Intel Hex Encoder/Decoder Class

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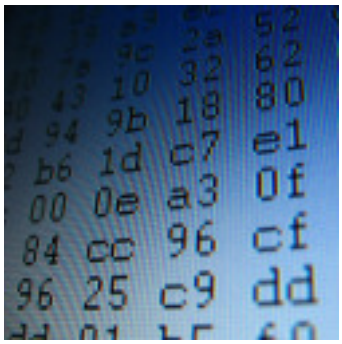
Contents

Chapter 1

Main Page



1.1 Introduction

The Intel HEX File class module is designed to encode, decode and manipulate the content of Intel HEX format files commonly generated by most toolchains for embedded processors and microcontrollers.

It uses standard C++ streams to decode files and store them in memory, and encode data stored in memory back into an Intel HEX format file. Once the file content is in memory, the content can then be manipulated using the available API.

With this class it is possible to create tools that can compare Intel HEX files, fill empty space with desired values, splice two or more files together to name a few possibilities.

1.2 Contact Information

For more information and the latest release, please visit this projects home page at `http://codinghead.github.com/Intel-HEX-Class` To participate in the project or for other enquiries, please contact Stuart Cording at `codinghead@gmail.com`

1.3 Licensing Information

1.4 Image Information

Image chosen for this project comes from 'Henkster'. Original image is from http://www.sxc.hu/photo/504350 on stock.xchng.

Author

Stuart Cording aka CODINGHEAD

Note

No notes to date (19th Jan 2012)

Chapter 2

Class Index

2.1 Class List

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

Chapter 3

File Index

3.1 File List

Here is a list of all files with brief descriptions:

Chapter 4

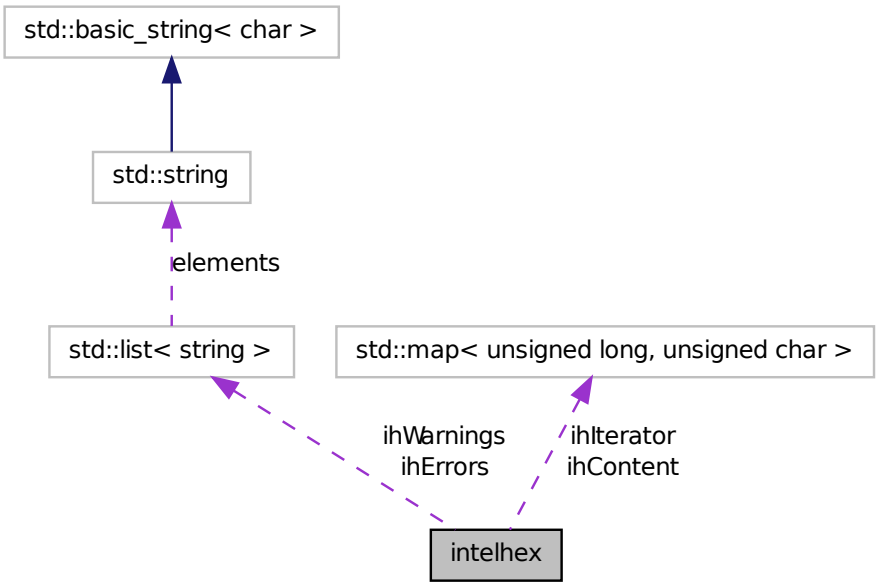
Class Documentation

4.1 intelhex Class Reference

Class to decode, encode and manipulate Intel HEX format files.

`#include <intelhexclass.h>`

Collaboration diagram for intelhex:



Public Member Functions

- intelhex ()

intelhex Class Constructor.

- ~intelhex ()

  intelhex Class Deconstructor.

- intelhex (const intelhex &ihSource)

  intelhex Class Copy Constructor.

- intelhex & operator= (const intelhex &ihSource)

  intelhex Class Assignment Operator.

- void begin ()

  Moves the address pointer to the first available address.

- void end ()

  Moves the address pointer to the last available address.

- void jumpTo (unsigned long address)

  Moves the address pointer to the desired address.

- unsigned long currentAddress ()

  Returns the current segment base address.

- bool startAddress (unsigned long *address)

  Returns the lowest address currently available.

- bool endAddress (unsigned long *address)

  Returns the highest address currently available.

- bool getData (unsigned char *data)
- bool getData (unsigned char *data, unsigned long address)
- bool insertData (unsigned char data)

  Inserts desired byte at the current address pointer.

- bool insertData (unsigned char data, unsigned long address)
- void overwriteData (unsigned char data)
- void overwriteData (unsigned char data, unsigned long address)
- bool blankFill (unsigned char data)
- bool blankFill (unsigned char *const data, unsigned long sizeOfData)
- void blankFill (unsigned char *const data, unsigned long sizeOfData, unsigned long endAddress)
- bool blankFillRandom ()
- void blankFillRandom (unsigned long endAddress)
- bool blankFillAddressLowByte ()
- void blankFillAddressLowByte (unsigned long endAddress)
- unsigned long getNoWarnings ()

  Returns number of unread warning messages.

- unsigned long getNoErrors ()

  Returns number of unread error messages.

- bool popNextWarning (string &warning)

  Pop next warning message from the list of warnings.

- bool popNextError (string &error)

  Pop next error message from the list of errors.

- bool getStartSegmentAddress (unsigned short *ipRegister, unsigned short *csRegister)

  Returns segment start address for the IP and ES registers.

- bool getStartLinearAddress (unsigned long *eipRegister)

  Returns segment linear address for the EIP register.

- void setStartSegmentAddress (unsigned short ipRegister, unsigned short csRegister)

  Sets the segment start address for the IP and CS registers.

- void setStartLinearAddress (unsigned long eipRegister)

  Sets the segment start address for the EIP register.

- void segmentAddressingOn ()

  Turns on segment addressing mode during encoding.

- void linearAddressingOn ()

  Turns on linear addressing mode during encoding.

- void verboseOn ()

  Turns on textual output to cout during decoding.

- void verboseOff ()

  Turns off textual output to cout during decoding.

Private Member Functions

- unsigned char stringToHex (string value)
- string ulToHexString (unsigned long value)
- string ucToHexString (unsigned char value)

  Converts an unsigned char to a string in HEX format.

- string ulToString (unsigned long value)

  Converts an unsigned long to a string in DEC format.

- void decodeDataRecord (unsigned char recordLength, unsigned long loadOffset, string::const_-iterator data)

  Decodes the data content of a data record.

- void addWarning (string warningMessage)

  Add a warning message to the warning message list.

- void addError (string errorMessage)

  Add an error message to the error message list.

Private Attributes

- map< unsigned long, unsigned char > ihContent

  Container for decoded Intel HEX content.

- map< unsigned long, unsigned char >::iterator ihIterator

  Iterator for the container holding the decoded Intel HEX content.

- pair< map< unsigned long, unsigned char >::iterator, bool > ihReturn

  Pair for the container holding the decoded Intel HEX content.

- unsigned long segmentBaseAddress

  Stores segment base address of Intel HEX file.

- struct {
  unsigned short csRegister
  unsigned short ipRegister
  bool exists
  } startSegmentAddress

  Stores the content of the CS/IP Registers, if used.

- struct {
  unsigned long eipRegister
  bool exists
  } startLinearAddress

  Stores the content of the EIP Register, if used.

- struct {
  list< string > ihWarnings
  unsigned long noOfWarnings
  } msgWarning

  Structure to hold warning messages.

- struct {
  list< string > ihErrors
  unsigned long noOfErrors
  } msgError

  Structure to hold error messages.

- bool foundEof

  Note that EOF record is found.

- bool verbose

  Select verbose mode.

- bool segmentAddressMode

  Select segment address mode.

Friends

- ostream & operator<< (ostream &dataOut, intelhex &ihLocal)

  Output stream overload operator.

- istream & operator>> (istream &dataIn, intelhex &ihLocal)

  Input stream overload operator.

4.1.1 Detailed Description

Class to decode, encode and manipulate Intel HEX format files. The Intel HEX class allows the user to stream in the content of an Intel HEX file so that its content can by analysed more easily than trying to decode the Intel HEX file in a text editor. In conjunction with a suitable application it is possible to create content, analyse content and even compare the content of files with one another.

Definition at line 82 of file intelhexclass.h.

4.1.2 Constructor & Destructor Documentation

4.1.2.1 intelhex::intelhex ( ) [inline]

intelhex Class Constructor.

Important initialisation steps performed here:

- clear segment base address to zero
- clear all x86 start address registers to zero
- note that there are, as yet, no errors or warnings
- note that the EOF record has not yet been found
- set verbode mode to 'false' (default)

Definition at line 371 of file intelhexclass.h.

4.1.2.2 intelhex::~intelhex ( ) [inline]

intelhex Class Deconstructor.

Currently the deconstructor is intentially empty.

Definition at line 398 of file intelhexclass.h.

4.1.2.3 intelhex::intelhex (const intelhex & *ihSource*) [inline]

intelhex Class Copy Constructor.

Currently the copy constructor is intentially empty.

Definition at line 408 of file intelhexclass.h.

4.1.3 Member Function Documentation

4.1.3.1 void intelhex::addError (string *errorMessage*) [private]

Add an error message to the error message list.

Parameters

errorMessage - the text to be added for this error

Definition at line 223 of file intelhexclass.cpp.

4.1.3.2 void intelhex::addWarning (string *warningMessage*) [private]

Add a warning message to the warning message list.

Parameters

warningMessage - the text to be added for this warning

Definition at line 206 of file intelhexclass.cpp.

4.1.3.3 void intelhex::begin ( ) [inline]

Moves the address pointer to the first available address.

The address pointer will be moved to the first available address in memory of the decoded file or of the data the user has inserted into memory for the purpose of encoding into the Intel HEX format.

See also

end()

Note

This function has no effect if no file has been as yet decoded and no data has been inserted into memory.

Definition at line 495 of file intelhexclass.h.

4.1.3.4 bool intelhex::blankFill (unsigned char *data*)

4.1.3.5 bool intelhex::blankFill (unsigned char *const data,* unsigned long *sizeOfData*)

4.1.3.6 void intelhex::blankFill (unsigned char *const data,* unsigned long *sizeOfData,* unsigned long *endAddress*)

4.1.3.7 bool intelhex::blankFillAddressLowByte ( )

4.1.3.8 void intelhex::blankFillAddressLowByte (unsigned long *endAddress*)

4.1.3.9 void intelhex::blankFillRandom (unsigned long *endAddress*)

4.1.3.10 bool intelhex::blankFillRandom ( )

4.1.3.11 unsigned long intelhex::currentAddress ( ) `[inline]`

Returns the current segment base address.

Current address will be returned.

See also

jumpTo()

Return values

Current address being pointed to.

Definition at line 550 of file intelhexclass.h.

4.1.3.12 void intelhex::decodeDataRecord (unsigned char *recordLength,* unsigned long *loadOffset,* string::const_iterator *data*) `[private]`

Decodes the data content of a data record.

Takes the data element of a data record in string format, converts each 2 char element into a single byte and then inserts that byte of data into the ihContent STL map.

See also

encodeDataRecord()

Parameters

recordLength - Number of bytes in this record as extracted from this line in the Intel HEX file

loadOffset - The offset from the segment base address for the first byte in this record

data - The data content of the record in a string

Definition at line 240 of file intelhexclass.cpp.

4.1.3.13 void intelhex::end ( ) `[inline]`

Moves the address pointer to the last available address.

The address pointer will be moved to the last available address in memory of the decoded file or of the data the user has inserted into memory for the purpose of encoding into the Intel HEX format.

See also

begin()

Note

This function has no effect if no file has been as yet decoded and no data has been inserted into memory.

Definition at line 517 of file intelhexclass.h.

4.1.3.14 bool intelhex::endAddress (unsigned long * *address*) [inline]

Returns the highest address currently available.

Returns the last address that appears in the memory if there is data present. If not, no value will be returned.

Parameters

address - variable to hold address requested

Return values

true - address existed and returned value is valid

false - address did not exist and returned valid is not valid

See also

startAddress()

Definition at line 597 of file intelhexclass.h.

4.1.3.15 bool intelhex::getData (unsigned char * *data*, unsigned long *address*)

4.1.3.16 bool intelhex::getData (unsigned char * *data*)

4.1.3.17 unsigned long intelhex::getNoErrors ( ) [inline]

Returns number of unread error messages.

Number of unread error messages will be returned.

See also

popNextWarning(), getNoWarnings(), popNextError()

Definition at line 663 of file intelhexclass.h.

4.1.3.18 unsigned long intelhex::getNoWarnings ( ) [inline]

Returns number of unread warning messages.

Number of unread warning messages will be returned.

See also

popNextWarning(), getNoErrors(), popNextError()

Definition at line 651 of file intelhexclass.h.

4.1.3.19 bool intelhex::getStartLinearAddress (unsigned long * *eipRegister*) [inline]

Returns segment linear address for the EIP register.

If this value exists, they will be returned. If not, the function returns false.

Parameters

eipRegister - variable to store EIP register's value

Return values

true - EIP register has defined value

false - EIP register do not contain value

See also

getStartSegmentAddress(), setStartSegmentAddress(), setStartLinearAddress()

Definition at line 771 of file intelhexclass.h.

4.1.3.20 bool intelhex::getStartSegmentAddress (unsigned short * *ipRegister,* unsigned short * *csRegister*) [inline]

Returns segment start address for the IP and ES registers.

If these values exist, they will be returned. If not, the function returns false.

Parameters

ipRegister - variable to store IP register's value

csRegister - variable to store CS register's value

Return values

true - IP and CS registers have defined values

false - IP and CS registers do not contain values

See also

getStartLinearAddress(), setStartSegmentAddress(), setStartLinearAddress()

Definition at line 745 of file intelhexclass.h.

4.1.3.21 bool intelhex::insertData (unsigned char *data,* unsigned long *address*)

4.1.3.22 bool intelhex::insertData (unsigned char *data*)

Inserts desired byte at the current address pointer.

Inserts byte of data at the current address pointer

Parameters

data - data byte to be inserted

See also

startAddress()

4.1.3.23 void intelhex::jumpTo (unsigned long *address*) [inline]

Moves the address pointer to the desired address.

Address pointer will take on the requested address.

See also

currentAddress()

Parameters

address - Desired new address for the address pointer

Definition at line 536 of file intelhexclass.h.

4.1.3.24 void intelhex::linearAddressingOn ( ) [inline]

Turns on linear addressing mode during encoding.

Uses the Linear Address Record during encoding.

Definition at line 832 of file intelhexclass.h.

4.1.3.25 intelhex& intelhex::operator= (const intelhex & *ihSource*) [inline]

intelhex Class Assignment Operator.

Implements the assignment operator so that the content of the Intel HEX file in memory can be copied to another 'intelhex' variable. You may want to keep a copy of the original data in memory and only manipulate a copy-

Parameters

ihSource - intelhex variable to be assigned to new variable

Return values

pointer to variable to which value is to be assigned

Definition at line 448 of file intelhexclass.h.

4.1.3.26 void intelhex::overwriteData (unsigned char *data*)

4.1.3.27 void intelhex::overwriteData (unsigned char *data,* unsigned long *address*)

4.1.3.28 bool intelhex::popNextError (string & *error*) [inline]

Pop next error message from the list of errors.

Next error message is returned from the list of errors. If there are no more errors in the list, no string will be returned unchanged.

Parameters

error - variable to store error string to be returned

Return values

true - more error messages are available

false - no more error messages are available

See also

getNoWarnings(), getNoErrors(), popNextError()

Definition at line 712 of file intelhexclass.h.

4.1.3.29 bool intelhex::popNextWarning (string & *warning*) [inline]

Pop next warning message from the list of warnings.

Next warning message is returned from the list of warnings. If there are no more warning in the list, the string will be unchanged.

Parameters

warning - variable to store warning string to be returned

Return values

true - more warning messages are available

false - no more warning messages are available

See also

getNoWarnings(), getNoErrors(), popNextError()

Definition at line 681 of file intelhexclass.h.

4.1.3.30 void intelhex::segmentAddressingOn ( ) [inline]

Turns on segment addressing mode during encoding.

Uses the Segment Address Record during encoding.

Definition at line 822 of file intelhexclass.h.

4.1.3.31 void intelhex::setStartLinearAddress (unsigned long *eipRegister*) [inline]

Sets the segment start address for the EIP register.

Allows user to define or redefine the contents of the EIP register

Parameters

eipRegister - desired EIP register value

See also

getStartSegmentAddress(), setStartSegmentAddress(), getStartLinearAddress()

Definition at line 811 of file intelhexclass.h.

4.1.3.32 void intelhex::setStartSegmentAddress (unsigned short *ipRegister,* unsigned short *csRegister*) [inline]

Sets the segment start address for the IP and CS registers.

Allows user to define or redefine the contents of the IP and CS registers

Parameters

ipRegister - desired IP register value

csRegister - desired CS register value

See also

getStartLinearAddress(), getStartSegmentAddress(), setStartLinearAddress()

Definition at line 793 of file intelhexclass.h.

4.1.3.33 bool intelhex::startAddress (unsigned long * *address*) [inline]

Returns the lowest address currently available.

Returns the first address that appears in the memory if there is data present. If not, no value will be returned.

See also

endAddress()

Parameters

address - variable to hold address requested

Return values

true - address existed and returned value is valid

false - address did not exist and returned valid is not valid

Definition at line 569 of file intelhexclass.h.

4.1.3.34 unsigned char intelhex::stringToHex (string *value*) [private]

Definition at line 92 of file intelhexclass.cpp.

4.1.3.35 string intelhex::ucToHexString (unsigned char *value*) [private]

Converts an unsigned char to a string in HEX format.

Takes the received paramter and converts it into its equivalent value represented in ASCII and formatted in hexadecimal. Return value is a 2 character long string, prefaced with '0' where necessary.

Parameters

value - a value between 0x00 and 0xFF

Return values

- 2-character long string

Note

Alpha characters are capitalised.

See also

stringToHex(), ulToHexString(), ulToString()

Definition at line 189 of file intelhexclass.cpp.

4.1.3.36 string intelhex::ulToHexString (unsigned long *value*) [private]

Definition at line 155 of file intelhexclass.cpp.

4.1.3.37 string intelhex::ulToString (unsigned long *value*) [private]

Converts an unsigned long to a string in DEC format.

Takes the received paramter and converts it into its equivalent value represented in ASCII and formatted in decimal. Return value will never be longer than a 48 character long string.

Parameters

value - value to be converted

Return values

- ASCII string representation of value

See also

stringToHex(), ulToHexString(), ucToHexString()

Definition at line 172 of file intelhexclass.cpp.

4.1.3.38 void intelhex::verboseOff ( ) [inline]

Turns off textual output to cout during decoding.

No output to cout during decoding of Intel HEX files.

Definition at line 853 of file intelhexclass.h.

4.1.3.39 void intelhex::verboseOn ( ) [inline]

Turns on textual output to cout during decoding.

Per record single line output to cout during decoding of Intel HEX files.

Definition at line 843 of file intelhexclass.h.

4.1.4 Friends And Related Function Documentation

4.1.4.1 ostream& operator<< (ostream & *dataOut,* intelhex & *ihLocal*) [friend]

Output stream overload operator.

Operator overloaded to encode any data held in memory into the Intel HEX format for storage on disk

See also

operator>>()

Parameters

dataOut - Output stream for to store the decoded file information

ihLocal - Points to this class so that friend function has access to private class members

Return values

- pointer to output stream

Definition at line 814 of file intelhexclass.cpp.

4.1.4.2 istream& operator>> (istream & *dataIn,* intelhex & *ihLocal*) [friend]

Input stream overload operator.

Operator overloaded to decode data streamed in from a file in the Intel HEX format into memory

See also

operator<<()

Parameters

dataIn - Input stream for the encoded file information

ihLocal - Points to this class so that friend function has access to private class members

Return values

- pointer to input stream

Definition at line 304 of file intelhexclass.cpp.

4.1.5 Member Data Documentation

4.1.5.1 unsigned short intelhex::csRegister

Definition at line 170 of file intelhexclass.h.

4.1.5.2 unsigned long intelhex::eipRegister

Definition at line 188 of file intelhexclass.h.

4.1.5.3 bool intelhex::exists

Definition at line 172 of file intelhexclass.h.

4.1.5.4 bool intelhex::foundEof [private]

Note that EOF record is found.

Used to note that the EOF record was found in order to ensure that it doesn't appear twice during encoding.

Definition at line 229 of file intelhexclass.h.

4.1.5.5 map<unsigned long, unsigned char> intelhex::ihContent [private]

Container for decoded Intel HEX content.

STL map holding the addresses found in the Intel HEX file and the associated data byte stored at that address

Definition at line 125 of file intelhexclass.h.

4.1.5.6 list<string> intelhex::ihErrors

Definition at line 219 of file intelhexclass.h.

4.1.5.7 map<unsigned long, unsigned char>::iterator intelhex::ihIterator [private]

Iterator for the container holding the decoded Intel HEX content.

Definition at line 131 of file intelhexclass.h.

4.1.5.8 pair<map<unsigned long, unsigned char>::iterator,bool> intelhex::ihReturn [private]

Pair for the container holding the decoded Intel HEX content.

This is used to acquire the result of an attempt to insert new data into ihContent. Since the ihContent is a map STL, it can't allow data to be assigned to the same address more than once. In this way we can ensure that no address in a file is falsely assigned data more than once.

Definition at line 142 of file intelhexclass.h.

4.1.5.9 list<string> intelhex::ihWarnings

Definition at line 204 of file intelhexclass.h.

4.1.5.10 unsigned short intelhex::ipRegister

Definition at line 171 of file intelhexclass.h.

4.1.5.11 struct { ... } intelhex::msgError [private]

Structure to hold error messages.

Holds error messages generated during encoding/decoding process and number of messages currently present in system

Parameters

ihErrors - list of error messages as strings

noOferrors - no of error messages still present in the list

4.1.5.12 struct { ... } intelhex::msgWarning [private]

Structure to hold warning messages.

Holds warning messages generated during encoding/decoding process and number of messages currently present in system

Parameters

ihWarnings - list of warning messages as strings

noOfWarnings - no of warning messages still present in the list

4.1.5.13 unsigned long intelhex::noOfErrors

Definition at line 220 of file intelhexclass.h.

4.1.5.14 unsigned long intelhex::noOfWarnings

Definition at line 205 of file intelhexclass.h.

4.1.5.15 bool intelhex::segmentAddressMode [private]

Select segment address mode.

If true, use the segment addressing mode when encoding files. otherwise the default linear address mode will be used. Please refer to Intel's Hexadecimal Object File Format Specifiation for further information.

Definition at line 247 of file intelhexclass.h.

4.1.5.16 unsigned long intelhex::segmentBaseAddress [private]

Stores segment base address of Intel HEX file.

The segment base address is a 32-bit address to which the current load offset (as found in a Data Record line of the Intel HEX file) is added to calculate the actual address of the data. The Data Records can only point to a 64kByte address, so the segment base address expands the addressing to 4GB. This variable always holds the last address accessed.

Definition at line 154 of file intelhexclass.h.

4.1.5.17 struct { ... } intelhex::startLinearAddress [private]

Stores the content of the EIP Register, if used.

Used to store the content of the EIP Register for HEX files created for x386 Intel processors. This information is retrieved from the the Start Linear Address Record. The found element defines if this register holds valid data or not.

Parameters

eipRegister - content of the EIP register

exists - defines if a value for the above register has been written (true) or not (false)

4.1.5.18 struct { ... } intelhex::startSegmentAddress [private]

Stores the content of the CS/IP Registers, if used.

Used to store the content of the CS and IS Register for HEX files created for x286 or earlier Intel processors. This information is retrieved from the Start Segment Address Record. The found element defines if these registers hold valid data or not.

Parameters

csRegister - content of the CS register

ipRegister - content of the IP register

exists - defines if values for the above registers have been written (true) or not (false)

4.1.5.19 bool intelhex::verbose [private]

Select verbose mode.

Used during development to display messages as the incoming data stream is decoded

Definition at line 237 of file intelhexclass.h.

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

- intelhexclass.h
- intelhexclass.cpp

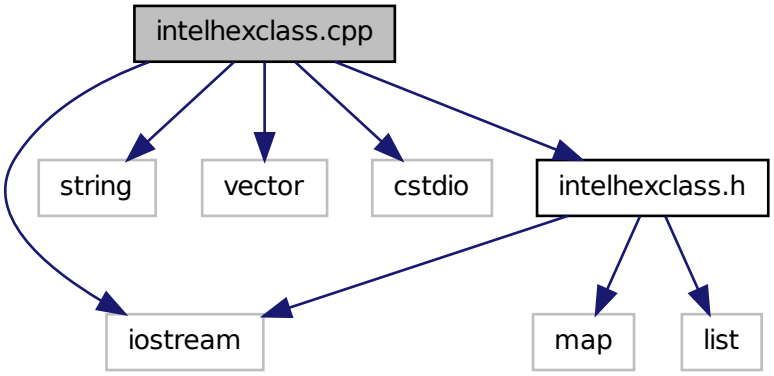
Chapter 5

File Documentation

5.1 intelhexclass.cpp File Reference

```
#include <iostream>
#include <string>
#include <vector>
#include <cstdio>
#include "intelhexclass.h"
```

Include dependency graph for intelhexclass.cpp:



Enumerations

- enum intelhexRecordType {
  DATA_RECORD, END_OF_FILE_RECORD, EXTENDED_SEGMENT_ADDRESS, START_-

SEGMENT_ADDRESS,
EXTENDED_LINEAR_ADDRESS, START_LINEAR_ADDRESS, NO_OF_RECORD_TYPES }

Functions

- istream & operator>> (istream &dataIn, intelhex &ihLocal)
- ostream & operator<< (ostream &dataOut, intelhex &ihLocal)

5.1.1 Detailed Description

Definition in file intelhexclass.cpp.

5.1.2 Enumeration Type Documentation

5.1.2.1 enum intelhexRecordType

Possible record types for Intel HEX file.

List of all possible record types that can be found in an Intel HEX file.

Enumerator:

DATA_RECORD
END_OF_FILE_RECORD
EXTENDED_SEGMENT_ADDRESS
START_SEGMENT_ADDRESS
EXTENDED_LINEAR_ADDRESS
START_LINEAR_ADDRESS
NO_OF_RECORD_TYPES

Definition at line 79 of file intelhexclass.cpp.

5.1.3 Function Documentation

5.1.3.1 ostream& operator<< (ostream & *dataOut,* intelhex & *ihLocal*)

Operator overloaded to encode any data held in memory into the Intel HEX format for storage on disk

See also

operator>>()

Parameters

dataOut - Output stream for to store the decoded file information
ihLocal - Points to this class so that friend function has access to private class members

Return values

- pointer to output stream

Definition at line 814 of file intelhexclass.cpp.

5.1.3.2 istream& operator>> (istream & *dataIn*, intelhex & *ihLocal*)

Operator overloaded to decode data streamed in from a file in the Intel HEX format into memory

See also

operator<<()

Parameters

dataIn - Input stream for the encoded file information

ihLocal - Points to this class so that friend function has access to private class members

Return values

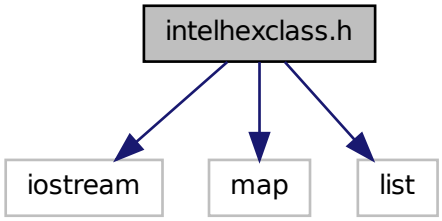
- pointer to input stream

Definition at line 304 of file intelhexclass.cpp.

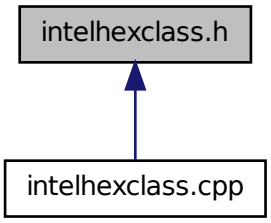
5.2 intelhexclass.h File Reference

```
#include <iostream>
#include <map>
#include <list>
```

Include dependency graph for intelhexclass.h:



This graph shows which files directly or indirectly include this file:



Classes

- class intelhex

  Class to decode, encode and manipulate Intel HEX format files.

5.2.1 Detailed Description

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A class to handle the encoding, decoding and manipulatio of an Intel HEX format file as generated by many tool chains for embedded processors and microcontrollers.

This class is constructed based upon the definition given in the document 'Hexadecimal Object File Format Specification', Revision A, January 6, 1988, © 1998 Intel Corporation.

Note

See the git versioning notes for version information

Definition in file intelhexclass.h.

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