffer
00012 {
00013 public:
00014     explicit Payload(const std::int32_t& detector_id) {}
00015     void                setBuffer(const Buffer& buffer);
00016     std::uint32_t        getEndOfDIFData() const;
00017     std::uint32_t        getSizeAfterDIFPtr() const;
00018     virtual std::uint32_t getNumberOfFrames() const = 0;
00019     virtual std::uint32_t getThresholdStatus(const std::uint32_t&, const std::uint32_t&) const = 0;
00020     virtual std::uint32_t getDIFid() const = 0;
00021     virtual std::uint32_t getDTC() const = 0;
00022     virtual std::uint32_t getGTC() const = 0;
00023     virtual std::uint32_t getBCID() const = 0;
00024     virtual std::uint64_t getAbsoluteBCID() const = 0;
00025     virtual std::uint32_t getASICid(const std::uint32_t&) const = 0;
00026     virtual std::uint32_t getFrameBCID(const std::uint32_t&) const = 0;
00027     virtual std::uint32_t getFrameTimeToTrigger(const std::uint32_t&) const = 0;
00028
00029     virtual ~Payload() {}

```

```

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

```

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

```

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

```

### Classes

- class [Payload100](#)

### 5.23.1 Detailed Description

#### Copyright

2022 G.Grenier F.Lagarde

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

## 5.24 Payload100.h

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

```

00001
00005 #pragma once
00006 #include "Payload.h"
00007
00008 #include <vector>
00009
00027 class Payload100 : public Payload
00028 {
00029 public:
00030     Payload100() : Payload(100) {}
00031     bool hasTemperature() const;
00032     bool hasAnalogReadout() const;
00033     virtual std::uint32_t getNumberOfFrames() const final;
00034     virtual std::uint32_t getThresholdStatus(const std::uint32_t&, const std::uint32_t&) const final;
00035     virtual std::uint32_t getDIFid() const final;
00036     virtual std::uint32_t getDTC() const final;
00037     virtual std::uint32_t getGTC() const final;
00038     virtual std::uint32_t getBCID() const final;
00039     virtual std::uint64_t getAbsoluteBCID() const final;
00040     virtual std::uint32_t getASICid(const std::uint32_t&) const final;
00041     virtual std::uint32_t getFrameBCID(const std::uint32_t&) const final;
00042     virtual std::uint32_t getFrameTimeToTrigger(const std::uint32_t&) const final;
00043     virtual ~Payload100();
00044     /*
00045     bool hasAnalogReadout() const;
00046
00047     bool hasSlowControl() const;
00048

```

```

00049 float getTemperatureDIF() const;
00050
00051 float getTemperatureASU1() const;
00052
00053 float getTemperatureASU2() const;
00054
00055 Buffer getSlowControl() const;
00056
00057 std::vector<bit8_t*> getFramesVector() const;
00058
00059 std::vector<bit8_t*> getLinesVector() const;
00060
00061 bool          hasLine(const std::uint32_t&) const;
00062
00063 bit8_t*       getFramePtr(const std::uint32_t&) const;
00064
00065 std::uint32_t getDIF_CRC() const;
00066
00067 private:
00068
00069 std::uint32_t getTASU1() const;
00070 std::uint32_t getTASU2() const;
00071 std::uint32_t getTDIF() const;
00072 */
00073
00074 private:
00075 bool          getFrameLevel(const std::uint32_t&, const std::uint32_t&, const std::uint32_t&)
    const;
00076 std::uint16_t  m_Version{13};
00077 std::vector<bit8_t*> m_Lines;
00078 std::vector<bit8_t*> m_Frames;
00079 virtual void    parsePayload() final;
00080 std::uint32_t   parseAnalogLine(const std::uint32_t& idx);
00081 std::uint32_t   getNumberLines() const;
00082 };

```

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

```

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

```

### Classes

- class [Payload150](#)

### 5.25.1 Detailed Description

#### Copyright

2022 G.Grenier F.Lagarde

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

## 5.26 Payload150.h

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

```

00001
00005 #pragma once
00006 #include "Payload.h"
00007
00008 #include <vector>
00009
00010 class Payload150 : public Payload
00011 {
00012 public:

```

```

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

```

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

```

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

```

### Classes

- class [PayloadLoader](#)

### 5.27.1 Detailed Description

#### Copyright

2022 G.Grenier F.Lagarde

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

## 5.28 PayloadLoader.h

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

```

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

```

## 5.29 libs/core/include/RawBufferNavigator.h File Reference

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

### Classes

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

### 5.29.1 Detailed Description

#### Copyright

2022 G.Grenier F.Lagarde

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

## 5.30 RawBufferNavigator.h

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

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

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

```
#include <chrono>
```

### Classes

- class [Timer](#)

### 5.31.1 Detailed Description

#### Copyright

2022 G.Grenier F.Lagarde

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

## 5.32 Timer.h

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

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

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

```
#include <stdint>
```

### Functions

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

### 5.33.1 Detailed Description

#### Copyright

2022 G.Grenier F.Lagarde

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

### 5.33.2 Function Documentation



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

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

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

## 5.34 Utilities.h

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

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

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

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

### Classes

- class [Version](#)

### 5.35.1 Detailed Description

#### Copyright

2022 G.Grenier F.Lagarde

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

## 5.36 Version.h

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

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

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

### Enumerations

- enum class [Valueksks](#) : std::uint8\_t { [GLOBAL\\_HEADER](#) = 0xb0 , [GLOBAL\\_HEADER\\_TEMP](#) = 0xbb }
- enum class [Hardware](#) : std::uint8\_t { [NUMBER\\_PAD](#) = 64 }

### 5.37.1 Detailed Description

#### Copyright

2022 G.Grenier F.Lagarde

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

### 5.37.2 Enumeration Type Documentation

#### 5.37.2.1 Hardware enum class [Hardware](#) : std::uint8\_t [strong]

##### Enumerator

<a href="#">NUMBER_PAD</a>	
----------------------------	--

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

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

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

Enumerator

GLOBAL_HEADER	
GLOBAL_HEADER_TEMP	

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

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

## 5.38 Words.h

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

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

## 5.39 libs/core/src/Bits.cc File Reference

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

### Functions

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

### 5.39.1 Detailed Description

Copyright

2022 G.Grenier F.Lagarde

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

### 5.39.2 Function Documentation

```

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

```

Stream operator to print bit8\_t aka std::uint8\_t and not char or unsigned char.

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

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

## 5.40 Bits.cc

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

```

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

```

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

```

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

```

## 5.42 BufferLooperCounter.cc

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

```

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

```

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

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

### Functions

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

#### 5.43.1 Detailed Description

##### Copyright

2022 G.Grenier F.Lagarde

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

#### 5.43.2 Function Documentation

**5.43.2.1 to\_string()** `std::string to_string (`  
     const [DIFSlowControl](#) & c )

Definition at line 256 of file [DIFSlowControl.cc](#).

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

## 5.44 DIFSlowControl.cc

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

```
00001
00005 #include "DIFSlowControl.h"
00006
00007 DIFSlowControl::DIFSlowControl(const std::uint8_t& version, const std::uint8_t& DIFId, unsigned char*
00008     cbuf) : m_Version(version), m_DIFId(DIFId), m_AsicType(2)
00009 {
00010     if(cbuf[0] != 0xb1) return;
00011     int header_shift{6};
00012     if(m_Version < 8) m_NbrAsic = cbuf[5];
00013     else
00014     {
00015         m_DIFId = cbuf[1];
00016         m_NbrAsic = cbuf[2];
00017         header_shift = 3;
00018     }
00019     int size_hardroc1 = m_NbrAsic * 72 + header_shift + 1;
00020     if(cbuf[size_hardroc1 - 1] != 0xal) size_hardroc1 = 0;
00021     int size_hardroc2 = m_NbrAsic * 109 + header_shift + 1;
00022     if(cbuf[size_hardroc2 - 1] != 0xal) size_hardroc2 = 0;
00023     if(size_hardroc1 != 0)
```

```

00024 {
00025     FillHR1(header_shift, cbuf);
00026     m_AsicType = 1;
00027 }
00028 else if(size_hardroc2 != 0)
00029     FillHR2(header_shift, cbuf);
00030 else
00031     return;
00032 }
00033
00034 inline std::uint8_t DIFSlowControl::getDIFId() { return m_DIFId; }
00035
00036 inline std::map<int, std::map<std::string, int> DIFSlowControl::getChipsMap() { return m_MapSC; }
00037
00038 inline std::map<std::string, int> DIFSlowControl::getChipSlowControl(const int& asicid) { return
m_MapSC[asicid]; }
00039
00040 inline int DIFSlowControl::getChipSlowControl(const std::int8_t& asicid, const std::string& param) {
return getChipSlowControl(asicid)[param]; }
00041
00042 void DIFSlowControl::FillHR1(const int& header_shift, unsigned char* cbuf)
00043 {
00044     int nasic{cbuf[header_shift - 1]};
00045     int idx{header_shift};
00046     for(int k = 0; k < nasic; k++)
00047     {
00048         std::bitset<72 * 8> bs;
00049         // printf("%x %x \n", cbuf[idx+k*72+69], cbuf[idx+k*72+70]);
00050         for(int l = 71; l >= 0; l--)
00051         {
00052             // printf("%d %x : %d -->", l, cbuf[idx+k*72+l], (71-l)*8);
00053             for(int m = 0; m < 8; m++)
00054             {
00055                 if(((1 < m) & cbuf[idx + k * 72 + l]) != 0) bs.set((71 - l) * 8 + m, 1);
00056                 else
00057                     bs.set((71 - l) * 8 + m, 0);
00058                 // printf("%d", (int) bs[(71-l)*8+m]);
00059             }
00060             // printf("\n");
00061         }
00062         FillAsicHR1(bs);
00063     }
00064 }
00065
00066 void DIFSlowControl::FillHR2(const int& header_shift, unsigned char* cbuf)
00067 {
00068     // int scsizer=cbuf[header_shift-1]*109+(header_shift-1)+2;
00069     int nasic{cbuf[header_shift - 1]};
00070     int idx{header_shift};
00071     // std::cout<<" DIFSlowControl::FillHR nasic "<<nasic<<std::endl;
00072     for(int k = 0; k < nasic; k++)
00073     {
00074         std::bitset<109 * 8> bs;
00075         // printf("%x %x \n", cbuf[idx+k*109+69], cbuf[idx+k*109+70]);
00076         for(int l = 108; l >= 0; l--)
00077         {
00078             // printf("%d %x : %d -->", l, cbuf[idx+k*109+l], (71-l)*8);
00079             for(int m = 0; m < 8; m++)
00080             {
00081                 if(((1 < m) & cbuf[idx + k * 109 + l]) != 0) bs.set((108 - l) * 8 + m, 1);
00082                 else
00083                     bs.set((108 - l) * 8 + m, 0);
00084                 // printf("%d", (int) bs[(71-l)*8+m]);
00085             }
00086             // printf("\n");
00087         }
00088         FillAsicHR2(bs);
00089     }
00090 }
00091
00092 void DIFSlowControl::FillAsicHR1(const std::bitset<72 * 8>& bs)
00093 {
00094     // Asic Id
00095     int asicid{0};
00096     for(int j = 0; j < 8; j++)
00097         if(bs[j + 9] != 0) asicid += (1 < (7 - j));
00098     std::map<std::string, int> mAsic;
00099     // Slow Control
00100     mAsic["SSC0"] = static_cast<int>(bs[575]);
00101     mAsic["SSC1"] = static_cast<int>(bs[574]);
00102     mAsic["SSC2"] = static_cast<int>(bs[573]);
00103     mAsic["Choix_caisson"] = static_cast<int>(bs[572]);
00104     mAsic["SW_50k"] = static_cast<int>(bs[571]);
00105     mAsic["SW_100k"] = static_cast<int>(bs[570]);
00106     mAsic["SW_100f"] = static_cast<int>(bs[569]);
00107     mAsic["SW_50f"] = static_cast<int>(bs[568]);
00108 }

```

```

00109 mAsic["Valid_DC"] = static_cast<int>(bs[567]);
00110 mAsic["ON_Discr1"] = static_cast<int>(bs[566]);
00111 mAsic["ON_Fsb"] = static_cast<int>(bs[565]);
00112 mAsic["ON_Otaq"] = static_cast<int>(bs[564]);
00113 mAsic["ON_W"] = static_cast<int>(bs[563]);
00114 mAsic["ON_Ss"] = static_cast<int>(bs[562]);
00115 mAsic["ON_Buf"] = static_cast<int>(bs[561]);
00116 mAsic["ON_Paf"] = static_cast<int>(bs[560]);
00117 // Gain
00118 for(int i = 0; i < 64; i++)
00119 {
00120     int gain{0};
00121     for(int j = 0; j < 6; j++)
00122         if(bs[176 + i * 6 + j] != 0) gain += (1 << j);
00123     mAsic["Channel_" + std::to_string(i) + "_" + "Gain"] = gain;
00124     mAsic["Channel_" + std::to_string(i) + "_" + "cTest"] = bs[112 + i];
00125     mAsic["Channel_" + std::to_string(i) + "_" + "Valid_trig"] = static_cast<int>(bs[25 + i]);
00126 }
00127
00128 mAsic["ON_Otabg"] = static_cast<int>(bs[111]);
00129 mAsic["ON_Dac"] = static_cast<int>(bs[110]);
00130 mAsic["ON_Otadac"] = static_cast<int>(bs[109]);
00131 // DAC
00132 int dac1{0};
00133 for(int j = 0; j < 10; j++)
00134     if(bs[j + 99] != 0) dac1 += (1 << j);
00135 mAsic["DAC1"] = dac1;
00136 int dac0{0};
00137 for(int j = 0; j < 10; j++)
00138     if(bs[j + 89] != 0) dac0 += (1 << j);
00139 mAsic["DAC0"] = dac0;
00140 mAsic["EN_Raz_Ext"] = static_cast<int>(bs[23]);
00141 mAsic["EN_Raz_Int"] = static_cast<int>(bs[22]);
00142 mAsic["EN_Out_Raz_Int"] = static_cast<int>(bs[21]);
00143 mAsic["EN_Trig_Ext"] = static_cast<int>(bs[20]);
00144 mAsic["EN_Trig_Int"] = static_cast<int>(bs[19]);
00145 mAsic["EN_Out_Trig_Int"] = static_cast<int>(bs[18]);
00146 mAsic["Bypass_Chip"] = static_cast<int>(bs[17]);
00147 mAsic["HardrocHeader"] = static_cast<int>(asicid);
00148 mAsic["EN_Out_Discr1"] = static_cast<int>(bs[8]);
00149 mAsic["EN_Transmit_On"] = static_cast<int>(bs[7]);
00150 mAsic["EN_Dout"] = static_cast<int>(bs[6]);
00151 mAsic["EN_RamFull"] = static_cast<int>(bs[5]);
00152 m_MapSC[asicid] = mAsic;
00153 }
00154
00155 void DIFSlowControl::FillAsicHR2(const std::bitset<109 * 8>& bs)
00156 {
00157     int asicid{0};
00158     for(int j = 0; j < 8; j++)
00159         if(bs[j + (108 - 7) * 8 + 2] != 0) asicid += (1 << (7 - j));
00160     std::map<std::string, int> mAsic;
00161     for(int i = 0; i < 64; i++)
00162     {
00163         int gain{0};
00164         int mask{0};
00165         mAsic["Channel_" + std::to_string(i) + "_" + "cTest"] = bs[i];
00166         for(int j = 0; j < 8; j++)
00167             if(bs[64 + i * 8 + j] != 0) gain += (1 << j);
00168         mAsic["Channel_" + std::to_string(i) + "_" + "Gain"] = gain;
00169         for(int j = 0; j < 3; j++)
00170             if(bs[8 * 77 + 2 + i * 3 + j] != 0) mask += (1 << j);
00171         mAsic["Channel_" + std::to_string(i) + "_" + "Mask"] = mask;
00172     }
00173     mAsic["PwrOnPA"] = static_cast<int>(bs[8 * 72]);
00174     mAsic["Cmdb3SS"] = static_cast<int>(bs[8 * 72 + 1]);
00175     mAsic["Cmdb2SS"] = static_cast<int>(bs[8 * 72 + 2]);
00176     mAsic["Cmdb1SS"] = static_cast<int>(bs[8 * 72 + 3]);
00177     mAsic["Cmdb0SS"] = static_cast<int>(bs[8 * 72 + 4]);
00178     mAsic["SwSsc0"] = static_cast<int>(bs[8 * 72 + 5]);
00179     mAsic["SwSsc1"] = static_cast<int>(bs[8 * 72 + 6]);
00180     mAsic["SwSsc2"] = static_cast<int>(bs[8 * 72 + 7]);
00181
00182     mAsic["PwrOnBuff"] = static_cast<int>(bs[8 * 73]);
00183     mAsic["PwrOnSS"] = static_cast<int>(bs[8 * 73 + 1]);
00184     mAsic["PwrOnW"] = static_cast<int>(bs[8 * 73 + 2]);
00185     mAsic["Cmdb3Fsb2"] = static_cast<int>(bs[8 * 73 + 3]);
00186     mAsic["Cmdb2Fsb2"] = static_cast<int>(bs[8 * 73 + 4]);
00187     mAsic["Cmdb1Fsb2"] = static_cast<int>(bs[8 * 73 + 5]);
00188     mAsic["Cmdb0Fsb2"] = static_cast<int>(bs[8 * 73 + 6]);
00189     mAsic["Sw50k2"] = static_cast<int>(bs[8 * 73 + 7]);
00190
00191     mAsic["Sw100k2"] = static_cast<int>(bs[8 * 74]);
00192     mAsic["Sw100f2"] = static_cast<int>(bs[8 * 74 + 1]);
00193     mAsic["Sw50f2"] = static_cast<int>(bs[8 * 74 + 2]);
00194     mAsic["Cmdb3Fsb1"] = static_cast<int>(bs[8 * 74 + 3]);
00195     mAsic["Cmdb2Fsb1"] = static_cast<int>(bs[8 * 74 + 4]);

```

```

00196 mAsic["CmdblFsb1"] = static_cast<int>(bs[8 * 74 + 5]);
00197 mAsic["Cmdb0Fsb1"] = static_cast<int>(bs[8 * 74 + 6]);
00198 mAsic["Sw50k1"] = static_cast<int>(bs[8 * 74 + 7]);
00199
00200 mAsic["Sw100k1"] = static_cast<int>(bs[8 * 75]);
00201 mAsic["Sw100f1"] = static_cast<int>(bs[8 * 75 + 1]);
00202 mAsic["Sw50f1"] = static_cast<int>(bs[8 * 75 + 2]);
00203 mAsic["Sel0"] = static_cast<int>(bs[8 * 75 + 3]);
00204 mAsic["Sel11"] = static_cast<int>(bs[8 * 75 + 4]);
00205 mAsic["PwrOnFsb"] = static_cast<int>(bs[8 * 75 + 5]);
00206 mAsic["PwrOnFsb1"] = static_cast<int>(bs[8 * 75 + 6]);
00207 mAsic["PwrOnFsb2"] = static_cast<int>(bs[8 * 75 + 7]);
00208
00209 mAsic["Sw50k0"] = static_cast<int>(bs[8 * 76]);
00210 mAsic["Sw100k0"] = static_cast<int>(bs[8 * 76 + 1]);
00211 mAsic["Sw100f0"] = static_cast<int>(bs[8 * 76 + 2]);
00212 mAsic["Sw50f0"] = static_cast<int>(bs[8 * 76 + 3]);
00213 mAsic["EnOtaQ"] = static_cast<int>(bs[8 * 76 + 4]);
00214 mAsic["OtaQ_PwrADC"] = static_cast<int>(bs[8 * 76 + 5]);
00215 mAsic["Discri_PwrA"] = static_cast<int>(bs[8 * 76 + 6]);
00216 mAsic["Discri2"] = static_cast<int>(bs[8 * 76 + 7]);
00217
00218 mAsic["Discri1"] = static_cast<int>(bs[8 * 77]);
00219 mAsic["RS_or_Discri"] = static_cast<int>(bs[8 * 77 + 1]);
00220
00221 mAsic["Header"] = asicid;
00222 for(int i = 0; i < 3; i++)
00223 {
00224     int B = 0;
00225     for(int j = 0; j < 10; j++)
00226         if(bs[8 * 102 + 2 + i * 10 + j] != 0) B += (1 << j);
00227     mAsic["B" + std::to_string(i)] = B;
00228 }
00229
00230 mAsic["Smalldac"] = static_cast<int>(bs[8 * 106]);
00231 mAsic["DacSw"] = static_cast<int>(bs[8 * 106 + 1]);
00232 mAsic["OtagBgSw"] = static_cast<int>(bs[8 * 106 + 2]);
00233 mAsic["Trig2b"] = static_cast<int>(bs[8 * 106 + 3]);
00234 mAsic["Trigl1b"] = static_cast<int>(bs[8 * 106 + 4]);
00235 mAsic["Trig0b"] = static_cast<int>(bs[8 * 106 + 5]);
00236 mAsic["EnTrigOut"] = static_cast<int>(bs[8 * 106 + 6]);
00237 mAsic["DiscrOrOr"] = static_cast<int>(bs[8 * 106 + 7]);
00238
00239 mAsic["TrigExtVal"] = static_cast<int>(bs[8 * 107]);
00240 mAsic["RazChnIntVal"] = static_cast<int>(bs[8 * 107 + 1]);
00241 mAsic["RazChnExtVal"] = static_cast<int>(bs[8 * 107 + 2]);
00242 mAsic["ScOn"] = static_cast<int>(bs[8 * 107 + 3]);
00243 mAsic["CLKMux"] = static_cast<int>(bs[8 * 107 + 4]);
00244
00245 // EnOCDout1b EnOCDout2b EnOCTransmitOn1b EnOCTransmitOn2b EnOCChipsatb SelStartReadout
SelEndReadout
00246 mAsic["SelEndReadout"] = static_cast<int>(bs[8 * 108 + 1]);
00247 mAsic["SelStartReadout"] = static_cast<int>(bs[8 * 108 + 2]);
00248 mAsic["EnOCChipsatb"] = static_cast<int>(bs[8 * 108 + 3]);
00249 mAsic["EnOCTransmitOn2b"] = static_cast<int>(bs[8 * 108 + 4]);
00250 mAsic["EnOCTransmitOn1b"] = static_cast<int>(bs[8 * 108 + 5]);
00251 mAsic["EnOCDout2b"] = static_cast<int>(bs[8 * 108 + 6]);
00252 mAsic["EnOCDout1b"] = static_cast<int>(bs[8 * 108 + 7]);
00253 m_MapSC[asicid] = mAsic;
00254 }
00255
00256 std::string to_string(const DIFSlowControl& c)
00257 {
00258     std::string ret;
00259     for(std::map<int, std::map<std::string, int>::const_iterator it = c.cbegin(); it != c.cend(); it++)
00260     {
00261         ret += "ASIC " + std::to_string(it->first) + " :\n";
00262         for(std::map<std::string, int>::const_iterator jt = (it->second).begin(); jt !=
(it->second).end(); jt++) ret += jt->first + " : " + std::to_string(jt->second) + "\n";
00263     }
00264     return ret;
00265 }

```

## 5.45 libs/core/src/FileSystem.cc File Reference

```
#include "FileSystem.h"
```

### Functions

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



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

### 5.45.1 Detailed Description

#### Copyright

2022 G.Grenier F.Lagarde

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

### 5.45.2 Function Documentation

**5.45.2.1 extension()** `std::string extension (`  
`const std::string & file )`

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

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

**5.45.2.2 filename()** `std::string filename (`  
`const std::string & file )`

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

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

**5.45.2.3 path()** `std::string path (`  
`const std::string & file )`

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

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

## 5.46 Filesystem.cc

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

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

## 5.47 libs/core/src/Formatters.cc File Reference

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

### Functions

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

### 5.47.1 Detailed Description

#### Copyright

2022 G.Grenier F.Lagarde

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

### 5.47.2 Function Documentation

**5.47.2.1 to\_bin()** [1/5] std::string to\_bin (  
const [bit16\\_t](#) & b )

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

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

**5.47.2.2 to\_bin()** [2/5] std::string to\_bin (  
const [bit32\\_t](#) & b )

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

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

**5.47.2.3 to\_bin()** [3/5] std::string to\_bin (  
const [bit64\\_t](#) & b )

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

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

**5.47.2.4 to\_bin()** [4/5] std::string to\_bin (  
const [bit8\\_t](#) & b )

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

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

**5.47.2.5 to\_bin()** [5/5] std::string to\_bin (  
    const Buffer & b,  
    const std::size\_t & begin,  
    const std::size\_t & end )

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

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

**5.47.2.6 to\_dec()** [1/5] std::string to\_dec (  
    const bit16\_t & b )

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

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

**5.47.2.7 to\_dec()** [2/5] std::string to\_dec (  
    const bit32\_t & b )

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

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

**5.47.2.8 to\_dec()** [3/5] std::string to\_dec (  
    const bit64\_t & b )

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

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

**5.47.2.9 to\_dec()** [4/5] std::string to\_dec (  
    const bit8\_t & b )

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

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

**5.47.2.10 to\_dec()** [5/5] std::string to\_dec (  
    const Buffer & b,  
    const std::size\_t & begin,  
    const std::size\_t & end )

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

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

**5.47.2.11 to\_hex()** [1/5] std::string to\_hex (  
    const bit16\_t & b )

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

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

**5.47.2.12 to\_hex()** [2/5] std::string to\_hex (  
    const bit32\_t & b )

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

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

**5.47.2.13 to\_hex()** [3/5] std::string to\_hex (  
    const bit64\_t & b )

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

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

**5.47.2.14 to\_hex()** [4/5] std::string to\_hex (  
    const bit8\_t & b )

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

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

**5.47.2.15 to\_hex()** [5/5] std::string to\_hex (  
    const Buffer & b,  
    const std::size\_t & begin,  
    const std::size\_t & end )

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

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

**5.47.2.16 to\_oct()** [1/5] std::string to\_oct (  
    const bit16\_t & b )

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

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

**5.47.2.17 to\_oct()** [2/5] std::string to\_oct (  
    const bit32\_t & b )

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

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

**5.47.2.18 to\_oct()** [3/5] std::string to\_oct (  
    const bit64\_t & b )

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

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

**5.47.2.19 to\_oct()** [4/5] std::string to\_oct (  
    const bit8\_t & b )

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

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

**5.47.2.20 to\_oct()** [5/5] `std::string to_oct (`  
`const Buffer & b,`  
`const std::size_t & begin,`  
`const std::size_t & end )`

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

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

## 5.48 Formatters.cc

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

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

```

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

```

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

```

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

```

### Enumerations

- enum class Size : std::uint8\_t {
 DATA\_FORMAT\_VERSION = 1 , DAQ\_SOFTWARE\_VERSION = 2 , SDCC\_FIRMWARE\_VERSION = 2 ,
 DIF\_FIRMWARE\_VERSION = 2 ,
 TIMESTAMP\_SECONDES = 4 , TIMESTAMP\_MILLISECONDS = 4 , GLOBAL\_HEADER = 1 , DIF\_IF = 1 ,
 DIF\_TRIGGER\_COUNTER = 4 , INFORMATION\_COUNTER = 4 , GLOBAL\_TRIGGER\_COUNTER = 4 ,
 ABSOLUTE\_BCID = 6 ,
 BCID\_DIF = 3 , NUMBER\_LINE = 1 , TEMP\_ASU1 = 4 , TEMP\_ASU2 = 4 ,
 TEMP\_DIF = 1 , HEADER\_LINE = 1 , NUMBER\_CHIPS = 1 , LINE\_SIZE = 64 \* 2 ,
 TRAILER\_LINE = 1 , FRAME\_HEADER = 1 , MICROROC\_HEADER = 1 , BCID = 3 ,
 DATA = 16 , FRAME\_TRAILER = 1 , GLOBAL\_TRAILER = 1 , CRC\_MSB = 1 ,
 CRC\_LSB = 1 , SC\_HEADER = 1 , DIF\_ID = 1 , ASIC\_HEADER = 1 ,
 SC\_ASIC\_SIZE = 1 , SC\_TRAILER = 1 , DATA\_FORMAT\_VERSION = 1 , DAQ\_SOFTWARE\_VERSION = 2
 ,
 SDCC\_FIRMWARE\_VERSION = 2 , DIF\_FIRMWARE\_VERSION = 2 , TIMESTAMP\_SECONDES = 4 ,
 TIMESTAMP\_MILLISECONDS = 4 ,
 GLOBAL\_HEADER = 1 , PMR\_ID\_SHIFT = 1 , PMR\_NBASIC\_SHIFT = 1 , PMR\_FORMAT\_SHIFT = 1 ,
 PMR\_GTC\_SHIFT = 3 , PMR\_ABCID\_SHIFT = 6 , PMR\_BCID\_SHIFT = 3 , PMR\_LTRG\_SHIFT = 4 ,
 HEADER\_LINE = 1 , NUMBER\_CHIPS = 1 , LINE\_SIZE = 64 \* 2 , TRAILER\_LINE = 1 ,
 FRAME\_HEADER = 1 , MICROROC\_HEADER = 1 , BCID = 3 , DATA = 16 ,
 FRAME\_TRAILER = 1 , GLOBAL\_TRAILER = 1 , CRC\_MSB = 1 , CRC\_LSB = 1 ,
 SC\_HEADER = 1 , DIF\_ID = 1 , ASIC\_HEADER = 1 , SC\_ASIC\_SIZE = 1 ,
 SC\_TRAILER = 1 }



```

• enum class Value : std::uint8_t {
    GLOBAL_HEADER = 0xb0 , GLOBAL_HEADER_TEMP = 0xbb , HEADER_LINE = 0xc4 , TRAILER_LINE =
    0xd4 ,
    FRAME_HEADER = 0xb4 , FRAME_TRAILER = 0xa3 , FRAME_TRAILER_ERROR = 0xc3 ,
    GLOBAL_TRAILER = 0xa0 ,
    SC_HEADER = 0xb1 , SC_TRAILER = 0xa1 , GLOBAL_HEADER = 0xb0 , GLOBAL_HEADER_TEMP =
    0xbb ,
    HEADER_LINE = 0xc4 , TRAILER_LINE = 0xd4 , FRAME_HEADER = 0xb4 , FRAME_TRAILER = 0xa3 ,
    FRAME_TRAILER_ERROR = 0xc3 , GLOBAL_TRAILER = 0xa0 , SC_HEADER = 0xb1 , SC_TRAILER =
    0xa1 }

```

### 5.49.1 Detailed Description

#### Copyright

2022 G.Grenier F.Lagarde

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

### 5.49.2 Enumeration Type Documentation

**5.49.2.1 Size** enum class Size : std::uint8\_t [strong]

#### Enumerator

DATA_FORMAT_VERSION	
DAQ_SOFTWARE_VERSION	
SDCC_FIRMWARE_VERSION	
DIF_FIRMWARE_VERSION	
TIMESTAMP_SECONDES	
TIMESTAMP_MILLISECONDS	
GLOBAL_HEADER	
DIF_IF	
DIF_TRIGGER_COUNTER	
INFORMATION_COUNTER	
GLOBAL_TRIGGER_COUNTER	
ABSOLUTE_BCID	
BCID_DIF	
NUMBER_LINE	
TEMP_ASU1	
TEMP_ASU2	
TEMP_DIF	
HEADER_LINE	
NUMBER_CHIPS	
LINE_SIZE	
TRAILER_LINE	
FRAME_HEADER	
MICROROC_HEADER	

## Enumerator

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

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

```

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

```

```

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

```

**5.49.2.2 Value** enum class `Value` : `std::uint8_t` [strong]

Enumerator

GLOBAL_HEADER	
GLOBAL_HEADER_TEMP	
HEADER_LINE	
TRAILER_LINE	
FRAME_HEADER	
FRAME_TRAILER	
FRAME_TRAILER_ERROR	
GLOBAL_TRAILER	
SC_HEADER	
SC_TRAILER	
GLOBAL_HEADER	
GLOBAL_HEADER_TEMP	
HEADER_LINE	
TRAILER_LINE	
FRAME_HEADER	
FRAME_TRAILER	
FRAME_TRAILER_ERROR	
GLOBAL_TRAILER	
SC_HEADER	
SC_TRAILER	

Definition at line 54 of file [Payload100.cc](#).

```

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

```

```

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

```

## 5.50 Payload100.cc

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

```

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

```

```

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

```

```

00147 {
00148     std::uint32_t shift{Size::MICROROC_HEADER + Size::BCID};
00149     return ((m_Frames[i][shift + ((3 - ipad / 16) * 4 + (ipad % 16) / 4)] » (7 - (((ipad % 16) % 4) * 2
+ ilevel))) & 0x1);
00150 }
00151
00152 inline std::uint32_t Payload100::getDIFid() const
00153 {
00154     std::uint32_t shift{+Size::GLOBAL_HEADER};
00155     return begin()[shift] & 0xFF;
00156 }
00157
00158 inline std::uint32_t Payload100::getDTC() const
00159 {
00160     std::uint32_t shift{Size::GLOBAL_HEADER + Size::DIF_IF};
00161     return (begin()[shift] « 24) + (begin()[shift + 1] « 16) + (begin()[shift + 2] « 8) + begin()[shift
+ 3];
00162 }
00163
00164 inline std::uint32_t Payload100::getGTC() const
00165 {
00166     std::uint32_t shift{Size::GLOBAL_HEADER + Size::DIF_IF + Size::DIF_TRIGGER_COUNTER +
Size::INFORMATION_COUNTER};
00167     return (begin()[shift] « 24) + (begin()[shift + 1] « 16) + (begin()[shift + 2] « 8) + begin()[shift
+ 3];
00168 }
00169
00170 inline std::uint32_t Payload100::getBCID() const
00171 {
00172     std::uint32_t shift{Size::GLOBAL_HEADER + Size::DIF_IF + Size::DIF_TRIGGER_COUNTER +
Size::INFORMATION_COUNTER + Size::GLOBAL_TRIGGER_COUNTER + Size::ABSOLUTE_BCID};
00173     return (begin()[shift] « 16) + (begin()[shift + 1] « 8) + begin()[shift + 2];
00174 }
00175
00176 inline std::uint64_t Payload100::getAbsoluteBCID() const
00177 {
00178     std::uint32_t shift{Size::GLOBAL_HEADER + Size::DIF_IF + Size::DIF_TRIGGER_COUNTER +
Size::INFORMATION_COUNTER + Size::GLOBAL_TRIGGER_COUNTER};
00179     std::uint64_t LBC = ((begin()[shift] « 16) | (begin()[shift + 1] « 8) | (begin()[shift + 2])) *
16777216ULL + ((begin()[shift + 3] « 16) | (begin()[shift + 4] « 8) | (begin()[shift + 5]));
00180     return LBC;
00181 }
00182
00183 inline std::uint32_t Payload100::getASICid(const std::uint32_t& i) const { return m_Frames[i][0] &
0xFF; }
00184
00185 inline std::uint32_t Payload100::getFrameBCID(const std::uint32_t& i) const
00186 {
00187     std::uint32_t shift{+Size::MICROROC_HEADER};
00188     return GrayToBin((m_Frames[i][shift] « 16) + (m_Frames[i][shift + 1] « 8) + m_Frames[i][shift + 2]);
00189 }
00190
00191 inline std::uint32_t Payload100::getFrameTimeToTrigger(const std::uint32_t& i) const { return getBCID()
- getFrameBCID(i); }
00192
00193 Payload100::~Payload100() {}
00194 /*
00195 inline bool Payload100::hasSlowControl() const { return theGetFramePtrReturn_ != size(); }
00196
00197 inline std::uint32_t Payload100::getTASU1() const
00198 {
00199     std::uint32_t shift{Size::GLOBAL_HEADER + Size::DIF_IF + Size::DIF_TRIGGER_COUNTER +
Size::INFORMATION_COUNTER + Size::GLOBAL_TRIGGER_COUNTER + Size::ABSOLUTE_BCID + Size::BCID_DIF +
Size::NUMBER_LINE};
00200     return (begin()[shift] « 24) + (begin()[shift + 1] « 16) + (begin()[shift + 2] « 8) + begin()[shift +
3];
00201 }
00202
00203 inline std::uint32_t Payload100::getTASU2() const
00204 {
00205     std::uint32_t shift{Size::GLOBAL_HEADER + Size::DIF_IF + Size::DIF_TRIGGER_COUNTER +
Size::INFORMATION_COUNTER + Size::GLOBAL_TRIGGER_COUNTER + Size::ABSOLUTE_BCID + Size::BCID_DIF +
Size::NUMBER_LINE + Size::TEMP_ASU1};
00206     return (begin()[shift] « 24) + (begin()[shift + 1] « 16) + (begin()[shift + 2] « 8) + begin()[shift +
3];
00207 }
00208
00209 inline std::uint32_t Payload100::getTDIF() const
00210 {
00211     std::uint32_t shift{Size::GLOBAL_HEADER + Size::DIF_IF + Size::DIF_TRIGGER_COUNTER +
Size::INFORMATION_COUNTER + Size::GLOBAL_TRIGGER_COUNTER + Size::ABSOLUTE_BCID + Size::BCID_DIF +
Size::NUMBER_LINE + Size::TEMP_ASU1 + Size::TEMP_ASU2};
00212     return begin()[shift];
00213 }
00214
00215 inline float Payload100::getTemperatureDIF() const
00216 {

```

```

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

```

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

```

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

```

### Enumerations

- enum class [Size](#) : std::uint8\_t {
 [DATA\\_FORMAT\\_VERSION](#) = 1 , [DAQ\\_SOFTWARE\\_VERSION](#) = 2 , [SDCC\\_FIRMWARE\\_VERSION](#) = 2 ,
 [DIF\\_FIRMWARE\\_VERSION](#) = 2 ,
 [TIMESTAMP\\_SECONDES](#) = 4 , [TIMESTAMP\\_MILLISECONDS](#) = 4 , [GLOBAL\\_HEADER](#) = 1 , [DIF\\_IF](#) = 1 ,
 [DIF\\_TRIGGER\\_COUNTER](#) = 4 , [INFORMATION\\_COUNTER](#) = 4 , [GLOBAL\\_TRIGGER\\_COUNTER](#) = 4 ,
 [ABSOLUTE\\_BCID](#) = 6 ,
 [BCID\\_DIF](#) = 3 , [NUMBER\\_LINE](#) = 1 , [TEMP\\_ASU1](#) = 4 , [TEMP\\_ASU2](#) = 4 ,
 [TEMP\\_DIF](#) = 1 , [HEADER\\_LINE](#) = 1 , [NUMBER\\_CHIPS](#) = 1 , [LINE\\_SIZE](#) = 64 \* 2 ,
 [TRAILER\\_LINE](#) = 1 , [FRAME\\_HEADER](#) = 1 , [MICROROC\\_HEADER](#) = 1 , [BCID](#) = 3 ,
 [DATA](#) = 16 , [FRAME\\_TRAILER](#) = 1 , [GLOBAL\\_TRAILER](#) = 1 , [CRC\\_MSB](#) = 1 ,
 [CRC\\_LSB](#) = 1 , [SC\\_HEADER](#) = 1 , [DIF\\_ID](#) = 1 , [ASIC\\_HEADER](#) = 1 ,
 [SC\\_ASIC\\_SIZE](#) = 1 , [SC\\_TRAILER](#) = 1 , [DATA\\_FORMAT\\_VERSION](#) = 1 , [DAQ\\_SOFTWARE\\_VERSION](#) = 2
 ,
 [SDCC\\_FIRMWARE\\_VERSION](#) = 2 , [DIF\\_FIRMWARE\\_VERSION](#) = 2 , [TIMESTAMP\\_SECONDES](#) = 4 ,
 [TIMESTAMP\\_MILLISECONDS](#) = 4 ,
 [GLOBAL\\_HEADER](#) = 1 , [PMR\\_ID\\_SHIFT](#) = 1 , [PMR\\_NBASIC\\_SHIFT](#) = 1 , [PMR\\_FORMAT\\_SHIFT](#) = 1 ,
 [PMR\\_GTC\\_SHIFT](#) = 3 , [PMR\\_ABCID\\_SHIFT](#) = 6 , [PMR\\_BCID\\_SHIFT](#) = 3 , [PMR\\_LTRG\\_SHIFT](#) = 4 ,

```

HEADER_LINE = 1 , NUMBER_CHIPS = 1 , LINE_SIZE = 64 * 2 , TRAILER_LINE = 1 ,
FRAME_HEADER = 1 , MICROROC_HEADER = 1 , BCID = 3 , DATA = 16 ,
FRAME_TRAILER = 1 , GLOBAL_TRAILER = 1 , CRC_MSB = 1 , CRC_LSB = 1 ,
SC_HEADER = 1 , DIF_ID = 1 , ASIC_HEADER = 1 , SC_ASIC_SIZE = 1 ,
SC_TRAILER = 1 }

```

- enum class Value : std::uint8\_t {
 GLOBAL\_HEADER = 0xb0 , GLOBAL\_HEADER\_TEMP = 0xbb , HEADER\_LINE = 0xc4 , TRAILER\_LINE = 0xd4 ,
 FRAME\_HEADER = 0xb4 , FRAME\_TRAILER = 0xa3 , FRAME\_TRAILER\_ERROR = 0xc3 ,
 GLOBAL\_TRAILER = 0xa0 ,
 SC\_HEADER = 0xb1 , SC\_TRAILER = 0xa1 , GLOBAL\_HEADER = 0xb0 , GLOBAL\_HEADER\_TEMP = 0xbb ,
 HEADER\_LINE = 0xc4 , TRAILER\_LINE = 0xd4 , FRAME\_HEADER = 0xb4 , FRAME\_TRAILER = 0xa3 ,
 FRAME\_TRAILER\_ERROR = 0xc3 , GLOBAL\_TRAILER = 0xa0 , SC\_HEADER = 0xb1 , SC\_TRAILER = 0xa1 }

### 5.51.1 Detailed Description

#### Copyright

2022 G.Grenier F.Lagarde

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

### 5.51.2 Enumeration Type Documentation

#### 5.51.2.1 Size enum class Size : std::uint8\_t [strong]

##### Enumerator

DATA_FORMAT_VERSION	
DAQ_SOFTWARE_VERSION	
SDCC_FIRMWARE_VERSION	
DIF_FIRMWARE_VERSION	
TIMESTAMP_SECONDES	
TIMESTAMP_MILLISECONDS	
GLOBAL_HEADER	
DIF_IF	
DIF_TRIGGER_COUNTER	
INFORMATION_COUNTER	
GLOBAL_TRIGGER_COUNTER	
ABSOLUTE_BCID	
BCID_DIF	
NUMBER_LINE	
TEMP_ASU1	
TEMP_ASU2	
TEMP_DIF	
HEADER_LINE	
NUMBER_CHIPS	



## Enumerator

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

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

```
00010 {
```

```

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

```

**5.51.2.2 Value** enum class `Value` : `std::uint8_t` [strong]

Enumerator

GLOBAL_HEADER
GLOBAL_HEADER_TEMP
HEADER_LINE
TRAILER_LINE
FRAME_HEADER
FRAME_TRAILER
FRAME_TRAILER_ERROR
GLOBAL_TRAILER
SC_HEADER
SC_TRAILER
GLOBAL_HEADER
GLOBAL_HEADER_TEMP
HEADER_LINE
TRAILER_LINE
FRAME_HEADER
FRAME_TRAILER
FRAME_TRAILER_ERROR
GLOBAL_TRAILER
SC_HEADER
SC_TRAILER

Definition at line 48 of file [Payload150.cc](#).

```

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

```

## 5.52 Payload150.cc

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

```

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

```

```

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

```

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

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

### 5.53.1 Detailed Description

#### Copyright

2022 G.Grenier F.Lagarde

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

## 5.54 RawBufferNavigator.cc

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

```
00001
00005 #include "RawBufferNavigator.h"
00006
00007 #include "Words.h"
00008
00009 int RawBufferNavigator::m_Start = 92;
00010
00011 void RawBufferNavigator::StartAt(const int& start)
00012 {
00013     if(start >= 0) m_Start = start;
00014 }
00015
00016 RawBufferNavigator::RawBufferNavigator() {}
00017
00018 void RawBufferNavigator::setBuffer(const Buffer& b)
00019 {
00020     m_Buffer          = b;
00021     m_StartPayload    = -1;
00022     m_StartPayloadDone = false;
00023 }
00024
00025 std::uint32_t RawBufferNavigator::getDetectorID() { return m_Buffer[0]; }
00026
00027 bool RawBufferNavigator::findStartOfPayload()
00028 {
00029     if(m_StartPayloadDone == true)
00030     {
00031         if(m_StartPayload == -1) return false;
00032         else
00033             return true;
00034     }
00035     else
00036     {
00037         m_StartPayloadDone = true;
00038         for(std::size_t i = m_Start; i < m_Buffer.size(); i++)
00039         {
00040             if(static_cast<std::uint8_t>(m_Buffer[i]) == static_cast<std::uint8_t>(Valueksks::GLOBAL_HEADER)
|| static_cast<std::uint8_t>(m_Buffer[i]) == static_cast<std::uint8_t>(Valueksks::GLOBAL_HEADER_TEMP))
00041             {
00042                 m_StartPayload = i;
00043                 return true;
00044             }
00045         }
00046         m_StartPayload = -1;
00047         return false;
00048     }
00049 }
00050
00051 std::int32_t RawBufferNavigator::getStartOfPayload()
00052 {
00053     findStartOfPayload();
00054     return m_StartPayload;
00055 }
00056
00057 bool RawBufferNavigator::validPayload() { return m_StartPayload != -1; }
00058
00059 Buffer RawBufferNavigator::getPayload() { return Buffer(&(m_Buffer.begin())[m_StartPayload],
m_Buffer.size() - m_StartPayload); }
```

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

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

### 5.55.1 Detailed Description

#### Copyright

2022 G.Grenier F.Lagarde

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

## 5.56 Version.cc

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

```
00001
00005 #include "Version.h"
00006
00007 const static Version streamout_version;
00008
00009 std::uint8_t Version::getMajor() { return major; }
00010
00011 std::uint8_t Version::getMinor() { return minor; }
00012
00013 std::uint8_t Version::getPatch() { return patch; }
00014
00015 std::string Version::getPreRelease()
00016 {
00017     switch(prerelease_type)
00018     {
00019         case semver::prerelease::alpha: return "alpha";
00020         case semver::prerelease::beta:  return "beta";
00021         case semver::prerelease::rc:    return "rc";
00022         case semver::prerelease::none:  return "";
00023         default: return "";
00024     }
00025 }
00026
00027 std::uint8_t Version::getPreReleaseNumber() { return prerelease_number; }
```

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

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

#### Classes

- class [textDump](#)

### 5.57.1 Detailed Description

#### Copyright

2022 G.Grenier F.Lagarde

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

## 5.58 textDump.h

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

```

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

```

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

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

### 5.59.1 Detailed Description

#### Copyright

2022 G.Grenier F.Lagarde

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

## 5.60 textDump.cc

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

```

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

```

```

00019 void textDump::processFrame(const Payload& d, uint32_t frameIndex)
00020 {
00021     print()->info("\tDisplaying frame number {} : ASIC ID {}, Frame BCID {}, Frame Time To Trigger
(a.k.a timestamp) is {}", frameIndex, d.getASICId(frameIndex), d.getFrameBCID(frameIndex),
d.getFrameTimeToTrigger(frameIndex));
00022 }
00023
00024 void textDump::processPadInFrame(const Payload& d, uint32_t frameIndex, uint32_t channelIndex)
00025 {
00026     if(d.getThresholdStatus(frameIndex, channelIndex) > 0) { print()->info("\t\tChannel {}, Threshold
{}", channelIndex, d.getThresholdStatus(frameIndex, channelIndex)); }
00027 }
00028
00029 void textDump::processSlowControl(Buffer) { print()->error("textDump::processSlowControl not
implemented yet."); }
00030
00031 void textDump::end() { print()->info("textDump end of report"); }

```

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

```

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

```

### Classes

- class [LCIOWriter](#)

### 5.61.1 Detailed Description

#### Copyright

2022 G.Grenier F.Lagarde

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

## 5.62 LCIOWriter.h

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

```

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

```



```

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

```

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

```

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

```

### 5.63.1 Detailed Description

#### Copyright

2022 G.Grenier F.Lagarde

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

## 5.64 LCIOWriter.cc

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

```

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

```

```

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

```

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

```

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

```

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

## Classes

- class [RawdataReader](#)

### 5.65.1 Detailed Description

#### Copyright

2022 G.Grenier F.Lagarde

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

## 5.66 RawdataReader.h

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

```
00001
00005 #pragma once
00006
00007 #include "Interface.h"
00008
00009 #include <array>
00010 #include <stdint>
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 };
```

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

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

### 5.67.1 Detailed Description

#### Copyright

2022 G.Grenier F.Lagarde

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

## 5.68 RawdataReader.cc

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

```

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

```

```

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

```

## 5.69 libs/interface/ROOT/include/DIF.h File Reference

```

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

```

### Classes

- class [DIF](#)

## Typedefs

- using [Hits\\_const\\_iterator](#) = std::vector< [Hit](#) >::const\_iterator

### 5.69.1 Detailed Description

#### Copyright

2022 G.Grenier F.Lagarde

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

### 5.69.2 Typedef Documentation

#### 5.69.2.1 Hits\_const\_iterator using [Hits\\_const\\_iterator](#) = std::vector<[Hit](#)>::const\_iterator

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

## 5.70 DIF.h

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

```

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

```

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

```
#include <vector>
```

### 5.71.1 Detailed Description

#### Copyright

2022 G.Grenier F.Lagarde

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

## 5.72 DIFLinkDef.h

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

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

## 5.73 libs/interface/ROOT/include/Event.h File Reference

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

#### Classes

- class [Event](#)

#### Typedefs

- using [DIFs\\_const\\_iterator](#) = std::map< std::uint8\_t, [DIF](#) >::const\_iterator

### 5.73.1 Detailed Description

#### Copyright

2022 G.Grenier F.Lagarde

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

## 5.73.2 Typedef Documentation

### 5.73.2.1 DIFs\_const\_iterator

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

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

## 5.74 Event.h

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

```
00001
00005 #pragma once
00006
00007 #include "DIF.h"
00008
00009 #include <TObject.h>
00010 #include <cstdint>
00011 #include <map>
00012
00013 using DIFs_const_iterator = std::map<std::uint8_t, DIF>::const_iterator;
00014
00015 class Event : public TObject
00016 {
00017 public:
00018     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 };
```

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

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

### 5.75.1 Detailed Description

#### Copyright

2022 G.Grenier F.Lagarde

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



## 5.76 EventLinkDef.h

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

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

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

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

### Classes

- class [Hit](#)

### 5.77.1 Detailed Description

#### Copyright

2022 G.Grenier F.Lagarde

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

## 5.78 Hit.h

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

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

```

00029     std::uint32_t getGTC() const;
00030     std::uint32_t getDIFBCID() const;
00031     std::uint32_t getFrameBCID() const;
00032     std::uint32_t getTimestamp() const;
00033     std::uint64_t getAbsoluteBCID() const;
00034
00035 private:
00036     std::uint8_t m_DIF{0};
00037     std::uint8_t m_ASIC{0};
00038     std::uint8_t m_Channel{0};
00039     std::uint8_t m_Threshold{0};
00040     std::uint32_t m_DTC{0};
00041     std::uint32_t m_GTC{0};
00042     std::uint32_t m_DIFBCID{0};
00043     std::uint32_t m_FrameBCID{0};
00044     std::uint32_t m_Timestamp{0};
00045     std::uint64_t m_AbsoluteBCID{0};
00046     ClassDef(Hit, 1);
00047 };

```

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

### 5.79.1 Detailed Description

#### Copyright

2022 G.Grenier F.Lagarde

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

## 5.80 HitLinkDef.h

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

```

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

```

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

```

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

```

#### Classes

- class [ROOTWriter](#)

## 5.82 ROOTWriter.h

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

```

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

```

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

```

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

```

### 5.83.1 Detailed Description

#### Copyright

2022 G.Grenier F.Lagarde

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

## 5.84 DIF.cc

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

```

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

```

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

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

### 5.85.1 Detailed Description

#### Copyright

2022 G.Grenier F.Lagarde

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

## 5.86 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(); }

```

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

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

### 5.87.1 Detailed Description

#### Copyright

2022 G.Grenier F.Lagarde

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

## 5.88 Hit.cc

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

```
00001
00006 #include "Hit.h"
00007 void Hit::clear()
00008 {
00009     m_DIF          = 0;
00010     m_ASIC         = 0;
00011     m_Channel      = 0;
00012     m_Threshold    = 0;
00013     m_DTC          = 0;
00014     m_GTC          = 0;
00015     m_DIFBCID      = 0;
00016     m_FrameBCID    = 0;
00017     m_Timestamp     = 0;
00018     m_AbsoluteBCID = 0;
00019 }
00020
00021 void Hit::setDIF(const std::uint8_t& dif) { m_DIF = dif; }
00022
00023 void Hit::setASIC(const std::uint8_t& asic) { m_ASIC = asic; }
00024
00025 void Hit::setChannel(const std::uint8_t& channel) { m_Channel = channel; }
00026
00027 void Hit::setThreshold(const std::uint8_t& threshold) { m_Threshold = threshold; }
00028
00029 void Hit::setDTC(const std::uint32_t& dtc) { m_DTC = dtc; }
00030
00031 void Hit::setGTC(const std::uint32_t& gtc) { m_GTC = gtc; }
00032
00033 void Hit::setDIFBCID(const std::uint32_t& difbcid) { m_DIFBCID = difbcid; }
00034
00035 void Hit::setFrameBCID(const std::uint32_t& framebcid) { m_FrameBCID = framebcid; }
00036
00037 void Hit::setTimestamp(const std::uint32_t& timestamp) { m_Timestamp = timestamp; }
00038
00039 void Hit::setAbsoluteBCID(const std::uint64_t& absolutebcid) { m_AbsoluteBCID = absolutebcid; }
00040
00041 std::uint8_t Hit::getDIFid()const { return m_DIF; }
00042
00043 std::uint8_t Hit::getASICid()const { return m_ASIC; }
00044
00045 std::uint8_t Hit::getChannel()const { return m_Channel; }
00046
00047 std::uint8_t Hit::getThreshold()const { return m_Threshold; }
00048
00049 std::uint32_t Hit::getDTC()const { return m_DTC; }
00050
00051 std::uint32_t Hit::getGTC()const { return m_GTC; }
00052
00053 std::uint32_t Hit::getDIFBCID()const { return m_DIFBCID; }
00054
00055 std::uint32_t Hit::getFrameBCID()const { return m_FrameBCID; }
00056
00057 std::uint32_t Hit::getTimestamp()const { return m_Timestamp; }
00058
00059 std::uint64_t Hit::getAbsoluteBCID()const { return m_AbsoluteBCID; }
```

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

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

### 5.89.1 Detailed Description

#### Copyright

2022 G.Grenier F.Lagarde

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

## 5.90 ROOTWriter.cc

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

```
00001
00006 #include "ROOTWriter.h"
00007
00008 void ROOTWriter::setFilename(const std::string& filename) { m_Filename = filename; }
00009
00010 ROOTWriter::ROOTWriter() : InterfaceWriter("ROOTWriter", "1.0.0") { addCompatibility("RawdataReader",
    ">=1.0.0"); }
00011
00012 void ROOTWriter::start()
00013 {
00014     m_File = TFile::Open(m_Filename.c_str(), "RECREATE", m_Filename.c_str(),
    ROOT::CompressionSettings(ROOT::kZLIB, 5));
00015     m_Tree = new TTree("RawData", "Raw SDHCAL data tree");
00016     m_Tree->Branch("Events", &m_Event, 512000, 99);
00017 }
00018
00019 void ROOTWriter::end()
00020 {
00021     if(m_Tree) m_Tree->Write();
00022     if(m_File)
00023     {
00024         m_File->Write();
00025         m_File->Close();
00026     }
00027     if(m_File) delete m_File;
00028 }
00029
00030 void ROOTWriter::processDIF(const Payload& d)
00031 {
00032     m_DIF->setID(d.getDIFid());
00033     m_DIF->setDTC(d.getDTC());
00034     m_DIF->setGTC(d.getGTC());
00035     m_DIF->setDIFBCID(d.getBCID());
00036     m_DIF->setAbsoluteBCID(d.getAbsoluteBCID());
00037 }
00038
00039 void ROOTWriter::processFrame(const Payload& d, const std::uint32_t& frameIndex)
00040 {
00041     m_Hit->setDIF(d.getDIFid());
00042     m_Hit->setASIC(d.getASICid(frameIndex));
00043     m_Hit->setDTC(d.getDTC());
00044     m_Hit->setGTC(d.getGTC());
00045     m_Hit->setDIFBCID(d.getBCID());
00046     m_Hit->setAbsoluteBCID(d.getAbsoluteBCID());
00047     m_Hit->setFrameBCID(d.getFrameBCID(frameIndex));
00048     m_Hit->setTimestamp(d.getFrameTimeToTrigger(frameIndex));
00049 }
00050
00051 void ROOTWriter::processPadInFrame(const Payload& d, const std::uint32_t& frameIndex, const
    std::uint32_t& channelIndex)
00052 {
00053     m_Hit->setChannel(channelIndex);
00054     m_Hit->setThreshold(static_cast<std::uint8_t>(d.getThresholdStatus(frameIndex, channelIndex)));
00055 }
00056
00057 void ROOTWriter::startEvent()
00058 {
```

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

