

ISO8211Lib



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# Chapter 1

## ISO8211Lib

### Introduction

ISO8211Lib is intended to be a simple reader for ISO/IEC 8211 formatted files, particularly those that are part of SDTS and S-57 datasets. It consists of open source, easy to compile and integrate C++ code.

### ISO 8211 Background

The [ISO 8211 FAQ](#) has some good background on ISO 8211 formatted files. I will briefly introduce it here, with reference to the library classes representing the components.

An 8211 file ([DDFModule](#)) consists of a series of logical records. The first record is special, and is called the DDR (Data Description Record). It basically contains definitions of all the data objects (fields or [DDFFieldDefn](#) objects) that can occur on the following data records.

The remainder of the records are known as DRs (data records - [DDFRecord](#)). They each contain one or more field ([DDFField](#)) instances. What fields appear on what records is not defined by ISO 8211, though more specific requirements may be implied by a particular data standard such as SDTS or S-57.

Each field instance has a name, and consists of a series of subfields. A given field always has the same subfields in each field instance, and these subfields are defined in the DDR ([DDFSubfieldDefn](#)), in association with their field definition ([DDFFieldDefn](#)). A field may appear 0, 1, or many times in a DR.

Each subfield has a name, format (from the [DDFSubfieldDefn](#)) and actual subfield data for a particular DR. Some fields contain an *array* of their group of subfields. For instance a *coordinate field* may have X and Y subfields, and they may repeat many times within one coordinate field indicating a series of points.

*This would be a real good place for a UML diagram of ISO 8211, and the corresponding library classes!*

### Development Information

The [iso8211.h](#) contains the definitions for all public ISO8211Lib classes, enumerations and other services.

To establish access to an ISO 8211 dataset, instantiate a [DDFModule](#) object, and then use the [DDFModule::Open\(\)](#) method. This will read the DDR, and establish all the [DDFFieldDefn](#), and [DDFSubfieldDefn](#) objects which can be queried off the [DDFModule](#).

The use [DDFModule::ReadRecord\(\)](#) to fetch data records ([DDFRecord](#)). When a record is read, a list of field objects ([DDFField](#)) on that record are created. They can be queried with various [DDFRecord](#) methods.

Data pointers for individual subfields of a [DDFField](#) can be fetched with [DDFField::GetSubfieldData\(\)](#). The interpreted value can then be extracted with the appropriate one of [DDFSubfieldDefn::ExtractIntValue\(\)](#), [DDFSubfieldDefn::ExtractStringValue\(\)](#), or [DDFSubfieldDefn::ExtractFloatValue\(\)](#). Note that there is no object instantiated for individual subfields of a [DDFField](#). Instead the application extracts a pointer to the subfields raw data, and then uses the [DDFSubfieldDefn](#) for that subfield to extract a usable value from the raw data.

Once the end of the file has been encountered ([DDFModule::ReadRecord\(\)](#) returns NULL), the [DDFModule](#) should be deleted, which will close the file, and cleanup all records, definitions and related objects.

## Class APIs

- [DDFModule](#) class.
- [DDFFieldDefn](#) class.
- [DDFSubfieldDefn](#) class.
- [DDFRecord](#) class.
- [DDFField](#) class.

A complete [Example Reader](#) should clarify simple use of ISO8211Lib.

## Related Information

- The ISO 8211 standard can be ordered through [ISO](#). It cost me about \$200CDN.
- The [ISO/IEC 8211/DDFS Home Page](#) contains tutorials and some code by Dr. Alfred A. Brooks, one of the originators of the 8211 standard.
- The [ISO/IEC 8211 Home Page](#) has some python code for parsing 8211 files, and some other useful background.
- The [SDTS++](#) library from the USGS includes support for ISO 8211. It doesn't include some of the 1994 additions to ISO 8211, but it is sufficient for SDTS, and quite elegantly done. Also supports writing ISO 8211 files.
- The USGS also has an older [FIPS123](#) library which supports the older profile of ISO 8211 (to some extent).

## Licensing

This library is offered as [Open Source](#). In particular, it is offered under the X Consortium license which doesn't attempt to impose any copyleft, or credit requirements on users of the code.

The precise license text is:

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## Building the Source

1. First, fetch the source. The most recent source should be accessible at an url such as <http://home.gdal.org/projects/iso8211/iso8211lib-1.4.zip>.
2. Untar the source.  

```
% unzip iso8211lib-1.4.zip
```
3. On unix you can now type ``configure" to establish configuration options.
4. On unix you can now type make to build libiso8211.a, and the sample mainline 8211view.

Windows developers will have to create their own makefile/project but can base it on the very simple Makefile.in provided. As well, you would need to copy cpl\_config.h.in to cpl\_config.h, and modify as needed. The default will likely work OK, but may result in some compiler warnings. Let me know if you are having difficulties, and I will prepare a VC++ makefile.

## Author and Acknowledgements

The primary author of ISO8211Lib is [Frank Warmerdam](#), and I can be reached at [warmerdam@pobox.com](mailto:warmerdam@pobox.com). I am eager to receive bug reports, and also open to praise or suggestions.

I would like to thank:

- [Safe Software](#) who funded development of this library, and agreed for it to be Open Source.
- Mark Colletti, a primary author of SDTS++ from which I derived most of what I know about ISO 8211 and who was very supportive, answering a variety of questions.
- Tony J Ibbs, author of the ISO/IEC 8211 home page who answered a number of questions, and collected a variety of very useful information.
- Rodney Jenson, for a detailed bug report related to repeating variable length fields (from S-57).

I would also like to dedicate this library to the memory of Sol Katz. Sol released a variety of SDTS (and hence ISO8211) translators, at substantial personal effort, to the GIS community along with the many other generous contributions he made to the community. His example has been an inspiration to me, and I hope similar efforts on my part will contribute to his memory.



## Chapter 2

# ISO8211\_Example

```
/* *****
 *
 * Project:   SDTS Translator
 * Purpose:   Example program dumping data in 8211 data to stdout.
 * Author:    Frank Warmerdam, warmerdam@pobox.com
 *
 *****
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 *
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 * DEALINGS IN THE SOFTWARE.
 *****/

#include <stdio.h>
#include "iso8211.h"

#include <algorithm>

CPL_CVSID("$Id: 8211view.cpp 7e07230bbff24eb333608de4dbd460b7312839d0 2017-12-11 19:08:47Z Even Rouault $")

static void ViewRecordField( DDFField * poField );
static int ViewSubfield( DDFSubfieldDefn *poSFDefn,
                        const char * pachFieldData,
                        int nBytesRemaining );

/* *****
/*                               main()                               */
/* *****

int main( int nArgc, char ** papszArgv )
{
    DDFModule      oModule;
    const char     *pszFilename = nullptr;
    int            bFSPTHack = FALSE;

    for( int iArg = 1; iArg < nArgc; iArg++ )
    {
        if( EQUAL(papszArgv[iArg], "-fspt_repeating") )
            bFSPTHack = TRUE;
        else
            pszFilename = papszArgv[iArg];
    }

    if( pszFilename == nullptr )
    {
```

```

    printf( "Usage: 8211view filename\n" );
    exit( 1 );
}

/* ----- */
/*      Open the file.  Note that by default errors are reported to      */
/*      stderr, so we don't bother doing it ourselves.                  */
/* ----- */
if( !oModule.Open( pszFilename ) )
{
    exit( 1 );
}

if( bFSPTHack )
{
    DDFFieldDefn *poFSPT = oModule.FindFieldDefn( "FSPT" );

    if( poFSPT == nullptr )
        fprintf( stderr,
            "unable to find FSPT field to set repeating flag.\n" );
    else
        poFSPT->SetRepeatingFlag( TRUE );
}

/* ----- */
/*      Loop reading records till there are none left.                  */
/* ----- */
DDFRecord *poRecord = nullptr;
int iRecord = 0;

while( ( poRecord = oModule.ReadRecord() ) != nullptr )
{
    printf( "Record %d (%d bytes)\n",
        ++iRecord, poRecord->GetDataSize() );

    /* ----- */
    /*      Loop over each field in this particular record.              */
    /* ----- */
    for( int iField = 0; iField < poRecord->GetFieldCount(); iField++ )
    {
        DDFField *poField = poRecord->GetField( iField );

        ViewRecordField( poField );
    }
}

/* ***** */
/*      ViewRecordField()                                              */
/*      Dump the contents of a field instance in a record.          */
/* ***** */

static void ViewRecordField( DDFField * poField )
{
    DDFFieldDefn *poFieldDefn = poField->GetFieldDefn();

    // Report general information about the field.
    printf( "    Field %s: %s\n",
        poFieldDefn->GetName(), poFieldDefn->GetDescription() );

    // Get pointer to this field's raw data.  We will move through
    // it consuming data as we report subfield values.

    const char *pachFieldData = poField->GetData();
    int nBytesRemaining = poField->GetDataSize();

    /* ----- */
    /*      Loop over the repeat count for this field's                */
    /*      subfields.  The repeat count will almost                    */
    /*      always be one.                                              */
    /* ----- */
    for( int iRepeat = 0; iRepeat < poField->GetRepeatCount(); iRepeat++ )
    {
        /* ----- */
        /*      Loop over all the subfields of this field, advancing    */
        /*      the data pointer as we consume data.                    */
        /* ----- */
        for( int iSF = 0; iSF < poFieldDefn->GetSubfieldCount(); iSF++ )
        {
            DDFFieldDefn *poSFDefn = poFieldDefn->GetSubfield( iSF );
            int nBytesConsumed =
                ViewSubfield( poSFDefn, pachFieldData, nBytesRemaining );

            nBytesRemaining -= nBytesConsumed;
        }
    }
}

```

```

        pachFieldData += nBytesConsumed;
    }
}

/* ***** */
/*          ViewSubfield()          */
/* ***** */

static int ViewSubfield( DDFSFieldDefn *poSFDefn,
                        const char * pachFieldData,
                        int nBytesRemaining )

{
    int          nBytesConsumed = 0;

    switch( poSFDefn->GetType() )
    {
        case DDFInt:
            if( poSFDefn->GetBinaryFormat() == DDFSFieldDefn::UInt )
                printf( "          %s = %u\n",
                    poSFDefn->GetName(),
                    static_cast<unsigned int>(
                        poSFDefn->ExtractIntData( pachFieldData, nBytesRemaining,
                                                &nBytesConsumed ) ) );
            else
                printf( "          %s = %d\n",
                    poSFDefn->GetName(),
                    poSFDefn->ExtractIntData( pachFieldData, nBytesRemaining,
                                                &nBytesConsumed ) );

            break;

        case DDFFloat:
            printf( "          %s = %f\n",
                poSFDefn->GetName(),
                poSFDefn->ExtractFloatData( pachFieldData, nBytesRemaining,
                                            &nBytesConsumed ) );

            break;

        case DDFString:
            printf( "          %s = '%s'\n",
                poSFDefn->GetName(),
                poSFDefn->ExtractStringData( pachFieldData, nBytesRemaining,
                                            &nBytesConsumed ) );

            break;

        case DDFBinaryString:
        {
            int i;
            //rjensen 19-Feb-2002 5 integer variables to decode NAME and LNAM
            int vrid_rcnm=0;
            int vrid_rcid=0;
            int foid_agen=0;
            int foid_find=0;
            int foid_fids=0;

            GByte *pabyBString = (GByte *)
                poSFDefn->ExtractStringData( pachFieldData, nBytesRemaining,
                                            &nBytesConsumed );

            printf( "          %s = 0x", poSFDefn->GetName() );
            for( i = 0; i < std::min(nBytesConsumed, 24); i++ )
                printf( "%02X", pabyBString[i] );

            if( nBytesConsumed > 24 )
                printf( "%s", "..." );

            // rjensen 19-Feb-2002 S57 quick hack. decode NAME and LNAM bitfields
            if ( EQUAL(poSFDefn->GetName(), "NAME") )
            {
                vrid_rcnm=pabyBString[0];
                vrid_rcid=pabyBString[1] + (pabyBString[2]*256)+
                    (pabyBString[3]*65536)+ (pabyBString[4]*16777216);
                printf("\tVRID RCNM = %d,RCID = %d",vrid_rcnm,vrid_rcid);
            }
            else if ( EQUAL(poSFDefn->GetName(), "LNAM") )
            {
                foid_agen=pabyBString[0] + (pabyBString[1]*256);
                foid_find=pabyBString[2] + (pabyBString[3]*256)+
                    (pabyBString[4]*65536)+ (pabyBString[5]*16777216);
                foid_fids=pabyBString[6] + (pabyBString[7]*256);
                printf("\tFOID AGEN = %d,FIDN = %d,FIDS = %d",
                    foid_agen,foid_find,foid_fids);
            }

            printf( "\n" );
        }
    }
}

```

```
        break;
    }
    return nBytesConsumed;
}
```

## Chapter 3

# Class Index

### 3.1 Class List

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

<a href="#">DDFField</a>	11
<a href="#">DDFFieldDefn</a>	13
<a href="#">DDFModule</a>	16
<a href="#">DDFRecord</a>	20
<a href="#">DDFSubfieldDefn</a>	29





## Chapter 4

# Class Documentation

### 4.1 DDFField Class Reference

```
#include <iso8211.h>
```

#### Public Member Functions

- void [Dump](#) (FILE \*fp)
- const char \* [GetSubfieldData](#) (DDFSubfieldDefn \*, int \*=&nullptr, int=0)
- const char \* [GetInstanceData](#) (int nInstance, int \*pnSize)
- const char \* [GetData](#) () const
- int [GetDataSize](#) () const
- int [GetRepeatCount](#) ()
- DDFFieldDefn \* [GetFieldDefn](#) ()

#### 4.1.1 Detailed Description

This object represents one field in a [DDFRecord](#). This models an instance of the fields data, rather than its data definition, which is handled by the [DDFFieldDefn](#) class. Note that a [DDFField](#) doesn't have DDFSubfield children as you would expect. To extract subfield values use [GetSubfieldData\(\)](#) to find the right data pointer and then use [ExtractIntData\(\)](#), [ExtractFloatData\(\)](#) or [ExtractStringData\(\)](#).

#### 4.1.2 Member Function Documentation

##### 4.1.2.1 Dump()

```
void DDFField::Dump (  
    FILE * fp )
```

Write out field contents to debugging file.

A variety of information about this field, and all its subfields is written to the given debugging file handle. Note that field definition information (ala [DDFFieldDefn](#)) isn't written.

## Parameters

<i>fp</i>	The standard IO file handle to write to. i.e. stderr
-----------	--

## 4.1.2.2 GetData()

```
const char* DDFField::GetData ( ) const [inline]
```

Return the pointer to the entire data block for this record. This is an internal copy, and should not be freed by the application.

## 4.1.2.3 GetDataSize()

```
int DDFField::GetDataSize ( ) const [inline]
```

Return the number of bytes in the data block returned by [GetData\(\)](#).

## 4.1.2.4 GetFieldDefn()

```
DDFFieldDefn* DDFField::GetFieldDefn ( ) [inline]
```

Fetch the corresponding [DDFFieldDefn](#).

## 4.1.2.5 GetInstanceData()

```
const char * DDFField::GetInstanceData (
    int nInstance,
    int * pnInstanceSize )
```

Get field instance data and size.

The returned data pointer and size values are suitable for use with [DDFRecord::SetFieldRaw\(\)](#).

## Parameters

<i>nInstance</i>	a value from 0 to <a href="#">GetRepeatCount()</a> -1.
<i>pnInstanceSize</i>	a location to put the size (in bytes) of the field instance data returned. This size will include the unit terminator (if any), but not the field terminator. This size pointer may be NULL if not needed.

## Returns

the data pointer, or NULL on error.

## 4.1.2.6 GetRepeatCount()

```
int DDFField::GetRepeatCount ( )
```

How many times do the subfields of this record repeat? This will always be one for non-repeating fields.

## Returns

The number of times that the subfields of this record occur in this record. This will be one for non-repeating fields.

## See also

[8211view example program](#) for a demonstration of handling repeated fields properly.

## 4.1.2.7 GetSubfieldData()

```
const char * DDFField::GetSubfieldData (
    DDFSubfieldDefn * poSFDefn,
    int * pnMaxBytes = nullptr,
    int iSubfieldIndex = 0 )
```

Fetch raw data pointer for a particular subfield of this field.

The passed [DDFSubfieldDefn](#) (poSFDefn) should be acquired from the [DDFFieldDefn](#) corresponding with this field. This is normally done once before reading any records. This method involves a series of calls to [DDFSubfield::GetDataLength\(\)](#) in order to track through the [DDFField](#) data to that belonging to the requested subfield. This can be relatively expensive.

## Parameters

<i>poSFDefn</i>	The definition of the subfield for which the raw data pointer is desired.
<i>pnMaxBytes</i>	The maximum number of bytes that can be accessed from the returned data pointer is placed in this int, unless it is NULL.
<i>iSubfieldIndex</i>	The instance of this subfield to fetch. Use zero (the default) for the first instance.

## Returns

A pointer into the [DDFField](#)'s data that belongs to the subfield. This returned pointer is invalidated by the next record read ([DDFRecord::ReadRecord\(\)](#)) and the returned pointer should not be freed by the application.

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

- iso8211.h
- ddffield.cpp

## 4.2 DDFFieldDefn Class Reference

```
#include <iso8211.h>
```

## Public Member Functions

- void [Dump](#) (FILE \*fp)
- const char \* [GetName](#) () const
- const char \* [GetDescription](#) () const
- int [GetSubfieldCount](#) () const
- [DDFSubfieldDefn](#) \* [GetSubfield](#) (int i)
- [DDFSubfieldDefn](#) \* [FindSubfieldDefn](#) (const char \*)
- int [GetFixedWidth](#) () const
- int [IsRepeating](#) () const
- void [SetRepeatingFlag](#) (int n)
- char \* [GetDefaultValue](#) (int \*pnSize)

### 4.2.1 Detailed Description

Information from the DDR defining one field. Note that just because a field is defined for a [DDFModule](#) doesn't mean that it actually occurs on any records in the module. DDFFieldDefns are normally just significant as containers of the DDFSubfieldDefns.

### 4.2.2 Member Function Documentation

#### 4.2.2.1 Dump()

```
void DDFFieldDefn::Dump (
    FILE * fp )
```

Write out field definition info to debugging file.

A variety of information about this field definition, and all its subfields is written to the give debugging file handle.

#### Parameters

<i>fp</i>	The standard IO file handle to write to. i.e. stderr
-----------	--

#### 4.2.2.2 FindSubfieldDefn()

```
DDFSubfieldDefn * DDFFieldDefn::FindSubfieldDefn (
    const char * pszMnemonic )
```

Find a subfield definition by its mnemonic tag.

#### Parameters

<i>pszMnemonic</i>	The name of the field.
--------------------	------------------------

**Returns**

The subfield pointer, or NULL if there isn't any such subfield.

**4.2.2.3 GetDefaultValue()**

```
char * DDFFieldDefn::GetDefaultValue (
    int * pnSize )
```

Return default data for field instance.

**4.2.2.4 GetDescription()**

```
const char* DDFFieldDefn::GetDescription ( ) const [inline]
```

Fetch a longer description of this field.

**Returns**

this is an internal copy and should not be freed.

**4.2.2.5 GetFixedWidth()**

```
int DDFFieldDefn::GetFixedWidth ( ) const [inline]
```

Get the width of this field. This function isn't normally used by applications.

**Returns**

The width of the field in bytes, or zero if the field is not apparently of a fixed width.

**4.2.2.6 GetName()**

```
const char* DDFFieldDefn::GetName ( ) const [inline]
```

Fetch a pointer to the field name (tag).

**Returns**

this is an internal copy and should not be freed.

**4.2.2.7 GetSubfield()**

```
DDFSubfieldDefn * DDFFieldDefn::GetSubfield (
    int i )
```

Fetch a subfield by index.

**Parameters**

<i>i</i>	The index subfield index. (Between 0 and <a href="#">GetSubfieldCount()-1</a> )
----------	---

**Returns**

The subfield pointer, or NULL if the index is out of range.

**4.2.2.8 GetSubfieldCount()**

```
int DDFFieldDefn::GetSubfieldCount ( ) const [inline]
```

Get the number of subfields.

**4.2.2.9 IsRepeating()**

```
int DDFFieldDefn::IsRepeating ( ) const [inline]
```

Fetch repeating flag.

**See also**

[DDFField::GetRepeatCount\(\)](#)

**Returns**

TRUE if the field is marked as repeating.

**4.2.2.10 SetRepeatingFlag()**

```
void DDFFieldDefn::SetRepeatingFlag (
    int n ) [inline]
```

this is just for an S-57 hack for swedish data

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

- iso8211.h
- ddfdefn.cpp

**4.3 DDFFModule Class Reference**

```
#include <iso8211.h>
```

## Public Member Functions

- [DDFModule](#) ()
- [~DDFModule](#) ()
- [Open](#) (const char \*pszFilename, int bFailQuietly=FALSE)
- [Close](#) ()
- [Dump](#) (FILE \*fp)
- [DDFRecord](#) \* [ReadRecord](#) ()
- [Rewind](#) (long nOffset=-1)
- [DDFFieldDefn](#) \* [FindFieldDefn](#) (const char \*)
- [GetFieldCount](#) () const
- [DDFFieldDefn](#) \* [GetField](#) (int)
- [AddField](#) ([DDFFieldDefn](#) \*poNewFDefn)

### 4.3.1 Detailed Description

The primary class for reading ISO 8211 files. This class contains all the information read from the DDR record, and is used to read records from the file.

### 4.3.2 Constructor & Destructor Documentation

#### 4.3.2.1 DDFModule()

```
DDFModule::DDFModule ( )
```

The constructor.

#### 4.3.2.2 ~DDFModule()

```
DDFModule::~~DDFModule ( )
```

The destructor.

### 4.3.3 Member Function Documentation

#### 4.3.3.1 AddField()

```
void DDFModule::AddField (
    DDFFieldDefn * poNewFDefn )
```

Add new field definition.

Field definitions may only be added to DDFModules being used for writing, not those being used for reading. Ownership of the [DDFFieldDefn](#) object is taken by the [DDFModule](#).

## Parameters

<i>poNewFDefn</i>	definition to be added to the module.
-------------------	---------------------------------------

## 4.3.3.2 Close()

```
void DDFModule::Close ( )
```

Close an ISO 8211 file.

## 4.3.3.3 Dump()

```
void DDFModule::Dump (
    FILE * fp )
```

Write out module info to debugging file.

A variety of information about the module is written to the debugging file. This includes all the field and subfield definitions read from the header.

## Parameters

<i>fp</i>	The standard IO file handle to write to. i.e. stderr.
-----------	---

## 4.3.3.4 FindFieldDefn()

```
DDFFieldDefn * DDFModule::FindFieldDefn (
    const char * pszFieldName )
```

Fetch the definition of the named field.

This function will scan the [DDFFieldDefn](#)'s on this module, to find one with the indicated field name.

## Parameters

<i>pszFieldName</i>	The name of the field to search for. The comparison is case insensitive.
---------------------	--

## Returns

A pointer to the request [DDFFieldDefn](#) object is returned, or NULL if none matching the name are found. The return object remains owned by the [DDFModule](#), and should not be deleted by application code.



## 4.3.3.5 GetField()

```
DDFFieldDefn * DDFModule::GetField (
    int i )
```

Fetch a field definition by index.

## Parameters

<i>i</i>	(from 0 to <a href="#">GetFieldCount()</a> - 1.
----------	---

## Returns

the returned field pointer or NULL if the index is out of range.

## 4.3.3.6 GetFieldCount()

```
int DDFModule::GetFieldCount ( ) const [inline]
```

Fetch the number of defined fields.

## 4.3.3.7 Open()

```
int DDFModule::Open (
    const char * pszFilename,
    int bFailQuietly = FALSE )
```

Open a ISO 8211 (DDF) file for reading.

If the open succeeds the data descriptive record (DDR) will have been read, and all the field and subfield definitions will be available.

## Parameters

<i>pszFilename</i>	The name of the file to open.
<i>bFailQuietly</i>	If FALSE a CPL Error is issued for non-8211 files, otherwise quietly return NULL.

## Returns

FALSE if the open fails or TRUE if it succeeds. Errors messages are issued internally with `CPL_Error()`.

## 4.3.3.8 ReadRecord()

```
DDFRecord * DDFModule::ReadRecord ( )
```

Read one record from the file.

**Returns**

A pointer to a [DDFRecord](#) object is returned, or NULL if a read error, or end of file occurs. The returned record is owned by the module, and should not be deleted by the application. The record is only valid until the next [ReadRecord\(\)](#) at which point it is overwritten.

**4.3.3.9 Rewind()**

```
void DDFModule::Rewind (
    long nOffset = -1 )
```

Return to first record.

The next call to [ReadRecord\(\)](#) will read the first data record in the file.

**Parameters**

<i>nOffset</i>	the offset in the file to return to. By default this is -1, a special value indicating that reading should return to the first data record. Otherwise it is an absolute byte offset in the file.
----------------	--

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

- iso8211.h
- ddfmodule.cpp

**4.4 DDFRecord Class Reference**

```
#include <iso8211.h>
```

**Public Member Functions**

- [DDFRecord](#) \* [Clone](#) ()
- [DDFRecord](#) \* [CloneOn](#) ([DDFModule](#) \*)
- void [Dump](#) (FILE \*)
- int [GetFieldCount](#) () const
- [DDFField](#) \* [FindField](#) (const char \*, int=0)
- [DDFField](#) \* [GetField](#) (int)
- int [GetIntSubfield](#) (const char \*, int, const char \*, int, int \*==nullptr)
- double [GetFloatSubfield](#) (const char \*, int, const char \*, int, int \*==nullptr)
- const char \* [GetStringSubfield](#) (const char \*, int, const char \*, int, int \*==nullptr)
- int [SetIntSubfield](#) (const char \*pszField, int iFieldIndex, const char \*pszSubfield, int iSubfieldIndex, int n↵ Value)
- int [SetStringSubfield](#) (const char \*pszField, int iFieldIndex, const char \*pszSubfield, int iSubfieldIndex, const char \*pszValue, int nValueLength=-1)
- int [SetFloatSubfield](#) (const char \*pszField, int iFieldIndex, const char \*pszSubfield, int iSubfieldIndex, double dfNewValue)
- int [GetDataSize](#) () const

- const char \* [GetData](#) () const
- [DDFModule](#) \* [GetModule](#) ()
- int [ResizeField](#) ([DDFField](#) \*poField, int nNewDataSize)
- int [DeleteField](#) ([DDFField](#) \*poField)
- [DDFField](#) \* [AddField](#) ([DDFFieldDefn](#) \*)
- int [CreateDefaultFieldInstance](#) ([DDFField](#) \*poField, int iIndexWithinField)
- int [SetFieldRaw](#) ([DDFField](#) \*poField, int iIndexWithinField, const char \*pachRawData, int nRawDataSize)
- int [Write](#) ()

#### 4.4.1 Detailed Description

Contains instance data from one data record (DR). The data is contained as a list of [DDFField](#) instances partitioning the raw data into fields.

#### 4.4.2 Member Function Documentation

##### 4.4.2.1 AddField()

```
DDFField * DDFRecord::AddField (
    DDFFieldDefn * poDefn )
```

Add a new field to record.

Add a new zero sized field to the record. The new field is always added at the end of the record.

NOTE: This method doesn't currently update the header information for the record to include the field information for this field, so the resulting record image isn't suitable for writing to disk. However, everything else about the record state should be updated properly to reflect the new field.

##### Parameters

<i>poDefn</i>	the definition of the field to be added.
---------------	--

##### Returns

the field object on success, or NULL on failure.

##### 4.4.2.2 Clone()

```
DDFRecord * DDFRecord::Clone ( )
```

Make a copy of a record.

This method is used to make a copy of a record that will become (mostly) the property of application. However, it is automatically destroyed if the [DDFModule](#) it was created relative to is destroyed, as its field and subfield definitions relate to that [DDFModule](#). However, it does persist even when the record returned by [DDFModule::ReadRecord\(\)](#) is invalidated, such as when reading a new record. This allows an application to cache whole DDFRecords.

**Returns**

A new copy of the [DDFRecord](#). This can be delete'd by the application when no longer needed, otherwise it will be cleaned up when the [DDFModule](#) it relates to is destroyed or closed.

**4.4.2.3 CloneOn()**

```
DDFRecord * DDFRecord::CloneOn (
    DDFModule * poTargetModule )
```

Recreate a record referencing another module.

Works similarly to the [DDFRecord::Clone\(\)](#) method, but creates the new record with reference to a different [DDFModule](#). All [DDFFieldDefn](#) references are transcribed onto the new module based on field names. If any fields don't have a similarly named field on the target module the operation will fail. No validation of field types and properties is done, but this operation is intended only to be used between modules with matching definitions of all affected fields.

The new record will be managed as a clone by the target module in a manner similar to regular clones.

**Parameters**

<i>poTargetModule</i>	the module on which the record copy should be created.
-----------------------	--

**Returns**

NULL on failure or a pointer to the cloned record.

**4.4.2.4 CreateDefaultFieldInstance()**

```
int DDFRecord::CreateDefaultFieldInstance (
    DDFField * poField,
    int iIndexWithinField )
```

Initialize default instance.

This method is normally only used internally by the [AddField\(\)](#) method to initialize the new field instance with default subfield values. It installs default data for one instance of the field in the record using the [DDFFieldDefn::GetDefaultValue\(\)](#) method and [DDFRecord::SetFieldRaw\(\)](#).

**Parameters**

<i>poField</i>	the field within the record to be assign a default instance.
<i>iIndexWithinField</i>	the instance to set (may not have been tested with values other than 0).

### Returns

TRUE on success or FALSE on failure.

#### 4.4.2.5 DeleteField()

```
int DDFRecord::DeleteField (
    DDFField * poTarget )
```

Delete a field instance from a record.

Remove a field from this record, cleaning up the data portion and repacking the fields list. We don't try to reallocate the data area of the record to be smaller.

NOTE: This method doesn't actually remove the header information for this field from the record tag list yet. This should be added if the resulting record is even to be written back to disk!

### Parameters

<i>poTarget</i>	the field instance on this record to delete.
-----------------	--

### Returns

TRUE on success, or FALSE on failure. Failure can occur if poTarget isn't really a field on this record.

#### 4.4.2.6 Dump()

```
void DDFRecord::Dump (
    FILE * fp )
```

Write out record contents to debugging file.

A variety of information about this record, and all its fields and subfields is written to the given debugging file handle. Note that field definition information (ala [DDFFieldDefn](#)) isn't written.

### Parameters

<i>fp</i>	The standard IO file handle to write to. i.e. stderr
-----------	--

#### 4.4.2.7 FindField()

```
DDFField * DDFRecord::FindField (
    const char * pszName,
    int iFieldIndex = 0 )
```

Find the named field within this record.

#### Parameters

<i>pszName</i>	The name of the field to fetch. The comparison is case insensitive.
<i>iFieldIndex</i>	The instance of this field to fetch. Use zero (the default) for the first instance.

#### Returns

Pointer to the requested [DDFField](#). This pointer is to an internal object, and should not be freed. It remains valid until the next record read.

#### 4.4.2.8 GetData()

```
const char* DDFFRecord::GetData ( ) const [inline]
```

Fetch the raw data for this record. The returned pointer is effectively to the data for the first field of the record, and is of size [GetDataSize\(\)](#).

#### 4.4.2.9 GetDataSize()

```
int DDFFRecord::GetDataSize ( ) const [inline]
```

Fetch size of records raw data ([GetData\(\)](#)) in bytes.

#### 4.4.2.10 GetField()

```
DDFField * DDFFRecord::GetField (
    int i )
```

Fetch field object based on index.

#### Parameters

<i>i</i>	The index of the field to fetch. Between 0 and <a href="#">GetFieldCount()-1</a> .
----------	--

#### Returns

A [DDFField](#) pointer, or NULL if the index is out of range.

#### 4.4.2.11 GetFieldCount()

```
int DDFFRecord::GetFieldCount ( ) const [inline]
```

Get the number of DDFFields on this record.

## 4.4.2.12 GetFloatSubfield()

```
double DDFRecord::GetFloatSubfield (
    const char * pszField,
    int iFieldIndex,
    const char * pszSubfield,
    int iSubfieldIndex,
    int * pnSuccess = nullptr )
```

Fetch value of a subfield as a float (double). This is a convenience function for fetching a subfield of a field within this record.

## Parameters

<i>pszField</i>	The name of the field containing the subfield.
<i>iFieldIndex</i>	The instance of this field within the record. Use zero for the first instance of this field.
<i>pszSubfield</i>	The name of the subfield within the selected field.
<i>iSubfieldIndex</i>	The instance of this subfield within the record. Use zero for the first instance.
<i>pnSuccess</i>	Pointer to an int which will be set to TRUE if the fetch succeeds, or FALSE if it fails. Use NULL if you don't want to check success.

## Returns

The value of the subfield, or zero if it failed for some reason.

## 4.4.2.13 GetIntSubfield()

```
int DDFRecord::GetIntSubfield (
    const char * pszField,
    int iFieldIndex,
    const char * pszSubfield,
    int iSubfieldIndex,
    int * pnSuccess = nullptr )
```

Fetch value of a subfield as an integer. This is a convenience function for fetching a subfield of a field within this record.

## Parameters

<i>pszField</i>	The name of the field containing the subfield.
<i>iFieldIndex</i>	The instance of this field within the record. Use zero for the first instance of this field.
<i>pszSubfield</i>	The name of the subfield within the selected field.
<i>iSubfieldIndex</i>	The instance of this subfield within the record. Use zero for the first instance.
<i>pnSuccess</i>	Pointer to an int which will be set to TRUE if the fetch succeeds, or FALSE if it fails. Use NULL if you don't want to check success.

## Returns

The value of the subfield, or zero if it failed for some reason.

#### 4.4.2.14 GetModule()

```
DDFModule* DDFRecord::GetModule ( ) [inline]
```

Fetch the [DDFModule](#) with which this record is associated.

#### 4.4.2.15 GetStringSubfield()

```
const char * DDFRecord::GetStringSubfield (
    const char * pszField,
    int iFieldIndex,
    const char * pszSubfield,
    int iSubfieldIndex,
    int * pnSuccess = nullptr )
```

Fetch value of a subfield as a string. This is a convenience function for fetching a subfield of a field within this record.

##### Parameters

<i>pszField</i>	The name of the field containing the subfield.
<i>iFieldIndex</i>	The instance of this field within the record. Use zero for the first instance of this field.
<i>pszSubfield</i>	The name of the subfield within the selected field.
<i>iSubfieldIndex</i>	The instance of this subfield within the record. Use zero for the first instance.
<i>pnSuccess</i>	Pointer to an int which will be set to TRUE if the fetch succeeds, or FALSE if it fails. Use NULL if you don't want to check success.

##### Returns

The value of the subfield, or NULL if it failed for some reason. The returned pointer is to internal data and should not be modified or freed by the application.

#### 4.4.2.16 ResizeField()

```
int DDFRecord::ResizeField (
    DDFField * poField,
    int nNewDataSize )
```

Alter field data size within record.

This method will rearrange a [DDFRecord](#) altering the amount of space reserved for one of the existing fields. All following fields will be shifted accordingly. This includes updating the [DDFField](#) infos, and actually moving stuff within the data array after reallocating to the desired size.

##### Parameters

<i>poField</i>	the field to alter.
<i>nNewDataSize</i>	the number of data bytes to be reserved for the field.



**Returns**

TRUE on success or FALSE on failure.

**4.4.2.17 SetFieldRaw()**

```
int DDFRecord::SetFieldRaw (
    DDFField * poField,
    int iIndexWithinField,
    const char * pachRawData,
    int nRawDataSize )
```

Set the raw contents of a field instance.

**Parameters**

<i>poField</i>	the field to set data within.
<i>iIndexWithinField</i>	The instance of this field to replace. Must be a value between 0 and GetRepeatCount(). If GetRepeatCount() is used, a new instance of the field is appended.
<i>pachRawData</i>	the raw data to replace this field instance with.
<i>nRawDataSize</i>	the number of bytes pointed to by pachRawData.

**Returns**

TRUE on success or FALSE on failure.

**4.4.2.18 SetFloatSubfield()**

```
int DDFRecord::SetFloatSubfield (
    const char * pszField,
    int iFieldIndex,
    const char * pszSubfield,
    int iSubfieldIndex,
    double dfNewValue )
```

Set a float subfield in record.

The value of a given subfield is replaced with a new float value formatted appropriately.

**Parameters**

<i>pszField</i>	the field name to operate on.
<i>iFieldIndex</i>	the field index to operate on (zero based).
<i>pszSubfield</i>	the subfield name to operate on.
<i>iSubfieldIndex</i>	the subfield index to operate on (zero based).
<i>dfNewValue</i>	the new value to place in the subfield.

**Returns**

TRUE if successful, and FALSE if not.

**4.4.2.19 SetIntSubfield()**

```
int DDFRecord::SetIntSubfield (
    const char * pszField,
    int iFieldIndex,
    const char * pszSubfield,
    int iSubfieldIndex,
    int nNewValue )
```

Set an integer subfield in record.

The value of a given subfield is replaced with a new integer value formatted appropriately.

**Parameters**

<i>pszField</i>	the field name to operate on.
<i>iFieldIndex</i>	the field index to operate on (zero based).
<i>pszSubfield</i>	the subfield name to operate on.
<i>iSubfieldIndex</i>	the subfield index to operate on (zero based).
<i>nNewValue</i>	the new value to place in the subfield.

**Returns**

TRUE if successful, and FALSE if not.

**4.4.2.20 SetStringSubfield()**

```
int DDFRecord::SetStringSubfield (
    const char * pszField,
    int iFieldIndex,
    const char * pszSubfield,
    int iSubfieldIndex,
    const char * pszValue,
    int nValueLength = -1 )
```

Set a string subfield in record.

The value of a given subfield is replaced with a new string value formatted appropriately.

**Parameters**

<i>pszField</i>	the field name to operate on.
<i>iFieldIndex</i>	the field index to operate on (zero based).
<i>pszSubfield</i>	the subfield name to operate on.
<i>iSubfieldIndex</i>	the subfield index to operate on (zero based). <span style="float: right;">Generated by Doxygen</span>
<i>pszValue</i>	the new string to place in the subfield. This may be arbitrary binary bytes if nValueLength is specified.
<i>nValueLength</i>	the number of valid bytes in pszValue, may be -1 to internally fetch with strlen().

**Returns**

TRUE if successful, and FALSE if not.

**4.4.2.21 Write()**

```
int DDFRecord::Write ( )
```

Write record out to module.

This method writes the current record to the module to which it is attached. Normally this would be at the end of the file, and only used for modules newly created with `DDFModule::Create()`. Rewriting existing records is not supported at this time. Calling `Write()` multiple times on a `DDFRecord` will result it multiple copies being written at the end of the module.

**Returns**

TRUE on success or FALSE on failure.

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

- iso8211.h
- ddfrecord.cpp

**4.5 DDFSubfieldDefn Class Reference**

```
#include <iso8211.h>
```

**Public Types**

- enum `DDFBinaryFormat`

**Public Member Functions**

- const char \* `GetName` () const
- const char \* `GetFormat` () const
- DDFDataType `GetType` () const
- double `ExtractFloatData` (const char \*pachData, int nMaxBytes, int \*pnConsumedBytes)
- int `ExtractIntData` (const char \*pachData, int nMaxBytes, int \*pnConsumedBytes)
- const char \* `ExtractStringData` (const char \*pachData, int nMaxBytes, int \*pnConsumedBytes)
- int `GetDataLength` (const char \*, int, int \*)
- void `DumpData` (const char \*pachData, int nMaxBytes, FILE \*fp)
- int `FormatStringValue` (char \*pachData, int nBytesAvailable, int \*pnBytesUsed, const char \*pszValue, int nValueLength=-1) const
- int `FormatIntValue` (char \*pachData, int nBytesAvailable, int \*pnBytesUsed, int nNewValue) const
- int `FormatFloatValue` (char \*pachData, int nBytesAvailable, int \*pnBytesUsed, double dfNewValue) const
- int `GetWidth` () const
- int `GetDefaultValue` (char \*pachData, int nBytesAvailable, int \*pnBytesUsed) const
- void `Dump` (FILE \*fp)

### 4.5.1 Detailed Description

Information from the DDR record describing one subfield of a [DDFFieldDefn](#). All subfields of a field will occur in each occurrence of that field (as a [DDFField](#)) in a [DDFRecord](#). Subfield's actually contain formatted data (as instances within a record).

### 4.5.2 Member Enumeration Documentation

#### 4.5.2.1 DDFBinaryFormat

```
enum DDSubfieldDefn::DDFBinaryFormat
```

Binary format: this is the digit immediately following the B or b for binary formats.

### 4.5.3 Member Function Documentation

#### 4.5.3.1 Dump()

```
void DDSubfieldDefn::Dump (
    FILE * fp )
```

Write out subfield definition info to debugging file.

A variety of information about this field definition is written to the give debugging file handle.

##### Parameters

<i>fp</i>	The standard IO file handle to write to. i.e. stderr
-----------	--

#### 4.5.3.2 DumpData()

```
void DDSubfieldDefn::DumpData (
    const char * pachData,
    int nMaxBytes,
    FILE * fp )
```

Dump subfield value to debugging file.

## Parameters

<i>pachData</i>	Pointer to data for this subfield.
<i>nMaxBytes</i>	Maximum number of bytes available in pachData.
<i>fp</i>	File to write report to.

## 4.5.3.3 ExtractFloatData()

```
double DDFSubfieldDefn::ExtractFloatData (
    const char * pachSourceData,
    int nMaxBytes,
    int * pnConsumedBytes )
```

Extract a subfield value as a float. Given a pointer to the data for this subfield (from within a [DDFRecord](#)) this method will return the floating point data for this subfield. The number of bytes consumed as part of this field can also be fetched. This method may be called for any type of subfield, and will return zero if the subfield is not numeric.

## Parameters

<i>pachSourceData</i>	The pointer to the raw data for this field. This may have come from <a href="#">DDFRecord::GetData()</a> , taking into account skip factors over previous subfields data.
<i>nMaxBytes</i>	The maximum number of bytes that are accessible after pachSourceData.
<i>pnConsumedBytes</i>	Pointer to an integer into which the number of bytes consumed by this field should be written. May be NULL to ignore. This is used as a skip factor to increment pachSourceData to point to the next subfields data.

## Returns

The subfield's numeric value (or zero if it isn't numeric).

## See also

[ExtractIntData\(\)](#), [ExtractStringData\(\)](#)

## 4.5.3.4 ExtractIntData()

```
int DDFSubfieldDefn::ExtractIntData (
    const char * pachSourceData,
    int nMaxBytes,
    int * pnConsumedBytes )
```

Extract a subfield value as an integer. Given a pointer to the data for this subfield (from within a [DDFRecord](#)) this method will return the int data for this subfield. The number of bytes consumed as part of this field can also be fetched. This method may be called for any type of subfield, and will return zero if the subfield is not numeric.

## Parameters

<i>pachSourceData</i>	The pointer to the raw data for this field. This may have come from <a href="#">DDFRecord::GetData()</a> , taking into account skip factors over previous subfields data.
<i>nMaxBytes</i>	The maximum number of bytes that are accessible after pachSourceData.
<i>pnConsumedBytes</i>	Pointer to an integer into which the number of bytes consumed by this field should be written. May be NULL to ignore. This is used as a skip factor to increment pachSourceData to point to the next subfields data.

## Returns

The subfield's numeric value (or zero if it isn't numeric).

## See also

[ExtractFloatData\(\)](#), [ExtractStringData\(\)](#)

## 4.5.3.5 ExtractStringData()

```
const char * DDFSubfieldDefn::ExtractStringData (
    const char * pachSourceData,
    int nMaxBytes,
    int * pnConsumedBytes )
```

Extract a zero terminated string containing the data for this subfield. Given a pointer to the data for this subfield (from within a [DDFRecord](#)) this method will return the data for this subfield. The number of bytes consumed as part of this field can also be fetched. This number may be one longer than the string length if there is a terminator character used.

This function will return the raw binary data of a subfield for types other than DDFString, including data past zero chars. This is the standard way of extracting DDFBinaryString subfields for instance.

## Parameters

<i>pachSourceData</i>	The pointer to the raw data for this field. This may have come from <a href="#">DDFRecord::GetData()</a> , taking into account skip factors over previous subfields data.
<i>nMaxBytes</i>	The maximum number of bytes that are accessible after pachSourceData.
<i>pnConsumedBytes</i>	Pointer to an integer into which the number of bytes consumed by this field should be written. May be NULL to ignore. This is used as a skip factor to increment pachSourceData to point to the next subfields data.

## Returns

A pointer to a buffer containing the data for this field. The returned pointer is to an internal buffer which is invalidated on the next [ExtractStringData\(\)](#) call on this [DDFSubfieldDefn\(\)](#). It should not be freed by the application.

See also

[ExtractIntData\(\)](#), [ExtractFloatData\(\)](#)

#### 4.5.3.6 FormatFloatValue()

```
int DDSubfieldDefn::FormatFloatValue (
    char * pachData,
    int nBytesAvailable,
    int * pnBytesUsed,
    double dfNewValue ) const
```

Format float subfield value.

Returns a buffer with the passed in float value reformatted in a way suitable for storage in a [DDFField](#) for this subfield.

#### 4.5.3.7 FormatIntValue()

```
int DDSubfieldDefn::FormatIntValue (
    char * pachData,
    int nBytesAvailable,
    int * pnBytesUsed,
    int nNewValue ) const
```

Format int subfield value.

Returns a buffer with the passed in int value reformatted in a way suitable for storage in a [DDFField](#) for this subfield.

#### 4.5.3.8 FormatStringValue()

```
int DDSubfieldDefn::FormatStringValue (
    char * pachData,
    int nBytesAvailable,
    int * pnBytesUsed,
    const char * pszValue,
    int nValueLength = -1 ) const
```

Format string subfield value.

Returns a buffer with the passed in string value reformatted in a way suitable for storage in a [DDFField](#) for this subfield.

#### 4.5.3.9 GetDataLength()

```
int DDSubfieldDefn::GetDataLength (
    const char * pachSourceData,
    int nMaxBytes,
    int * pnConsumedBytes )
```

Scan for the end of variable length data. Given a pointer to the data for this subfield (from within a [DDFRecord](#)) this method will return the number of bytes which are data for this subfield. The number of bytes consumed as part of this field can also be fetched. This number may be one longer than the length if there is a terminator character used.

This method is mainly for internal use, or for applications which want the raw binary data to interpret themselves. Otherwise use one of [ExtractStringData\(\)](#), [ExtractIntData\(\)](#) or [ExtractFloatData\(\)](#).

## Parameters

<i>pachSourceData</i>	The pointer to the raw data for this field. This may have come from <a href="#">DDFRecord::GetData()</a> , taking into account skip factors over previous subfields data.
<i>nMaxBytes</i>	The maximum number of bytes that are accessible after pachSourceData.
<i>pnConsumedBytes</i>	Pointer to an integer into which the number of bytes consumed by this field should be written. May be NULL to ignore.

## Returns

The number of bytes at pachSourceData which are actual data for this record (not including unit, or field terminator).

## 4.5.3.10 GetDefaultValue()

```
int DDFSubfieldDefn::GetDefaultValue (
    char * pachData,
    int nBytesAvailable,
    int * pnBytesUsed ) const
```

Get default data.

Returns the default subfield data contents for this subfield definition. For variable length numbers this will normally be "0<unit-terminator>". For variable length strings it will be "<unit-terminator>". For fixed length numbers it is zero filled. For fixed length strings it is space filled. For binary numbers it is binary zero filled.

## Parameters

<i>pachData</i>	the buffer into which the returned default will be placed. May be NULL if just querying default size.
<i>nBytesAvailable</i>	the size of pachData in bytes.
<i>pnBytesUsed</i>	will receive the size of the subfield default data in bytes.

## Returns

TRUE on success or FALSE on failure or if the passed buffer is too small to hold the default.

## 4.5.3.11 GetFormat()

```
const char* DDFSubfieldDefn::GetFormat ( ) const [inline]
```

Get pointer to subfield format string



#### 4.5.3.12 GetName()

```
const char* DDFSubfieldDefn::GetName ( ) const [inline]
```

Get pointer to subfield name.

#### 4.5.3.13 GetType()

```
DDFDataType DDFSubfieldDefn::GetType ( ) const [inline]
```

Get the general type of the subfield. This can be used to determine which of [ExtractFloatData\(\)](#), [ExtractIntData\(\)](#) or [ExtractStringData\(\)](#) should be used.

#### Returns

The subfield type. One of DDFInt, DDFFloat, DDFString or DDFBinaryString.

#### 4.5.3.14 GetWidth()

```
int DDFSubfieldDefn::GetWidth ( ) const [inline]
```

Get the subfield width (zero for variable).

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

- iso8211.h
- ddsubfielddefn.cpp



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